Assessing the Potential for Demand Response Programs Springfield, IL

DOE's EPACT Report to Congress on Demand Response in Electricity Markets

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Grid Modernization – A Presidential Priority

"…We have modern interstate grids for our phone lines and our highways. It's time for America to build a modern electricity grid."

President George W. Bush

April 27, 2005

…. And now also a priority of Congress due to the Energy Policy Act of 2005

EPACT Sec. 1252 Smart Metering [and much more!]

- Nine subsections on demand response, including:
  - Utilities must offer time-based metering & communications;
  - States must investigate DR & time-based metering;
  - Federal assistance, guidance, and encouragement; and,
  - Encourage regional coordination by states

U.S. Congress Demand Response Policy Statement

Federal Encouragement of Demand Response

"It is the policy of the United States that time-based pricing and other forms of demand response….shall be encouraged, the deployment of such technology and devices….shall be facilitated, and unnecessary barriers to demand response participation in energy, capacity and ancillary service markets shall be eliminated."

– Energy Policy Act of 2005, Sec. 1252(f)

DOE's Informal Demand Response Program Goals

- Customer-friendly instead of engineer-friendly
- Promote both wholesale level demand response and retail level demand response
- Arrest the continuing slide in legacy retail-level demand response program (regulatory incentives?)
- Demand response that includes "long-run demand response" (ie. energy efficiency)
- "Equivalent" treatment in regional and distribution-level planning
- Bottom line: Ensure robust market-oriented demand response capability in U.S. electric markets

EPACT Sec. 1252(d) DOE Demand Response Report to Congress

> ***The Secretary [of Energy] shall be responsible for… not later than 180 days after the date of enactment of the Energy Policy Act of 2005, providing Congress with a report that [1] identifies and quantifies the national benefits of demand response and [2] makes a recommendation on achieving specific levels of such benefits by January 1, 2007.***

- **www.electricity.gov; under "EPACT button"**
- **FERC also has Rpt to Congress – but annual**

DOE Feb 2006 Report to Congress on Nat'l Benefits of Demand Response

- Identified DR Benefits:
  - Participant financial benefits, market-wide benefits, reliability and market performance benefits
  - DOE reviewed 10 recent studies and concluded:
    - Lack of standardized and accepted analytic methods
    - Preferable to quantify DR benefits at state/regional level (rather than nat'l) because tied directly to local system conditions and market structure
- Made Policy Recommendations in Six Areas:
  - Fostering Price-based Demand Response
  - Improving Incentive-based DR Programs
  - Strengthening DR Analysis and Valuation
  - Integrating DR into Resource Planning
  - Increased Adoption of Enabling Technologies
  - Enhancing Federal Demand Response Actions

Demand Response Definitions Used

- Price-based Options
  - Real-Time Pricing (RTP)
  - Critical Peak Pricing (CPP)
  - Time-of-use (TOU) rate
- Incentive-based DR Programs
  - Direct Load Control
  - Interruptible/curtailable service
  - Emergency DR Programs
  - Capacity Market Programs
  - Demand Bidding/Buyback programs

DOE DR Rpt to Congress Policy Recommendations

Fostering Price-Based Demand Response	In accordance with EPACT, State regulatory authorities must decide whether their utilities must offer customers time-based rate schedules (i.e., RTP, CPP and TOU rates) and advanced metering and communications technology. <u>Large Customers</u> •In states that allow retail competition, state regulatory authorities and electric utilities should consider adopting RTP as their default service option for large customers. •In states that do not allow retail competition, state regulatory authorities and electric utilities should consider offering RTP to large customers as an optional service. •Regional entities and collaborative processes, state regulatory authorities, and electric utilities should provide education, outreach, and technical assistance to customers to maximize the effectiveness of RTP tariffs. <u>Medium and Small Business Customers</u> •State regulatory authorities and electric utilities should investigate new strategies for segmenting medium and small business customers to identify relatively homogeneous sub-sectors that might make them better candidates for price-based demand response approaches. •State regulatory authorities and electric utilities should consider conducting business case analysis of CPP for medium and small business customers. Results from existing pilot programs should be carefully evaluated and included in the analysis. •State regulatory authorities and electric utilities should consider conducting policy or business case analysis of RTP for medium business customers. Results from existing pilot programs should be carefully evaluated and included in the analysis. <u>Residential Customers</u> •State regulatory authorities and electric utilities should consider conducting business case analysis of CPP for residential customers. Results from existing pilot programs should be carefully evaluated and included in the analysis. •State regulatory authorities and electric utilities should investigate the cost-effectiveness of offering technical and/or financial assistance to small business & residential customers to enable their participation in CPP or TOU tariffs and enhance their abilities to reduce demand in response to higher prices.
Improving Incentive-Based Demand Response	•Traditional load management (LM) programs such as direct load control of residential and small commercial equipment and appliances (e.g., ACs, water heaters, and pool pumps) with an established track record of providing cost-effective DR should be maintained/expanded. •State regulatory authorities and electric utilities should consider offering existing and new participants in these LM programs "pay-for-performance" incentive designs, similar to those implemented by ISOs/RTOs and some utilities, which include a certain level of payment to customers who successfully reduce demand when called upon to do so during events. •Regional entities, state regulatory authorities, and electric utilities should consider including these emergency DR program features: ▪ Payments that are linked to the higher of real-time market prices or an administratively-determined floor payment that exceeds customers' transaction costs; ▪ "Pay-for-performance" approaches that include methods to measure and verify demand reductions; ▪ Low entry barriers for DR providers, and in vertically integrated systems, procedures to ensure that customers have access to these programs; & ▪ Multi-year commitments from regional entities for emergency DR programs so that customers and aggregators can make decisions about committing time and resources. •State regulatory authorities should investigate whether it would be cost-effective for default service providers to implement demand response. They should also provide cost recovery for DR investments undertaken by distribution utilities.

DOE DR Rpt to Congress
Policy Recommendations (cont)

Strengthening Demand Response Analysis and Valuation	•A voluntary and coordinated effort should be undertaken to strengthen demand response analysis capabilities. This effort should include participation from regional entities, state regulatory authorities, electric utilities, trade associations, demand response equipment manufacturers and providers, customers, environmental and public interest groups, and technical experts. The goal should be to establish universally applicable methods and practices for quantifying the benefits of demand response.
Integrating Demand Response into Resource Planning	•FERC and state regulatory agencies should work with interested ISOs/RTOs, utilities, other market participants and customer groups to examine how much demand response is needed to improve the efficiency and reliability of their wholesale and retail markets. •Resource planning initiatives should review existing demand response characterization methods and improve existing planning models to better incorporate different types of demand response as resource options. •ISOs and RTOs, in conjunction with other stakeholders, should conduct studies to understand demand response benefits under foreseeable future circumstances as part of regional transmission planning and under current market conditions in their demand response performance studies.
Adopting Enabling Technologies	•State regulatory authorities and electric utilities should assure that utility consideration of advanced metering systems includes evaluation of their ability to support price-based and reliability-driven demand response, and that the business case analysis includes the potential impacts and benefits of expanded demand response along with the operational benefits to utilities. •State regulatory authorities and electric utilities should evaluate enabling technologies that can enhance the attractiveness and effectiveness of demand response to customers and/or electric utilities, particularly when they can be deployed to leverage advanced metering, communications, and control technologies for maximum value and impact. •State legislatures should consider adopting new codes and standards that do not discourage deployment of cost-effective demand response and enabling technologies in new residential and commercial buildings and multi-building complexes.
Enhancing Federal Actions	•DOE, to the extent annual appropriations allow, should continue to provide technical assistance on demand response to states, regions, electric utilities, and the public including activities with stakeholders to enhance information exchange so that lessons learned, best practices, new technologies, barriers, and ways to mitigate the barriers can be identified and discussed. •DOE and FERC should continue to coordinate their respective demand response and related activities. •FERC should continue to encourage demand response in the wholesale markets it oversees. •DOE, through its Federal Energy Management Program, should explore the possibility of conducting demand response audits at Federal facilities. •DOE and the Environmental Protection Agency should explore efforts to include appropriate demand response programs and pricing approaches, where appropriate, in the ENERGY STAR® and other voluntary programs.

Six Main Policy Recommendations

- Fostering Price-Based Demand Response
- Improving Incentive-Based Demand Response Programs
- Strengthening DR Analysis and Valuation
- Integrating DR into Resource Planning
- Increased Adoption of Enabling Technologies
- Enhancing Federal Demand Response Actions

- Following slides discuss issues behind each main recommendation. There are 24 sub-recommendations.

Recommendation #1: Fostering Price-Based Demand Response

- Marginal cost of supplying electricity varies significantly; but nearly all customers face time-averaged, fixed retail rates
- Customers have little or no incentive to adjust their demand to supply-side conditions, which leads to inefficient use of resources
- Policy Issues:
  - What evidence is there that RTP or CPP delivers DR?
  - Lack of advanced metering is major barrier to widespread implementation
  - Do state PUCs have political will to aggressively promote price-based DR?

Recommendation #2: Improving Incentive-Based Demand Response Programs

- Trends in ISO DR programs
- Issues:
  - Not all ISOs have integrated DR into their wholesale markets
  - Traditional Load Mgmt programs (DLC and I/C) need to be adapted to new market structures and circumstances

Recommendation #3: Strengthening DR Analysis and Valuation

- Challenges in measuring DR Impacts
  - Direct Load Control impacts are reasonably well-characterized, but impacts from price-based DR depend on customer behaviors that are price- or incentive-driven
- Challenges in estimating net benefits of DR
  - Cost reporting issues (participant costs)
  - Value of DR not fully reflected in standard B/C tests
  - Reliability benefits valued differently by customers
  - Other benefits difficult to quantify
- Bottom Line: More comprehensive evaluation framework needed to fully value benefits of DR

Recommendation #4: Integrating DR into Resource Planning

- How much DR is needed for ensuring resource adequacy, given market structures and system conditions?
- Improve characterization of DR in Resource Planning Models
- Organized Markets: ISO/RTO evaluations focus only on short-term impacts and benefits of DR
  - More effort needed to characterize long-term impacts and potential DR benefits, as part of ISO long-range planning studies

Recommendation #5: Increased Adoption of Enabling Technologies

- Lack of interval metering is significant barrier to deployment of price-based demand response among residential and small C/I customers
- Many large C/I customers do not fully utilize capabilities of EMCS and EIS systems, advanced HVAC and lighting controls
- Enabling technologies that automate load response provide opportunity to improve persistence of load impacts and increase number of customers willing to curtail loads

Recommendation #6: Enhancing Federal Demand Response Actions

- Federal government can and should lead by example on DR
- DOE should continue to:
  - provide technical assistance on DR to state and regional policymakers, utilities, and ISO/RTOs
  - coordinate with FERC on DR activities
  - through Federal Energy Mgt Program, investigate and evaluate costs/benefits of metering and continue DR audits at Federal facilities
  - Work with EPA to explore efforts to include DR programs in Energy Star programs

Conclusions on EPACT Effect on DR

- "Is all this wishful thinking"; "what is going on..or is this just one more policy with no teeth?"
- EPACT is the most legislative support for DR that will occur from Congress…don't expect more
- What happens next is up to states, regulators, the electric industry, and the supplier industry

Recent DOE Work on DR in Illinois

- Case study and analysis of real time pricing in Illinois
- “Real Time Pricing as a Default or Optional Service for C&I Customers: A Comparative Analysis of Eight Case Studies, G. Barbose, C. Goldman, et. al.
- http://eetd.lbl.gov/ea/emp/

Mid-Atlantic Distributed Resource Initiative (MADRI)

Developing Regional Policies & Market-Enabling Activities to Support Distributed Generation and Demand Response

- Goal: Improve the effectiveness of deployment of distributed resources (distributed generation, demand response, energy efficiency) in the Mid-Atlantic region to improve electric reliability and reduce costs….*driven by the state commissions*
- Objectives:
  - Educate stakeholders (especially state officials) on opportunities, barriers, and solutions
  - Pursue consensus on preferred solutions
- A stakeholder process with open meetings held every 5-6 weeks, with working groups meeting more often
- Focuses on Mid-Atlantic region/"Classic PJM" with input from neighboring states
- Established in June 2004 by State PUC Commissioners, U.S. DOE, U.S. EPA, and PJM Interconnection
- Building on the success of the New England Demand Response Initiative (NEDRI)
- Web site: www.energetics.com/madri

Extra Slides: U.S. Participation in IEA Demand Response Resources Project

Int'l Energy Agency Demand Response Resources Project

- U.S. is part of this project, DOE is country rep with FERC and DRCC as "country experts"
- Demand Response Coordinating Committee (DRCC) formed to coalesce US industry
- Purpose:
  - Review current demand response practices in each project member countries
  - Develop tools and recommendations for better integrating DR into member country's electricity markets

IEA DRR Project Subtasks

2) **Market Characterization** - of demand response products, services and enabling technologies

3) ***Market Potential of DRR*** - methods for assessing the available DR market potential in a given market

4) ***DRR Valuation*** **- methods and procedures required to establish the value of DR and to administer them in each country to create a valuation framework to guide development initiatives**

5) **Role and Value of Technologies** - catalogue that describes the technologies and systems available for use in DR programs both from perspective of system operator and participating customer

6) **Market Barriers, DR Solutions and Recommendations** - Identify current DR products and market barriers. Develop recommendations for DR implementations.

7) **Communications & Workshops** - web portal and country workshops on DRR methods, technologies, and applications

8) **Implementation** - delivery of intellectual property created in the DRR Project to the IEA DSM Programme and the participating countries

IEA DRR Project Portal

dsm.iea.org/NewDSM/Work/Tasks/13/task13.asp

www.demandresponseresources.com