Dynamic Pricing: Potential Wholesale Market Benefits

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MIWG
October 26, 2009

Draft –for Discussion Purposes Only

Background

- Retail rate design is on the forefront of energy policy discussions:
  - *Many states are re-evaluating retail rates in ways to promote market, conservation and environmental mandates*
  - *The FERC is evaluating the ability of dynamic pricing to increase efficiency in electric power system*
- In New York mandatory hourly pricing for many large and medium commercial customers, and NYSPSC is exploring the potential for expansion to smaller customers
- FERC National Demand Response Assessment report:
  - *"A conclusion of this Assessment is that at the national level the largest gains in demand response impacts can be made through dynamic pricing programs when they are offered as the default tariff, particularly when they are offered with enabling technologies."*
- NYISO Market Advisor's 2008 State of the Market Report:
  - *"[T]he fact that most retail loads pay prices that are unaffected by the short-term fluctuations in wholesale prices serves as a barrier to demand response because it removes the incentive for the loads to respond."*

NYISO Study

- Purpose
  - *Estimate the wholesale market impacts of expanded dynamic pricing*
  - *No recommendation for particular rate design*
- Approach
  - *Wholesale market simulation using proxy demand elasticities for New York under multiple scenarios*
    - Conservation case
    - High capacity price
    - High demand elasticity

Simulation Design

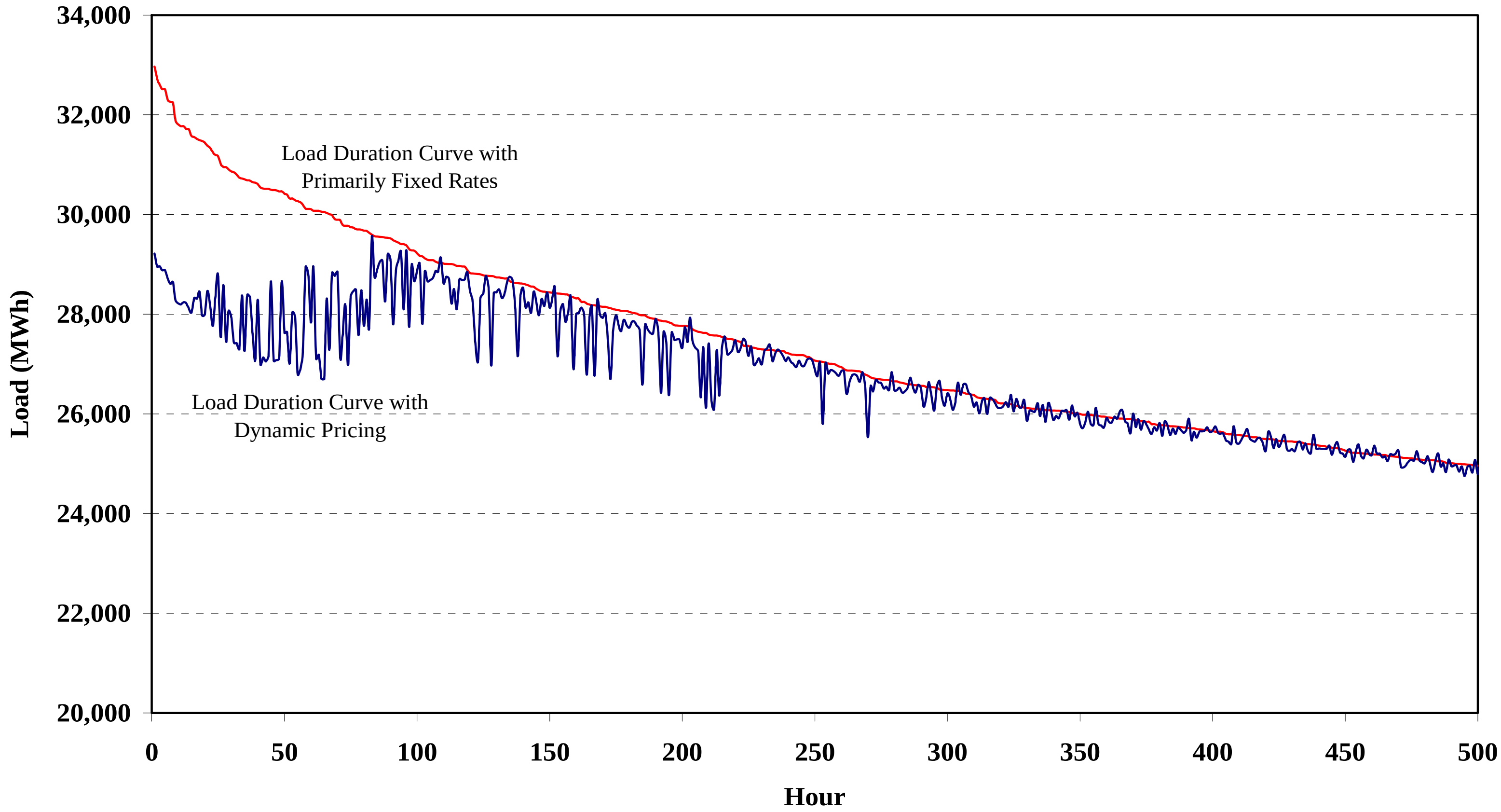
- Define fixed and dynamic rates
  - *Consistent with 2010 forecast of market conditions*
  - *Dynamic rates based on LBMPs w/ capacity cost during critical hours*
  - *Dynamic rate structured so that average customer's cost would be unchanged from fixed rate if demand remained unchanged*
  - *Analysis uses representative customers in four regions: West (A-E), East (F-I), NYC (J) and Long Island (K)*
- Estimate the effects of dynamic pricing on consumer demand
  - *Elasticities of demand derived from dynamic pricing pilot programs with small customers and full scale deployments for large customers*
  - *Used Brattle's PRISM software to apply elasticities of demand to calculate hourly differences between fixed and dynamic rates*
- Quantify changes in demand on LBMPs using dispatch simulation
  - *Conservative assumption that suppliers' bids to supply energy remain the same despite price-responsive demand*
- Did not evaluate long-term savings or long-term equilibrium prices

Simulation Results

- Demand reduction
  - *System peak demand reduction of 10 to 14 percent*
  - *Annual energy consumption increase in most cases due to lower prices during the majority of hours; but decreases in Conservation case due to affect of in-home displays*
- Cost reduction
  - *Total resource cost reduction of 3 to 6 percent ($143 to $509 mm) for the year*
  - *Market-based customer cost reduction of 2 to 5 percent ($171 to $579 mm) per year, excluding AMI deployment costs*
- Social welfare improvement
  - *Consumer surplus increase of $162 to $572 mm per year*
  - *Total social surplus increase of $141 to $403 mm per year*

Simulation Results

Impact of Dynamic Pricing on Hourly Loads



Simulation Results

Effects of Dynamic Pricing on Peak and Average Demand

Dynamic Pricing Scenario	Change in System Peak		Change in New York City Peak		Change in Long Island Peak		Change in Average Load			
	All Hours		*All Hours*		*All Hours*		*All Hours*		*150 Hours w/Max Δ Load*	
	(MW)	**(%)**	**(MW)**	**(%)**	**(MW)**	**(%)**	**(MW)**	**(%)**	**(MW)**	**(%)**
Base Case	(3,418)	(10%)	(1,514)	(13%)	(590)	(11%)	84	0.4%	(1,897)	(6%)
Conservation	(3,751)	(11%)	(1,514)	(13%)	(604)	(11%)	(288)	(1.5%)	(2,158)	(7%)
High Capacity Price	(4,282)	(13%)	(1,671)	(14%)	(776)	(14%)	176	1.0%	(3,147)	(11%)
High Elasticity	(4,603)	(14%)	(1,961)	(16%)	(779)	(14%)	130	0.7%	(3,606)	(12%)

Change in Annual Resource Costs

Dynamic Pricing Scenario	Change in Energy Production Cost		Change in Capacity Cost		Total Change in Resource Cost	
	(Million $)	**(%)**	**(Million $)**	**(%)**	**(Million $)**	**(%)**
Base Case	10.6	0.3%	(153.6)	(11%)	(143.0)	(2.6%)
Conservation	(188.2)	(4.5%)	(163.3)	(12%)	(351.5)	(6.3%)
High Capacity Price	60.3	1.4%	(569.0)	(13%)	(508.8)	(6.0%)
High Elasticity	22.5	0.5%	(204.1)	(15%)	(181.6)	(3.3%)

Simulation Results

Change in Annual Market-Based Customer Costs

Dynamic Pricing Scenario	**Change in Market Based Energy Costs**		**Change in Capacity Costs**		**Total Change in Market Based Customer Costs**	
	All Hours		***All Hours***		***All Hours***	
	(Million $)	**(%)**	**(Million $)**	**(%)**	**(Million $)**	**(%)**
Base Case	(17.8)	(0.2%)	(153.6)	(11%)	(171.3)	(1.6%)
Conservation	(415.6)	(4.3%)	(163.3)	(12%)	(578.9)	(5.2%)
High Capacity Price	62.1	0.6%	(569.0)	(13%)	(507.0)	(3.6%)
High Elasticity	(4.5)	(0.0%)	(204.1)	(15%)	(208.6)	(1.9%)

Conclusion

- Dynamic Pricing could provide significant benefit to New York consumers:
  - *Market-based cost savings in the range of $171 million to $579 million for the year*
- A key to achieving full benefits is enabling technology, such as in-home displays
- A more accurate and complete evaluation of the benefits from expanding dynamic pricing in New York would require pilot studies or other customer research
- NYISO is willing work with its market participants, regulators and other stakeholders to explore the benefits and costs of dynamic pricing

The New York Independent System Operator (NYISO) is a not-for-profit corporation that began operations in 1999. The NYISO operates New York's bulk electricity grid, administers the state's wholesale electricity markets, and provides comprehensive reliability planning for the state's bulk electricity system.

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