

Constrained Run Dispatch and Pricing

Market Pricing Working Group

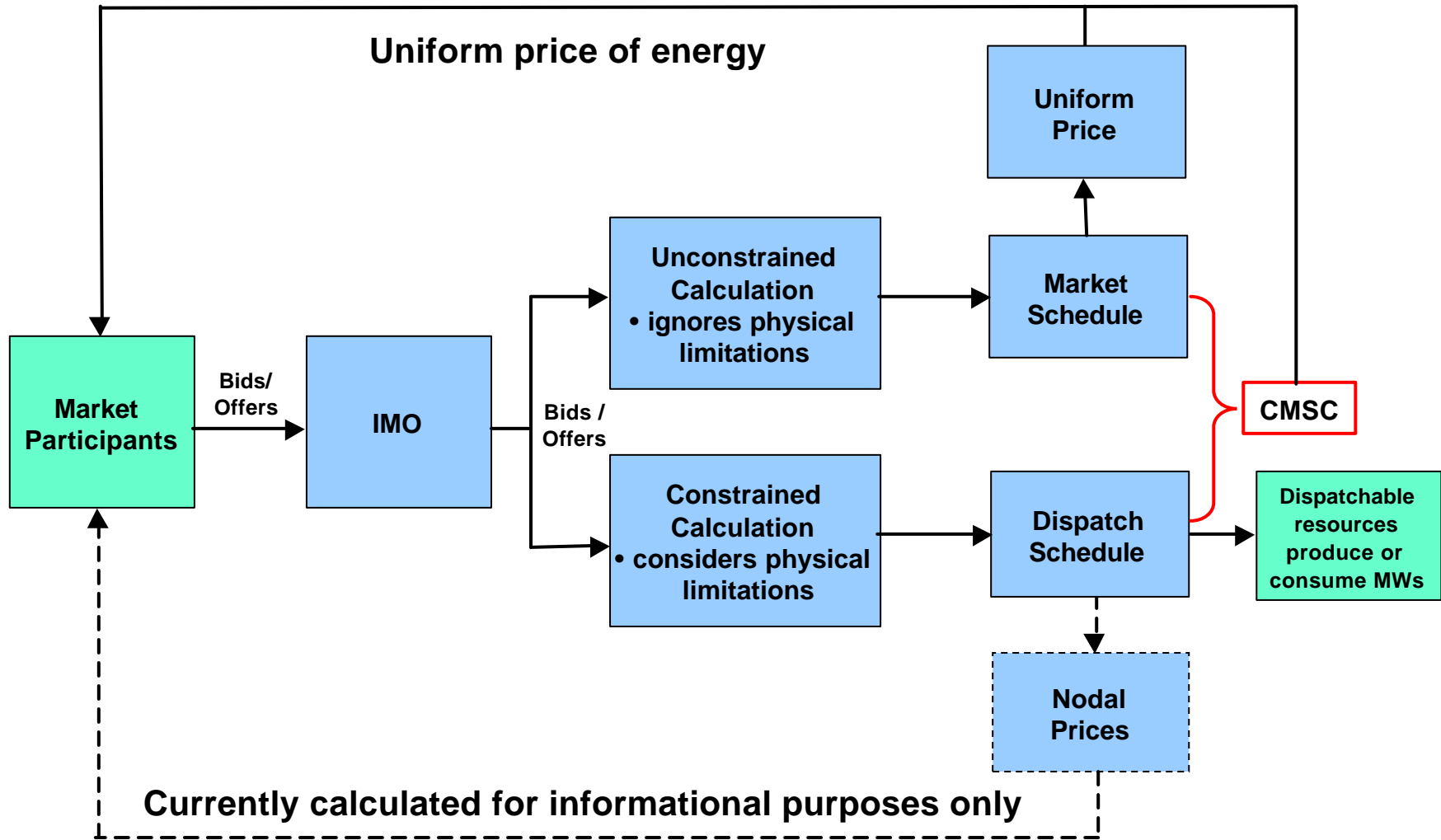
Meeting #4

June 25, 2004

What is Nodal Pricing?

- Nodal Pricing is a method of determining prices in which market clearing prices are calculated for a number of locations on the transmission grid called nodes
 - Each node represents a physical location on the transmission system including generators and loads
- The price at each node represents the locational value of energy, which includes the cost of the energy and the cost of delivering it (i.e. losses and congestion)
- Nodal prices are determined by calculating the incremental cost of serving one additional MW of load at each location subject to system constraints (i.e. transmission limits, ramp rates of resources, contingency analysis)

Review of Current Pricing Scheme



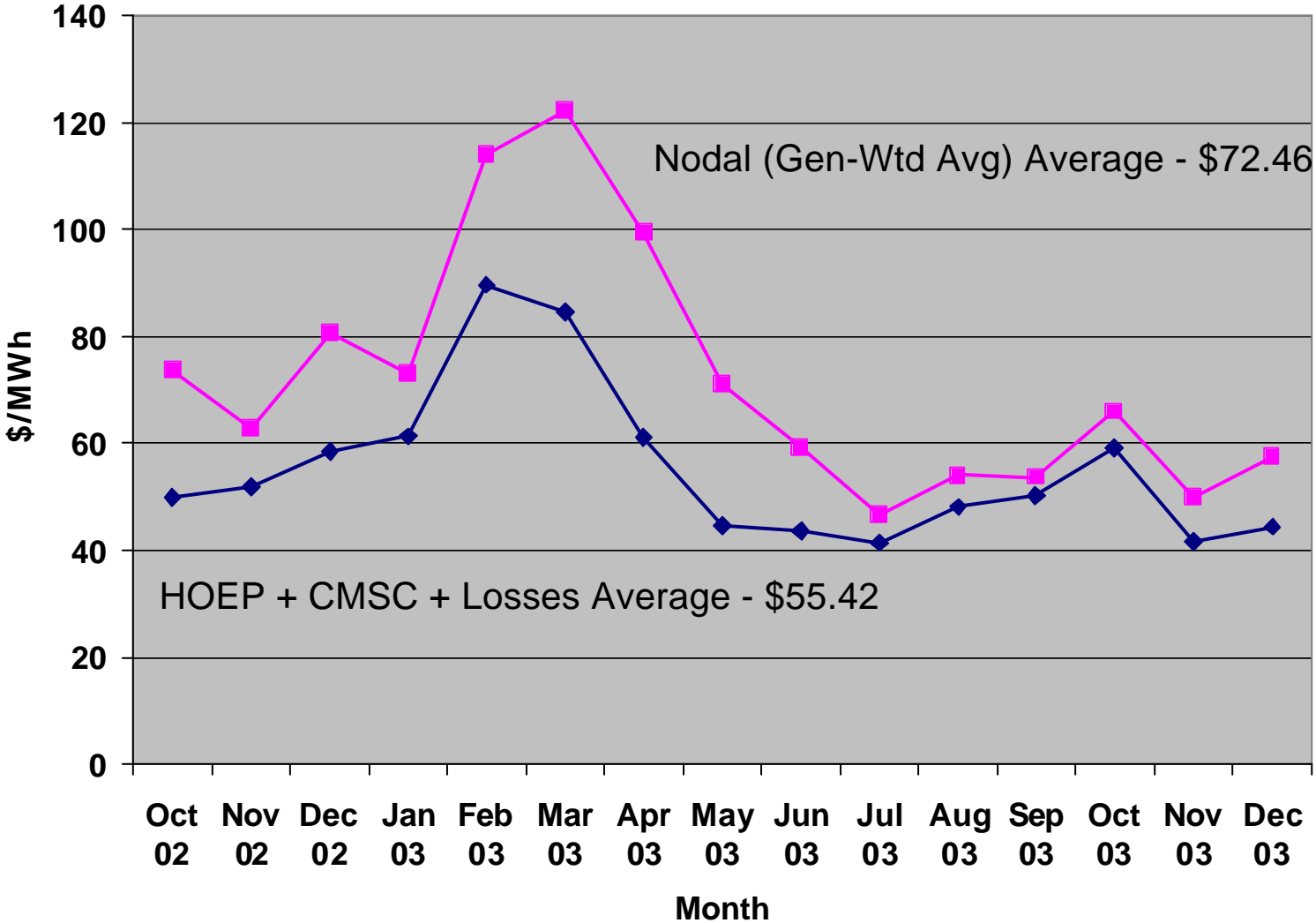
Uniform Total Pricing

What we need to determine?

- Total price paid by load customers under uniform pricing

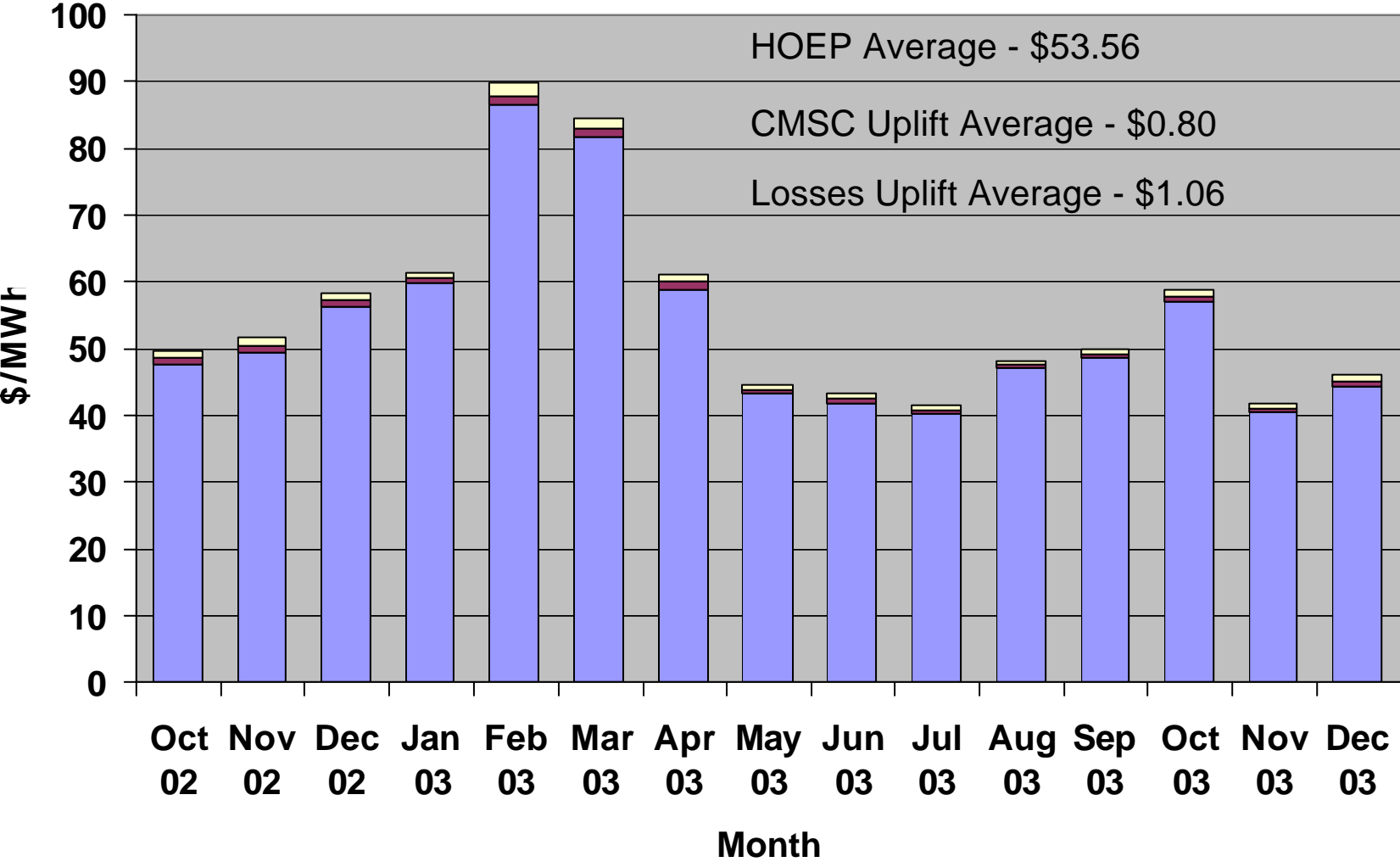
HOEP + CMSC Uplift + Losses Uplift

Total Price Comparison



◆ Uniform (HOEP+CMSC+Losses) ■ Nodal (Gen-Wtd Avg)

Total Price Components



■ HOEP
 ■ CMSC Uplift
 ■ Losses Uplift

Demand-Supply Balance

- HOEP does not accurately reflect the demand-supply balance
 - Unconstrained calculation has access to larger resource stack than constrained calculation, e.g.
 - Operating reserve in NW Ontario that is available but can't be delivered
 - Full capability of quick-start units and partially dispatched units that can't be delivered due to transmission constraints
- Nodal prices properly reflect the demand-supply balance
 - Constrained calculation determines the schedule of resources that can be delivered while considering constraints of the transmission system

Demand Differences

- Demand for the constrained calculation is estimated before the interval for which resources are dispatched
- Demand for the unconstrained calculation is measured after the interval

Ramp Rate Constraints

- Unconstrained calculation uses artificial (12x) ramp rate to determine HOEP
- Constrained calculation uses actual (1x) ramp rates to dispatch the system and calculate nodal prices

How Nodal Prices Vary Across Ontario

Ontario is divided into 10 transmission zones

- Same 10 zones identified in IMO's 18-month and 10-year outlook forecast documents
- For each zone, either one nodal price or a set of weighted nodal prices is chosen as the indicative price for that zone
- Price differences between indicative prices in these zones indicate areas of congestion and relative losses

Average Congestion and Losses (Oct '02 - Dec '03)

