Independent Electricity Market Operator

Ontario Demand Forecast

from January 2002 to June 2003

December 17, 2001

Caution and Disclaimer

The contents of these materials are for discussion and information purposes and are provided "as is" without representation or warranty of any kind, including without limitation, accuracy, completeness or fitness for any particular purpose. The Independent Electricity Market Operator (IMO) assumes no responsibility to you or any third party for the consequences of any errors or omissions. The IMO may revise these materials at any time in its sole discretion without notice to you. Although every effort will be made by the IMO to update these materials to incorporate any such revisions it is up to you to ensure you are using the most recent version.

Table of Contents

1.0 Introduction 1
1.1 Outlook Documents 1
1.2 Demand Forecast Document 1
2.0 Forecasting Process and Assumptions 3
2.1 Forecasting Process 3
2.2 Forecast Drivers 3
3.0 Historical Demand 7
3.1 Historical Energy Demand 7
3.2 Historical Peak Demand 11
3.3 Historical Load Profiles 15
4.0 Demand Forecast 17
4.1 Energy Demand Forecast 17
4.2 Peak Demand Forecast 18
4.3 Comparison of Current Forecast to Previous Forecasts 20

Appendix A - Weather Scenarios 21
Appendix B - Energy Demand Forecast Details 23
Appendix C - Peak Demand Forecast Details 25
Appendix D - Analytical Factors Affecting Demand 29
Appendix E – Ontario's Internal Zones 31

List of Tables

Table 2.1 Ontario Economic Drivers 5
Table 3.1 Ontario Annual Energy and Peak Demand 7
Table 3.2 Ontario Seasonal Energy Demand 8
Table 3.3 Ontario's Hottest Summers and Coldest Winters 9
Table 3.4 Ontario Annual Energy Demand, Actual and Weather Corrected 10
Table 3.5 Ontario Annual Energy Demand and Economic Factors 10
Table 3.6 Historical Peak Dates 12
Table 3.7 Peak Dates' Weather Rankings 13
Table 3.8 Twenty Five Hottest and Coldest Days from 1970-2001 14
Table 3.9 Actual Historical Peak Demand 15
Table 3.10 Weather Corrected Historical Peak Demand 15
Table 4.1 Ontario Monthly Energy Demand, Normal & Extreme Weather 17
Table 4.2 Forecast of Monthly Peak Demand – Normal & Extreme Weather 19
Table B1 Weekly Zonal Energy Forecast, Normal Weather 23
Table C1 Weekly Zonal Coincident Peak Demand Forecast, Normal Weather 25
Table C1 - continued 26
Table C2 Weekly Zonal Non-Coincident Peak Demand Forecast, Normal Weather 27
Table C2 - continued 28
Table D1 Approximate Analytical Factors Affecting Demand 29
Table D1 - continued 30

List of Figures

Figure 3.2 Winter 2001 Average Hourly Load Profile 16
Figure 3.3 Summer 2001 Average Hourly Load Profile 16
Figure 4.1 Monthly System Energy Demand – Normal Weather 18
Figure 4.2 Forecast of Weekly 20-Minute System Peak Demand - Normal & Extreme Weather 19
Figure E1 Ontario's Internal Zone 31

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 1, 2002 to June 30, 2003 and supercedes Section 2 of the report titled "An Assessment of the Adequacy of the Ontario Electricity System from October 2001 to March 2003", dated September 28, 2001.

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. 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 electricity demand is the sum of coincident loads plus the losses on the IMO-controlled grid. Ontario demand does not include loads that are supplied by embedded generation nor those not served by the IMO-controlled grid (e.g. Cornwall Electric). This forecast was based on actual demand, weather and economic data ending August 31, 2001. The forecast horizon of this report is January 2002 through to March 2003.

Section 2.0 describes the process used to forecast electricity demand. Section 3.0 looks at historical demand, Section 4.0 presents the forecast and Appendices A through E 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, or to forecasts.assessments@theIMO.com.

2.0 Forecasting Process and Assumptions

2.1 Forecasting Process

The forecast of Ontario electricity demand described in this document was developed by the IMO utilizing a forecasting system developed in conjunction with Regional Economic Research.

The system utilizes multivariate econometric equations to estimate the relationships between energy and peak demand and a number of analytical factors or drivers. The drivers that the system includes are weather effects, economic data and calendar variables. Using regression techniques, the model estimates the relationship between these factors and energy and peak demand. Several calibration routines within the system ensure the integrity of the forecast with respect to energy and peak demand, and regional and system wide projections.

The forecasting system produces the following output:

- a forecast of the 20-minute east and west peak demand, as well as the coincident system peak demand (under Normal, Extreme and Mild weather conditions);
- hourly energy demand by region (under Normal, Extreme and Mild weather conditions);
- load forecast uncertainty presented in MW but representing one standard deviation in the underlying weather elements.

For the purpose of analysis several weather scenarios were generated. The Base Case demand forecast is generated using the Median economic forecast in conjunction with Normal weather. An explanation of Normal weather and the other weather scenarios is contained in Appendix A Weather Scenarios.

Since the last forecast, the model has been re-estimated based on data through the end of August 2001. As such, the model coefficients have been recalculated to reflect the most recent data, in particular the all-time peaks of early August. In addition, the structure of the forecasting system has been modified to address several issues. Cloud and wind have been separated into seasonal components. Adjustments to the system were made to correct for the tendency to over-forecast winter peaks and under-forecast summer peaks. Finally, the weather scenarios were updated and the method of deriving the Extreme weather scenario was changed. The weather underpinning the forecast is described further in Appendix A Weather Scenarios.

2.2 Forecast Drivers

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 D Analytical Factors Affecting Demand summarizes the relative impacts on energy and peak demand for the driver variables.

Calendar variables include the day of the week and holidays, both of which impact energy consumption. Generally, electricity consumption is higher during the week than on weekends and there is a pattern determined by the specific day of the workweek. Holidays act much like weekends, in that energy consumption is lower on holidays. The reason for this relationship is that industrial load is lower on holidays and weekends as fewer facilities are operating.

Hours of daylight are key in shaping peak demand. For example, after the sun has set, electricity demand is higher due to the need for electric lighting. This is particularly important in winter when sunset coincides with increases in load associated with cooking load and return to home activities. Hours of daylight are included with calendar variables since forecasting both is very straightforward.

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 acute weather conditions usually underpin the seasonal peaks.

For purposes of the demand forecast, weather is not forecasted but "Normal" weather is utilized, based on historical data. An Extreme weather scenario was also produced composed of cold winters and hot summers. A more detailed explanation of how the Extreme and Normal weather scenarios are generated are contained in Appendix A Weather Scenarios. That section also discusses the relationship between the weather scenarios and the Load Forecast Uncertainty (LFU).

It should be recognized that for resource adequacy assessments, the "Normal" weather forecast is used in conjunction with a measure of LFU to consider a full range of peak demands, that can occur with various weather conditions with varying probability of occurrence.

Economic conditions contribute to the growth in both energy and peak 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.

The unfortunate events of September 11, 2001 have led to a significant shift in the economic expectations with respect to the previous economic outlook. Industry experts were already predicting an economic slowdown in 2002 and although the fundamental economics have not changed drastically since that point, the collective psyche of North America has. Consumption represents nearly two-thirds of the economy and is highly dependent on consumer confidence, which has oscillated between fear and the need to carry on with ones life. To date the impacts have been mixed as well, with some industries hit hard while others have fared better. For example, tourism has obviously been hit hard while auto sales, on dealer incentives, have remained buoyant.

The uncertainty of the times does lead to a mindset or retrenchment, both at the personal and corporate level. However, the U.S. Federal Reserve rate cuts, increased government spending and the patriotic need to carry on, is expected to mitigate this tendency. Despite the historic impacts, the economic impacts should be short lived and the U.S. economy should return to the path it was on prior to September.

A slowing U.S. economy in 2002, will impact Ontario harder than most of the other provinces. As such, the expectation for Ontario is a weak 2002 and an improving 2003 in line with the U.S. projections. Employment growth for 2002 is expected to be the lowest since 1993. Likewise, housing starts are expected to drop, as consumers defer large purchases until they feel more economically secure. For the forecast period, Ontario is expected to see housing starts of 65,500 in 2002, before rebounding to 68,600 in 2003. Employment is projected to grow by 0.5% in 2002, strengthening to 2.5% in 2003. Table 2.1 presents these key Ontario economic drivers.

Table 2.1 Ontario Economic Drivers

Year	Ontario Employment		Ontario Housing Starts	
	Thousands	Annual Growth (%)	Thousands	Annual Growth (%)
1995	5,128	2.02	31.9	-23.26
1996	5,175	0.92	39.5	23.89
1997	5,298	2.37	50.0	26.47
1998	5,476	3.35	50.1	0.23
1999	5,672	3.59	62.9	25.63
2000	5,856	3.23	67.4	7.15
2001 (f)	5,942	1.48	69.8	3.59
2002 (f)	5,972	0.51	65.4	-6.39
2003 (f)	6,122	2.50	68.6	4.93

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 as a 20-minute average. One can look at the daily, weekly, monthly, seasonal or annual peak.

Table 3.1 shows the actual annual energy and peak demand, on a calendar basis, for the period 1984-2001.

Table 3.1 Ontario Annual Energy and Peak Demand

Calendar Year	Annual Demand			
	Actual Energy (TWh)	Annual Growth (%)	Actual Peak (MW)	Annual Growth (%)
1984	112.29		18,896	
1985	116.05	3.34%	20,473	8.35%
1986	120.57	3.90%	20,668	0.95%
1987	126.46	4.88%	20,524	-0.70%
1988	134.39	6.28%	23,012	12.12%
1989	140.77	4.74%	23,630	2.69%
1990	136.74	-2.86%	22,311	-5.58%
1991	136.97	0.16%	23,212	4.04%
1992	134.38	-1.89%	23,540	1.41%
1993	133.48	-0.67%	22,087	-6.17%
1994	134.87	1.05%	24,007	8.69%
1995	137.04	1.60%	22,855	-4.80%
1996	137.42	0.28%	22,321	-2.34%
1997	138.37	0.69%	22,197	-0.56%
1998	139.93	1.13%	*22,443*	1.11%
1999	144.09	2.97%	*23,435*	4.42%
2000	146.95	1.98%	23,428	-0.03%
2001			*25,269*	7.86%

Notes to Table 3.1:
Italics and shading indicate a summer peak.

3.1 Historical Energy Demand

Actual primary energy demand has averaged annual growth of 1.7% over the historic period of 1984 to 2000. 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. As well, throughout the course of the year, the variability of weather will mean that highs and lows have a tendency 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.

As stated above, calendar impacts have a negligible impact on annual energy demand. Calendar variables would have a much larger impact when comparing seasons, months and weeks.

Table 3.2 displays the actual and weather corrected energy demand by season over the past five years. The first part of the table shows the demand by season; the second part the share of the seasonal year; the third part the average daily energy demand and the fourth the growth in average daily energy demand. Not surprisingly, winter accounts for nearly half of the total energy demand since winter accounts for nearly 42% of the seasonal year. However, the Average Daily Energy Demand does indicate that although the winter season still has largest energy demand, the difference between summer and winter is closing.

Table 3.2 Ontario Seasonal Energy Demand

Seasonal Energy Demand										
	Actual Energy Demand					Weather Corrected Energy Demand				
Seasonal Year	Winter (TWh)	Spring (TWh)	Summer (TWh)	Fall (TWh)	Total (TWh)	Winter (TWh)	Spring (TWh)	Summer (TWh)	Fall (TWh)	Total (TWh)
1996	62.01	21.47	32.92	21.54	137.42	61.28	21.27	32.89	21.38	137.42
1997	60.95	21.65	33.65	21.83	138.37	60.94	21.49	33.67	21.69	138.37
1998	60.53	21.79	35.71	22.18	139.93	61.14	21.72	35.25	22.21	139.93
1999	61.41	23.35	37.07	22.98	144.09	62.11	23.53	36.27	22.77	144.09
2000	62.94	22.89	36.46	23.32	146.95	63.70	22.83	36.51	23.24	146.95
2001	64.70	22.59	38.06			64.53	22.55	37.37		
Seasonal Share	Winter Share (%)	Spring Share (%)	Summer Share (%)	Fall Share (%)	Total (%)	Winter Share (%)	Spring Share (%)	Summer Share (%)	Fall Share (%)	Total (%)
1996	45%	16%	24%	16%	100%	44%	15%	24%	15%	100%
1997	44%	16%	24%	16%	100%	44%	16%	24%	16%	100%
1998	43%	16%	25%	16%	100%	44%	15%	25%	16%	100%
1999	42%	16%	26%	16%	100%	43%	16%	25%	16%	100%
2000	43%	16%	25%	16%	100%	44%	16%	25%	16%	100%
Seasonal	Average Daily Energy Demand (GWh)					Average Daily Energy Demand (GWh)				
Year	Winter	Spring	Summer	Fall	Total	Winter	Spring	Summer	Fall	Total
1996	408	352	358	353	377	403	349	358	350	374
1997	404	355	366	358	378	404	352	366	356	378
1998	401	357	388	364	384	405	356	383	364	384
1999	407	383	403	377	397	411	386	394	373	396
2000	414	375	396	382	398	419	374	397	381	400
2001	428	370	414			425	370	406		
Seasonal	Growth in Average Daily Energy Demand					Growth in Average Daily Energy Demand				
Year	Winter	Spring	Summer	Fall	Total	Winter	Spring	Summer	Fall	Total
1997	-1.1%	0.9%	2.2%	1.3%	0.4%	0.1%	1.0%	2.4%	1.5%	1.0%
1998	-0.7%	0.6%	6.1%	1.6%	1.5%	0.3%	1.1%	4.7%	2.4%	1.8%
1999	1.5%	7.2%	3.8%	3.6%	3.3%	1.6%	8.3%	2.9%	2.5%	3.1%
2000	1.8%	-2.0%	-1.6%	1.5%	0.3%	1.9%	-3.0%	0.7%	2.1%	0.8%
2001	3.5%	-1.3%	4.4%			1.3%	-1.2%	2.4%		
Avg	1.0%	1.0%	2.9%	2.0%	1.4%	1.0%	1.2%	2.6%	2.1%	1.7%

Notes to Table 3.2:

The winter season is from November 1st through to March 31st. 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.

Table 3.3 shows the hottest summers and coldest winters of the last thirty-two years (1970-2001). This ranking is based on the cumulative temperature and humidity index. This helps put the Average Daily Energy Demand values from Table 3.2 into perspective and enables comparison with the weather corrected values in the same table. The increases in the Average Daily Energy Demand for the winter of 1996 and 2000 can be attributed to the cold weather. The same applies to the summer demand and hot weather of 1998 and 1999. One of the key impacts of the hot summers experienced in recent years is to increase the penetration of space cooling or air conditioning. Mitigating some of the increase in cooling-sensitive loads is the on-going replacement of older, inefficient air conditioning units with newer more efficient units. The overall impact of these hotter summers and increased penetration of air conditioning has been to make summer peak demand more sensitive to hot weather.

Table 3.3 Ontario's Hottest Summers and Coldest Winters

Rank	Hottest Summers	Coldest Winters
1	1995	1996
2	1999	1984
3	1973	1976
4	1983	1980
5	2001	1992
6	1991	1988
7	1988	2000
8	1998	1977
9	1987	1994
10	1975	1978

Table 3.4 shows the weather corrected annual energy demand. The actual energy demand is adjusted to reflect the Normal weather that underpins the forecast. The correction for each of the years is less than 1%, showing 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 5 of the 6 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 affects of weather, which occur with various frequencies. See Appendix A Weather Scenarios for further discussion on weather.

Table 3.4 Ontario Annual Energy Demand, Actual and Weather Corrected

Calendar Year	Annual Energy Demand			
	Actual Energy (TWh)	Annual Growth (%)	Weather Corrected Energy (TWh)	Annual Growth (%)
1995	137.04	1.60%	136.11	
1996	137.42	0.28%	136.82	0.52%
1997	138.37	0.69%	138.06	0.90%
1998	139.93	1.13%	140.40	1.70%
1999	144.09	2.97%	143.56	2.25%
2000	146.95	1.98%	147.05	2.43%

Table 3.5 shows the growth in annual energy demand and the economic drivers. The table illustrates the relationship, particularly with respect to employment, between the drivers and annual energy demand.

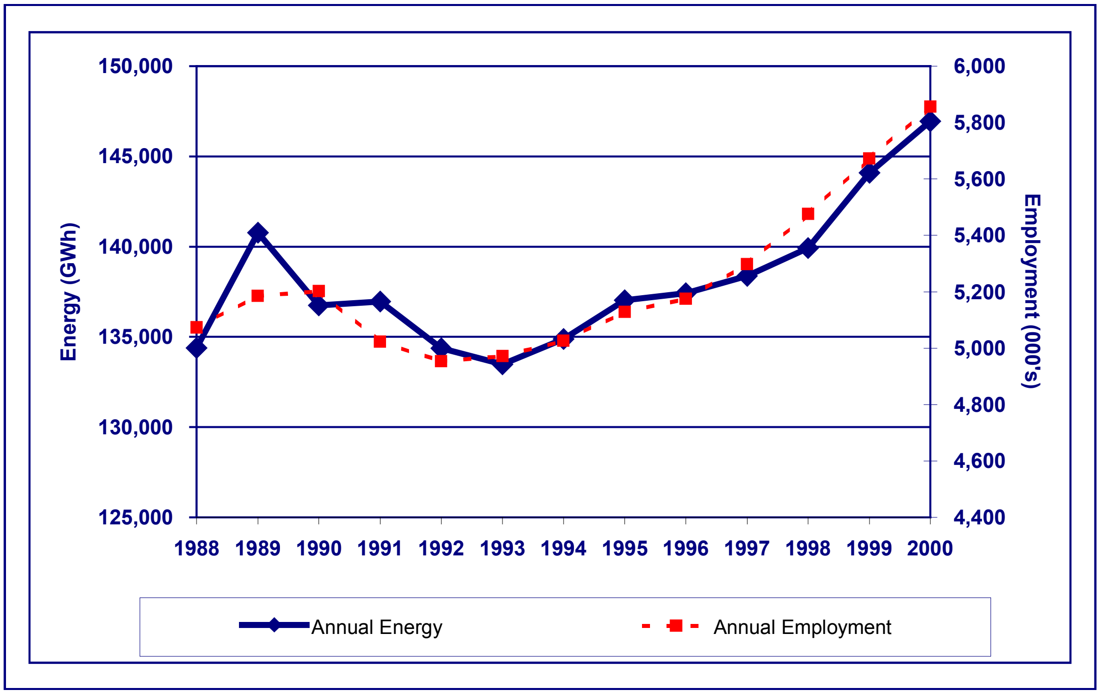
Appendix D Analytical Factors Affecting Demand contains analytical factors showing the impacts of changes to the drivers on energy demand.

Table 3.5 Ontario Annual Energy Demand and Economic Factors

Calendar Year	Annual Energy Demand and Economic Factors		
	Actual Energy Demand Growth (%)	Employment Growth (%)	Housing Stock Growth (%)
1990	-2.86%	0.33%	2.23%
1991	0.16%	-3.46%	1.20%
1992	-1.89%	-1.36%	1.32%
1993	-0.67%	0.37%	1.11%
1994	1.05%	1.09%	1.05%
1995	1.60%	2.02%	0.95%
1996	0.28%	0.92%	0.88%
1997	0.69%	2.37%	1.15%
1998	1.13%	3.35%	1.26%
1999	2.97%	3.59%	1.37%
2000	1.98%	3.23%	1.60%

Figure 3.1 graphically shows employment and annual energy demand. It is easy to see that over the course of recent history the level of economic activity has heavily influenced energy demand.

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, and 2001, 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 201 monthly peaks have occurred on a weekend and none of those were summer or winter peaks. Table 3.6 shows the actual summer and winter peaks dates for the time frame 1985 to 2001.

Table 3.6 Historical Peak Dates

Seasonal Year	Peak Demand			
	Winter Peak Date	Day of Week	Summer Peak Date	Day of Week
1985	21-Jan-85	Mon	14-Aug-85	Wed
1986	27-Jan-86	Mon	7-Jul-86	Mon
1987	8-Dec-86	Mon	17-Aug-87	Mon
1988	14-Jan-88	Thu	4-Aug-88	Thu
1989	4-Jan-89	Wed	10-Jul-89	Mon
1990	13-Dec-89	Wed	4-Jul-90	Wed
1991	21-Jan-91	Mon	29-Aug-91	Thu
1992	16-Jan-92	Thu	26-Aug-92	Wed
1993	1-Feb-93	Mon	27-Aug-93	Fri
1994	19-Jan-94	Wed	17-Jun-94	Fri
1995	6-Feb-95	Mon	15-Aug-95	Tue
1996	11-Dec-95	Mon	7-Aug-96	Wed
1997	17-Jan-97	Fri	14-Jul-97	Mon
1998	14-Jan-98	Wed	15-Jul-98	Wed
1999	13-Jan-99	Wed	5-Jul-99	Mon
2000	17-Jan-00	Mon	31-Aug-00	Thu
2001	12-Dec-00	Tue	8-Aug-01	Wed

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. Table 3.7 ranks the weather for each of the peak dates in Table 3.6. A value of one would indicate that the weather for that day was either the coldest or hottest of that year, based on the Temperature Humidity Index (THI). Since peak values are determined by both weather and calendar variables, a second column for both the summer and winter peaks dates shows the ranking again after eliminating holiday and weekend observations.

Table 3.7 Peak Dates' Weather Rankings

Seasonal Year	Peak Demand			
	Winter Peak Date Seasonal Rank	Winter Peak Date Seasonal Rank (Excl. Weekends & Holidays)	Summer Peak Date Seasonal Rank	Summer Peak Date Seasonal Rank (Excl. Weekends & Holidays)
1990	9	7	1	1
1991	1	1	10	8
1992	1	1	2	2
1993	2	1	2	2
1994	2	1	2	1
1995	2	1	3	3
1996	18	13	2	1
1997	2	1	1	1
1998	2	1	2	2
1999	2	2	1	1
2000	1	1	1	1
2001	20	11	3	3

In many cases where the peak date is not the same as the day with the most severe weather, it is not unusual for the weather and peak days to be one after the other. In the instance of the 2001 summer peak, the peak date was August 8th, while both the 7th and 9th had more severe weather.

From Table 3.7 we can see the importance of calendar and weather variables as they impact the peak demand. 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. Table 3.8 shows the twenty-five coldest and hottest days, based on the THI, experienced over the time frame 1970-2001.

Combining the information in Table 3.8 with that of Table 3.3 we can see the difference between seasonal and episodic impacts. Here we can see that although the summer of 1995 had only two of the twenty-five hottest days, it still ranks as the hottest summer over the past 32 years. Conversely, the summer of 1988 had seven days in the top twenty-five extreme weather days, yet ranks as only the 7th hottest summer out of 32. Similarly, the winter of 1996 ranks as the coldest, yet does not have a single day in the top twenty-five coldest and the winter of 1994 has four days in the top twenty-five yet ranks as the 9th coldest out of 32 winters.

Table 3.8 Twenty Five Hottest and Coldest Days from 1970-2001

Rank	Extreme Summer Days	Extreme Winter Days
1	14-Jul-95	15-Jan-94
2	5-Jul-99	17-Jan-82
3	9-Aug-01	19-Jan-94
4	7-Aug-01	3-Jan-81
5	4-Jul-99	17-Feb-79
6	8-Jul-88	11-Jan-81
7	18-Jun-94	16-Jan-94
8	20-Jul-77	4-Jan-81
9	8-Aug-01	23-Jan-76
10	12-Jul-87	18-Jan-97
11	28-Aug-73	18-Jan-76
12	3-Aug-88	11-Feb-79
13	20-Jul-91	10-Jan-82
14	1-Aug-75	21-Jan-84
15	24-Jul-01	22-Dec-89
16	19-Jun-95	26-Jan-94
17	13-Aug-88	21-Jan-70
18	17-Jun-94	26-Dec-93
19	31-Jul-75	16-Jan-72
20	4-Aug-88	22-Jan-76
21	30-Jul-99	14-Jan-99
22	5-Aug-88	25-Dec-80
23	20-Jul-78	5-Feb-95
24	14-Aug-88	17-Jan-00
25	9-Jul-88	17-Jan-97

In looking at the dates in Table 3.8, peak demand values for these days would be in excess of those predicted using the Normal weather since these weather conditions represent a significant deviation from the expected range of values. These severe weather episodes are captured, however, by the LFU and the Extreme weather scenario. Using the LFU allows a probability to be assigned to these weather events.

Table 3.9 shows the actual summer and winter peaks from 1990 through to 2001. 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 3.9 Actual Historical Peak Demand

Seasonal Year	Winter Peak (MW)	Summer Peak (MW)
1990	23,630	20,453
1991	23,212	21,150
1992	23,540	19,976
1993	22,087	20,937
1994	24,007	20,923
1995	22,855	21,770
1996	22,823	21,428
1997	22,197	21,667
1998	21,575	22,443
1999	23,308	23,435
2000	23,428	23,222
2001	23,291	25,269

Notes to Table 3.9:

The winter season is from November through till 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.

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 3.10. 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 3.10 Weather Corrected Historical Peak Demand

Seasonal Year	Winter Peak (MW)	Summer Peak (MW)	Winter Peak Correction Factor (MW)	Summer Peak Correction Factor (MW)
1995	22,351	20,841	-504	-929
1996	22,256	20,463	-567	-965
1997	21,744	20,702	-453	-965
1998	22,050	21,700	475	-743
1999	22,453	21,776	-855	-1,659
2000	22,690	22,221	-738	-1,001
2001	23,294	22,632	3	-2,637

3.3 Historical Load Profiles

The relationship between energy and peak demand can be depicted by load profiles or load shapes. The following figures depict the average hourly demand for the summer and winter of 2001. The graphs show load shapes for both weekdays and non-weekdays (weekends and holidays). Please note that all hours are in Eastern Standard Time.

Figure 3.2 Winter 2001 Average Hourly Load Profile

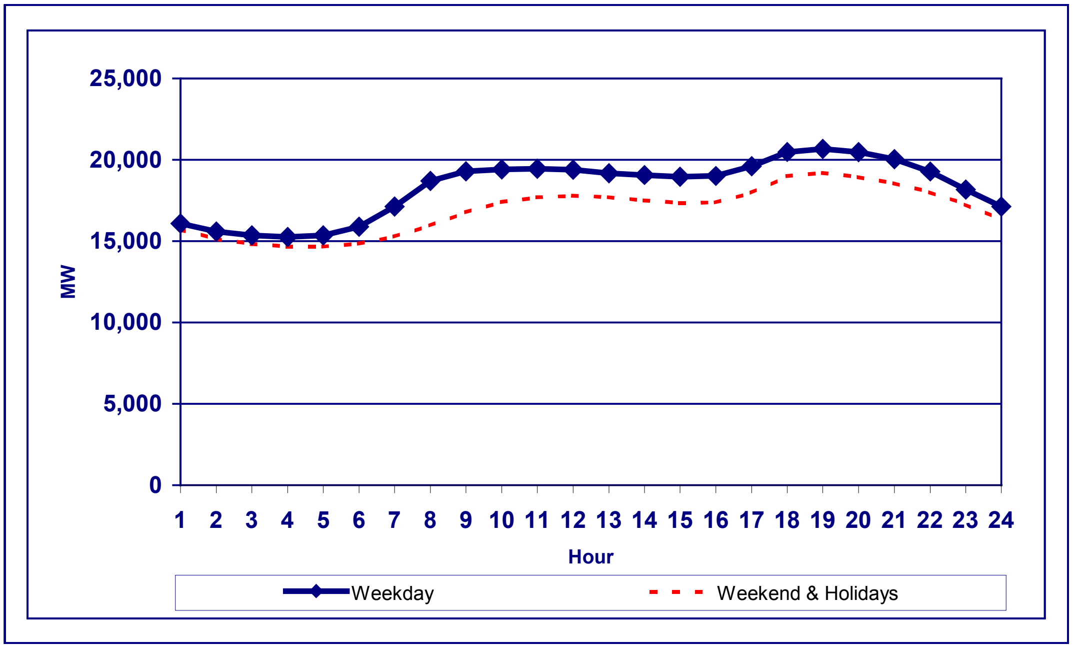
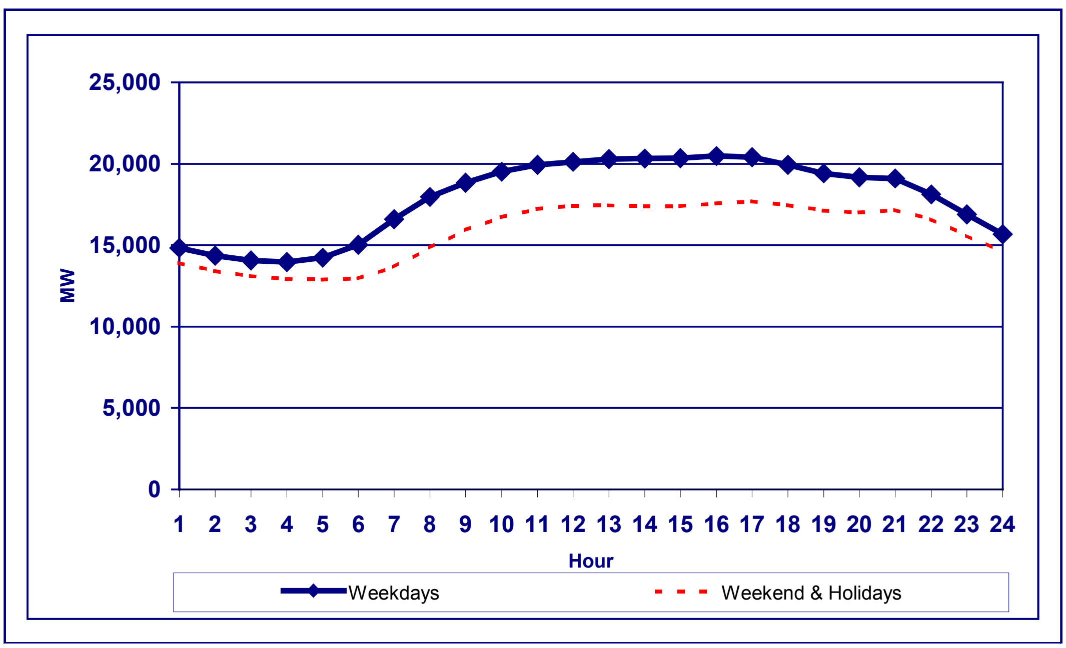


Figure 3.3 Summer 2001 Average Hourly Load Profile



4.0 Demand Forecast

The demand forecast is split into two separate parts, the energy demand forecast and the 20-minute peak demand forecast. In this section, the discussion focuses on the system, more detailed information on the individual zones can be found in Appendices B and C.

4.1 Energy Demand Forecast

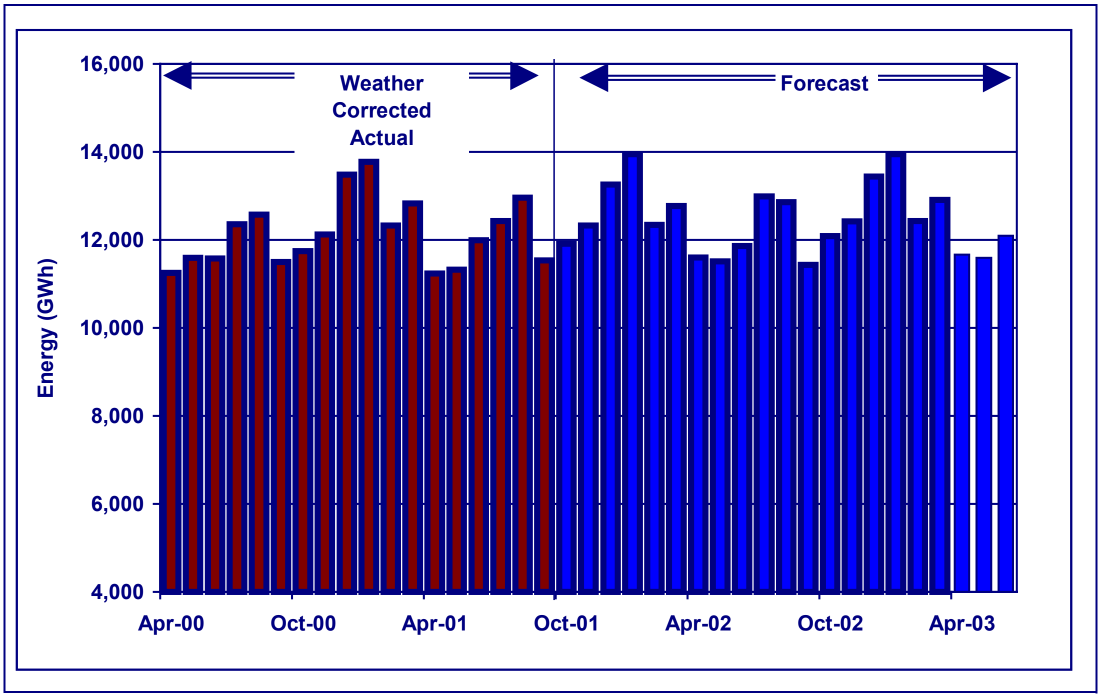
The predicted monthly energy demand for the system for the time frame January 2002 through to June 2003 is contained in Table 4.1. This table contains the forecast of energy demand under both the Normal and Extreme weather scenarios. For a more detailed discussion of the weather scenarios, refer to Appendix A Weather Scenarios. Figure 4.1 shows the monthly energy demand. Energy demand is expected to exhibit average annual growth of 0.9% in 2002 and 1.0% in 2003. Growth in demand is driven by changes in economic activity, the number of end-users and the penetration of electric powered devices.

Although this section of the report deals with summary details at the system level, the demand forecast is produced on an hourly basis for all nine zones within the system. A forecast of zonal energy demand by week is provided in Appendix B and a map of the zones is depicted in Appendix E. 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 (GWh)	Energy Demand - Extreme Weather (GWh)
Jan-02	13,949	15,196
Feb-02	12,344	13,561
Mar-02	12,769	13,885
Apr-02	11,595	12,265
May-02	11,512	12,435
Jun-02	11,857	13,115
Jul-02	12,987	14,250
Aug-02	12,859	14,234
Sep-02	11,427	12,365
Oct-02	12,080	12,600
Nov-02	12,417	13,290
Dec-02	13,440	14,732
Jan-03	13,950	15,195
Feb-03	12,429	13,654
Mar-03	12,907	14,008
Apr-03	11,665	12,329
May-03	11,589	12,513
Jun-03	12,094	13,381

Figure 4.1 Monthly System Energy Demand – Normal Weather



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 C. The Normal weather winter peak for 2002 is expected to be 23,596 MW, increasing to 23,984 MW for winter 2003. The Normal weather summer peak for 2002 is projected to be 22,941 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.

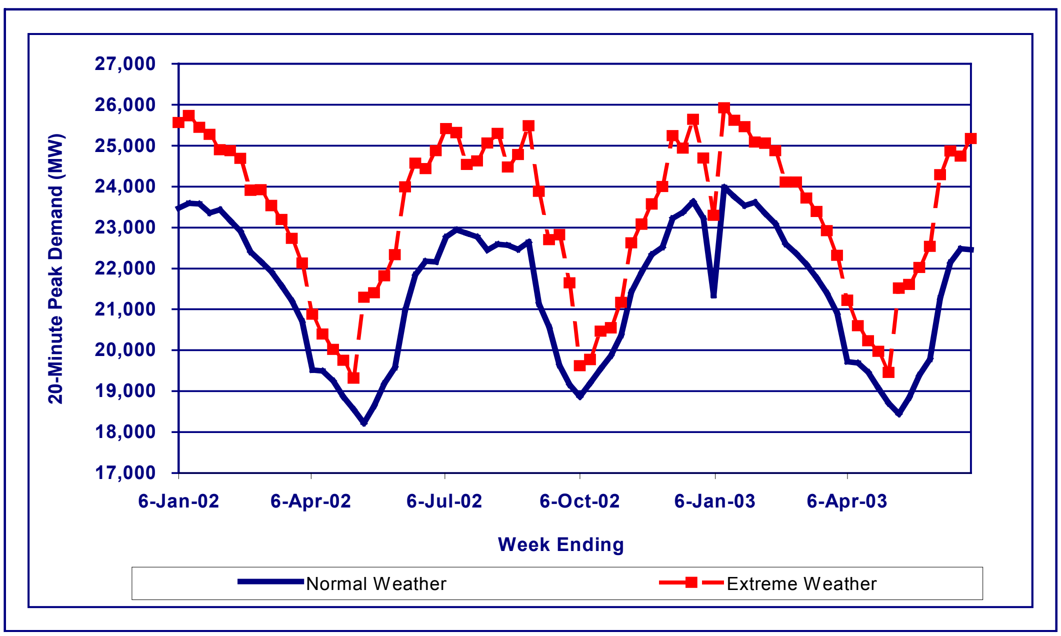
As described in Appendix A, Normal weather represents “an average” of historical weekly peak weather values. As such, there is a likelihood that actual weather may be less severe or may be more severe than Normal weather, and hence actual demands may be higher or lower than the Normal weather peak demand forecast. The Extreme weather scenario is based on the most severe weather events of the past 30 years. As such, the Extreme scenario endeavors to capture the outer limit of where the peak potential could be. The probability of various peaks occurring can be calculated in conjunction with the Load Forecast Uncertainty. For further discussion on LFU please see Appendix A and Appendix C, Table C1 for the LFU numbers.

The resource adequacy assessments described in the companion document, “An Assessment of the Adequacy of the Ontario Electricity System”, 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.

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

Month	Normal Weather Peak Demand (MW)	Extreme Weather Peak Demand (MW)
Jan-02	23,596	25,733
Feb-02	23,161	24,876
Mar-02	21,916	23,534
Apr-02	19,518	20,875
May-02	19,581	22,336
Jun-02	22,177	24,873
Jul-02	22,941	25,412
Aug-02	22,648	25,483
Sep-02	21,136	23,879
Oct-02	20,365	21,164
Nov-02	22,519	24,000
Dec-02	23,637	25,644
Jan-03	23,984	25,921
Feb-03	23,346	25,061
Mar-03	22,100	23,717
Apr-03	19,721	21,079
May-03	19,783	22,538
Jun-03	22,481	25,170

Figure 4.2 Forecast of Weekly 20-Minute System Peak Demand - Normal & Extreme Weather



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 28th, 2001, covering the period October 2002 to March 2003.. There have been a number of substantial changes to the forecasting methodology and process since that time. As well, the economic outlook has been revised downward by a significant degree.

With respect to the forecasting methodology, the treatment of cloud and wind has been changed to a seasonal approach. Adjustments were made to the model to more accurately capture the trends in summer and winter peaks. The Normal weather scenario was updated to include the weather of 2001 through to the end of August. The methodology for calculating the Extreme weather scenario was completely revised and updated. As well, the model has been re-estimated so that the coefficients can incorporate the most recent data.

The significant reductions in economic expectations see a much lower final quarter of 2001, leading into a much weaker 2002. An increase in growth is expected in 2003, though the majority of that impact is really beyond the forecast horizon (June 2003) of this document.

In terms of electricity demand we see two different impacts. The model revisions and updated weather scenarios lend themselves to higher peak values. The September 2001 forecast predicted a 2002 summer Normal peak of 22,474 MW as opposed to this document, which contains a summer 2002 Normal peak of 22,941 MW. The winter 2002 Normal peaks are virtually the same. However, due to the changes to the Extreme weather scenario, the Extreme weather peaks are significantly higher in this updated forecast (25,733 MW vs. 24,231 MW for the winter Extreme peak and 25,483 MW vs. 23,618 MW for the summer Extreme peak demand).

The energy demand outlook has been revised downward as a result of the lower economic growth expectations. A decrease in economic activity has meant that the anticipated annual electricity demand for 2002 has dropped to 149.2 TWh from the 150.6 TWh predicted in September 2001.

Appendix A - Weather Scenarios

The weather scenarios are constructed on a weekly basis, starting on Monday and ending on Sunday. For each year of historical weather data the observations are therefore divided up into weeks. For the purpose of determining the first week of the year, it would be the first week with the majority of its days in the new calendar. Therefore, the earliest the first week could start would be December 29th and the latest would be January 4th. Starting with week 1, each of the daily observations will be sorted from highest to lowest within each week for the entire 30-year weather history.

The Normal weather is simply the average of the 30-year history. Using temperature as an example, the average of the coldest day in Week 1 for each year from 1972 through to 2001 will become the coldest day of Week 1 of the Normal weather scenario. The average of the next coldest day for each year of Week 1 will become the second coldest day of Week 1 of the Normal weather scenario. This is repeated for all of the days in all of the weeks, resulting in a Normal weather year. For summer values, the hottest days would be averaged to determine the hottest days within the Normal weather scenario.

For the Extreme weather scenario, the historical data is ranked as with the Normal weather. However rather than taking the average of the ranked data, the Extreme weather uses the maximum values for the summer and the minimum values for the winter. In this way, the Extreme scenario will contain the most severe historical conditions for each week. This is a departure from the previous Extreme methodology. In past forecasts, the Extreme weather was calculated like the Normal weather except that it was the average of the five most severe days. Obviously, the updated Extreme scenario will lead to higher peak values than the previous methodology. The new methodology was adopted to acknowledge the fact that although the probability of observing a once in thirty year event was small for each week, the chance of getting a once in thirty year event over the course of the year is significantly higher. For example, within the Extreme weather scenario the most severe weather days in each of the 52 weeks can be attributed to one of the 30 years of history. In doing so, 25 out of the total of 30 years of weather history would account for at least one weekly "peak" weather day.

Previously, the Normal and Extreme weather were mapped to individual weekdays based on historical patterns. This too has been changed so that the peak eliciting weather now occurs on the same day of each week. This allows for more consistent inter-week comparison and produces a smoother weekly profile.

Load Forecast Uncertainty (LFU) is another approach to account for the uncertainty associated with the variability of weather. LFU represents the variation in peak demand based on one standard deviation in the weather inputs. Unlike the weather scenarios, which are derived to provide point forecasts under different weather conditions, LFU is used to develop distributions of possible outcomes around those point forecasts. For example, actual weather has a 50/50 probability of being higher or lower than the Normal weather scenario. For the weekly peak plus the LFU, actual weather would have roughly an 85/15 chance of being lower/higher than the Normal weather plus uncertainty that underpins the forecast. The Extreme weather scenario does not directly translate into probabilistic terms since it is based on severe historic weather conditions. However, the Extreme weather scenario approximates the Normal weather forecast plus two standard deviations in the weather elements. The exact probability one can associate with the Extreme weather scenario varies by week. In some weeks the Extreme weather value lies outside of two standard deviations, whereas in other weeks it lies within two standard deviations. This is not illogical in that for any given week, history may have provided an unusual weather episode that will not be surpassed for many years, whereas another week may not have encountered an unusual weather episode.

Appendix B - Energy Demand Forecast Details

Table B1 Weekly Zonal Energy Forecast, Normal Weather

	(GWh)										
Week Ending	Northwest	Northeast	East	Essa	Ottawa	Toronto	Niagara	Bruce	Southwest	West	Total System
6-Jan-02	164	251	365	159	176	923	124	17	565	328	3,070
13-Jan-02	166	254	378	164	179	952	127	17	585	337	3,158
20-Jan-02	166	254	375	163	178	944	127	17	581	335	3,140
27-Jan-02	166	252	372	161	176	937	127	17	580	334	3,123
3-Feb-02	167	251	376	163	178	946	127	17	585	336	3,146
10-Feb-02	165	248	374	162	177	943	127	17	585	336	3,135
17-Feb-02	166	245	370	160	175	930	127	17	580	333	3,102
24-Feb-02	164	240	361	156	171	908	126	17	568	327	3,036
3-Mar-02	162	237	361	156	171	908	126	17	565	327	3,029
10-Mar-02	160	232	354	153	167	890	125	17	556	323	2,977
17-Mar-02	157	231	349	151	165	878	124	16	551	320	2,942
24-Mar-02	154	228	341	148	161	858	124	16	543	315	2,889
31-Mar-02	149	225	323	140	153	814	120	16	520	302	2,762
7-Apr-02	144	218	339	122	142	829	115	16	532	298	2,755
14-Apr-02	149	212	337	121	141	822	117	16	521	305	2,740
21-Apr-02	147	206	330	118	138	806	116	15	512	300	2,688
28-Apr-02	143	201	324	116	135	791	115	15	505	296	2,641
5-May-02	142	195	321	115	134	784	114	15	502	294	2,616
12-May-02	141	192	318	114	133	778	112	15	498	294	2,595
19-May-02	139	192	318	114	133	777	112	15	494	294	2,587
26-May-02	136	192	313	112	131	765	111	14	483	289	2,546
2-Jun-02	137	190	326	116	137	793	114	15	505	303	2,637
9-Jun-02	138	187	337	117	146	815	117	16	530	323	2,726
16-Jun-02	140	184	346	121	150	838	119	16	540	328	2,781
23-Jun-02	140	182	352	123	152	851	121	16	544	332	2,814
30-Jun-02	140	181	356	124	154	861	122	16	549	335	2,838
7-Jul-02	134	181	364	127	157	881	124	17	558	345	2,887
14-Jul-02	135	180	369	129	159	892	124	17	562	353	2,920
21-Jul-02	136	181	372	130	161	899	124	17	565	358	2,942
28-Jul-02	136	182	366	128	158	886	122	17	560	358	2,913
4-Aug-02	138	182	366	128	158	886	122	17	563	358	2,919
11-Aug-02	140	188	358	125	155	866	123	17	554	353	2,879
18-Aug-02	140	191	361	126	156	874	124	17	562	357	2,908
25-Aug-02	141	197	359	125	155	869	124	17	564	355	2,906
1-Sep-02	142	203	360	125	156	870	125	17	565	356	2,920
8-Sep-02	136	202	332	116	144	803	117	15	515	321	2,700
15-Sep-02	142	201	331	116	143	802	117	15	515	317	2,699
22-Sep-02	144	199	325	113	141	787	114	15	506	308	2,653
29-Sep-02	145	200	324	113	140	784	113	15	504	304	2,643

Notes to Table B1:
Figure may not add due to rounding.

Table B1 – continued

	(GWh)										
Week Ending	Northwest	Northeast	East	Essa	Ottawa	Toronto	Niagara	Bruce	Southwest	West	Total System
6-Oct-02	149	203	311	116	150	792	113	15	503	301	2,653
13-Oct-02	150	209	313	118	155	807	114	15	511	300	2,692
20-Oct-02	149	216	313	118	154	804	113	15	510	297	2,689
27-Oct-02	150	221	323	122	159	832	116	16	529	305	2,773
3-Nov-02	154	220	320	121	158	822	117	16	525	307	2,758
10-Nov-02	156	229	330	125	163	850	123	16	533	317	2,841
17-Nov-02	158	232	341	129	168	876	123	16	543	322	2,907
24-Nov-02	158	235	346	131	171	891	124	16	551	324	2,947
1-Dec-02	158	238	350	135	174	902	124	17	560	326	2,985
8-Dec-02	164	242	349	157	186	914	126	17	574	331	3,061
15-Dec-02	163	245	353	159	189	925	126	17	578	332	3,087
22-Dec-02	163	249	358	162	191	938	127	17	583	336	3,125
29-Dec-02	148	239	338	153	181	886	117	16	544	317	2,939
5-Jan-03	157	248	347	152	170	884	119	16	542	313	2,949
12-Jan-03	166	255	381	165	180	958	129	18	590	341	3,183
19-Jan-03	166	255	378	164	179	951	128	18	587	339	3,164
26-Jan-03	166	253	375	163	177	944	128	18	586	338	3,147
2-Feb-03	167	252	379	164	179	953	129	18	591	340	3,171
9-Feb-03	165	249	377	163	178	949	129	18	591	340	3,159
16-Feb-03	166	246	372	161	176	937	128	17	586	337	3,127
23-Feb-03	164	241	363	157	172	914	127	17	574	331	3,061
2-Mar-03	163	238	364	158	172	915	127	17	571	331	3,056
9-Mar-03	160	233	357	155	169	898	127	17	562	327	3,003
16-Mar-03	158	232	351	152	166	885	126	17	557	324	2,968
23-Mar-03	155	229	344	149	163	865	126	16	549	319	2,915
30-Mar-03	150	226	332	144	157	836	124	16	535	312	2,832
6-Apr-03	145	218	341	126	145	837	117	16	539	303	2,789
13-Apr-03	150	212	340	122	142	831	118	16	529	308	2,767
20-Apr-03	147	207	327	117	137	799	116	15	510	299	2,673
27-Apr-03	144	202	327	117	137	800	116	15	513	300	2,672
4-May-03	143	195	325	116	136	793	115	15	509	298	2,645
11-May-03	141	192	322	116	135	787	114	15	506	298	2,624
18-May-03	139	192	322	115	134	786	114	15	502	298	2,616
25-May-03	137	192	317	114	132	774	112	15	491	293	2,575
1-Jun-03	137	191	328	117	138	801	116	15	509	305	2,656
8-Jun-03	138	188	341	119	148	826	119	16	541	329	2,766
15-Jun-03	140	185	351	122	152	849	121	16	551	333	2,820
22-Jun-03	140	183	356	124	154	862	122	17	555	338	2,853
29-Jun-03	140	182	360	126	156	872	124	17	560	341	2,878

Notes to Table B1:
Figure may not add due to rounding.

Appendix C - Peak Demand Forecast Details

Table C1 Weekly Zonal Coincident Peak Demand Forecast, Normal Weather

Week Ending	20-Minute Coincident Peak Demand (MW)											
	Northwest	Northeast	East	Essa	Ottawa	Toronto	Niagara	Bruce	Southwest	West	Total System	Load Forecast Uncertainty
6-Jan-02	1,054	1,576	2,941	1,275	1,392	7,403	895	130	4,360	2,444	23,470	683
13-Jan-02	1,054	1,582	2,957	1,282	1,400	7,446	895	132	4,399	2,449	23,596	761
20-Jan-02	1,056	1,596	2,950	1,279	1,397	7,427	900	132	4,392	2,450	23,579	869
27-Jan-02	1,050	1,575	2,924	1,268	1,384	7,362	892	132	4,359	2,408	23,354	731
3-Feb-02	1,053	1,570	2,936	1,273	1,390	7,392	896	130	4,382	2,412	23,434	465
10-Feb-02	1,038	1,549	2,896	1,256	1,371	7,292	891	132	4,347	2,389	23,161	588
17-Feb-02	1,035	1,530	2,861	1,240	1,354	7,202	887	129	4,312	2,361	22,911	674
24-Feb-02	1,023	1,504	2,789	1,210	1,321	7,023	877	124	4,219	2,316	22,406	716
3-Mar-02	1,027	1,479	2,754	1,194	1,304	6,933	865	123	4,167	2,327	22,173	700
10-Mar-02	1,009	1,455	2,719	1,179	1,287	6,846	861	125	4,123	2,312	21,916	677
17-Mar-02	988	1,441	2,670	1,158	1,264	6,722	855	123	4,073	2,278	21,572	617
24-Mar-02	971	1,428	2,616	1,134	1,238	6,586	851	120	4,018	2,246	21,208	607
31-Mar-02	937	1,411	2,547	1,104	1,206	6,412	843	117	3,931	2,202	20,710	568
7-Apr-02	883	1,355	2,496	895	1,043	6,097	783	113	3,796	2,057	19,518	553
14-Apr-02	933	1,363	2,468	885	1,031	6,030	810	112	3,730	2,127	19,489	463
21-Apr-02	918	1,335	2,441	876	1,020	5,964	810	110	3,678	2,097	19,249	442
28-Apr-02	908	1,289	2,395	859	1,001	5,852	808	106	3,568	2,070	18,856	398
5-May-02	907	1,247	2,353	844	983	5,748	805	104	3,515	2,047	18,553	368
12-May-02	856	1,164	2,313	829	966	5,650	773	103	3,454	2,111	18,219	1,200
19-May-02	846	1,201	2,374	851	992	5,800	805	103	3,485	2,179	18,636	1,613
26-May-02	840	1,206	2,470	886	1,032	6,034	824	106	3,556	2,234	19,188	1,367
2-Jun-02	838	1,217	2,529	907	1,056	6,177	838	107	3,639	2,273	19,581	1,451
9-Jun-02	843	1,160	2,715	947	1,175	6,570	880	118	4,024	2,543	20,975	1,168
16-Jun-02	857	1,156	2,860	997	1,238	6,922	909	126	4,179	2,606	21,850	1,205
23-Jun-02	862	1,145	2,909	1,015	1,259	7,041	929	127	4,222	2,668	22,177	1,076
30-Jun-02	859	1,140	2,912	1,015	1,260	7,047	939	125	4,207	2,656	22,160	1,304
7-Jul-02	824	1,146	3,005	1,048	1,300	7,273	952	129	4,328	2,766	22,771	1,199
14-Jul-02	831	1,110	3,031	1,057	1,312	7,335	953	129	4,373	2,810	22,941	1,008
21-Jul-02	837	1,115	3,013	1,051	1,304	7,291	948	129	4,344	2,823	22,855	902
28-Jul-02	838	1,114	2,990	1,043	1,294	7,235	940	130	4,345	2,842	22,771	879
4-Aug-02	847	1,109	2,940	1,025	1,273	7,116	924	128	4,308	2,784	22,454	949
11-Aug-02	861	1,127	2,951	1,029	1,277	7,142	931	129	4,337	2,809	22,593	1,097
18-Aug-02	865	1,156	2,936	1,024	1,271	7,105	936	130	4,326	2,819	22,568	866
25-Aug-02	870	1,187	2,915	1,016	1,261	7,054	929	130	4,323	2,783	22,468	1,115
1-Sep-02	875	1,240	2,918	1,018	1,263	7,062	950	130	4,372	2,820	22,648	1,232
8-Sep-02	863	1,275	2,724	950	1,179	6,592	909	118	3,984	2,542	21,136	1,248
15-Sep-02	872	1,256	2,636	919	1,141	6,379	889	116	3,870	2,482	20,560	895
22-Sep-02	889	1,208	2,509	875	1,086	6,072	834	110	3,713	2,335	19,631	1,337
29-Sep-02	895	1,207	2,441	851	1,056	5,907	808	109	3,630	2,255	19,159	1,349

Notes to Table C1:
Load Forecast Uncertainty (LFU) is one standard deviation in system peak demand due to variations in weather.

Table C1 - continued

	20-Minute Coincident Peak Demand (MW)											
Week Ending	Northwest	Northeast	East	Essa	Ottawa	Toronto	Niagara	Bruce	Southwest	West	Total System	Load Forecast Uncertainty
6-Oct-02	954	1,268	2,262	855	1,116	5,821	787	109	3,613	2,084	18,869	351
13-Oct-02	935	1,305	2,323	878	1,146	5,979	788	110	3,666	2,071	19,201	353
20-Oct-02	934	1,340	2,370	895	1,169	6,098	793	111	3,747	2,092	19,549	387
27-Oct-02	932	1,372	2,414	912	1,191	6,211	799	113	3,815	2,114	19,873	432
3-Nov-02	984	1,365	2,467	932	1,217	6,349	791	119	3,968	2,173	20,365	373
10-Nov-02	1,002	1,434	2,612	987	1,289	6,723	875	120	4,060	2,321	21,423	450
17-Nov-02	1,018	1,450	2,686	1,015	1,325	6,913	885	124	4,133	2,366	21,915	310
24-Nov-02	1,022	1,478	2,752	1,040	1,358	7,082	892	124	4,206	2,387	22,341	494
1-Dec-02	1,006	1,543	2,770	1,047	1,367	7,129	897	126	4,249	2,385	22,519	492
8-Dec-02	1,056	1,522	2,770	1,251	1,481	7,264	907	133	4,400	2,443	23,227	767
15-Dec-02	1,051	1,537	2,793	1,261	1,493	7,324	908	133	4,426	2,445	23,371	630
22-Dec-02	1,053	1,561	2,829	1,277	1,512	7,417	917	133	4,458	2,480	23,637	824
29-Dec-02	1,032	1,623	2,770	1,251	1,481	7,264	910	129	4,333	2,433	23,226	639
5-Jan-03	979	1,594	2,554	1,154	1,365	6,698	820	116	3,904	2,156	21,340	683
12-Jan-03	1,065	1,598	3,004	1,303	1,422	7,563	917	134	4,479	2,499	23,984	761
19-Jan-03	1,058	1,596	2,969	1,287	1,406	7,474	914	133	4,436	2,480	23,753	869
26-Jan-03	1,052	1,579	2,944	1,277	1,394	7,413	906	132	4,404	2,438	23,539	731
2-Feb-03	1,055	1,574	2,956	1,282	1,399	7,441	909	132	4,426	2,441	23,615	465
9-Feb-03	1,039	1,554	2,916	1,265	1,381	7,343	906	131	4,392	2,419	23,346	588
16-Feb-03	1,037	1,535	2,880	1,249	1,364	7,251	901	129	4,356	2,389	23,091	674
23-Feb-03	1,026	1,507	2,810	1,219	1,330	7,075	891	127	4,268	2,346	22,599	716
2-Mar-03	1,030	1,484	2,774	1,203	1,313	6,984	878	126	4,214	2,354	22,360	700
9-Mar-03	1,011	1,458	2,740	1,188	1,297	6,898	875	124	4,169	2,340	22,100	677
16-Mar-03	991	1,445	2,693	1,168	1,275	6,779	869	123	4,120	2,308	21,771	617
23-Mar-03	973	1,432	2,636	1,143	1,248	6,638	865	121	4,063	2,275	21,394	607
30-Mar-03	942	1,414	2,567	1,113	1,215	6,464	857	119	3,975	2,231	20,897	568
6-Apr-03	888	1,349	2,521	904	1,053	6,160	790	116	3,856	2,084	19,721	553
13-Apr-03	936	1,359	2,493	894	1,041	6,091	818	114	3,788	2,153	19,687	463
20-Apr-03	920	1,338	2,468	885	1,031	6,029	821	112	3,736	2,123	19,463	442
27-Apr-03	899	1,304	2,411	865	1,007	5,891	810	111	3,687	2,084	19,069	398
4-May-03	897	1,255	2,373	851	991	5,797	808	107	3,553	2,065	18,697	368
11-May-03	862	1,168	2,340	839	977	5,716	784	104	3,513	2,140	18,443	1,200
18-May-03	851	1,201	2,397	860	1,001	5,857	815	106	3,543	2,207	18,838	1,613
25-May-03	844	1,210	2,494	894	1,042	6,092	834	109	3,610	2,261	19,390	1,367
1-Jun-03	840	1,221	2,552	915	1,066	6,235	848	110	3,696	2,300	19,783	1,451
8-Jun-03	849	1,140	2,752	960	1,191	6,659	888	123	4,124	2,587	21,273	1,168
15-Jun-03	857	1,163	2,894	1,009	1,252	7,004	921	129	4,265	2,653	22,147	1,205
22-Jun-03	864	1,150	2,944	1,027	1,274	7,126	942	129	4,311	2,714	22,481	1,076
29-Jun-03	863	1,144	2,946	1,028	1,275	7,131	952	129	4,296	2,693	22,457	1,304

Notes to Table C1:
Load Forecast Uncertainty (LFU) is one standard deviation in system peak demand due to variations in weather.

Table C2 Weekly Zonal Non-Coincident Peak Demand Forecast, Normal Weather

	20-Minute Non-Coincident Peak Demand (MW)										
Week Ending	Northwest	Northeast	East	Essa	Ottawa	Toronto	Niagara	Bruce	Southwest	West	Total
6-Jan-02	1,068	1,708	2,941	1,275	1,392	7,403	897	130	4,360	2,444	23,618
13-Jan-02	1,069	1,715	2,957	1,282	1,400	7,446	895	132	4,399	2,449	23,744
20-Jan-02	1,064	1,696	2,950	1,279	1,397	7,427	900	132	4,392	2,450	23,687
27-Jan-02	1,060	1,665	2,924	1,268	1,384	7,362	892	132	4,359	2,408	23,454
3-Feb-02	1,067	1,646	2,936	1,273	1,390	7,392	896	130	4,382	2,412	23,524
10-Feb-02	1,054	1,605	2,896	1,256	1,371	7,292	891	132	4,347	2,391	23,235
17-Feb-02	1,053	1,563	2,861	1,240	1,354	7,202	887	129	4,312	2,370	22,971
24-Feb-02	1,042	1,529	2,789	1,210	1,321	7,023	877	125	4,220	2,336	22,472
3-Mar-02	1,034	1,513	2,756	1,195	1,305	6,938	872	124	4,167	2,327	22,231
10-Mar-02	1,019	1,489	2,719	1,179	1,287	6,846	863	125	4,123	2,312	21,962
17-Mar-02	1,001	1,477	2,670	1,158	1,264	6,722	855	123	4,073	2,278	21,621
24-Mar-02	988	1,455	2,616	1,134	1,238	6,586	851	120	4,018	2,246	21,252
31-Mar-02	955	1,435	2,547	1,104	1,206	6,412	843	117	3,931	2,205	20,755
7-Apr-02	929	1,430	2,496	895	1,043	6,097	783	113	3,796	2,068	19,650
14-Apr-02	958	1,407	2,468	885	1,031	6,030	813	112	3,730	2,127	19,561
21-Apr-02	941	1,356	2,441	876	1,020	5,964	816	110	3,678	2,103	19,305
28-Apr-02	923	1,317	2,395	859	1,001	5,852	808	108	3,623	2,074	18,960
5-May-02	914	1,283	2,353	844	983	5,749	805	106	3,574	2,054	18,665
12-May-02	907	1,325	2,313	829	966	5,650	782	105	3,458	2,117	18,452
19-May-02	894	1,313	2,378	853	993	5,810	805	105	3,493	2,179	18,823
26-May-02	878	1,296	2,473	887	1,033	6,042	824	106	3,563	2,234	19,336
2-Jun-02	876	1,277	2,531	908	1,057	6,184	838	111	3,646	2,273	19,701
9-Jun-02	885	1,254	2,717	948	1,176	6,576	880	120	4,033	2,543	21,132
16-Jun-02	889	1,238	2,862	998	1,239	6,927	909	127	4,192	2,606	21,987
23-Jun-02	893	1,230	2,910	1,015	1,259	7,043	929	127	4,237	2,668	22,311
30-Jun-02	891	1,225	2,912	1,016	1,260	7,048	939	126	4,222	2,656	22,295
7-Jul-02	866	1,222	3,006	1,048	1,301	7,275	952	130	4,344	2,768	22,912
14-Jul-02	869	1,222	3,031	1,057	1,312	7,335	959	130	4,373	2,810	23,098
21-Jul-02	873	1,223	3,013	1,051	1,304	7,291	953	130	4,344	2,823	23,005
28-Jul-02	876	1,222	2,990	1,043	1,294	7,235	944	130	4,345	2,842	22,921
4-Aug-02	893	1,230	2,940	1,025	1,273	7,116	928	130	4,308	2,784	22,627
11-Aug-02	896	1,260	2,951	1,029	1,277	7,142	936	130	4,337	2,809	22,767
18-Aug-02	898	1,293	2,936	1,024	1,271	7,105	941	130	4,326	2,819	22,743
25-Aug-02	904	1,340	2,915	1,016	1,261	7,054	935	130	4,323	2,783	22,661
1-Sep-02	909	1,363	2,920	1,018	1,264	7,067	950	131	4,379	2,823	22,824
8-Sep-02	902	1,364	2,726	951	1,180	6,598	909	120	3,987	2,542	21,279
15-Sep-02	915	1,358	2,640	921	1,143	6,390	889	116	3,880	2,482	20,734
22-Sep-02	928	1,360	2,509	875	1,086	6,072	845	112	3,713	2,339	19,839
29-Sep-02	934	1,359	2,441	851	1,056	5,907	818	110	3,644	2,257	19,377

Table C2 - continued

20-Minute Non-Coincident Peak Demand (MW)											
Week Ending	Northwest	Northeast	East	Essa	Ottawa	Toronto	Niagara	Bruce	Southwest	West	Total
6-Oct-02	961	1,338	2,309	857	1,120	5,840	787	109	3,613	2,084	19,018
13-Oct-02	959	1,378	2,323	878	1,146	5,979	793	110	3,666	2,097	19,329
20-Oct-02	953	1,419	2,370	895	1,169	6,098	796	113	3,747	2,105	19,665
27-Oct-02	950	1,459	2,414	912	1,191	6,211	801	113	3,815	2,115	19,981
3-Nov-02	991	1,517	2,467	932	1,217	6,349	842	119	3,968	2,173	20,575
10-Nov-02	1,008	1,555	2,612	987	1,289	6,723	875	121	4,060	2,321	21,551
17-Nov-02	1,020	1,580	2,686	1,015	1,325	6,913	885	124	4,133	2,366	22,047
24-Nov-02	1,022	1,594	2,752	1,040	1,358	7,082	892	125	4,206	2,387	22,458
1-Dec-02	1,019	1,618	2,770	1,047	1,367	7,129	897	129	4,273	2,401	22,650
8-Dec-02	1,057	1,646	2,770	1,251	1,481	7,264	908	133	4,400	2,443	23,353
15-Dec-02	1,051	1,667	2,793	1,261	1,493	7,324	910	133	4,426	2,445	23,503
22-Dec-02	1,055	1,689	2,829	1,277	1,512	7,417	918	133	4,458	2,480	23,768
29-Dec-02	1,045	1,700	2,770	1,251	1,481	7,264	910	131	4,358	2,458	23,368
5-Jan-03	1,050	1,711	2,629	1,154	1,365	6,698	845	118	3,949	2,219	21,738
12-Jan-03	1,071	1,717	3,004	1,303	1,422	7,563	917	134	4,479	2,499	24,109
19-Jan-03	1,065	1,702	2,969	1,287	1,406	7,474	914	133	4,436	2,480	23,866
26-Jan-03	1,061	1,673	2,944	1,277	1,394	7,413	906	132	4,404	2,438	23,642
2-Feb-03	1,068	1,653	2,956	1,282	1,399	7,441	909	132	4,426	2,441	23,707
9-Feb-03	1,055	1,612	2,916	1,265	1,381	7,343	906	131	4,392	2,420	23,421
16-Feb-03	1,054	1,571	2,880	1,249	1,364	7,251	901	129	4,356	2,398	23,153
23-Feb-03	1,045	1,533	2,810	1,219	1,330	7,075	891	127	4,270	2,364	22,664
2-Mar-03	1,036	1,517	2,777	1,204	1,315	6,991	886	126	4,214	2,354	22,420
9-Mar-03	1,021	1,493	2,740	1,188	1,297	6,898	877	124	4,169	2,340	22,147
16-Mar-03	1,004	1,480	2,693	1,168	1,275	6,779	869	123	4,120	2,308	21,819
23-Mar-03	990	1,458	2,636	1,143	1,248	6,638	865	121	4,063	2,275	21,437
30-Mar-03	959	1,439	2,567	1,113	1,215	6,464	857	119	3,975	2,233	20,941
6-Apr-03	932	1,426	2,521	1,029	1,123	6,160	843	116	3,856	2,143	20,149
13-Apr-03	961	1,413	2,493	894	1,041	6,091	820	114	3,788	2,153	19,768
20-Apr-03	945	1,363	2,468	885	1,031	6,029	825	112	3,736	2,127	19,521
27-Apr-03	928	1,328	2,418	867	1,010	5,907	817	111	3,687	2,100	19,173
4-May-03	914	1,289	2,373	851	991	5,797	808	110	3,626	2,072	18,831
11-May-03	912	1,325	2,340	839	977	5,716	793	106	3,516	2,146	18,670
18-May-03	899	1,318	2,402	861	1,003	5,868	815	107	3,551	2,207	19,031
25-May-03	882	1,300	2,497	896	1,043	6,101	834	109	3,618	2,261	19,541
1-Jun-03	881	1,293	2,555	916	1,067	6,242	848	111	3,705	2,300	19,918
8-Jun-03	888	1,263	2,752	960	1,191	6,659	893	124	4,124	2,589	21,443
15-Jun-03	891	1,249	2,897	1,010	1,254	7,011	921	129	4,280	2,653	22,295
22-Jun-03	894	1,236	2,946	1,027	1,275	7,129	942	130	4,328	2,714	22,621
29-Jun-03	894	1,231	2,948	1,028	1,276	7,134	952	129	4,314	2,693	22,599

Appendix D - Analytical Factors Affecting Demand

Table D1 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	1°C Increase	6,450 MWh Increase
	10°C > and < 16° C	1°C Increase	375 MWh Increase
	< 10°C	1°C Decrease	2,525 MWh Increase
	Daily Avg Humidity - Dewpoint		
	> 16° C	1°C Increase	2,350 MWh Increase
	10°C > and < 16° C	1°C Increase	125 MWh Increase
	< 10°C	1°C Decrease	925 MWh Increase
	Wind		
	Summer	1 km/hr Decrease	225 MWh Increase
	Winter	1 km/hr Increase	225 Mwh Increase
	Cloud		
	Summer	Decrease of 1 on Scale	1,000 MWh Increase
	Winter	Increase of 1 on Scale	1,625 MWh Increase
Economic	Employment	Increase of 1,000 jobs	20 MWh Increase
	Housing Stock	Increase of 1,000 houses	30 MWh Increase
Calendar	Holidays	New Year's Day	65,000 MWh Decrease
		Good Friday	45,000 MWh Decrease
		Victoria Day	48,000 MWh Decrease
		Canada Day	25,000 MWh Decrease
		Simcoe Day	37,000 MWh Decrease
		Labour Day	54,000 MWh Decrease
		Thanksgiving Day	53,000 MWh Decrease
		Rememberance Day	3,000 MWh Decrease
		Christmas	83,000 MWh Decrease
		Boxing Day	51,000 MWh Decrease
		New Year's Eve	14,000 MWh Decrease
		Week Between Christmas and New Years Eve	37,500 MWh Decrease
	Day of Week	Monday vs Sunday	44,250 MWh Increase
		Tuesday vs Sunday	45,800 MWh Increase
		Wednesday vs Sunday	46,300 MWh Increase
		Thursday vs Sunday	46,550 MWh Increase
		Friday vs Sunday	43,300 MWh Increase
		Saturday vs Sunday	11,550 MWh Increase

Table D1 - continued

Factors Affecting Daily Peak Demand			
Variable Class	**Variable**	**Change in Variable**	**Impact On Daily Peak Demand (MW)**
Weather	Temperature		
	> 16º C	1ºC Increase	370 MW Increase
	10ºC > and < 16º C	1ºC Increase	50 MW Increase
	< 10ºC	1ºC Decrease	110 MW Increase
	Humidity - Dewpoint		
	> 16º C	1ºC Increase	130 MW Increase
	10ºC > and < 16º C	1ºC Increase	20 MW Increase
	< 10ºC	1ºC Decrease	40 MW Increase
	Wind		
	Summer	1 km/hr Decrease	10 MW Increase
	Winter	1 km/hr Increase	15 MW Increase
	Cloud		
	Summer	Decrease of 1 on Scale	80 MW Increase
	Winter	Increase of 1 on Scale	70 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	2,200 MW Decrease
		Canada Day	900 MW Decrease
		Simcoe Day	1,400 MW Decrease
		Labour Day	2,250 MW Decrease
		Thanksgiving Day	2,300 MW Decrease
		Rememberance Day	425 MW Decrease
		Christmas	4,600 MW Decrease
		Boxing Day	2,400 MW Decrease
		New Year's Eve	800 MW Decrease
		Week Between Christmas and New Years Eve	1,500 MW Decrease
	Day of Week	Monday vs Sunday	2,000 MW Increase
		Tuesday vs Sunday	1,950 MW Increase
		Wednesday vs Sunday	1,950 MW Increase
		Thursday vs Sunday	1,900 MW Increase
		Friday vs Sunday	1,650 MW Increase
		Saturday vs Sunday	250 MW Increase

Appendix E – Ontario's Internal Zones

Figure E1 Ontario's Internal Zones