Attachment VI

Benefits of Coordinating the Interchange Between New York and New England

Presented to:

Joint NYISO/ISO-NE Stakeholder
Technical Conference on Broader Regional Markets

David B. Patton, Ph.D.
Potomac Economics

January 21, 2011

POTOMAC ECONOMICS

Introduction

- This presentation summarizes our assessment of the benefits of initiatives to improve the efficiency of the interchange between New York and New England.
- Improved scheduling would more fully utilize the transmission interfaces between the markets and generate significant benefits.
  - ✓ The true efficiency benefits are best measured as reduced production costs.
  - ✓ Production costs are reduced as lower-cost resources in one market displace higher-cost resources in the adjacent market.
  - ✓ The result of this process is improved price convergence between the markets.
  - ✓ In most cases, the short-term consumer savings (resulting from the price-effects of improved scheduling) would be substantially higher than the production cost savings.
- Our previous assessments have consistently found that coordination would lead to significant reductions in production costs and consumer costs.
- This assessment expands the analysis to estimate the benefits of specific proposals for coordinating the interchange between New York and New England.

Updates to the Analysis of Improved Interchange

- Our previous simulations estimated the benefits that would result from optimal scheduling of the interfaces between the markets.
  - ✓ However, the portion of the benefits that are ultimately realized depends on the effectiveness of the market solutions that are implemented by the ISOs.
- The ISOs are currently evaluating the benefits of specific proposals that will improve, but will not perfectly optimize the interchange due to uncertainties.
- The results that are discussed in this presentation compare the benefits from optimal scheduling to the benefits that would result from two specific proposals:
  - ✓ <u>Tie Optimization</u> – The ISOs exchange information 15 minutes in advance and optimize the interchange based on a prediction of market conditions. The interchange would be adjusted every 15 minutes.
  - ✓ <u>Interface Bidding</u> – Identical to Tie Optimization, except the interchange schedule is only adjusted to the extent that market participants have submitted intra-hour interface bids priced below the predicted price difference between markets.

Modeling Specific Interchange Proposals

- To quantify the share of potential benefits that would be captured by each proposal, we performed the simulations using three sets of assumptions:
  - ✓ Ideal Interchange – Assumes the interchange is adjusted to the optimal level based on perfect information. The adjustment in interchange increased toward the higher-priced market until: (i) the interface is fully loaded, (ii) internal constraints prevent additional re-dispatch, or (iii) the adjustment reaches 500 MW.
  - ✓ Tie Optimization – Assumes the interchange is adjusted to the forecasted optimal level. The ISOs' forecast may differ from actual conditions, so the resulting interchange may not be optimal.
    - – For NYISO, we use the advisory price produced by the RTD that precedes the quarter hour RTD case.
    - – For ISO-NE, we use its hour-ahead forecast. The forecast errors are larger than the errors in New York understandably. We reduce the errors by 50 percent to account for the expected increase in accuracy when the timeframe is shortened.
  - ✓ Interface Bidding – Same as Tie Optimization, except an assumed interface "bid stack" limits re-dispatch when the marginal bid the forecasted price difference.
- Comparing the results of these simulations allows us to evaluate the efficiency of specific proposals compared to ideal interchange scheduling.

Discussion of Assumptions Used in Simulations

- Use of Interval Data – In past analyses (e.g., in Annual Reports), we estimated the optimal interchange using historic hourly-integrated real-time data, while these simulations use real-time data at the interval level.
  - ✓ The use of hourly data resulted in conservative estimates by assumed one interchange value for the hour -- it is usually efficient to adjust the interchange throughout the hour.
  - ✓ This analysis allows adjustments each 15 minutes.
- 500 MW Limit on Adjustments – The latest simulations impose a 500 MW limit on the size of the adjustment in the interchange in any interval (past simulations had no limit).
  - ✓ The simulation model does not "see" internal transmission constraints that would bind due to the interchange adjustment, so this limit reduces tendency to over-estimate potential re-dispatch.
- Consumer Savings – These are calculated as the change in real-time prices times the load affected by the price change.
  - ✓ The load affected is limited by congestion (e.g., binding constraints into SE New York limit the downstate consumer savings).
- Negative-LBMP Intervals – We exclude intervals when the New York border price is negative, since these are likely to become far less prevalent after (i) the HQ interface is scheduled on a 5-minute basis and (ii) the regulation demand curve is modified.

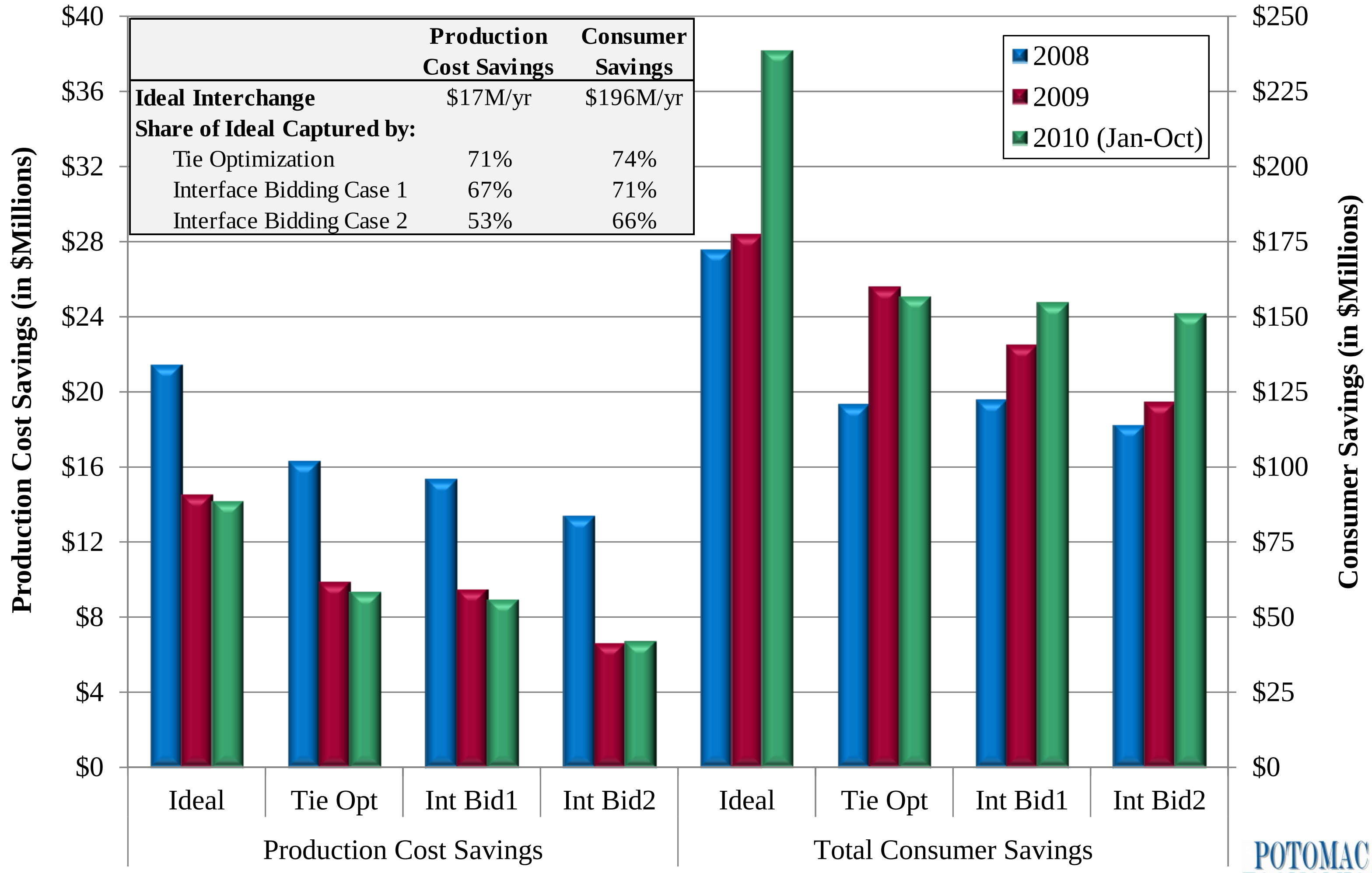
Discussion of Assumptions Used in Simulations

- Top of the Hour: Our simulations exclude intervals at the top of each hour.
  - ✓ These intervals are frequently affected by ramp constraints and other conditions that lead to transient price spikes that our simulations are not designed to model accurately.
  - ✓ Hence, we conservatively estimate zero benefits from these intervals, although it is likely that the interchange would be improved in these intervals.
- Congestion Assumptions: The simplified network model used in our simulations is based on active constraints, and assumes no re-dispatch after the interchange adjustments.
  - ✓ This is conservative because redispatch may occur that would produce additional savings that we do not capture.
  - ✓ For example, the scope of the consumer savings could be broader than we estimate if optimal redispatch would reduce or eliminate congestion on active constraints.
- Interface Bidding assumption: We assumed a interface bid stack beginning at zero and rising linearly up to $10 at 500 MW in the first case, and rising linearly to $40 at 500 MW in the second case.

Production Cost Savings and Consumer Savings

- The following figures show the estimated production cost savings and consumer savings for each of the cases that we analyzed.
- The average production cost savings was roughly $18 million per year, although this is likely conservative as a long-run expectation because:
  - ✓ One quarter of the hour is not included;
  - ✓ The supply and demand conditions in both areas were not as tight as they are likely to be in the long run and shortages were relatively infrequent; and
  - ✓ Fuel prices were relatively lower for much of this period.
- The results show that roughly 70 percent of the efficiency benefits are captured by tie optimization and only slightly less by the lower priced interface bids.
  - ✓ The higher-priced interface bids degrades the benefits to 54 percent of the ideal case.
- The figure also shows that consumer savings in the ideal case average almost $200 million per year, which is conservative for the same reasons as listed above.
  - ✓ Nearly three-quarters of the savings are captured by tie optimization, which falls only slightly to 71 percent with low-priced interface bids.
- The second figure shows that the consumer savings accrue to both areas, although the relative savings has shifted year-to-year as congestion patterns and supply conditions have changed.

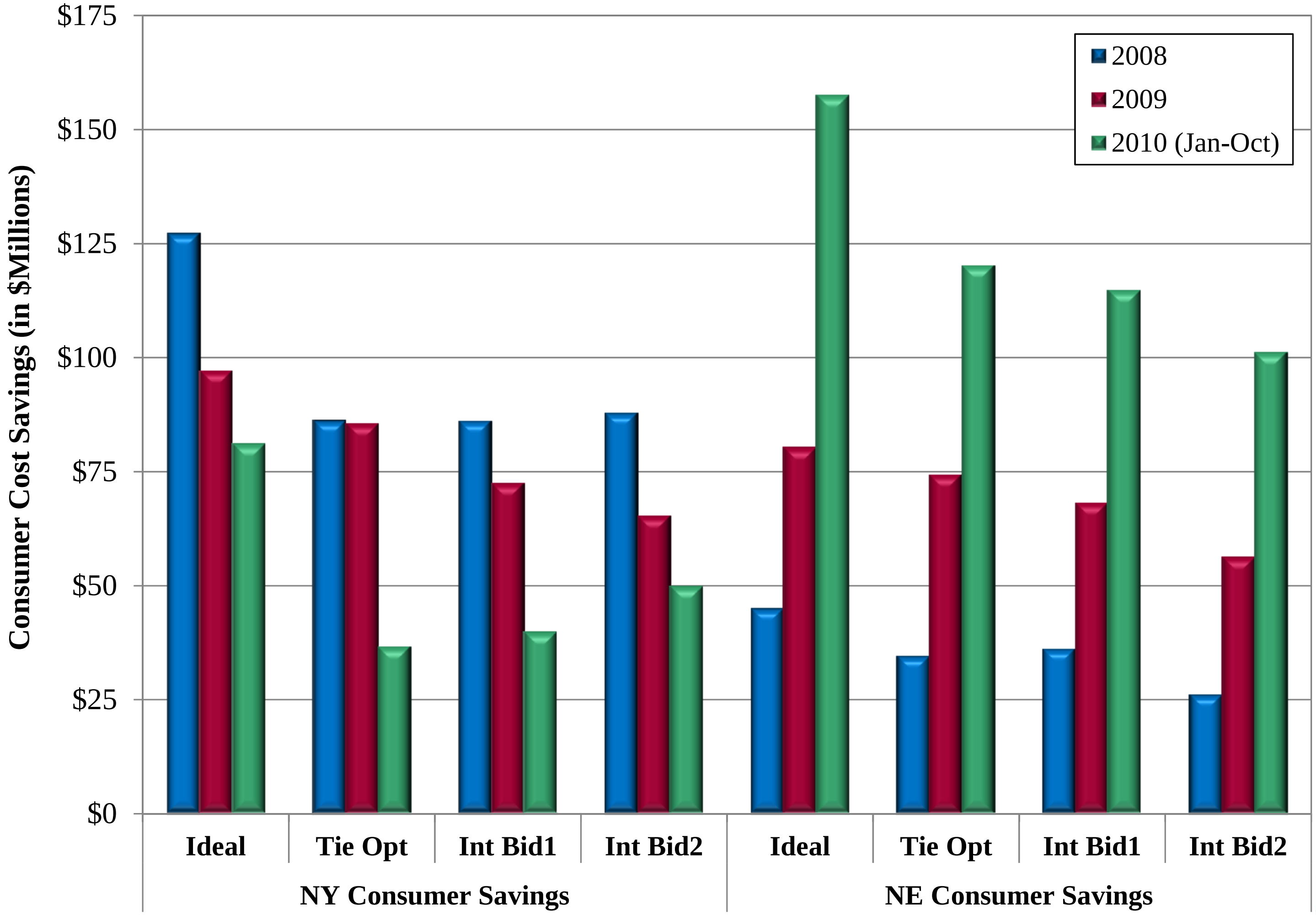
Production Cost Savings and Consumer Savings



	Production Cost Savings	Consumer Savings
Ideal Interchange	$17M/yr	$196M/yr
Share of Ideal Captured by:		
Tie Optimization	71%	74%
Interface Bidding Case 1	67%	71%
Interface Bidding Case 2	53%	66%

POTOMAC ECONOMICS

Production Cost Savings and Consumer Savings



POTOMAC ECONOMICS

Other Simulation Results

- The following table provides some additional detail regarding the results of the simulation.
- It shows that in each year, the adjustments occur relatively evenly in both directions, which contributes to consumer savings in both areas each year.

	Ideal Interchange				Tie Opt	Int Bid 1	Int Bid 2
	2008	2009	2010	2008-10	2008-10	2008-10	2008-10
Flow Adjusted Into NY (% of intervals)	42%	46%	44%	44%	43%	43%	43%
Flow Adjusted Into NE (% of intervals)	41%	44%	45%	43%	42%	42%	42%
When Flow Adjusted Into NY:							
Avg. Adjustment (MW)	266	259	265	264	262	186	101
Avg. System LBMP Change in NY ($/MWh)	-$10.63	-$7.19	-$7.07	-$8.30	-$8.24	-$7.11	-$5.64
Avg. System LMP Change in NE ($/MWh)	$7.00	$2.96	$3.39	$4.45	$4.84	$3.95	$2.75
When Flow Adjusted Into NE:							
Avg. Adjusted Interchange (MW)	-226	-220	-237	-228	-210	-153	-89
Avg. System LBMP Change in NY ($/MWh)	$7.96	$4.36	$4.83	$5.72	$6.73	$5.62	$4.14
Avg. System LMP Change in NE ($/MWh)	-$8.21	-$4.93	-$7.43	-$6.86	-$6.88	-$5.87	-$4.39

POTOMAC ECONOMICS

Conclusions and Recommendations

- These results show sizable efficiency and consumer savings in all cases analyzed, which supports the ISOs' initiative to pursue improved interface scheduling.
  - ✓ For the reasons we have discussed, these savings are likely to be conservative and would be larger under tighter supply/demand conditions over the long-run.
  - ✓ These savings are larger than the potential savings available from most other initiatives and should, therefore, be a relatively high priority.
- While tie optimization is superior to interface bidding, the benefits are very similar if participants submit relatively low-cost interface bids.
- Questions?

POTOMAC ECONOMICS