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Putting the Pieces Back Together: "True Pricing" for Ontario Electricity

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Declaration of Interest

Neither author has any direct involvement or active commercial interests in the Ontario energy markets.

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Putting the Pieces Back Together: "True Pricing" for Ontario Electricity

GREG BADEN AND LUCIA TOMSON

INTRODUCTION

Most people have surely never heard of the Global Adjustment (GA) mechanism yet it is why Ontario consumers are paying more for electricity than exporters of Ontario power. Introduced in 2005 to cover some of the costs of new electricity generation, the GA is the portion of an Ontario electricity consumer's bill that represents the difference – usually an increase – between an electricity generator's market revenues and the contracted price. While the GA has been instrumental in meeting the government's objectives, it has reduced the usefulness of the Hourly Ontario Electric Price (HOEP) as a signal for demand response and conservation, and disadvantaged all Ontario electricity users. Without changes, the pricing problems associated with the GA will continue to grow. This paper proposes a GA calculated hourly, instead of the current monthly, so that when combined with the HOEP a truly representative hourly price results that is fair to all consumers of Ontario electricity.

"Without changes, the pricing problems associated with the Global Adjustment will continue to grow"

BACKGROUND

In 2005, Ontario faced looming electricity shortages due to the lack of private investment in new electricity generation. The reluctance to invest in the electricity market was a direct consequence of a confidence loss stemming from the province's restructuring of that sector. In response, the government established a new program where long-term electricity contracts enhanced pricing assurance to new generators. At the same time, the GA was imposed on all Ontario electricity consumers to recover the additional costs of the long-term contracts.[1]

This approach achieved the desired result: it stimulated investment in new generation. But is has created new problems because the GA has grown to be as significant as the hourly electricity market in determining the price Ontario consumers pay for electricity. Today, more than 80 per cent of Ontario's electricity production receives support under the GA mechanism with the remaining electricity production participating solely in the hourly electricity market.

Going forward, the GA is expected to continue to grow in magnitude and importance. In his 2011 Annual Report, the Auditor General of Ontario predicted, "By 2014, the GA is expected to be six cents per kilowatt hour – almost two-thirds of the electricity charge – and will be almost two times more than that year's projected hourly Ontario energy price." This trend of increasing GA costs results from continued investment in new generation capacity supported by programs like the Feed-in Tariff with its long-term price guarantees.

The cost pressure of a large and growing GA would be mitigated if the GA were charged on a different basis. We propose that the current two electricity pricing components, the (hourly) HOEP and (monthly) GA, be combined into a single hourly electricity commodity price.

[1] While the long-term price guarantees could be below the short-term market price, making the GA a rebate to customers (and it was originally called the "Provincial Benefit" in anticipation of that), in recent years it has always been a charge.

GLOBAL ADJUSTMENT

The GA is administered by the Independent Electricity System Operator (IESO) and covers the following generators:[2]

- Prescribed generation facilities operated by Ontario Power Generation (OPG) with rates set by the Ontario Energy Board (OEB);
- Non-utility generators with contracts and OPG thermal-generation support payments managed by the Ontario Electricity Finance Corporation (OEFC); and
- Bruce Power nuclear energy, renewable electricity and natural gas-fired generators under contract to the Ontario Power Authority (OPA).

These generators all receive payments under contracts or a regulatory decision over and above whatever they might receive as participants in the hourly electricity market. The revenue to make these payments is aggregated into the GA and recovered as a per kilowatt-hour (kWh) charge payable by consumers on electricity consumed in Ontario. If a generator should receive more from HOEP than it is guaranteed, it rebates the excess, and that excess is included in determining the GA.

From a consumer's perspective, whether consumers purchase electricity from an independent retailer or through the Regulated Price Plan set every six months by the OEB, the price[3] is effectively the sum of the HOEP and GA.

"Together, these generators account for 80 per cent or more of the market."

EFFECT OF THE GLOBAL ADJUSTMENT

Because the GA bypasses the competitive hourly electricity market, it has changed the way generators offer into that market. Typically in "energy-only" markets like Ontario,[4] generators formulate hourly offers by balancing the objectives of making a sale with maximizing revenues.

But in the case of generators under contract with the OPA, their long-range average pricing is established by the contracts, which both guarantee minimum revenues and place a cap on maximum revenues. These generators, therefore, have no motivation to exceed their revenue caps and instead offer electricity at lower prices to increase their likelihood of being dispatched knowing they will be topped up to their contract price via the GA. Non-utility generators (NUGs), Bruce Power nuclear and OPG prescribed assets are in a similar situation.

Together, these generators account for 80 per cent or more of the market. The remaining generators are primarily older run-of-the-river hydroelectric stations that operate when and if they have water, rather than when prices are attractive. As a result, these remaining generating units bring little competitive tension to the hourly market.

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[2] The costs of various demand-response programs, including conservation and demand management implemented by the OPA, are also recovered through the GA but these are a relatively small component – part of the smallest component which is less than 8 percent in aggregate (Ontario Energy Board).

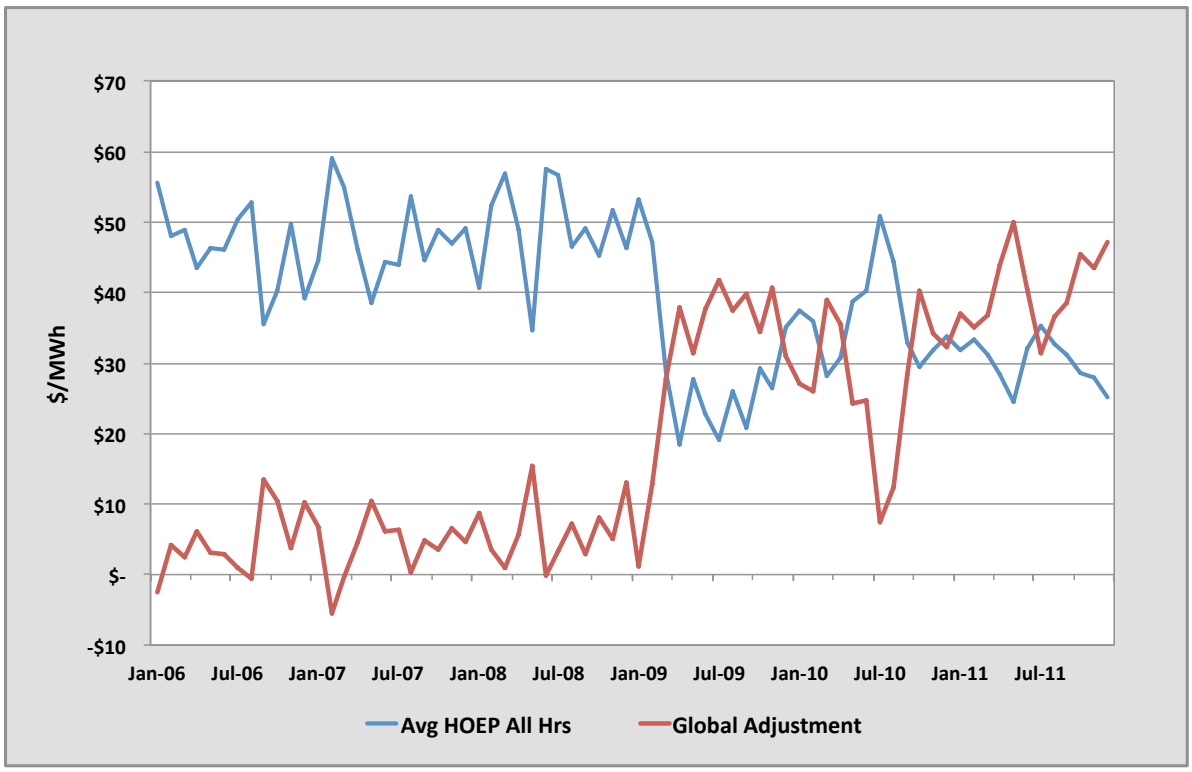
[3] A consumer's monthly bill shows various other charges such as delivery, paying off historic debt and regulating the system's operation, but the electricity price charged for the quantity of electricity consumed is based on the sum of the HOEP and GA.

[4] An "energy-only" market is one where generators rely solely on energy sales as contrasted to, for example, a "capacity market" where they would also receive payments for being available to generate even if they are not called on to do so.

Since the generators receiving payments through the GA mechanism have little or no motivation to exceed their revenue caps, their offer behaviour tends to drive the HOEP down. The lower HOEP inevitably leads to a higher GA because the GA is tied directly to the HOEP by contracts and regulatory orders that prescribe the average price or revenue received by the generators.

The history and inverse relationship of the HOEP and GA are evident in Figure 1.

Figure 1: The Inverse Relationship between the HOEP and GA[5]



(Ontario Energy Board)

"electricity markets adjacent to Ontario do not have mechanisms similar to the GA"

EXPORTS

Ontario exporters are charged only the HOEP. This is consistent with common practice throughout North America where electricity trade between different markets is based solely on the energy price and does not include various ancillary and regulatory charges levied on internal market transactions. However, electricity markets adjacent to Ontario do not have mechanisms similar to the GA.

For most markets, the loss of revenue from not including ancillary and regulatory charges on exports is more or less balanced by savings from not paying them on imports. However, with the GA accounting for more than one-half of Ontario generators' revenues, the GA is clearly not being offset by any savings from charges avoided on imports.

The following table shows an estimate of the value loss in not charging the GA on electricity exports over recent years.[6]

[5] Why did HOEP drop in 2009? One contributing factor was the average monthly price of natural gas which fell from a peak of around $13/gigajoule in June 2008 to almost $3/gigajoule in September 2009. Coal appears to have followed a similar trend, with OPG reporting a peak of about $110/tonne in Q3 2008 before declining to an average of around $53/tonne in Q4 2009.

Table 1: GA Losses from Exports

Year	Exports	Imports	Net Exports	Annual Average Global Adjustment	Estimated Loss in Not Charging GA on Exports
	MWh	MWh	MWh	$/MWh	$ millions
2005	8,581,561	8,120,753	460,808	$2.51	$20
2006	9,751,916	5,006,423	4,745,493	$4.55	$40
2007	10,489,035	5,790,829	4,698,206	$4.03	$40
2008	18,570,879	7,997,884	10,572,995	$6.15	$110
2009	14,777,783	3,026,284	11,751,499	$31.19	$460
2010	10,809,322	3,684,269	7,125,053	$27.63	$300
2011	10,983,396	1,775,318	9,208,078	$40.48	$440

(National Energy Board; Independent Electricity System Operator website)

There is no reason that GA should not be added to the cost of electricity exported because exporters have an impact on the GA charged Ontario consumers. They purchase all their electricity in the hourly electricity market so that their electricity demand is included in the calculation of total market demand.[7] This total market demand governs how many generating units operate and, therefore, directly affects the size of the GA.

"There is no reason that GA should not be added to the cost of electricity exported because exporters have an impact on the GA charged Ontario consumers"

MIXING TIMESCALES

The current GA arrangement not only dampens the price variations between on and off peak hours but undermines conservation and demand management that is triggered by HOEP. Savings through cost reduction on electricity bills is key to both encouraging and maintaining customers' interest in conservation and demand management. Combine the fact that HOEP has evolved to be a smaller portion of the electricity bill with the fact that the GA is a flat rate that is charged on the total monthly electricity consumed regardless of the time of day, and it is clear that savings from time shifting is minimal. Minimal savings leads to minimal investment of time or money on the part of consumers in managing their electricity costs.

CALCULATING GA HOURLY

The problems associated with export subsidies and real-time price inaccuracy would be addressed if the GA were calculated and set on an hourly basis rather than a monthly basis. As at present, the true cost of electricity would still be the sum of HOEP and GA, but since they would both be set hourly, their sum would be seen by all buyers, both export and in-province, as an hourly price in real time.

[6] The estimates are simply (actual MWh exported) x (GA). Had the GA been charged on exports, the volume exported would have fallen. However, determining just how much they would drop is far from simple since it is observed that exports occur in hours even when the HOEP is higher than the hourly price in neighbouring markets so simple economic elasticity analysis does not apply.

[7] In fact, all electricity generated in Ontario passes through the hourly market whether for export or in-province use. Exports as well as internal transactions may also involve longer-term bilateral agreements between generator and buyer, but these are purely financial arrangements.

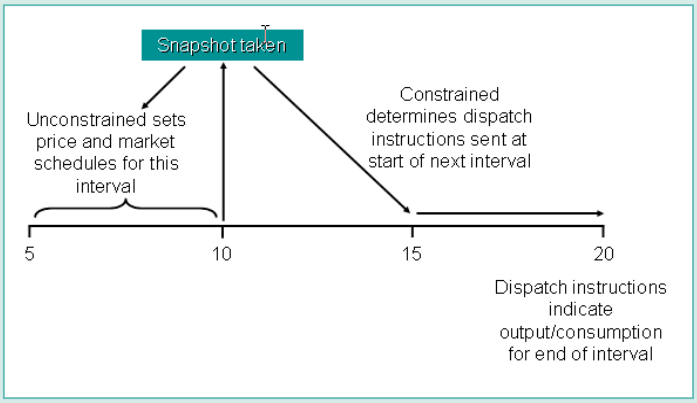
HOURLY GA AND THE CURRENT REAL-TIME PROCESSES

The process of determining the hourly electricity price and what generators will be dispatched to operate begins with dispatchable generators, dispatchable loads (loads that will not take service if price is above what they offer to pay), importers and exporters submitting bid and offers.

The IESO forecasts the electricity demand for non-dispatchable loads, the largest segment of Ontario electricity demand. Each non-dispatchable generator, which includes wind and solar generators, is required to submit individual energy production forecasts.

In real time, the IESO uses an algorithm that is run every five minutes in two modes that are termed the unconstrained and constrained dispatch algorithms. The "unconstrained mode," which ignores realities like transmission congestion and generator ramp rates, calculates the market-clearing price. The HOEP is the weighted average of twelve five-minute market-clearing prices.

The "constrained mode" produces the real time generator dispatch schedule that includes the system realities and calculates the locational prices or "shadow prices" for each generation facility, interconnection point and transmission-connected load in Ontario. The diagram to the right from an IESO training document helps to explain how the algorithm outputs are related.



(Indpendent Electric System Operator)

The data, contract terms and algorithms are available to calculate the GA every five minutes by determining the difference between the generators' fixed price and the HOEP. For generators that have a monthly revenue guarantee, the hourly calculation will require more effort but the basis is already embedded in the currently used GA forecast procedure.

"As at present, the true cost of electricity would still be the sum of HOEP and GA"

This pricing mechanism would not only greatly simplify customers' interaction with the market but reduce costs overall by both recovering the correct proportion of total production costs from exports and sending more accurate price signals to consumers.

The hourly real time GA rate can be calculated and integrated with the HOEP through the current pre-dispatch and real-time price processes (see Text Box). Most of the key inputs necessary to calculate an hourly GA rate are already part of these processes. They are:

- dispatch schedule for each generator and importer;
- total demand, including exports;
- system and generator operational limits that may affect supply and demand; and,
- HOEP.

The only other pieces of information necessary to calculate an hourly GA are the revenue and price guarantees that apply to generators covered by the GA – and these are available to the IESO.

In the real-time pricing process, a dispatch algorithm is used to calculate a market-clearing price. The algorithm is run every five minutes to account for the changes in generator output and demand. Calculating an hourly real-time GA could follow a similar process to derive a weighted average GA rate that then could be added into the calculation of the HOEP at the end of the hour.

In the pre-dispatch process, the same dispatch algorithm is run hourly to create a set of forecast prices and dispatch schedules for the upcoming hours. Again, a similar process could be used to forecast the GA rate.

CONCLUSION

The changes introduced in 2005 to support investment in new Ontario generation capacity have had unintended consequences that have reduced the importance of the HOEP in determining the price of electricity. The GA now represents the largest volumetric charge on Ontario consumers' electricity bills which results in demand response and conservation programs being undermined and electricity being exported at less than full cost.

Calculating the GA rate hourly will combine the two components of electricity price – HOEP and GA – into a single price that will reflect the hourly variation in generating costs. This amalgamation of the HOEP and GA will strengthen the hourly price signal and lead to more effective consumer responses to hourly changes in market prices and, in the longer-term, lead to lower overall electricity prices.

At the same time, combining the HOEP and GA into a single price will ensure exporters will pay the same price as Ontario consumers for electricity generated in the province. Though not discussed in this paper, the combining of HOEP and GA may also result in the development of forward contracting and risk management products that could support the development of new generation capacity without public support.

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