Demand Response

Enabling Behavior Modification: Markets, Customers, Regulators

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Demand Response ("DR")
What is the Big Deal?

- LOWER AVERAGE WHOLESALE PRICES
- LOWER COSTS TO CONSUMERS

Generation, Transmission and DR are SUBSTITUTES
• DR can serve as a local peaking resource
• DR can provide relief for overloaded transmission systems
• DR can DEFER the need for infrastructure investment/upgrade
What has FERC Said?

- EPACT (2005)
  - DR is important to the efficient function of wholesale markets
  - Eliminate unnecessary barriers to DR in wholesale markets (Energy, Capacity, Ancillary, reserves) to customers and load aggregators at either retail or wholesale levels.

- Order 890, 890A
  - Treat DR as comparable to generators

- Order 693
  - Incorporate DR and DSM into NERC reliability standards

- Order 719
  - Direct participation of DR in ISOs/RTOs
Where is Demand Response?

- Historical DR/DSM programs
  - Utilities separated DR incentives from basic retail rates
    - Adder/Discount
    - Interruptible rates
  - No tie to wholesale prices
    - No incentive to over achieve
- Retail rates are bundled, there is no tie energy prices
- Billing systems do not have ability to bill multiple rates
- Data systems don’t have the capacity
How Can we Change?

- **Willingness to Change**
  - The success of demand response participation is based on the customer’s willingness to change consumption patterns
  - Reduce use during peak times

- **Knowledge to Change**
  - Customer, markets, regulators must know in order to accommodate change

- **Incentive to Change**
  - Customers must have an incentive to change behaviors

ENABLE Change
Market Acceptance: Enabling Demand Response

- Enabling Customers
- Enabling Program Design
- Enabling Regulatory
- Enabling Technology
- Enabling Knowledge
- Enabling Deployment
Enabling Customers

- Simple Message – SAVE $$
  - Coordinated Campaign - Regulators (national, state, local), consumer advocates, utilities, vendors must coordinate

- Simple Billing

- Clear Benefits - Equitable benefits to customer segments
  - Low-income
  - Elderly
  - Special Needs
  - High Use, Low Use

- Flexible program design
  - Voluntary, Choice

- Cost Effectiveness, Affordability

- Secure
  - Assurance of privacy
  - Clearly stated disconnection policies
Enabling Program Design
National – State - Local

- Availability of Dynamic Pricing
  - Suite of options to choose from
    - Ability to incorporate net-metering
  - Voluntary, opt-in
  - Back-office billing must be able to handle net-metering debits, credits and accruals for annual net-metering

- Open Architecture and Standards

- Integration or Coordination with other DSM programs
  - Energy Efficiency
  - Home Weatherization
  - Leverage of funding
  - Solar, Wind, Energy Storage

- Co-existence of RTO/ISO and LSE/EDU programs
  - Notification protocols
  - Target Role of ARCs/CSPs

- Standardization of M&V
Enabling Technology: National - State - Local

- Advanced Metering Technologies
  - Net metering capabilities
  - Interval data exchange with DR provider
    - Load and price
  - Capability of multiple billing structures
  - Affordability of enabling technologies
  - Prohibition of prepaid meters
- Home Area Networks
  - Internet access
  - Central control station
- Open standards and protocols
  - Upgradable
  - Vendor neutral
- Smart Appliances
- Cost Effectiveness
- Simple, User Friendly
Enabling Regulatory National - State

- Cost Effectiveness
  - Quantitative cost benefit (TRC)
  - Qualitative benefits included
- Cost Recovery
  - Annual caps ($/yr), performance based
  - Net of benefits
  - Socialization of infrastructure costs
    - All customers should have the option to access real time price signals
- Standardization/Oversight of disconnect procedure
- Rate Design
  - Increase connection between wholesale and retail prices
- Standardization of M&V
- Incorporation of DR in operational and long-term planning
Enabling Knowledge

Information sharing

National Data Clearinghouse

- Pilot Programs
- Customer response
  - Elasticity of demand
  - Participation metrics
- Regional Characteristics
- Operational Benefits
- Program design
- Rate design
- Technology
Appendix

- **FERC Best Practices**
  - Coordinated national and local education efforts
    - DR, AMI, Dynamic pricing
    - Incorporation of EE & other DSM programs
  - Data clearinghouse on AMI tech, operational benefits, consumer benefits
    - Open information sharing among utilities, state, local regulators
  - Coordination of wholesale and retail programs
  - Open standards for communication and data exchange (meter, appliances, technologies)
  - Cost effectiveness
    - Based on net of benefits
  - Incorporation of DR in operational and long-term planning
Benefit Categories of Demand Response

- Generation capacity and energy/congestion
- Transmission capacity and losses
- Distribution capacity and losses
- Environmental benefits
- Lower market prices for capacity and energy
- Market mitigation ([rice volatility and market power]
- Option value to hedge risks and provide insurance

*The higher the benefit value of DR the more categories it can be applied to. The lower the benefit value of DR, the less.*
Types of Demand Response Programs

- Dynamic Pricing w/out enabling technologies
  - All response is through manual control
  - Based on price signal (RT, DA, TOU)

- Dynamic pricing w/enabling technologies
  - Automated demand response
    - Programmable thermostats
    - Smart appliances

- Direct load control
  - End uses are controlled by the utility
    - Air condition cycling programs

- Interruptible tariffs
  - Customers reduce load to predetermined level in event of system reliability need

- Other DR
  - Capacity bidding
  - Demand bidding
  - Aggregation offering
Major Points

- **Cost Effectiveness**
  - Cost benefit test (TRC, UTC)
  - Costs to customers
  - Costs of enabling technology

- **Significant need for Efficient Deployment**
  - Deployment Plan
  - Cost-recovery stated (cap on cost incr./yr)
  - Annual audits – verify
  - Can’t throw $ at utility
  - Stranded cost (scalability for future)
Who is our audience?:
Customer Segmentation

- Residential
- Small Commercial and Industrial
  - Peak is less than 20KW
- Medium Commercial and Industrial
  - Peak is between 20KW and 200KW
- Large commercial and industrial
  - Peak is greater than 200KW