

Demand Response: Turning Theory into Reality --an Unfinished Symphony

Peak Load Management Association

October 7, 2002

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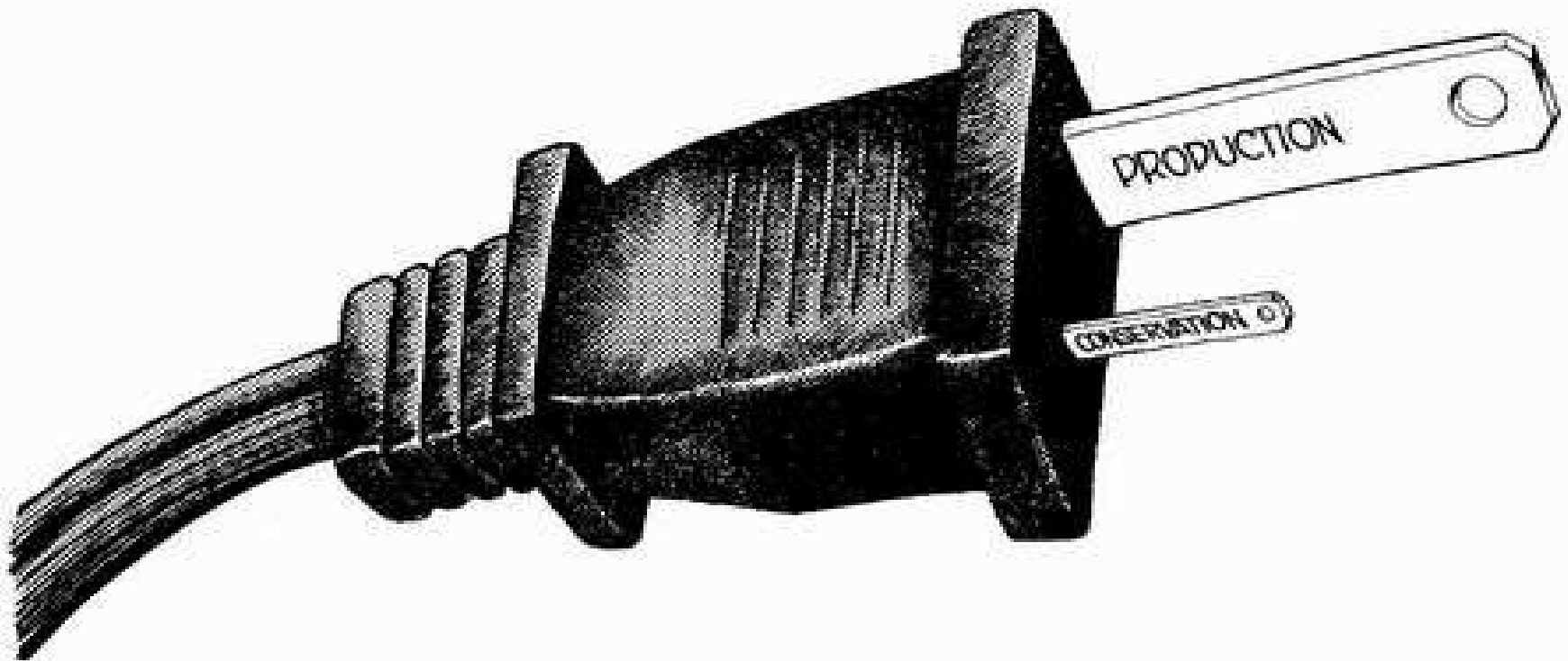
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State of Energy -- 2002

ENR ENERGY FROM PROGRESS
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THE BUSH ENERGY PLAN





New England Demand Response Initiative

- **Goal:** *balanced* energy markets
- **Breadth:** Remove market and policy barriers to all customer-based resources: load response, energy efficiency, and distributed generation
- **Depth:** Propose coordinated policies and programs for wholesale, wires, and retail
- **Sponsors:** ISO-NE, 6 state PUCs, DOE, EPA, NESCAUM (state air directors)
- **Facilitated stakeholder process**
 - ISOs, government sponsors, plus market participants (all sectors) and advocates



Goals of the process

- Identify short-term and long-term demand response opportunities in NE
- Identify barriers at wholesale and retail
- Develop consensus on policies and programs for the region
 - For the ISO, and to recommend to FERC
 - Recommendations to state PUCs
 - And to environmental regulators
- Support viable business models for DR



Demand Response: Five substantive areas

- (A) Price-response in wholesale markets
- (B) Reliability programs: ancillary services, emergency curtailments
- (C) Retail pricing, advanced metering
- (D) Long-term Demand Response: Embedded energy efficiency
- (E) Transmission -- congestion relief, prices, and expansion plans



Demand Response (A)

Wholesale market features

- Demand-side bidding
 - Price-sensitive load bids reveal a real demand curve
- Multi-settlements markets
 - Day-ahead settlement permits economic resales of planned load reductions
- Demand release resales
 - Resales into short-term markets will moderate price spikes and generator market power



Demand Response (B) Reliability Resources

- **Retail Loads Should Be Able to Participate in All Wholesale Markets**
- Day-ahead ancillary services
 - Spinning reserves
 - Nonspinning reserves
 - Replacement reserves
- Real-time (intra-hour) energy and
- congestion management
- Emergency load interruptions

Loads should be able to set prices, not just be price takers!



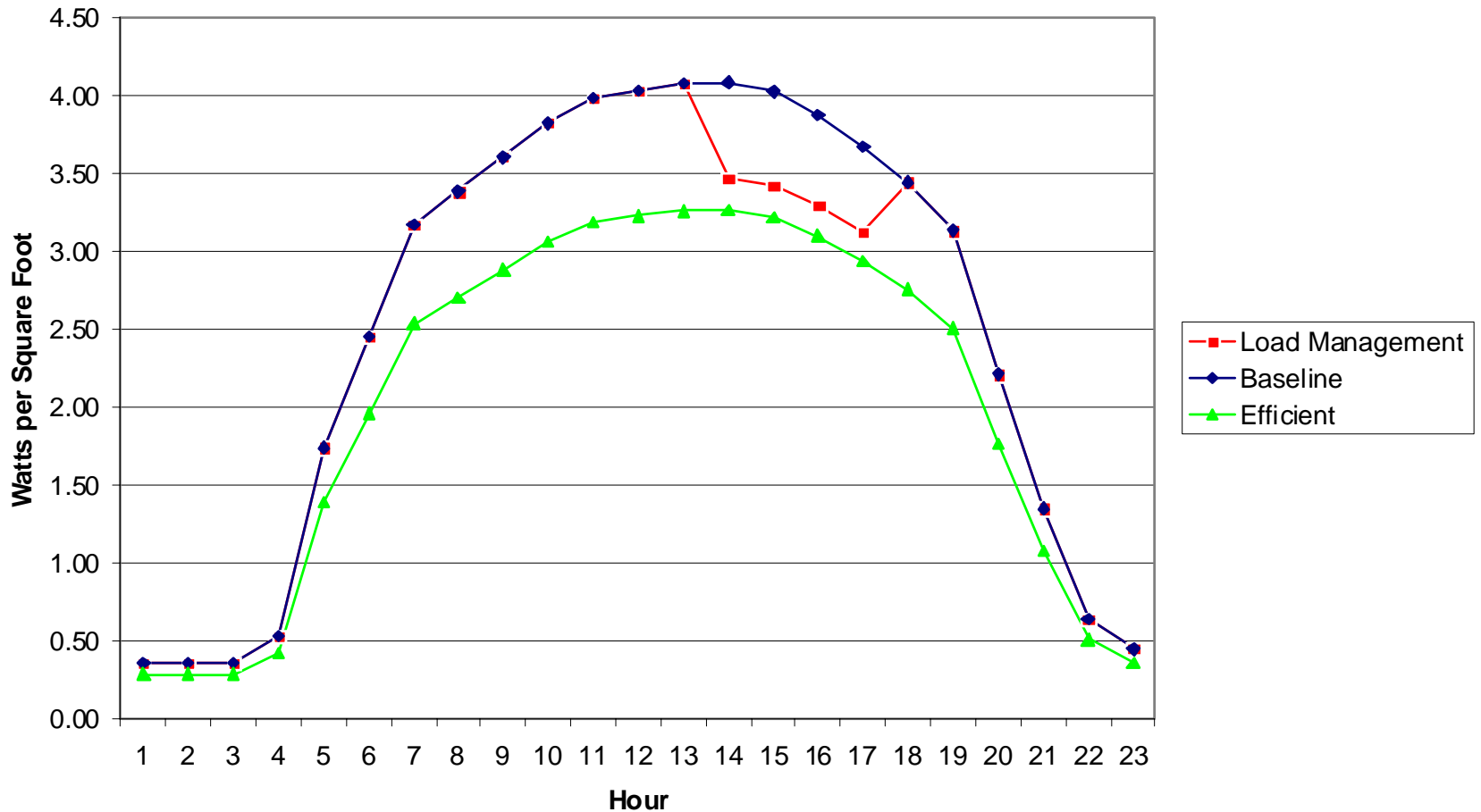
Demand Response (C)

Retail tariffs and meters

- State policy dilemma:
 - Most customers want uniform retail rates; but
 - Time- and market-based rates are needed to improve price response in the wholesale market
- “Push-Pull” on Real Time Pricing
 - Market reformers: “show them the price”
 - Consumer advocates: “the ENRON price?”
- Good news - there are lots of options:
 - Flat w/ DR payments -- Inverted Block -- TOU -- voluntary RTP -- California 20/20, Puget, Georgia...

Demand Response (D) Long-term Efficiency

Combined Commercial Cooling and Lighting Loadshape
Baseline and Load Management Compared to Energy Efficiency



(E) The Challenge of Transmission Planning



- **FERC:** RTO has Transmission planning responsibility
- **NTGS:** “Regional planning processes must consider transmission and non-transmission alternatives when trying to eliminate bottlenecks.”
- **Challenges:** (a) integrated analysis in a de-integrated industry (b) transmission system is regional, but siting decisions and transmission alternatives are local
- How can the ISOs weigh demand-side alternatives?



Efficient Reliability Test

- **Before “socializing” the costs of a proposed reliability-enhancing investment through uplift or tariff, ISO-NE (and PUCs and FERC) should require a showing:**
 - **that the relevant market is fully open to demand-side as well as supply resources;**
 - **that the proposed investment is the lowest cost, reasonably-available measure to correct a remaining market failure; and**
 - **that benefits will be widespread, and thus appropriate for broad-based funding.**



DR, SMD, and States: An Unfinished Symphony

DR Opportunity	SMD Treatment?	State action needed ?
(A) Price-Responsive Load	Supports- both DAM & spot	Important
(B) Ancillary services	Supports, but specifics needed	Helpful
(C) Long-term resource adequacy	Supports, but means uncertain	Perhaps
(D) Efficiency and long-term DR	Silent, needs improvement	Yes – default service, rate design, PBFs, etc
(E) Transmission rates & planning	Needs work– LMP vs. socialized T	Yes, but regional policy is key



Unfinished Business

- How can we build DR into default service?
- Can we reduce the throughput incentive?
- Transmission expansion planning -- new all-resources techniques needed
- Maximizing total resource savings -- coordinated delivery of DR and EE
- Environmental standards for BUGs
- Help decisionmakers understand: What do customers need and want? What is needed for a viable DR business to thrive?



For more information

- New England Demand Response Initiative
 - web links at <http://nedri.raabassociates.org/> and www.raonline.org
 - Posted: Framing Papers and Memos on Demand Response; DR Strategy memos and proposals
- “Efficient Reliability: The Critical Role of Demand-Side Resources in Power Systems and Markets” (R Cowart, NARUC June 2001)
- “Demand-Side Resources and Regional Power Markets: A Roadmap for FERC” (RTO Futures, January 2002)



Backup slides follow

- Extra slides follow here

Electric Restructuring Year 2000



BTW Accuracy First, Rights Second
Power, Privilege, and Money
Control, Right, Control





Retail barriers to demand response

- Averaged rates and default service plans block price signals, slow innovation
- Disco rate designs promote throughput
- Uniform buy-back rates don't include premium for avoided distribution costs
- Utility as gatekeeper vs. utility as facilitator
 - Can customers or their agents sell directly into wholesale markets?
- Metering traditions, costs and standards

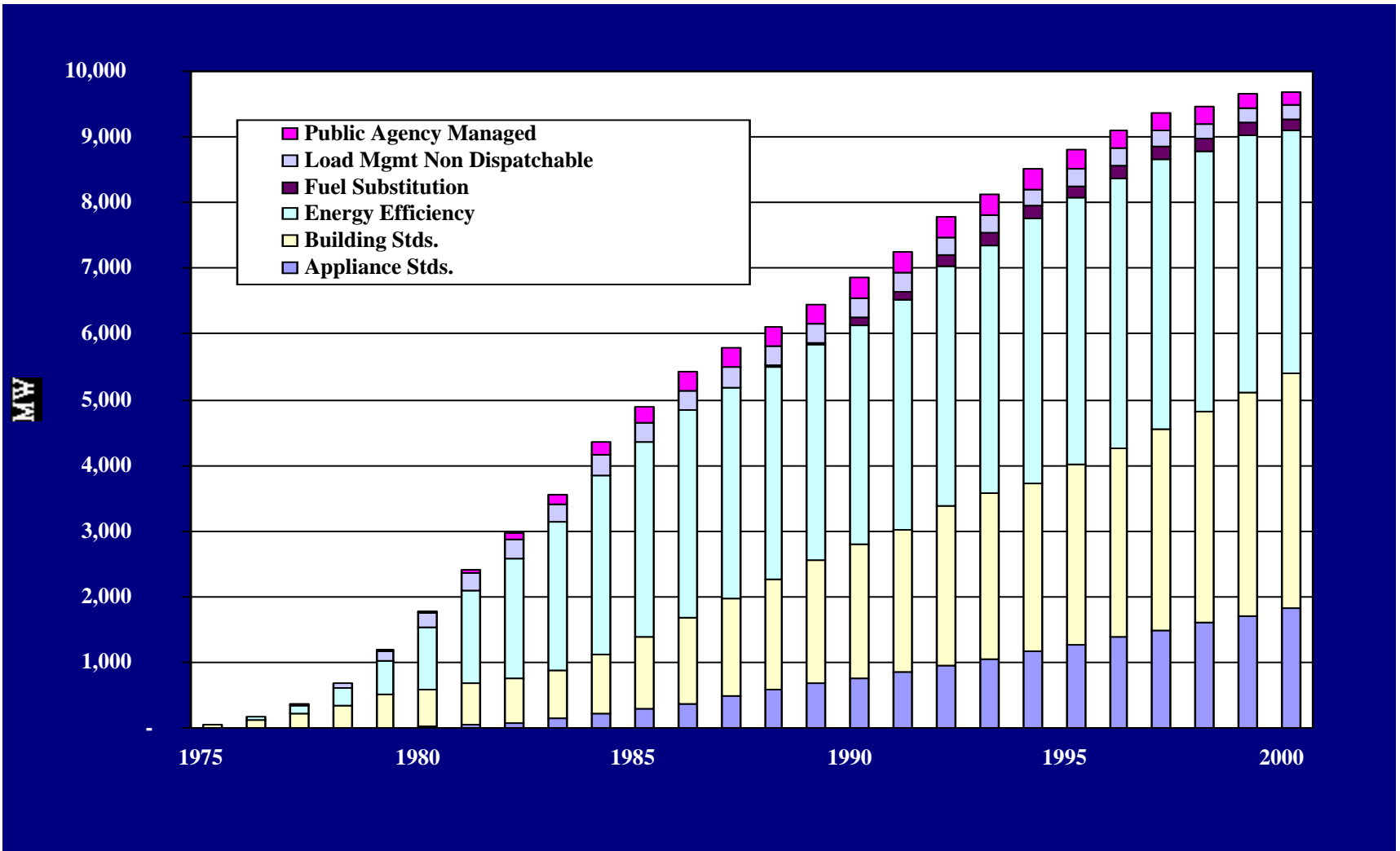


Tariffs and metering Challenges and options

- How can states add TOU prices or price response options to franchise tariffs and default service plans?
- Flat, averaged, or deaveraged distribution rates?
- Should standard offer prices track the market? How closely?
- Mandatory TOU or RTP rates for C & I?
- Mass deploy advanced metering? Mandatory or optional? Who owns the meter and its data?



Impact of California DSM Programs and Standards





(D) Investing in Efficiency: Options and challenges

- Can states reform Disco ratemaking to eliminate the throughput incentive?
- Financing efficiency: wires charges and other
- Can NE adopt regional codes and standards?
- Should the ISO permit “regional reliability charges” to support cost-effective regional efficiency programs?
- Can the regional value of long-term EE be revealed in ICAP markets?



Pricing and Socializing - No Big Deal?

- “It’s Only 10%”
- “Tasty Treats for Transmission”
- The Transmission Policy Barbell:
 - Competitive effects on different generators
 - Effects on the market value of load-side resources
- Remote generation subsidized or not?
- Dynamic effects - signals to investors
- Dynamic effects - logrolling on the wires



Transmission expansion- Demand-side issues

- **Efficient Reliability Decision Rule -**
 - A least cost “hard look” at proposed socialized costs
- **“Open Season” for transmission upgrades and their alternatives**
 - Expose proposed grid enhancements to marketplace alternatives
- **State transmission siting rules**
 - Recognize regional needs , but
 - Consider demand-side options in determining what those needs really are

Open Season for

Transmission and Alternatives



- NTGS: “...opportunities for customers to reduce their electricity demands voluntarily, and targeted energy-efficiency and distributed generation, should be coordinated within regional markets.”
- How to test the preferred alternative in transmission planning?
- One answer: Put it out to bid
- Essential component: Winning bid has the same security of payment as the transmission proposal would have.



Demand Response (E): Transmission Policy

- **Thinking twice about congestion:**
LMP reveals value of DR, EE, DG in load pockets
- **The rolled-in facilities problem:**
 - generators indifferent to costly locations
 - undermines load center resources
- **Transmission planning:**
 - Transmission AND its alternatives





Demand Response (B) Reliability: Challenges

- Wholesale policy needs:
 - Needed: neutral terms for bidding reserves
 - Can system operators rely on sampling, avoid expensive metering on dispersed DR assets?
- Retail policy issues:
 - Can end-users and their agents provide ancillary services, or just utilities/LSEs?
 - How to lessen burdensome interconnection rules and standby charges?
 - How to coordinate RTO-level and utility-run programs?



NEDRI Structure

- **Sponsors:** ISO New England, NECPUC and six state PUCs, US DOE, US EPA, State Air Directors
- **Conveners:** Richard Cowart, Policy Director
Jonathan Raab, Facilitator
- Expert team of consultants
- **Participants:** broad-based, representative group -- ISOs (NE and NY), government, customers, utilities and other providers

Day-Ahead Demand Response



- **Submit offer in day-ahead market (minimum increment of 1 MW)**
- **Minimum bid of \$50/MWh with maximum bid of \$500/MWh**
- **If resource is interrupted day-ahead, resource is financially bound for accepted interruption**
- **Resources would be eligible for ICAP credit**
- **In real-time, deviations from day-ahead are charged/credited at real-time LMP**

Day-Ahead Demand

Response:

Major Issues

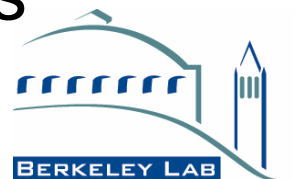
- Program Duration (2 vs 3 years) and Start Date
- Eligible Participants
 - Current NEPOOL requirements may serve as barrier to entry
 - Create separate Demand Response Provider category
- Role of onsite generation
 - Consider utilizing “model” rules for local generators (“output-based”)
- Allow participation in multiple DR programs
- Performance Compensation
 - Pay Higher of accepted bid or DA-LMP (not just DA-LMP)



Real-time Demand

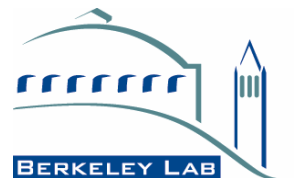
Response (“Emergency” Program)

- DR must respond to ISO interrupt notice within 30-minutes or up to 2-hours
- Require the Internet-based communication system
- Receive real-time LMP for interrupted (measured against the base line) with:
 - Guaranteed minimum payment of \$150/MWh and \$100/MWh for up to 2 hours (for 30 minute or 2 hour notice response)
- Resource eligible for ICAP credit
- Call by ISO on a zonal or system wide basis



Real-Time Demand Response: Major Issues

- Emergency programs are good marketing platform
- Need higher floor price that better reflects customer value of lost load
 - Higher of Real-time LMP or \$500/MWh minimum for 30 minute notice or \$350/MWh for 2 hour notice
- Eligible Participants (I.e. NEPOOL participant requirements)
- Role of onsite generation
- Allow participation in multiple DR programs



Real-Time Profile Response

- No interval metering required (I.e., residential and small C/I)
- Load capable of interruption on demand (with 30-minutes)
- Aggregated (super-thermostats, pool pumps)
- Receive real-time LMP for interruption (statistically determined) with guaranteed minimum payment of \$100/MWh
- Response determined through statistical means (research meters)
- Call by ISO on a zonal basis based upon d ahead



FERC's Proposal for New England

- Need to get real demand response going real soon
- Stated goal: Get 5-10% of NE load into a stable DR program that has longer than a summer peak lifespan -- for 3-4 year period
- Need a regional approach
- NE -- unique position to advise FERC on DR elements of SMD
- FERC will provide staff support and some funding for program design



What do customers want in DR programs?

- Timely and certain payments for performance
- Minimal downside risks (e.g. performance penalties)
- Relatively certain stream of benefits in order to make “business case” for investment
- Easy to enroll and participate (Low “hassle factor)
- Useful “toys”: enabling technology that can be used to manage energy costs
- Customized, tailored service offerings
- Clear program goals that align with their business interests or priorities