18-MONTH OUTLOOK

From December 2014 to May 2016

Power to Ontario. On Demand.

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 2014 to May 2016 and supersedes the previous forecast released in September 2014.

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.

Overall, energy demand for the six months was down a significant 2.6% compared to the same six months a year previous. This is no surprise considering the milder than normal weather over the course of the summer. After adjusting for weather, the decline was a more modest 1.7% reduction.

Wholesale customers continue to show growth over the same time frame a year earlier. Growth for the May to October period is up 3.3% compared to a year ago and up 9.3% over the same period for 2011. Wholesale customer's consumption has shown year over year growth in 13 of the last 14 months. The growth has been modest but fairly consistent with Mining, Iron & Steel and the Petroleum industries leading the growth.

Despite the growth in the directly connected industries, overall electricity consumption has declined. The declines at the distribution level are attributable to two main factors: conservation and embedded generation. These factors also impact peak demands as well.

The 2014 summer peak of 21,636 MW was the lowest summer peak since 1997. Mild weather was a contributing factor, but embedded solar and the Industrial Conservation Initiative (ICI) were significant contributors as well. With such a low summer peak, the ICI will have an impact on the upcoming winter peak as well.

Economic Outlook

The global economy continues to be a muddle of positive and negative news. On the positive side, stronger U.S. growth, a lower dollar and lower oil prices will help boost Ontario's energy intensive industrial sector. On the negative side, geopolitical instability, weak confidence and indebtedness act as a drag on growth and stability.

Despite slow economic growth since the recession, it does appear that Ontario's economic prospects will continue to improve over the forecast horizon.

Canada's strong fundamentals of low interest rates, a robust financial sector, an educated workforce and vast mineral resources certainly help the country's long term growth prospects.

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 effects of demand measures are added back into the demand history and the forecast is generated based on these adjusted demand numbers. The estimated impacts stemming from the Industrial Conservation Initiative is decremented from the forecast. Conservation, embedded generation, demand response and the pricing impacts 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 decrease over the forecast horizon as a result of downward pressure from gains in lighting efficiency. Summer peaks will face greater downward pressure from numerous sources - air conditioning efficiency, pricing impacts and solar embedded generation.

Energy demand is expected to show a small decrease in 2014 due primarily to conservation savings and the growth in embedded generation output. Demand is expected to remain flat in 2015 as the growth in embedded generation capacity slows and economic expansion picks up.

Table 1: Peak and Energy Demand Forecast

Season	Normal Weather Peak (MW)	Extreme Weather Peak (MW)
Winter 2014-15	22,266	23,259
Summer 2015	22,989	24,838
Winter 2015-16	22,215	23,031
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	141.3	0.1%
2013 Energy	140.5	-0.6%
2014 Energy (Forecast)	139.6	-0.6%
2015 Energy (Forecast)	139.6	0.0%

- End of Section

Caution and Disclaimer

Table of Contents

Executive Summary .... **ii**
Table of Contents .... **v**
List of Tables .... **vi**
List of Figures .... **vi**
1.0 Introduction **1**
1.1 Outlook Documents 1
1.2 Demand Forecast Document 1
2.0 Demand Forecast **2**
3.0 Historical Review **4**
3.1 Six Month Review – May to October 4
3.2 Historical Energy Demand 9
3.3 Historical Peak Demand 12
3.4 Load Duration Curves 15
3.5 Historical Minimum Demand 18
4.0 Forecasting Process and Assumptions **19**
4.1 Calendar Drivers for Forecast 19
4.2 Economic Drivers for Forecast 19
4.3 Weather Drivers for Forecast 22
4.4 Conservation and Demand Measures 22

List of Tables

Table 1: Peak and Energy Demand Forecast iii
Table 2.1: Weekly Peak and Energy Demand Forecast 2
Table 3.1: Historical 2014 Weather and Demand Summary 7
Table 3.2: Historical Weekly Energy Demand 12
Table 3.3: Weekly Peak Demand 15
Table 4.1: Forecast of Ontario Economic Drivers 20

List of Figures

Figure 2.1: Weekly Energy Demand – History and Forecast 3
Figure 2.2: Weekly Peak Demand – History and Forecast 3
Figure 3.1: Average Daily High Temperatures (Toronto) 8
Figure 3.2: Summer Heat Waves and Peak Demand 8
Figure 3.3: Wholesale Customers' Year-over-Year Change in Consumption 9
Figure 3.4: Wholesale Customers' Average Hourly Consumption by Industry Segment 10
Figure 3.5: Embedded Generation's Share of Energy Output 11
Figure 3.6: Wholesale Customers' Coincident Peak and Average Hourly Consumption 13
Figure 3.7: Embedded Solar and the Impact on Summer Peaks 14
Figure 3.8: Summer Load Duration Curve 16
Figure 3.9: Spring Load Duration Curve 16
Figure 3.10: Winter Load Duration Curve 17
Figure 3.11: Fall Load Duration Curve 17
Figure 3.12: Weekly Minimum Demands 18
Figure 4.1: Zonal Employment Growth 21
Figure 4.2: Composition of Ontario's Employment Growth 21
Figure 4.3: Projected Embedded Generation Capacity 24

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. The demand forecast is generated quarterly and a separate Ontario Demand Forecast document is released twice per year. This Ontario Demand Forecast supports this requirement and covers the period from December 2014 to May 2016. It supersedes the previous forecast released in September 2014 and the previous Ontario Demand Forecast document released in May 2014.

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_2014dec.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 is based on actual demand, weather and economic data through the end of August. 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_2014dec.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)
07-Dec-14	21,095	22,193	409	2,900	06-Sep-15	18,506	22,050	1,370	2,514
14-Dec-14	20,866	22,219	555	2,897	13-Sep-15	18,257	20,777	680	2,466
21-Dec-14	21,212	22,538	690	2,940	20-Sep-15	17,991	20,134	781	2,488
28-Dec-14	20,459	21,537	362	2,770	27-Sep-15	17,109	18,369	420	2,436
04-Jan-15	20,781	21,700	528	2,819	04-Oct-15	17,225	17,601	554	2,466
11-Jan-15	22,266	23,259	570	2,996	11-Oct-15	17,217	17,661	786	2,490
18-Jan-15	21,569	22,479	547	2,951	18-Oct-15	17,755	18,181	507	2,450
25-Jan-15	21,723	22,505	483	2,953	25-Oct-15	17,763	18,320	392	2,536
01-Feb-15	21,722	22,514	404	2,985	01-Nov-15	18,252	18,719	318	2,571
08-Feb-15	20,991	22,089	734	2,944	08-Nov-15	18,969	19,381	416	2,635
15-Feb-15	20,375	21,896	635	2,860	15-Nov-15	19,292	20,079	601	2,656
22-Feb-15	20,113	21,839	581	2,821	22-Nov-15	19,744	20,606	342	2,735
01-Mar-15	20,737	21,773	501	2,891	29-Nov-15	20,190	21,250	607	2,775
08-Mar-15	19,893	20,720	531	2,805	06-Dec-15	20,727	21,866	409	2,856
15-Mar-15	18,913	19,933	649	2,718	13-Dec-15	21,013	21,957	555	2,900
22-Mar-15	18,285	19,120	611	2,628	20-Dec-15	20,706	21,819	690	2,886
29-Mar-15	18,353	19,592	569	2,632	27-Dec-15	20,401	22,190	362	2,849
05-Apr-15	18,175	18,842	567	2,540	03-Jan-16	20,781	21,723	528	2,803
12-Apr-15	17,506	18,535	471	2,507	10-Jan-16	22,215	23,031	570	2,993
19-Apr-15	16,860	17,358	496	2,460	17-Jan-16	21,490	22,198	547	2,942
26-Apr-15	16,644	17,030	531	2,437	24-Jan-16	21,645	22,227	483	2,945
03-May-15	17,509	19,899	721	2,430	31-Jan-16	21,642	22,232	404	2,979
10-May-15	17,662	20,250	849	2,417	07-Feb-16	20,922	21,910	734	2,935
17-May-15	18,594	21,820	845	2,448	14-Feb-16	20,305	21,727	635	2,850
24-May-15	18,943	21,914	1,175	2,403	21-Feb-16	20,023	21,648	581	2,810
31-May-15	19,427	21,607	1,330	2,452	28-Feb-16	20,662	21,697	501	2,890
07-Jun-15	19,719	23,224	1,292	2,612	06-Mar-16	19,843	20,671	531	2,815
14-Jun-15	20,888	23,631	1,055	2,646	13-Mar-16	19,417	20,438	649	2,751
21-Jun-15	21,659	24,083	835	2,687	20-Mar-16	18,222	19,059	611	2,626
28-Jun-15	22,378	24,066	754	2,758	27-Mar-16	18,300	19,541	569	2,585
05-Jul-15	22,498	23,996	1,016	2,716	03-Apr-16	18,400	18,979	567	2,582
12-Jul-15	22,989	24,838	814	2,791	10-Apr-16	17,486	18,518	471	2,520
19-Jul-15	22,871	23,997	838	2,694	13-Apr-16	16,831	17,333	496	2,460
26-Jul-15	22,384	24,410	1,035	2,803	24-Apr-16	16,605	16,997	531	2,436
02-Aug-15	22,229	24,433	841	2,794	01-May-16	17,473	19,867	721	2,436
09-Aug-15	21,573	24,626	958	2,754	08-May-16	17,639	20,231	849	2,419
16-Aug-15	21,526	24,137	985	2,740	15-May-16	18,563	21,791	845	2,450
23-Aug-15	21,511	23,802	1,362	2,760	22-May-16	18,905	21,875	1,175	2,458
30-Aug-15	20,370	23,010	1,413	2,637	29-May-16	19,407	21,562	1,330	2,397

Compared to the previous forecast, the overall energy demand is slightly higher though it varies by month. Likewise, the weekly peaks were generally higher, though they too vary by month. 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

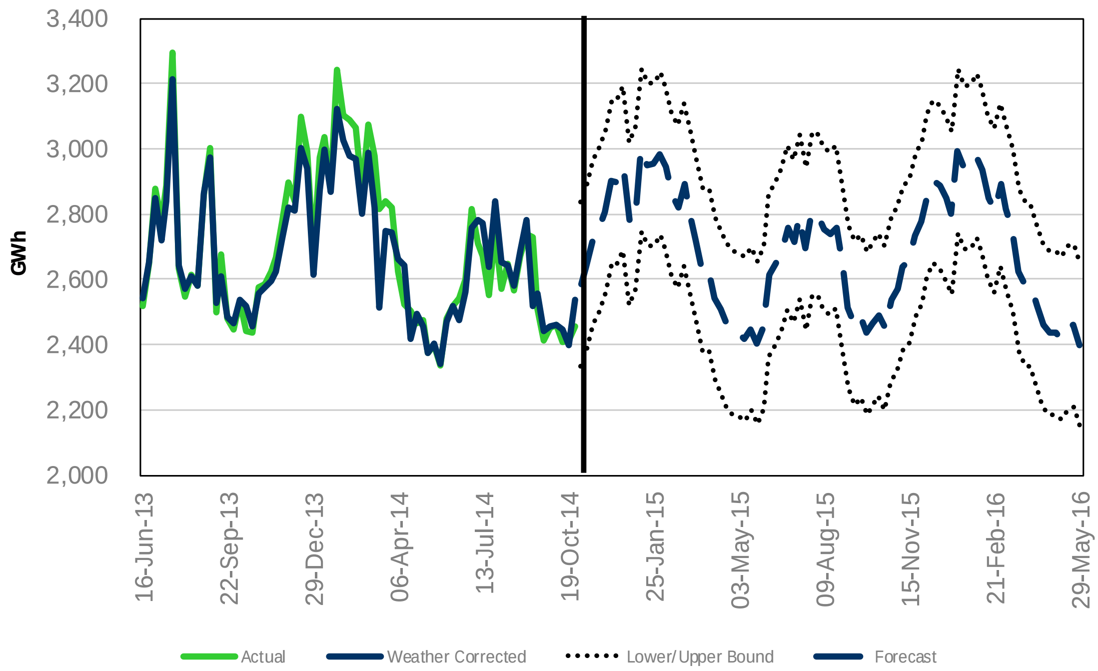
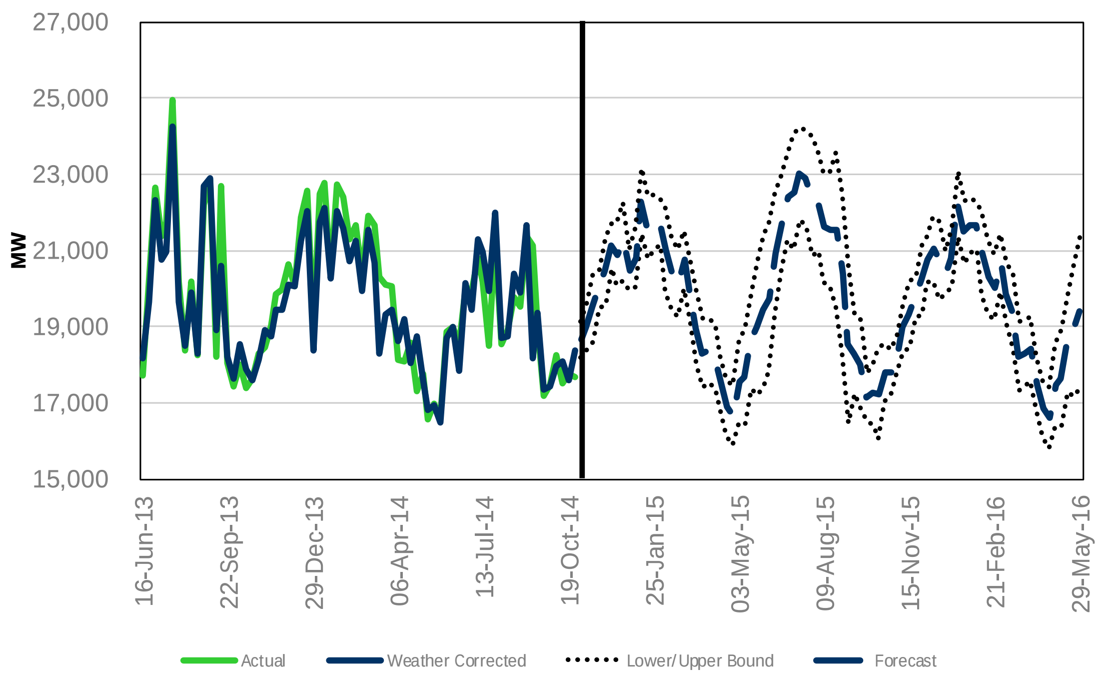


Figure 2.2: Weekly Peak Demand – History and Forecast



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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 2014 was milder than normal. Table 3.1 contains a summary of the weather and demand for the past six months.

May

- May's temperature was fairly normal, though it lacked any humidity. The peak occurred on the third hottest day of the month but followed the two hottest.
- Peak day temperatures were fairly typical for May as evidenced by the fact that the actual peak and weather corrected peak were very similar (18,844 MW versus 18,705 MW). The weather corrected peak was in line with May values experienced since the recession.
- With normal weather, Ontario's energy demand for the month was 10.6 TWh (10.6 TWh weather corrected). The actuals and weather corrected values were the lowest since 2009.
- Minimum demand for the month was 10,719 MW which is consistent with May numbers since the recession. However, it was the lowest May minimum since 1997.
- Wholesale customers' consumption for the month increased by 3.4% over the previous May. Petro-chemicals and steel were the main industries accounting for the growth this month.

June

- June's weather, like May, was also pretty close to normal. The peak occurred on the second hottest day and last day of the month.
- The actual peak of 20,807 MW and weather corrected peak of 20,350 MW were the lowest June peaks since 1996 – almost 20 years. The low peak is attributable to the timing of the warmer weather. Though the peak occurred during a period of warmer weather, it fell on a Monday right between a weekend and the Canada Day holiday. The calendar significantly blunted the peak.
- The near normal weather translated into little difference between the actual monthly energy which was 11.2 TWh and 11.1 TWh weather corrected numbers. Both values have been typical of Junes since the recession.
- The minimum for the month was 10,723 MW, which again was consistent with the experience since the recession.
- Wholesale customers' consumption continued to show consistent growth with a 6.0% increase over the previous June. The steel, petroleum and mining sectors led the growth in June.

July

- The weather for July was much lower than normal and there were no sustained heat waves as the temperatures rose and fell. The hottest day had an afternoon high of 30°C and was followed by a day where the high was 22°C. The second hottest day was Canada Day.
- The peak demand for the month was 21,300 (21,527 MW weather corrected) and occurred on the hottest day of the month. Overall, the peak temperature was lower than normal. The peak demand of 21,300 MW was the second lowest July peak since Market opening. The reduction came from lower distributor loads as well as lower than expected peak temperatures.
- Energy demand for the month was 11.7 TWh (12.1 TWh weather corrected). This represents a change of -7.9% from previous July. Both the actual and weather corrected energy were the lowest since the recessionary July 2009.
- Minimum demands for the month were 11,321 MW. Once again this was the lowest since July 2009.
- Wholesale customers' consumption increased for the eleventh consecutive month. Their consumption rose 6.5% compared to the last July. Steel, mining, petroleum and cement industries drove the growth in July.

August

- August's weather was also much milder than normal. The peak did occur on the hottest day which was cooler and less humid than normal. Like July, August had no sustained heat wave that would lead to a temperature "build-up" that usually drives summer peaks. The peak day high was 30.3°C whereas the next day's high was 24.3°C.
- The actual peak was 21,363 MW and the weather-corrected peak was 21,651 MW. These are the lowest August values since the late 1990's.
- Ontario's energy demand for the month was 11.7 TWh (11.8 TWh weather corrected). Once again, these values are the lowest since the late 1990's.
- August's minimum demand came in at 11,362 MW which was actually a slight increase over 2013. This level of minimum demand has been consistent since the recession.
- Wholesale customers' consumption for the month increased by 4.8% over the previous August. The growth came from the petroleum, steel and mining sectors.

September

- After the summer's mild weather September brought warmer than normal weather. September started with a week of warm weather with the peak falling on the hottest day of the month.
- The actual peak of 21,123 MW is typical of the September experience since the recession. However, given the warmer than normal weather, the weather corrected value was a much more modest 19,374 MW which is similar to the September 2009 value.
- The monthly energy was 10.8 TWh and 10.7 TWh weather corrected. Both values are consistent with the September values since the recession.
- The minimum demand level for the month was 11,112 MW which is consistent with the numbers since the recession.

- Wholesale customers' consumption continued to show consistent growth with a 3.1% increase over the previous September. Steel, petroleum and mining continue to lead the growth.

October

- The weather for October was milder than normal. Generally, the month is cold weather peaking, though, on occasion, warm weather peaks have occurred at the beginning of the month. For the month, both the high and low temperatures were milder than normal.
- The peak for the month was 17,784 MW (18,781 MW weather corrected) which is fairly consistent for October values since 2009. The peak occurred at the end of the month as the weather turned colder. The peak occurred on the fourth coldest day of the month but during a string of cold days. Halloween was the coldest day of the month.
- The energy for the month was 10.8 TWh (11.0 TWh weather corrected). These numbers are also consistent with October demands since 2009, though the actual was on the lower side. This is a recurring theme as demand has remained fairly flat since the recession
- The minimum demand of 10,769 MW is the lowest for October since the late 1990's.
- Wholesale customers' consumption growth fell for the first time since July 2013. Year over year load fell by 3.6% with the reduction led both those same sectors that had led the recent growth, mining, steel and petroleum.

Overall, energy demand for the six months was down 2.6% compared with the same six months a year prior. Much of that decline was due to the mild 2014 summer. After correcting for weather the reduction is a smaller 1.7%. Over the same time, wholesale consumers' consumption had shown an increase of 3.3%.

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 past 12 months compared to the history for 1982-2012. The figure illustrates the weather of the past year – colder than normal winter, a milder summer and warm fall.

Figure 3.2 depicts the three day average of temperatures for each summer since 1970. The line in effect, shows the average temperature for the hottest heatwave of each summer. The first conclusion is that the 2014 heatwave was cold by historical standards but not uncommon as the summers of 2000, 2004 and 2009 had similar heatwaves. The markers note the peak demands during those heatwaves of 2000, 2004 and 2009. It immediately becomes clear that previous peaks under similar weather conditions gave rise to higher peaks. There are a few items that explain the divergence. First, unlike 2000, 2004 and 2009, the 2014 heatwave occurred over a holiday which would reduce the peak impact. Canada Day generally knocks 1,500 MW off of the daily peak demand. As well, embedded solar generation, conservation and the Industrial Conservation Initiative all worked to reduce the 2014 peak unlike the earlier peaks depicted in the graph. Further discussion on those factors is included in section 3.3.

Table 3.1: Historical 2014 Weather and Demand Summary

Historical Analysis		May	June	July	August	September	October
Actual Weather	Average Temperature (°C)	18.6	24.5	24.7	24.6	21.3	14.4
	Minimum Temperature (°C)	11.7	17.2	20.4	17.4	13.6	6.8
	Maximum Temperature (°C)	29.4	31.2	29.8	31.3	31.4	23.0
Normal Weather	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 Demand	Peak Demand (MW)	18,844	20,807	21,300	21,363	21,123	17,784
	Average Hour (MW)	14,305	15,595	15,749	15,750	15,051	14,543
	Minimum Hour (MW)	10,719	10,723	11,321	11,362	11,112	10,769
	90th Percentile (MW)	16,260	18,696	18,362	18,644	17,826	16,659
	Percent above 20,000 (MW)	0.0%	1.1%	3.5%	1.5%	1.7%	0.0%
	# of Hours Above 20,000 (MW)	0	8	26	11	12	0
	Energy Demand (GWh)	10,643	11,229	11,717	11,718	10,837	10,820
Weather Corrected Demand	Peak Demand (MW)	18,705	20,350	21,993	21,651	19,374	18,781
	Energy Demand (GWh)	10,634	11,051	12,145	11,803	10,714	11,012
Forecast Demand	Peak Demand (MW)	18,964	22,470	22,949	21,403	19,023	18,639
	Energy Demand (GWh)	10,790	11,346	12,360	11,993	10,580	11,127

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)

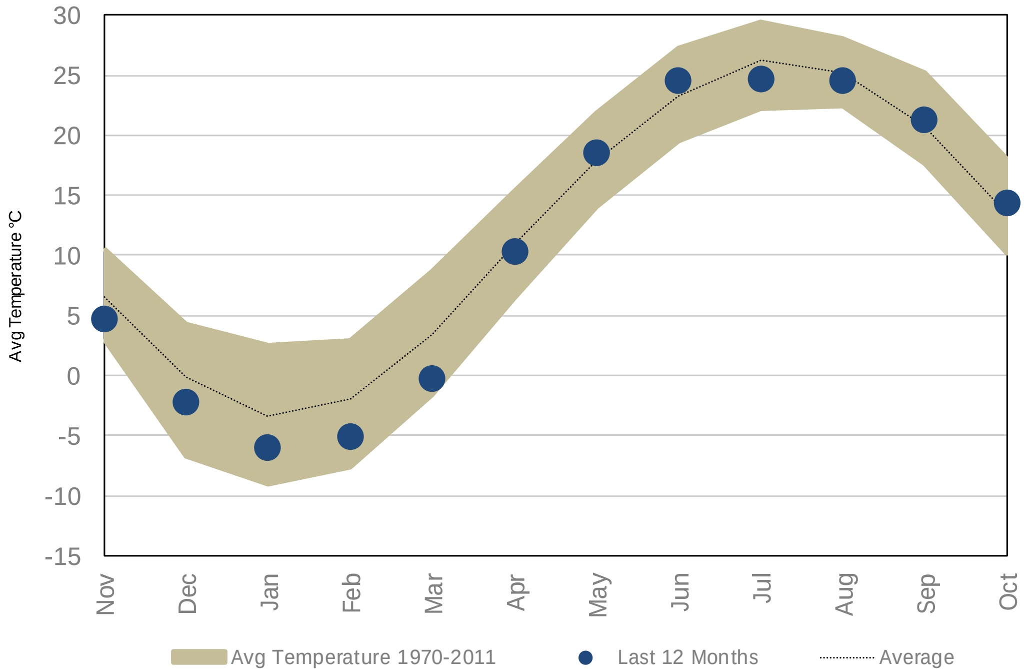
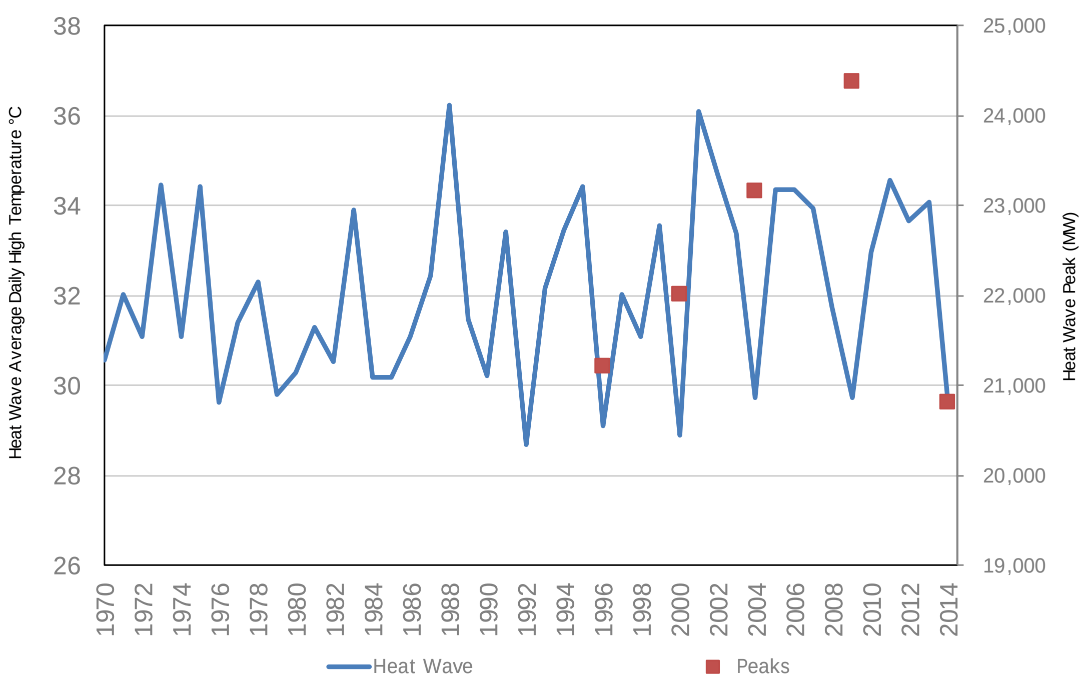


Figure 3.2: Summer Heat Waves and Peak Demand



3.2 Historical Energy Demand

Overall energy demand has fallen by 2.6% compared to the same six months a year previous. Part of this decline can be attributed to the mild summer weather. After adjusted for weather, the year over year decline is 1.7%. Ironically, for the year to date (January to October) the year over year decline is just 0.1% as the higher demand during the cold winter mostly offsets the lower demand during the summer. The weather adjusted 1.7% decline is mostly attributable to growth in embedded generation output and conservation savings.

Energy demand for 2014 is projected to decline by 0.6% compared to 2013 and remain flat in 2015. Whereas distributor's consumption has declined year over year for nine of the ten months this year, wholesale industrial customers' consumption has increased in nine of the ten months. Part of the discrepancy can be attributed to weather impacts, as industrial load is not as weather sensitive as distributor load. Also, wholesale loads are not impacted by embedded generation, whereas distributor loads are. Likewise, conservation initiatives and time of use rates have had a significant impact on distributor loads, though these factors and the Industrial Conservation Initiative also impact industrial loads as well.

Figure 3.3 shows the year-over-year change in wholesale customers' average hourly consumption. The graph shows the downward trend beginning in the spring of 2005. With the rise of the Canadian dollar, export oriented energy intensive industries began to see declines in their output. Over the same period, the pulp and paper sector, which historically was the largest consumer of electricity, began to experience declines due to fundamental changes in the industry. With more recycled content and less demand for newsprint, the sector saw significant reductions. The impact of the recession can clearly be seen in the chart. As well, the recovery period shows periods of both growth and loss.

Figure 3.3: Wholesale Customers' Year-over-Year Change in Consumption

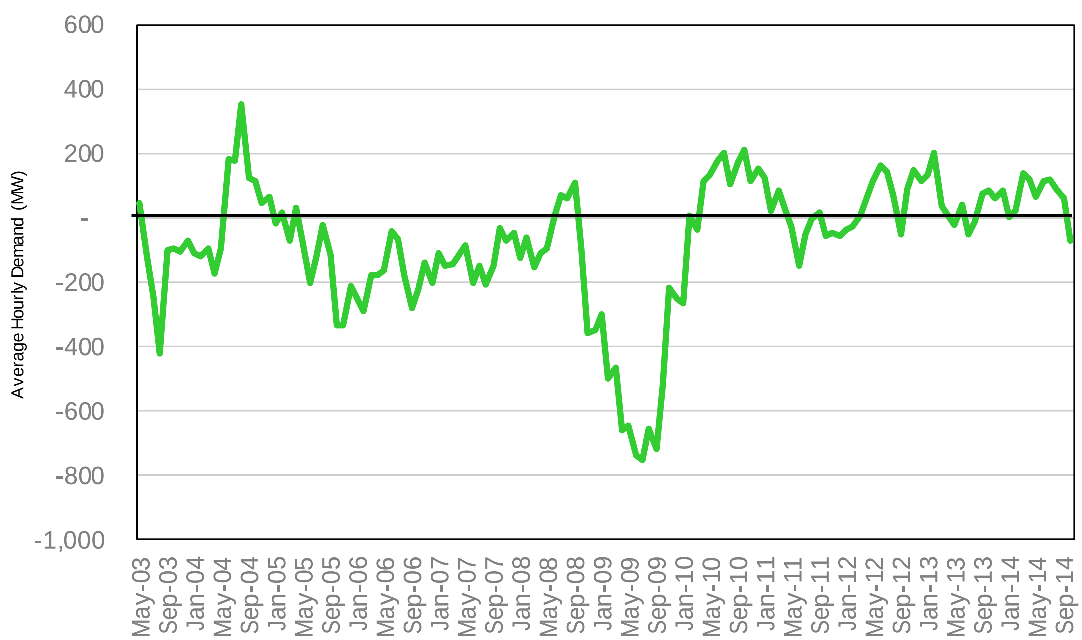


Figure 3.4: Wholesale Customers' Average Hourly Consumption by Industry Segment

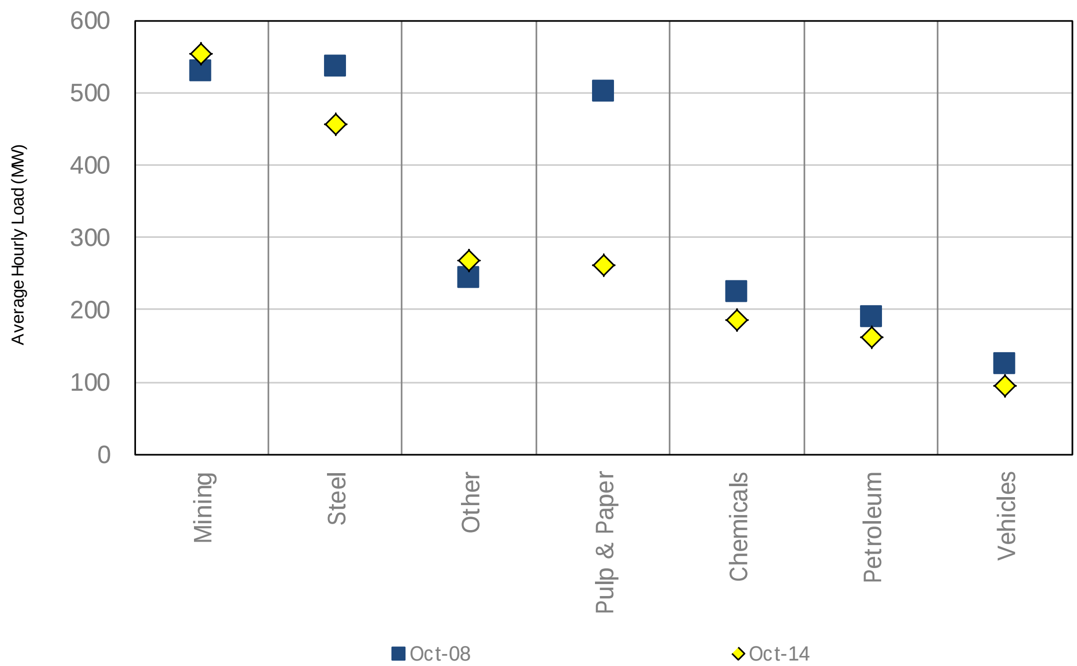


Figure 3.4 shows the wholesale customers' average hourly load by industry segment for the ten months of 2014 compared to the same ten months prior to the recession. The graph highlights that most sectors' current loads remain below their pre-recession levels with the exception of Mining and Other. For comparison sake, the distributors' average hourly load has fallen from 13,943 MW to 13,236 MW – a decline of 707 MW or 5.1%

Energy demand has remained fairly flat following the recession. 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 3.5 shows embedded generation's share of monthly energy output. Though embedded generation shows seasonal volatility, the underlying upward trend is quite evident in the graph. Throughout the forecast, the embedded generation component will continue to grow as renewable energy contracts come into commercial operation.

Figure 3.5: Embedded Generation's Share of Energy Output

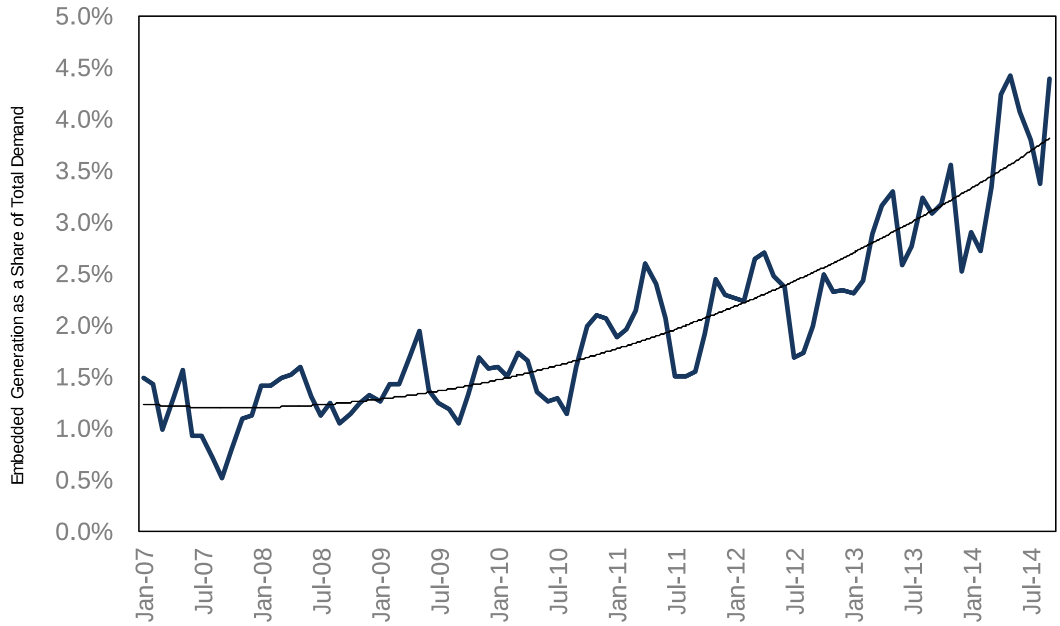


Table 3.2 contains the weekly energy demand for the past six months. The table has the actual and weather-corrected demand for each week and notes any item of significance for the week. If the weather-corrected demand is greater than the actual demand, it means that the actual weather was milder than normal. This is evident throughout the past summer. 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	04-May-14	22-Apr-14	2,475	2,454	
19	11-May-14	30-Apr-14	2,373	2,373	
20	18-May-14	07-May-14	2,397	2,403	
21	25-May-14	13-May-14	2,335	2,339	Victoria Day
22	01-Jun-14	21-May-14	2,480	2,470	
23	08-Jun-14	27-May-14	2,519	2,519	
24	15-Jun-14	02-Jun-14	2,544	2,476	
25	22-Jun-14	12-Jun-14	2,600	2,563	
26	29-Jun-14	17-Jun-14	2,817	2,756	
27	06-Jul-14	27-Jun-14	2,708	2,780	Canada Day
28	13-Jul-14	30-Jun-14	2,670	2,772	
29	20-Jul-14	07-Jul-14	2,553	2,638	
30	27-Jul-14	14-Jul-14	2,744	2,839	
31	03-Aug-14	22-Jul-14	2,570	2,651	
32	10-Aug-14	01-Aug-14	2,648	2,643	Civic Holiday
33	17-Aug-14	06-Aug-14	2,566	2,579	
34	24-Aug-14	11-Aug-14	2,670	2,683	
35	31-Aug-14	21-Aug-14	2,736	2,782	
36	07-Sep-14	26-Aug-14	2,730	2,520	Labour Day
37	14-Sep-14	05-Sep-14	2,507	2,558	
38	21-Sep-14	10-Sep-14	2,411	2,439	
39	28-Sep-14	15-Sep-14	2,452	2,458	
40	05-Oct-14	25-Sep-14	2,458	2,458	
41	12-Oct-14	29-Sep-14	2,407	2,445	
42	19-Oct-14	09-Oct-14	2,414	2,399	Thanksgiving Day
43	26-Oct-14	14-Oct-14	2,455	2,537	

3.3 Historical Peak Demand

Peak demands are weather-driven, weekday events. Peak demands have been facing downward pressure due to a several key factors. Conservation, time of use rates, embedded generation, demand measures, the Industrial Conservation Initiative (ICI) and lower levels of economic activity have all contributed to lower peak demands.

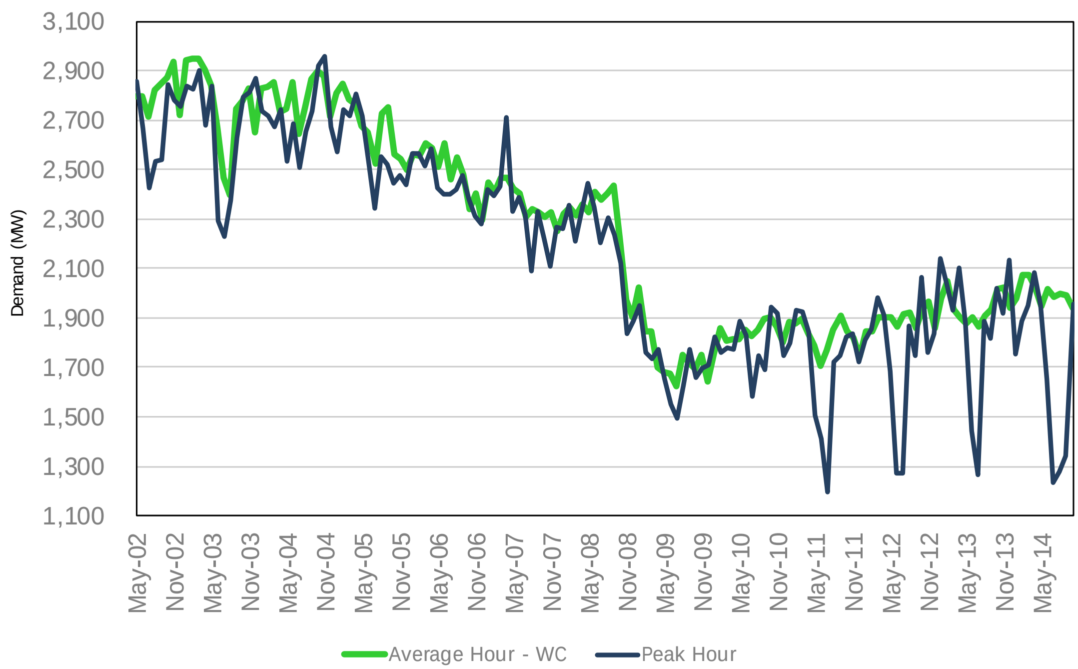
The 2014 summer peak was 21,363 MW which was the lowest summer peak since 1997. Much of this was due to the milder than normal weather, the lack of any sustained heat wave and hot weather landing on weekends and holidays. For calendar year 2014, the system will be winter peaking for the first time in ten years.

At the time of the 2014 summer peak there was only 1 MW of demand measures activated. In addition to the weather impacts, the 2014 summer peaks faced downward pressure from three main factors; prices (ICI and TOU), embedded generation and conservation.

Under the ICI, Class A customers can reduce their Global Adjustment (GA) costs by reducing their consumption during the peak hour on each of the five highest daily peaks. This can lead to load reductions in the neigbourhood of 900 MW. However, that relies on the Class A customers ability to identify those five peak days. With the mild weather of 2014, that would have proven more challenging than in previous years. Since the program runs from May to April there will be significant downward pressure on the upcoming winter peaks due to the low peaks over the summer.

Figure 3.6 shows the directly connected industrial customers average hourly consumption and coincident peak consumption by month. In general, it shows that these directly connected facilities operate 24/7 as their average and peak load are virtually the same. However, with the introduction of the ICI in 2010, these customers have responded by reducing their loads during perceived "high five" peak days. The graph clearly shows a reduction of roughly 600 MW during those peak periods. In addition to the directly connected loads, there are Class A customers served by the distributors and they would also be reducing their consumption during these periods.

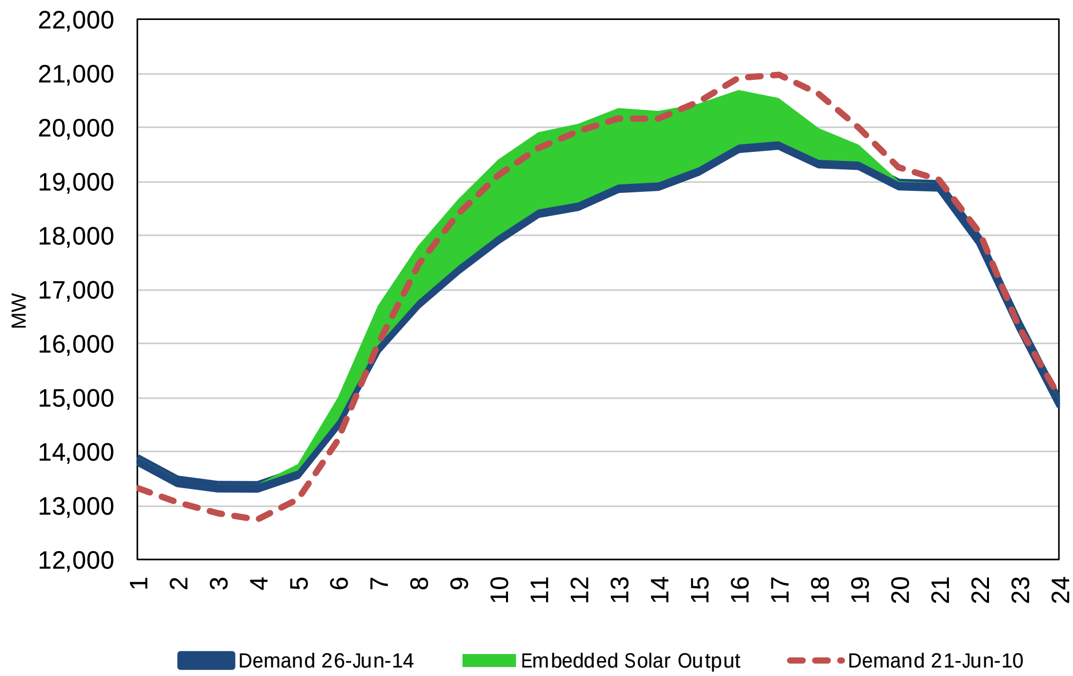
Figure 3.6: Wholesale Customers' Coincident Peak and Average Hourly Consumption



Embedded generation is having an equally important impact on summer peak demand. The vast majority of embedded generation is solar powered and that means that it is reducing the summer peak but not affecting the winter peak. The impact fluctuates depending on the installed capacity – which has grown significantly over the past few years – and the cloud cover.

Figure 3.7 shows the difference in the hourly profile for two days in June, one from 2010 and one from 2014. In 2010, the embedded solar capacity was just over 50 MW and by 2014 it had increased to just over 1,500 MW. The impact of the sunny weather on June 26th, 2014 was to reduce demand across the afternoon and over the peak.

Figure 3.7: Embedded Solar and the Impact on Summer Peaks



Finally, conservation initiatives aimed at improving air conditioner efficiency, building insulation and refrigeration have also led to a reduction in summer peak demands.

Unlike the summer peaks, winter peaks are facing less downward pressure. To date, the ICI has not impacted winter peaks – though that is likely to change this winter – and embedded solar doesn't impact winter peaks as they occur after sunset. Improvements in lighting efficiency are having a significant impact on winter peaks as lighting loads drop.

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	04-May-14	22-Apr-14	17,763	17,604	11.3
19	11-May-14	30-Apr-14	16,567	16,791	6.6
20	18-May-14	07-May-14	16,966	16,912	13.0
21	25-May-14	13-May-14	16,619	16,466	20.6
22	01-Jun-14	21-May-14	18,844	18,705	19.6
23	08-Jun-14	27-May-14	19,000	18,968	29.4
24	15-Jun-14	02-Jun-14	18,517	17,836	29.1
25	22-Jun-14	12-Jun-14	19,966	20,120	26.2
26	29-Jun-14	17-Jun-14	19,944	19,431	31.2
27	06-Jul-14	27-Jun-14	20,807	21,281	27.0
28	13-Jul-14	30-Jun-14	20,195	20,973	30.3
29	20-Jul-14	07-Jul-14	18,506	19,935	28.4
30	27-Jul-14	14-Jul-14	21,300	21,993	22.4
31	03-Aug-14	22-Jul-14	18,545	18,694	29.8
32	10-Aug-14	01-Aug-14	18,911	18,752	27.0
33	17-Aug-14	06-Aug-14	19,767	20,389	24.7
34	24-Aug-14	11-Aug-14	19,532	19,902	27.5
35	31-Aug-14	21-Aug-14	21,363	21,651	25.7
36	07-Sep-14	26-Aug-14	21,123	18,152	31.3
37	14-Sep-14	05-Sep-14	19,029	19,374	31.4
38	21-Sep-14	10-Sep-14	17,175	17,324	22.7
39	28-Sep-14	15-Sep-14	17,483	17,421	17.8
40	05-Oct-14	25-Sep-14	18,241	17,962	20.9
41	12-Oct-14	29-Sep-14	17,491	18,063	23.9
42	19-Oct-14	09-Oct-14	17,763	17,586	13.9
43	26-Oct-14	14-Oct-14	17,679	18,358	22.1

3.4 Load Duration Curves

The following load duration curves display load for the four seasons. The seasons are defined as, summer (June, July and August), spring (March, April and May), winter (December, January and February) and fall (September, October and November). The following graphs are presented in reverse order with the most recent data (summer) first (Figures 3.8 to 3.11).

The figures are not weather-corrected so the weather will influence the shape of each of the graphs. The impact of the milder summer is seen in the load duration curve. Likewise, the long, cold 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.

The load duration curves are depicted for the last two seasons against the range for the period 2003-2012. The graphs illustrate that the combined impact of structural economic change, embedded generation and conservation have pushed the load duration curves towards the bottom of the range.

Figure 3.8: Summer Load Duration Curve

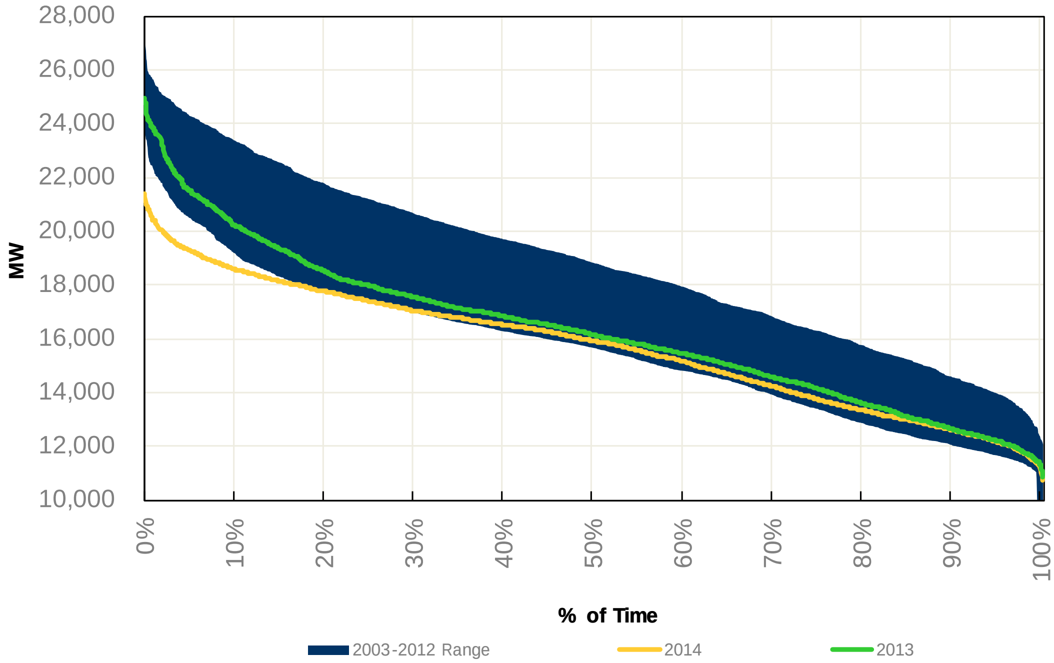


Figure 3.9: Spring Load Duration Curve

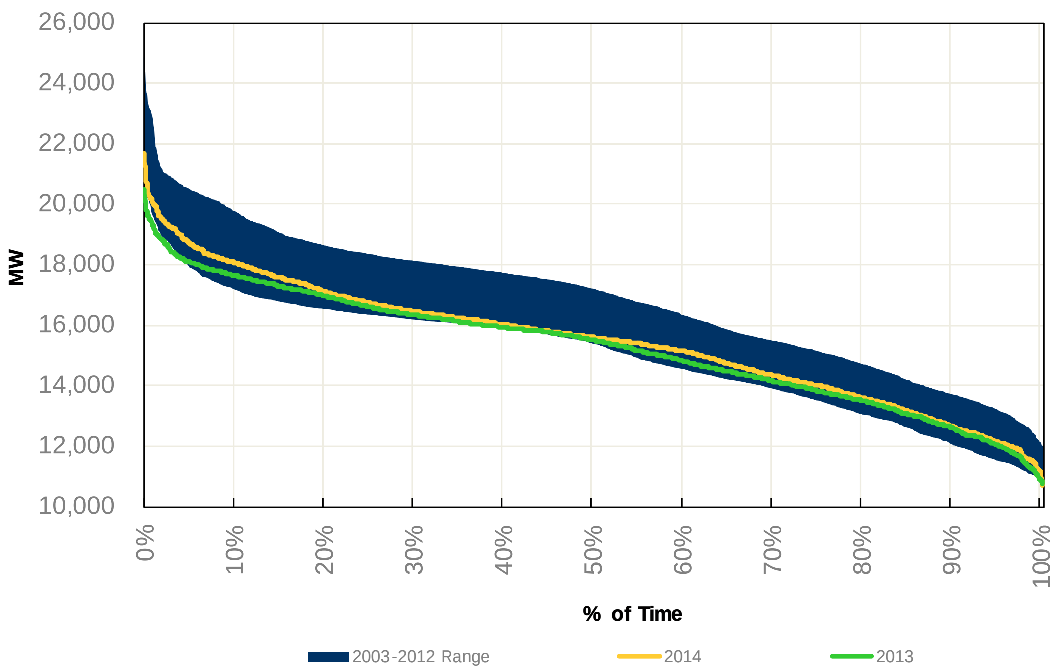


Figure 3.10: Winter Load Duration Curve

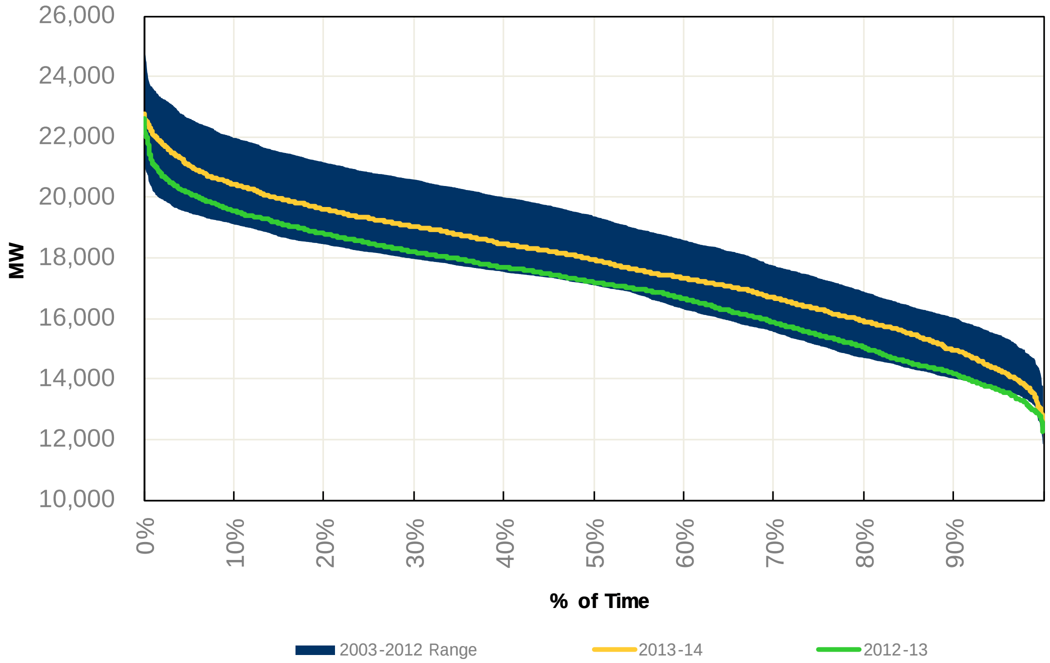
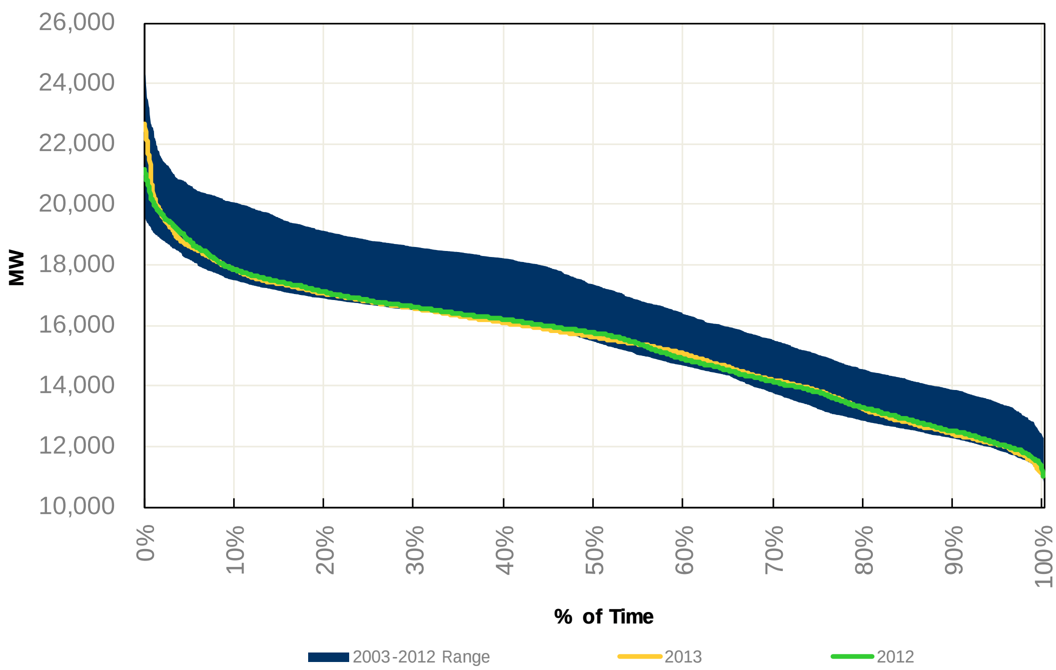


Figure 3.11: Fall Load Duration Curve

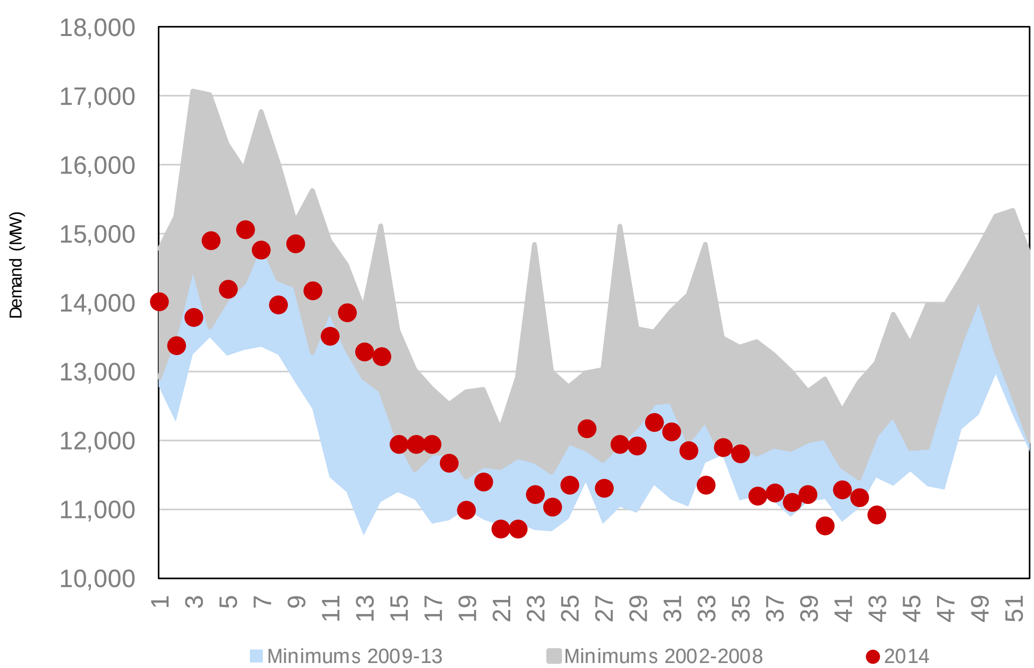


3.5 Historical Minimum Demand

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. For 2014, the colder winter is reflected in the weekly minimum demands. Despite the mild summer weather, weekly minimums (weeks 23-35) were not as low as they have been in recent years. However, the warm fall has given rise to low weekly minimums. If minimums are more a product of economic activity, the low values over the fall may be a harbinger and bear watching.

Figure 3.12 shows the minimum weekly demands for 2014 against two time frames. The first time frame is the period from market opening to the end of 2008. This represents a period of relatively strong economic activity. The second period is that from the recession through to the end of 2013. With the 2008-09 recession there was a structural shift downwards in the minimum demands as energy intensive industrial loads were reduced, shifted or eliminated. The observations for 2014 would have signaled stronger underlying growth except for the recent observations for September and October.

Figure 3.12: 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_2014dec.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 purchased forecasts of economic data in order to generate economic drivers for the demand forecast and to provide additional insight and analysis.

The economic climate since the recession has been a mixed bag both globally and within Ontario. The post-recession period has been unlike any previous recovery period as it has been marked by tepid expansion. High debt loads – at both the public and private level – has acted as a drag on growth. Despite a period of some of the lowest interest and inflation rates in history, overall low confidence has meant that those rates have not led to a strong rebound. Governments, businesses and consumers have remained cautious and reluctant.

Within Ontario, the results to date have been mixed as well. Some sectors have done quite well, while others continue to struggle despite the end of the recession. There has been of late a number of encouraging signs for the Ontario economy. Ontario's major electricity customers tend to be export oriented so the lower dollar would certainly help that portion of the economy. As well, lower oil prices help those same energy-intensive trade based enterprises as it would lead to a reduction in costs.

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.

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 (%)
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	6,664	1.5	71.9	14.6	1.294	1.50
2009	6,511	-2.3	47.9	-33.3	1.283	-0.82
2010	6,599	1.4	57.1	19.1	1.300	1.28
2011	6,724	1.9	65.2	14.3	1.321	1.62
2012	6,776	0.8	74.4	14.1	1.336	1.14
2013	6,876	1.5	58.7	-21.1	1.354	1.33
2014 (f)	6,928	0.8	55.8	-5.0	1.366	0.93
2015 (f)	7,006	1.1	54.2	-2.9	1.381	1.10

In previous editions of this document it was noted how Ontario's economy has been growing but that growth was not broad-based or robust. Much of the growth has been in the service sector and concentrated in the Greater Toronto Area (GTA). Now, it appears that the growth is sustained as employment has grown consistently since the recession. As Figure 4.1 shows, job growth is a little more broad-based geographically as jobs are now being generated outside the GTA. The only trend that continues is that job growth is primarily from the service sector.

Figure 4.2 shows the continued dominance of the service sector in job creation. Though manufacturing has not added jobs, the level of activity has increased as evidenced in the wholesale customer demand numbers.

Other Goods includes mining, construction, utilities and agriculture. All of these sectors except utilities have been trending downward the past six months. The Ontario economy continues to evolve and change as a result of economic forces. There is a natural maturation process where economies shift from large scale production to smaller, higher valued production and a larger role for the service sector. However, Ontario's vast natural resources will translate into resource development and processing over the long term.

Figure 4.1: Zonal Employment Growth

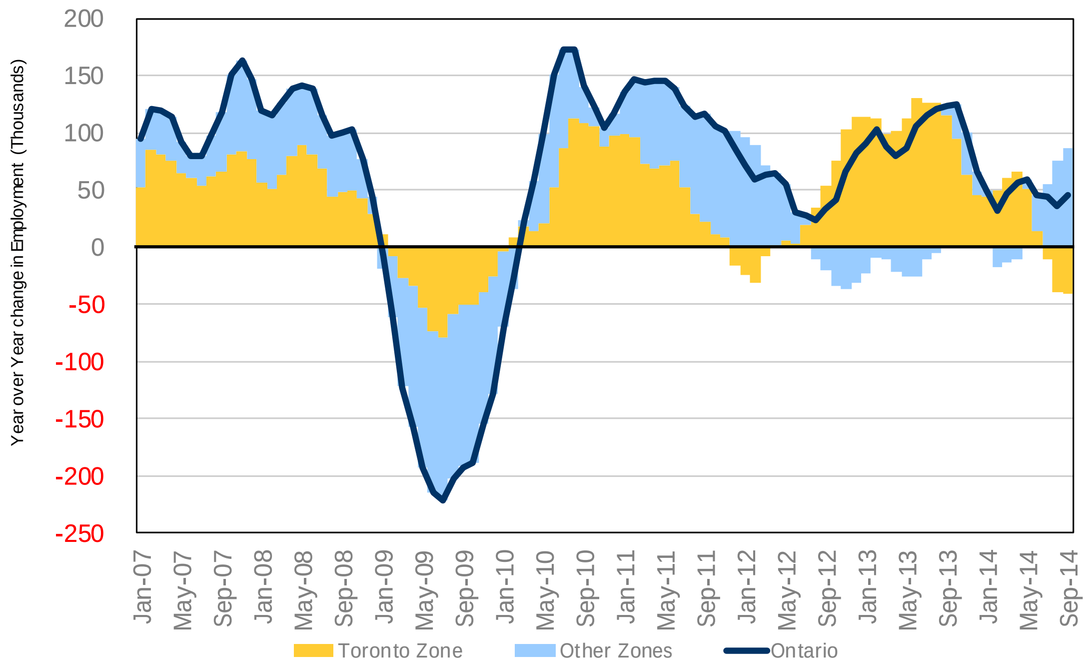
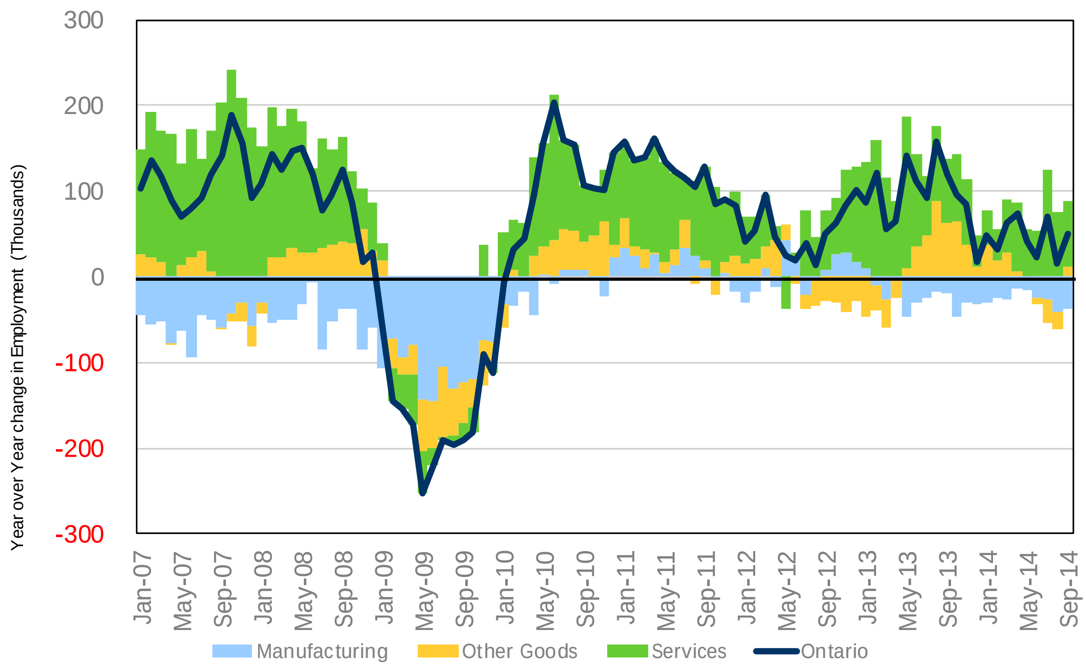


Figure 4.2: Composition of Ontario's Employment Growth



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. 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. Those programs will also have varying effects by zone. Other programs, such as those aimed at improving the insulation of building envelopes, will impact electricity consumption year round.

Over the course of the forecast, the winter peak for 2015-16 is expected to see incremental conservation savings of 120 MW compared to the winter peak for 2014-15.

Prices

Prices include the impact of Time of Use (TOU) rates and the Industrial Conservation Initiative (ICI). Both are factored into the demand forecast as load modifiers. As both programs are relatively new and changing, information continues to be gathered and analyzed. The impact of these programs continues to evolve as market participants and consumers gain more experience and adjust their consumption.

TOU impacts vary as rates are set. The overall impact will be to shift load within the day or week. The means that peaks will be impacted more than energy. At the same time, overall increases will help drive conservation savings through quicker payback on investments.

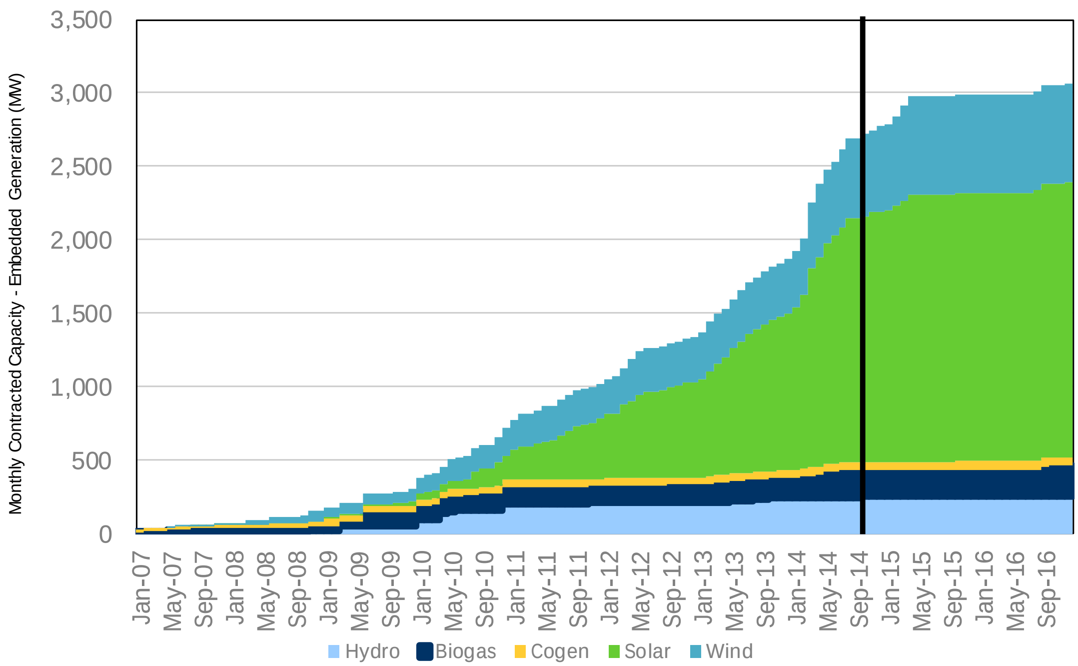
The ICI has had a significant impact on peak demand on hot summer days. Class A customers can manage their Global Adjustment costs by reducing their consumption on the five days with the highest peaks. The impact of the ICI stretches beyond the five peak days as Class A customers will be "guessing' which days fall within those five days. Starting this year (May 2014 to April 2015) the program has been expanded to be open to customers with a peak demand over 3 MW. Those customers can now choose to opt into the program in order to reduce their electricity costs. Previously, the program was only available to customers with a peak greater than 5 MW. For 2013, the impact of ICI was estimated to be roughly 900 MW on those five peak days with a smaller impact on peak with the potential of falling in the high five. For this year, the impacts may be muted as the mild summer weather made peak determination more difficult. As well, the fact that some of the high five peaks will likely end up occurring in the winter could introduce new wrinkles to the analysis – do the participants have the same energy flexibility in the winter as they do in the summer?

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), all generation under the Micro-FIT program 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. Over the course of the 18-Month forecast a large volume of embedded generation capacity is projected to be added to the distribution system. The majority of this embedded generation will be solar powered. There is just under 300 MW of incremental embedded generation projected to be added over the forecast horizon. It is comprised of solar (153 MW), wind (128 MW), cogeneration (4 MW) and hydro (7 MW). Figure 4.3 shows the projected embedded generation capacity for the Outlook period.

Figure 4.3: Projected Embedded Generation Capacity



Demand Measures

Demand measures include the demand response programs, Peaksaver and the dispatchable loads program. The demand forecast is not altered for demand measures as they are treated as resources.

The demand measures capacity varies by week over the forecast. This is due to a number of factors. Peaksaver is only available from May to September as it is based on cycling air-conditioner load. Dispatchable loads historically have not bid into the market during the high five periods. Therefore, despite a total demand measure capacity of over 1,200 MW, the available capacity can range from a low of the available capacity can run from a low of 375 MW (during a winter high five peak) to a high of 791 MW (summer non-high five peak).

- End of Document -