Integrating Demand Response and Energy Efficiency: Options and Issues

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FERC View of Market Intervention

• Wholesale electricity markets do not automatically structure themselves with fair behavioral rules, provide a level playing field for market participants, effectively monitor themselves, check the influence of market power, mitigate prices that are unlawful, or fix themselves when broken.

EE Advocate Views: Market Design

• System planning, not just *transmission* planning
• Effective regional planning and coordination
• EE included as a demand response resource
• Comparable, meaningful opportunities for EE in:
  – Regional system expansion planning and investment
  – Relief of persistent congestion
  – Resource adequacy
  – Distribution system expansion
• Regional funding for demand resources
• *All of these have not been realized*

Demand Response Resources

A broad definition of demand response:

• Shorter-term demand response (load management and curtailment) including economic and price responsive load programs (e.g., ISO load response)
• Pricing and metering
• Energy efficiency load reductions as longer-term demand response
• All aspects of markets (energy, capacity, ancillary services, contingency, etc.)
Evolving Concepts of Demand Response

- Shorter-term (LM) and longer-term (EE)
- Event driven vs. investment driven
- Response to call/emergency or response to price
- Geographically targeted vs broadcast
- Demand only vs. on-site generation

- Deployable: energy efficiency, building codes and equipment standards
- Dispatchable: in response to an ISO call (emergency or reliability programs)
- Scheduled: load bidding into day-ahead markets

Example: Two Scenarios

- Illustrative only – other scenarios possible
- Existing large commercial office building
- Albany, NY (8760 hr load shape data)
- Peak load and load shape on summer day
  1. Energy efficiency measures for lighting and cooling that reduced load by 20%
  2. Load management (STDR) as 4 hour curtailment load reduction of 15% by reducing lighting and HVAC load (no BUG)
Energy Efficiency Compared to Load Management (4 hr curtailment)

Combined Commercial Cooling and Lighting Loadshape
Baseline, Load Management (STDR), and Energy Efficiency

Watts per Square Foot

Hour

0.00 0.50 1.00 1.50 2.00 2.50 3.00 3.50 4.00 4.50
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

Load Management
Baseline
Efficient

Opportunity: Integrating Energy Efficiency & STDR/Load Response

Combined Commercial Cooling and Lighting Loadshape with Efficiency and Load Management (Four-Hour Curtailment by 15%)

Watts per Square Foot

Hour

0.00 0.50 1.00 1.50 2.00 2.50 3.00 3.50 4.00 4.50
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

Baseline
Efficient and Load Mng
Efficient
New England Demand Response Initiative (NEDRI)

- **Goal**: Increase demand response to balance markets
- **Objective**: Devise an effective long-term strategy for demand responsiveness, including shorter-term load response and longer-term energy efficiency investments
- **Depth**: Propose coordinated policies and programs for wholesale, wires, and retail
- **Facilitated stakeholder process**:
  - About 40 participants: ISO-NE, 6 state PUCs, state air regulators, DOE, EPA, market participants, and advocates
- **Sponsors**: ISO-NE, DOE, EPA, FERC, and NECPUC

NEDRI EE Recommendations

- System Benefit Charge (SBC) Funds and Ratepayer Support for Energy Efficiency
- Principles for Effective Energy Efficiency Programs and Portfolios
- Minimum Energy Efficiency Standards for Appliances and Equipment
- Building Energy Codes
- Enhanced Regional Coordination for Demand Side Resources
- Complementary and Integrated Options for Energy Efficiency and Shorter Term Demand Response
- Comparable or Equal Treatment for Energy Efficiency in Power Delivery Systems (as one of several demand response resources)
Complementary and Integrated Approaches: EE and STDR

- Integrate shorter-term DR and EE programs into complementary offerings
  - Fully utilize DR enabling technologies for both EE and shorter-term DR
  - Promote effective facility O&M
  - Comprehensive and coordinated marketing programs and information
  - Coordinated program management and delivery

Fully Utilize Technologies and O&M

- STDR technologies that assist in energy efficiency (metering, analysis, control, communication, education)
- EE technologies that enable or assist in STDR, for example:
  - EMS and controls
  - Dimmable lighting systems
  - Smart chips in efficient appliances/equipment
- Efficient and effective O&M
Comprehensive, Coherent Marketing, and Integrated Delivery

- Comprehensive, coherent messages
- Coordinated marketing of EE & STDR
  - Account managers
  - Integrated assessment and analysis
  - STDR from customer viewpoint
  - Value for customer and for system
- Integrated programs and delivery
  - Coordinated or integrated programs

Implications and Observations

- Some tensions or conflicts between resources
- Technology installed for shorter term DR may be used for energy efficiency, which is good…
- …but doing so impacts the customer baseline, and the ability to curtail load further, therefore reducing the level of shorter term demand response in the future (and customer payments)
- And vice versa: doing STDR may reduce value of EE
- Focus on peak reductions vs. energy reductions
- Some pricing approaches reduce EE value off peak
- Mismatch between system value, customer value, and the integrated value of energy efficiency
Challenges and Next Steps

- Customer world vs system operator world
- Reduce market barriers and risks to increase customer participation in many forms of DR, or have a fairly small demand response (and much larger market power for suppliers)
- EE as longer-term demand response, or at least as parallel valuable resource
- Market rules that value all load reductions in some comparable manner (resource parity)
- Capacity credits in addition to energy market

Will Regional Markets “Work” for Energy Efficiency Resources?

- Doubtful, at least in near term
- Regional markets are de-integrated (compared to integrated value of EE), and focused on shorter-term or dispatchable resources
- Significant institutional barriers
- At a minimum, a long transition
- Therefore, it is essential to continue to intervene to achieve cost-effective EE
- Public policies and EE programs are a must
- EE/DR integration possible and can be valuable, but some tensions and issues to address