

ONTARIO ENERGY REPORT Q3 2015

JULY – SEPTEMBER 2015
ELECTRICITY

Ontario Grid-Connected Peak Demand (Q3)

22,516 MW set in Q3-July 28, 2015, 6:00 PM EDT

Source: IESO

Transmission Grid-Connected Generation Output (Q3)

Nuclear	23.3 TWh	61.1%
Hydro	8.6 TWh	22.4%
Gas	4.6 TWh	12.1%
Wind	1.4 TWh	3.7%
Biofuel	0.1 TWh	<1%
Solar	0.09 TWh	<1%

Source: IESO

Conservation Savings (Q3)

Net Peak Demand Savings	184 MW
Net Energy Savings	96 GWh

Source: IESO

Ontario Grid-Connected Peak Demand (YTD for 2015)

22,516 MW set in Q3-July 28, 2015, 6:00 PM EDT

Source: IESO

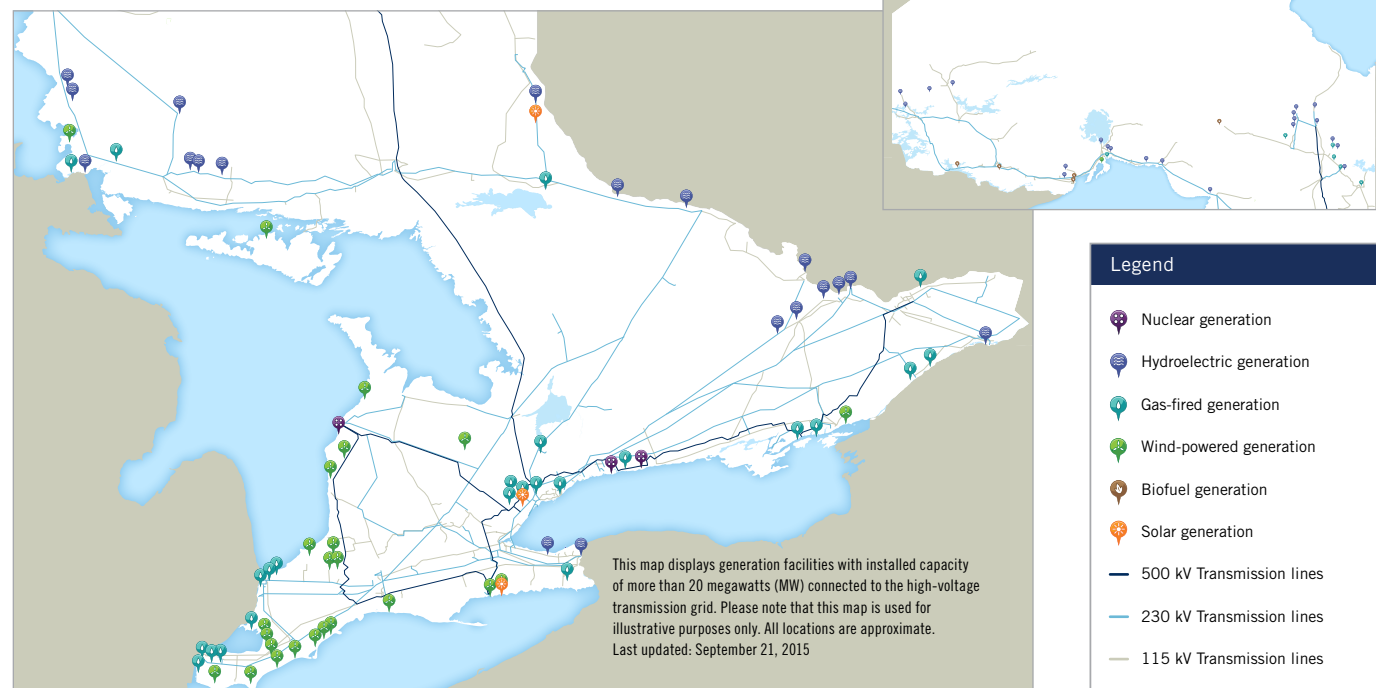
Commodity Cost – Class A (¢/kWh)	Q3	YTD
Hourly Ontario Energy Price (Unweighted average)	2.40	2.41
Global Adjustment (Average, Class A) ¹	4.36	3.83
Total	6.76	6.24

Source: IESO

Commodity Cost – Class B (¢/kWh)	Q3	YTD
Hourly Ontario Energy Price (Weighted Average)	2.57	2.62
Global Adjustment (Average, Class B) ¹	7.54	7.27
Total	10.11	9.89

Source: IESO

Ontario's Transmission Grid

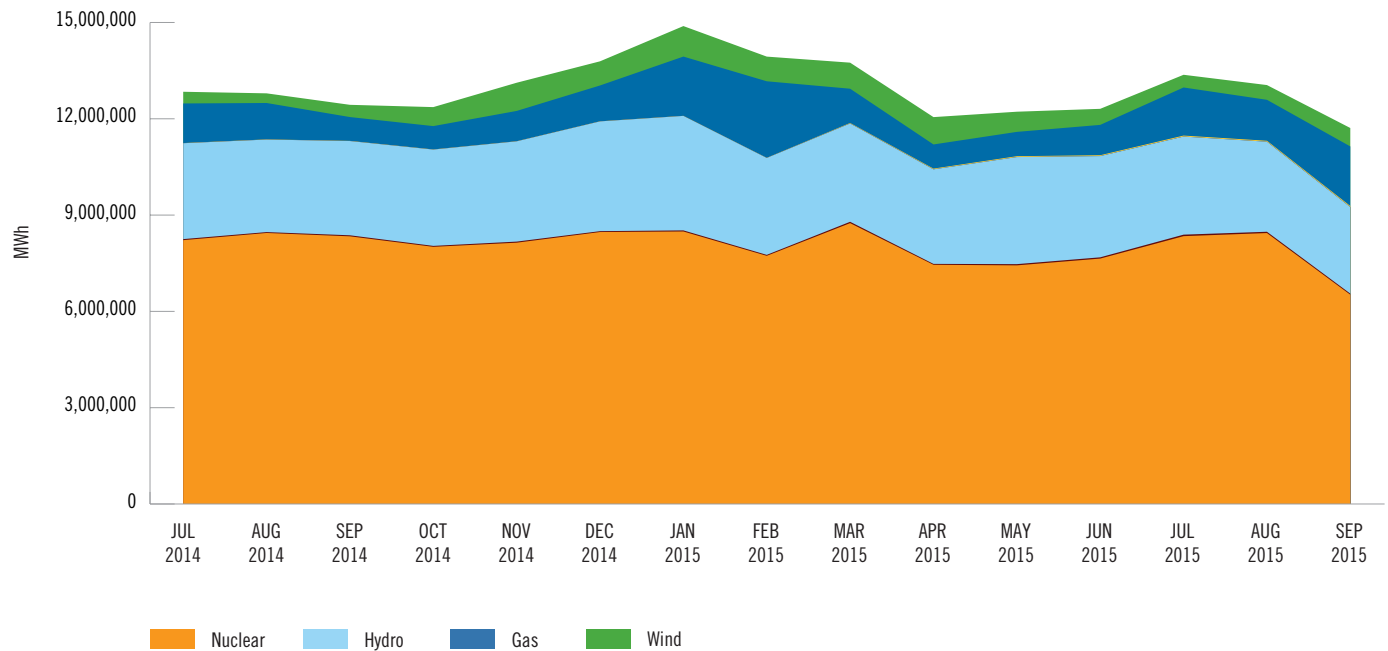


1. Class A customers are large electricity consumers that pay Global Adjustment based on their proportion of energy use during the five hours of the year with the highest demand. All other customers are Class B.

Electricity Supply

Monthly Energy Grid Output by Fuel Type (MWh)

Ontario's bulk electricity grid has a diverse supply mix, featuring baseload generators that provide energy around the clock, intermittent generators that generate when they are able (primarily wind and solar), and flexible generators that can change their output quickly (primarily natural gas).



Source: IESO

Note: Total MW value may not add up to sum of column totals due to rounding.

Grid-connected solar represented 0.2% and grid-connected biofuel represented 0.3% in the third quarter of 2015.

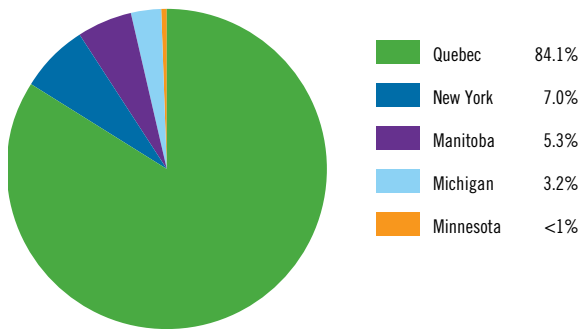
The data shown above is sourced from a report developed by the IESO, available at http://reports.ieso.ca/public/GenOutputbyFuelMonthly/PUB_GenOutputbyFuelMonthly.xml. The report uses settlement data to provide information for all self-schedulers, intermittent and dispatchable Ontario generators registered as a Market Participant. The report – which includes all grid-connected generators, plus those embedded generators that are also registered as market participants – is published monthly as per the Physical Settlement calendar.

Imports and Exports

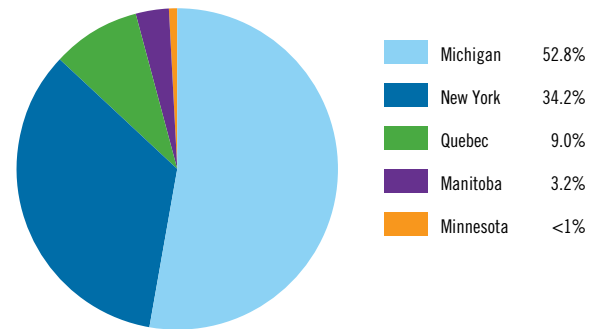
Ontario is connected to a large, stable network of transmission systems across North America, which supports system reliability and economic efficiency. Imports compete against domestic generation to provide energy at the best possible price and to support the province's needs during periods of high demand. Ontario also exports energy when prices are higher, which helps to bring in revenue that helps offset other system and infrastructure costs and can help maintain system reliability during times of surplus generation.

Ontario imports and exports power across 26 interties with two provinces and three states. While Ontario is electrically interconnected with Manitoba, Michigan, Minnesota, New York and Quebec, the interties allow for electricity trade in transactions that can reach across eastern North America, contributing to a more diversified and competitive pool of supply.

Imports



Exports



Q3 (GWh)	Manitoba	Michigan	Minnesota	New York	Quebec	Total
Imports	90	54	7	118	1,429	1,699
Exports	149	2,473	39	1,598	421	4,680

Source: IESO

Note: Numbers may not add up to source totals due to rounding.

Installed Capacity Connected to Transmission Grid

Changes to installed transmission grid capacity in this quarter highlight the continuing process of renewal in Ontario's electricity sector. While nuclear, hydroelectric and natural gas production accounted for the vast majority of bulk supply, new wind, biofuel and solar generators continued to connect to the transmission grid.

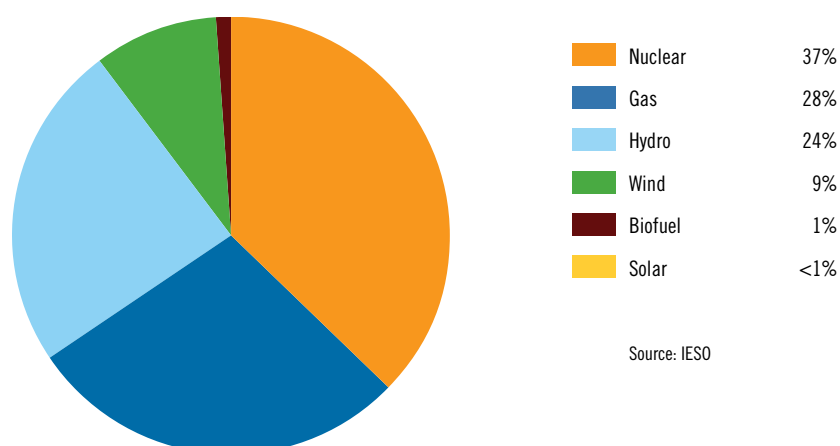
New Facilities Registered in Q3

The following project has completed commissioning and the market entry process and is included as part of total installed IESO Market Participant generator capacity:

- Goulais Wind Farm – 25 MW

Source: IESO

Installed Generation Capacity (Grid-Connected)



Note: data include all transmission-connected generation facilities and distribution-connected facilities that are Market Participants.

The table below shows the increased use of renewable resources for generating electricity in the province.

Installed Generation Capacity (Grid-Connected) (MW)

Year	Nuclear	Hydro	Coal	Gas ¹	Wind	Biofuel	Solar ²	Total
2015 MW (Q3)	12,978	8,462	0	9,934	3,234	455	140	35,203
2015 % (Q3)	37%	24%	0%	28%	9%	1%	<1%	
2014 MW	12,947	8,462	0	9,920	2,543	455	40	34,367
2013 MW	12,947	7,939	2,291	9,920	1,725	124	0	34,946
2012 MW	12,998	7,947	3,293	9,987	1,511	122	0	35,858
2011 MW	11,446	7,947	4,484	9,549	1,412	122	0	34,960

Source: IESO

Embedded Generation (IESO-contracted)

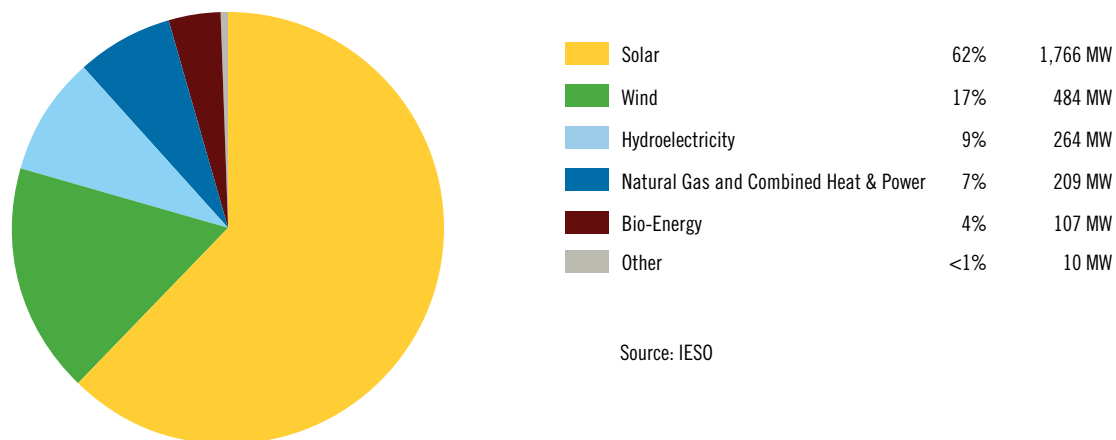
Embedded generators supply electricity to local distribution systems, helping to offset demand on the transmission grid by supporting some of the needs of local communities. While wind and solar make up the majority of contracted embedded generation, the IESO has contracted for increasing amounts of hydroelectric, combined heat and power, natural gas and bio-energy systems that will also connect to local distribution networks.

By the end of Q3 2015, there was more than 2,840 MW of contracted generation in commercial operation within local distribution systems.

1. Units that use natural gas, oil or are dual fuel, such as Lennox, NP Kirkland and NP Cochrane, are included in the Gas category.

2. Solar category represents grid-connected solar facilities. Most solar generation in Ontario is currently connected to distribution systems.

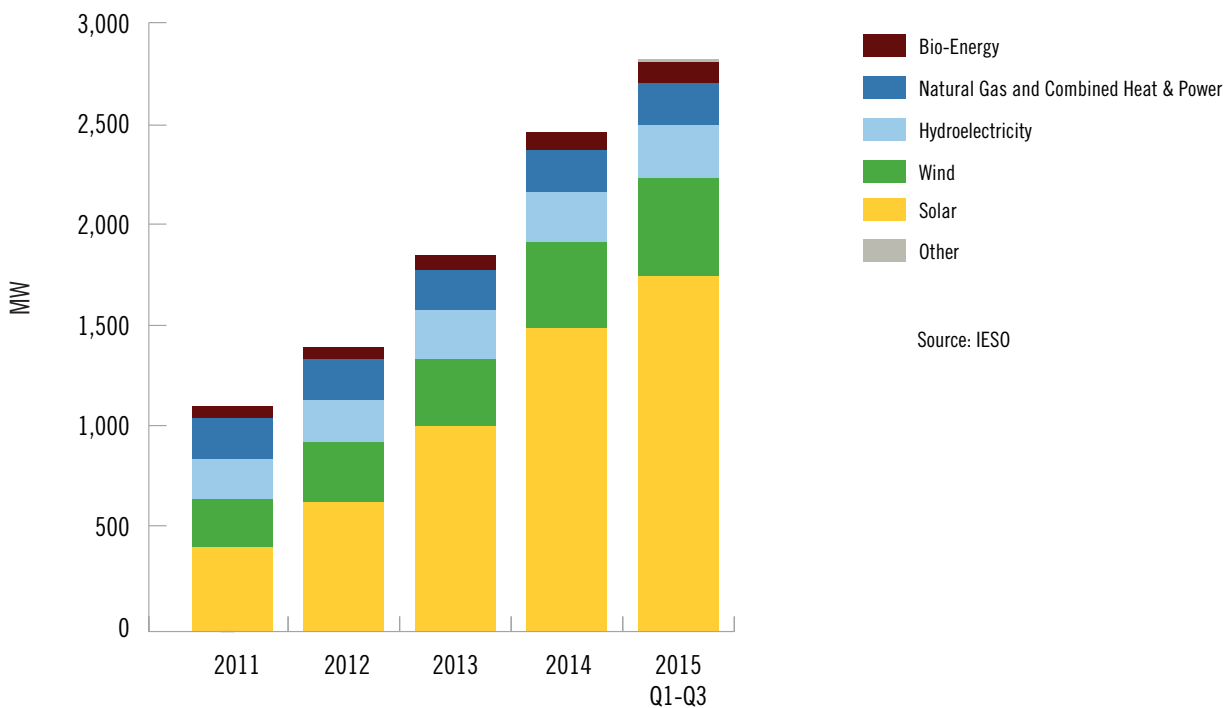
Contracted Embedded Generation Capacity in Commercial Operation (at end of Q3)



Note: Numbers may not add up to source totals due to rounding.

The table below shows the increased use of embedded generation to supply electricity to local distribution systems in the province.

Contracted Embedded Generation Capacity in Commercial Operation



*Total IESO-contracted embedded generation in commercial operation at end of each period. Numbers may not add up to source totals due to rounding.

The data shown above are sourced from the IESO Progress Report on Contracted Supply. The report provides a quarterly update on the status of supply and procurement initiatives that are under development or in commercial operation, by fuel type, and aggregates total capacities as stated in each contract, which differs from values on installed capacity used for operation purposes. The report is available at <http://www.ieso.ca/Documents/Supply/Progress-Report-Contracted-Supply-Q32015.pdf>.

Available Capacity at Peak**26,678 MW (Q3)**

Peak Demand	22,516 MW (Q3)	Operating Reserve Requirement	1,500 MW (Q3)
Minimum Demand	10,927 MW (Q3)		

Source: IESO

Available capacity is all installed grid-connected capacity, less allowances made for seasonal derates, planned outages and the capacity of energy-limited resources. Reserves are required to ensure that the forecast Ontario Demand can be supplied with a sufficiently high level of reliability. Operating Reserve is the amount of supply resources required to handle the loss of the largest contingency on the grid, plus the loss of half the amount of the second largest contingency. More information on the criteria, tools and methodology the IESO uses to perform resource adequacy assessments can be found at http://www.ieso.ca/Documents/marketReports/Methodology_RTAA_2015jun.pdf.

Conservation

As part of the new Conservation First Framework for 2015-2020, the province has established a target of 7 terawatt-hours (TWh) in electricity savings to be achieved through conservation programs offered by local distribution companies (LDCs). The province also established a target of 1.7 TWh to be achieved through the Industrial Accelerator Program, which is delivered by the IESO to transmission-connected customers. Overall the province expects to achieve 8.7 TWh in savings by December 31, 2020.

The IESO has conditionally approved 42 CDM Plans, representing 72 of the 75 LDCs – approximately 99.9% of the allocated 7 TWh CDM target. Approved CDM plans are posted at <http://www.ieso.ca/Pages/Conservation/Conservation-First-Framework/Conservation-and-Demand-Management-Plans.aspx>.

Conservation Portfolio Progress – Preliminary Unverified Incremental Results (as of Q3)

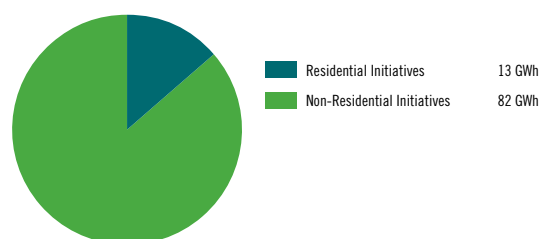
Incremental Progress – Q3 2015		Q3 2015*
LDC Delivered Programs	Net Peak Demand Savings (MW)	18
	Net Energy Savings (GWh)	95
IESO and other Non-LDC Programs	Net Peak Demand Savings (MW)	166
	Net Energy Savings (GWh)	0.9
Total Net Peak Demand Savings (MW)		184
Total Net Energy Savings (GWh)		96

* Results are presented at the generator level; totals may not align due to rounding.

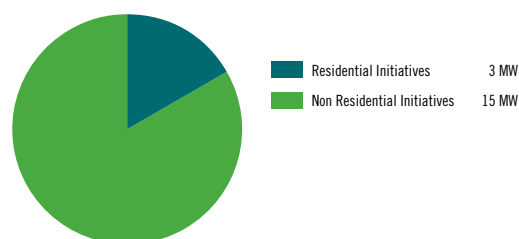
Source: IESO

Energy Savings through LDC-led Conservation Programs (Q3)

Net Energy Savings



Peak Demand Savings



Source: IESO

Note: Preliminary unverified results (as of Q3). Totals may not align due to rounding.

Demand Response

Demand response and peak savings programs benefit the electricity system and lower energy costs for consumers by contributing to overall peak savings for the province.

The Capacity-Based Demand Response (CBDR) program came into effect in the first quarter of 2015, bringing contracted demand response providers from the DR3 program into the wholesale energy market to better reflect system needs. The CBDR program, which represents approximately 500 MW of demand response capacity, was not activated in Q3.

More information on Capacity-Based Demand Response is available at <http://www.ieso.ca/Pages/Participate/Capacity-Based-Demand-Response.aspx>.

The IESO is also focusing on the development of demand-side resources, including market-based mechanisms such as a demand response auction, and will continue to put conservation first in planning the power system.

Peak Savings

The Industrial Conservation Initiative (ICI) encourages large consumers to shift their energy use away from system-wide peaks. Customers who are able to reduce their impact on peaks benefit the system by reducing the need to build new infrastructure. Participating customers are assessed an individual Global Adjustment (GA) rate, based on the percentage that their demand contributes to the top five system coincident peaks measured during a defined base period.

Though final data for the period May 2015 to April 2016 will not be available until next year, initial estimates would indicate that ICI impacts for the monthly peaks of July and August were in the neighbourhood of 1,000 MW.

The table below lists the top five daily peaks for the most recent base period, which began on May 1, 2014, and ended on April 30, 2015. Given the relatively mild summer in 2014, three of the top five Ontario demand peaks occurred in the first quarter of 2015.

Industrial Conservation Initiative Coincident Peak Values (for base period May 1, 2014 to April 30, 2015)

Date	Hour Ending	Net Ontario Load (MW)	Embedded Generation (MW)	Total (MW)
January 7, 2015	19	21,118.570	491.57	21,610.140
February 19, 2015	20	20,976.264	440.031	21,416.295
August 26, 2014	17	20,967.233	682.792	21,650.025
February 23, 2015	20	20,862.399	539.973	21,402.372
September 5, 2014	17	20,830.888	884.74	21,715.628

Source: IESO

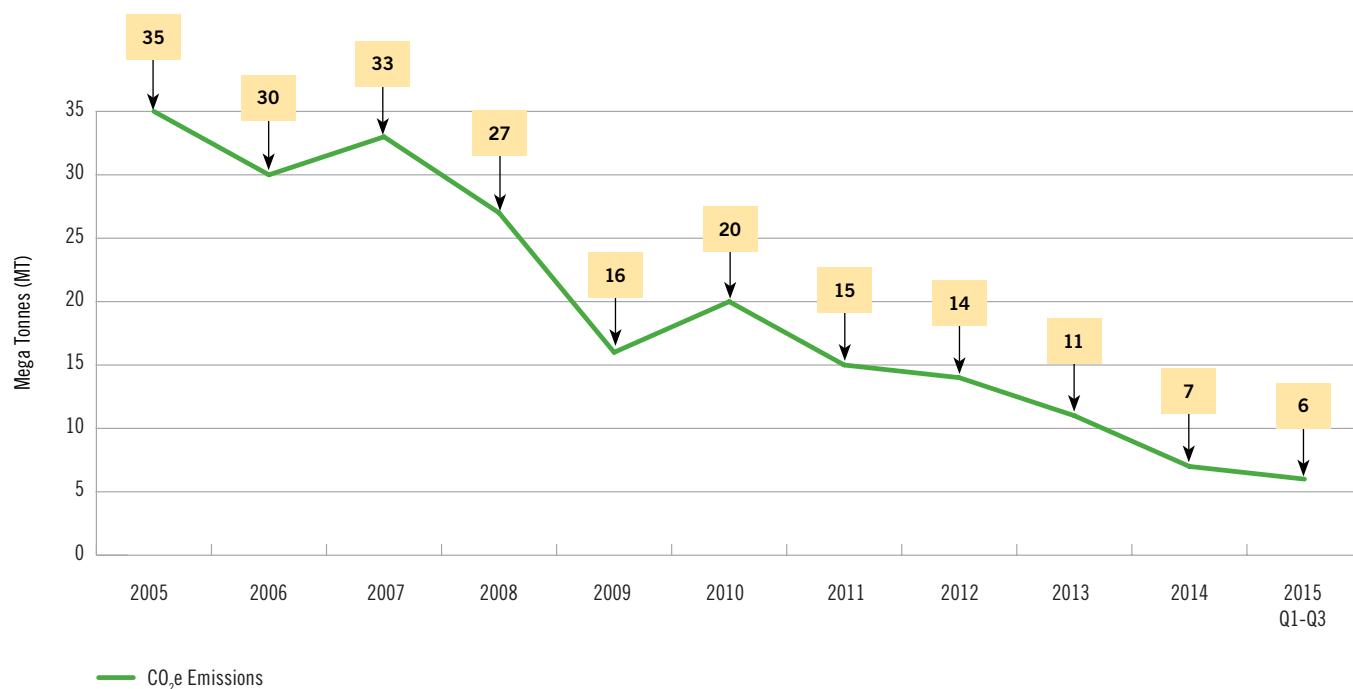
Note: The value in the Total (MW) column is the number used to calculate a customer's Peak Demand Factor.
The above values are used for the adjustment period July 1, 2015 to June 30, 2016.

More information on the ICI is available at http://www.ieso.ca/Documents/settlements/April_2015-ICI_Backgrounder.pdf.

Emissions – CO₂ Equivalents

The marked decline in CO₂ equivalent emissions is a result of the phase-out of coal-fired electricity generation in the province and uptake of renewable generation and conservation measures. Emissions of oxides of sulphur (SO_x) – which are predominantly a by-product of coal combustion – have also shown a marked decrease with the phase-out of coal-fired electricity.

CO₂ Emissions for the Ontario Electricity Sector



Source: IESO, Environment Canada

Air Contaminants

Air contaminants, including oxides of sulphur (SO_x), oxides of nitrogen (NO_x) and fine particulate matter (PM_{2.5}), are also released during combustion of fossil fuels.

Air Contaminants for the Ontario Electricity Sector (Tonnes)

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015 Q1-Q3
SO _x Emissions	114,323	87,932	105,420	76,020	30,768	38,448	11,971	10,342	10,192	847	474
NO _x Emissions	48,143	38,955	43,846	38,314	24,389	28,130	18,988	19,077	17,183	11,520	6,973
PM _{2.5} Emissions	1,787	1,529	1,876	1,314	1,779	2,120	562	478	439	281	196

Source: IESO, Environment Canada

Electricity Demand

Electricity demand is generally shaped by several factors that have differing impacts – those that increase demand (population growth, economic change), those that reduce demand on the grid (conservation, embedded generation) and those that shift demand (time-of-use rates, the Industrial Conservation Initiative). The impact of each of these factors on electricity consumption varies by season and time of day.

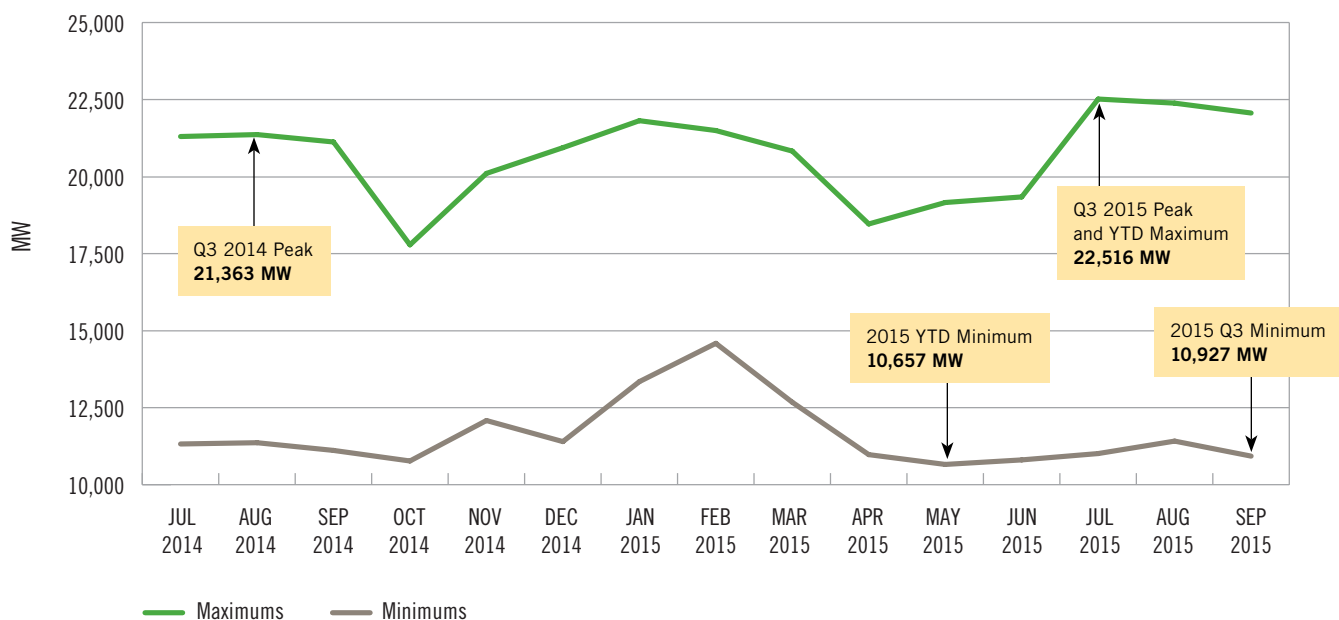
Even as the Ontario economy has moved beyond the 2008 recession, demand has remained flat. This trend is expected to continue as capacity and energy margins remain adequate and can be attributed in part to the successful implementation of conservation initiatives.

Ontario Grid-Connected Peak Demand – as of end of Q3

22,516 MW set in Q3 - July 28, 2015, 6:00 PM EDT

The summer of 2015 was slightly warmer than last year. Ontario returned to its traditional load pattern with a summer peak, due largely to air conditioning demand. This contrasts with 2014, which saw a winter peak due to an extremely cold winter “Polar Vortex”.

Ontario Monthly Peaks and Minimums (MW)



Source: IESO

Forecast Demand Peaks

The demand for electricity on the provincial grid is forecast on a rolling 18-month basis. An assessment is done to assure the adequacy of the existing and proposed generation and transmission facilities to meet demand needs. The chart below presents normal weather forecasts, representing a typical peak for the time of year, and extreme weather forecasts that reflect severe weather conditions. The impacts of time-of-use rates and the Industrial Conservation Initiative – which incents customers to reduce demand in peak demand hours – are also factored into the demand forecast in this report.

Season	Normal Weather Peak (MW)	Extreme Weather Peak (MW)
Winter 2015-2016	22,360	23,261
Summer 2016	22,649	24,623
Winter 2016-2017	22,378	23,355

Source: IESO 18-Month Outlook

Q3 Ontario Grid-Connected Energy Demand (TWh)

Year	Total (TWh)
2015	35.26
2014	34.27
2013	35.66
2012	37.13
2011	36.97

Source: IESO Power Data, Demand Overview

Historical Totals – Annual Ontario Grid-Connected Energy Demand (TWh)

Year	Total (TWh)	Change Over Previous Year
2015 (YTD as of end of Q3)	104.3	N/A
2014	139.8	-0.64%
2013	140.7	-0.42%
2012	141.3	-0.14%
2011	141.5	-0.35%

Source: IESO Power Data, Demand Overview

Note: Total does not include the impact of embedded generation to reduce demand.

Electricity Prices

Commodity Cost (¢/kWh)

Commodity cost comprises two components, the wholesale price (the Hourly Ontario Energy Price) and the Global Adjustment. The commodity cost is only a portion of the total energy bill.

Class A

Month (¢/kWh)	JUL 2014	AUG 2014	SEP 2014	OCT 2014	NOV 2014	DEC 2014	JAN 2015	FEB 2015	MAR 2015	APR 2015	MAY 2015	JUN 2015	JUL 2015	AUG 2015	SEP 2015	2015 YTD Avg.
HOEP*	2.25	2.06	1.41	0.62	1.52	2.02	2.86	4.97	2.42	1.57	1.42	1.42	2.03	2.19	2.99	2.41
Average Class A Global Adjustment Rate	2.94	3.09	3.50	4.42	3.93	3.84	2.89	2.21	3.16	4.27	4.26	4.39	4.76	4.56	3.77	3.83
Total Cost of Commodity	5.19	5.15	4.91	5.04	5.45	5.86	5.75	7.18	5.58	5.84	5.68	5.81	6.79	6.75	6.76	6.24

*(Unweighted) average of Hourly Ontario Energy Prices to reflect a typical (flat) industrial consumption profile.

Class B

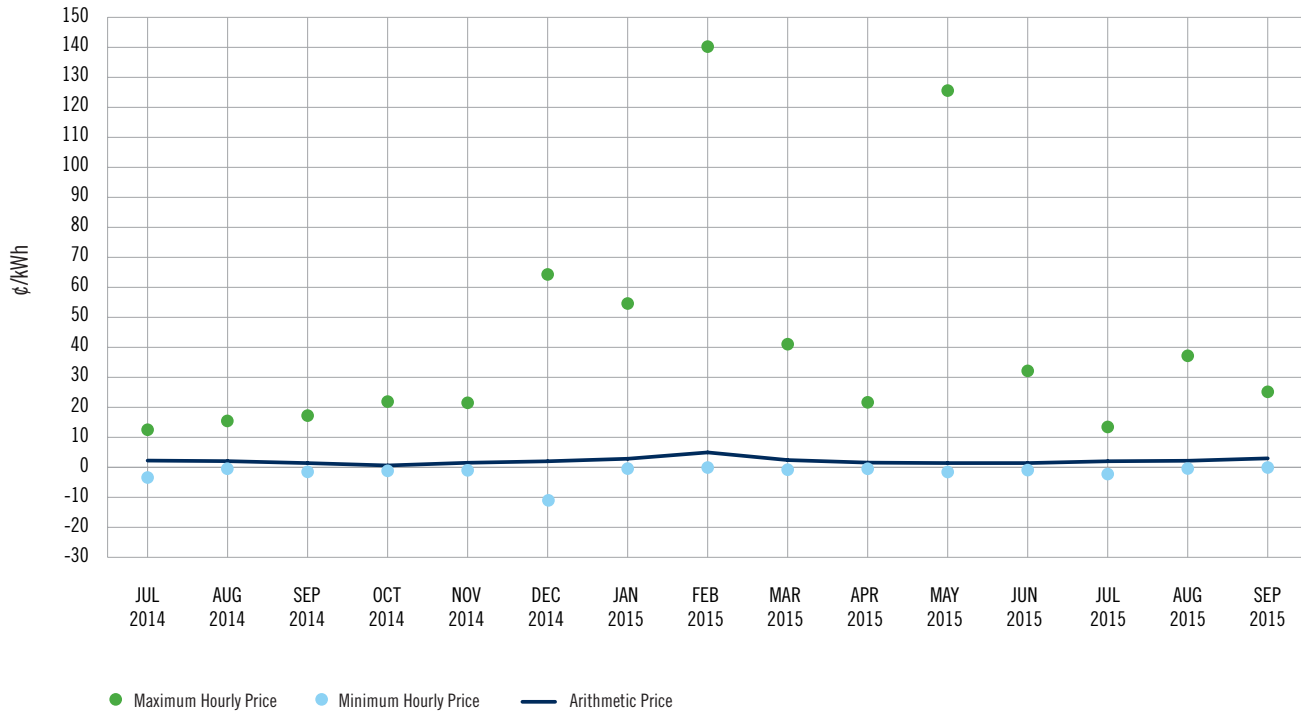
Month (¢/kWh)	JUL 2014	AUG 2014	SEP 2014	OCT 2014	NOV 2014	DEC 2014	JAN 2015	FEB 2015	MAR 2015	APR 2015	MAY 2015	JUN 2015	JUL 2015	AUG 2015	SEP 2015	2015 YTD Avg.
HOEP**	2.37	2.21	1.55	0.71	1.65	2.24	2.96	5.12	2.56	1.65	1.54	1.53	2.22	2.34	3.19	2.62
Class B Global Adjustment Rate	6.26	6.76	7.96	10.01	8.23	7.44	5.07	3.96	6.29	9.56	9.67	9.54	7.88	8.01	6.70	7.27
Total Cost of Commodity	8.63	8.97	9.51	10.72	9.88	9.68	8.03	9.08	8.85	11.21	11.21	11.07	10.1	10.35	9.89	9.89

**Averages are weighted by the amount of electricity used throughout the province within each hour to broadly reflect the consumption profile of Class B (i.e., residential and commercial) consumers.

Source: IESO

Monthly Wholesale Electricity Prices (¢/kWh)

The wholesale electricity price fluctuates by the hour. This chart shows the highest, lowest and average wholesale prices for each month. The monthly price varies depending on factors in the electricity market that shift the energy price higher or lower. A higher average monthly price exerts a downward pressure on costs that needs to be recovered through Global Adjustment, illustrated below.



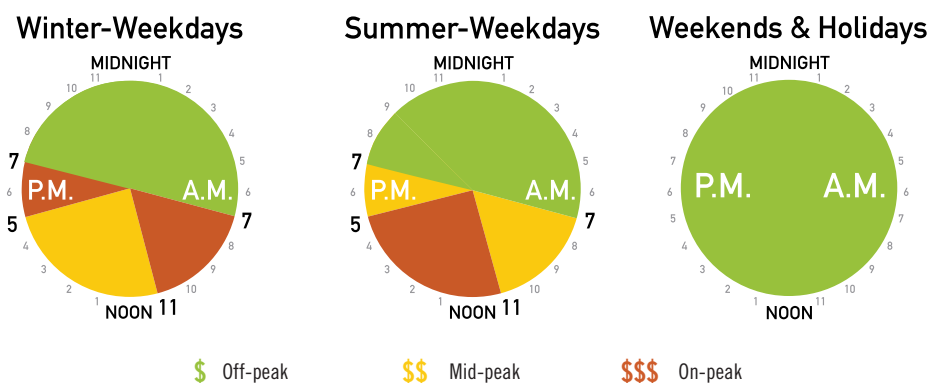
Source: IESO

Time-of-Use Pricing under the Regulated Price Plan (RPP)

In accordance with the mandate provided under the *Ontario Energy Board Act*, the OEB has developed the regulated price plan (RPP), a plan which provides eligible residential and small business consumers with stable and predictable electricity pricing, encourages conservation and ensures the price consumers pay for electricity better reflects the price paid to generators. The plan has been in place since 2005.

The RPP is established by forecasting the cost of supply for RPP customers for an upcoming year and determining the prices that will recover those forecast costs from eligible customers. Consumers with eligible time-of-use (or “smart”) meters that can determine when electricity is consumed during the day will pay the RPP under a time-of-use price structure. The prices for this plan are based on three time-of-use periods per weekday. These periods are referred to as off-peak, mid-peak and on-peak and are shown in the figure below. The hours for mid-peak and on-peak periods are different in the summer and winter months to match energy consumption patterns in those seasons.

Summer and Winter Time-of-Use Hours



Source: OEB

RPP prices reflect a forecast of prices on the Ontario wholesale electricity market, as well as other components of supply costs, such as those resulting from contracts. These costs are allocated to TOU consumption periods based on the type of supply that provides value at those times. For example, costs for always-on baseload sources of generation (such as nuclear) are allocated across all periods whereas costs for demand response conservation programs are only allocated to on-peak periods. The lowest (off-peak) price is below the average RPP supply cost, while the other two are above it. The time-of-use (TOU) prices applicable in Q3 2015 for consumers with eligible time-of-use meters are shown in the table below.

RPP Time of use prices effective May 1, 2015

Time-of-use RPP Prices – ¢/kWh	Off-Peak	Mid-Peak	On-Peak	Average Price
Price (¢)	8.0	12.2	16.1	10.2
% of TOU Consumption	64%	18%	18%	

Sample Residential Monthly Bill

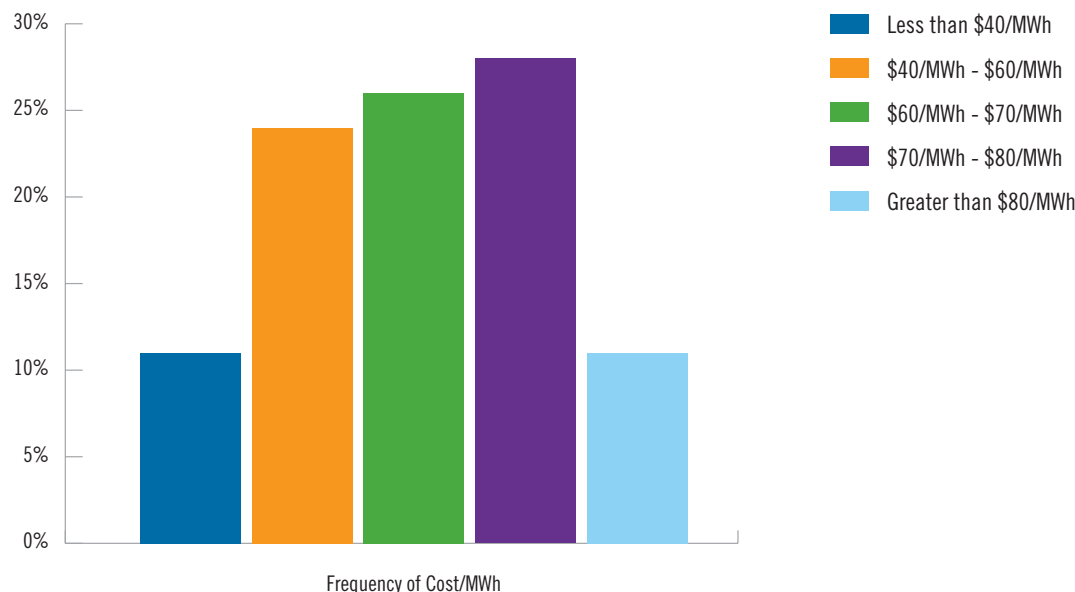
	Electricity	Delivery	Regulatory	DRC	HST	OCEB	Total Bill
Monthly Cost (\$)	81.68	46.20	4.98	5.60	17.97	-15.62	140.59

This table shows a residential monthly bill for a Toronto Hydro residential RPP TOU customer with monthly usage of 800 kWh as of May 1, 2015, with 64% of consumption occurring off-peak, 18% occurring mid-peak and 18% occurring on-peak. For consumers in other service territories, delivery cost will vary and is determined according to their local distributor's distribution rates (as approved by the OEB). For additional information please see the OEB's bill calculator <http://www.ontarioenergyboard.ca/OEB/Consumers/Electricity/Your+Electricity+Utility>.

Ontario Industrial Electricity Rates

Industrial electricity consumers can either be directly connected to the high-voltage transmission grid or receive electricity from their local distributor (e.g., Toronto Hydro). Directly-connected consumers do not pay distribution charges, thus lowering their electricity cost. The table below shows the distribution of average all-in prices for all directly-connected consumers in Ontario for 2014. In Ontario, electricity rates for large industrial consumers in Ontario vary by customer as they are determined by individual consumption patterns. Generally speaking, the less energy a large industrial uses during peak hours, the more these consumers reduce their impact on the provincial power system as well as their electricity costs. For most, the commodity cost incorporates both the market price as well as an allocation of the Global Adjustment based on their energy use during peaks.

Transmission-Connected Industrial Rates¹



The table below shows average all-in electricity prices for a distribution-connected industrial consumer in several service territories.²

Distribution-Connected Industrial Rates (2014)

\$/MWh	Windsor (EnWin)	Hamilton (Horizon)	Ottawa	Sudbury	Toronto ³
HOEP ⁴	\$32.39	\$32.39	\$32.39	\$32.39	\$32.39
Class A Global Adjustment	\$31.08	\$31.08	\$31.08	\$31.08	\$31.08
Delivery	\$13.26	\$17.10	\$16.47	\$16.10	\$17.80
Regulatory	\$5.73	\$5.79	\$5.73	\$5.95	\$5.75
DRC	\$7.00	\$7.00	\$6.90	\$7.00	\$7.00
All-In Price	\$93.07	\$96.97	\$96.28	\$96.13	\$97.63

1. Does not include Northern Industrial Electricity Rate Program

2. Data in the table is for a hypothetical consumer with a monthly peak demand of 5 megawatts and an 85% load factor. Load factor is an expression of how much energy was used in a time period, expressed as a percentage of what would have been used if consuming at full potential for the entire period. A 30 day month is assumed.

3. The distribution cost estimate for an industrial customer in Toronto reflects the assumption that 1 kVA is 1kW for billing purposes.

4. HOEP is the arithmetic average for all hours in 2014. The Global Adjustment shown in the table is an average of all distribution-connected Class A consumers for 2014.

Electricity – What's New

A collection of electricity reports and publications.

Information	Published By	Date
 18 Month Outlook	IESO	December 14, 2015
 Conservation Progress Report	IESO	December 14, 2015
 Progress Report on Contracted Electricity Supply	IESO	December 14, 2015
 LTPE: Comparison of 2014 Forecast vs. 2014 Actual Results	IESO	December 14, 2015
 2011-2014 Conservation Results Report	IESO	December 23, 2015
 Environmental Emissions Data Reports (Pickering, Darlington, Western Waste Management)	OPG	December 14, 2015
 Pickering Performance Reports	OPG	December 14, 2015
 Darlington Performance Reports	OPG	December 14, 2015
 Western Waste Management Performance Reports	OPG	December 14, 2015
 OPG Sustainable Development Report	OPG	December 14, 2015
 OPG Quarterly PowerNews / Performance Report	OPG	December 14, 2015
 Darlington Refurbishment Update	OPG	December 14, 2015
 Hydro One Quarterly Report	Hydro One	December 14, 2015
 Regulated Price Plan: Price Report (November 1, 2015 to October 31, 2016)	OEB	October 15, 2015
 Summary of LDC Conservation Results	OEB	December 14, 2015
 Natural Gas Rate Updates	OEB	December 14, 2015
 Ontario Energy Use and GHG emissions for the Broader Public Sector	Ministry of Energy	December 14, 2015