Load Response

NARUC Energy Regulatory Partnership Program

The Energy Regulatory Commission of the Republic of Macedonia
and
The Vermont Public Service Board

by

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Overview

- Load Management
- Special Contracts
- Time-of-Day Rates
- Demand Response

Load Management

- "Load management" has been practiced by many utilities since the 1980s as part of their demand-side management programs.
- Encourages time-shifting of electricity use.
- 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
- Most load management in Vermont provided under special contract

Special Contracts

- Governed by Statute (30 V.S.A. § 229):
  - No special products, services or rates that deviate from tariffs without prior Board approval
  - Civil penalties for violation:
    - $100 - $1,000 for officer or employee
    - Up to $10,000 for company
  - Board approval: special rate must exceed marginal or embedded cost of service and provide contribution to fixed costs
- Docket 6758 – 2002 Investigation into Special Contract Violations
  - Fines totaling almost $400,000*

* (includes telephone and gas companies)

History of Special Contracts in Vermont

- Utility-Specific Special Contracts
  - Economic Development
  - Generation Displacement
  - Interruptible
- Docket 6555 - Generic Load Response Special Contracts
  - Implementing ISO-NE LRP
- Special Contracts Versus Tariffs

Interruptible Rates and Contracts

- Snowmaking, large industrial customers
- Reduced rate provided in exchange for promise to interrupt or limit load
- Some “take and pay” provisions
- Most interruptible contract rates still subject to Energy Efficiency Charge

Time-of-Use Rates

- Shift usage from peak to off-peak hours or seasons
  - In Vermont, some utilities offer for all customer types
- Real-time pricing shows better overall economic efficiency
  - Customers accrue savings as they respond (not by paying premium)
  - Customers may choose (and pay) not to respond
  - Not necessarily efficient for small customers

Demand Response

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

Goals of Demand Response

- Enhance system reliability
- Improve demand elasticity
- Reduce price volatility
- Put downward pressure on prices
- Hedge against volatile input prices (gas)
- Provide contingency reserve
- Send better price signals to customers
- Temper the potential market power of suppliers
- Improve the environment

NEDRI

- New England Demand Response Initiative
- Collaborative of
  - New England market participants
  - state utility regulators
  - regional environmental regulators
  - ISO
  - public interest groups
- Supported by FERC and DOE
- Mission to build consensus on viable, effective demand-response programs

Types of Load Response Programs

- #1 Load Reduction Bid as Generation
  - – Used in many markets
  - – Interruptible load / traditional program
- #2 Real-Time Demand Response
  - – Used in markets that have wholesale bid-based spot markets
  - – Emergency and voluntary (price) response
  - – Profiled response

Types of Programs (cont'd)

- #3 Day Ahead Demand Response
  - Used in wholesale spot markets that include a day-ahead component
  - Financially binding load bidding
  - Demand response bids treated the same as generation bids
  - To be implemented June 1, 2005
- #4 Targeted Demand Response
  - Used in conjunction with locational marginal pricing
  - To relieve congestion in constrained areas

Customer Requirements

- For emergency programs: must be available for interruption when called
- Emergency program requires an Internet-Based Communication System
  - Not required for real-time profiled response
  - Interval metering not required for real-time profiled response
- May aggregate load to reach minimum required
  - Requires agreement and technical support from internet-based communication supplier
  - All loads must be within same zone

Implementation Issues

- Retail rate dilemma:
  - Time- and market-based rates are needed to improve price response in the wholesale market
  - Price signals are fundamental
  - BUT most customers want uniform retail rates
- Retail rates are disconnected from wholesale rates in real-time
- Good news - lots of rate design options:
  - Flat rate w/ demand response payments
  - Inverted block rates
  - Simple time-of-use rates
  - Sending accurate price signals IS possible

Barriers to Demand Response

Market Barriers

- Load profiling by pools and RTOs
- Reliability rules and practices which exclude demand-side resources
- Historic subsidies for generation and transmission
- Transmission pricing and expansion policies that do not support low-cost demand-side resources
- Averaged rates and default service plans that block price signals
- Retail rate designs that promote higher usage

Barriers (cont.)

- Customer Barriers
  - Utility as gatekeeper vs. utility as facilitator
  - Metering traditions, costs and standards
  - Customer baseline uncertainty
  - Payments that are too low
  - Short or untimely notice of event
  - Minimum kW participation requirement
  - Staff and resource constraints

Demand Response Challenges

- Programs are new and not yet widely available to customers
- Programs are changing annually; customers can't plan
- Payments depend on energy clearing prices
  - When prices are low, participation is low
  - Does customer cost outweigh customer benefit?
- Portion of savings / credits / payments that are returned to customer
  - New York = 90%
  - Connecticut = 100%
  - Vermont = 70%
- Technology such as metering and internet communications are not widespread

Challenges (cont.)

- What is the link between the wholesale program and the retail customer?
- Who will market these programs?
  - Load serving entities (LSEs)
  - Energy services companies (ESCOs)
  - Curtailment service providers (CSPs)
  - Aggregators
- Who will pay for these programs? What is the collection mechanism?
- Will charges be put on all customers or only those in areas of need?
- Will programs decline if prices are low — the paradox of success.
- How can the programs be maintained so that they are available when needed?

The Challenging Future of Demand Response Programs

- What level of demand response is needed?
- How long will they be needed – Stability?
  - Will real-time pricing be widespread
  - Will programs survive falling energy prices?
- Who will pay for technology infrastructure?
- Will extra payments be needed to bring forth a response
  - To date, experience suggests yes
- Will demand response be incorporated equitably into capacity markets and the planning process?

Load Management Results

- 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)

Load Management Potential

- Nationally:
  - – 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

Load Management Results

- New England (as of January, 2005):
  - Ready to respond:
    - 534 Assets
      - 98.6% Local Distribution Companies
    - 368 MW
      - 153 MW real-time price
      - 120 MW real-time 30-minute demand
      - 12 MW real-time 2-hour demand
      - 83 MW profiled response

Demand Response and Energy Efficiency

- Demand Response
  - Reduces peak/critical loads
  - May or may not save energy
  - Used for short periods of time
- Energy Efficiency
  - Reduces energy use
  - Can impact peak
  - Generally long-term

Demand Response and Energy Efficiency

- DR clearly valuable, EE should still be a high priority:
  - EE 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 can also provide downward pressure on fuel prices
  - Doing EE first avoids insufficient DR