

MONTHLY MARKET REPORT

November 2016

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This report provides a summary of key market data from the IESO-administered markets. It is intended to provide a quick reference for all market stakeholders. In all cases, the data used to produce all graphs in this report, are available for download from the [Market Summaries](#) page of the IESO Web site. Any data used in this report is provided for information purposes only, and should not be used for settlement purposes.

1. Market Prices

1.1 Introduction

This section provides information on several of the key prices in the Ontario wholesale electricity market. A brief description of each displayed price item is included. For more information on any of the price items, please refer to appropriate market rules, market manuals and IESO Marketplace Training materials, or contact the IESO Customer Relations.

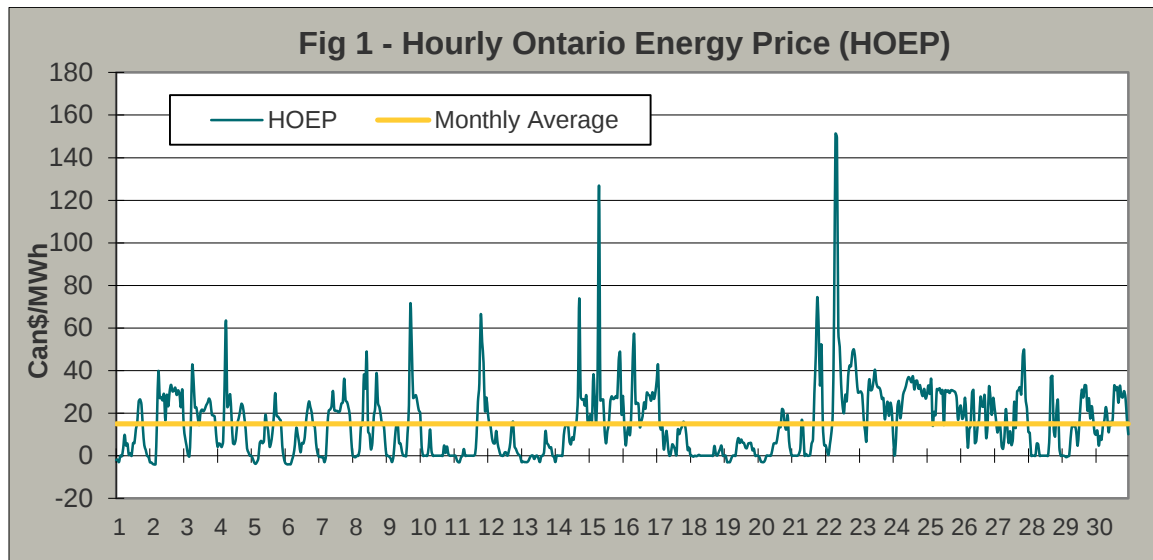
1.2 Hourly Ontario Energy Price (HOEP)

HOEP is the hourly price that is charged to Local Distributing Companies and other non-dispatchable loads. HOEP is also paid to self-scheduling generators. HOEP becomes the basis of the commodity charges in the Retail electricity market if customers receive their electricity from their Local Distributing Company. Customers who have arranged contracts with licensed Retailers are not affected by HOEP, but instead are charged their particular contract rate for the commodity.

Note: The IESO provides a convenient graph of HOEP prices for the current and previous day on the [Today's Market](#) page on the IESO Web site. These graphs also provide an estimate of future HOEP prices for the remainder of the day, and by afternoon, estimates for the next day. The estimates for future Hourly Ontario Energy Prices are extracted from an IESO report referred to as the pre-dispatch. Pre-dispatch data is updated every hour. All future prices are derived by simulating a supply/demand balance, using prices offered by suppliers in the market, prices bid by price-sensitive consumers in the market, and the IESO's forecast of the total demand for electricity in the province. The actual supply/demand balance can vary from these projections for a number of reasons:

- The actual demand for electricity can fluctuate as factors such as weather, (temperature, amount of cloud cover, wind etc.), affect the amount of electricity required by consumers.
- At the same time, operational difficulties or delays in a generation unit returning from an outage can result in higher priced generation being called on to fill the gap.
- Finally, any changes in price resulting from such variations can cause some price-sensitive loads to make alternative consumption decisions, or cause importers and exporters to revise their plans.

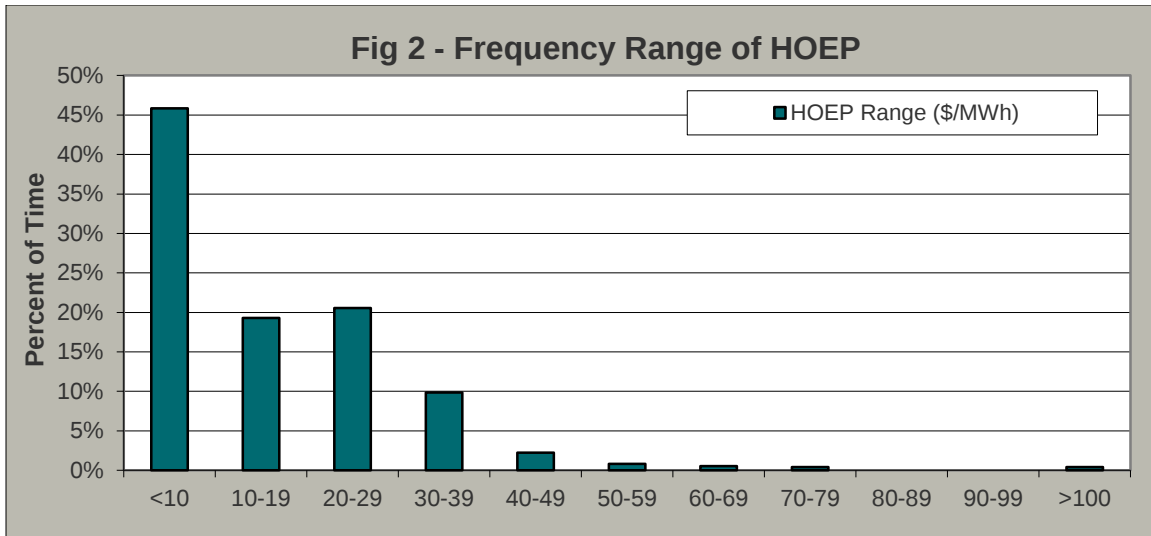
In this report, two graphs of HOEP are provided; the first shows a chronological graph of hourly HOEP prices for the month. The second graph shows the frequency at which the HOEP fell within specific price bands.



Hourly Ontario Energy Price \$/MWh			
	For the month	On-Peak	Off-Peak
Average	14.96	21.13	9.05
Maximum	151.14	151.14	67.17
Minimum	-4.12	-0.25	-4.12

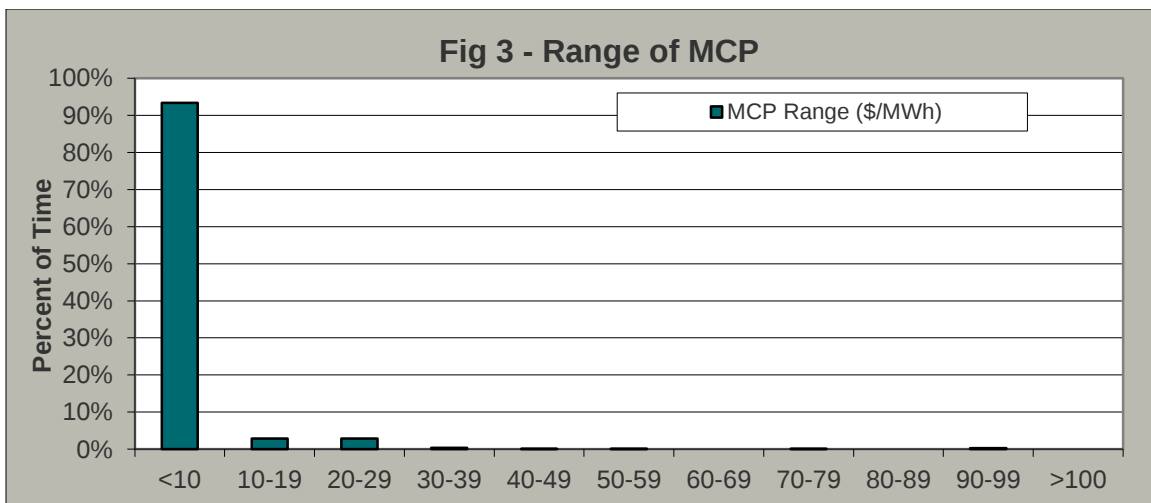
Monthly Weighted Average based on Ontario Demand = \$16.11/MWh or 1.61¢/kWh. This weighted average is provided as information, and may be of use to customers whose consumption pattern, or that of their local distributing company, approximates that of the total Ontario system.

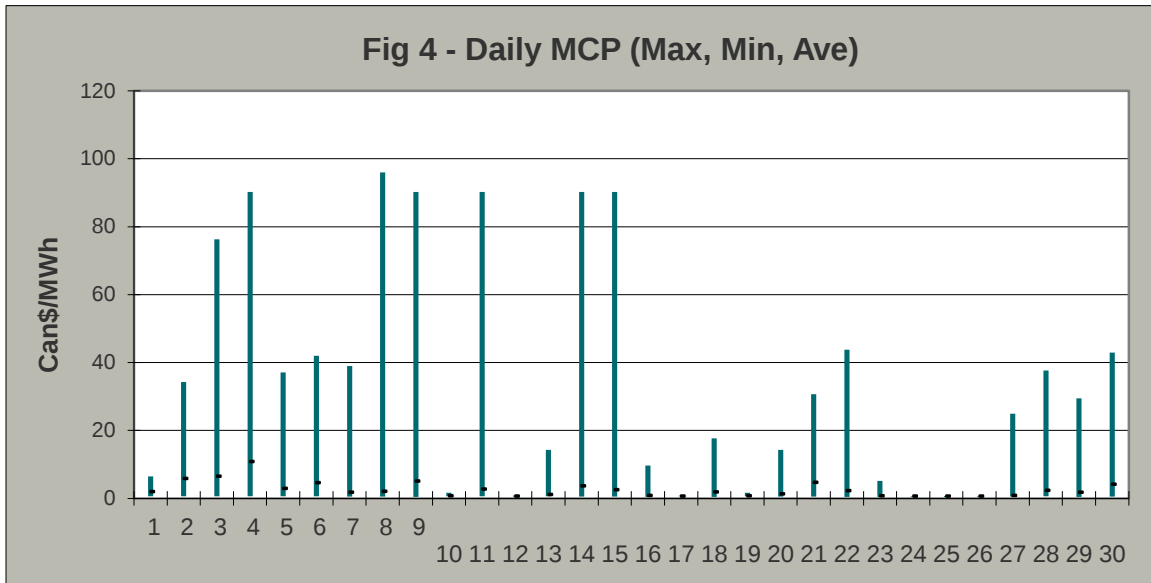
Note: On Peak average price is the straight arithmetic average of HOEP in hours 8 to 23 (EST), Monday to Friday (5 x 16). Off Peak average price is the straight arithmetic average of HOEP for all remaining hours in the week. The wholesale market does not use a formal definition of on and off-peak hours. The IESO is providing this calculation purely for information purposes, and will continue to use this definition throughout the year.



1.3 Ontario 5-Minute Market Clearing Price (MCP)

The Ontario 5-minute MCP is the price paid to dispatchable generators and charged to dispatchable loads. All other participants are charged or paid using hourly prices. The 5-minute price is calculated immediately after the fact for every 5-minute interval, using the unconstrained dispatch algorithm. The algorithm takes generator offers to sell and price-sensitive loads' bids to buy and dispatches these resources to achieve a supply-demand balance, and resulting price. The price is posted on the [Market Data](#) page on the IESO Web site, within 5-minutes of the conclusion of an interval. The 5-minute price, by its nature, will fluctuate more than the HOEP (an arithmetic average of the 12 MCPs for any particular hour), as it more directly reflects the short-term supply/demand variations caused by unexpected fluctuations in the demand for electricity or by equipment breakdowns.



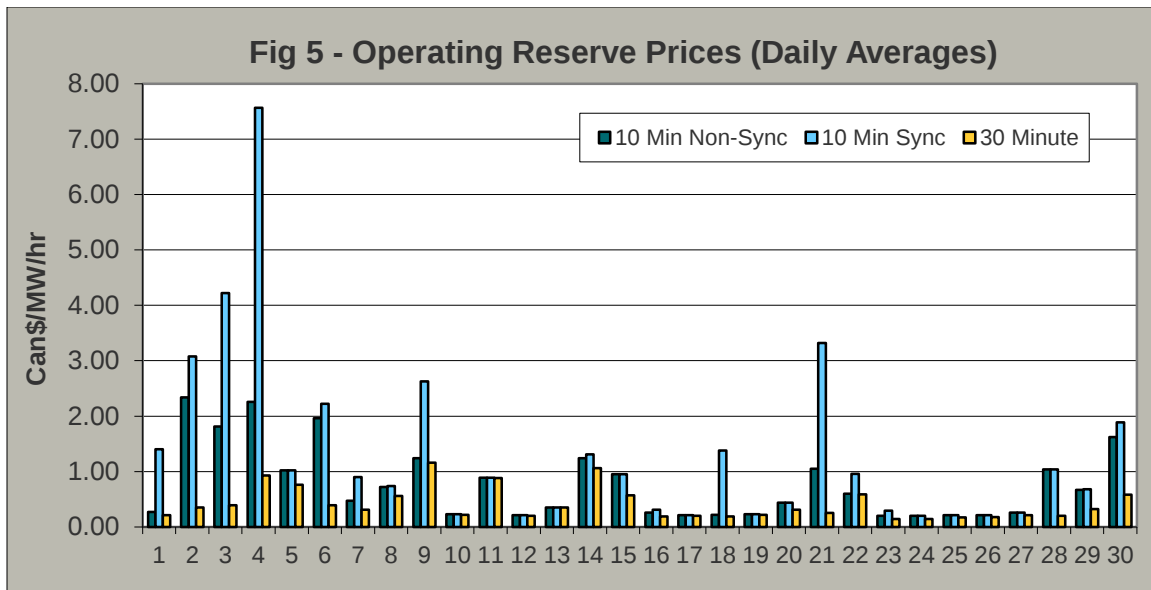


1.4 Operating Reserve Prices

Operating Reserve is generation capacity or load reduction capacity that the IESO can call upon on short notice. Operating Reserve is purchased by the IESO in amounts needed to meet the reliability rules established by the North American Electricity Reliability Council (NERC), and the Northeast Power Coordinating Council (NPCC). The IESO recovers the required funds to pay for the purchased operating reserve from all customers in the wholesale market, via the Hourly Uplift Settlement Charges. These Charges are discussed further and presented in Section 1.5 of this report.

The IESO purchases defined amounts of Operating Reserve from Participants via three real-time markets; a 10 minute synchronized reserve market, a 10 minute non-synchronized reserve market, and a 30-minute reserve market.

The operating reserve is like a buffer - a shock absorber to maintain the reliability of the system by allowing for sudden unexpected surges in demand or unanticipated reductions in supply - that is, in available generation. Like energy dispatch instructions, Operating Reserve schedules are determined every 5 minutes, with a resultant price for each type of operating reserve for every 5-minute interval. The IESO's decisions, on who will provide the market with operating reserve, and who will supply the market with energy, are integrated to arrive at the optimum market outcome. This creates a strong correlation between the energy price fluctuations and the fluctuations in reserve prices.



Average Operating Reserve Prices for this month were:

10 minute synchronized reserve:	\$1.31/ MW/hr
10 minute non-synchronized reserve:	\$0.78/ MW/hr
30 minute reserve:	\$0.41/ MW/hr

1.5 Hourly Uplift Settlement Charges

Uplift charges will now only be reported in one spot in this report – in the Table in Section 7. The Daily Uplift which was introduced in October 2011 will also be added to this table. The hourly uplift, IOG and monthly uplift values incorporate a few additional charge types that were not previously included.

Definition: The Hourly Uplift Settlement Charges presents hourly charge which covers the costs of Operating Reserve, Congestion Management Settlement Credits, Intertie Offer Guarantee payments (IOG), and other hourly costs such as energy losses on the IESO-controlled grid.

1.6 Monthly Uplift Charges

Uplift charges will now only be reported in one spot in this report – in the Table in Section 7. The Daily Uplift which was introduced in October 2011 will also be added to this table. The hourly uplift, IOG and monthly uplift values incorporate a few additional charge types that were not previously included.

1.7 Transmission Rights Auction

The Transmission Rights Market is a financial market that is based on the import and export of electricity on the interconnection lines between Ontario and its surrounding markets in Manitoba, Quebec, New York, Michigan and Minnesota. The transmission capacity of these interconnections is limited. When the interconnection lines reach their limits, energy prices can differ between Ontario and its surrounding markets. The Transmission Rights Market allows participants to buy financial protection ahead of time, to hedge against the possible price differences. These transmission rights are financial only. They do not give the holder of these rights any scheduling priority and do not limit other participants' access to physical transmission across the interconnection lines.

The Transmission Rights contracts are auctioned off by the IESO. Successful bidders pay the market clearing price for the particular Transmission Right, in return for the right to receive revenues from the IESO in amounts proportional to the financial congestion which may occur over that interface for the duration of the contract.

This month, the IESO conducted three transmission rights auctions. The market clearing prices in the auctions are listed in the table below. The prices have been rounded to the nearest dollar.

	Short Term Auction November 2016 \$/MW	
Intertie Zone	Import to Ontario	Export from Ontario
New York	26	4096
Michigan	14	10601
Minnesota	104	3802
Manitoba	90	3846
Quebec - AT	77	120
Quebec - D5A	0	0
Quebec - D4Z	0	
Quebec - P33C	0	
Quebec - X2Y	0	
Quebec - H4Z		4
Quebec - B5D/B31L	4	

1.8 Transmission Rights Payments

The holders of Transmission Rights Contracts own the right to receive congestion payments from the IESO whenever congestion results in differences between the Ontario price and the relevant external zone price. The table in this section shows the payments that a holder of a 1 MW Transmission Rights Contract received from the IESO in this month. These payments would be made to holders of either Long - Term Transmission Rights Contracts that encompass this month, or Short -Term Transmission Rights contracts for this month.

Intertie Zone	Import to Ontario (\$ per 1 MW contract)	Export from Ontario (\$ per 1 MW Contract)
Manitoba		4,396
Michigan		7,711
Minnesota	20	3,124
New York		5,609
Quebec - B5D/B31L		
Quebec - D4Z		
Quebec - D5A		
Quebec - H4Z		7
Quebec - P33C		
Quebec - X2Y		
Quebec - AT	137	

1.9 Transmission Rights Clearing Account

The table below provides the activity of the Transmission Rights Clearing Account on a monthly basis for the past 12 months. It shows the revenues from the Transmission Rights Auctions, congestion rents from the market, interest earned on the balance and the Transmission Rights payments to Transmission Rights holders in millions of dollars. Long term auction revenues are allocated evenly over the applicable 12 month term and the table below does not include revenues from future months. As per Chapter 8, section 4.18 of the market rules the reserve threshold as set by the IESO Board is equal to \$20 million.

Transmission Rights (TR) Summary	Previous Balance	Dec-15	Jan-16	Feb-16	Mar-16	Apr-16	May-16	Jun-16	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	LTD Total
Allocated TR Auction Revenues	\$508.4	\$8.1	\$8.9	\$10.8	\$12.7	\$8.9	\$11.7	\$10.5	\$12.7	\$11.4	\$13.3	\$11.9	\$11.5	\$640.8
Congestion Rents Received from the Market	\$726.0	\$14.0	\$19.7	\$18.2	\$16.8	\$21.9	\$13.9	\$8.2	\$14.2	\$7.3	\$24.4	\$23.0	\$13.8	\$921.4
Interest earned on TR Bank Account	\$3.9	\$0.1	\$0.0	\$0.0	\$0.0	\$0.1	\$0.0	\$0.0	\$0.0	\$0.0	\$0.1	\$0.1	\$0.1	\$4.6
TR Payments to Rights Holders	-\$908.5	-\$15.3	-\$20.9	-\$22.2	-\$17.3	-\$30.1	-\$14.3	-\$7.7	-\$13.5	-\$8.3	-\$27.7	-\$22.6	-\$9.7	-\$1,118.2
TR Clearing Account Disbursement	-\$299.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	-\$45.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	-\$68.0	-\$412.0
Total	\$30.7	\$6.9	\$7.8	\$6.9	\$12.1	\$0.8	-\$33.6	\$11.0	\$13.4	\$10.4	\$10.0	\$12.3	-\$52.3	\$36.6

2. Market Demand

2.1 Market Demand Definitions and Graphs

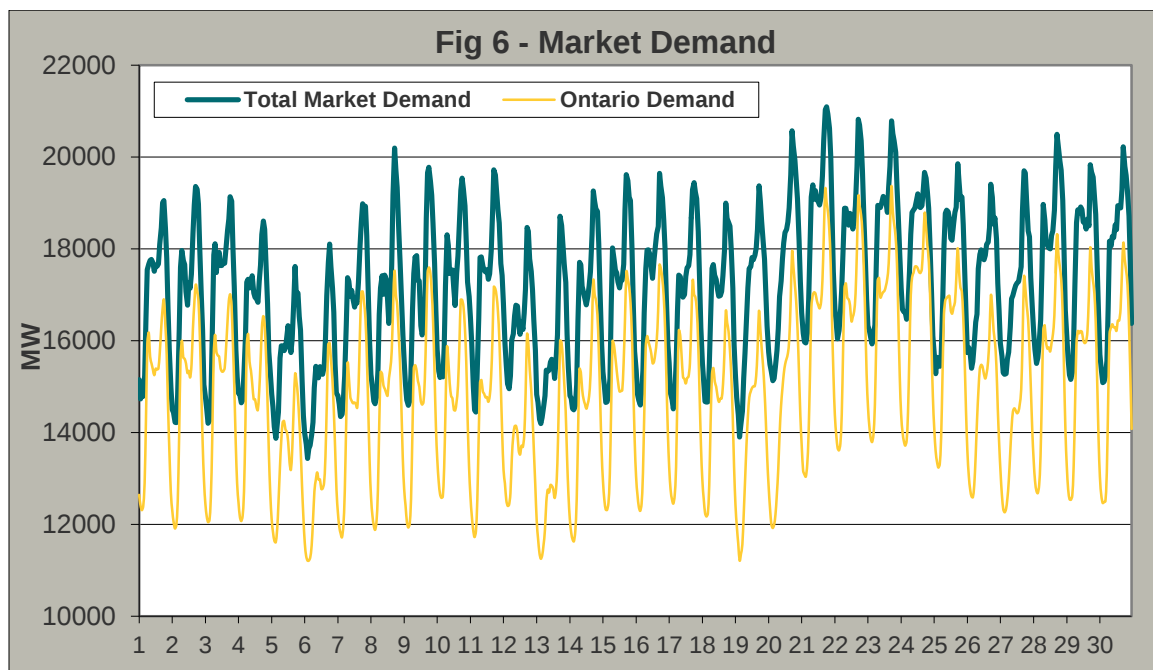
The graph below plots values for both Total Market Demand and Ontario Demand.

Total Market Demand represents the total energy that was supplied from the IESO-Administered Market.

The IESO calculates Total Market Demand by summing all output from generators registered in the Market plus all scheduled imports to the province. It is also equal to the sum of all load supplied from the Market plus exports from the province, plus all line losses incurred on the IESO-controlled grid.

Ontario Demand represents the total energy that was supplied from the IESO-Administered Market for the sake of supplying load within Ontario.

It is also equal to the sum of all loads within Ontario which is supplied from the Market, plus all line losses incurred on the IESO-controlled grid.



Demand

Average hourly values for the month:
Maximum hourly values for the month:
Minimum hourly values for the month:
Total Demand for the month:

Total Market Demand

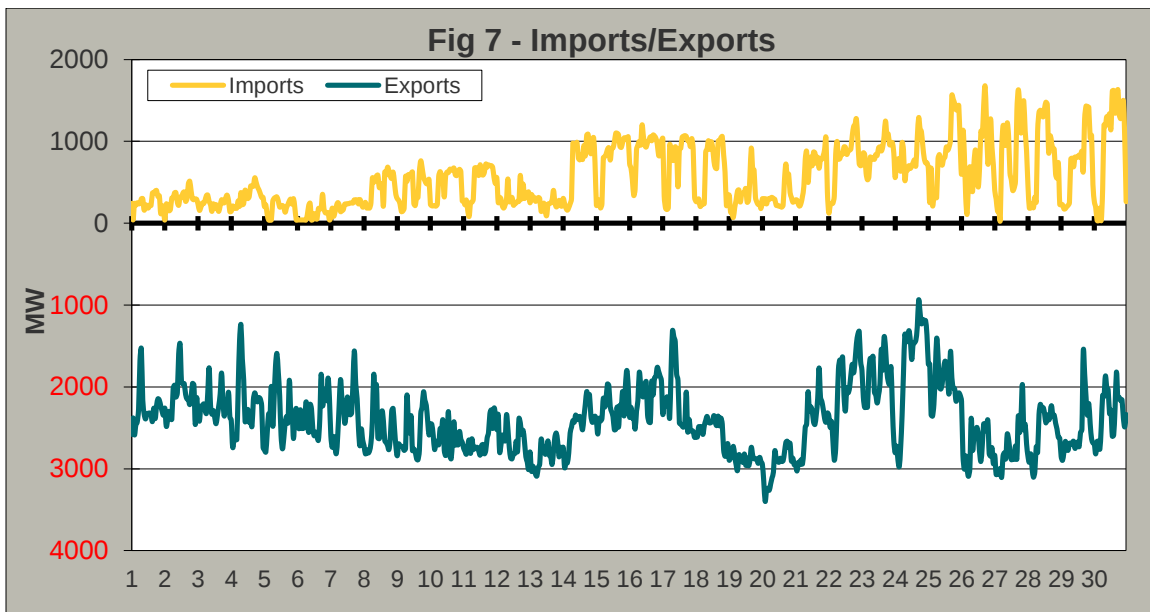
17,188 MW
21,092 MW
13,432 MW
12,375,599 MWh

Ontario

14,858 MW
19,369 MW
11,211 MW
10,697,635 MWh

2.2 Imports & Exports

The graph below plots both imports to Ontario and exports from Ontario during the month. Economic **imports** and **exports** are scheduled into/out of Ontario on an hourly basis, up to the physical capabilities of the Grid and the interconnections between the systems.



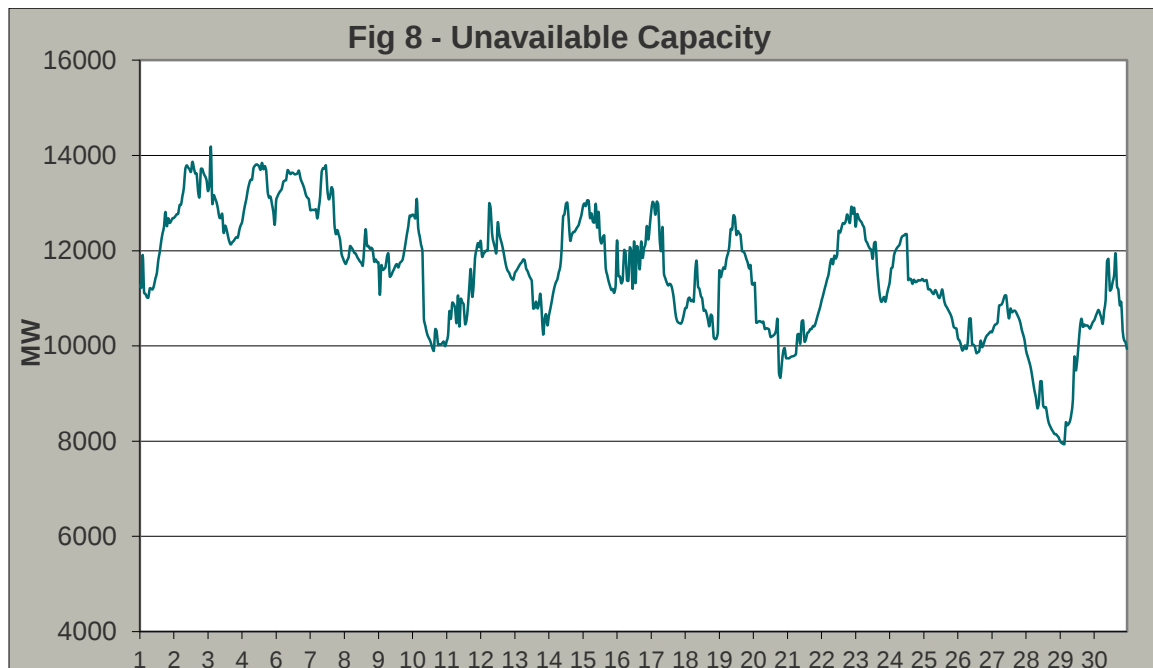
Average export schedule for the month = 2,400 MW
Average import schedule for the month = 588 MW
Average net intertie schedule = 1,843 MW net export

3. Unavailable Capacity

3.1 Unavailable Capacity

It is clear from the various graphs in this report that the demand for electricity varies greatly; from hour to hour, from day to day, and from season to season. The amount of generation available for operation also varies greatly over these same timeframes. The graph in this section shows the total capability of generation within Ontario that is unavailable for operation. These quantities are published by the IESO several times per day in the System Status Reports (SSR). The values in this graph are calculated by summing the following quantities (all in MW):

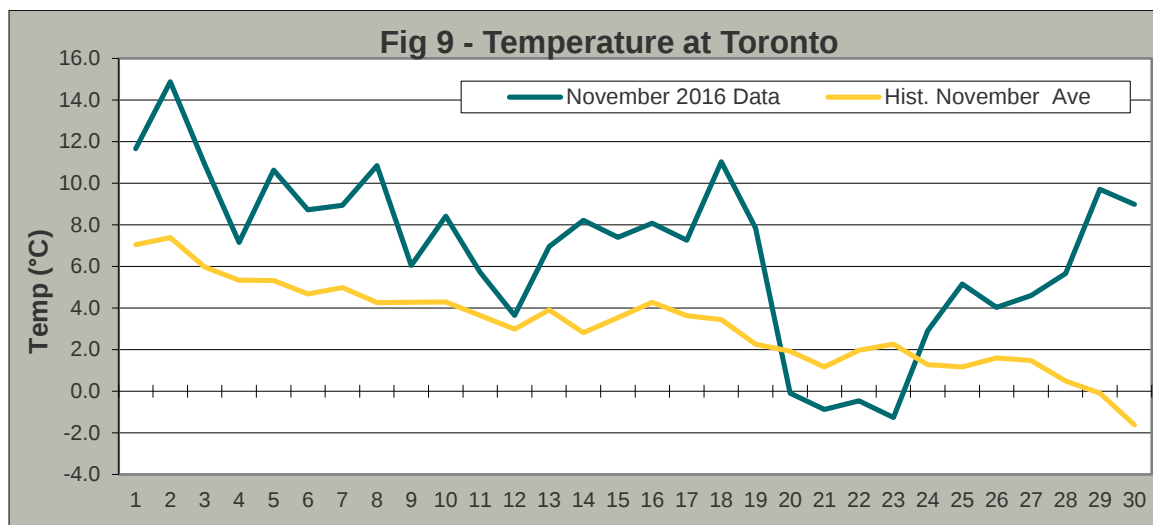
- capacity of generators on planned and forced outages
- capacity of planned and forced deratings
- unscheduled capacity from Intermittent, Self-Scheduling, and Transitional Scheduling Generators
- constrained capacity due to operating security limits and plotting the highest value for each day. The values are taken from the most up-to-date SSR at any point in time.



4. Weather

4.1 Temperature

Demand for electricity is affected by weather in many ways. By far the most significant factor is temperature, with warm summer-like temperatures causing an increase in load due to air conditioning use, and cold winter temperatures resulting in additional heating load. The graph below shows the average daily temperature in Toronto throughout this month, and compares it to historic average temperatures for the corresponding days. This graph displays Toronto temperatures. However, the IESO monitors weather conditions (temperature, humidity, wind speed, illumination, storm activities) across the entire province and factors these conditions into our demand forecasting and our operational decisions.

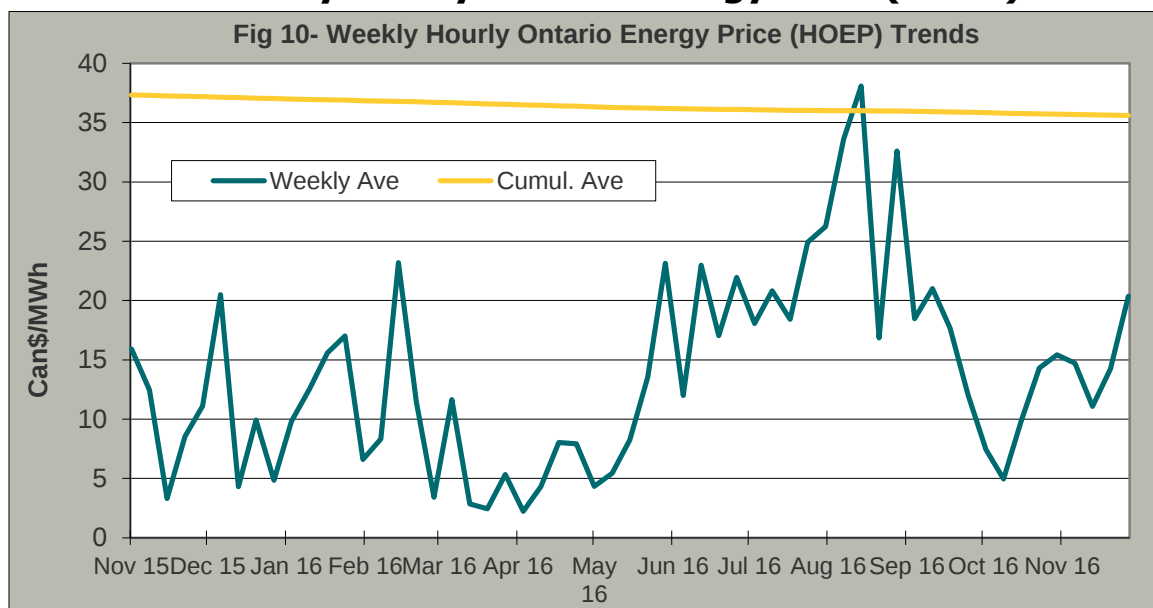


5. Longer-Term Trends

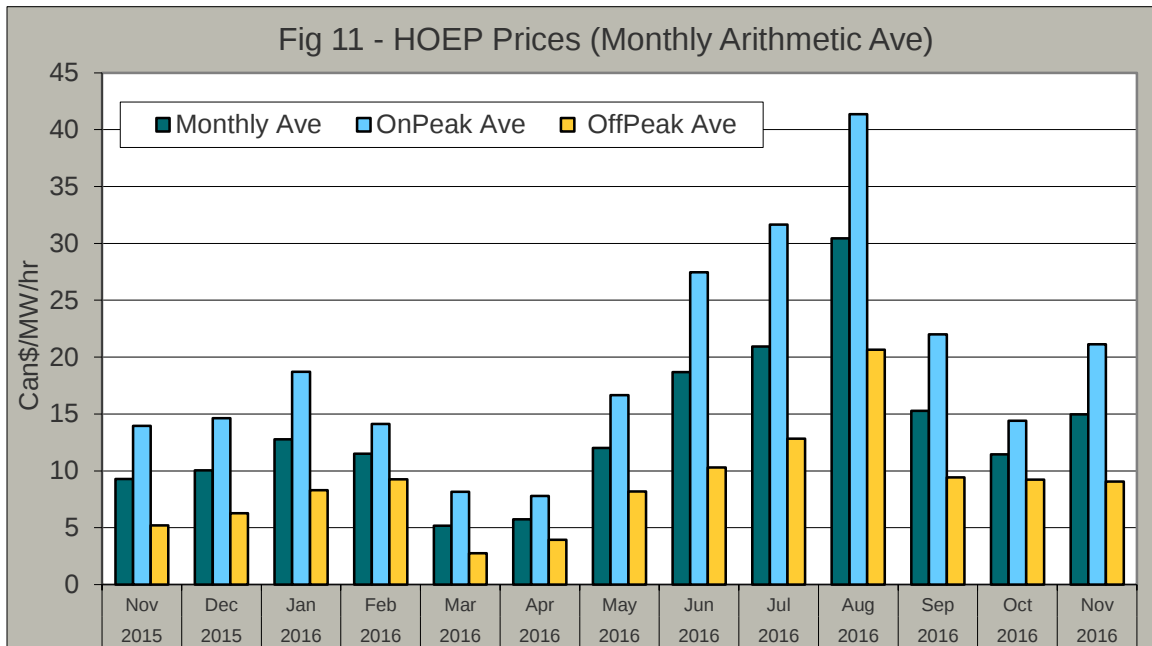
This section provides graphs that display average quantities over longer periods of time than what is available in either the Monthly graphs or in the IESO's Weekly Market Reports. This longer-term perspective will allow seasonal variations to be observed. For additional background on the particular information being graphed, please refer to the relevant monthly graph and write-up presented earlier in this report.

Starting in January, 2004, the Monthly Market Report incorporated nine new graphs. All of these graphs have been produced based on data previously included in the [Market Surveillance Panel Reports](#), and depict a small subset of the tabular data from these reports. In the January 2004 Monthly Market Report these graphs showed information from market opening to January 2004. Starting with the February 2004 Monthly Market Report, the graphs show the most recent month plus one year of history.

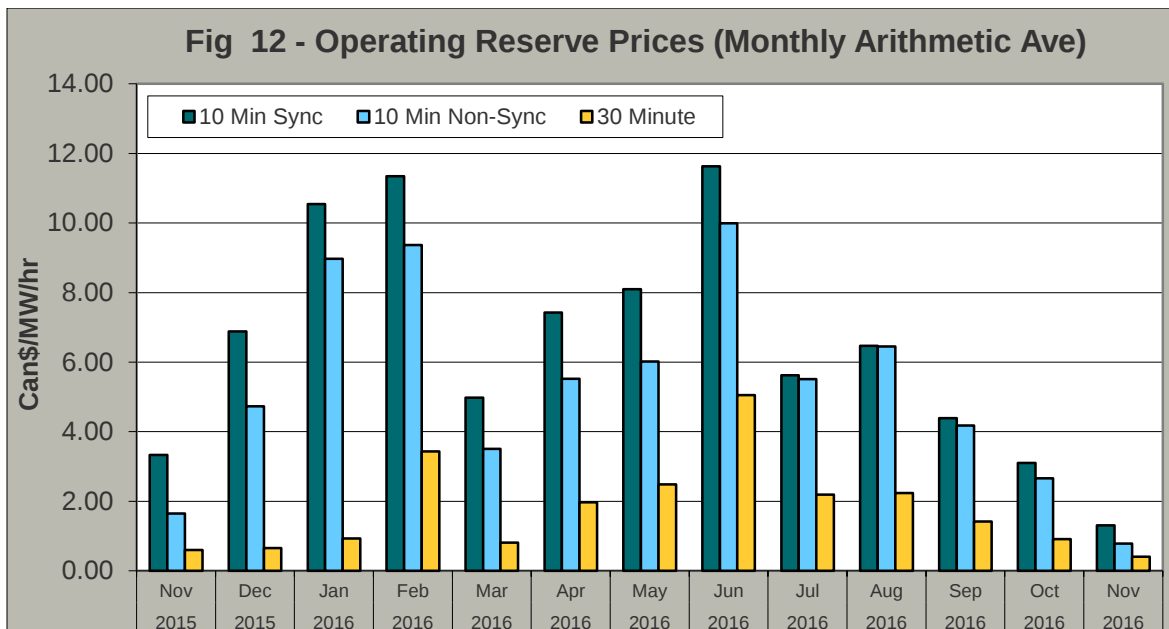
5.1 Weekly Hourly Ontario Energy Price (HOEP) Trends



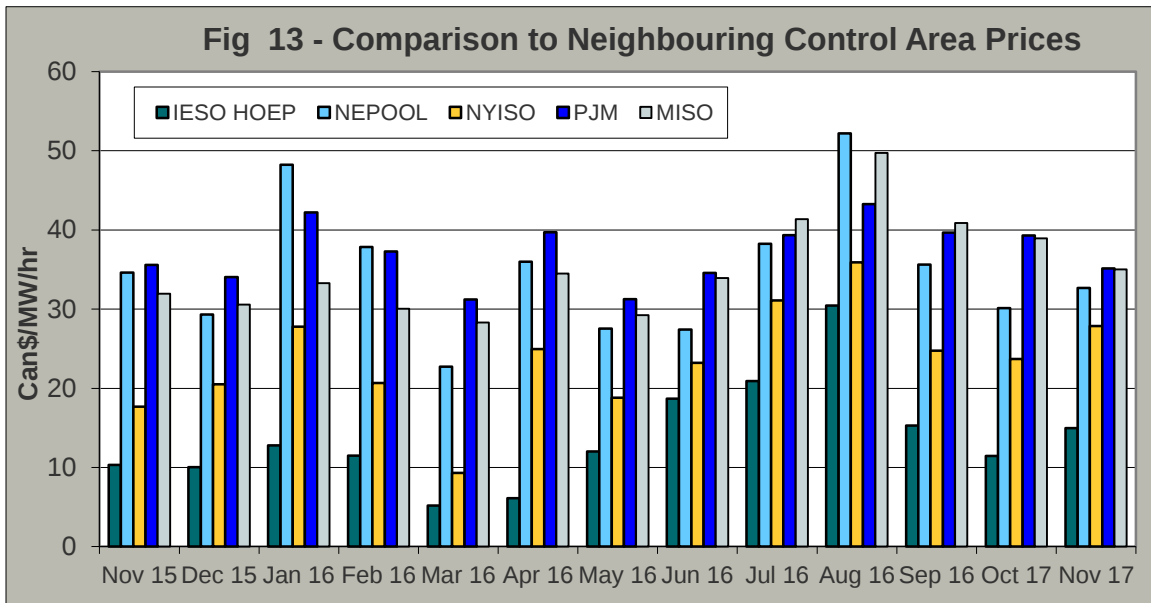
5.2 HOEP Prices (Monthly Arithmetic Ave)



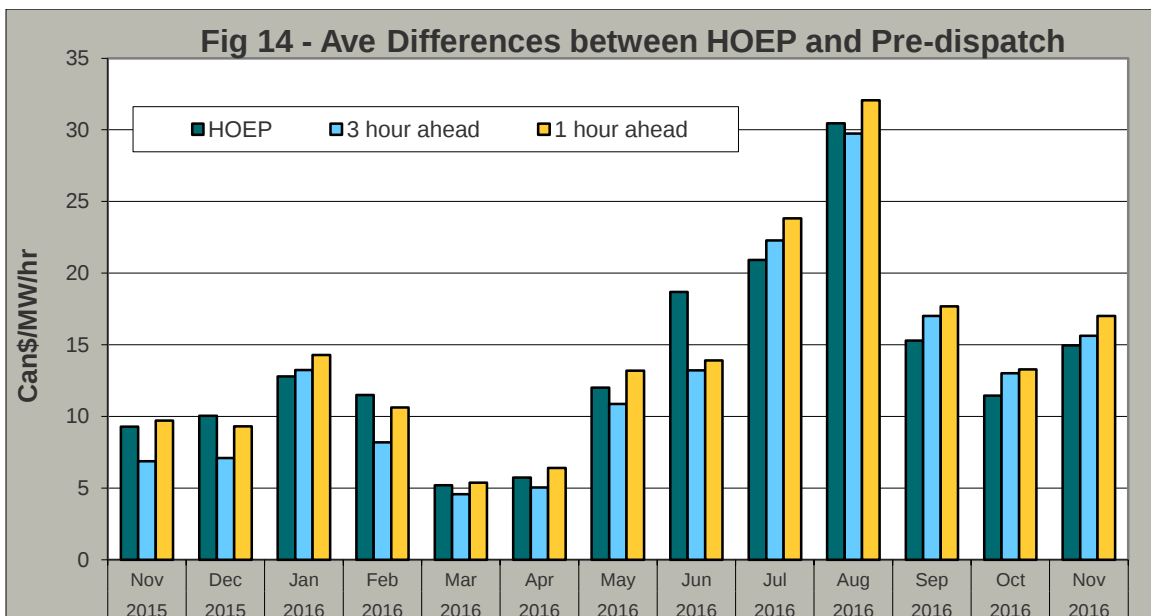
5.3 Operating Reserve Prices (Monthly Arithmetic Ave)



5.4 Comparison to Neighbouring Control Area Prices

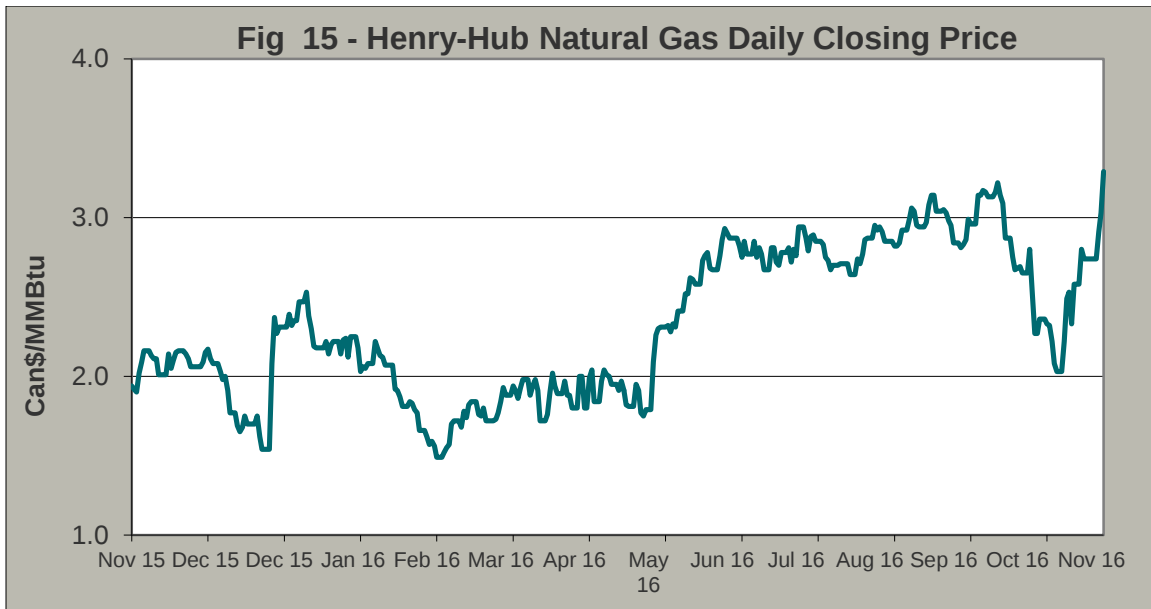


5.5 Ave Differences between HOEP and Pre-dispatch

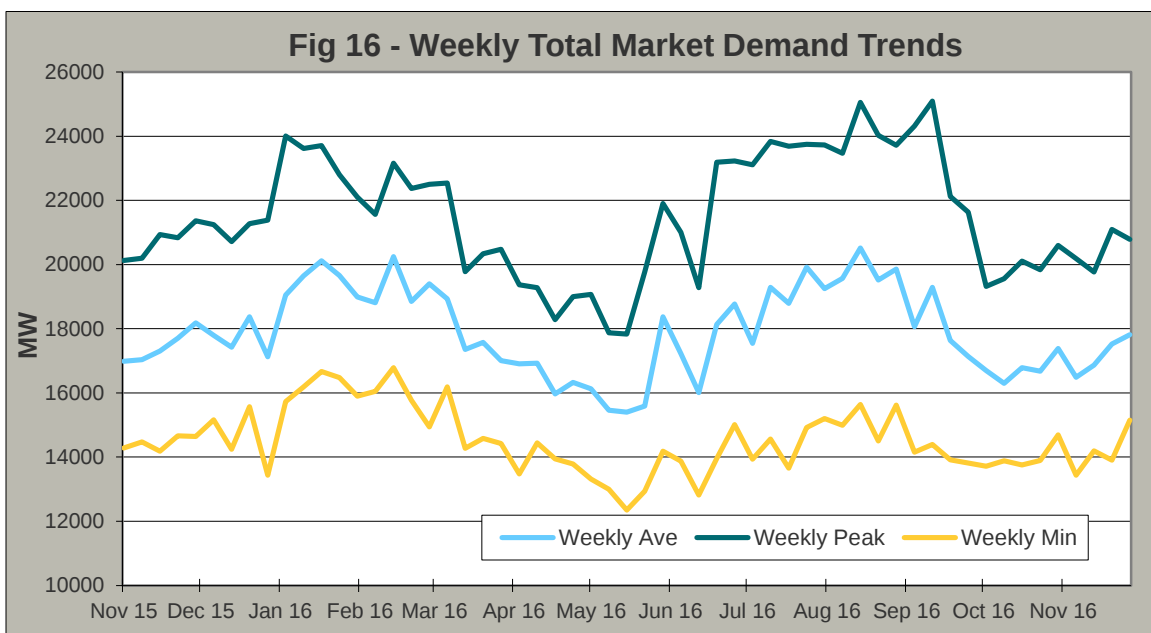


5.6 Henry-Hub Natural Gas Closing Price

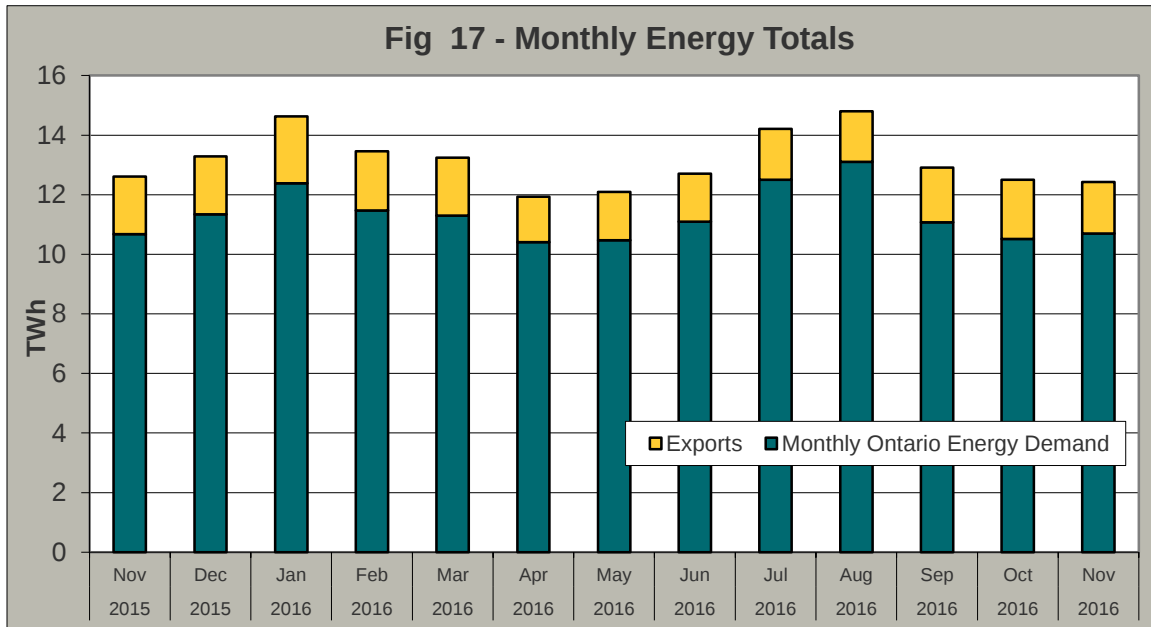
Natural gas is a fuel for some Ontario-based generation, and when dispatched, is often the marginal source of electricity in Ontario. In addition, gas prices influence import offers into Ontario and export bids out of the province.



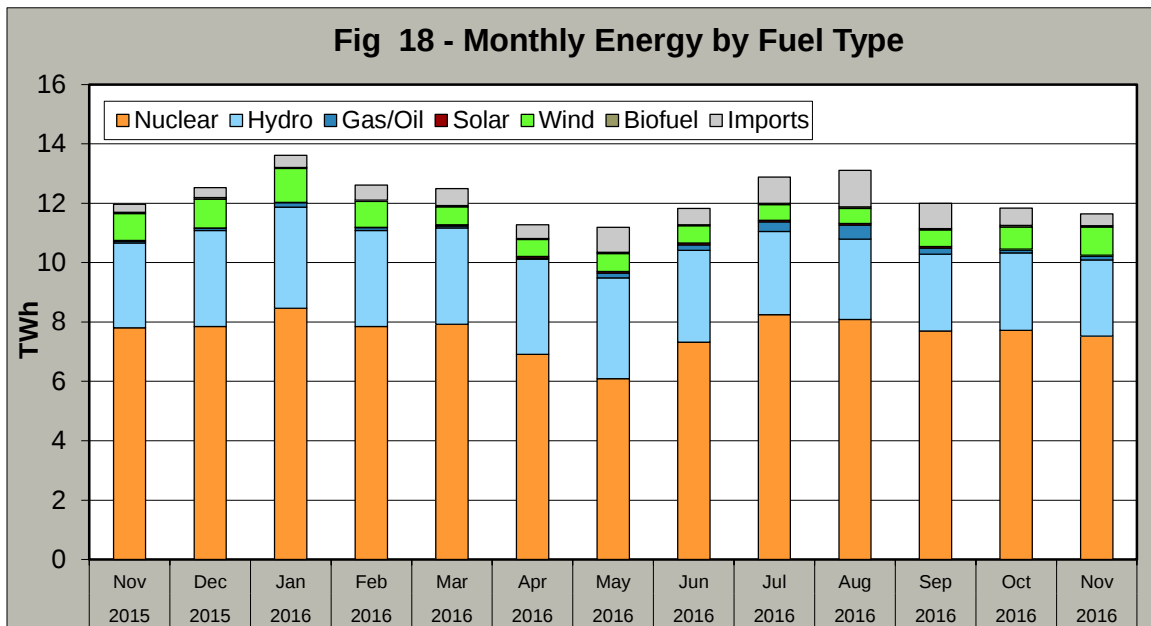
5.7 Weekly Market Demand Trends



5.8 Monthly Energy Totals

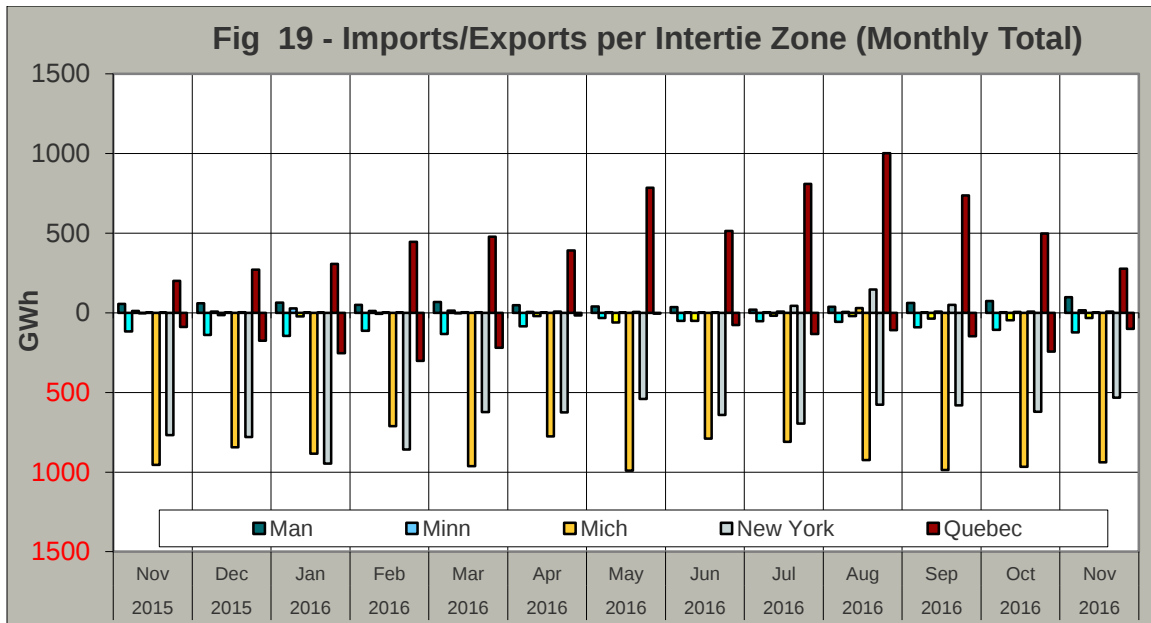


5.9 Monthly Energy by Fuel Type



5.10 Imports/Exports per Intertie Zone (Monthly Total)

Note: Imports are depicted as above zero, whereas Exports are depicted as below zero



5.11 Weekly Average Hourly Uplift Charges Trends

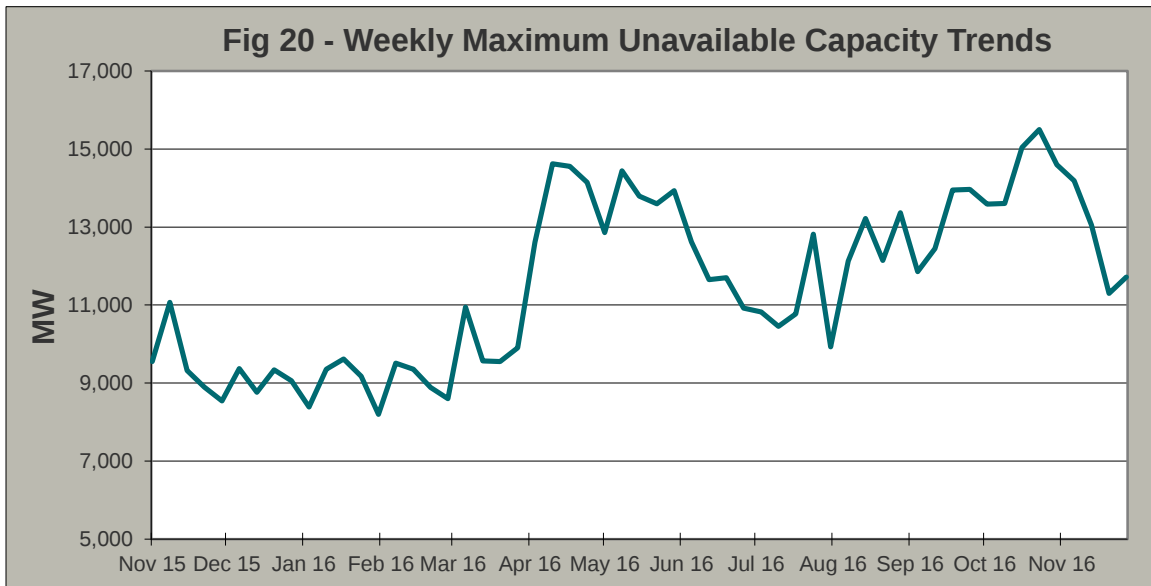
Uplift charges will now only be reported in one spot in this report – in the Table in Section 7. The Daily Uplift which was introduced in October 2011 will also be added to this table. The hourly uplift, IOG and monthly uplift values incorporate a few additional charge types that were not previously included.

Definitions of Hourly Uplift Settlement Charge: The Hourly Uplift Settlement Charge presents hourly charges which cover the costs of Operating Reserve, Congestion Management Settlement Credits, Intertie Offer Guarantee payments (IOG), and other hourly costs such as energy losses on the IESO-controlled grid.

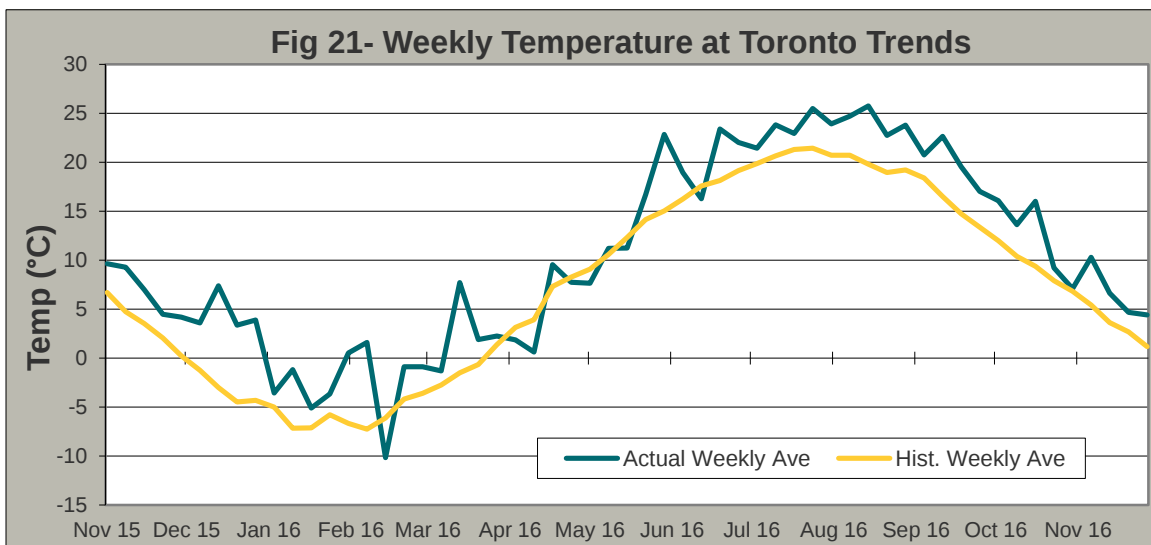
5.12 Hourly Uplifts (Monthly Total)

Uplift charges will now only be reported in one spot in this report – in the Table in Section 7. The Daily Uplift which was introduced in October 2011 will also be added to this table. The hourly uplift, IOG and monthly uplift values incorporate a few additional charge types that were not previously included.

5.13 Weekly Maximum Unavailable Capacity Trends



5.14 Weekly Temperature at Toronto Trends



6. Global Adjustment

The global adjustment mechanism (GA) is the difference between the total payments made to certain contracted or regulated generators, demand management, and conservation programs, and any offsetting market revenues. The GA charge applied to all customers in Ontario, including customers who pay the market price (HOEP) and customers who have signed a contract with a licensed electricity retailer. For customers on the Regulated Price Plan (RPP), it is factored into the rate set by the Ontario Energy Board. The adjustment may be positive or negative depending on the fluctuation of prices in the wholesale electricity market.

The GA is calculated as a total dollar amount for each month based on the difference between market revenues and the following components:

Wind

- Includes projects under Renewable Energy Supply, Renewable Energy Standard Offer Program, and the Feed-in-Tariff program

Biomass, Landfill and Byproduct

- Includes projects under Renewable Energy Supply, Renewable Energy Standard Offer Program, Feed-in-Tariff, recently converted OPG Atikokan and Thunder Bay facilities, and NUG contracts with the IESO

Hydro

- Facilities with agreements through Renewable Energy Supply Program, Renewable Energy Standard Offer Program, Hydroelectric Contract Initiative, and the Feed-in-Tariff programs. Also includes OPG's facilities that fall under the Hydroelectric Energy Supply Agreement.

Nuclear (non-OPG) and Natural Gas

- Bruce Power nuclear and natural gas facilities including OPG's Lennox (dual fuel).

Solar

- Includes projects under Renewable Energy Supply, Renewable Energy Standard Offer Program, and the Feed-in-Tariff program

Industrial Electricity Incentive Program

- An incentive for eligible consumers in Ontario to increase industrial production. Eligible activities include building a new, or expanding a facility, in a specific NAICS Canada 2012 sector.

Funds and Financing

- Includes programs supporting community group in the design and delivery of renewable energy initiatives. It also includes contract penalties received from generators.

Conservation

- Conservation programs including Save on Energy and the Conservation Fund

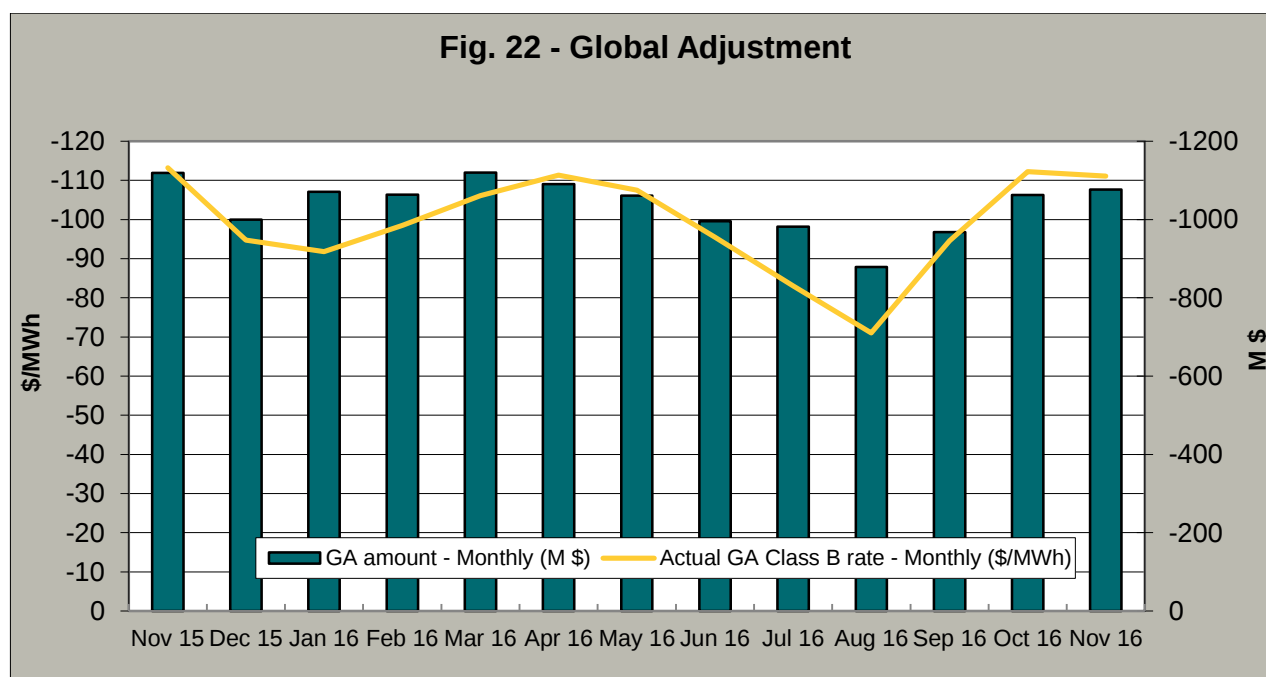
Ontario Power Generation – Regulated Nuclear and Hydro

- Regulated rates for OPG's nuclear and remaining hydro generation set by the Ontario Energy Board

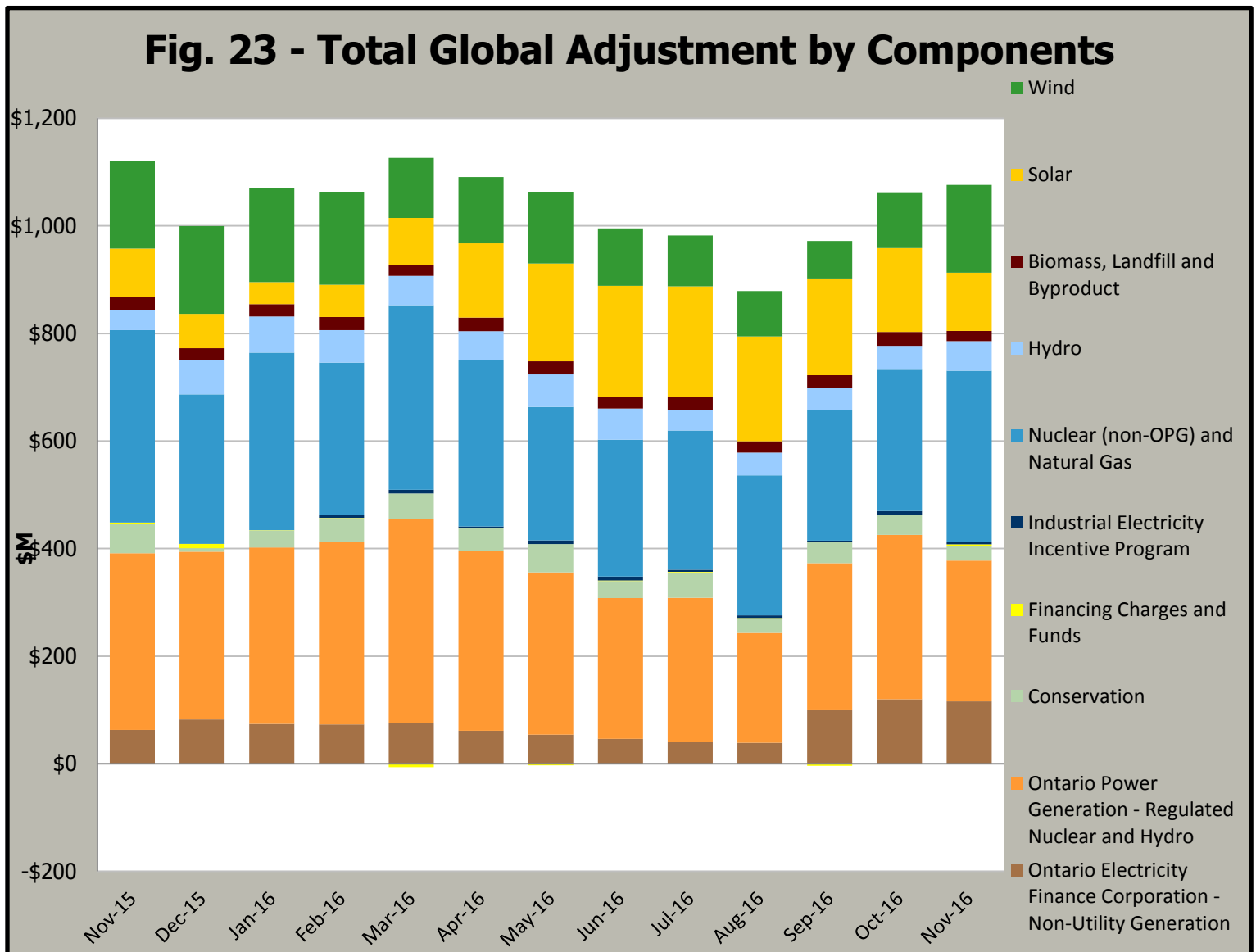
Ontario Electricity Financial Corporation – Non-Utility Generation

- Contracts administered by the Ontario Electricity Financial Corporation with existing generation facilities

Customers with an average demand over three megawatts are eligible to pay for the global adjustment based on a coincident peak calculation. Consumers with an average demand three megawatts and under pay the global adjustment based on the total amount of energy they used for the month. For more information on how Class A and B customers pay the GA, see: <http://www.ieso.ca/Pages/Ontario%27s-Power-System/Electricity-Pricing-in-Ontario/Global-Adjustment.aspx>. The total GA amount and the actual Class B rate are depicted below in Figure 22.



The graph below (Figure 23) highlights the components of the GA amount. The GA amounts increase or decrease in response to changes in HOEP. When HOEP is lower, the GA is higher to cover the additional payments such as for energy contracts, and regulated generation.



Note: Figure 23 – Total Global Adjustment by Components graph has been re-categorized based on stakeholder feedback to provide more transparency and better reflect GA component amounts, specifically by fuel type effective February 2016.

7. Summary of Wholesale Market Electricity Charges in Ontario's Competitive Marketplace

A summary of this month's market results that correspond with the charge items indicated in the chart below.

IESO WHOLESALE MARKET	Arithmetic Average		Weighted Average	
	Current Month	Year-to-Date	Current Month	Year-to-Date
Commodity Charge				
HOEP	\$14.96	\$14.92	\$16.11	\$16.69
Actual Global Adjustment Class B Rate	\$111.09	\$97.47	\$111.09	\$97.47
Total	\$126.05/MWh or 12.61¢/kWh	\$112.39/MWh or 11.24¢/kWh	\$127.20/MWh or 12.72¢/kWh	\$114.16/MWh or 11.42¢/kWh
Wholesale Market Service Charges				
Hourly Uplift - CMSC	\$ 0.75	\$ 0.68	\$ 0.75	\$ 0.73
Hourly Uplift - IOG	\$ 0.06	\$ 0.09	\$ 0.06	\$ 0.10
Hourly Uplift - Other	\$ 0.49	\$ 0.71	\$ 0.50	\$ 0.75
Daily Uplifts	\$ 0.14	\$ 0.20	\$ 0.15	\$ 0.21
Monthly Uplift	-\$ 5.09	-\$ 0.87	-\$ 5.09	-\$ 0.83
IESO Administration	\$ 0.80	\$ 0.80	\$ 0.80	\$ 0.80
OPA Administration	\$ 0.44	\$ 0.44	\$ 0.44	\$ 0.44
Rural/Remote Settlement	\$ 1.30	\$ 1.30	\$ 1.30	\$ 1.30
Ontario Electricity Support Program Charge (OESP)	\$ 1.10	\$ 1.10	\$ 1.10	\$ 1.10
¹ Monthly Class B Capacity-Based DR Recovery	\$ 0.44	\$ 0.36	\$ 0.44	\$ 0.36
Overall Total	\$0.43/MWh or \$0.04¢/kWh	\$4.81/MWh or \$0.48¢/kWh	\$0.45/MWh or \$0.05¢/kWh	\$4.96/MWh or \$0.50¢/kWh
Wholesale Transmission Charge	\$ 9.87/MWh or 0.99 ¢/kWh	\$10.24/MWh or 1.02 ¢/kWh	\$ 9.87/MWh or 0.99 ¢/kWh	\$10.23/MWh or 1.03¢/kWh
Debt Retirement Charge	\$7.00/MWh or 0.70 ¢/kWh	\$7.00/MWh or 0.70 ¢/kWh	\$7.00 /MWh or 0.70 ¢/kWh	\$7.00/MWh or 0.70 ¢/kWh
TOTALS	\$143.35/MWh or 14.34¢/kWh	\$134.44/MWh or 13.44¢/kWh	\$144.52/MWh or 14.45¢/kWh	\$136.35/MWh or 13.64¢/kWh

¹ The Capacity-Based Demand Response (CBDR) Program was implemented to bridge the period from the expiration of the Demand Response 3 (DR3) Program until the first Demand Response Auction. The cost of CBDR program will be recovered from Ontario loads as an uplift charge. The cost recovery mechanism follows the Global Adjustment (GA) allocation method.

Note: Year-to-Date is since January 1, 2016

There are two commodity charges quoted above. The arithmetic average price would be representative of the average commodity charge for a customer whose electrical demand is relatively consistent throughout the day, the night and the weekends. The weighted average price would be applicable to a customer whose consumption mirrored that of the total system. The actual average commodity price paid by a wholesale customer will be very sensitive to their consumption pattern.

The Wholesale Transmission Charge listed above has been calculated by summing all transmission-related fees paid by all loads in the province, and dividing that sum by the total energy delivered to those loads. As such, this number is not representative of the fee paid by any particular customer. Rather, each customer's actual fee for transmission service will depend on many factors such as peak consumption pattern and the types of transmission services applicable to the customer.

Renewable Generation Connection

In addition to the wholesale market charges listed above, participant invoices now include settlement amounts to recover certain costs incurred by distribution companies for the connection of new renewable generation to their local distribution system.

These charges are covered under charge type 1463 - Renewable Generation Connection - Monthly Compensation Settlement Credit. Costs are charged to participants based on their proportion of Allocated Quantity of Energy Withdrawn (AQEW) for the month, including embedded generation for LDCs. The monthly rates are summarized below:

Month, Year	Rate (\$/MWh)	Preliminary/Final
October, 2016	0.0194	Final
November, 2016	0.0191	Preliminary

The recovery of these costs was enabled by Regulation [330/09](#), and the amounts are approved by the Ontario Energy Board. Further details regarding the decision EB-2010-0191 can be found on the OEB website: <http://www.ontarioenergyboard.ca>.

Questions on any information contained in this report should be directed to:
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