18-MONTH OUTLOOK

From December 2012 to May 2014

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 electricity demand forecast for the period from December 2012 to May 2014 and supersedes the previous forecast released in September 2012.

Economic Outlook

The global economy continues to struggle through the residual problems of the financial crisis and ensuing 2009 recession. High levels of debt and unemployment continue to hamper the major economies. The Euro zone has once again dipped into recession, U.S. growth has been sluggish and even emerging markets have seen their growth rates fall as they are dependent on exports to those advanced economies for growth.

The high levels of public debt make stimulus spending unpalatable for most nations and interest rates are at historic lows so there is no opportunity for stimulus through rates. Both consumers and businesses have been wary and are looking for signs that will boost their confidence. Consistent, if unspectacular growth will help shore up that confidence which will in turn foster greater economic expansion. The global economy will have to grow out of its current situation but that may take time.

Despite rather strong domestic fundamentals, Canada has struggled within the global economy as Canada is a reliant on trade for growth. In Ontario, the export based sectors have been negatively impacted by not only the drop in global demand but also by the appreciation of the Canadian dollar. Ontario exporters therefore see less demand and greater competition. Though global demand may gain in strength, it is unlikely that the Canadian dollar will weaken significantly as Canada's currency is tied to oil prices.

Within Ontario, austerity measures at both the federal and provincial levels will have some moderating impact on growth. However, the biggest economic boost would come with a resurging U.S. economy and recent signs have indicated the potential for stronger growth.

The keys to the economic outlook are:

- Low interest rates will enable purchasing by consumers and business.
- Spending restraint – Governments and consumers with high debt loads will look at ways to reduce spending.
- Euro Zone Debt – Until sufficiently addressed this issue will have negative impacts on the global economy.
- U.S. Economy – An improving U.S. economy will help stimulate the demand for Ontario goods.

Economic growth is expected to improve over the forecast horizon.

Actual Weather and Demand

Since the last Ontario Demand Forecast document was published, actual demand and weather data have been reported for the six months of May through October.

For the six months actual energy demand was higher for each of the months except September compared to the same months a year prior. Actual demand was 1.7% higher than the same six months a year prior. The period was warmer than normal – particularly June and July – however, even after adjusting for weather the six months were 1.4% higher than the weather-corrected values a year earlier. Once again, only September showed a decline over the previous year.

The same strength is seen in the consumption by wholesale customers. Their consumption for the period May to October 2012 was up 4.9% over the same period a year earlier. Once again that growth was fairly consistent as each month was higher than a year prior with the exception of September. Despite the growth, industrial demand is still significantly below (-19.6%) the pre-recessionary levels.

The overall weather was much milder than normal with each of the months ranking fairly high compared to the 43 years of weather history since 1970. May (3rd), June (3rd), July (1st) and August (9th), all ranked in the top quartile of hottest average temperature. September (16th) and October (24th) were closer to normal. Overall, the weather correction for the six months was -1.3 TWh.

The 2012 summer peak demand occurred on July 17th which was the hottest and most humid day of the summer with an afternoon high of 35.5°C and a Humidex of 45.4°C. The peak demand was 24,636 MW (23,745 MW weather-corrected). The actual peak was lower than the previous summer's but the weather corrected peak was higher. At the time of the 2012 summer peak there was 386 MW of demand measures and an estimated global adjustment impact of roughly 750 MW reducing peak demand.

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 demand response programs are included in our analysis as a resource under the category of demand measures. The estimated impacts stemming from the global adjustment is decremented from the forecast. Conservation, embedded generation, demand response and the global adjustment 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. Winter peak demands will show a slight increase over the forecast horizon whereas summer peaks will show a decline. Winter peaks will face downward pressure from gains in lighting efficiency. Summer peaks will face greater

downward pressure from numerous sources - air conditioning efficiency, global adjustment impacts and solar embedded generation.

Energy demand is expected to show a small increase in 2012 before declining in 2013. The bump in 2012 is partially due to the leap year while the decline in 2013 is due to increases in embedded generation.

Table 1: Peak and Energy Demand Forecast

Season	Normal Weather Peak (MW)	Extreme Weather Peak (MW)
Winter 2012-13	22,014	23,250
Summer 2013	23,266	25,422
Winter 2013-14	22,096	23,329
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	141.2	-0.6%
2012 Energy (Forecast)	142.0	0.5%
2013 Energy (Forecast)	140.4	-1.1%

- End of Section

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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 December 2012 to May 2014. It supersedes the previous forecast released in September 2012.

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_2012jun.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 August 2012. Data for September and October 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_2012nov.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)
09-Dec-12	21,213	22,181	500	2,890	08-Sep-13	20,456	22,930	1,388	2,582
16-Dec-12	21,259	22,349	600	2,915	15-Sep-13	19,511	22,392	1,168	2,494
23-Dec-12	21,693	22,658	485	2,965	22-Sep-13	19,289	21,128	548	2,519
30-Dec-12	19,707	21,114	407	2,696	29-Sep-13	18,803	19,820	709	2,517
06-Jan-13	21,202	22,843	620	2,882	06-Oct-13	17,781	18,349	439	2,469
13-Jan-13	22,009	23,016	608	3,018	13-Oct-13	17,575	17,839	636	2,455
20-Jan-13	22,014	23,250	585	3,035	20-Oct-13	17,501	17,967	742	2,456
27-Jan-13	21,681	22,801	563	3,001	27-Oct-13	18,375	18,587	488	2,542
03-Feb-13	21,830	22,837	504	2,998	03-Nov-13	18,323	18,633	391	2,536
10-Feb-13	21,774	22,701	433	3,024	10-Nov-13	19,315	19,370	347	2,593
17-Feb-13	21,163	22,451	575	2,975	17-Nov-13	19,411	20,049	436	2,647
24-Feb-13	20,797	22,292	486	2,876	24-Nov-13	19,935	20,455	614	2,714
03-Mar-13	20,572	22,157	436	2,906	01-Dec-13	20,303	20,966	453	2,748
10-Mar-13	20,655	21,546	364	2,875	08-Dec-13	20,745	22,058	579	2,825
17-Mar-13	19,626	20,493	415	2,813	15-Dec-13	21,310	22,152	400	2,866
24-Mar-13	19,359	20,317	529	2,765	22-Dec-13	21,424	22,331	492	2,892
31-Mar-13	18,691	19,601	492	2,612	29-Dec-13	19,397	20,616	726	2,659
07-Apr-13	18,511	19,973	454	2,644	05-Jan-14	20,612	21,487	447	2,819
14-Apr-13	17,976	18,928	426	2,583	12-Jan-14	22,096	23,329	648	3,031
21-Apr-13	17,509	18,622	340	2,516	19-Jan-14	21,555	22,681	624	2,977
28-Apr-13	17,276	18,290	360	2,508	26-Jan-14	21,680	22,681	558	2,989
05-May-13	17,112	20,016	391	2,454	02-Feb-14	21,757	22,610	480	3,025
12-May-13	17,773	20,643	573	2,468	09-Feb-14	21,108	22,399	637	2,976
19-May-13	17,605	20,230	697	2,431	16-Feb-14	20,697	22,200	538	2,891
26-May-13	19,038	22,711	696	2,407	23-Feb-14	20,467	22,059	483	2,857
02-Jun-13	19,112	22,091	1,161	2,484	02-Mar-14	21,029	21,986	404	2,925
09-Jun-13	19,531	23,138	1,249	2,564	09-Mar-14	20,065	21,425	437	2,836
16-Jun-13	20,550	24,128	1,247	2,634	16-Mar-14	19,053	20,594	557	2,746
23-Jun-13	21,195	24,630	699	2,654	23-Mar-14	18,455	19,773	517	2,641
30-Jun-13	22,569	24,603	827	2,769	30-Mar-14	18,538	20,295	478	2,668
07-Jul-13	22,616	24,297	695	2,669	06-Apr-14	17,869	19,798	449	2,608
14-Jul-13	23,266	25,422	932	2,801	13-Apr-14	17,604	19,176	358	2,530
21-Jul-13	23,060	24,611	819	2,806	20-Apr-14	17,146	17,914	379	2,439
28-Jul-13	22,613	24,291	853	2,750	27-Apr-14	17,011	17,790	411	2,437
04-Aug-13	22,586	24,802	977	2,769	04-May-14	17,526	20,652	604	2,441
11-Aug-13	22,405	25,211	857	2,752	11-May-14	17,661	19,961	733	2,419
18-Aug-13	21,687	24,387	882	2,710	18-May-14	18,536	21,983	732	2,446
25-Aug-13	21,565	23,984	743	2,696	25-May-14	18,930	22,102	1,222	2,399
01-Sep-13	21,503	23,744	1,162	2,708	01-Jun-14	18,950	22,434	1,315	2,478

Compared to the previous forecast, weekly peak and energy demand are lower for most weeks. 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

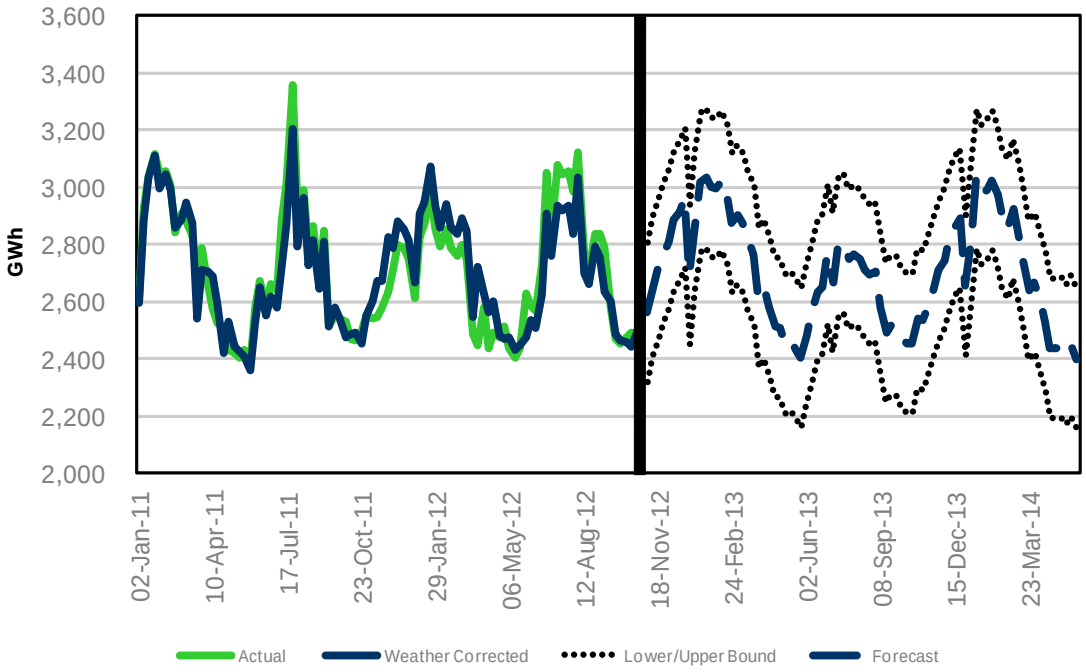
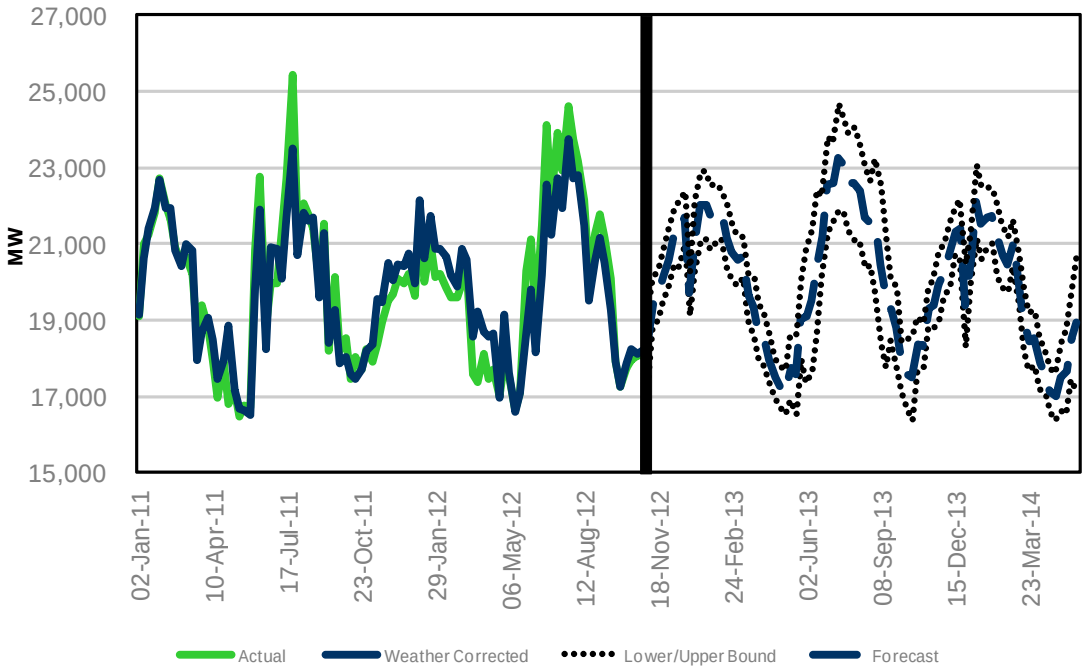


Figure 2.2: Weekly Peak Demand – History and Forecast



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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 – May to October

Since the last Ontario Demand document actuals have been recorded for the period May to October. The summer of 2012 was warmer than normal – particularly June and July. Table 3.1 contains a summary of the weather and demand for the past six months.

May

- May was warmer than normal in terms of both average and peak temperature. It ranked as the third warmest average temperature since 1970. The hottest day was not the peak day as the peak occurred on the Monday following the hottest day.
- The 21,106 MW peak was above average based on historical standards. The weather-corrected peak was lower at 19,809 MW. Energy demand was higher than the previous May but still on the low side as the economy has not recovered to pre-recession levels. Demand was 11.1 TWh (weather corrected was 11.1 TWh).
- Minimum demand (10,998 MW) was the highest since the recession.
- Wholesale industrial consumption was 6.5% higher than May 2011 but 21.6% below the pre-recessionary May 2008 value.

June

- June's average temperature was warmer than normal and ranks as the third warmest since 1970. The peak did not occur on the hottest day but the day with the highest Humidex.
- The actual peak of 24,107 MW (22,571 MW weather corrected) were both higher than the previous June. Energy demand for the month was 11.8 TWh and 11.4 TWh weather corrected. Both represent an increase over the previous June.
- Minimum demand (11,017 MW) was also a slight improvement over June 2011.
- Wholesale industrial consumption was 9.4% higher than June 2011. Consumption was 11.3% above the recessionary June 2009 but still 22.7% below the June 2008 value.

July

- The average temperature for July was the hottest since 1970 and the peak temperature the fourth highest. The peak occurred on the hottest and most humid day in the month.
- The July peak was 24,636 MW and 23,745 MW weather corrected. The weather corrected peak was higher than the previous June. Energy demand was 13.5 TWh (12.9 TWh weather corrected) driven by the high average temperature. The weather corrected energy demand was the highest July value since the recession.
- Minimum demand was 12,425 MW which is the highest since July 2006.
- Wholesale industrial energy demand was 8.2% higher than July 2011, but 19.5% below the pre-recessionary July 2008.

August

- In August the weather began to moderate from the highs of June and July. August's average temperature was 9th highest since 1970. In addition to the month being less hot, it was also less humid. The hottest day was a Saturday so it was not the peak day. The peak did occur on the preceding Friday which was the second hottest day.
- The actual peak (23,188 MW) and energy demand (12.6 TWh) were higher than last August's values. The same is true for the weather corrected values (22,797 MW and 12.4 TWh).
- Minimum demand for the month was 11,676 MW which was lower than the previous year's.
- Wholesale industrial energy demand was up 3.8% compared to the previous year and is roughly 20.0% lower than the pre-recession August 2008.

September

- Overall, September was warmer than normal but not significantly so. The same applies to the peak temperatures.
- The month's peak demand of 21,183 MW (20,514 MW weather corrected) were the lowest since 2009. Energy demand was 11.0 TWh (10.9 TWh weather-corrected). Both were the lowest since September 2009 as well.
- The minimum demand of 11,012 MW, also the lowest since September 2009.
- Of the six months, only September saw a year over year decline in wholesale industrial energy demand. Demand was 2.8% lower than last year and 23.8% below the pre-recession level.

October

- October was mildly warmer than normal both in terms of average and peak temperature. The monthly peak occurred on the second coldest day as the coldest day was a Sunday.
- The actual peak 18,829 MW (18,951 MW weather corrected) was higher than all the October peaks since the recession. Weather corrected energy demand was 11.3 TWh (11.1 TWh actual) the highest October energy demand since pre-recession.
- Minimum demand (11,436 MW) was also the highest value since before the recession.
- October saw a return to the year over year growth in wholesale industrial energy demand. Demand was up 4.8% over last October but still 12.6% below the pre-recessionary values of October 2008.

Table 3.3.2 of the 18-Month Outlook Tables spreadsheet contains monthly demand information going back to market opening.

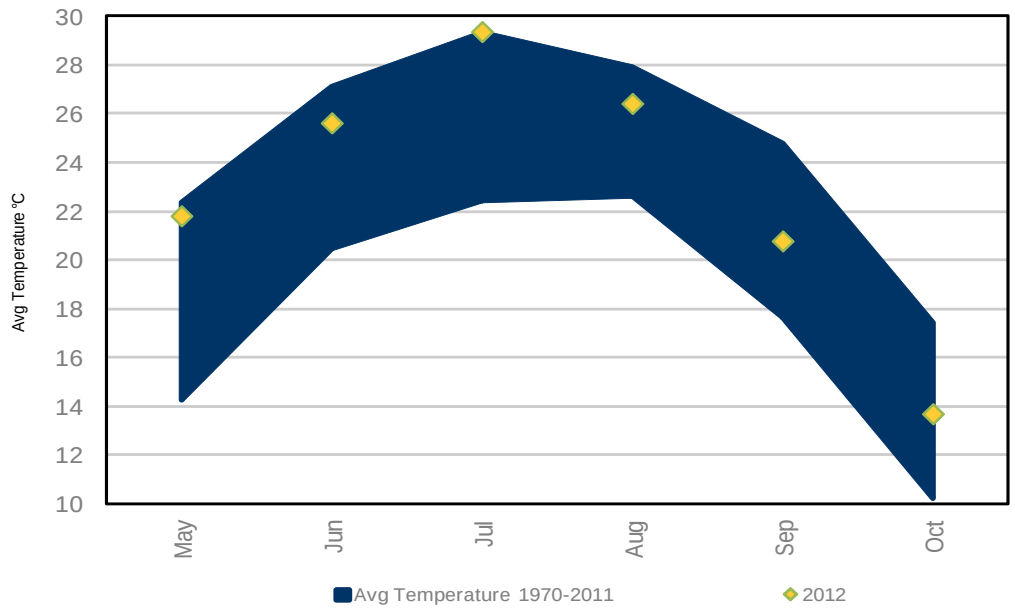
Table 3.1 contains a summary of the weather and demand for the past six months. Figure 3.1 shows the average daily high temperature by month for 2012 compared to the history for 1970-2011.

Table 3.1: Historical 2012 Weather and Demand Summary

Historical Analysis		May	June	July	August	September	October
Actual	Average Temperature (°C)	21.4	25.4	29.1	26.2	20.7	13.3
	Minimum Temperature (°C)	14.0	13.1	23.1	20.7	13.8	4.3
	Maximum Temperature (°C)	30.7	34.2	36.2	32.6	28.7	23.6
Monthly Normal	Normal Average Temperature (°C)	17.1	23.8	26.4	24.4	20.9	12.6
	Normal Minimum Temperature (°C)	8.7	13.4	20.0	18.2	9.5	4.0
	Normal Maximum Temperature (°C)	27.2	31.3	30.9	30.8	29.8	21.1
Actual	Peak Demand (MW)	21,106	24,107	24,636	23,188	21,183	18,829
	Average Hour (MW)	14,969	16,389	18,087	16,979	15,334	14,976
	Minimum Hour (MW)	10,998	11,017	12,425	11,676	11,012	11,436
	90th Percentile (MW)	17,581	20,405	22,075	20,667	18,710	16,975
	Percent above 20,000 (MW)	1.8%	13.0%	28.5%	14.7%	3.2%	0.0%
	# of Hours Above 20,000 (MW)	13	94	212	109	23	0
	Energy Demand (GWh)	11,137	11,800	13,457	12,633	11,041	11,142
Weather Corrected	Peak Demand (MW)	19,809	22,571	23,745	22,797	20,514	18,951
	Energy Demand (GWh)	11,028	11,415	12,872	12,366	10,923	11,287
Forecast	Peak Demand (MW)	19,038	22,569	23,298	22,957	20,506	18,346
	Energy Demand (GWh)	10,944	11,398	12,319	12,419	10,811	11,200

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

Figure 3.1: Average Daily High Temperatures (Toronto)



3.2 Historical Energy Demand

Overall demand has shown some strength as 2012 has unfolded. The additional leap year day does give a boost to the growth rate for 2012 of roughly 0.3%. Likewise, the fact that 2013 has only 365 days contributes a reduction of 0.3% in 2013. Once the additional day is accounted for growth will only be 0.2% in 2012. Over the first four months of 2012 only February showed an increase over the previous year and that was only due to the additional leap year day. However, of the six months since April, demand has shown year over year increases in all but September.

After taking a step backwards in 2011, wholesale customer demand has shown consistent strength since March 2012. For the first 10 months of 2012 wholesale customers consumption has shown an increase of 3.2% over the previous year.

Figure 3.2 shows the year-over-year change in wholesale customers' average hourly consumption. The graph illustrates the increasing momentum of 2012 after a weak 2011. Although 2012 has seen some positive gains, industrial consumption remains below the pre-recessionary levels. Structural change in the economy has had a variety of impacts across the various industrial sectors. Figure 3.3 shows the wholesale customers' average hourly load by industry segment for the first ten months of the years 2008-2012. The graph shows that those industries with the highest load levels have seen the greatest reduction in their load and that none of the major industrial segments have surpassed their pre-recessionary levels.

Distributor's consumption is lower by 1.0% for the first 10 months of 2012. Much of that decline is due to the extremely mild winter. Weather corrected distributor's consumption is up 0.5% for the first 10 months of 2012.

Energy demand has followed a similar path to that of the industrial sector. Though some of this is due to the impact of the economy on overall electricity consumption, much of the reduced demand growth is due to the rise of conservation and embedded generation capacity over the past three years.

Figure 3.4 shows quarterly energy demand and embedded generation output. Though embedded generation shows seasonal volatility, the underlying upward trend is quite evident in the graph. Moving forward the embedded generation component will continue to grow as renewable energy contracts come into commercial operation.

Figure 3.2: Wholesale Customers' Year-over-Year Change in Consumption

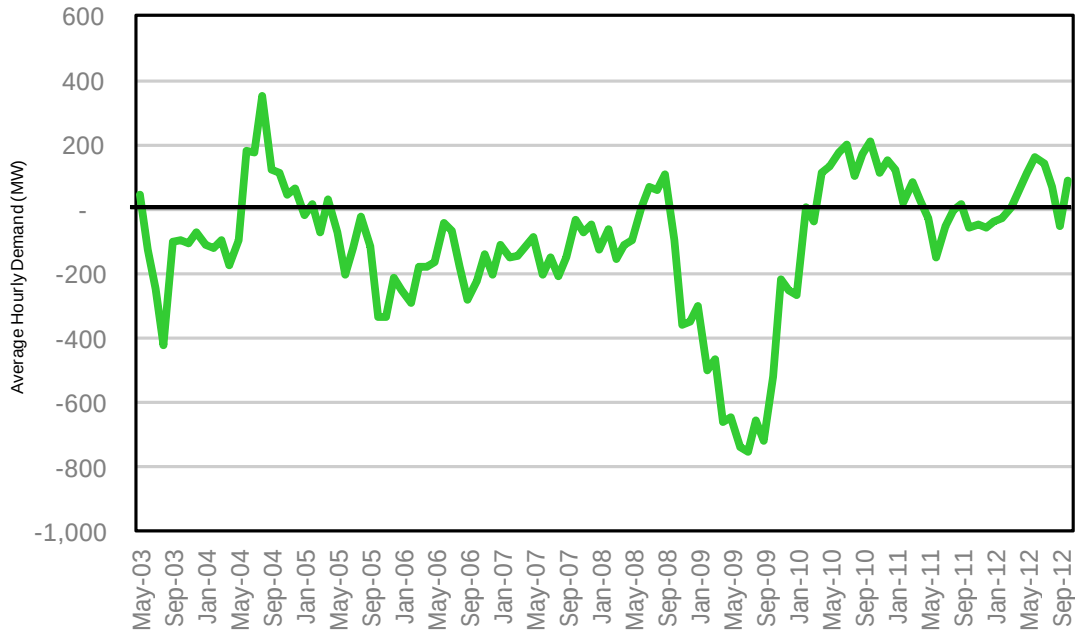


Figure 3.3: Wholesale Customers' Average Hourly Consumption by Industry Segment

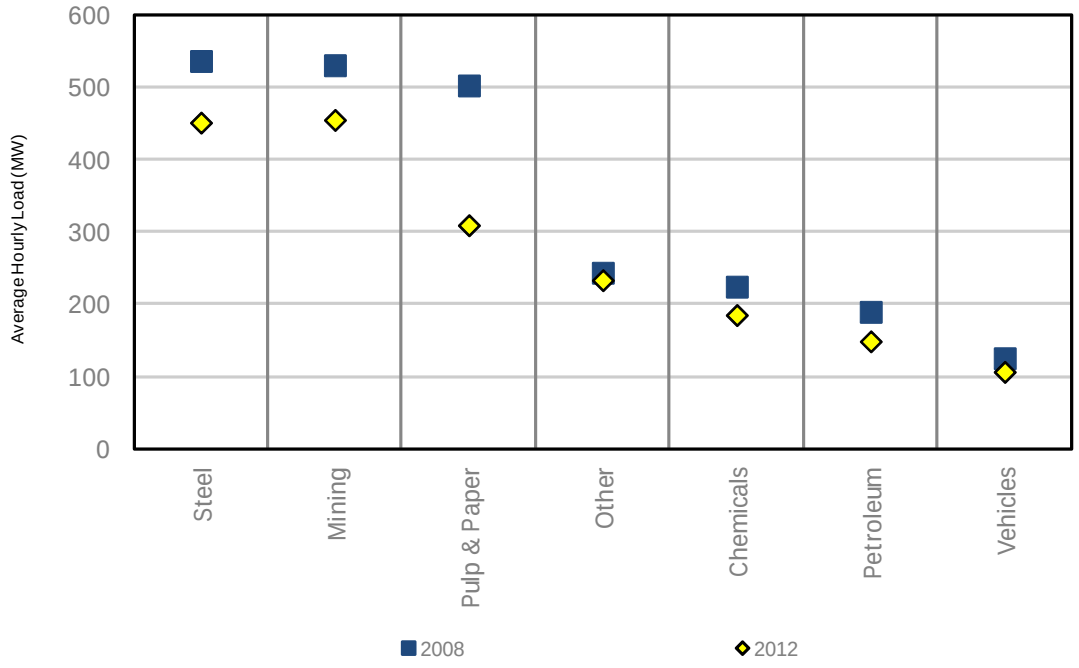


Figure 3.4: Quarterly Energy Demand and Embedded Generation

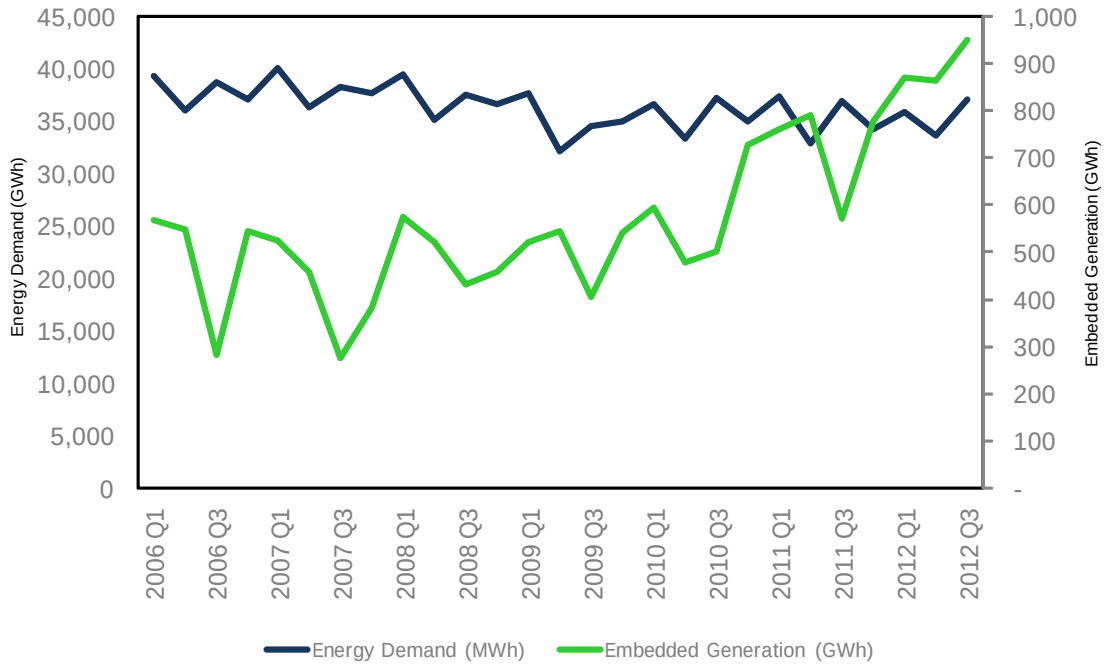


Table 3.2 contains the weekly energy demand for the past six months. The table has the actual and weather-corrected demand for each week and notes any item of significance for the week. If the weather-corrected demand is greater than the actual demand, it means that the actual weather was milder than 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
18	06-May-12	30-Apr-12	2,440	2,476	
19	13-May-12	07-May-12	2,403	2,433	
20	20-May-12	15-May-12	2,441	2,447	
21	27-May-12	25-May-12	2,629	2,476	Victoria Day
22	03-Jun-12	28-May-12	2,587	2,539	
23	10-Jun-12	10-Jun-12	2,570	2,510	
24	17-Jun-12	11-Jun-12	2,730	2,625	
25	24-Jun-12	20-Jun-12	3,054	2,911	
26	01-Jul-12	28-Jun-12	2,839	2,764	Canada Day
27	08-Jul-12	04-Jul-12	3,080	2,939	
28	15-Jul-12	13-Jul-12	3,048	2,922	
29	22-Jul-12	17-Jul-12	3,059	2,936	
30	29-Jul-12	23-Jul-12	2,988	2,837	
31	05-Aug-12	03-Aug-12	3,121	3,035	
32	12-Aug-12	08-Aug-12	2,771	2,700	Civic Holiday
33	19-Aug-12	16-Aug-12	2,712	2,662	
34	26-Aug-12	24-Aug-12	2,840	2,795	
35	02-Sep-12	31-Aug-12	2,836	2,753	
36	09-Sep-12	06-Sep-12	2,791	2,636	Labour Day
37	16-Sep-12	13-Sep-12	2,577	2,605	
38	23-Sep-12	17-Sep-12	2,469	2,486	
39	30-Sep-12	25-Sep-12	2,453	2,463	
40	07-Oct-12	03-Oct-12	2,477	2,463	
41	14-Oct-12	11-Oct-12	2,492	2,445	Thanksgiving Day
42	21-Oct-12	15-Oct-12	2,489	2,498	
43	28-Oct-12	24-Oct-12	2,537	2,655	

3.3 Historical Peak Demand

Peak demands are weather-driven, weekday events. Peak demands have been facing downward pressure due to a number of factors. Conservation, time of use rates, embedded generation, demand response, global adjustment and lower levels of economic activity have all contributed to lower peak demands.

The peak for the summer of 2012 was 24,636 MW which was lower than the peaks for the past two summers. On a weather-corrected basis the results are similar in that the peak was higher than last year but lower than 2010. The summer peaks are coming under increased downward pressure. Conservation programs initial targets were to reduce the peak demand. Therefore, efforts focused on improving air conditioner efficiency and improving the building envelope. Currently 43% of the existing embedded generation capacity is solar and 72% of the projected embedded generation capacity additions over the forecast horizon are expected to be solar powered. By the end of the forecast nearly 1,500 MW of embedded solar capacity is expected to be in commercial operation. That amount of embedded solar will have a significant impact on the summer peak. Conversely the embedded solar will have no impact on the winter peak.

Demand measures have an impact on summer peaks as well. The IESO reports actual demand which would be after the affects of demand measures. For forecasting purposes the demand is "reconstituted" to remove the impacts of demand measures. This ensures consistency between

the demand forecast and resources which include demand measures. Demand Response program (DR3) was activated three times over the summer and Peaksaver was activated twice.

Figure 3.5 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. Historically it had also shown that the average and peak demands are highly correlated. However, starting in 2010 there appears to be a divergence between the average and monthly peaks over the summer months. This is the impact of the global adjustment. Class A customers have begun to reduce demand during peak summer hours as a result of the global adjustment. Estimating the impacts can be complicated as the global adjustment relies on Class A customers correctly identifying the five peak days. This can lead to reductions on days that do not turn out to be top five days.

Figure 3.6 shows the difference between the wholesale customers' average hourly consumption for the monthly and their hourly consumption during the monthly peak for the period since January 2005. Since the five highest peaks have only occurred during the summer, the difference between the two series is relatively small during the winter, spring and fall. However, starting in 2010 Class A customers could reduce costs by reducing consumption on the five peak days. This is seen in the chart. Although all wholesale customers are Class A customers not all Class A customers are wholesale customers so the global adjustment impact would be greater than that depicted in the graph.

Figure 3.5: Wholesale Customers' Coincident Peak and Average Hourly Consumption

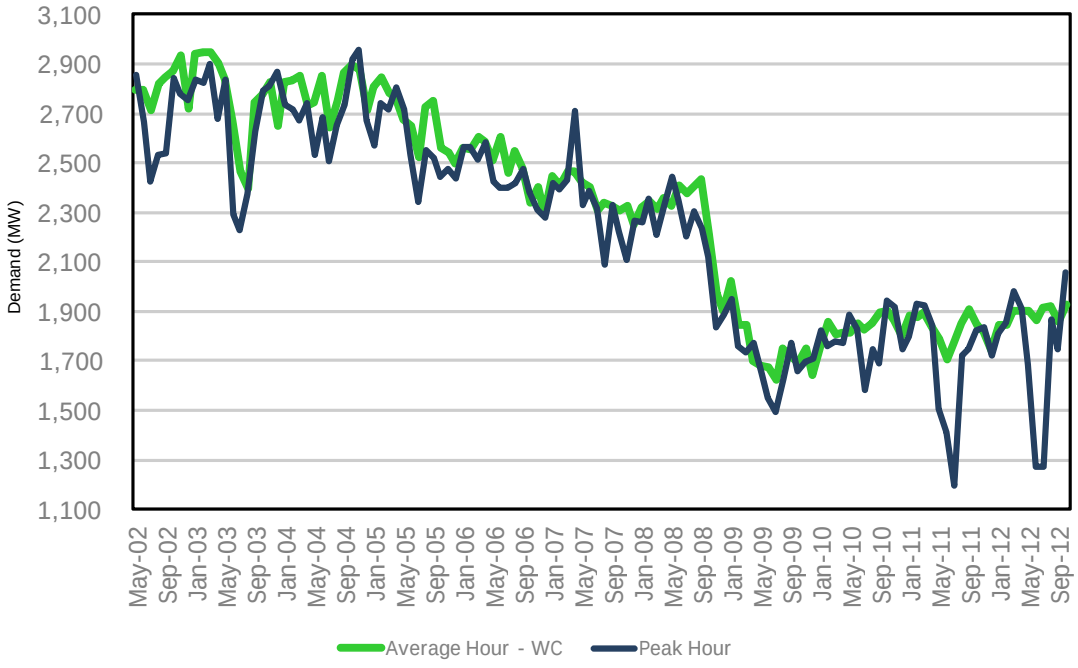


Figure 3.6: Difference in Wholesale Customers' Peak and Average Hourly Consumption

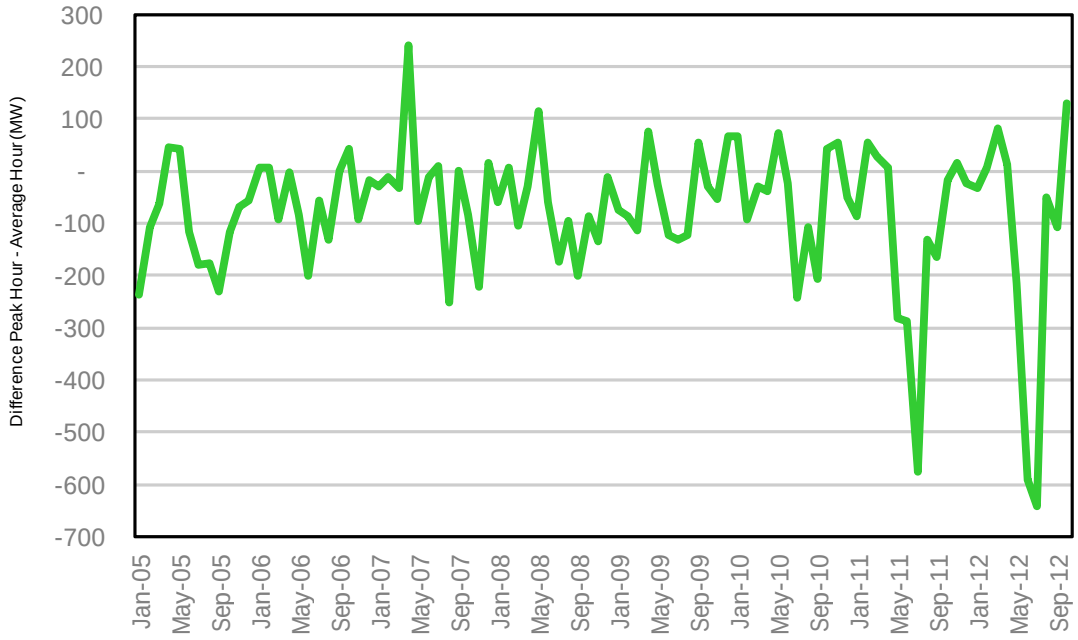


Table 3.3 shows the actual and weather-corrected weekly peak demand for the past six months.

Table 3.3: Weekly Peak Demand

Week Number	Week Ending	Peak Day	Actual Peak (MW)	Weather Corrected Peak (MW)	Peak Day Temperature
18	06-May-12	Mon-Apr-30	17,560	17,651	9.4
19	13-May-12	Mon-May-7	16,656	16,598	15.3
20	20-May-12	Tue-May-15	17,097	17,088	23.7
21	27-May-12	Fri-May-25	20,295	18,668	30.7
22	03-Jun-12	Mon-May-28	21,106	19,809	28.6
23	10-Jun-12	Sun-Jun-10	19,276	18,184	29.0
24	17-Jun-12	Mon-Jun-11	21,508	20,173	27.7
25	24-Jun-12	Wed-Jun-20	24,107	22,571	34.2
26	01-Jul-12	Thu-Jun-28	22,151	21,233	29.2
27	08-Jul-12	Wed-Jul-4	23,910	22,723	35.9
28	15-Jul-12	Fri-Jul-13	22,927	21,962	32.3
29	22-Jul-12	Tue-Jul-17	24,636	23,745	36.2
30	29-Jul-12	Mon-Jul-23	23,745	22,706	34.1
31	05-Aug-12	Fri-Aug-3	23,188	22,797	30.1
32	12-Aug-12	Wed-Aug-8	22,170	21,497	28.2
33	19-Aug-12	Thu-Aug-16	20,242	19,504	26.8
34	26-Aug-12	Fri-Aug-24	21,277	20,576	28.7
35	02-Sep-12	Fri-Aug-31	21,800	21,160	32.6
36	09-Sep-12	Thu-Sep-6	21,183	20,514	27.1
37	16-Sep-12	Thu-Sep-13	20,078	19,258	28.7
38	23-Sep-12	Mon-Sep-17	17,899	17,927	23.2
39	30-Sep-12	Tue-Sep-25	17,266	17,272	22.0
40	07-Oct-12	Wed-Oct-3	17,746	17,892	18.5
41	14-Oct-12	Thu-Oct-11	17,974	18,257	12.8
42	21-Oct-12	Mon-Oct-15	18,069	18,123	11.0
43	28-Oct-12	Wed-Oct-24	18,081	18,220	11.4
44	31-Oct-12	Mon-Oct-29	18,829	18,951	4.3

3.4 Load Duration Curves

The following load duration curves display load for the four seasons. The seasons are defined as fall (September, October and November), winter (December, January and February), spring (March, April and May) and summer (June, July and August). The following graphs are presented in reverse order with the most recent data (winter) first (Figures 3.7 to 3.10).

The figures are not weather-corrected so the weather will influence the shape of each of the graphs. The impact of the warmer than normal summer is seen in the load duration curve. Likewise, the extremely mild winter weather is very evident in the winter load duration curve.

The spring and fall load duration curves are more heavily influenced by the level of economic activity than by the weather. Those load duration curves show that demand remains low by historical standards.

Figure 3.7: Summer Load Duration Curve

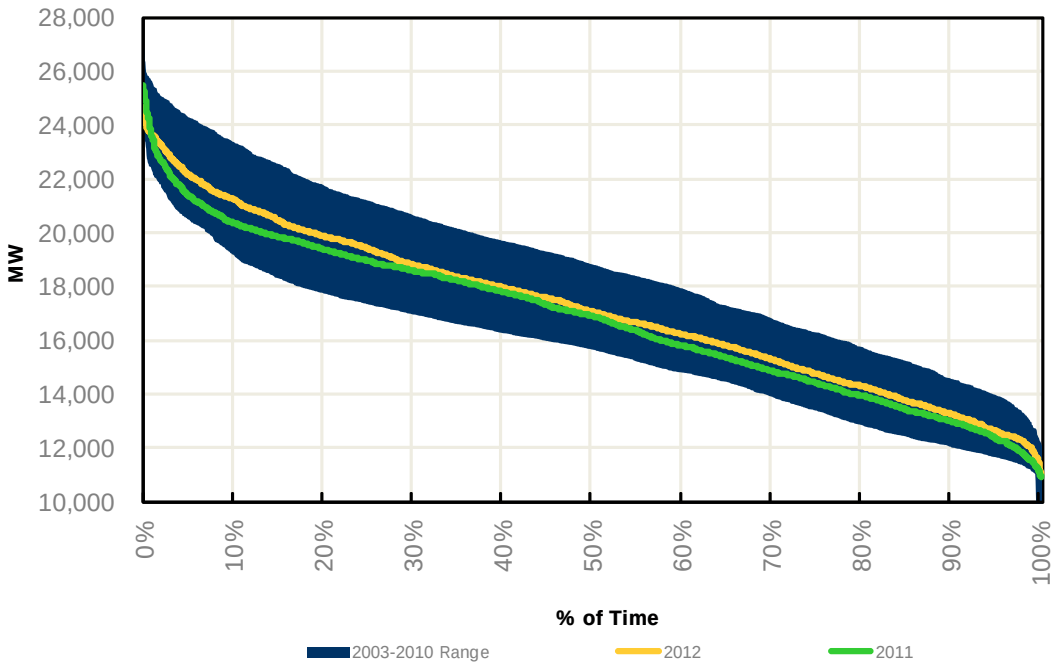


Figure 3.8: Spring Load Duration Curve

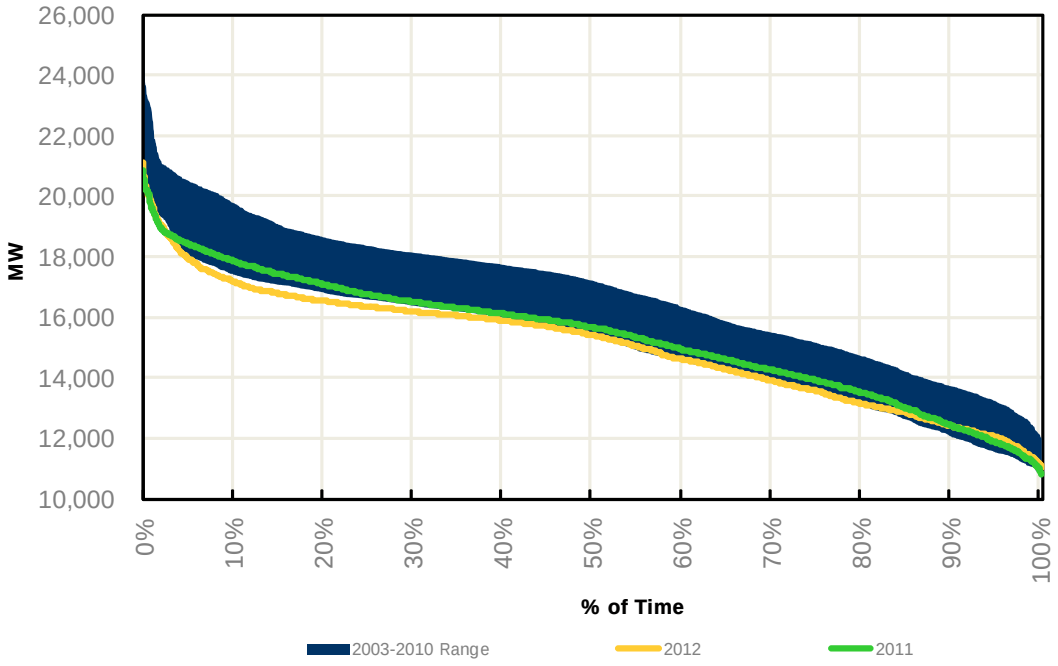


Figure 3.9: Winter Load Duration Curve

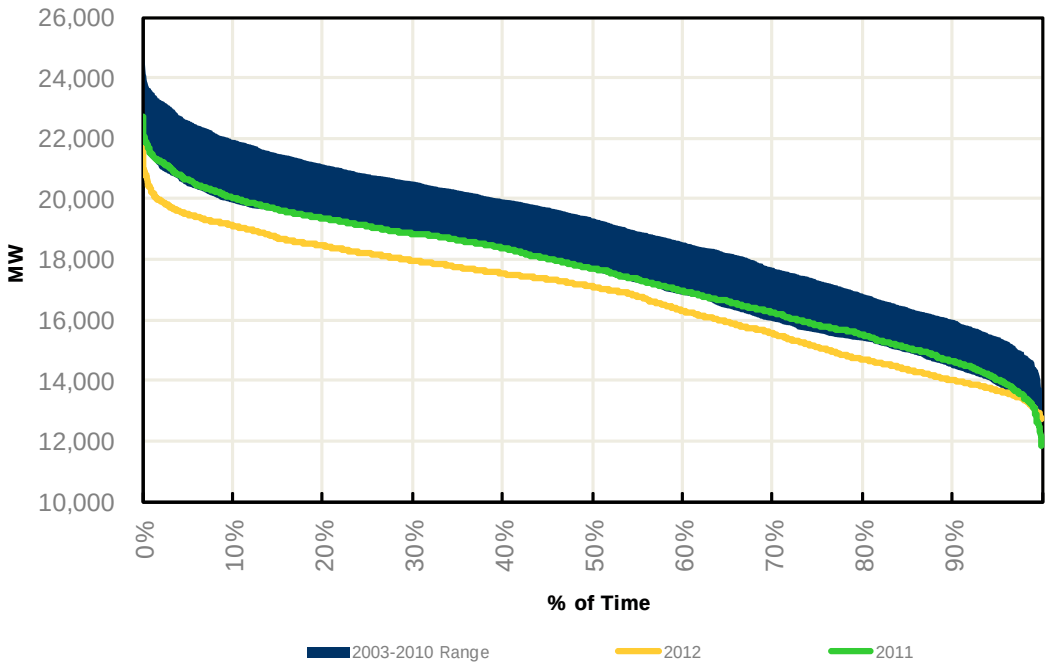
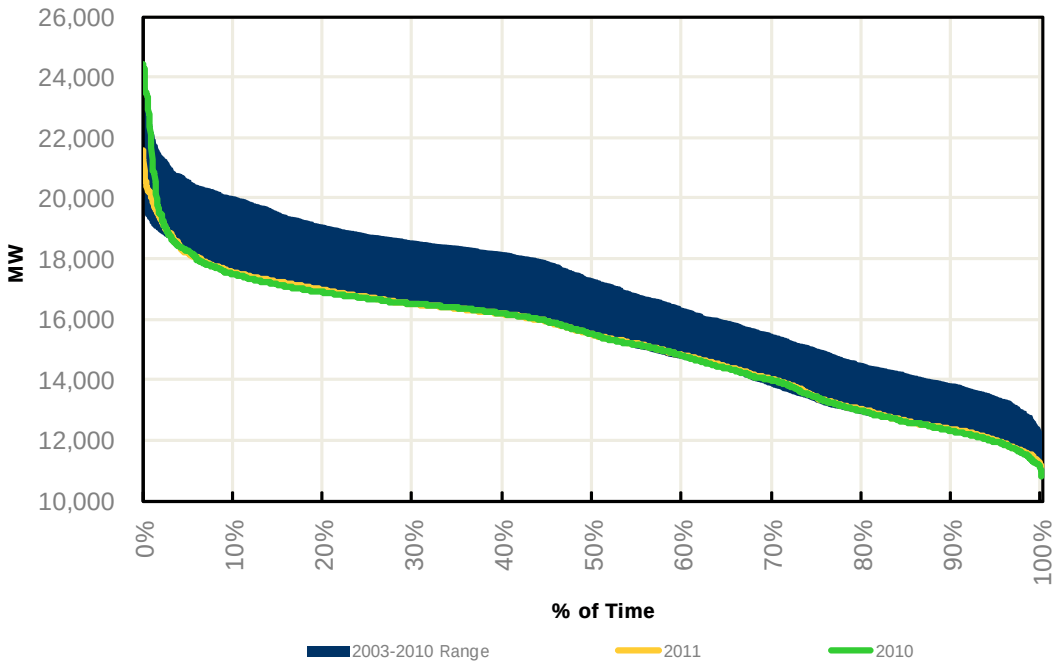


Figure 3.10: Fall Load Duration Curve

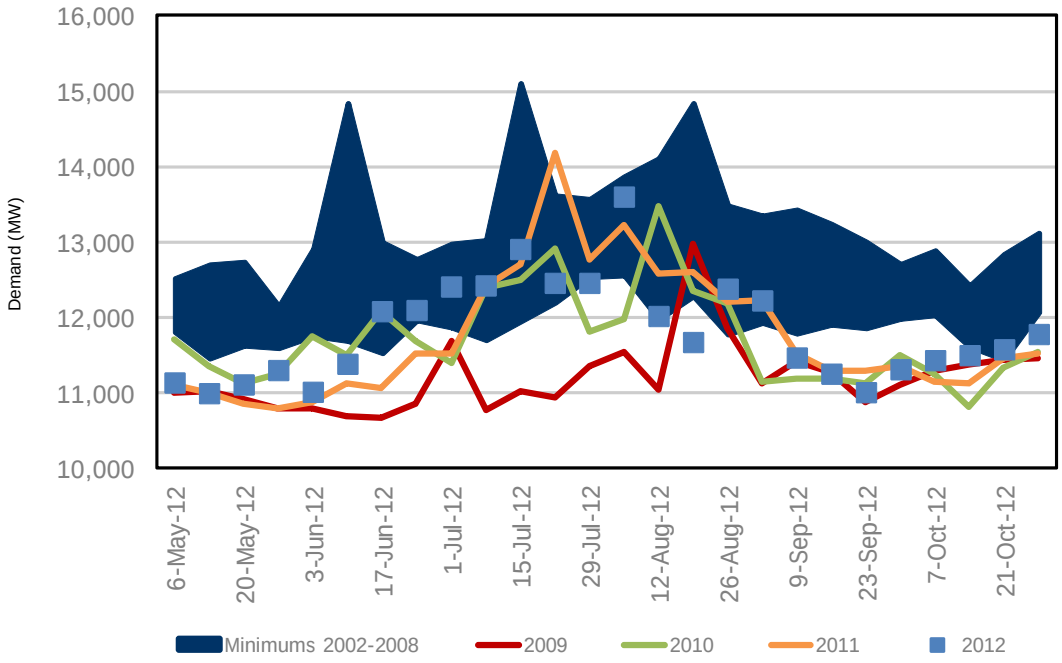


3.5 Historical Minimum Demand

Like peak demands, the minimums are driven by weather, calendar and economic effects. Which of the drivers is most important varies throughout the seasons. The winter, spring and fall have the potential for heating load whereas the summer period has the potential for cooling loads. With the warmer weather over the course of the last six months, minimums are driven by the level of economic activity rather than by the weather. Most of the weekly minimums come on the weekend or holidays when the level of economic activity is lower.

Figure 3.11 shows the minimum weekly demands for the period May to October since market opening. The band represents the range of values for the years 2002-2008. The individual values are shown for 2009, 2010, 2011 and 2012. The financial crisis happened in the fall of 2008. Therefore, 2009 is the heart of the recession and 2010 and after is the recovery period. The graph shows how the minimums have trended since the recession. The minimums in 2012 have been higher then recent experience but still remain below their pre-recession levels.

Figure 3.11: Weekly 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_2012jun.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 both a consensus of publicly available provincial forecasts and purchases forecasts of economic data in order to generate economic drivers for the demand forecast and to provide 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.

Following the financial crisis of 2008 and the recession of 2009, the ensuing recovery period has been very weak by historic standards. The Euro zone debt crisis has become a symbol of the times as both household and public debt loads had grown beyond sustainable levels. This in effect explains sluggish recovery period. High debt levels have limited government stimulus spending. Low interest rates have removed the stimulus potential of rate reductions. Households have cut spending in order to reduce their debt loads. Combined these actions have either prevented stimulus or acted as a drag on the recovery.

The business sector has generally managed the recent economic cycle but remain cautious and are hesitant to make aggressive growth or investment strategies. Consistent and stable growth will help boost both business and consumer confidence. This will increase investment and consumer spending and help foster stronger economic growth. However, it will take time to reduce the high levels of employment and debt which are the main factors affecting confidence.

Ontario's economy will benefit from a stronger American economy as we have significant trade ties with our neighbor. Recent U.S. data and forecasts point towards continued improvement in the U.S. economy. The high Canadian dollar has a negative impact on Ontario's export based industries but it is unlikely that the dollar will fall over the course of the forecast as the Canadian dollar is boosted by international oil prices.

Growth will vary across the industrial sectors due to restructuring caused by the recession and evolution as Ontario's economy matures towards a more service sector oriented economy. Some industrial segments will continue to face rationalization of uneconomic capacity over the forecast

horizon. They will survive but at a smaller and more efficient scale. Other sectors such as mining are expected to flourish going forward as demand is closely tied to high growth economies of Asia. The end results will be a different industrial composition than that prior to 2009.

Despite rather strong Canadian fundamentals there are a number of factors that will mitigate Ontario's growth over the forecast. Government austerity measures - both federal and provincial - high personal debt levels and high oil prices will act as a drag on Ontario's growth. On the plus side, stronger global growth and in particular U.S. economic expansion will help boost production in Ontario, creating jobs and increasing the demand for electricity.

Table 4.1 contains the summary of key economic drivers.

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	57.1	19.1	1.303	1.34
2011	6,724	1.4	65.2	14.3	1.321	1.37
2012 (f)	6,771	0.7	69.0	5.8	1.335	1.05
2013 (f)	6,848	1.1	62.6	-9.2	1.351	1.20
2014 (f)	6,951	1.5	59.7	-4.7	1.369	1.34

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 1980 to 2010 would be the first value for the normal January. The median value of the second highest weather factor from each January from 1980 to 2010 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 31-year history.

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. Although the Extreme weather scenario is useful when examining peak conditions, it 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 Measures

There are a number of initiatives and policies that have an impact on electricity demand. They can be grouped as follows; conservation, prices, embedded generation and demand measures. Each impacts demand in a different way.

Conservation

Conservation includes energy efficiency programs, conservation behaviour and fuel switching. and the impacts of smart meters. 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.

The impacts of conservation vary according to the program mix. For example, programs that promote increasing the efficiency of air conditioners will reduce the demand for electricity in

summer but have no impact in the winter. Programs aimed at improving the insulation of building envelopes will impact electricity consumption year round.

Prices

Prices include the impact of Time of Use (TOU) rates and the Global Adjustment. Both are factored into the demand forecast. As both programs are relatively new information is still be gathered and analyzed. The impact on market participants and consumers continues to evolve as more experience is gained.

TOU rates will vary as these rates are set. However, the more pronounce impact will be on load shifting within the day or week. The expected peak impacts are greater than the energy impacts.

The global adjustment is most likely to impact demand on hot summer days. However, it can stretch beyond the five peak days as Class A customers will be "guessing' which days fall within those five days. Like TOU rates the impacts are expected to be significant for peak demand but no for energy demand.

Embedded Generation

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).

Information on embedded generation is factored into the forecast and decremented from demand. Embedded generation will displace demand that would normally have been supplied through the IESO grid. Although the actual demand for electricity is unaltered, the source of supply changes and must be reflected in this forecast of grid supplied electricity. Embedded generation will impact both peak and energy demand. The mix of embedded generation will determine the seasonal impacts. A large volume of solar generation is expected to be hooked up to the distribution system. Solar generation will have a significant impact on the summer peak but no impact on the winter peak – as the winter peak occurs after the sun has set. More wind or biogas will alter those impacts.

Demand Measures

Demand measures include the OPA's demand response programs, Peaksaver and the dispatchable loads program. The OPA provides the demand response capacity for its programs and the dispatchable loads capacity is derived from historical information. The demand forecast is not altered for demand measures as they are treated as resources.

- End of Document -