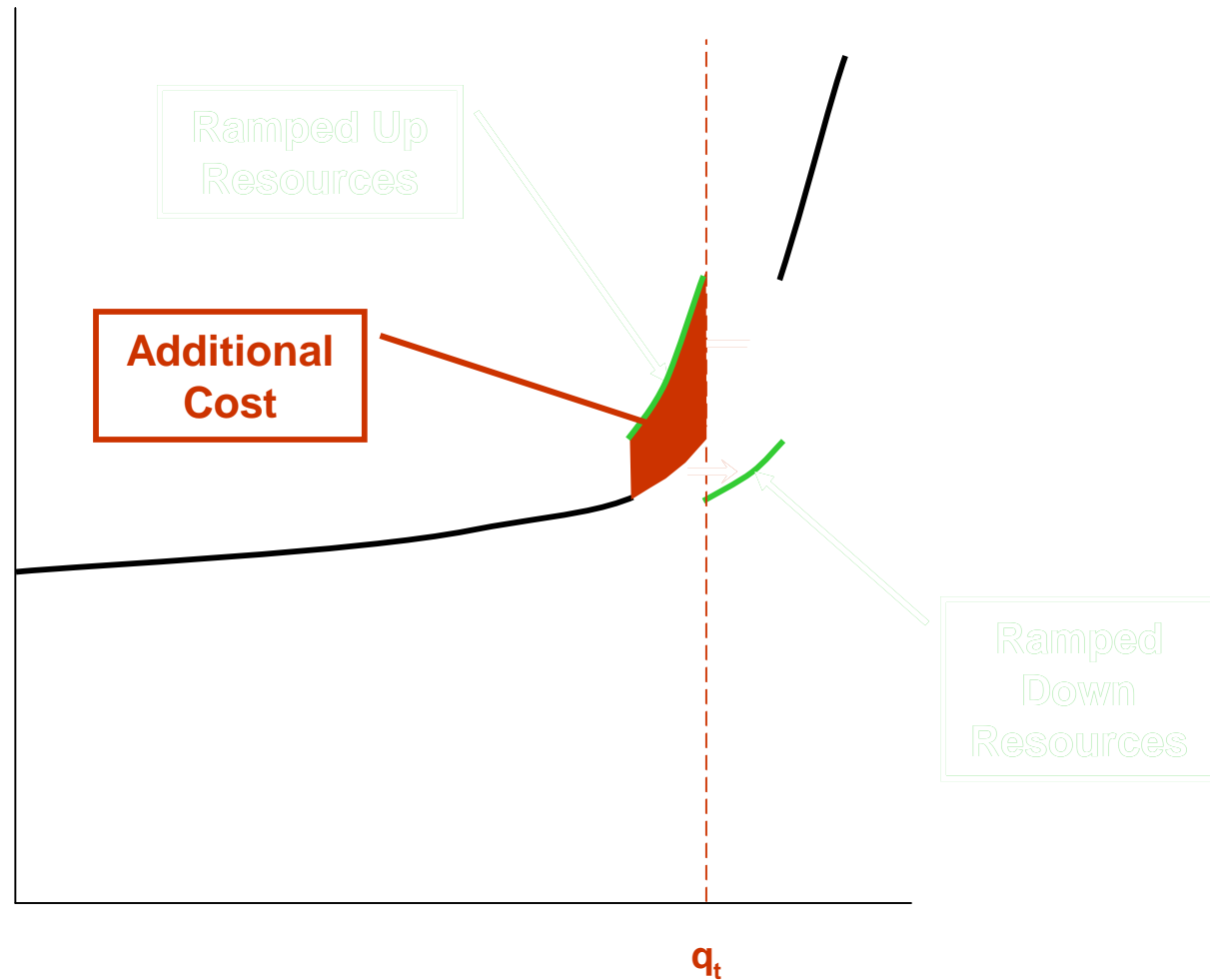


MIO Pricing Options

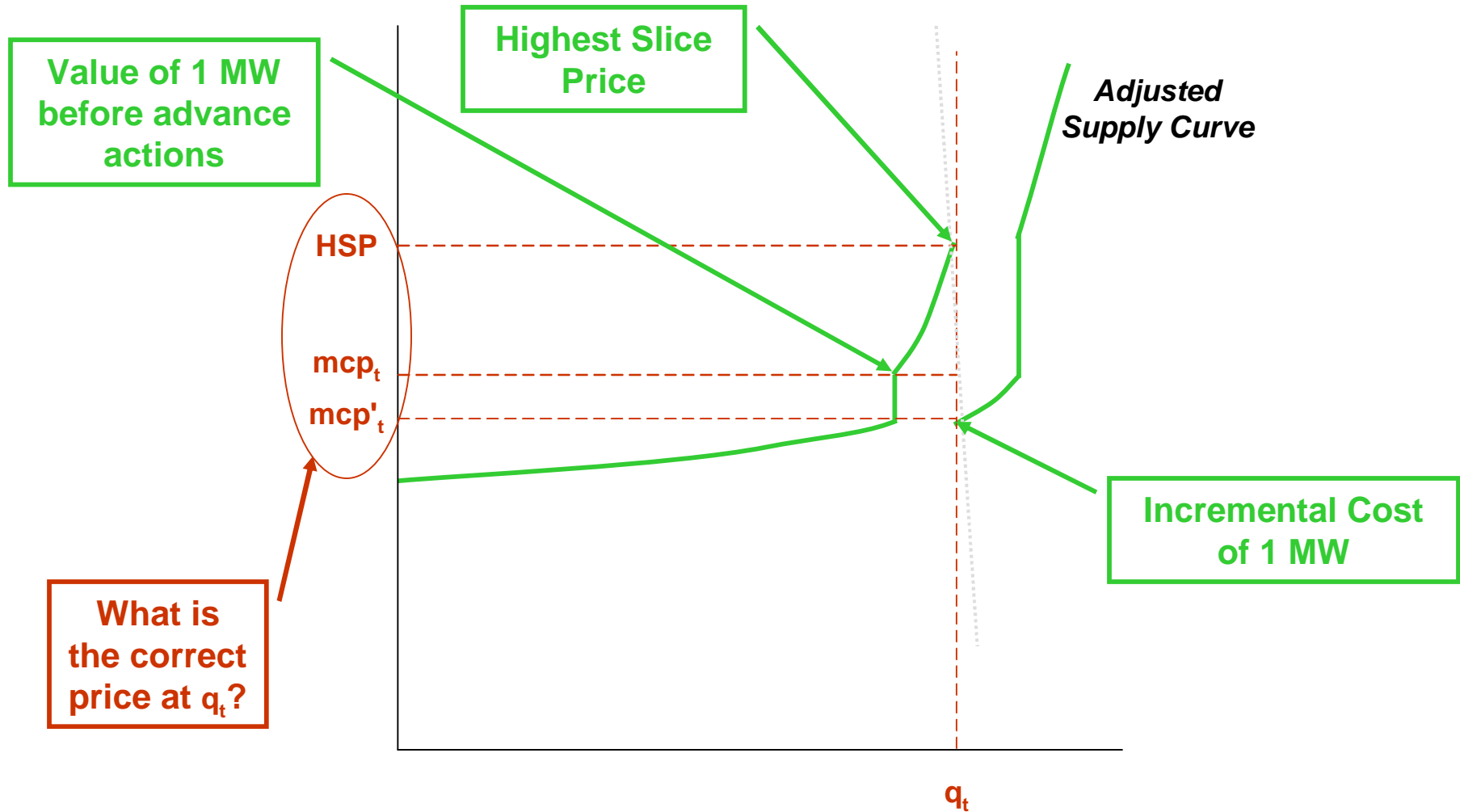
Market Pricing Working Group
July 8th, 2005



Impact in the Advance Interval



Pricing in Advance Interval



- 1. MIO Incremental Price**
- 2. MIO HSP#1 – The higher of (MIO Incremental Price and the highest slice price of units that are ramping up).**
- 3. MIO Modified Incremental Price (NEW)**

- **Based on the cost of an additional MW of demand at the interval.**
- **Includes the cost of ramping up units early to meet future demand.**
- **Ramped up units will be held whole over the ramp period without additional production cost guarantees.**

- **The MIO incremental price will be used for all intervals except for the intervals that MIO ramps up units to meet the interval demand (final ramp up intervals)**
- **The price of the final ramp-up intervals will be based on the total cost of meeting an additional MW of demand at these intervals. (Ramp up costs + costs of one more MW at the interval)**

- **The cost of meeting an additional MW of demand from each ramped up unit consists of:**
 - **cost of increasing the unit output in each interval in which the unit was ramped up early and decreasing the output of the marginal cheaper unit (ramping up costs).**
 - **Cost of supplying the one additional MW at the final ramp up interval**
- **MIO will use the cheaper units slices to their full available capacity.**
- **The marginal unit will be the most expensive and will set the price for the final interval.**

- Calculate the cost of meeting an additional MW from each ramped up unit.

$$\left(\begin{array}{l} \text{Unit highest dispatch} \\ \text{slice price for the final} \\ \text{ramp up interval} \end{array} \right) + \sum_{\text{Ramping Intervals}} \left[\left(\begin{array}{l} \text{Unit highest} \\ \text{dispatched} \\ \text{slice price} \end{array} \right) - \left(\begin{array}{l} \text{MIO incremental} \\ \text{price for the} \\ \text{interval} \end{array} \right) \right]$$

- The price for the final ramp up interval will be set to the highest of (MIO incremental price for the interval and the highest cost of meeting an additional MW from each ramped up unit)

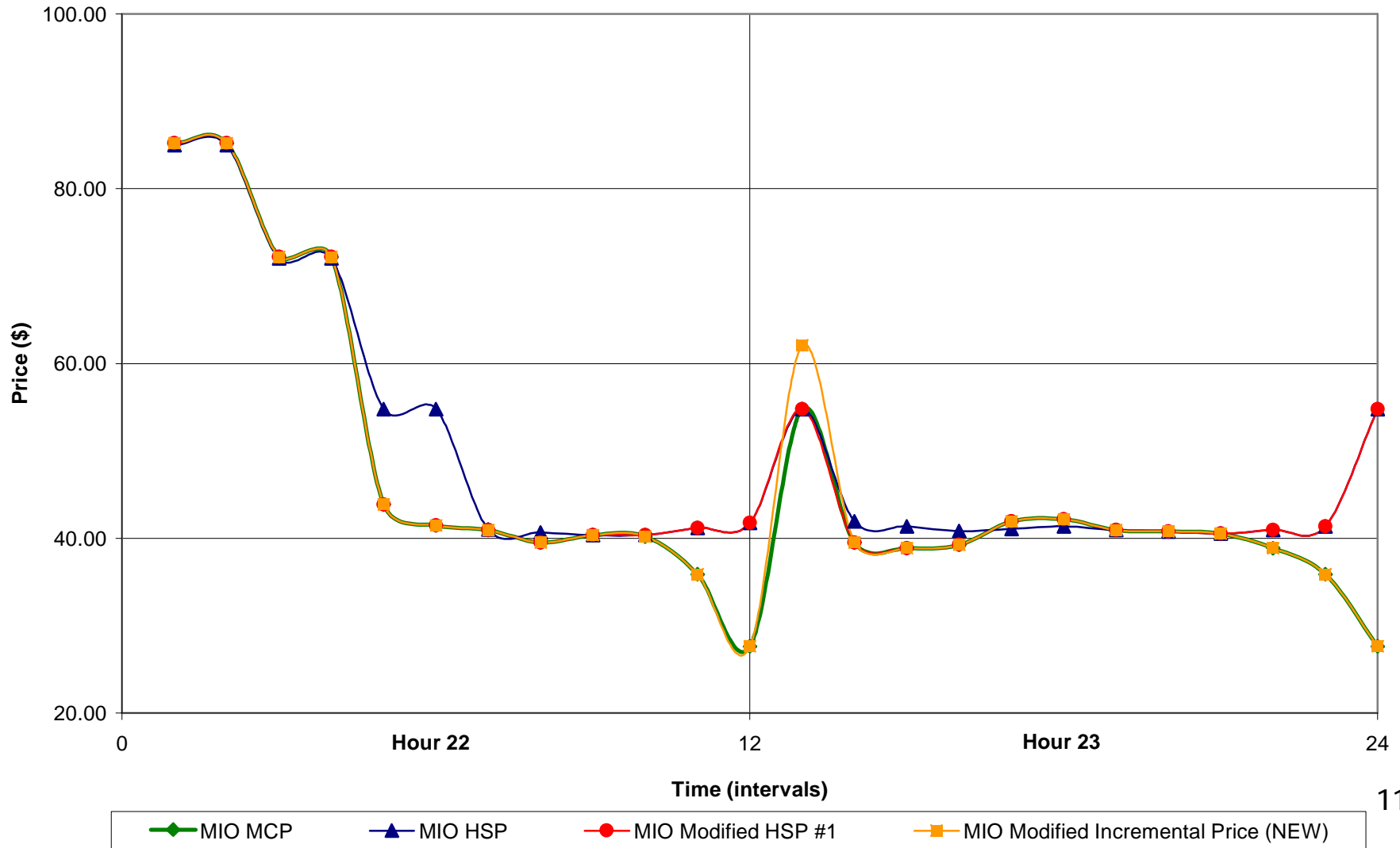
	Offer Price (\$/MWh)	Bid Min (MW)	Bid Max (MW)	5-Minute Ramp Capability (MW)
Unit A	20	0	50	20
Unit B	28	0	30	10
Unit C	45	20	60	4
Unit D	60	40	70	2
Unit E	200	0	100	10

Myopic	Current Output	Pd 1 Dispatch	Pd 2 Dispatch	Pd 1 Cost	Pd 2 Cost	
Unit A	35	50	50	\$ 1,000	\$ 1,000	
Unit B	26	28	30	\$ 784	\$ 840	
Unit C	18	20	24	\$ 900	\$ 1,080	
Unit D	40	40	42	\$ 2,400	\$ 2,520	
Unit E	0	0	1	\$ -	\$ 200	Total Cost
Total	119	138	147	\$ 5,084	\$ 5,640	\$ 10,724

MIO	Current Output	Pd 1 Dispatch	Pd 2 Dispatch	Pd 1 Cost	Pd 2 Cost	
Unit A	35	50	50	\$ 1,000	\$ 1,000	
Unit B	26	27	30	\$ 756	\$ 840	
Unit C	18	21	25	\$ 945	\$ 1,125	
Unit D	40	40	42	\$ 2,400	\$ 2,520	
Unit E	0	0	0	\$ -	\$ -	Total Cost
Total	119	138	147	\$ 5,101	\$ 5,485	\$ 10,586

- **Unit C is ramped up to meet the demand for interval 2.**
- **The cost of meeting an additional MW of demand at interval 2 using Unit C = \$62.**
- **If the demand for interval 2 is slightly lower than forecast, incremental price for interval 2 = \$60 (Unit D)
→ Unit C sets the price at \$62**
- **If the demand is slightly higher than forecast, incremental price for interval 2 = \$200 (Unit E)
→ Unit E sets the price at \$200**
- **Under both scenarios Unit C is held whole over the ramp period (two intervals).**

Interval Prices for Hour 22 - 23 Feb. 5, 2004



Summary of Average Daily Prices

Date	12X Ramp MCP	MIO MCP (INC.)	MIO HSP	MIO MHSP#1	MIO MHSP#2	MIO Modified Incremental (NEW)
Dec. 11/04	39.95	39.39	40.93	40.54	39.96	39.71
Dec. 12/04	55.68*	56.60	56.23	58.19	57.40	57.18
Dec. 13/04	57.22	58.55	58.95	59.87	59.21	59.37
Feb. 5/05	45.00*	47.90	51.61	49.19	48.58	48.46
Feb. 6/05	42.86*	43.09	45.36	43.91	43.50	43.79
Feb. 7/05	46.07	45.79	47.41	46.58	46.19	46.23
Mar. 11/05	72.16	72.18	73.46	72.93	72.56	72.39
Mar. 12/05	67.10*	66.27	66.86	66.61	66.44	66.30
Mar. 13/05	47.00*	46.43	48.11	47.37	46.90	46.96
Mar. 14/05	60.17	55.23	57.97	56.58	55.90	55.96
Mar. 15/05	54.66	52.79	54.16	53.67	53.23	53.48
Mar. 16/05	55.98*^	55.50	56.96	57.00	56.25	56.32

* Results were adjusted for large demand differences

^ Results were adjusted for tool problems

Percentage Change in Daily Prices Compared to the 12X Ramp MCP

Date	MIO MCP (INC.)	MIO HSP	MIO MHSP#1	MIO MHSP#2	MIO Modified Incremental (NEW)
Dec. 11/04	-1.4	2.44	1.48	0.02	-0.60%
Dec. 12/04	1.65	0.99	4.51	3.09	2.69%
Dec. 13/04	2.32	3.01	4.63	3.48	3.76%
Feb. 5/05	6.44	14.68	9.31	7.96	7.69%
Feb. 6/05	0.54	5.83	2.45	1.49	2.17%
Feb. 7/05	-0.61	2.91	1.12	0.25	0.35%
Mar. 11/05	0.03	1.8	1.07	0.55	0.32%
Mar. 12/05	-1.24	-0.36	-0.73	-0.98	-1.19%
Mar. 13/05	-1.21	2.36	0.79	-0.21	-0.09%
Mar. 14/05	-8.21	-3.66	-5.97	-7.1	-7.00%
Mar. 15/05	-3.42	-0.91	-1.81	-2.62	-2.16%
Mar. 16/05	-0.86	1.75	1.82	0.48	0.61%
Average All days	-0.5	2.57	1.57	0.53	0.55%
Average Excluding Feb.5/05	-1.13	1.47	0.85	-0.13	-0.10%

- **August MPWG meeting – Possible further discussion of MIO pricing options.**
- **September MPWG meeting – Polling of attendees on a recommended action plan for the temporal issues.**