

Introduction and Overview: Demand Response and Energy Efficiency Today and Tomorrow: What are the Opportunities?

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What is “demand response”?

Demand response refers to the capacity of customers to reduce their electricity consumption as prices rise in wholesale markets or to reduce their consumption in response to emergency calls for load curtailment when reliability is threatened (CEC and CPUC--Messenger 2002).



“Demand response” is an expansion of “load management”

- “Load management” has been practiced by many utilities since the 1980s as part of their demand-side management programs.
- Common LM programs include direct load control, interruptible rates, time of use rates and load shifting.
- New approaches include real-time pricing, critical peak pricing, demand bidding



Potential Benefits of DR (Peak Load Management Alliance)

- Improved system reliability,
- Cost avoidance,
- Greater market efficiency,
- Improved risk management,
- Reduced negative environmental impacts,
- Improved customer service, and
- Market power mitigation



Size of Demand Resources Nationally

Peak demand reductions achieved (2003) by:

- Utility DSM programs (LM and EE combined)
22,904 MW
- EE programs alone: 13,581 MW
- LM programs alone: 9,323 MW
- DR program impacts: ~4,000 MW*

* (difficult to get good national estimate; this overlaps with LM estimate; difficulty getting combined, consistent ISO, utility, non-utility DR data)



So why the interest in DR now?

- Restructuring and emergence of competitive wholesale power markets.
- Reliability concerns and events—T&D systems severely constrained in some areas; low generation reserve margins.
- Interest in exposing customers to real market prices and conditions



Size of the DR “Prize?”

- GAO estimates that nationally we could save up to \$15 billion annually from RTP and other dynamic pricing
- A FERC study estimates that “moderate” amount of DR could save \$7.5 billion annually by 2010



Types of Demand Response Programs

- Reliability-based—also known as “load response programs”—direct load control, curtailable/interruptible load programs
- Market-based—also known as “price response programs”—real-time/critical peak pricing; demand bidding/buyback



Synopsis of Program Activity

Of 90 utilities included in EEI national survey:

- 30 utilities offer direct load control programs
- 29 offer curtailment programs for large C/I
- 10 offer some kind of dynamic pricing (RTP or CPP)
- 5 offer interruptible programs
- 2 offer demand bidding programs



Leading Initiatives & Organizations (a sampling—are others)

- California: CPUC, CEC, PIER Demand Response Research Center, LBNL
- Demand Response and Advanced Metering Coalition
- Peak Load Management Alliance
- International Energy Agency—Demand Response Project
- US Demand Response Coordinating Committee
- New England Demand Response Initiative—and now the Mid-Atlantic Demand Response Initiative
- PJM Demand Response Working Group
- NYSERDA and NYISO
- And FERC, EEI, NARUC involved in certain key issues



Demand Response Vs. Energy Efficiency

Demand Response

- Primarily reduces peak/critical loads
- Generally controllable
- May or may not save energy
- Commonly purchased for short periods

Energy Efficiency

- Primarily reduces energy use
- Can have significant impacts at peak
- Generally not controllable
- Generally long-lived



Demand Response & Energy Efficiency: Possible Synergies

- Experience from one type of program can lead to greater awareness of energy and money savings opportunities from other approaches.
- Customers who participate in one type of program may be prime candidates for participating in other types programs.
- Co-marketing also possible.
- Technologies that can enable demand response also can be used to manage energy-use year-round.



Demand Response & energy Efficiency: Possible Conflicts

- Objectives different -- can lead to different areas of focus, technologies & priorities.
- Efficiency can reduce financial incentive for DR and visa versa.
- Institutional barriers—e.g., difficulties allocating costs/benefits among customers, utilities/service providers, ISOs, society.
- Marketing messages can be different: get by with less (for short periods) vs. same services but less energy.



Experience with Integrated Approaches

To date very limited experience--a few examples:

- NYSERDA's Peak Load Reduction Program includes "permanent" (EE) options
- CEC's "Enhanced Automation" promotes building EMS systems to provide DR and improve overall EE
- PG&E developing integrated program approaches
- A handful of residential RTP/CPP programs (in CA, NY and IL) include some integrated messages and may be having some EE impacts



Experience with Integrated Approaches

- We really only have limited anecdotal evidence of correlation between demand response and energy efficiency;
- DR program evaluations have quantified peak period impacts (kW and kWh), but not “spill-over” effects on overall energy use or energy efficiency.



Recommendations

- *Make it a research priority to study the effects of demand response programs on overall energy usage.*
- *Make it a policy priority to design and test programs that explicitly combine demand response and energy efficiency objectives.*



Recommendations

While DR clearly valuable, EE should still be a high priority:

- Savings are certain and long-lasting.
- EE provides “baseload” demand reduction—savings realized at all times equipment is on—and doesn’t require switching or activation.
- EE provides variety of broader system benefits.
- EE generally improves customer amenities—or provides same levels using less energy.
- EE can provide downward pressure on fuel prices.
- Doing EE first avoids “inefficient DR”—possible disincentive to reduce baseline use.



Take Away Thought

The strategic combination of EE and DR components has the potential to produce programs attractive to customers and very beneficial to the electric system. Integration of DR and EE should be tested as one component of an overall demand side resource portfolio.



**For more information—
forthcoming report from ACEEE**

*Exploring the Relationship Between Demand
Response and Energy Efficiency: A Review of
Experience and Discussion of Key Issues*

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To be available for free at:

<http://aceee.org/pubs/u052.htm>

