Next Generation Demand Response: Responsive Demand through Automation and Variable Pricing

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Overview

- Existing DR Programs: enable ISOs match demand to available supply, maintain reliability in emergencies, and reduce consumer costs
  - Most DR programs target only larger customers, reduce demand only for emergencies or specified events, & rely on administrative baselines
- Power sector remains highly inefficient: Building to meet demands that occur only in a few hours increases costs by billions of dollars a year
- Next generation of responsive demand can be:
  - Broader, extending choice and control to millions of residential and small commercial and industrial customers
  - Continuous, enabling affordable integration of renewables
  - Deeper, creating a more efficient and resilient power system
- Path Forward:
  - Emerging Technologies and Variable Pricing
  - Recognition of Responsive Demand in Wholesale Markets

Smart Technologies are the Future

- Smart thermostats and other smart devices can implement consumer preferences to reduce customer bills without compromising comfort
  - Tap hidden energy storage: thermal inertia in buildings, water heating, refrigeration & flexibility in when most devices need to use energy
  - Reduce the estimated 20% of energy wasted by heating & cooling unoccupied spaces and the lack of effective control systems
- With advanced data analytics and pre-cooling smart thermostats have cut peak air conditioning demand by 50% or more and up to 3kW per home
- Continuous, autonomous response, in near real time, to modest or significant changes in anticipated prices or grid conditions, enhancing customer control without requiring behavioral changes
- Already cost-effective and increasingly affordable with breakthroughs in performance and energy efficiency of sensors and batteries, advances in data analytics and cloud computing, near ubiquitous wireless networks, secure addressability of any device with Version 6 of Internet Protocol

Enabling Efficient Pricing

- Variable pricing is NOT essential to the adoption of smart devices
- Smart devices will make variable pricing increasingly acceptable
- Time-varying rates and dynamic retail pricing work:
  - Significantly reducing peak demand with pricing plus enabling technologies achieving reductions of 30% or more in many instances
  - Providing customers greater control over their bills, variable pricing is associated with high levels of customer satisfaction
  - Enhancing fairness: Flat rates often result in low income customers subsidizing higher income consumers with more peak oriented loads
- Defaults Matter: When variable rates have been offered on an opt-out basis only a small percentage of customers choose a flat rate
  - Consumers encounter dynamic prices for essential commodities – food and gasoline – and capital intensive services – airlines and hotels
  - There are multiple ways to combine a dynamic price with protections against high monthly bills

Next Generation Demand Response Policies

- States and Utilities: Integrate smart devices into Demand-side Programs
  - Incentive and financing programs can demonstrate the impacts of smart devices, make them available to low income customers, and accelerate their adoption
- ISO and FERC: Wholesale incentives for LSE's to compete on bill savings
  - Wholesale settlements should, to the extent feasible, reflect the actual interval loads of the customers of each LSE
  - Information on anticipated interval prices should be available continuously, to any device, anywhere, as inexpensively as possible
    - Most ISOs already develop indicative "look ahead" price forecasts
    - FERC has a statutory mandate to "facilitate price transparency" and "provide for the dissemination, on a timely basis of information about prices to the public."
- States, Utilities, and Suppliers: Expand the use of dynamic pricing
  - Provide a dynamic price on an opt-out basis for those who can benefit
  - Offer packages combining a dynamic price and price insurance (a cap)
  - Provide customer education and bill comparison tools

Recognition in Wholesale Markets

- ISOs will need to adjust operating, planning, and resource adequacy forecasts for growth of responsive demand
  - Traditional forecasting methods will not reflect the impact of growth in responsive demand on forecast demand in high price periods
  - Variety of dynamic pricing pilots suggest "price response impacts can be estimated quite confidently and accurately." – EPRI (2008).
- Applying conventional DR program requirements to price responsive customers does not work – responsive demand is not a resource and should remain on the demand side of the demand / supply balance
- Energy Emergencies are different, will require a new approach, options:
  - Lifting the cap on prices would be straightforward and efficient
  - A wholesale product for wholesale market participants could provide additional incentives to replace ISO emergency DR programs:
    - ISO Repurchase of LSE Capacity Option : ISOs could formally recognize and allow LSEs – or their agents or assigns – to resell the option to take power at or below the maximum market price, which is effectively created by the LSEs' capacity obligations

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