

Memorandum

To: Market Pricing Working Group

From: John MacKenzie

Date: 27 January 2009

Re: Redefining MPWG Issue #7: Imports and Exports Setting the Ontario Market Clearing Price

Background

The existing definition of MPWG Issue #7 (Imports and Exports Setting the Ontario Market Clearing Price) is attached to this memo (see Attachment A).

At the MPWG meeting in December 2008, an industrial consumer suggested that the existing definition of the MPWG Issue #7 is more in the form of a 'solution' rather than an 'issue' i.e. allowing imports and exports to set the real-time price is a statement of a 'solution' rather than a statement of an 'issue' or 'problem' for which allowing imports and exports to set the clearing price is a potential solution. The consumer requested that the IESO consider re-defining Issue #7 as an 'issue'.

Issue #7 was first identified by the Market Pricing Working Group in 2004 as a 'market clearing price formulation' issue/initiative. The main concern identified at that time was that inertie transactions could establish pre-dispatch prices but could not set real-time market (RTM) prices. Please refer to the Description section in Attachment A.

Real-Time Market Price Formulation in IESO-Administered Markets

Real-time market prices in the IESO-administered markets are determined on 'system marginal cost of production' basis i.e. real-time energy prices set by the resource that can meet an incremental change in real-time demand. Economic theory states that "in power market, as in all other markets, the competitive price is never greater than the marginal cost of production"¹.

System marginal cost pricing was expected to result in real-time price signals that accurately reflect the costs of meeting an incremental change in demand. Such pricing should drive efficient short-term supply and demand responses (productive and allocative efficiencies) and by extension long term investment and innovation efficiencies (dynamic efficiencies).

¹ Steven Stoff, "Power System Economics" p. 61, Wiley-Interscience, 2002.

In the IESO-administered markets there are many resources that supply electricity in real-time that are not eligible to set the real-time price:

- self-scheduling and intermittent generation as they do not submit offers and typically do not respond to market price signals;
- ramp-constrained generation as they are unable to meet a change in demand due to their physical constraints;
- import and export transactions scheduled and fixed for an hour.

These supply resources, while not able to set real-time price, are included in the real-time price formulation as 'price-takers' and to a greater or lesser extent indirectly influence the real-time price. For example, import transactions scheduled for the hour are placed in the bottom of the real-time supply stack, effectively shifting the real-time supply curve to the right and placing downward pressure on real-time prices.

Both the unconstrained and constrained pricing regimes are founded on the marginal cost pricing principle. However, the unconstrained sequence makes different assumptions regarding which resources are marginal. For example, units that are constrained on and their schedules fixed to their minimum loading point in the constrained schedule cannot be marginal in the constrained pricing system. However, these units can influence the real-time unconstrained price (i.e., in the unconstrained sequence these units can be scheduled below their minimum loading point and can set the unconstrained price). Units that are ramp constrained in the constrained schedule may be able to set the price in the unconstrained schedule as it is assumed that they can ramp three times their actual ramping capability.

Side payments may be necessary to compensate those resources meeting demand in real-time but not eligible to set real-time price. In the Ontario market, these side payments take the form of CMSC and IOG payments. These costs are recovered through hourly uplift charges.

Potential Impact on Efficiency:

Failure to capture some of these costs (like import IOG's) in the marginal real-time price may lead to inefficient consumption decisions from consumers that are price responsive a day or so in advance but become non-price responsive in real-time or near real-time. These may be consumers that need to plan their next day's consumption profile in advance, but once they commit to a profile, it becomes too difficult (too costly for them to change their consumption) . If the expected HOEP is less than the value that these consumers place on the last MW of consumption, they will consume. However, if the value that these consumers place on the last MW of consumption is less than the cost of the MW of imports actually used to serve them, then it is inefficient for them to consume. This would be inefficient in an ex ante sense (prior to the scheduling of the import). If the HOEP reflected the cost of the import, these consumers would adjust their consumption plans accordingly a day in advance and the import would not be schedule come real-time. Furthermore, over the long-term, since the level of consumption is

higher than the efficient level, it could lead to a need for additional capacity investment that would otherwise have been avoided.

On the other hand, it is possible that adding the cost of the import to the real-time price could lead to inefficient consumption by consumers that are price responsive in real-time. After the one-hour ahead pre-dispatch the cost of the import is sunk; it cannot be avoided. If the real-time price reflected these costs, it may induce consumers that continue to be responsive in real-time, not to consume, even though the actual cost of the MW dispatched to serve them was less than their marginal value of consumption. This would be inefficient in an ex post sense (after the scheduling of the import).

Additional Points to Consider

1. Other electricity markets generally have market clearing prices set on a system marginal cost basis. However some other markets also have day-ahead markets where a large proportion of physical and financial commitments are established and all domestic resources, imports and exports are potentially 'marginal' and can set the day-ahead price. Ontario does not have such a day-ahead price setting mechanism.
2. The IESO believes that the New York ISO real-time market prices can be set by 'fixed block' gas turbine units that can operate only at a single point i.e. the units are either off or on at a single fixed output². These gas turbines cannot physically change their output incrementally in response to real-time changes in demand. This may be an example where real-time system marginal cost pricing was modified to capture the impact of non-marginal resources. However, we understand that these gas turbines operate very infrequently and so the modified pricing occurs very infrequently. This would not be the case if Ontario were to adopt a different pricing methodology that factored in directly the presence of imports, exports and ramp constrained generation. These resources occur every hour in Ontario.
3. An issue of the relative market efficiency impacts of the existing real-time price determination is very broad. All transactions and resources not eligible to set real-time price would need to be considered. The implications of changing the pricing methodology on market uplifts and other industry payments would need to be understood.

² Extract from NYISO presentation "Use of Pricing Basepoints in Establishing Day-Ahead Schedules", October 29, 2008

- "Price setting logic implemented throughout the NYISO energy markets was established to create the capability for inflexible but fast starting gas turbines to be able to set price, by allowing these resources to be dispatched flexibly between 0 and their minimum generation levels. The logic is variously known as "price setting logic", "ideal dispatch", or "hybrid pricing".
- To reflect the actual physical operating restrictions of these gas turbines to run at (near) full output, the actual operating instructions, or schedules, for all units are established separately.
- This logic was the intended outcome when this market design was developed. The alternative would have been to not allow GT's to set price and incorporate any additional running costs into uplift."

4. If Issue #7 is re-defined as an examination of the relative efficiency impacts of system marginal cost pricing and other pricing methodologies, there are a number of other related market issues, including the following:
 - a. MPWG Issue #41: More efficient uniform price
 - b. MPWG Issue #31: Multi-Interval Optimization Pricing Methodology
 - c. Dispatch Issues SE-61

Alternative Issue Statement

A more appropriate definition of the issue may be:

Given the Ontario market design and structure, which costs (or resource constraints) should be reflected in the unconstrained marginal cost pricing calculation to induce efficient dispatch outcomes?

Proposed Next Steps

1. Based on MPWG feedback, the IESO to consider re-defining Issue #7 and re-establishing the priority on that basis.

Yours truly,

John MacKenzie

Market Pricing Working Group

Issue 7: Imports and Exports setting the Ontario Market Clearing Price



Date Raised

This issue was first noted early in the operation of the IESO-administered market and raised again by the Day-Ahead Market (DAM) Working Group in early 2004.

In the December 7, 2005 resolution from the IESO Board of Directors approving the Day Ahead Commitment Process, the Board instructed the IESO to “to give focussed attention to resuming and advancing work with stakeholders on...whether intertie transactions should be considered in the calculation of the Ontario Market Clearing Price.”.

Description

The market clearing price for energy and operating reserve in the IESO-administered market was established by design to be the marginal resource cost based on offers and bids. As imports and exports cannot be dispatched on a 5-minute basis, they are therefore not a marginal resource in real-time, and therefore do not set the market clearing price (MCP) in the real-time market. However, imports and exports can be scheduled/dispatched within the timeframe of the pre-dispatch sequence and therefore can set the pre-dispatch price. This discrepancy in price determination raises concern over whether the prices are being calculated appropriately and fairly.

Background

The current Ontario energy market has been designed to allow market participants to import power from and export power to other jurisdictions. Since the source of the imports and destination of the exports are outside the Ontario control area and involve the use of interconnected facilities, coordination of operation with neighbouring control areas is required. Reliability standards must be adhered to and agreed to scheduling protocols with neighbouring jurisdictions followed. Such coordination of operation cannot currently be achieved in real-time. Consistent with current interchange scheduling protocol timelines, imports and exports are scheduled for one hour periods during the hour-ahead pre-dispatch run of the scheduling algorithm. Imports offered at prices below the hour-ahead pre-dispatch price and exports bid at prices above the hour-ahead pre-dispatch price are all scheduled for real-time dispatch. In the real-time scheduling sequence, the intertie bid and offer schedules in the hour-ahead pre-dispatch are treated as fixed for the entire delivery hour and do not adjust with changes in the 5-minute MCP. This is accomplished by placing net import quantities (scheduled imports minus scheduled exports) at the bottom of the offer curve at a very low price. This ensures that the import and export quantities are included in the determination of real-time dispatch and that their associated bids and offers are unable to set the MCP. As a result, the MCP is determined solely by the supply-demand balance between dispatchable resources that can physically change their input/output levels within the 5-minute time frame or resolution of the MCP calculation.

The price used to settle imports and exports in real-time is the sum of the real-time MCP and the Intertie Congestion Price (ICP) for the specific intertie zone involved, which is determined during the hour-ahead pre-dispatch run. Importers are also provided with further price risk mitigation through the IESO's Intertie Offer Guarantee (IOG) payments. The IOG ensures that, over the course of the hour, an importer will receive at least the average price of their offer; hence, they will not suffer from lost operating profit. Examining the effects that the IOG payments may have on MCP could provide further insight into this issue.

Furthermore, the Day-Ahead Market design proposes to set the price of electricity one day ahead of real-time, on an hourly basis. Imports (and exports) would be able to offer into this hourly market and thus could set the day-ahead price of electricity. The real-time market, however, will remain in effect alongside this Day Ahead Market, and it will continue to be dispatched on 5-minute intervals. Hence, interties will remain unable to set the real-time price of electricity. This disparity in price-determination between the two markets is also an important aspect of this issue.

Why a Pricing Issue

The disparate treatment of import offers and export bids in pre-dispatch as compared to real-time can yield significant price differences. This raises the question of whether the differing prices and their consequences are fair and accurate for all Market Participants. The inability of intertie transactions to set the price in real-time requires examination.

Impacts of Issue

Market Impact

The differing treatment of import offers and export bids in the pre-dispatch compared to real-time price determination process gives rise to questions of fairness in the consequent application of these prices and associated adjustments and/or guarantees to resources inside and outside of Ontario. In addition, the divergent price-determination processes call into question the efficiency and accuracy of the pricing signals in the market.

Participant Impact

[To be developed]

IESO Processes and Procedures Impact

[To be developed]

Related Issues

- 008: Multi-Part Bids/Offer
- 012: Under-commitment of Available Generation
- 013: Impact of Out of Market Resources on the Market
- 014: Hour(s)-Ahead Price Signal Uncertainty
- 024: Reducing Frequency of Failed Intertie Transactions

- 030: Forecast of Real-Time Price

Options Considered

[To be developed]

Selected References

Day Ahead Market Strawman Release 4.0 – Design Issues Log #9

http://www.ieso.ca/imoweb/pubs/consult/mep/DAM_WG_Strawman-4_0.pdf

Market Surveillance Panel Monitoring Report on the IMO-Administered Electricity Markets for May to August 2002

http://www.ieso.ca/imoweb/pubs/marketSurv/ms_mspReport_2002oct07.pdf

Quick Take: Intertie Offer Guarantee – September 22, 2002

http://www.ieso.ca/imoweb/pubs/training/QT1_IOG_2002sep10.pdf

Marketplace Training: Introduction to Ontario's Physical Markets

<http://www.ieso.ca/imoweb/pubs/training/IntroOntarioPhysicalMarkets.pdf>