# 18-MONTH OUTLOOK

**From June 2011 to November 2012**

ieso
Power to Ontario. On Demand.

**Ontario Demand Forecast**

# Executive Summary

The IESO is responsible for forecasting electricity demand on the IESO-controlled grid and for assessing whether transmission and generation facilities are adequate to meet Ontario's needs. This document presents the demand forecast for the period from June 2011 to November 2012 and supersedes the previous forecast released in February 2011.

**Economic Outlook**

The key economic themes have not changed over the past six months. In fact, the same issues continue to dominate the Ontario economic landscape and some have intensified. Here are the key economic factors impacting the province:

- Exchange rate – The Canadian dollar continues to rise against the U.S. dollar and will continue to see upward pressure with high oil and commodity prices. The high dollar negatively impacts Ontario's export-oriented manufacturers.
- Debt - High debt loads will continue to act as a drag on growth. Consumer spending has been restrained since the onset of the recession. Now governments are moving from stimulus spending to debt reduction through a variety of austerity measures. The carrying costs of high debt loads combined with higher interest rates will impact both consumers and governments.
- Oil prices – Significantly higher oil prices impact the cost of goods as transportation prices rise, acting as a drag on economic growth.

The current global volatility - both politically and economically – has meant that growth has been slow for most countries coming out of the global recession of 2009. This low growth should persist throughout 2011.

**Actual Weather and Demand**

Since the last Ontario Demand Forecast document was published, actual demand and weather data have been reported for the winter and spring.

For the period November 2010 through April 2011, the weather was generally colder than normal. All of the months showed a year-over-year increase in demand for electricity. However, after adjusting for weather, only March has shown an increase. For 2010 electricity demand was up 2.2% over 2009 (1.2% weather corrected) but demand was still more than 6 TWh lower than the pre-recession levels of 2008. For the four months ending in April, demand has increased by 2.5% over the same months a year ago (-0.4% weather corrected).

The winter peak demand was 22,733 MW and occurred on January 24, 2011. The weather on this date was fairly typical and the weather-corrected peak showed an increase of 1.4% over the previous winter.

For the period November 2010 to April 2011, all of the monthly minimum demands were higher than the previous year with the exception of January 2011. Unusually mild

weather on New Year's Day led to the lowest January demand since market opening. The impact of a daytime high over 9°C on a holiday drove demand down. January aside, the higher minimum demand levels reflect a resumption of baseload demand from the manufacturing sector.

**Demand Forecast**

The 18-Month Outlook's demand forecast includes the impact of additional conservation savings and demand reductions from projected off-grid or embedded generation. The Ontario Power Authority (OPA) and local distribution companies (LDCs) will be the organizations driving these impacts through their program offerings. In the 18-Month Outlook the impacts of conservation and embedded generation are decremented from demand, whereas the OPA's demand response programs are included in our analysis as a resource under the category of demand measures. Conservation, embedded generation and demand response are discussed in section 4.4 of this document.

Table 1 summarizes the annual peak and energy demand forecast for the period covered in this 18-month forecast. Peak demands will show only small increases over the forecast horizon as conservation, embedded generation and time-of-use prices offset the demand growth attributable to the economic recovery, demographic growth and increases in the number of electric end-use devices.

Energy demand is expected to show a very slight increase this year with stronger growth expected in 2012. .

**Table 1: Peak and Energy Demand Forecast**

| Season | Normal Weather Peak (MW) | Extreme Weather Peak (MW) |
|---|---|---|
| Summer 2011 | 23,539 | 26,073 |
| Winter 2011-12 | 22,495 | 23,765 |
| Summer 2012 | 23,712 | 26,269 |
| **Year** | **Normal Weather Energy (TWh)** | **% Growth in Energy** |
| 2006 Energy | 152.3 | -1.9% |
| 2007 Energy | 151.6 | -0.5% |
| 2008 Energy | 148.9 | -1.8% |
| 2009 Energy | 140.4 | -5.7% |
| 2010 Energy | 142.1 | 1.2% |
| 2011 Energy (Forecast) | 142.9 | 0.5% |
| 2012 Energy (Forecast) | 145.6 | 1.9% |

**- End of Section**

## 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 System Operator (IESO) assumes no responsibility to you or any third party for the consequences of any errors or omissions. The IESO may revise these materials at any time in its sole discretion without notice to you. Although every effort will be made by the IESO to update these materials to incorporate any such revisions it is up to you to ensure you are using the most recent version.

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# 1.0 Introduction

## 1.1 Outlook Documents

The Ontario Electricity Market Rules (Chapter 5 Section 7.1) require that a demand forecast for the next 18 months be produced and published on a quarterly basis. This Ontario Demand Forecast meets this requirement and covers the period from June 2011 to November 2012. It supersedes the previous forecast released February 2011.

## 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 methodology described in the document "Methodology to Perform Long Term Assessments" (IESO_REP_0266), found on the IESO website at http://www.ieso.ca/imoweb/pubs/marketReports/Methodology_RTAA_2011may.pdf. Readers may envision other 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.

Ontario demand is the sum of coincident loads plus the losses on the IESO-controlled grid. This demand forecast was based on actual demand, weather and economic data through the end of December 2010. Data for January through April 2011 have been incorporated into the tables and figures of this document. This document is divided into the following sections:

- Section 2.0 summarizes the forecast results
- Section 3.0 looks at historical demand
- Section 4.0 describes the assumptions used in this forecast of electricity demand
- All the tables in this report are contained in the 18-Month Outlook Tables (http://www.ieso.ca/imoweb/pubs/marketReports/18MonthOutlookTables_2011may.xls) spreadsheet posted alongside the Outlook documents. The spreadsheet's historical tables contain data right back to market opening which would not be practical in a printed document.

Readers are invited to provide comments or suggestions regarding the content of this or future reports. To do so, please call the IESO Customer Relations at 905-403-6900 or 1-888-448-7777 or send an email to customer.relations@ieso.ca.

Electronic copies of the forecast and weather scenarios are available upon request.

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# 2.0 Demand Forecast

This section presents the demand forecast for the Outlook period. Additional tables are included in the 18-Month Outlook Tables spreadsheet.

Table 2.1 contains the forecast of system weekly peak and energy demand. It also includes the load forecast uncertainty (LFU) for the weekly peak. The LFU is a measure of variability in load due to the volatility of weather.

**Table 2.1: Weekly Peak and Energy Demand Forecast**

| Week Ending | Normal Peak (MW) | Extreme Peak (MW) | Load Forecast Uncertainty (MW) | Normal Energy Demand (GWh) | Week Ending | Normal Peak (MW) | Extreme Peak (MW) | Load Forecast Uncertainty (MW) | Normal Energy Demand (GWh) |
|---|---|---|---|---|---|---|---|---|---|
| 05-Jun-11 | 19,609 | 24,358 | 1,614 | 2,557 | 04-Mar-12 | 20,982 | 22,261 | 395 | 2,955 |
| 12-Jun-11 | 19,853 | 23,567 | 1,315 | 2,621 | 11-Mar-12 | 21,155 | 22,006 | 440 | 2,949 |
| 19-Jun-11 | 21,207 | 24,664 | 1,216 | 2,706 | 18-Mar-12 | 20,080 | 20,929 | 756 | 2,858 |
| 26-Jun-11 | 21,772 | 25,189 | 1,442 | 2,731 | 25-Mar-12 | 19,723 | 20,570 | 718 | 2,820 |
| 03-Jul-11 | 23,107 | 24,861 | 1,258 | 2,736 | 01-Apr-12 | 19,413 | 20,346 | 820 | 2,719 |
| 10-Jul-11 | 23,108 | 25,101 | 1,142 | 2,863 | 08-Apr-12 | 19,024 | 20,093 | 952 | 2,671 |
| 17-Jul-11 | 23,539 | 26,073 | 908 | 2,897 | 15-Apr-12 | 18,423 | 19,349 | 680 | 2,619 |
| 24-Jul-11 | 23,426 | 25,139 | 1,033 | 2,886 | 22-Apr-12 | 18,024 | 19,038 | 401 | 2,555 |
| 31-Jul-11 | 22,989 | 25,452 | 916 | 2,849 | 29-Apr-12 | 17,637 | 18,975 | 724 | 2,556 |
| 07-Aug-11 | 23,197 | 25,558 | 1,044 | 2,847 | 06-May-12 | 17,644 | 20,551 | 900 | 2,523 |
| 14-Aug-11 | 22,563 | 25,496 | 1,125 | 2,852 | 13-May-12 | 18,038 | 21,114 | 726 | 2,526 |
| 21-Aug-11 | 22,575 | 24,898 | 917 | 2,824 | 20-May-12 | 18,121 | 20,752 | 971 | 2,505 |
| 28-Aug-11 | 21,830 | 24,272 | 1,022 | 2,750 | 27-May-12 | 19,196 | 22,948 | 1,186 | 2,483 |
| 04-Sep-11 | 22,110 | 24,686 | 1,221 | 2,824 | 03-Jun-12 | 19,316 | 23,719 | 1,593 | 2,582 |
| 11-Sep-11 | 20,571 | 23,614 | 1,674 | 2,585 | 10-Jun-12 | 20,069 | 23,794 | 1,408 | 2,655 |
| 18-Sep-11 | 19,565 | 23,008 | 1,468 | 2,607 | 17-Jun-12 | 20,902 | 24,858 | 1,608 | 2,737 |
| 25-Sep-11 | 18,993 | 21,019 | 1,546 | 2,519 | 24-Jun-12 | 22,410 | 25,362 | 1,179 | 2,747 |
| 02-Oct-11 | 18,084 | 19,131 | 515 | 2,535 | 01-Jul-12 | 23,577 | 25,307 | 1,294 | 2,858 |
| 09-Oct-11 | 18,235 | 18,754 | 440 | 2,551 | 08-Jul-12 | 23,004 | 24,941 | 1,180 | 2,814 |
| 16-Oct-11 | 17,875 | 18,439 | 362 | 2,500 | 15-Jul-12 | 23,712 | 26,270 | 942 | 2,895 |
| 23-Oct-11 | 18,113 | 18,613 | 391 | 2,595 | 22-Jul-12 | 23,590 | 24,878 | 1,051 | 2,919 |
| 30-Oct-11 | 18,646 | 19,108 | 409 | 2,613 | 29-Jul-12 | 23,190 | 25,550 | 898 | 2,797 |
| 06-Nov-11 | 18,869 | 19,580 | 515 | 2,606 | 05-Aug-12 | 23,426 | 26,202 | 1,178 | 2,909 |
| 13-Nov-11 | 19,490 | 20,219 | 577 | 2,680 | 12-Aug-12 | 22,833 | 25,633 | 1,261 | 2,852 |
| 20-Nov-11 | 20,139 | 20,868 | 455 | 2,762 | 19-Aug-12 | 22,685 | 24,652 | 997 | 2,856 |
| 27-Nov-11 | 20,563 | 21,175 | 602 | 2,822 | 26-Aug-12 | 22,268 | 24,757 | 1,012 | 2,813 |
| 04-Dec-11 | 20,940 | 22,034 | 536 | 2,868 | 02-Sep-12 | 22,039 | 25,274 | 1,260 | 2,824 |
| 11-Dec-11 | 21,741 | 22,683 | 528 | 2,945 | 09-Sep-12 | 21,233 | 23,826 | 1,618 | 2,701 |
| 18-Dec-11 | 21,742 | 22,775 | 620 | 2,971 | 16-Sep-12 | 19,675 | 23,267 | 1,515 | 2,625 |
| 25-Dec-11 | 22,015 | 23,030 | 519 | 2,988 | 23-Sep-12 | 19,629 | 21,892 | 828 | 2,571 |
| 01-Jan-12 | 21,125 | 22,383 | 514 | 2,792 | 30-Sep-12 | 19,391 | 20,655 | 337 | 2,588 |
| 08-Jan-12 | 22,058 | 23,209 | 617 | 2,978 | 07-Oct-12 | 18,408 | 19,069 | 553 | 2,573 |
| 15-Jan-12 | 22,495 | 23,483 | 657 | 3,096 | 14-Oct-12 | 18,073 | 19,062 | 522 | 2,541 |
| 22-Jan-12 | 22,479 | 23,765 | 660 | 3,097 | 21-Oct-12 | 18,225 | 18,778 | 430 | 2,597 |
| 29-Jan-12 | 22,377 | 23,352 | 544 | 3,089 | 28-Oct-12 | 18,870 | 19,313 | 503 | 2,625 |
| 05-Feb-12 | 22,160 | 23,032 | 447 | 3,053 | 04-Nov-12 | 18,850 | 20,088 | 774 | 2,630 |
| 12-Feb-12 | 21,712 | 22,978 | 820 | 3,059 | 11-Nov-12 | 19,948 | 20,342 | 572 | 2,720 |
| 19-Feb-12 | 21,844 | 22,922 | 501 | 3,027 | 18-Nov-12 | 20,260 | 21,007 | 434 | 2,784 |
| 26-Feb-12 | 21,109 | 22,633 | 418 | 2,910 | 25-Nov-12 | 20,721 | 21,345 | 702 | 2,842 |

Compared to the previous forecast, weekly peak demands are quite similar. . Energy demand is slightly higher, particularly in the latter part of the forecast. Figures 2.1 and 2.2 show the projected energy and peak demand for the outlook period.

**Figure 2.1: Weekly Energy Demand – History and Forecast**

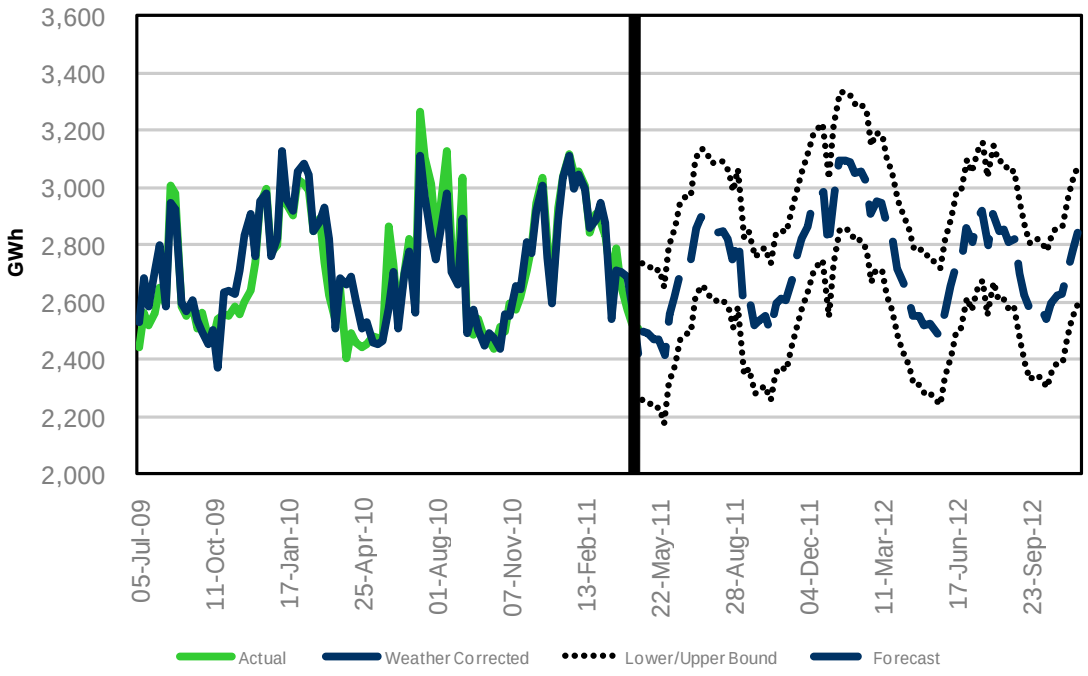
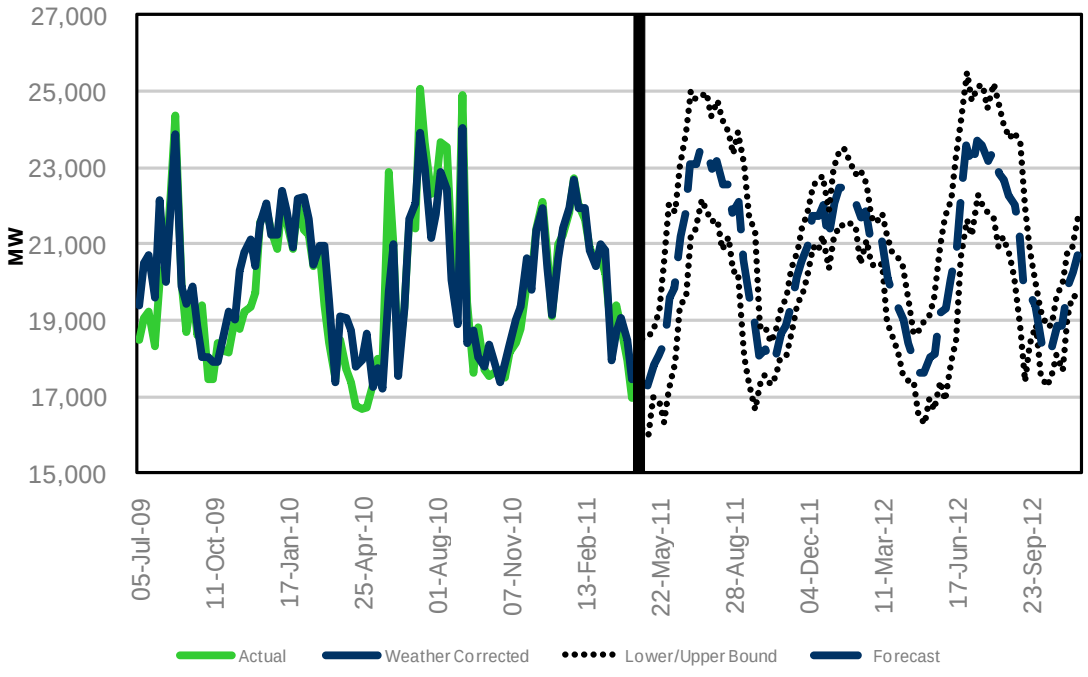



**Figure 2.2: Weekly Peak Demand – History and Forecast**

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# 3.0 Historical Review

This section discusses historical electricity demand. The weather-corrected numbers are generated based on Normal weather.

## 3.1 Six Month Review - November to April

The weather was cooler than normal throughout the winter of 2010-11. Demand has shown year-over-year increases for this period, but those increases disappear once the demand is weather corrected.

November

- November was milder than normal.
- Peak demand was 19,970 MW or 20,650 MW weather-corrected. The actual peak was 260 MW higher than the previous year's, which was the lowest November peak since market opening.
- Actual energy demand for the month was 11.3 TWh (11.5 TWh weather-corrected). Weather-corrected demand was down 3.2% over the previous November.
- Wholesale industrial energy demand was 6.4% higher than the previous November.

December

- December was colder than normal though the coldest days were fairly typical of December weather. The peak occurred on December 13, the coldest day of the month.
- Peak demand for the month was 22,114 MW (21,962 MW weather-corrected). This is a slim reduction from the previous December.
- Actual energy demand for the month was 12.7 TWh (12.5 TWh weather-corrected). Weather-corrected demand has declined each year since December 2004.
- Wholesale industrial customers' consumption showed strong growth of 9.3% compared to the previous December.

January

- January's weather was similar to December's in that it was colder than normal but the peak weather was fairly typical. Despite the generally cold weather, the day with the most focus for the month was New Year's Day, which was unseasonably warm with an afternoon high in excess of 9˚C. This gave rise to the lowest January minimum demand since market opening due to the mild temperatures and the holiday.
- The monthly peak was 22,733 MW (22,695 MW weather-corrected) and was an increase over the previous January. This was the peak for the entire winter. The peak day was not the coldest day of the month as those days coincided with weekends, effectively blunting their impact.
- Actual energy demand for the month was 13.3 TWh (13.2 TWh weather-corrected). Weather-corrected energy demand was down 0.6% compared to the previous year.

- Despite the lower overall energy demand, wholesale industrial customers' consumption continued to show strength with a 7.1% increase over the previous year.

February

- The weather for February was very close to normal both in average and peak temperature.
- The peak for the month was 21,871 MW (21,938 MW weather-corrected).
- Actual energy demand for the month was 11.8 TWh (11.7 TWh weather-corrected). Weather-corrected demand was down 1.0% over the previous year.

Wholesale industrial customers' consumption grew by 1.1% over the previous year, the lowest year-over-year change since March 2010.

March

- March's weather was near normal but lacked a typical cold peak day.
- The 20,667 MW peak occurred on March 2, the coldest day of the month. The weather-corrected peak was 21,000 MW.
- Actual energy demand for the month was 12.4 TWh (12.3 TWh weather-corrected). This was a 0.8% increase over the previous March.
- Wholesale industrial customers' consumption rebounded from February's value as demand was up 4.8% over the previous March.

April

- For April, the weather was fairly normal but lacked neither very warm or very cold weather to drive a significant peak. The peak was 17,945 MW (18,868 MW weather-corrected), the second lowest April peak since the electricity market opened.
- April's energy demand (10.8 TWh actual and 11.0 TWh weather-corrected) was the lowest April since market opening. Weather-corrected demand was 0.8% lower than a year earlier.
- Wholesale industrial customers' consumption grew by 1.4% on a year-over-year basis.

Table 3.3.2 of the 18-Month Outlook Tables spreadsheet contains monthly demand information going back to market opening. Table 3.1 contains a summary of the weather and demand for the past six months.

**Table 3.1: Historical 2010 Weather and Demand Summary**

| Historical Analysis | | November | December | January | February | March | April |
|---|---|---|---|---|---|---|---|
| **Actual** | Average Temperature (°C) | 7.6 | -1.7 | -4.4 | -1.9 | 2.8 | 10.7 |
| | Minimum Temperature (°C) | -0.4 | -11.6 | -17.3 | -9.9 | -4.5 | 3.7 |
| | Maximum Temperature (°C) | 14.5 | 9.7 | 11.8 | 9.5 | 14.6 | 22.5 |
| **Monthly Normal** | Normal Average Temperature (°C) | 6.7 | 0.2 | -3.3 | -1.5 | 3.6 | 10.7 |
| | Normal Minimum Temperature (°C) | -2.0 | -8.4 | -13.5 | -13.5 | -5.5 | 2.8 |
| | Normal Maximum Temperature (°C) | 18.9 | 10.0 | 6.7 | 8.2 | 16.7 | 25.0 |
| **Actual** | Peak Demand (MW) | 19,970 | 22,114 | 22,733 | 21,871 | 20,667 | 17,945 |
| | Average Hour (MW) | 15,700 | 17,086 | 17,879 | 17,523 | 16,603 | 14,984 |
| | Minimum Hour (MW) | 11,584 | 12,614 | 11,835 | 13,358 | 12,736 | 11,276 |
| | 90th Percentile (MW) | 17,897 | 19,769 | 20,362 | 19,880 | 18,529 | 17,113 |
| | Percent above 20,000 (MW) | 0.0% | 7.5% | 15.3% | 7.9% | 1.1% | 0.0% |
| | # of Hours Above 20,000 (MW) | 0 | 56 | 114 | 53 | 8 | 0 |
| | Energy Demand (GWh) | 11,304 | 12,712 | 13,302 | 11,775 | 12,352 | 10,788 |
| **Weather Corrected** | Peak Demand (MW) | 20,650 | 21,962 | 22,695 | 21,938 | 21,004 | 18,868 |
| | Energy Demand (GWh) | 11,502 | 12,543 | 13,200 | 11,742 | 12,284 | 10,996 |
| **Forecast** | Peak Demand (MW) | 20,718 | 21,581 | 22,271 | 21,982 | 20,550 | 18,196 |
| | Energy Demand (GWh) | 11,620 | 12,708 | 13,344 | 11,980 | 12,467 | 10,966 |

Notes for Table 3.1 – Weather is for Toronto. Temperature is the daily high. Forecast is the most recent for that period.

## 3.2 Historical Energy Demand

Actual energy demand was 2.5% higher for the first four months of 2011 compared to 2010. After adjusting for the weather impacts, demand was 0.4% lower than the same months of 2010. Demand is 6.0% lower than the pre-recession values for 2008.

Despite the weak growth over the start of 2011, the wholesale customers' consumption has shown fairly strong year-over-year growth. For the first four months of the year, wholesale consumption has increased by 3.6% over 2010. However, those levels are still 19.7% below the pre-recession volumes. Wholesale consumption is tracking roughly 460 MW lower – on an hourly basis – than it was in early 2008.

Figure 3.1 shows the year-over-year change in wholesale customers' average hourly consumption. Consumption had been on a downward trend since the spring of 2005, a result of the appreciating Canadian dollar. Demand had started to increase just prior to the financial crisis of late 2008 and the ensuing recession throughout 2009. In the spring of 2010, wholesale consumers' loads started showing year-over-year gains, which strengthened throughout the year.

Figure 3.2 shows the wholesale customers' average hourly load by industry segment for 2008-2010. The graph shows that those industries with the highest load levels have seen the greatest reduction in their load.

**Figure 3.1: Wholesale Customers' Year-over-Year Change in Consumption**

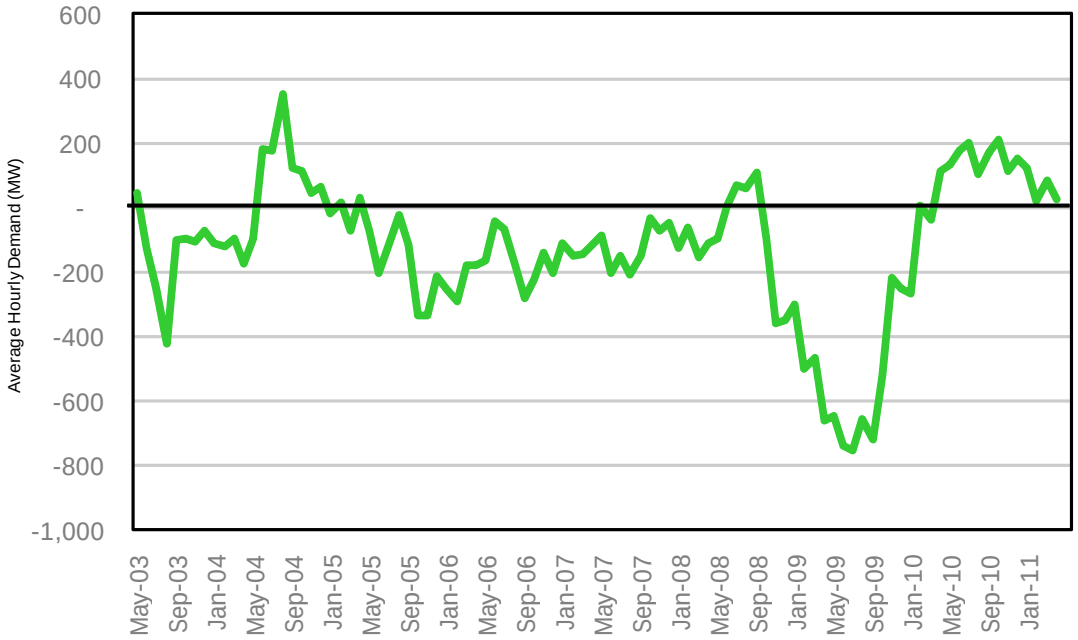
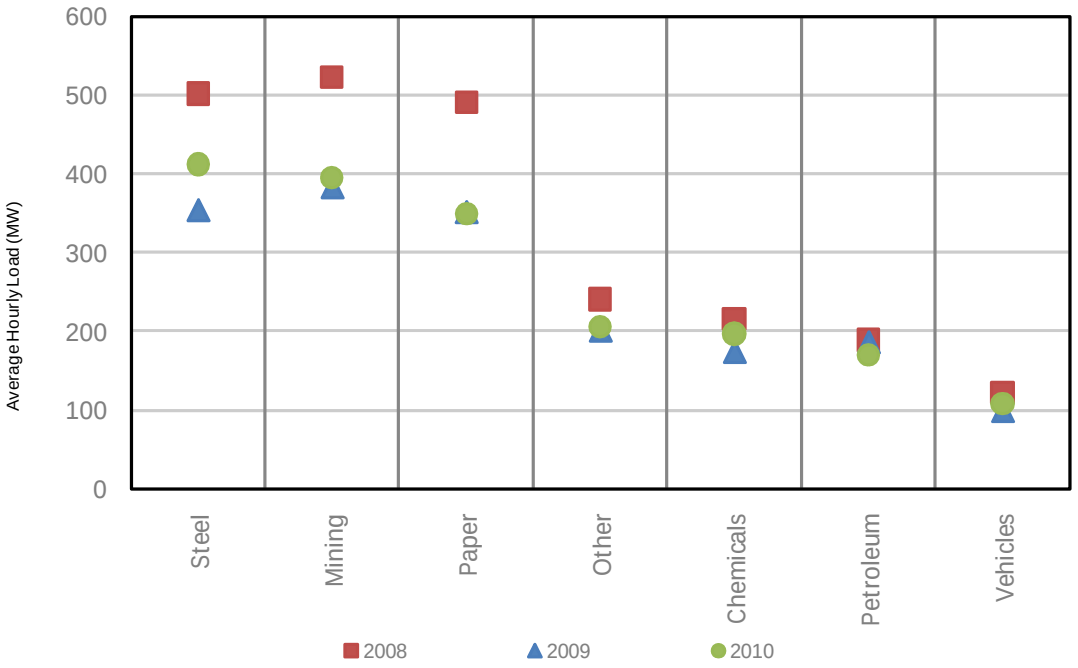



**Figure 3.2: Wholesale Customers' Average Hourly Consumption by Industry Segment**




Overall energy demand has followed a similar path to that of the industrial sector. Though not as volatile, energy demand growth has been flat or negative since 2005. Part of this is due to

economic factors but the growth in conservation, and recently, embedded generation, has further eroded the demand for electricity on the IESO-controlled grid.

Figure 3.3 displays a moving average of weekly demand. The graph depicts the general decline in energy demand since the summer of 2005 and the steep decline due to the recession. The tail end shows the recent economic rebound.

**Figure 3.3: Energy Demand – 52-Week Moving Average**

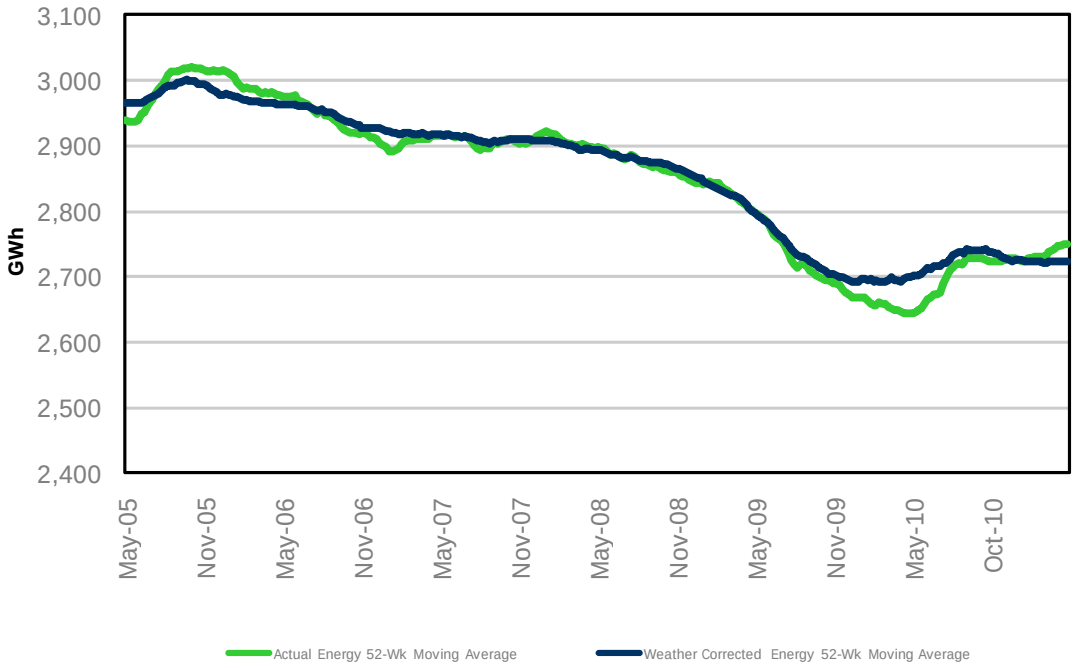



Table 3.2 contains the weekly energy demand for the past six months. The table has the actual and weather-corrected demand for each week and notes any item of significance for the week. If the weather-corrected demand is greater than the actual demand, it means that the actual weather was milder than normal. Additional history is available in the 18-Month Outlook Tables spreadsheet in Table 3.3.1.

**Table 3.2: Historical Weekly Energy Demand**

| Week Number | Week Ending | Peak Day | Actual Energy (GWh) | Corrected Energy (GWh) | Notes |
|---|---|---|---|---|---|
| 44 | 07-Nov-10 | 03-Nov-10 | 2,598 | 2,553 | |
| 45 | 14-Nov-10 | 08-Nov-10 | 2,578 | 2,658 | Remembrance |
| 46 | 21-Nov-10 | 18-Nov-10 | 2,619 | 2,644 | |
| 47 | 28-Nov-10 | 25-Nov-10 | 2,713 | 2,811 | |
| 48 | 05-Dec-10 | 02-Dec-10 | 2,794 | 2,774 | |
| 49 | 12-Dec-10 | 08-Dec-10 | 2,950 | 2,922 | |
| 50 | 19-Dec-10 | 13-Dec-10 | 3,034 | 3,008 | |
| 51 | 26-Dec-10 | 20-Dec-10 | 2,822 | 2,757 | Christmas Day |
| 52 | 02-Jan-11 | 28-Dec-10 | 2,610 | 2,599 | New Year's Day |
| 1 | 09-Jan-11 | 06-Jan-11 | 2,933 | 2,889 | |
| 2 | 16-Jan-11 | 12-Jan-11 | 3,040 | 3,035 | |
| 3 | 23-Jan-11 | 17-Jan-11 | 3,117 | 3,114 | |
| 4 | 30-Jan-11 | 24-Jan-11 | 3,050 | 2,999 | |
| 5 | 06-Feb-11 | 31-Jan-11 | 3,059 | 3,047 | |
| 6 | 13-Feb-11 | 08-Feb-11 | 3,008 | 2,997 | |
| 7 | 20-Feb-11 | 15-Feb-11 | 2,844 | 2,858 | |
| 8 | 27-Feb-11 | 22-Feb-11 | 2,909 | 2,888 | Family Day |
| 9 | 06-Mar-11 | 02-Mar-11 | 2,883 | 2,947 | |
| 10 | 13-Mar-11 | 09-Mar-11 | 2,834 | 2,879 | |
| 11 | 20-Mar-11 | 14-Mar-11 | 2,667 | 2,540 | March Break |
| 12 | 27-Mar-11 | 23-Mar-11 | 2,789 | 2,714 | |
| 13 | 03-Apr-11 | 28-Mar-11 | 2,657 | 2,705 | |
| 14 | 10-Apr-11 | 05-Apr-11 | 2,574 | 2,691 | |
| 15 | 17-Apr-11 | 13-Apr-11 | 2,527 | 2,589 | |
| 16 | 24-Apr-11 | 19-Apr-11 | 2,511 | 2,423 | Easter |

## 3.3 Historical Peak Demand

Peak demands are generally weather-driven, weekday events. Peak demands have declined as industrial loads fell during the recession and have yet to return to their pre-recession levels. The lower levels of economic activity impacts minimum, peak and overall energy demand. Figure 3.4 shows the wholesale customers' consumption at the time of the monthly peak and the average hourly consumption for the month. The graph clearly shows the economic impact on peak demands. It also illustrates that average and peak demands are highly correlated.

The same pattern can be seen at the system level as the recession impacted overall demand. Figure 3.5 shows the 52-week moving average of peak demand. Here a drop similar to that seen in the wholesale customers' consumption is evident. Roughly 1,200 MW of total demand was lost during the recession followed by a modest rebound of 500 MW over the recovery period to date.

Table 3.3 shows the actual and weather-corrected weekly peak demand for the past six months.

**Figure 3.4: Wholesale Customers' Coincident Peak and Average Hourly Consumption**

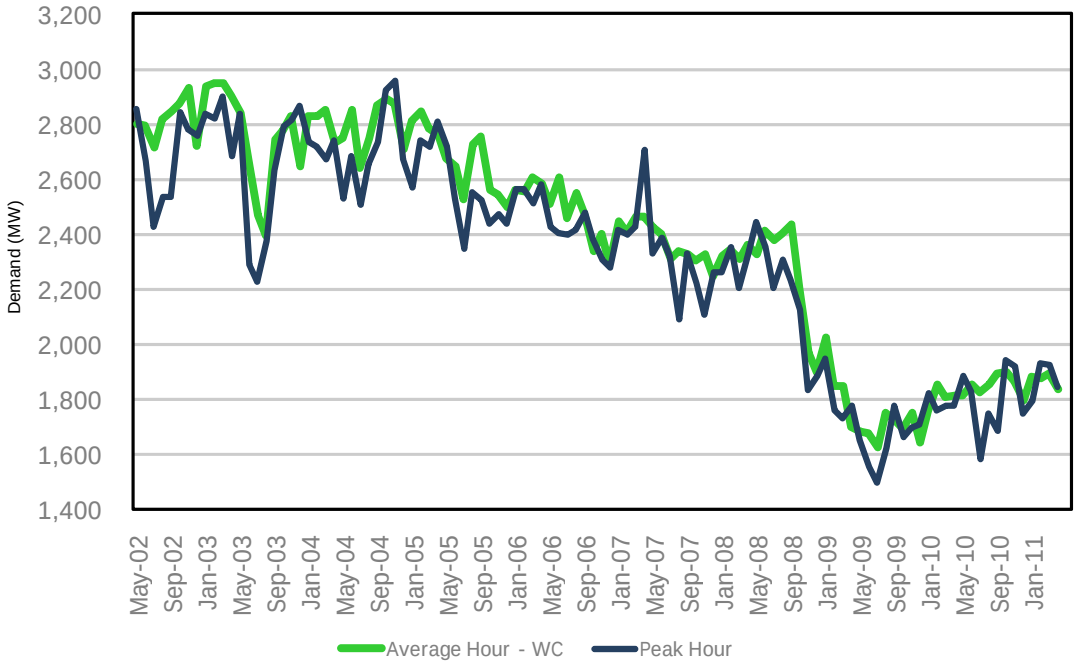



**Figure 3.5: Peak Demand – 52-Week Moving Average**

**Table 3.3: Weekly Peak Demand**

| Week Number | Week Ending | Peak Day | Actual Peak (MW) | Weather Corrected Peak (MW) | Peak Day Temperature |
|---|---|---|---|---|---|
| 44 | 07-Nov-10 | Wed-Nov-3 | 18,147 | 18,361 | 9.4 |
| 45 | 14-Nov-10 | Mon-Nov-8 | 18,417 | 19,045 | 10.0 |
| 46 | 21-Nov-10 | Thu-Nov-18 | 18,793 | 19,344 | 6.2 |
| 47 | 28-Nov-10 | Thu-Nov-25 | 19,970 | 20,650 | 4.2 |
| 48 | 05-Dec-10 | Thu-Dec-2 | 20,160 | 19,812 | 0.8 |
| 49 | 12-Dec-10 | Wed-Dec-8 | 21,409 | 21,355 | -3.6 |
| 50 | 19-Dec-10 | Mon-Dec-13 | 22,114 | 21,962 | -11.6 |
| 51 | 26-Dec-10 | Mon-Dec-20 | 20,813 | 20,401 | -0.7 |
| 52 | 02-Jan-11 | Tue-Dec-28 | 19,102 | 19,133 | -0.7 |
| 1 | 09-Jan-11 | Thu-Jan-6 | 21,010 | 20,650 | -3.2 |
| 2 | 16-Jan-11 | Wed-Jan-12 | 21,264 | 21,417 | -7.7 |
| 3 | 23-Jan-11 | Mon-Jan-17 | 21,820 | 21,946 | -7.1 |
| 4 | 30-Jan-11 | Mon-Jan-24 | 22,733 | 22,695 | -9.0 |
| 5 | 06-Feb-11 | Mon-Jan-31 | 22,045 | 21,938 | -10.7 |
| 6 | 13-Feb-11 | Tue-Feb-8 | 21,651 | 21,935 | -9.9 |
| 7 | 20-Feb-11 | Tue-Feb-15 | 20,898 | 20,846 | -4.9 |
| 8 | 27-Feb-11 | Tue-Feb-22 | 20,526 | 20,445 | -3.9 |
| 9 | 06-Mar-11 | Wed-Mar-2 | 20,667 | 21,004 | -4.3 |
| 10 | 13-Mar-11 | Wed-Mar-9 | 20,203 | 20,831 | 2.8 |
| 11 | 20-Mar-11 | Mon-Mar-14 | 18,636 | 17,953 | 2.7 |
| 12 | 27-Mar-11 | Wed-Mar-23 | 19,380 | 18,690 | -4.5 |
| 13 | 03-Apr-11 | Mon-Mar-28 | 18,826 | 19,069 | 2.2 |
| 14 | 10-Apr-11 | Tue-Apr-5 | 17,945 | 18,506 | 5.2 |
| 15 | 17-Apr-11 | Wed-Apr-13 | 16,980 | 17,480 | 11.2 |
| 16 | 24-Apr-11 | Tue-Apr-19 | 17,932 | 17,948 | 5.7 |

## 3.4 Load Duration Curves

The following graphs display the load duration curves for the winter months – December, January and February - for the past three years. For the winter of 2008-09, the financial meltdown had already occurred but demand had only weakened slightly. By the following winter the recession had already hit its nadir. Finally, through the most recent winter, the recovery remained soft due to debt concerns and a weak U.S. dollar. The figures are not weather-corrected so the weather will influence the shape of each of the graphs (Figures 3.6 to 3.8).

For December, the 2008 curve is the highest of the past three years. The other two years are basically indistinguishable from each other. Although Ontario was already in recession in December 2008, demand did not fall dramatically until the start of 2009.

For January, the 2008 curve is the highest as it was colder than both 2009 and 2010. The duration curves for February are virtually identical, showing the slow pace of the economic recovery.

**Figure 3.6: December Load Duration Curve**

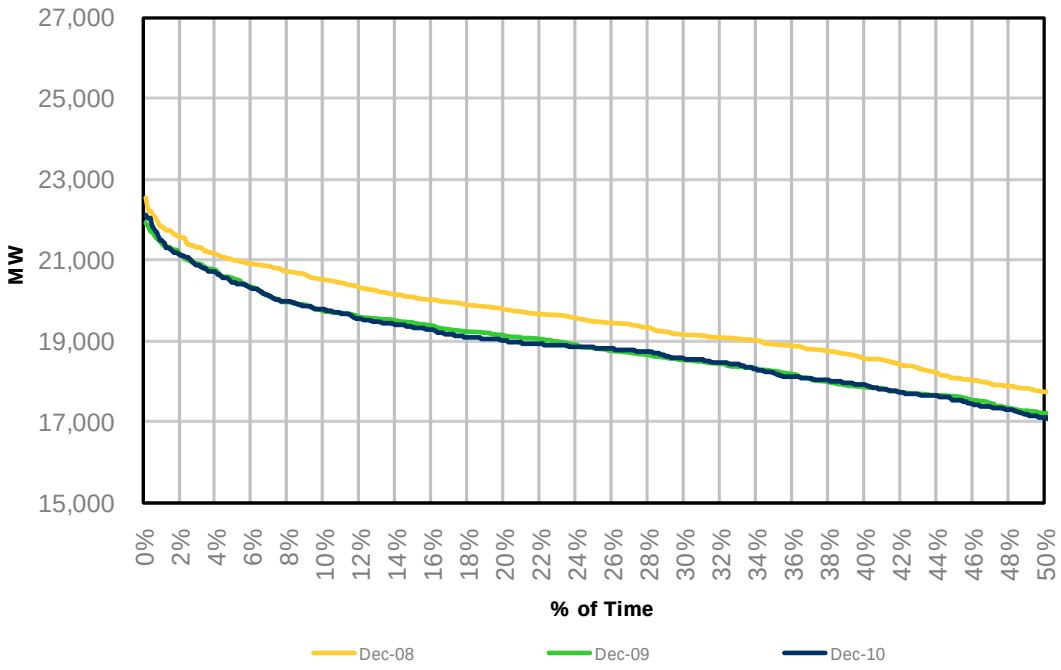



**Figure 3.7: January Load Duration Curve**

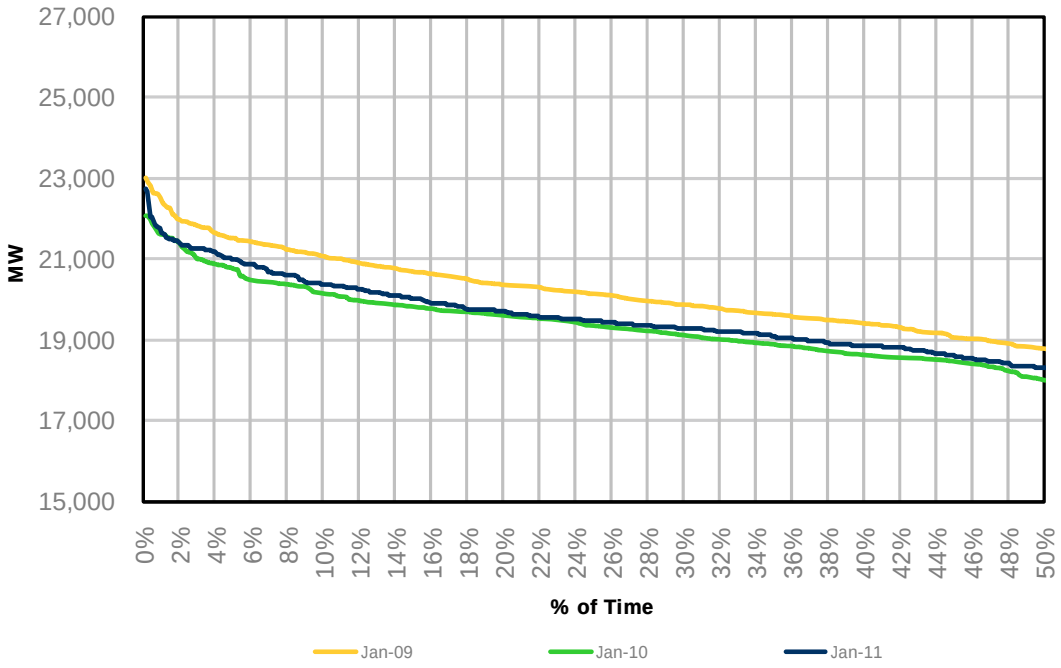
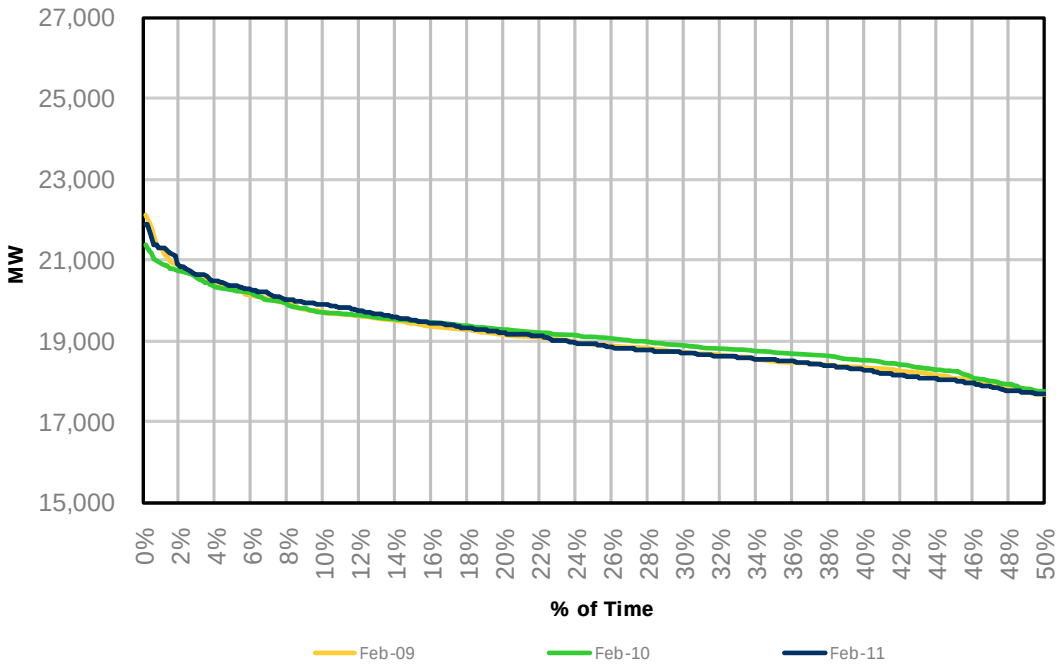


**Figure 3.8: February Load Duration Curve**

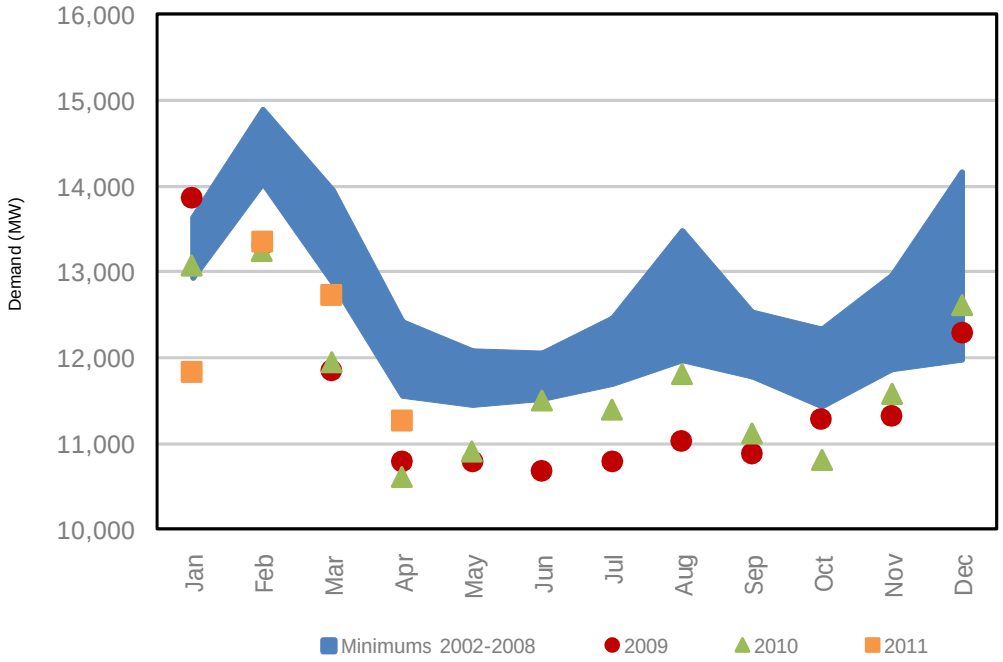



## 3.5 Historical Minimum Demand

Lower demand levels – a result of the recession – have given rise to operational concerns regarding surplus baseload generation. With the loss of energy-intense industrial loads, the monthly minimums have dropped over the 2009-2011 timeframe. Except for the winter period when minimum demands are higher, minimums are driven by economics rather than weather impacts. Minimums usually occur on weekends or holidays (and, in many cases, holiday weekends) during the early hours of the morning. Figure 3.9 shows the minimum demands for each month since market opening. The band represents the range of values for the years 2002-2008. The individual values are shown for 2009, 2010 and 2011 to date. All of the all-time lows have been set since the start of the recession. The all-time low for December was set in 2008 which is during the recession. The fall and spring are most representative of true baseload demand as they have minimal weather impact.

The spring and summer are the most challenging times for surplus baseload generation. The spring, summer and fall months all have low demand minimums, and the challenge stems from the generation. In the spring the system gets extra run-of-river hydro generation from freshet and the summer has additional capacity as few generators are on planned outage.

**Figure 3.9: Monthly Minimum Demands**




**- End of Section -**

# 4.0 Forecasting Process and Assumptions

A detailed description of the forecasting methodology can be found in the document entitled "Methodology to Perform Long Term Assessments" (IESO_REP_0266) (found on the IESO web site at http://www.ieso.ca/imoweb/pubs/marketReports/Methodology_RTAA_2011may.pdf).

The form and structure of the model have been modified to enhance and strengthen the explanatory powers of the economic drivers, conservation and embedded generation. The most recent demand, weather and economic data were incorporated into the model, which was re-estimated based on this information.

The forecast of demand requires inputs and this section covers each class of drivers.

## 4.1 Calendar Drivers for Forecast

Calendar variables are addressed in the Methodology document. Essentially, forecasting demand for electricity according to the calendar – days of the week, holidays, sunrise and sunset – is pretty straightforward.

## 4.2 Economic Drivers for Forecast

To produce an energy and peak demand forecast, an economic forecast of various drivers is required. The IESO uses a consensus of four publicly available provincial forecasts to generate economic drivers. The IESO also purchases economic forecasts for additional insight and analysis. Table 4.1 summarizes the key economic drivers for the demand forecast. The Ontario growth index is a weighting of the economic drivers as they relate to demand.

Throughout 2010 a number of issues persisted that hampered the recovery in export-oriented Ontario. The high level of debt - both private and public - has undermined consumer confidence. As well, the low U.S. dollar has made American manufacturers more competitive than Canadian firms, particularly in light of a "Buy American" mindset south of the border.

On the plus side, the auto sector has partially rebounded from the lows of 2009. Although not at pre-recession levels, the industry has helped the economic recovery through it consumption of steel and other materials.

Additionally, there has been a move towards austerity measures in order to rein in public debt. There will be a swing towards fiscal restraint as the current slate of fiscal stimulus measures is eliminated. Against this backdrop, economic growth is expected to be fairly muted over the forecast horizon. High commodity prices and a low U.S. dollar will remain a challenge for Ontario's manufacturing sector. These factors combined with weak global demand makes the prospect of a strong recovery in industrial demand unlikely for the foreseeable future. The impact of higher debt loads and higher inflation will lead to higher interest rates in the future.

Ultimately, the economic forecast still faces considerable downside risk due to the debt concerns of a number of nations.

**Table 4.1: Forecast of Ontario Economic Drivers**

| Year | Ontario Employment | | Ontario Housing Starts | | Ontario Growth Index | |
|---|---|---|---|---|---|---|
| | Thousands | Annual Growth (%) | Thousands | Annual Growth (%) | Index | Annual Growth (%) |
| 1995 | 5,098 | 2.0 | 31.9 | -23.3 | 1.025 | 1.42 |
| 1996 | 5,161 | 1.2 | 39.5 | 23.9 | 1.036 | 1.05 |
| 1997 | 5,277 | 2.3 | 50.0 | 26.5 | 1.054 | 1.69 |
| 1998 | 5,440 | 3.1 | 50.1 | 0.2 | 1.077 | 2.18 |
| 1999 | 5,621 | 3.3 | 62.9 | 25.6 | 1.102 | 2.34 |
| 2000 | 5,801 | 3.2 | 67.4 | 7.1 | 1.128 | 2.39 |
| 2001 | 5,924 | 2.1 | 70.3 | 4.2 | 1.150 | 1.88 |
| 2002 | 6,014 | 1.5 | 79.6 | 13.3 | 1.169 | 1.65 |
| 2003 | 6,203 | 3.1 | 80.9 | 1.7 | 1.198 | 2.49 |
| 2004 | 6,310 | 1.7 | 79.9 | -1.3 | 1.219 | 1.78 |
| 2005 | 6,390 | 1.3 | 73.2 | -8.4 | 1.237 | 1.49 |
| 2006 | 6,485 | 1.5 | 67.8 | -7.4 | 1.256 | 1.53 |
| 2007 | 6,585 | 1.6 | 62.8 | -7.4 | 1.275 | 1.47 |
| 2008 | 6,686 | 1.5 | 71.9 | 14.6 | 1.294 | 1.50 |
| 2009 | 6,535 | -2.3 | 47.9 | -33.3 | 1.286 | -0.63 |
| 2010 | 6,632 | 1.5 | 57.8 | 20.5 | 1.303 | 1.34 |
| 2011 (f) | 6,731 | 1.5 | 52.1 | -9.7 | 1.320 | 1.29 |
| 2012 (f) | 6,826 | 1.4 | 51.6 | -1.0 | 1.336 | 1.23 |

## 4.3 Weather Drivers for Forecast

Since forecasting long-term weather is not possible, weather scenarios are generated using historical data. The analytical studies that the IESO produces serve a variety of purposes and needs. As such, a variety of inputs are required. Therefore the IESO produces demand forecasts based on a number of different weather scenarios. The most commonly utilized scenarios are Normal and Extreme.

The weather scenarios are generated using the following steps:

- For each day over the past 31 years a "weather factor" is calculated based on the weather conditions of that day (temperature, wind speed, cloud cover and humidity). This weather factor represents the MW impact on demand if those weather conditions were observed in the forecast horizon.
- The daily weather factors are sorted from highest to lowest for each month.
- Normal weather is based on the median value of the sorted weather factors across the 31 years of history. For example, the median value of the maximum weather factor from each January from 1978 to 2008 would be the first value for the normal January. The median value of the second highest weather factor from each January from 1978 to 2008 would be the second day in the normal January. This is repeated until all days in the month are generated. Once the normal months are created they are mapped to the calendar based on the weekly average distribution of weather. The weekly peak eliciting weather is always mapped to Wednesday to ensure that peaks do not occur on weekends or holidays.

- Extreme weather is generated in a similar manner except that we use the maximum, rather than the median value from the sorted data.

Load Forecast Uncertainty (LFU) - a measure of demand fluctuations due to weather variability - is a critical part of the analysis. In conjunction with the Normal weather forecast, LFU is valuable in determining a distribution of potential outcomes under various weather conditions. The resource adequacy assessments use the Normal weather forecast in combination with LFU to consider a full range of peak demands that can occur under various weather conditions with varying probability of occurrence.

The Extreme weather scenario is valuable for studying situations where the system is under duress. The Extreme weather scenario is useful when examining peak conditions but is unrealistic from an energy demand standpoint, as severe weather conditions do not persist over a long time period.

The 18-Month Outlook Tables spreadsheet includes Table 3.3.5, which has the Normal and Extreme weather scenarios. For each week, the table shows the historical weather used for the peak day of that week. The table shows the daily high (temperature) and wind speed. Not shown but used in forecasting demand are humidity and cloud cover. The IESO uses six weather stations in the demand models – the data in the table is for Toronto. The weather scenarios were updated for data through the end of December 2010.

## 4.4 Conservation and Demand Management

Conservation and demand management within the Outlook are broken into three categories: conservation, embedded generation and demand management. Conservation includes energy efficiency programs, conservation behaviour, fuel switching and the impacts of smart meters. Embedded generation refers to load-displacing generation that is located on the Market Participants' side of the meter. This would include all generation under the Renewable Energy Standard Offer Program (RESOP) and some generation under the Green Energy Act's Feed-in Tariff (FIT). Demand management includes the OPA's demand response programs and the IESO's dispatchable loads. These groups will impact demand throughout the forecast.

Projected conservation numbers are provided to the IESO by the Ontario Power Authority (OPA). These projections are based on existing and future programs. Projected conservation impacts are decremented from demand.

Information on embedded generation is factored into the forecast. Embedded generation will displace demand that would normally have been met through the grid. Although the actual demand for electricity is unaltered, the source of supply will not be from the grid. Therefore the impacts of embedded generation are decremented from the forecast.

Demand response capacity projections are also provided by the OPA. Demand management programs represent a demand reduction that will be dispatched like a resource or generator. Conceptually, these programs represent capacity that can be called on when needed. Therefore, demand management is treated as a resource with a capacity value in MW. Adjustments are made based on historical data for the amount of demand management that is deemed to be reliably available.

Over the course of the forecast, the amount of conservation and demand management are expected to increase. Conservation - at the time of the summer peak - is expected to grow by 125 MW. Embedded generation's available capacity at the time of summer peak is expected to grow

by 175 MW over the outlook timeframe. Lastly, demand management programs are projected to increase their capacity from 850 MW to 1,350 MW over the course of the forecast horizon.

**- End of Document -**