



Demand Response as a Resource: Can Power Markets be Efficient & Competitive with One Hand Clapping?

ELCON Demand Response Workshop

June 13, 2007



Overview

- Ohio Overview
- Electric Restructuring in Ohio: Background & What's Next?
- Role of Demand Response
- Can We Have Efficient Markets without Demand Response?
- Questions



Standard Caveats

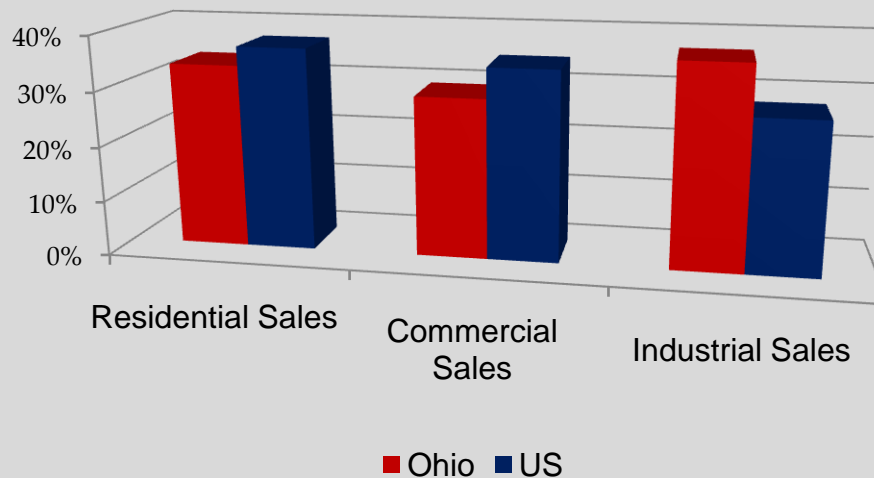
- Views are My Own
- Policy, Not Pending Cases
- Limitations & Luxury of Being a New Commissioner



Ohio Overview

- Annual Energy Sales: Over 160,000 GWH
 - Industrial Energy Users: 37% of Sales
- 4 Utilities: 7 Operating Companies
 - AEP: Ohio Power & Columbus Southern Power
 - FirstEnergy: Ohio Edison, Cleveland Electric, Toledo Electric
 - Duke: Duke Energy Ohio
 - Dayton Power & Light
- 2 RTOs
 - MISO: FirstEnergy & Duke
 - PJM: AEP & DP&L

GWH Sales by Sector





Electric Restructuring in Ohio

- Restructuring Legislation: SB 3 (1999)
 - Declared Generation to be a Competitive Service
 - Authorized Commission to Declare Additional Services Competitive
 - Set Initial Market Development Period 2001 – 2005
 - Transition Cost Recovery to be Completed No Later than 2010
 - Required Corporate Separation Plans
 - Only FirstEnergy Has Moved Generation to Wholesale Affiliate
 - EDUs Required to Provide Market-based Standard Offer Service and Competitive Bidding Option
 - Commission Given Rulemaking Authority to Implement Broadly Stated Policy Objectives



Electric Restructuring in Ohio

- Retail Competition
 - Retail Choice for Smaller Customers Not Successful
 - Larger Customers Continue to Procure Energy Competitively
- Negotiated Rate Stabilization Plans
 - General Assembly (Oct. 2003): “continue to take the necessary steps ... to ensure that a healthy competitive market is in place before full electric competition begins.”
 - Protected Consumers from Sticker Shock and Improved Earnings Stability for Utilities
 - Negotiated against Backdrop of Immature Markets



Rate Stabilization Plans: AEP

- Three-year rate stabilization period: Jan. 1, 2006 – Dec. 31, 2008
- Generation rates for all customer classes will increase by
 - 3 percent each year (2006, 2007, and 2008) for Columbus Southern Power
 - 7 percent for Ohio Power customers
 - Customers choosing a competitive electric supplier during the RSP can avoid increases
- Distribution rates are frozen through 2008
- AEP provides \$14 million for economic development and to assist low-income customers
- Monongahela Power's service territory to AEP (Columbus Southern Power) on Nov. 9, 2005



Rate Stabilization Plans: Duke Energy Ohio

- Three-year rate stabilization period: Jan. 1, 2006 – Dec. 31, 2008
- Generation rates change quarterly for recovery of fuel and environmental compliance costs
 - Some of increases can be avoided by the first 25 percent of residential customers who shop for a competitive electric supplier



Rate Stabilization Plans: FirstEnergy

- Three-year rate stabilization period: Jan. 1, 2006 – Dec. 31, 2008
- The PUCO rejected the results of an auction, finding that the RSP provided lower electricity rates.
- FirstEnergy provided additional funding for economic development programs
- Additional settlement addressed:
 - Recovery of additional fuel and distribution-related costs
 - Funding for demand side management programs



Rate Stabilization Plans: DP&L

- Five-year rate stabilization period: Jan. 1, 2006 – Dec. 31, 2010
 - If market prices fall during the RSP, the PUCO can terminate the plan in order to provide market-based rates to customers
- Generation rate increases are capped at 11 percent over the five-year RSP
 - Residential customers will receive a 7.5 percent generation discount from 2006-2008.
- Distribution rates are frozen through 2008
- DP&L financial support of the voluntary enrollment procedure, designed to enroll residential customers with competitive suppliers, extends through 2007



Ohio Energy Policy

- Executive Order No. 2:
 - Appointed Energy Advisor
 - Required Coordination at Deputy Director Level or above among >20 State Agencies and Boards with Energy Related Programs
 - Mandated 5% Reduction in State Energy Use in 1st Year, 15% over 4 years



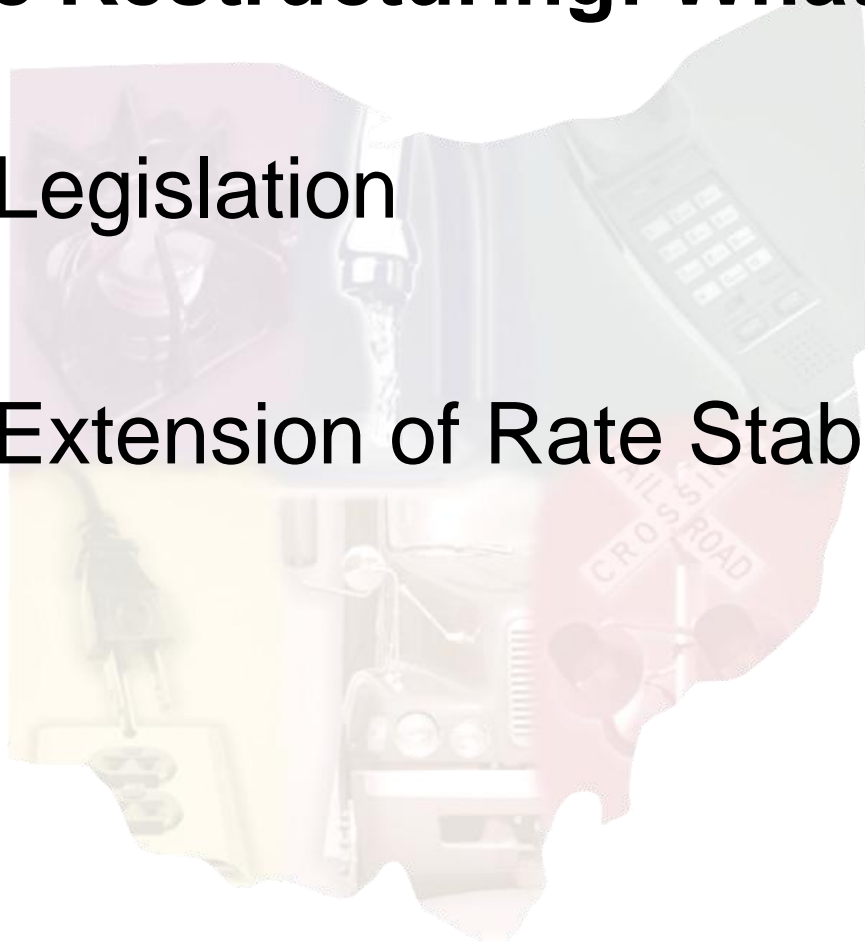
Electric Restructuring: What's Next

- Governor Strickland (5/1/2007): “Competitive markets simply have not developed. And lower electric rates were probably not a realistic expectation. ... However, we cannot go back to the ‘good old days’ – of cost-of-service regulation – we cannot put the Genie back in the bottle.”
- Governor’s Principles: New Energy Compact
 - Foundation of Transparency & Accountability
 - Give Customers Equal Footing with Utilities
 - Prioritize Energy Efficiency: Give customers the tools they need to exercise greater responsibility for their individual energy footprints
 - Stimulate renewable energy consumption & attract advanced energy investment
 - Modernize Ohio’s electric infrastructure
 - Integrate environmental considerations as a guiding concern



Electric Restructuring: What's Next

- Potential Legislation
- Potential Extension of Rate Stabilization Plans





Key Challenges

- End of Rate Stabilization Plans
- Investment Climate: Reducing Business Risk for Business and Utilities
- Climate Change Mitigation
- Infrastructure Modernization



Value of Demand Response

- Modeling of Competitive Market Structures for New York (Jan. 1997):
 - Demand Response Sensitivity Case:
 - Estimated Response Based on Data from RTP Pilots in US & EU
 - Assumed 17% of Load Could Respond
 - Modeled 1 Year Impact for 2011
 - Effect of Demand Response:
 - Peak Demand declined 3.2% (975 MW)
 - Energy Use declined 0.7%
 - Average Spot Prices Declined:
 - 4.9% Long Island
 - 4.5% New York City
 - 3.2% Buffalo
 - Compared to Building New Capacity Costs Reduced: \$1.1 Billion



Promise of Demand Response

- Demand Response Potential to Reduce Costs Well Documented**

Study	Centolella & Parmelee (1997)	ICF (2002)	Faruqui & George (2002)	DOE (2003)	Borenstein (2005)	Neenan et al. (2005)	NPCC (2005)	Violette et al. (2006)
Scope	New York	U.S.	Midwest Utility	U.S.	California	New England	Northwest States	Subset of MAAC
Horizon	13 yr. (1999)	17 yr. (2004)	20 Yr. (2002)	1 Yr. (2003)	Equilibrium	5 yr. (2006)	20 Yr. (2006)	20 yr. (2004)
Participation	17% of Load	50% all customers	100% of Residential	4.5% of Load	33% of Load	2% of Load	6% of Peak Demand	15% of Load
Gross Benefit (Million \$)	\$1,148	\$52,236	\$1,000	\$362 / yr.	\$ 302 / yr.	\$350	\$718	\$1,476

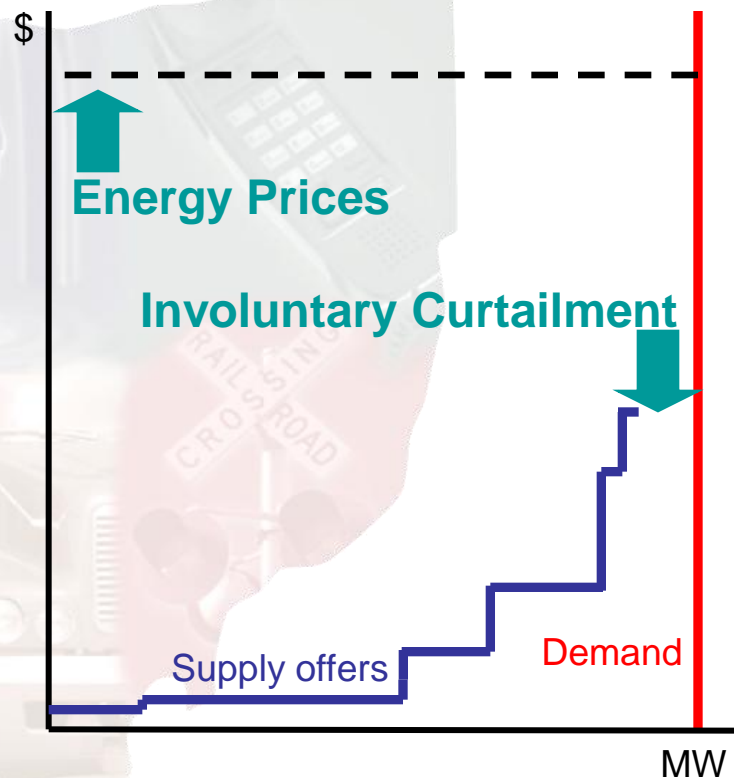
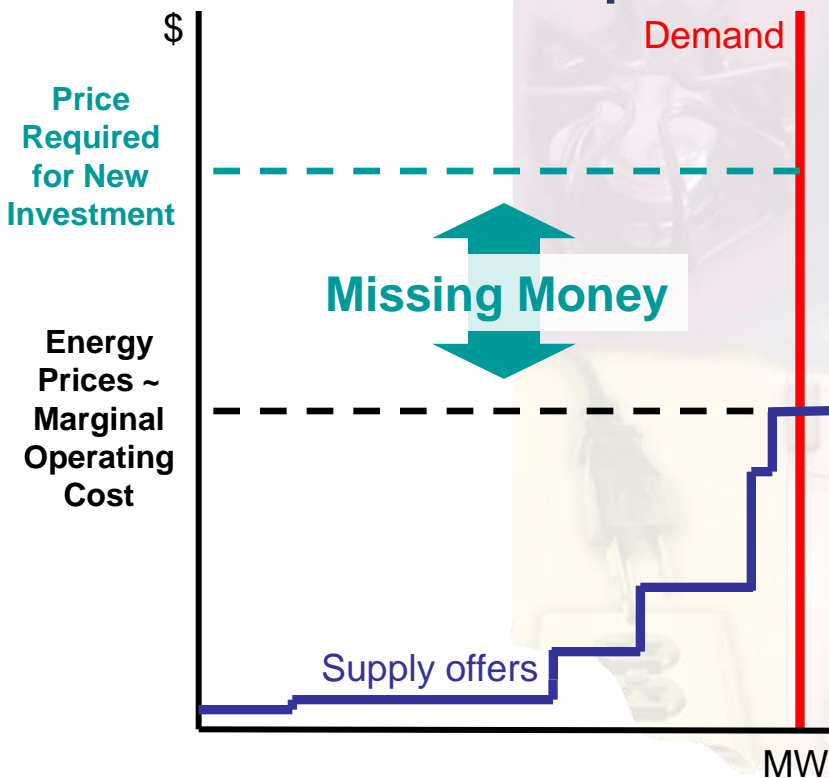
- Targeted Demand Response Can Defer Transmission & Distribution Investment**
- With Intelligent Semi-Autonomous Controls, Direct Control, & 2-Way Communication, Could Provide Most Ancillary Services**



Volatility Without Demand Response

- When Surplus, Prices Insufficient to Support Resource Development

- Shortages Raise Prices & Require Involuntary Curtailment

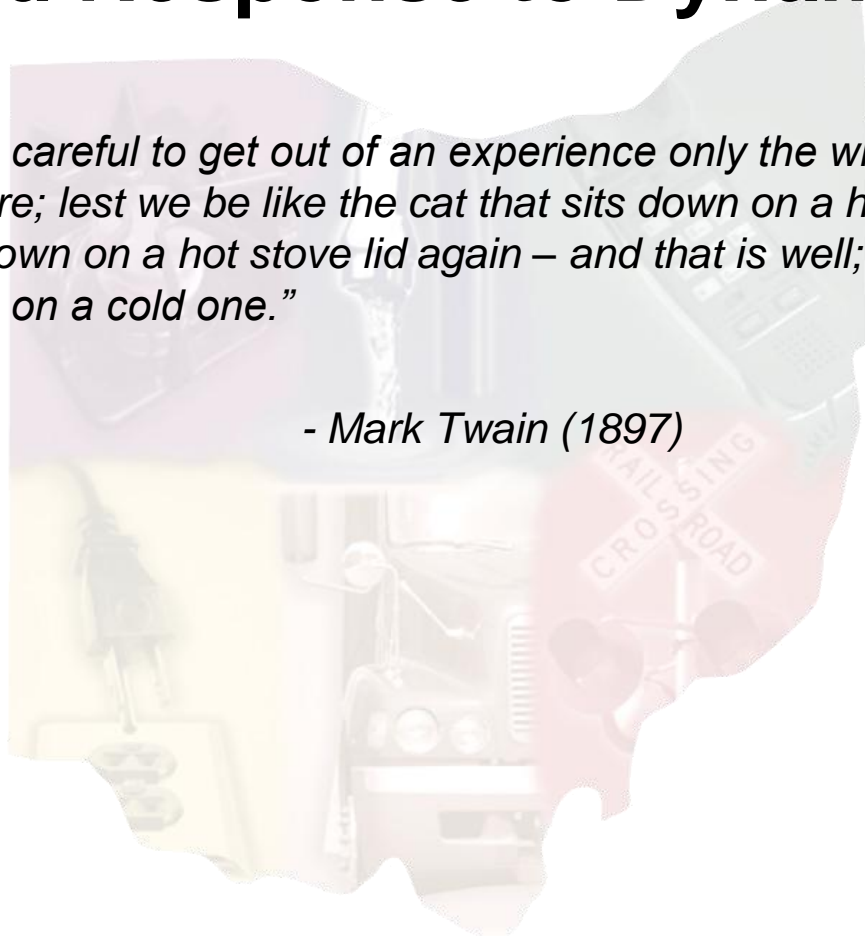




A Learned Response to Dynamic Prices

"We should be careful to get out of an experience only the wisdom that is in it – and stop there; lest we be like the cat that sits down on a hot stove lid. She will never sit down on a hot stove lid again – and that is well; but also she will never sit down on a cold one."

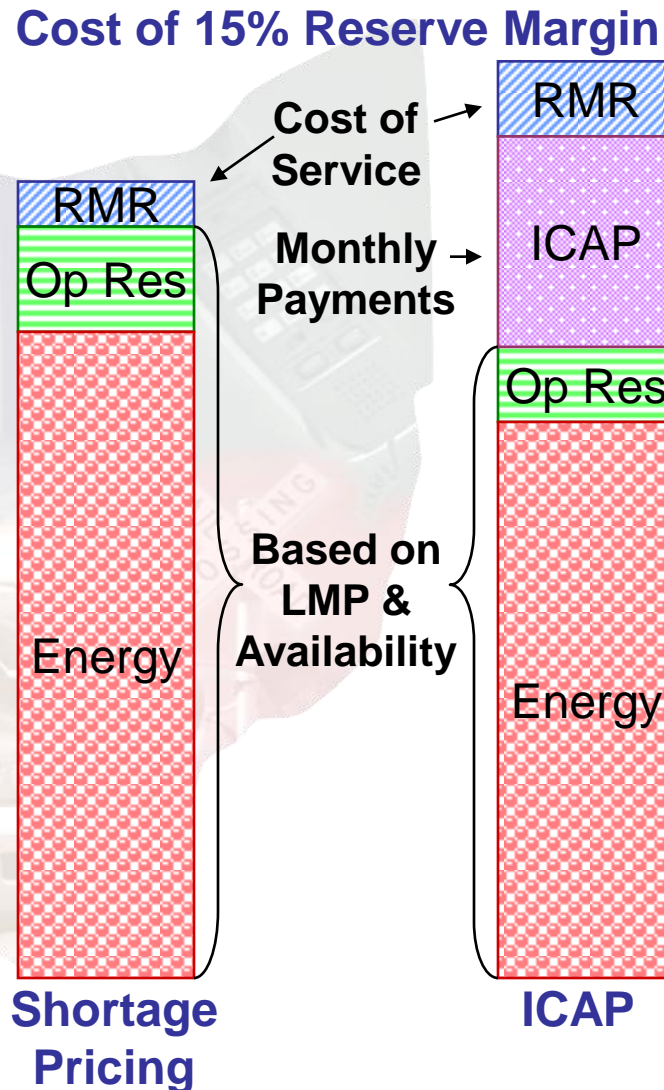
- Mark Twain (1897)





Installed Capacity Market vs. Demand Response + Shortage Prices

- **Both Can Achieve Any Given Level of Reserves**
- **Shortage Prices in Energy Market**
 - Expands Range of Demand Response
 - Improves Generator Availability
 - Avoids Uneconomic Transmission Congestion
 - Enhances Price Signals for Investment
- **ICAP Approach Can Have Higher Total Costs**
- **ICAP Requirements Limit Opportunity for Choice**
 - Given Shortage Pricing & DR, Consumers Can Decide How Much to Hedge in Forward Contracts

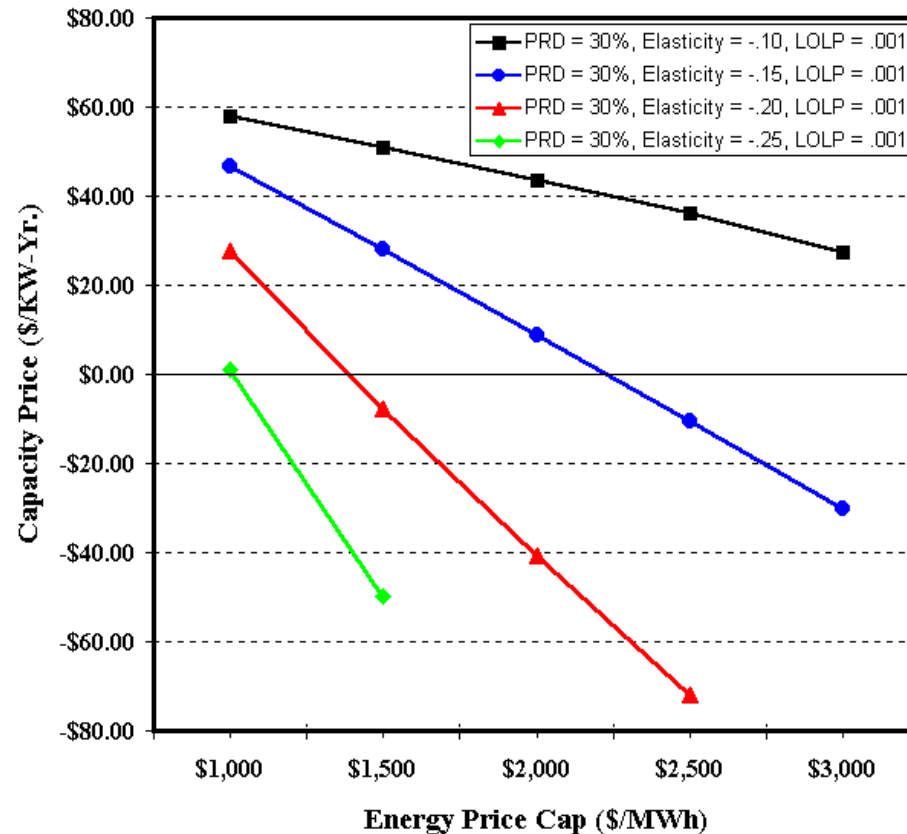




Demand Response Impact: More Efficiently Mitigating Volatility

- Greater Demand Response
 - Increases the Likely Hours of Economic Operation of New Resources
 - Mitigates Load and Price Uncertainty
- With ICAP, Demand Response Reduces Capacity Payments Needed to Attract Investment

Capacity Prices Required To Attract New CTs



Source: Borlick (2003)



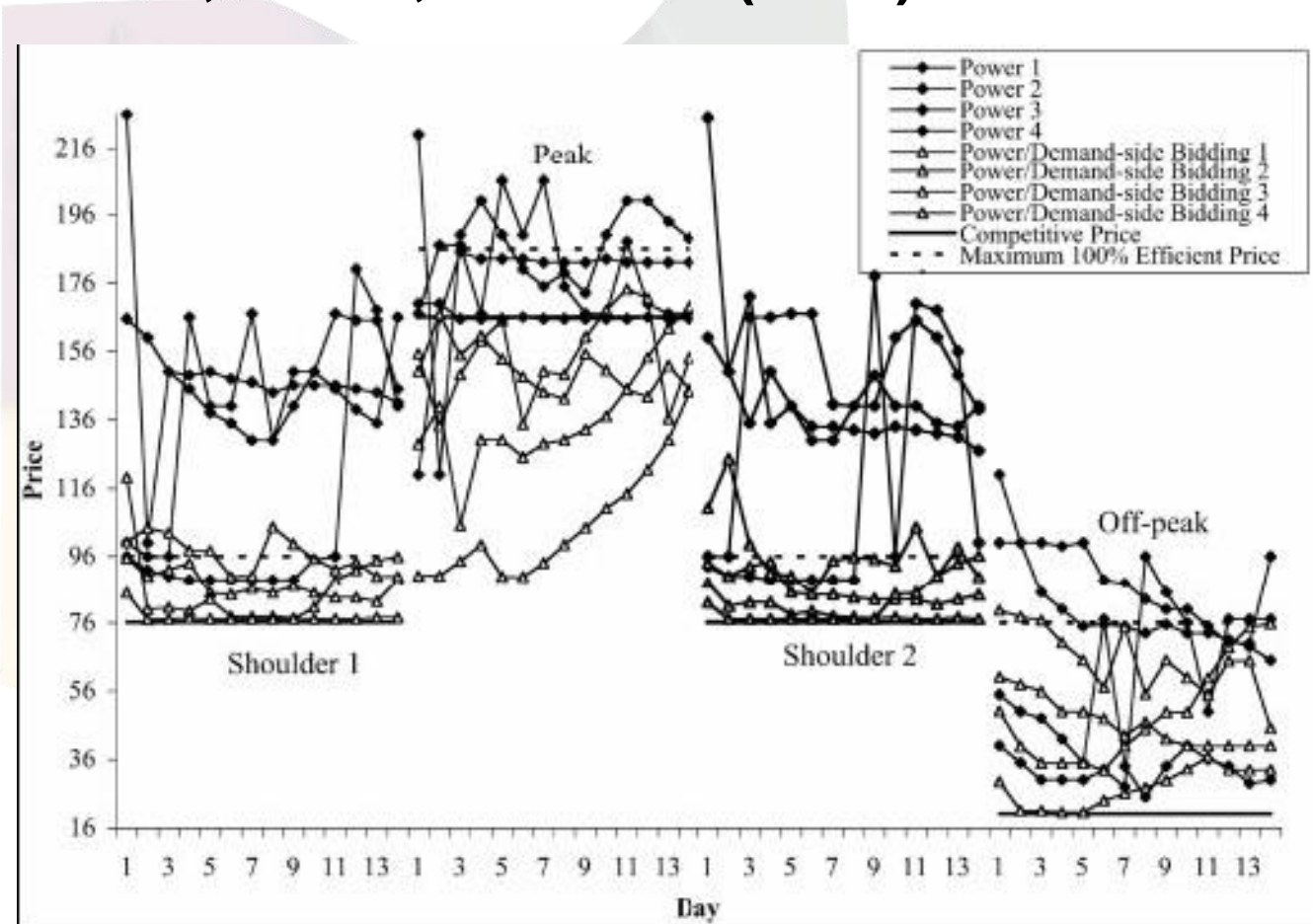
Demand Response Impact: Mitigation of Market Power

- Increasing Price Elasticity Reduces the Return to Suppliers from Exercise of Market Power
 - Cannot increase prices where good substitutes for a product
 - Borenstein & Bushnell (1997): Increasing elasticity from 0.1 to 0.4 in California market could reduce potential (Cournot) mark-up above competitive prices by 40% to 90%.
- Capacity of Demand to Respond Neutralizes Market Power in Experimental Studies
 - Potential Response limits Strategic Behavior
 - Rassenti, Smith, & Wilson (2003): Demand Bidding results in “prices are consistently within the 100% efficient-outcome range” and “eliminates price spikes.”



Experimental Economics: Rassenti, Smith, & Wilson (2003)

“Demand-side bidding almost completely counteracts the power treatment. Prices are consistently within the 100% efficient outcome range.
Furthermore, the time series of prices with demand-side bidding markedly lacks the volatility of the sessions without demand-side bidding.”





Key Challenges & Demand Response

- End of Rate Stabilization Plans – Demand Response:
 - Enhances Consumer Choice
 - Helps Move Gas Off the Margin
 - Transitions from Capacity Markets
 - Checks Market Power
 - Influences Forward Price Expectations
- Reducing Business Risk for Business and Utilities – Demand Response:
 - Reduces Price Volatility
- Climate Change Mitigation – Demand Response:
 - Reduces Cross-Temporal Subsidies
 - Bridges to New Technology
- Infrastructure Modernization – Demand Response:
 - Provides Transactional Controls
 - Platform for Smart Grid



Demand Response Chasm

• Current Environment

- Limited Demand Response
- Generator Market Power Concerns
- High Price Volatility if Supply Tightens
- Involuntary Curtailments in Shortages
- *Higher Total Costs*



• Higher Demand Response Future

- At least Modest Participation
- Market Power Mitigated
- Reduced Price Volatility
- Consumer Choice on Forward Contracting & Interruption Price
- *Lower Total Cost*



Demand Response: Ohio Status

- Duke
 - RTP: 30 Customers (550 MW of Load)
 - Peak Load Management Program: 2 Customers (1.8 MW of Load)
- FirstEnergy
 - Interruptible Load: ~70 Customers Up to 600 MW (Up to 480MW Emergency Reduction)
 - AC DLC Program for 2007: 50,000 switches / 60MW
- AEP
 - Interruptible Load: 313 MW
 - Small Customer TOU rates
- DPL
 - Customer in PJM DR program 3.5 MW



Demand Response: Ohio Next Steps

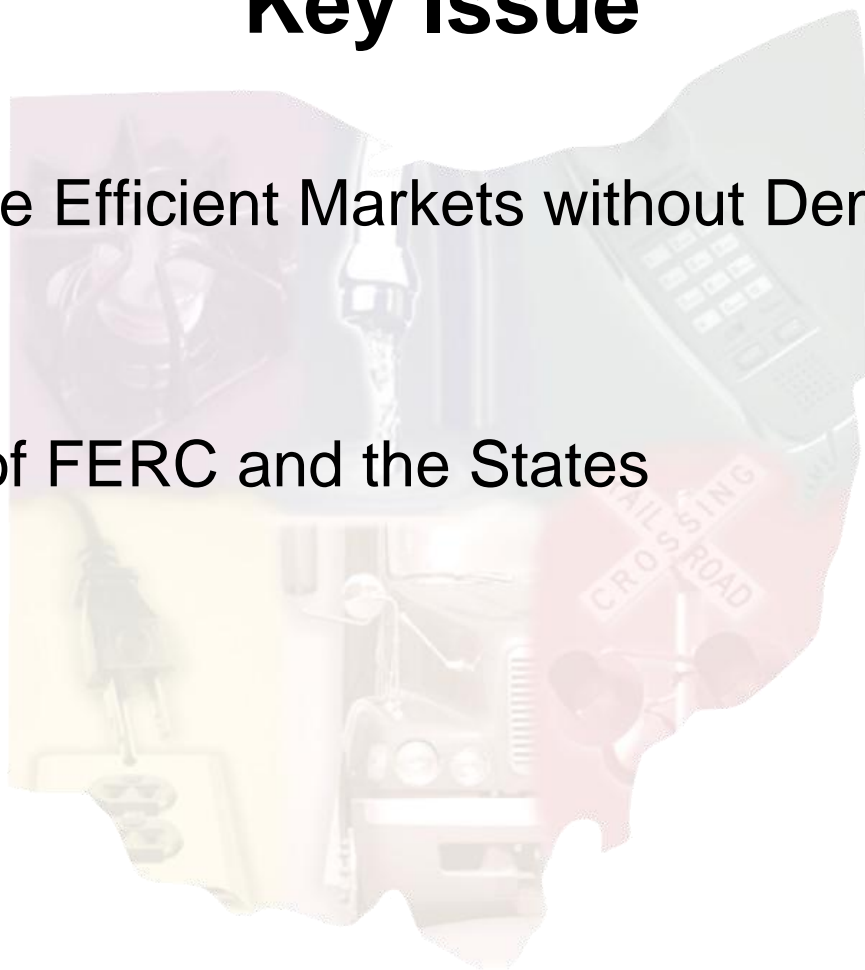
- AMI: Technical Conferences
- Post-Stabilization Plans





Key Issue

- Can We Have Efficient Markets without Demand Response?
- Obligations of FERC and the States





Questions





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