

Status of LMP Study

Stakeholder Advisory Committee
November 1, 2006



Why Study LMP - Refresher

- July SAC meeting, recommended that the IESO proactively study the potential introduction of LMP (Locational Market Pricing) in Ontario as a priority for development of the Ontario electricity market
- A recommendation in the latest market surveillance panel report to introduce locational pricing
- Increasing congestion management settlement credit complexities
- Day-ahead market design will vary depending on how real-time prices are calculated

- Discussion of completed work
- Discussion of locational pricing and historical shadow prices
- Proposed areas for further study

- Research on other jurisdictions that have implemented or are about to implement locational prices to observe their experiences – (posted paper)
- Posted paper on pricing model options for Ontario

- Provides price transparency– communicates the market value of electricity at locations allowing for the right economic signals through congestion pricing:
 - Reflects congestion and loss costs in energy prices – removes indirect subsidies
 - Provides economic indicators in aid of system expansion and reinforcement plans
 - Improves market efficiencies:
 - Addresses inefficiencies currently exhibited in export and import transactions
 - Eliminates current signals that at times encourage behaviours that are in conflict with reliability and the constraints on the system
 - Provides immediate feedback on implications of grid or generator outages

- Provides transparent basis for generation procurement plans and demand response programs to provide maximum benefits to the province
- Reduces out-of-market uplift charges that are currently being incurred due to out-of-merit dispatch relative to the uniform price

First Conclusion From Our Study

- The current nodal-based shadow prices are not an adequate starting point from which to make a locational pricing policy decision
 - However, the past shadow prices provide a directional signal
- If locational pricing had existed in the past under exactly the same market circumstances, the nodal prices would have been different from the shadow prices
- Any future locational prices would be significantly affected by changing market circumstances

Direct Comparison Not Simple - the “mechanics of the calculations”

- Direct comparison of constrained shadow prices and HOEP is problematic due to calculation differences:
 - Losses:
 - Current treatment of losses is too simplistic for locational pricing, and often yields inappropriate shadow prices
 - Primary Demand:
 - Constrained dispatch uses a forecast demand.
 - Unconstrained uses actual PD taken at the end of the interval.
 - Ramp Rates:
 - Constrained optimizes over 5 critical intervals spread out over the next hour with 1X ramp.
 - Unconstrained optimizes over 1 interval with 12X ramp rate
 - Generator characteristics:
 - Constrained respects minimum loading points.
 - Unconstrained ignores minimum loading points

Direct Comparison Not Simple - the “market would react differently”

- Direct comparison of constrained shadow prices to any future locational prices is problematic due to market factors:
 - Bidding behaviour changes
 - Local Market Power changes
 - Changes in import/export behaviours
 - Sensitivity to external factors (e.g. fuel prices, water conditions, generator availability)

- MSP has routinely published historical average shadow prices on a regional basis – has lead to certain expectations and perceptions
- Our analysis leads us to believe that regional price differences would have existed, but would not be near as dramatic as suggested by comparing historical shadow prices to the historical HOEP
 - Additional work required
- Historical shadow prices, as currently available, reflect neither past nor future nodal prices

Historical Shadow Prices Analysis
118 Nodes Selected for Study Period July 1, 2004 – August 31, 2006

Northwest
26 Nodes

Northeast
42 Nodes

2 Nodes
Ottawa

ESSA
2 Nodes

East
13 Nodes

Bruce
2 Nodes

SW
9 Nodes

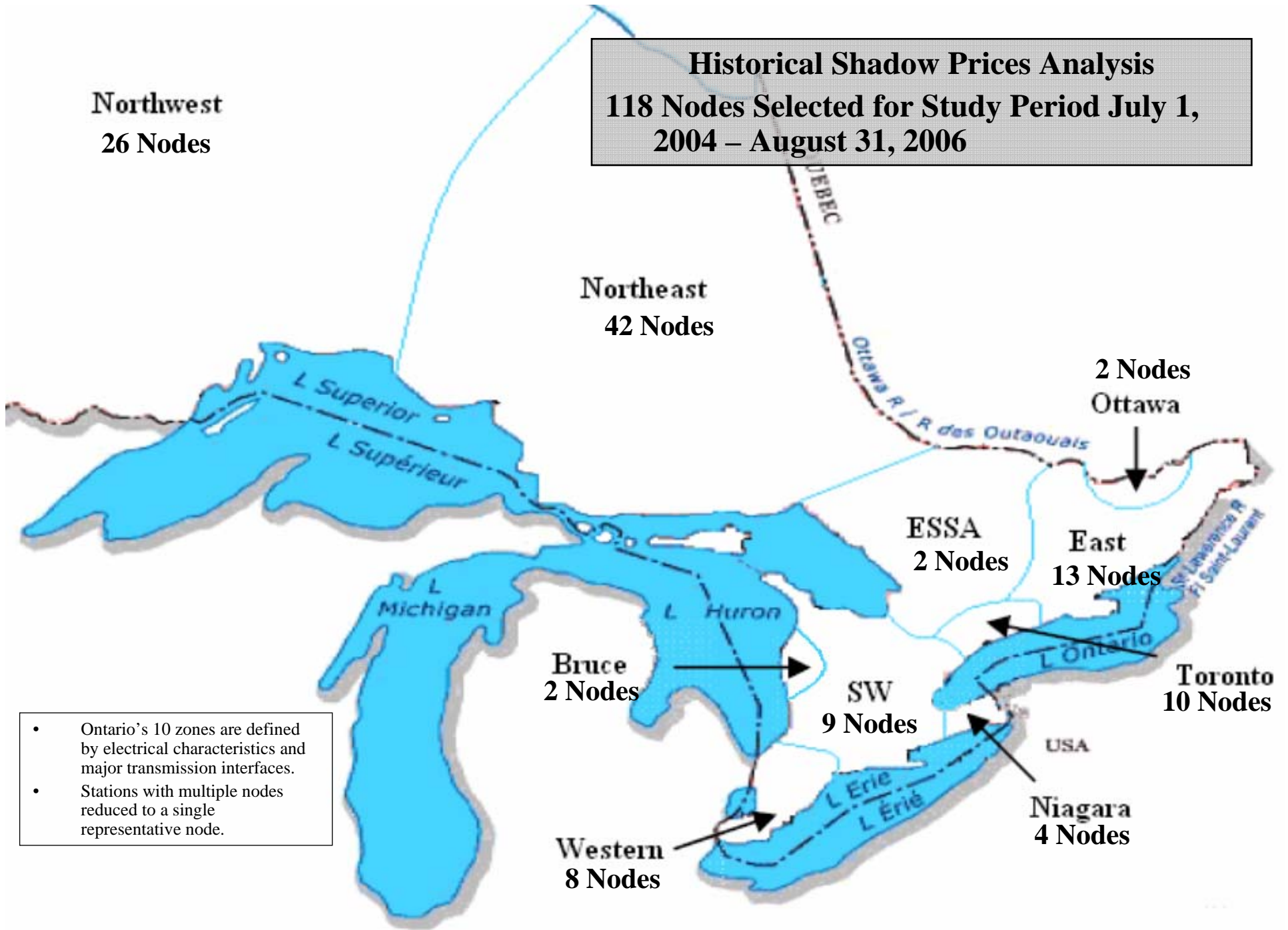
Toronto
10 Nodes

USA

Niagara
4 Nodes

Western
8 Nodes

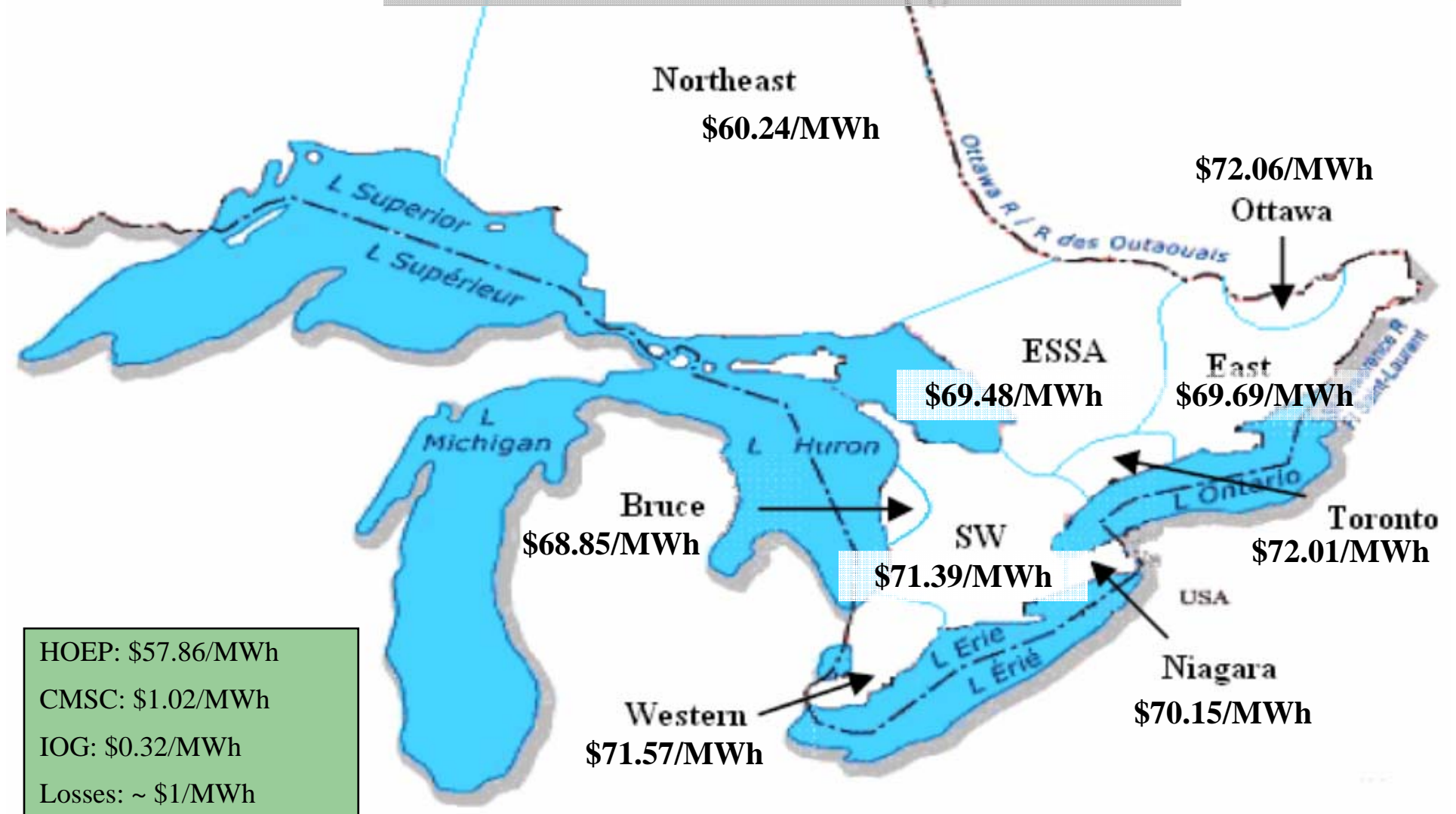
- Ontario's 10 zones are defined by electrical characteristics and major transmission interfaces.
- Stations with multiple nodes reduced to a single representative node.



Average historical shadow prices are presented for information purposes only and in no way reflect either future pricing or pricing that would have existed if prices were based on nodal prices.

Northwest
\$32.49/MWh

Northeast
\$60.24/MWh



HOEP: \$57.86/MWh
CMSC: \$1.02/MWh
IOG: \$0.32/MWh
Losses: ~ \$1/MWh

Early IESO-staff Conclusions

- Under any locational pricing model, energy prices for the majority of participants will likely be higher
- If historical congestion on East-West tie continues, then there will be lower prices in Northwest Ontario, but this condition is very sensitive to market factors such as fuel prices, water conditions, generator availability
- Price differences between North-East and Southern Ontario will likely be smaller than suggested by shadow prices
- Import/export behaviour will change significantly under any locational pricing model, likely mitigating the effects of locational pricing

A good starting point, but significantly more work needs to be done for a complete analysis.

- Gain further understanding of locational price impacts through:
 - modifying historical data or pursuing modelling capability to reflect expected behavioural and/or mechanical differences.
- Issues to be examined:
 - Bidding behaviour changes
 - Local Market Power changes
 - Changes in import/export behaviours
 - Sensitivity to external factors (e.g. fuel prices, water conditions, generator availability)
 - Transitional mechanisms – measured pace of change

- Proceed with gusto on additional nodal price analysis to support future policy decision on locational pricing, and incorporate this schedule into day-ahead market design work
- Abandon locational pricing studies and attempt to build a day-ahead market based on current constrained/unconstrained pricing construct
- Continue locational pricing analysis at a measured pace, and in parallel explore DACP enhancements that might bring additional and demonstrable benefits for the market