CCRE Commentary

AUGUST 2015

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Apples to Apples: Fixing Ontario's Electricity Price Mismatch

by Greg Baden

Council for Clean & Reliable Electricity
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THE AUTHOR

Greg Baden

Greg Baden has over 30 years of experience in the gas and electricity industry. Prior to starting BECL and Associates Ltd., an energy consulting practice in 2006, Greg was the vice president for electricity sector business development for Shell Trading/Coral Energy, the global marketing arm of the Royal Dutch Shell Group. His achievements include among others the negotiation of the commercial arrangements that supported the development of the Brighton Beach power station in Windsor, Ontario. As a consultant, he has advised clients in both Ontario and Alberta on energy markets and commercial matters.

Declaration of Interest

The author does not have any direct involvement or active commercial interests in the Ontario energy markets.

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INTRODUCTION

Ontario's electricity pricing mechanisms result in Ontarians paying as much as $60 per megawatt-hour (MWh) more for their own electricity than those who import it. In a previous paper (Baden and Tomson 2012), we recommended addressing these anomalies and removing the effective subsidy that Ontario pays on electricity exports. We advocated calculating the Global Adjustment on an hourly instead of monthly basis and adding it to the Hourly Ontario Energy Price to give a "true" price that is valid for both the Ontario and export markets.

"Ontario real-time prices are nowhere near equivalent to those in its export markets"

A counter-argument to this proposal is that various electricity markets, including Ontario's, have agreed to price exports based on the real-time market hourly price and, consequently, the Global Adjustment should not be included in the Ontario export price. Here, I respond to this counter-argument with the benefit of more data and reflection. I affirm both the initial recommendation and add a complementary recommendation that Ontario replace its existing partial day-ahead mechanism[1] with a full day-ahead market.

BACKGROUND

The argument raised against including the Global Adjustment in the export price implies that the hourly market or real-time prices for the various markets that import from and export to Ontario are more or less equivalent. This paper contends that these prices are nowhere near the same. It is also important to note that there is no formal treaty or agreement between Ontario and the adjacent electricity markets on how the export price should be set. The current export-price setting mechanism is simply an Ontario practice that has existed since at least the development of competitive electricity markets in the 1990s, and perhaps even longer.

Hourly market or real-time prices are products of each market's design, rules, installed-generation mix, load characteristics and the delivered cost of fuel used for generation, to name a few of the key factors. The New York and Midcontinent Independent System Operator (MISO)[2] electricity markets, the most significant import and export markets for Ontario (Carr 2010), operate day-ahead energy, hourly energy, installed capacity and ancillary services markets. Of the three markets—New York, MISO and Ontario—only Ontario operates solely a real-time hourly energy market, albeit with a day-ahead commitment process (DACP) and an ancillary services market. In the New York and MISO markets, imports and exports can be scheduled in both day-ahead and hourly markets. It is important to note that unlike the New York and MISO day-ahead markets, Ontario's DACP does not establish a set of hourly day-ahead prices; instead, the DACP is simply a mechanism, which generators are obligated to offer into, for scheduling slower responding generating assets ahead of the delivery hour.

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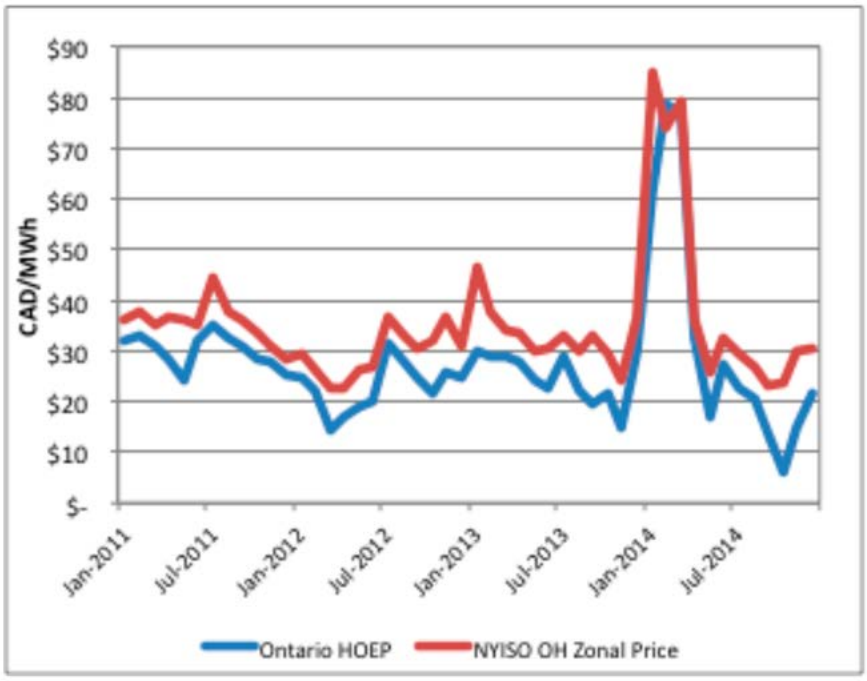
[1] The Day-Ahead Commitment Process or DACP is a mechanism for scheduling and committing resources required to the expected level of demand for the next day, into which all generators are obligated to offer. The DACP was developed to enhance market reliability, but is not similar to the Ontario hourly market or the New York day-ahead market because it does not provide pricing assurances.

[2] MISO operates competitive wholesale electricity markets in the US Midwest from Montana to Michigan and Indiana.

"only Ontario operates solely a real-time hourly energy market"

Figure 1 *- Comparison of New York and Ontario Real-Time Prices*



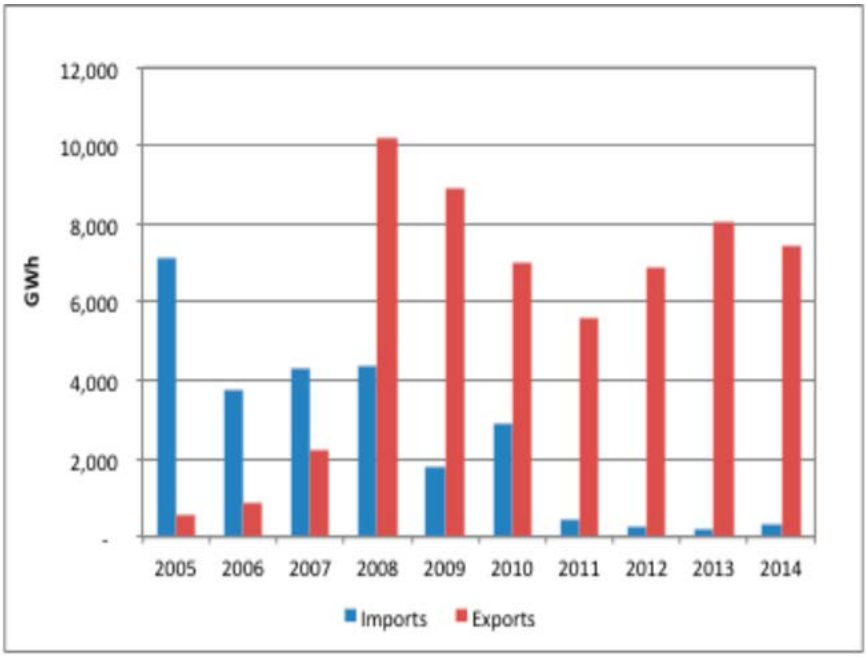
Source: Author's graph from IESO and NYISO data

Even though Ontario's hourly market is similar in design to the New York and MISO hourly markets, considering the Ontario hourly market price as equivalent to the New York or MISO real-time market price ignores the effects of the day-ahead market on real-time demand and prices. A comparison of Ontario hourly prices and the applicable New York intertie price in Figure 1 shows that Ontario prices on average have been lower. A report by the New York Independent System Operator (NYISO)[3] states that real-time prices in 2013 averaged roughly US$9 per MWh higher on the NYISO side of the interface than on the Ontario side. A comparison of Ontario and MISO hourly and real-time prices shows similar results.

As seen in Figure 1, the Ontario Hourly Energy Price in 2014 was on average US$12 per MWh[4,5], lower than the corresponding import price in the New York hourly market. The difference between the export and import prices more than covered the $6/MWh or so in uplift, administration and transmission charges that Ontario electricity exporters have to pay. When the MISO hourly and day-ahead markets began in 2005, energy marketers and importers recognized the opportunity presented by buying Ontario electricity and selling it in New York. Within a few years, traders increased Ontario exports to MISO by a factor of 10, while imports plummeted at the same time (see Figure 2).

[3] See 2013 State of the Market Report prepared by Potomac Economics (Patton, VanSchaick and Chen 2014).
[4] See 2014 State of the Market Report prepared by Potomac Economics (Patton, VanSchaick and Chen 2015).
[5] Unless explicitly indicated otherwise, all prices are stated in Canadian dollars.

Figure 2 *- Ontario Imports and Exports to MISO*



Source: Author's graph from IESO and MISO data

"only a small fraction of electricity traded in the New York and MISO markets actually trades in the hourly markets "

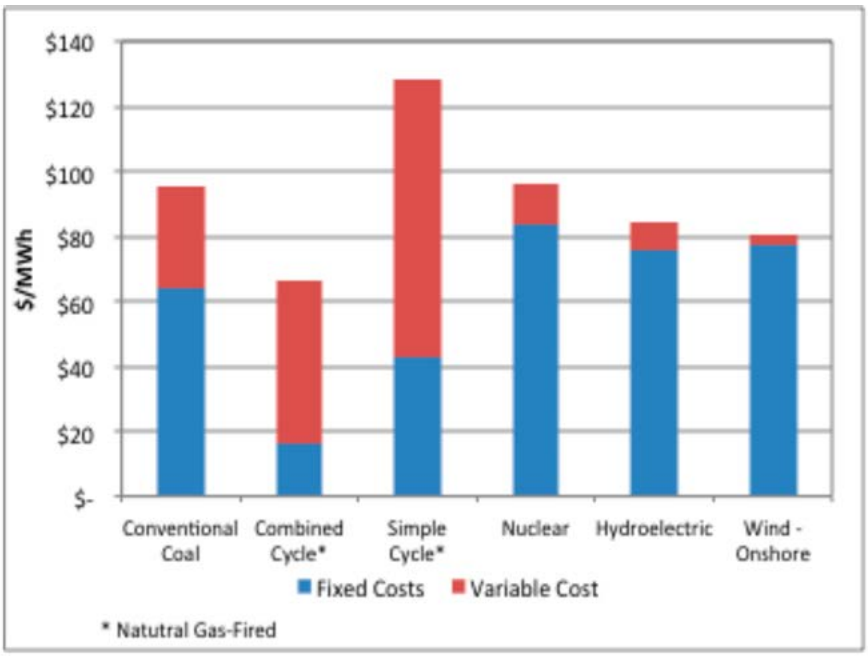
One of the key reasons the New York and MISO hourly prices are higher than the corresponding Ontario hourly price is that only a small fraction of electricity traded in the New York and MISO markets actually trades in the hourly markets; about seven per cent in the case of New York and one or two per cent in the case of MISO in 2013. Instead, in New York and MISO the large majority of electricity is traded in their respective day-ahead markets. Consequently, these hourly markets are essentially balancing markets, in which natural-gas-fired peaking generators, demand-response programs and intermittent generators participate, while large baseload generating facilities such as nuclear, coal, run-of-the-river hydro and natural-gas-fired combined cycle plants generally do not. In contrast, in Ontario all electricity, regardless of whether it is produced by baseload, peaking or intermittent-generating capacity, trades in the hourly market.

The differences between Ontario's hourly market and the New York and MISO day-ahead and hourly markets help explain the root causes of their price differences. The primary purpose of a day-ahead market is to provide generators, particularly baseload generators that cannot respond quickly to short-term hourly market changes, with a firm production schedule well ahead of the delivery hour. The real-time market is then used to activate faster-responding generation to manage the inevitable differences between actual and expected electricity requirements that result from unplanned outages of scheduled day-ahead generation, production from intermittent sources such as wind generators and from unexpected load changes. In large measure because Ontario has only the DACP mechanism, and not a full day-ahead market that provides a price commitment, a majority of Ontario exports are purchased in the hourly market and scheduled for delivery in the New York and MISO real-time markets.

In all of these markets, the marginal generator, or last generator dispatched, sets the price paid to all generators in any hour. Typically, generators offer electricity at their variable generation cost and if the generator's offer is accepted, it will be paid either a price equivalent to its variable cost (if the generator is the marginal generator) or one that exceeds its variable costs (if it is not the marginal generator). Successful generators over time will receive sufficient payments in excess of their variable costs to cover their fixed costs and provide a return on investment. In the case of Ontario, generators also receive payments from the Independent Electricity System Operator (IESO) funded by the Global Adjustment that, in part, offsets their fixed costs.

"Ontario prices reflect mostly the variable cost of nuclear and hydroelectric generation"

***Figure 3** - Fixed and Variable Costs of Generating Technologies*



Source: Author's graph from US EIA 2014 data

The chart in Figure 3 illustrates representative fixed and variable costs for new generating facilities. The five generating technologies shown make up the majority of the installed generating capacity in the Ontario, New York and MISO electricity markets. The variable-cost values are the sum of fuel costs, variable operating and maintenance costs and transmission system fees, while fixed costs are the sum of debt and equity costs incurred to build the generating facility along with fixed operating and maintenance costs. Older generating facilities that are beyond their initial investment cycle will have much lower fixed costs.

On average, hourly prices in the Ontario electricity market in recent years have varied from as low as $23/MWh in 2012 to highs of about $32/MWh in 2014. These prices reflect mostly the variable costs of nuclear and hydroelectric generation that produced more than 80 per cent of the province's electricity between 2012 and 2014. At these prices, Ontario generators did not recover their fixed costs and, hence, relied on the Global Adjustment.

CONCLUSION

Electricity exports from Ontario occur at many times of the day and night in which the marginal generator is a baseload nuclear, hydroelectric or combined cycle natural gas facility. Those exports flow into the New York and MISO hourly markets where the marginal generator is a natural-gas-fired peaking facility with higher variable costs and market prices. This situation, as previously mentioned, arises because Ontario operates only an hourly market, whereas New York and MISO operate both hourly and day-ahead markets.

In addition to better aligning with neighbouring markets and improving pricing comparability, implementation of a day-ahead market in Ontario would provide a number of other benefits.

- Baseload generating assets would be able to secure a day-ahead commitment.
- Similar to the New York and MISO markets, 80 per cent to 90 per cent of the electricity generated in Ontario would trade in the day-ahead market and as little as 10 per cent or less in the hourly market.
- Peaking and intermittent resources would become the primary participants in the hourly market, which also would continue to be the primary market for exports. As a result, export prices would rise, and at the same time Global Adjustment payments made to peaking and intermittent generators would decline.
- Hourly market prices would still occasionally drop to negative values as the result of excess supply, but with a day-ahead market a majority of the electricity produced by baseload generators would be shielded from the negative prices. (Only the generating assets participating in the hourly market would be exposed to negative prices.) As a result, the Global Adjustment payments would be lower compared to payments made currently when there is surplus baseload generation available.

"Ontario baseload generation exports into markets priced by peaking generation"

Nothing in the analysis presented refutes or conflicts with the conclusion of the previous paper (Baden and Tomson 2012) that recommended calculating the Global Adjustment on an hourly basis and combining the resulting charge with the Hourly Ontario Energy Price into a single "true" hourly price. Increasing the price of electricity exports by including the Global Adjustment in the hourly price would reduce the volume of exports and, at the same, lower the Global Adjustment amounts paid by Ontario consumers.

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