“Adopting a Ramp Charge to Improve the Performance of the Ontario Market”

Market Pricing Working Group

July 7, 2006

Adopting a Ramp Charge…

- 1 Times Myopic is the preferred solution

Adopting a Ramp Charge…

- Did I mention 1 Times Myopic is the preferred solution?

"Adopting a Ramp Charge to Improve Performance of the Ontario Market"

- Prepared by LECG on behalf of APPrO
  - June 21, 2006
- Utilizes Fossil and Hydroelectric Generator data primarily from OPG

Section I:
Report Executive Summary

- The report indicates ramping costs of more than $4.24/MW at fossil plants and potentially more at hydroelectric facilities.
- The total cost of adopting a Ramping Charge of this size is less than ½ % of the cost of wholesale power in Ontario at $78M annually.
  - These estimates include the efficiency losses and increased maintenance costs at fossil plants and efficiency losses alone at hydroelectric facilities.
  - These estimates do not include the opportunity costs associated with the higher forced outage rates resulting from increased cycling of generating facilities.
  - These estimates presume that the requirement for ramp continues as it is today

Implementation

- The ramp charge would be paid to every generator that changes its output at the direction of the IESO.
- The adoption of this charge will provide a much needed price signal that will create an incentive for the IESO to use ramp more effectively thereby reducing the excessive level of Dispatch Instructions
- Generators will be incented to maintain and provide greater ramping capability and rate

Section II:
The Current System

- the DSO
  - is very complex, but has its limitations
  - is expected to optimize dispatch at all times
  - doesn’t have all cost information required to perform a complete optimization
  - includes a number of fictions
    - 12 times ramp rate
    - Constrained dispatch and unconstrained price setting
    - CMSC’s
    - Out of market control actions

In short, the DSO can’t optimize costs if it does not consider them!

Section II:
The Current System

- If generators are not compensated for ramping, and ramping increases their costs, ramping capability may soon disappear
- According to the IESO, more than two times the required ramp was called upon during 2005.
- Brookfield's data shows starts at its hydroelectric facilities have more than doubled.
- The current system does not consider costs associated with ramp in dispatch - ramp is unnecessarily over-utilized!

Section III
Proposed Ramp Cost Recovery

- The LECG report proposes that the IESO compensate Generators who ramp in response to Dispatch Signals.
- Funding for this compensation could be through an uplift charge
- Incorporating a ramp charge marks a move towards a more complete and accurate optimization of the Ontario energy system.

Section IV
Ramping Costs

- 3 categories of Cost associated with Ramp were considered:
  1. Loss of efficiency
  2. Increased maintenance costs
  3. Increased potential for forced outages and de-ratings

Section IV
Ramping Costs - Nanticoke

- Data from OPG's Nanticoke coal-fired station were evaluated:
  - Each of the 8 units were evaluated separately
  - Hourly data was used
  - Increases and decreases in output were considered equally
- Efficiency Losses
  - For every MW of ramp:
    - efficiency costs of $3.32 are incurred;
    - Natural gas consumed during the starting and stopping of pulverizers totals an average of $0.33.
- Maintenance Costs - Nanticoke
  - For every MW or ramp, a cost of $0.59 is incurred

Summing these results in a cost of $4.24 /MW

Section IV
Ramping Costs - Nanticoke

- Opportunity Costs associated with increased Effective Forced Outage Rate (EFOR) - Nanticoke
  - There appears to have been a significant increase in EFOR since market opening
  - Regression analysis shows a relationship between frequent dispatch instructions and increasing EFOR
  - Analysis suggests that EFOR may have been 9.6% lower absent ramping or $28.74/MW ramp – this analysis fails the “P” test, but additional data may result in statistical significance.
  - OPG’s analysis shows estimates that ramping has increased EFOR by 2.4% - this translates to a cost of $7.18/MW of ramp

To be conservative, these EFOR results are not included in the proposed ramp charge.

Section IV
Ramping Costs - Hydroelectric

- Data for the period 1997-2001 from 6 of OPG's hydroelectric plants were compared to the post market period from 2002 through 2005.
- Hydroelectric efficiency dropped coincident with the introduction of the market by as little as 1.8% and as much as 7.6%.
- Using 2005 average energy sale prices, this translates into a cost of $10.79 / MW-ramp.
- The average drop of efficiency at ramping hydroelectric plant was 4.3% rather than the 5.3% for the 6 specific plants studied.

Section IV
Ramping Costs - Hydroelectric

- Maintenance Costs were not evaluated for hydroelectric plant, nor were reductions from increases in forced outage rates.
- The report concludes that ramp costs at hydroelectric plant are reasonable at the $4.24/MW-ramp level or higher

Section V
Basis for the Proposal

- Ramp payments are a deviation from the energy only market – it would be only one of many that already exist
- To ensure market efficiency the IESO must properly take account of generator ramping costs and pay appropriate compensation for these costs

Section V
Basis for the Proposal

- Including ramping costs in offers would require suppliers to know their ramping requirements in advance – this raises a number of problems:
  - This would raise price to all suppliers – even those who aren't providing ramp
  - Offers must reflect the marginal cost of production – doing otherwise reduces the participants profitability
  - Including ramp costs in offers insulates the IESO from the cost consequences of their actions
  - Ramp payments incents appropriate operational response to dispatch
  - Ramp payments ensure that adequate ramp is available

Section VI
Conclusion

- The paper provides the rationale requested by the IESO to support the adoption of a ramp charge in the Ontario market.
- A ramp charge can be adopted quickly
- It moves the market in the right direction, with payments tied more directly to costs
- It provides appropriate incentives to generators and to the IESO
- It provides a means to improve the fairness and efficiency of the market
- The Supply Directive predicts a longer life for coal fired facilities – their reliability needs to be considered.

It will allow us all to get on with other more pressing issues