18-MONTH OUTLOOK

From June 2013 to November 2014

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 June 2013 to November 2014 and supersedes the previous forecast released in February 2013.

Economic Outlook

Economic growth is expected to improve over the forecast horizon. Nevertheless, the global economy continues to struggle in the wake of a broad recession. Many of the eurozone nations remain mired in recession. The U.S. economy continues to experience mixed progress. Chinese growth is barely hitting government targets as, like the other emerging economies, they are dependent on exports to U.S. and eurozone consumers. As a trade-based nation, Canada faces a similar fate in that its growth is sustained through exports.

High levels of public debt make stimulus spending unpalatable and difficult for most nations, so stimulus measures are replaced by low interest rates. This is a double-edged sword, as cheap credit would help stimulate spending but also increase debt load. That, in turn, would be a worry down the road when interest rates inevitably rise.

Despite higher profits and low interest rates, business investment has been at low levels. The Bank of Canada had expressed its concern that firms were sitting on cash. However, those firms remain cautious about expansion, because of the state of the global economy. Debt reduction, job creation and increased confidence – both business and consumer - may take time.

Despite rather strong domestic fundamentals, Canada is not immune to the developments in the global economy. As for Ontario, the manufacturing sector has been impacted by the global recession and the appreciation of the Canadian dollar over the past ten years. This means Ontario exporters see less demand for their goods and greater price competition from other producers. Though global demand will gain in strength, it is unlikely the Canadian dollar will weaken significantly.

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.
- Global and U.S. Economy – An improving U.S. economy will help stimulate the demand for Ontario goods.

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 November through April.

Overall, energy demand for the six months was up a robust 2.3% compared to the same months a year earlier. After adjusting for the leap year affects, demand would have been up by 3.2% over the same six month period a year earlier. However, the weather had much to do with the growth. The winter of 2011-12 was fairly mild and generated low demand numbers. After adjusting for weather and the leap year, demand has grown 0.6% for the six months. Despite this small increase demand is slightly lower than the same period two years ago (November 2010 to April 2011). Electricity demand has been rather flat since the recession.

On the positive side, wholesale customers have shown strength over the past six months. For the six month period their consumption was up 5.1% over the same period a year earlier. The down side is that the strongest month over the six month period was the first month November at 8.1% and the weakest was April at 0.2%. Still, the hourly average hourly demand for the wholesale customers was 2,049 MW in February 2013, the highest since October 2008 – the beginning of the financial crisis.

The overall weather for the period was fairly normal. November, February and March were typical, December and January were milder than normal and April was colder than normal. Overall, the weather correction for the six months was 0.7 TWh.

The 2012-13 winter peak demand occurred on January 24th which was the third day of a cold snap where the afternoon high was -12.8°C. The winter peak demand was 22,610 MW (22,808 MW weather-corrected). Both the actual peak and the weather corrected peak were higher than the previous winter's. At the time of the 2012-13 winter peak there was 3.5 MW of demand measures.

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 Global Adjustment Allocation 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 decrease in 2013 due primarily to the leap year impact and the growth in embedded generation capacity.

Table 1: Peak and Energy Demand Forecast

Season	Normal Weather Peak (MW)	Extreme Weather Peak (MW)
Summer 2013	23,213	25,368
Winter 2013-14	22,239	23,297
Summer 2014	22,937	24,954
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	141.8	0.4%
2013 Energy (Forecast)	141.2	-0.4%

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Caution and Disclaimer

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1.0 Introduction

1.1 Outlook Documents

The Ontario Electricity Market Rules (Chapter 5 Section 7.1) require that a demand forecast for the next 18 months be produced and published on a quarterly basis. This Ontario Demand Forecast meets this requirement and covers the period from June 2013 to November 2014. It supersedes the previous forecast released in February 2013 and the previous Ontario Demand Forecast document released in November 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_2013may.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 February. Data for March and April 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_2013may.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-Jun-13	19,461	23,068	1,298	2,598	09-Mar-14	20,045	21,401	531	2,872
16-Jun-13	20,482	24,060	1,298	2,670	16-Mar-14	19,030	20,569	649	2,781
23-Jun-13	21,127	24,561	749	2,690	23-Mar-14	18,433	19,751	611	2,674
30-Jun-13	22,499	24,533	876	2,807	30-Mar-14	18,513	20,271	569	2,702
07-Jul-13	22,567	24,247	770	2,708	06-Apr-14	17,855	19,780	567	2,641
14-Jul-13	23,213	25,368	1,003	2,842	13-Apr-14	17,586	19,157	471	2,563
21-Jul-13	23,006	24,554	889	2,847	20-Apr-14	17,132	17,901	496	2,471
28-Jul-13	22,561	24,240	926	2,790	27-Apr-14	16,999	17,778	531	2,469
04-Aug-13	22,534	24,750	1,050	2,810	04-May-14	17,513	19,637	721	2,473
11-Aug-13	22,360	25,165	930	2,794	11-May-14	17,654	19,953	849	2,451
18-Aug-13	21,641	24,340	954	2,751	18-May-14	18,526	21,974	845	2,479
25-Aug-13	21,521	23,939	817	2,737	25-May-14	18,922	22,094	1,175	2,431
01-Sep-13	21,457	23,697	1,233	2,748	01-Jun-14	18,943	22,327	1,330	2,511
08-Sep-13	20,405	22,878	1,464	2,619	08-Jun-14	19,865	23,383	1,292	2,627
15-Sep-13	19,460	22,340	1,243	2,530	15-Jun-14	20,711	23,796	1,055	2,670
22-Sep-13	19,237	21,075	622	2,555	22-Jun-14	21,565	24,048	835	2,754
29-Sep-13	18,751	19,768	784	2,553	29-Jun-14	22,318	24,315	754	2,758
06-Oct-13	17,754	18,293	537	2,508	06-Jul-14	22,513	24,075	1,016	2,703
13-Oct-13	17,548	17,809	733	2,494	13-Jul-14	22,937	24,954	814	2,787
20-Oct-13	17,473	17,938	839	2,495	20-Jul-14	22,776	23,905	838	2,736
27-Oct-13	18,347	18,558	585	2,582	27-Jul-14	22,140	24,128	1,035	2,819
03-Nov-13	18,294	18,602	487	2,577	03-Aug-14	22,120	24,378	841	2,795
10-Nov-13	19,283	19,340	437	2,635	10-Aug-14	21,582	24,573	958	2,661
17-Nov-13	19,384	20,021	532	2,690	17-Aug-14	21,488	23,656	985	2,671
24-Nov-13	19,906	20,427	708	2,758	24-Aug-14	21,465	23,320	1,362	2,709
01-Dec-13	20,278	20,939	550	2,793	31-Aug-14	20,461	22,675	1,413	2,614
08-Dec-13	20,718	22,027	677	2,871	07-Sep-14	18,975	22,355	1,370	2,453
15-Dec-13	21,281	22,120	496	2,912	14-Sep-14	18,755	21,002	680	2,454
22-Dec-13	21,392	22,298	585	2,938	21-Sep-14	18,600	19,717	781	2,515
29-Dec-13	19,304	20,524	755	2,697	28-Sep-14	17,727	17,777	420	2,464
05-Jan-14	20,739	21,438	353	2,854	05-Oct-14	17,099	17,422	554	2,481
12-Jan-14	22,239	23,297	570	3,068	12-Oct-14	17,357	17,649	786	2,524
19-Jan-14	21,699	22,649	547	3,014	19-Oct-14	18,079	18,265	507	2,509
26-Jan-14	21,826	22,649	483	3,026	26-Oct-14	18,064	18,281	392	2,576
02-Feb-14	21,902	22,579	404	3,062	02-Nov-14	18,652	18,842	318	2,621
09-Feb-14	21,077	22,364	734	3,012	09-Nov-14	18,898	19,437	416	2,638
16-Feb-14	20,666	22,167	635	2,927	16-Nov-14	19,465	19,914	601	2,703
23-Feb-14	20,438	22,028	581	2,892	23-Nov-14	19,944	20,496	342	2,754
02-Mar-14	20,999	21,954	501	2,961	30-Nov-14	20,456	21,401	607	2,805

Compared to the previous forecast, weekly peak are slightly lower and the overall energy demand is slightly higher. Figures 2.1 and 2.2 show the projected energy and peak demand for the outlook period.

Figure 2.1: Weekly Energy Demand – History and Forecast

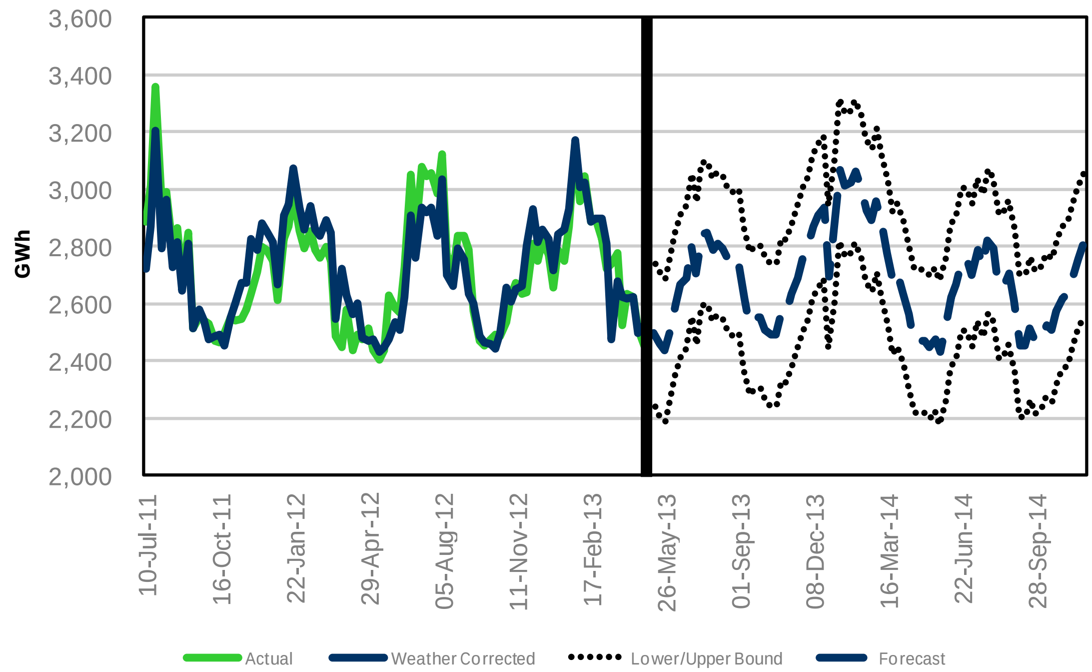
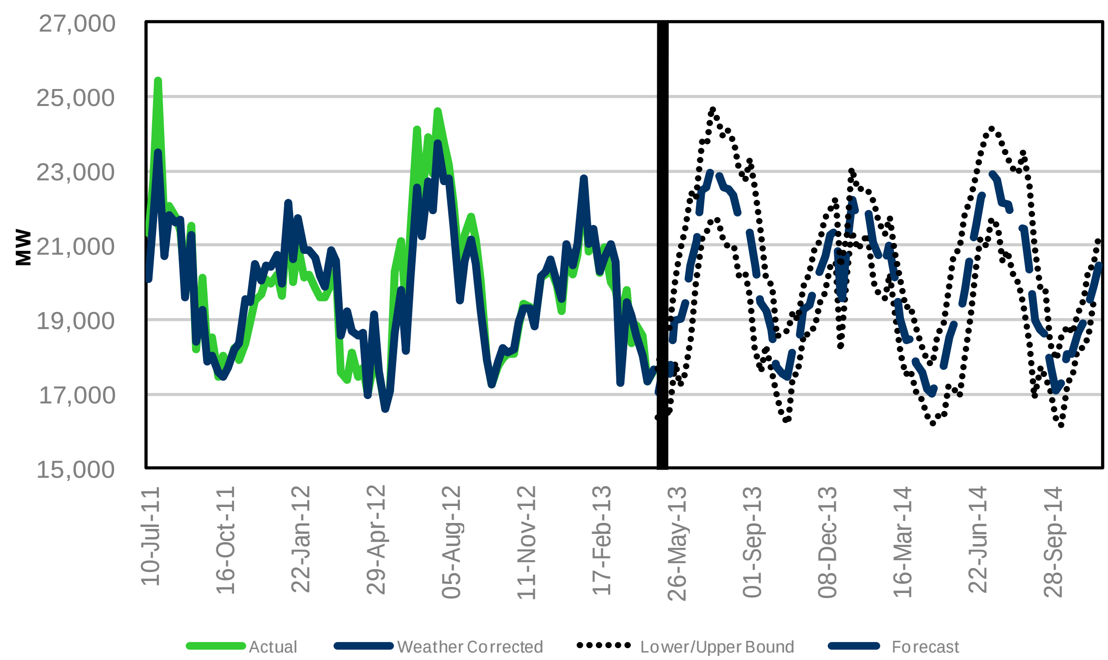


Figure 2.2: Weekly Peak Demand – History and Forecast



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3.0 Historical Review

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

3.1 Six Month Review – November to April

Since the last Ontario Demand document actuals have been recorded for the period November to April. The winter of 2012-13 was fairly close to normal despite a milder December and January. Table 3.1 contains a summary of the weather and demand for the past six months.

November

- November's weather was fairly close to normal. The peak occurred on November 30th which was the coldest day of the month.
- The 20,144 MW peak was the highest post-recessionary peak for November. The weather-corrected peak was lower at 20,180 MW and is consistent with recent experience. Prior to the recession, November peaks were in the range of 22,000-23,000 MW but since the recession fall in the 20,000-21,000 MW range. Energy demand for the month was the highest it has been in over 3 years. Demand was 11.5 TWh (weather corrected was 11.7 TWh).
- Minimum demand (15,954 MW) was the highest since the recession.
- Wholesale industrial consumption was 8.1% higher than November 2011.

December

- December was milder than normal. The peak did not occur on the coldest day. The coldest period of the month was later during the holiday period. December peaks always occur before the holidays as school vacations and lower levels of economic activity prevent peaks from occurring during this time.
- The actual peak of 20,382 MW only slightly higher than the past December while the 20,614 MW weather corrected peak represents an all-time low for the month. Energy demand for the month was 12.1 TWh and 12.4 TWh weather corrected are consistent with Decembers since the recession.
- Minimum demand (16,650 MW) was the lowest December since market opening.
- Wholesale industrial consumption was 6.5% higher than December 2011.

January

- The weather for January was milder than normal. The peak did not occur on the coldest day, but during the cold snap with the coldest temperatures.
- The January peak was 22,610 MW and 22,808 MW weather corrected. Both were an increase over January 2012 and are roughly comparable to January 2011. Energy demand was 12.9 TWh and 13.2 TWh weather corrected. The actual energy was only higher than last January but the weather corrected value is consistent with values since the recession.
- Minimum demand was 12,270 MW which is the second lowest January recorded.
- Wholesale industrial energy demand was 7.3% higher than January 2012.

February

- The weather for February was very close to normal. The peak temperatures were slightly milder than normal. The peak occurred during a pronounced cold snap that spanned the first week of February. The peak did not occur on the coldest day.
- The actual peak (21,426 MW) and energy demand (11.7 TWh) were higher than last February's values. The same is true for the weather corrected values peak (21,451 MW). After adjusting for the weather and the leap year impact demand would have increased as well.
- Minimum demand for the month was 13,638 MW which is the highest since pre-recession February 2008.
- Despite having one less day, wholesale customers' consumption increased by 7.1% over the previous February.

March

- March was very similar to February in that its overall average temperature was fairly close to normal but the peak temperatures were milder than normal. The peak did not occur on the coldest day.
- The month's peak demand of 19,825 MW (20,557 MW weather corrected) were the lowest since before market opening. Energy demand was 11.9 TWh (11.8 TWh weather-corrected).
- The minimum demand of 11,963 MW is typical of the post-recession period, but would be low compared to pre-2009.
- Wholesale customers' consumption growth weakened in March growing by just 1.8% over the previous March. Over the previous five months year over year growth had averaged 6.7%.

April

- The weather for April was colder than normal. The peak for April can be either the result of either cold or hot weather. For April 2013, the peak was a cold weather peak. The peak did not occur on the coldest day but within a cold snap at the start of the month.
- The actual peak 18,854 MW (18,588 MW weather corrected) was consistent with the post recessionary April values. Weather corrected energy demand was 11.0 TWh (10.9 TWh actual) again consistent with the levels experienced since the recession.
- Minimum demand (11,209 MW) which was lower than April 2012.
- Wholesale customers' consumption growth was much weaker for the second consecutive month. Their consumption growth had been strong for five months, averaging 6.7%. However year over year growth for April was just 0.1%.

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

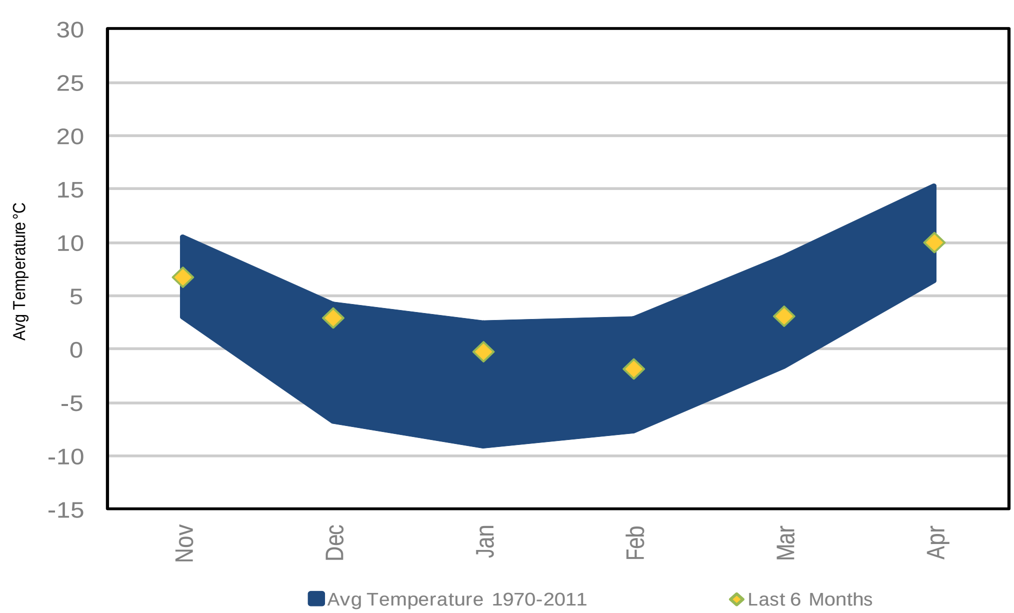
Table 3.1 contains a summary of the weather and demand for the past six months. Figure 3.1 shows the average daily high temperature by month for 2012 compared to the history for 1970-2011.

Table 3.1: Historical 2012 Weather and Demand Summary

Historical Analysis		November	December	January	February	March	April
Actual	Average Temperature (°C)	6.8	3.0	-0.2	-1.8	3.1	10.0
	Minimum Temperature (°C)	-3.7	-5.1	-13.5	-10.7	-4.2	0.1
	Maximum Temperature (°C)	19.3	15.6	14.8	6.6	12.9	19.8
Monthly Normal	Normal Average Temperature (°C)	6.7	0.2	-3.3	-1.5	3.6	10.7
	Normal Minimum Temperature (°C)	-2.0	-8.4	-13.5	-13.5	-5.5	2.8
	Normal Maximum Temperature (°C)	18.9	10.0	6.7	8.2	16.7	25.0
Actual	Peak Demand (MW)	20,144	20,382	22,610	21,426	19,825	18,854
	Average Hour (MW)	15,954	16,312	17,325	17,474	16,073	15,201
	Minimum Hour (MW)	11,824	12,670	12,270	13,638	11,963	11,209
	90th Percentile (MW)	18,350	18,765	20,124	19,633	18,101	17,186
	Percent above 20,000 (MW)	0.3%	1.3%	11.2%	5.8%	0.0%	0.0%
	# of Hours Above 20,000 (MW)	2	10	83	39	0	0
	Energy Demand (GWh)	11,487	12,136	12,890	11,742	11,958	10,945
Weather Corrected	Peak Demand (MW)	20,180	20,614	22,808	21,451	20,557	18,558
	Energy Demand (GWh)	11,733	12,388	13,165	11,701	11,823	11,011
Forecast	Peak Demand (MW)	20,572	21,693	22,014	21,774	20,635	18,492
	Energy Demand (GWh)	11,630	12,612	13,314	11,820	12,283	11,018

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)



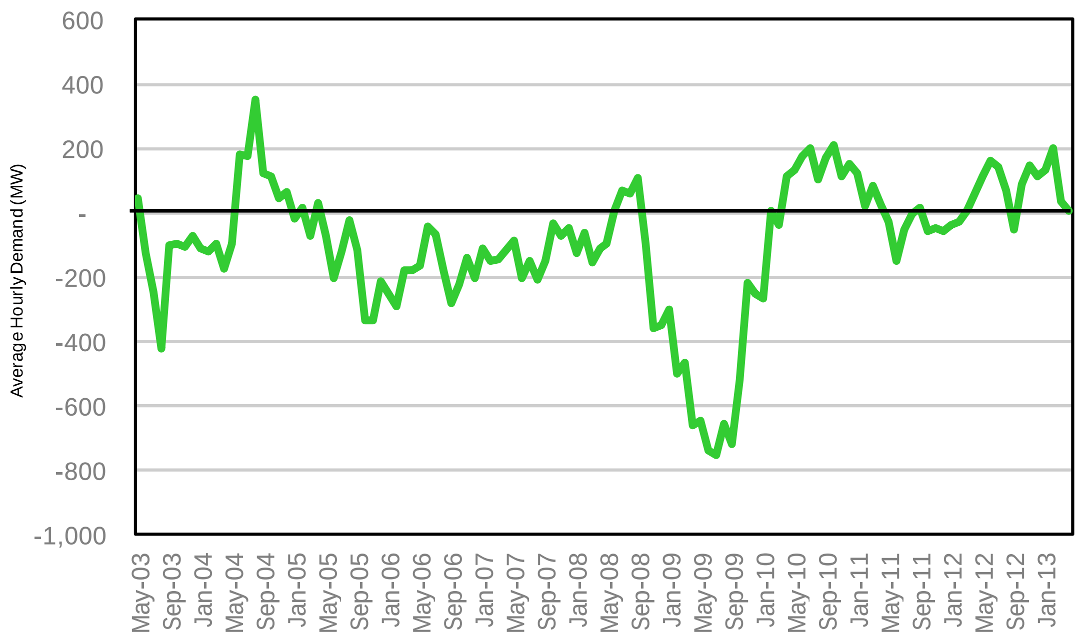
3.2 Historical Energy Demand

Overall demand has shown some strength over the past six months – November 2012 to April 2013. However, that growth is a result of a more typical 2012-13 winter than underlying growth. When comparing to the much milder winter of 2011-12, actual demand for the six months was up 2.6%. After adjusting for weather the energy demand shows a 0.2% decline compared to the previous year. After accounting for the leap year impacts, the growth rate turns to a positive 0.4% growth. Despite the small rise over the previous year, the period November 2012 to April 2013 would still be lower than the energy demand for November 2010 to April 2011 by 0.6%. Generally, demand has been flat since the end of the recession in 2010.

Wholesale customer demand had shown consistently strong year over year growth since February 2012. Despite strong growth in January and February, year over year growth for March and April averaged only 1.0%. Growth for the six months was 5.1% higher than the same six months a year prior. Compared to the pre-recession levels, wholesale customers' load is down by 16.5%, but this represents an improvement over the past few years

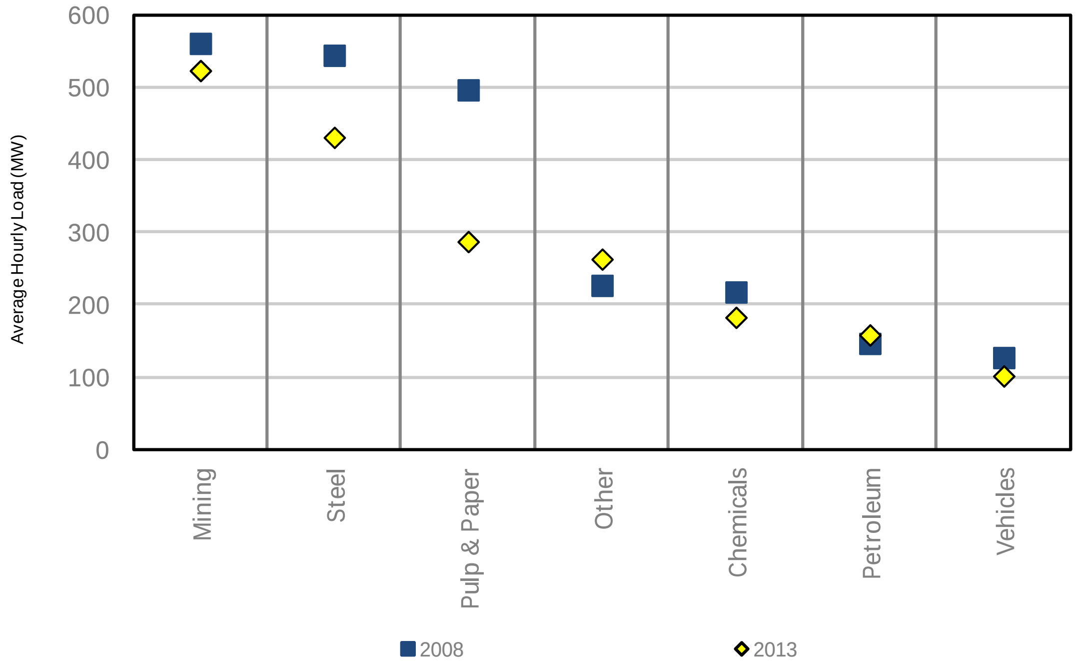
Figure 3.2 shows the year-over-year change in wholesale customers' average hourly consumption.

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



The graph illustrates the increasing momentum of 2012-13 after a weak 2011. 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 six month period compared to the same six months prior to the recession. The graph highlights the lost loads in the paper and steel sectors. The other sectors are fairly close to their pre-recession levels.

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



Distributor's consumption was 1.9% higher for the six months compared to a year earlier. Once again, much of the growth was attributable to weather. After adjusting for weather and the leap year, the growth rate was 0.4%. The growth has not been consistent with one month showing an increase followed by a decrease the next.

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 3.4 shows monthly energy demand and embedded generation output. Though embedded generation shows seasonal volatility, the underlying upward trend is quite evident in the graph. Annual embedded generation topped 3.1 TWh in 2012 up from 1.9 TWh in 2009. Moving forward the embedded generation component will continue to grow as renewable energy contracts come into commercial operation.

Figure 3.4: Monthly Energy Demand and Embedded Generation

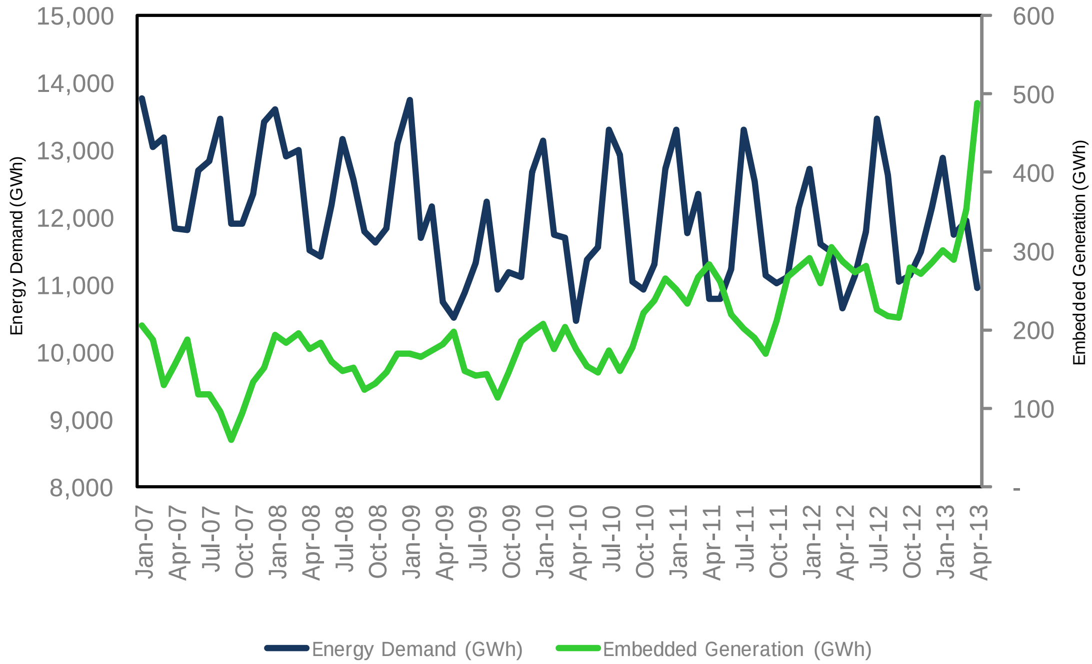


Table 3.2 contains the weekly energy demand for the past six months. The table has the actual and weather-corrected demand for each week and notes any item of significance for the week. If the weather-corrected demand is greater than the actual demand, it means that the actual weather was milder than 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
44	04-Nov-12	29-Oct-12	2,630	2,611	
45	11-Nov-12	06-Nov-12	2,673	2,650	
46	18-Nov-12	13-Nov-12	2,634	2,665	
47	25-Nov-12	19-Nov-12	2,642	2,806	
48	02-Dec-12	30-Nov-12	2,812	2,932	
49	09-Dec-12	05-Dec-12	2,749	2,819	
50	16-Dec-12	11-Dec-12	2,820	2,863	
51	23-Dec-12	20-Dec-12	2,773	2,827	
52	30-Dec-12	27-Dec-12	2,660	2,719	Christmas Day
1	06-Jan-13	02-Jan-13	2,790	2,844	New Year's Day
2	13-Jan-13	07-Jan-13	2,753	2,859	
3	20-Jan-13	17-Jan-13	2,874	2,932	
4	27-Jan-13	24-Jan-13	3,165	3,172	
5	03-Feb-13	01-Feb-13	2,959	3,009	
6	10-Feb-13	04-Feb-13	3,047	3,022	
7	17-Feb-13	12-Feb-13	2,886	2,889	
8	24-Feb-13	20-Feb-13	2,899	2,900	Family Day
9	03-Mar-13	27-Feb-13	2,825	2,901	
10	10-Mar-13	04-Mar-13	2,724	2,812	
11	17-Mar-13	14-Mar-13	2,742	2,479	
12	24-Mar-13	18-Mar-13	2,777	2,679	
13	31-Mar-13	25-Mar-13	2,528	2,622	Good Friday
14	07-Apr-13	03-Apr-13	2,635	2,618	Easter Monday
15	14-Apr-13	11-Apr-13	2,626	2,627	
16	21-Apr-13	15-Apr-13	2,516	2,499	
17	28-Apr-13	24-Apr-13	2,457	2,524	

3.3 Historical Peak Demand

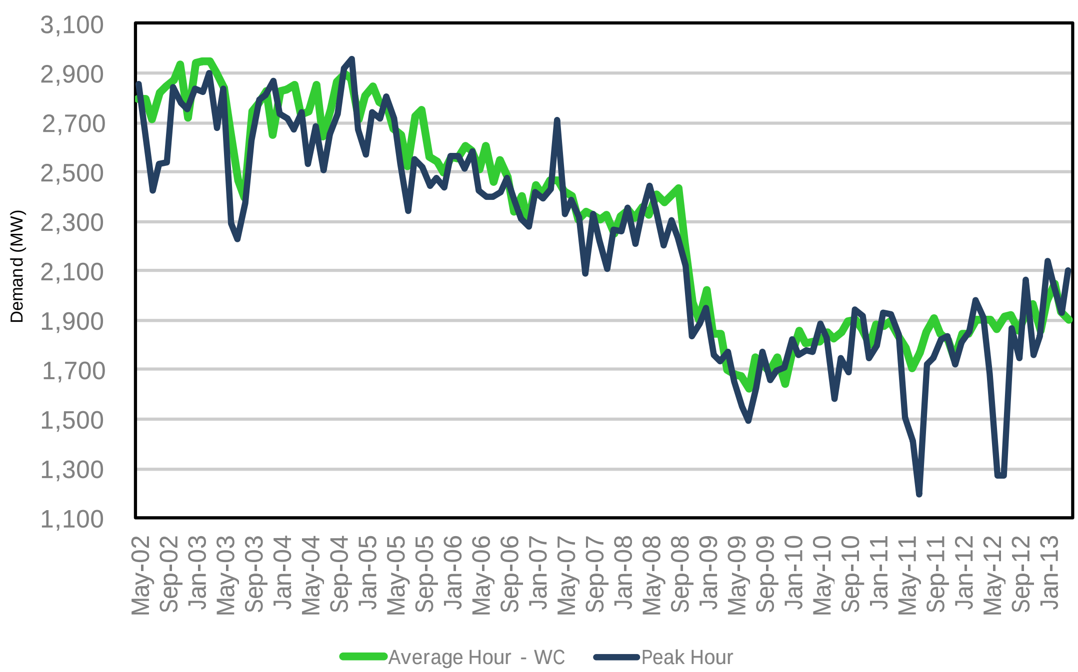
Peak demands are weather-driven, weekday events. Peak demands have been facing downward pressure due to a number of factors. Conservation, time of use rates, embedded generation, demand response, the Global Adjustment allocation (GAA) and lower levels of economic activity have all contributed to lower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

The winter peak was 22,610 MW which was higher than last winter's peak and similar to the peak of two past winters. The winter peaks do not face the same downward pressure that summer peaks do. Conservation initiatives have a better opportunity to reduce summer peaks by targeting air conditioning load which makes up the majority of the summer peak. Winter peaks are a mix of end-uses and can't be as easily targeted. The vast majority of embedded generation will be solar powered. Solar generation will be high during the summer peaks as they occur in the afternoon. Winter peaks occur after sunset and will therefore not be impacted by embedded solar. Demand response does occur during the winter peaks, however the available capacity is significantly smaller as programs such as Peaksaver are not available in the winter. To date, the five peak days for the GAA have all occurred in the summer therefore the winter peaks have not observed any GAA impacts (yet).

The interesting aspect of the seasonal peaks is that the winter peak has less underlying growth but fewer factors acting to mitigate that growth while the summer peak has greater underlying growth but more factors working to reduce it.

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. However, the graph shows that the impacts are occurring in the summer but not in the winter.

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



Indeed, the summer peaks have much more going on than the winter peaks do. 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 75% of the projected embedded generation capacity additions over the forecast horizon are expected to be solar powered. By the end of the forecast nearly 1,700 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.

Figure 3.6 shows the break down in the summer 2012 peak for July 17th. The actual peak recorded for that day was 24,636 MW. However, as the chart illustrates demand would have been higher if not for a number of mitigating factors. The peak demand was reduced by demand measures (385 MW), embedded generation (511 MW) and estimated GAA impacts (930 MW) from all Class A customers. This analysis does not show the impact of conservation which also would have contributed to higher reconstituted demand number.

Figure 3.6: Anatomy of a Summer Peak

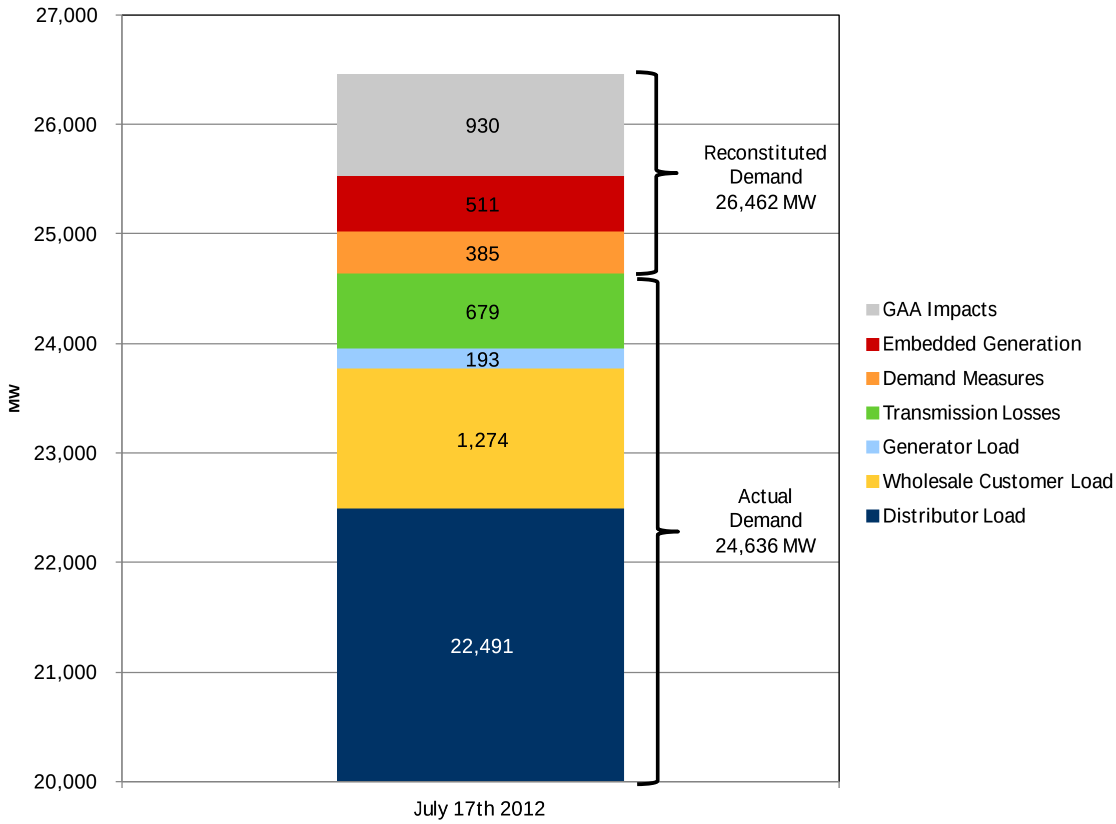


Table 3.3 shows the actual and weather-corrected weekly peak demand for the past six months.

Table 3.3: Weekly Peak Demand

Week Number	Week Ending	Peak Day	Actual Peak (MW)	Weather Corrected Peak (MW)	Peak Day Temperature
44	04-Nov-12	29-Oct-12	19,419	19,310	4.3
45	11-Nov-12	06-Nov-12	19,359	19,330	2.7
46	18-Nov-12	13-Nov-12	18,859	18,814	3.0
47	25-Nov-12	19-Nov-12	20,144	20,180	8.4
48	02-Dec-12	30-Nov-12	20,208	20,316	-3.7
49	09-Dec-12	05-Dec-12	20,382	20,614	1.5
50	16-Dec-12	11-Dec-12	19,916	19,999	-1.0
51	23-Dec-12	20-Dec-12	19,223	19,557	2.6
52	30-Dec-12	27-Dec-12	20,712	21,035	-3.1
1	06-Jan-13	02-Jan-13	20,221	20,464	-2.8
2	13-Jan-13	07-Jan-13	20,753	21,041	0.3
3	20-Jan-13	17-Jan-13	22,610	22,808	-7.3
4	27-Jan-13	24-Jan-13	20,816	21,046	-11.6
5	03-Feb-13	01-Feb-13	21,426	21,451	-7.1
6	10-Feb-13	04-Feb-13	20,258	20,306	-5.8
7	17-Feb-13	12-Feb-13	20,941	20,674	0.6
8	24-Feb-13	20-Feb-13	20,003	21,033	-5.5
9	03-Mar-13	27-Feb-13	19,825	20,557	1.5
10	10-Mar-13	04-Mar-13	19,027	17,298	-1.8
11	17-Mar-13	14-Mar-13	19,792	19,468	0.1
12	24-Mar-13	18-Mar-13	18,379	19,128	-0.1
13	31-Mar-13	25-Mar-13	18,854	18,558	5.4
14	07-Apr-13	03-Apr-13	18,574	18,053	2.3
15	14-Apr-13	11-Apr-13	17,358	17,334	0.1
16	21-Apr-13	15-Apr-13	17,635	17,672	12.6
17	28-Apr-13	24-Apr-13	16,697	16,733	12.3

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

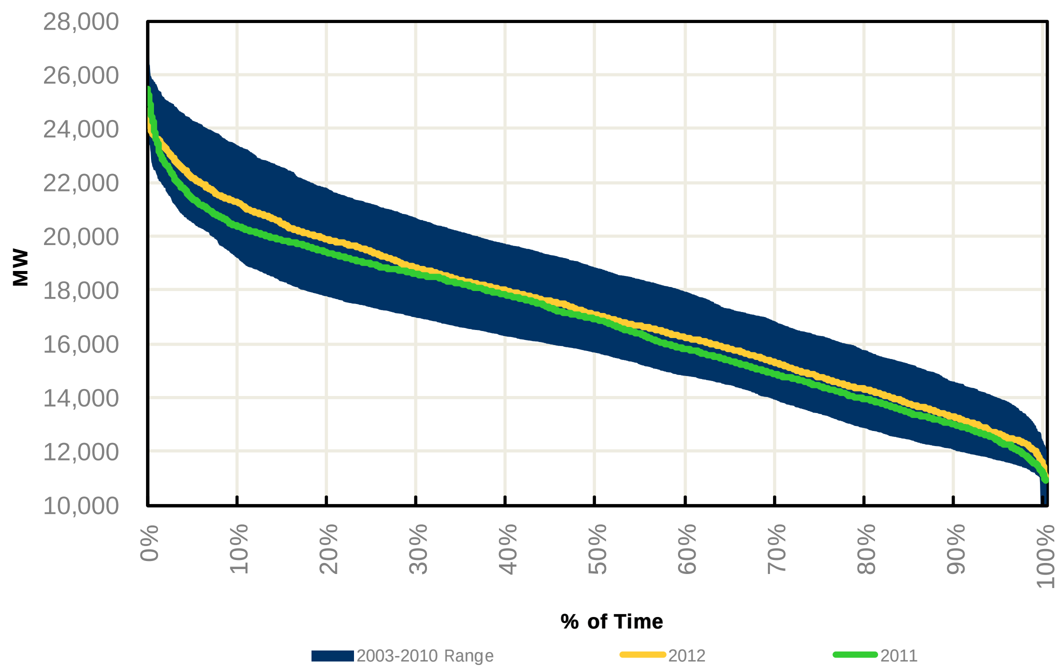


Figure 3.8: Spring Load Duration Curve

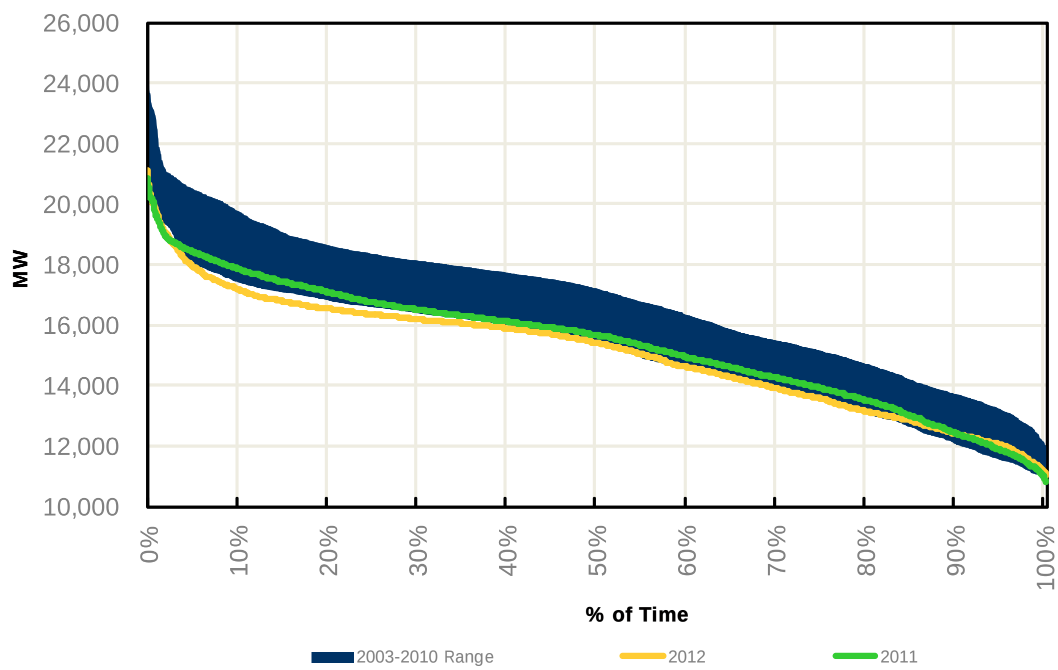


Figure 3.9: Winter Load Duration Curve

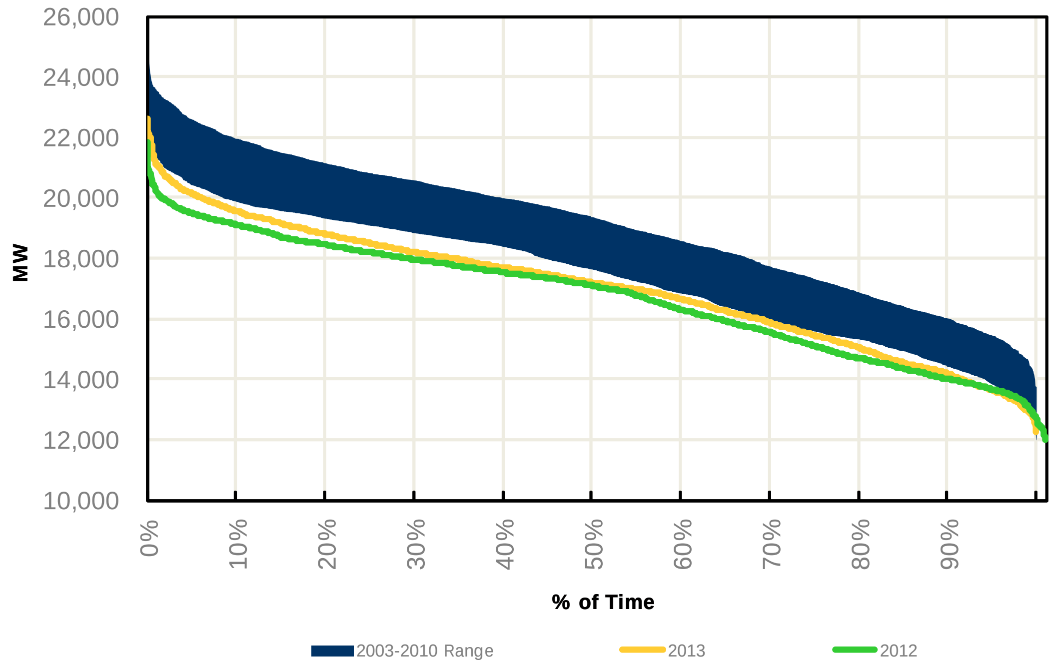
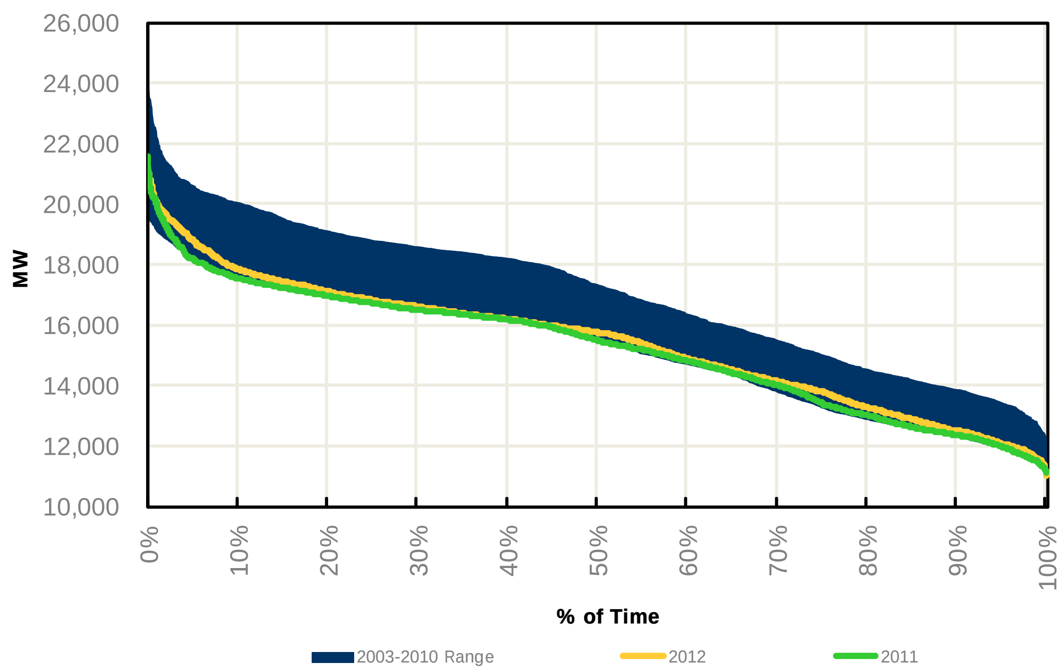


Figure 3.10: Fall Load Duration Curve



3.5 Historical Minimum Demand

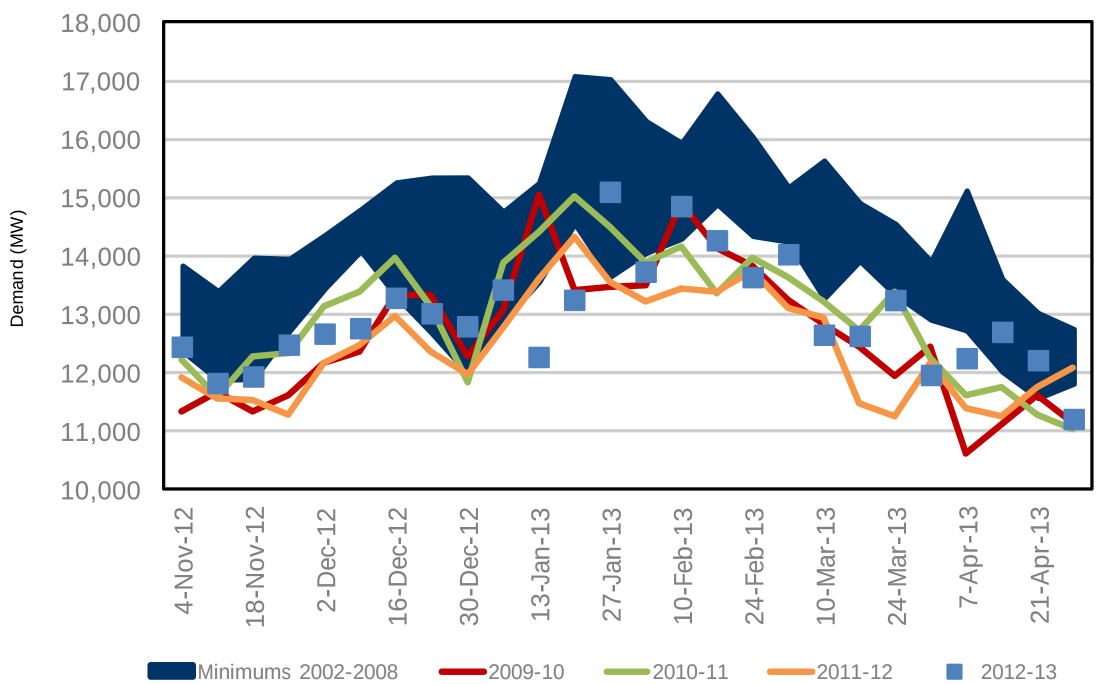
Like peak demands, the minimums are driven by weather, calendar and economic effects. Which of the drivers is most important varies throughout the seasons. The winter, spring and fall have the potential for heating load whereas the summer period has the potential for cooling loads. With the colder weather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

During the recession, load was not affected proportionally. Overnight loads bore a higher proportion of load loss as industries cut overnight shifts and weekend shifts first. As well, overnight loads are the least weather sensitive, so that the economic reductions would have a more profound impact on minimums than on overall energy demand.

Figure 3.11 shows the minimum weekly demands for the period November to April since market opening. The band represents the range of values for the years 2002-2008. The individual values are shown for 2009-10, 2010-11, 2011-12 and 2012-13. The financial crisis happened in the fall of 2008 and the 2009-10 timeframe represents the recovery period. Since then minimum loads have shown a small increase.

Minimums

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_2013may.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.

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	6,776	0.8	74.4	14.1	1.336	1.14
2013 (f)	6,864	1.3	57.4	-22.9	1.352	1.23
2014 (f)	6,960	1.4	55.3	-3.6	1.369	1.25

The global economy has continued to expand at a modest. Both the Euro zone and the U.S. economies have struggled with high debt loads and high unemployment. Even emerging markets have had their growth rates tempered as they rely on consumers in North American and Europe to help fuel their growth.

Unfortunately, the slow pace of growth has meant that high debt loads and high levels of unemployment are being brought down at a slow pace. This has been a detrimental to confidence – both business and consumer - who are waiting for signs of economic improvement to get them spending again. Unfortunately, economic news remains mixed and sustained, strong growth appears unattainable.

As well, we can see the transformation in Ontario's economy by looking at the composition of employment.

Figure 4.1 shows the year over year change in employment for Ontario, the Toronto zone and all other zones combined. It is fairly evident that despite a fairly geographically balanced recovery period from the start of 2010 until mid 2012, the past year has seen all job growth concentrated in the Greater Toronto Area.

Figure 4.2 shows the year over year changes in employment broken down into services, manufacturing and other goods (mining, construction, agriculture, forestry etc.). This graph shows that even prior to the recession Ontario was shedding manufacturing jobs and adding service sector jobs. Manufacturing jobs were lost as a result of the appreciating Canadian dollar starting in 2003-04. Since the recession manufacturing has stabilized but has rarely been a source of job growth.

Figure 4.1: Zonal Employment Growth

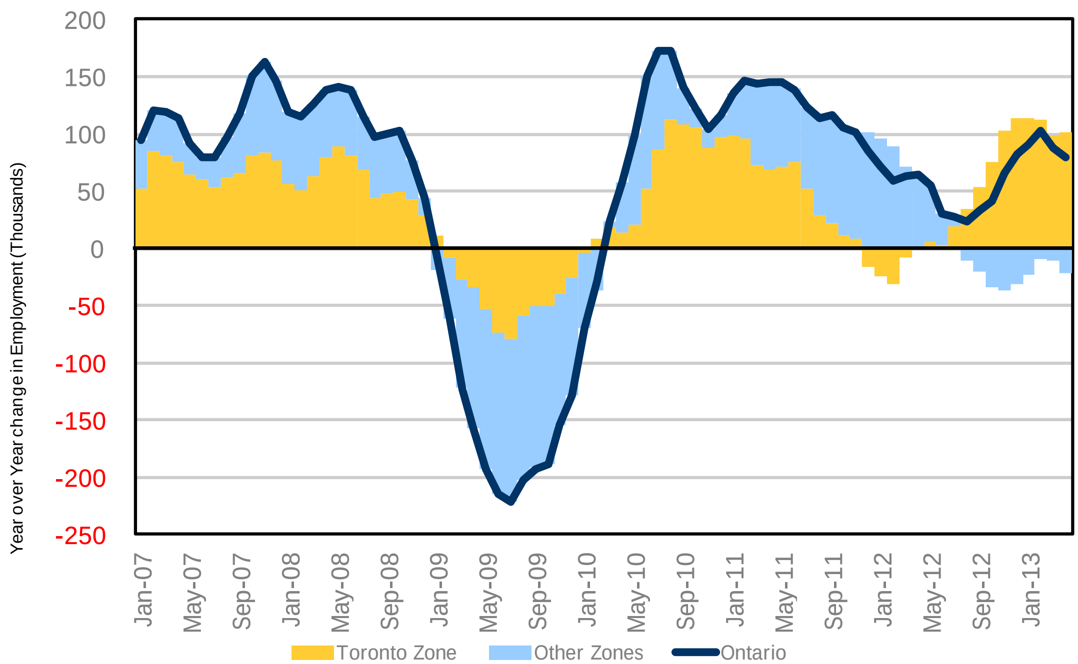
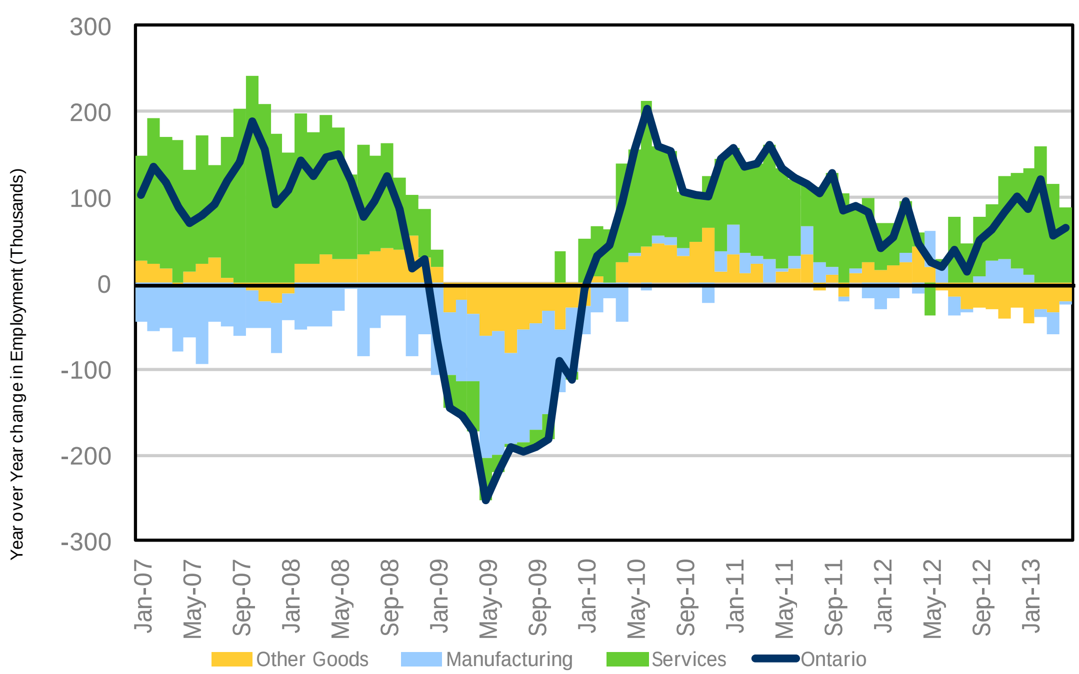


Figure 4.2: Composition of Ontario's Employment Growth



The growth in the job market is a reflection of the on-going structural change as Ontario shifts away from energy intensive industries to a more service based economy. This is part evolution – the maturing of an economy – and part revolution – the elimination of unproductive resources during the recession. This helps explain the relative stable electricity demand against a rise in gross domestic product (GDP).

Ontario still has vast natural resources that would translate into increased electric load as they are extracted and processed. However, those developments are more relevant to a longer forecast horizon.

Combined, the state of the global economy and the structural changes in the Ontario economy mean that electricity demand growth will not be fuelled by economic 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. 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 Allocation. Both are factored into the demand forecast. As both programs are relatively new 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 will 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.

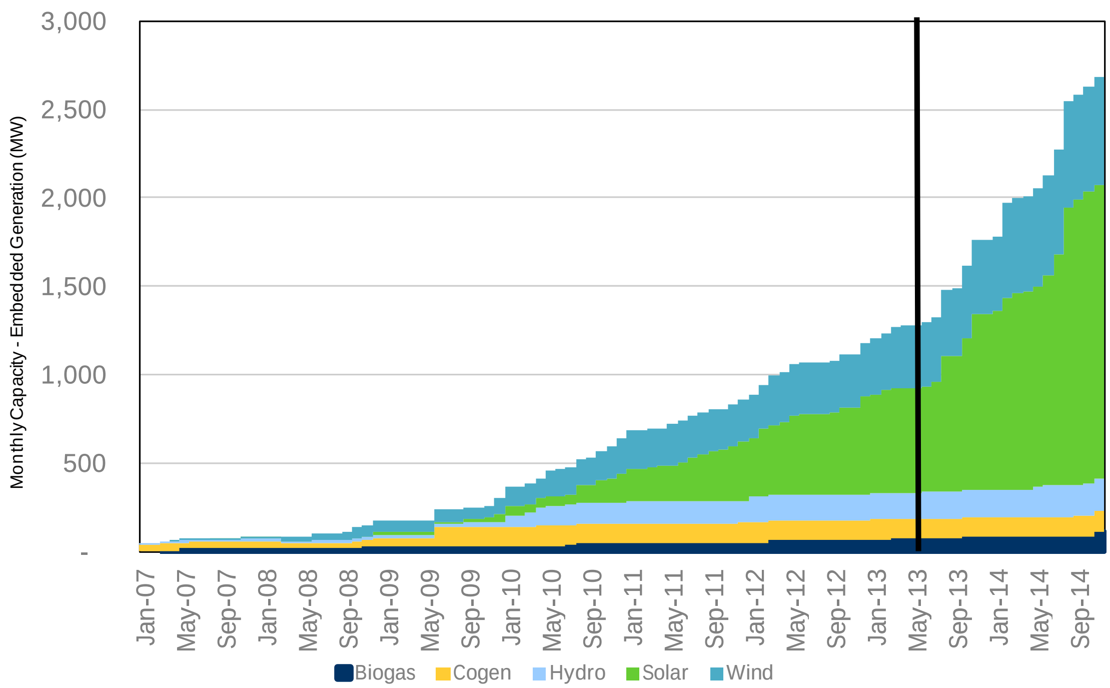
The Global Adjustment Allocation (GAA) has had a significant impact on peak demand on hot summer days. Class A customers can manage their Global Adjustment costs by reducing their consumption on the five days with the highest peaks. The impact of the GAA stretches beyond the five peak days as Class A customers will be "guessing' which days fall within those five days. Over the summer of 2012, the GAA impacts were nearly 900 MW on the five peak days and roughly 450 MW on the next highest five peak days.

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 1,425 MW of incremental embedded generation projected to be added over the forecast horizon. It is comprised of solar (1,068 MW), wind (270 MW), biogas (52 MW) and hydro (31 MW). The large increase in solar capacity 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. 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 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 -