Smart Grid and Demand Response

Optimizing the Way Electricity is Produced, Delivered, Consumed and Saved

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Smart Grid – Why it’s not so smart now

- Information, sensing and control technologies not embedded
- Operations and Customer Service not optimized
  - e.g. “rolling the trucks” during outages
- Not ready for integration of intermittent, variable renewable energy
  - e.g. “When the wind stopped blowing in Texas”
- Not based on time-based costs and prices
  - Cranking up the AC during peak period regardless of costs
- Customer is in the dark (from an information standpoint)
Smart Grid Technologies

- Smart Meters
- Communications Networks
- Home Area Networks and Information Displays
- Demand Response Technologies
- Energy Storage
- Plug-in Electric Vehicles
- Automated Sensors and Controls
- Dynamic Energy Management
- Substation Automation
- Automated Outage Management
- SynchroPhasors and other Transmission technologies
Smart Grid in Practice

- Outage Management
- Grid Optimization
- Energy Efficiency
- Demand Response
- Renewable Energy Integration
- Cybersecurity
- Dynamic Storage
- Time-based Pricing
- Customized Products and Services
Smart Grid – The Desirable Attributes

- Emissions Limiting
- Communicating
- Self-Healing
- Secure
- Resilient
- Reliable
- Private
- Open
- Flexible
- Future-Proof
- Cost-Effective
- Interoperable
- Information-based
- Dynamically Controllable
Challenges for Policy Makers

- Implement RPS/Renewable
- Infrastructure Investment
- Privacy
- Time-Based Pricing
- Interconnection
- Customer Service
- Customer Options
- Marketplace Innovation
- Market Power
- Decoupling & Incentives
- Climate Change
- Transportation
- Integrated Resource Planning
- Low Prices
- Innovation
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Energy Efficiency

- Conservation
- Energy Efficiency
- Smart Grid
  - Optimizing operations and delivery
    - Transmission
    - Distribution
  - Energy Efficiency (new era)
  - Demand Response
  - Engaging and incorporating the customer
The New Era of Efficiency

- Time-based
- Dynamic
- Information-based
- Holistic approach
- Systems approach
- Behavior-based as well as technology-based
- Price Signals
- Smart
  - Smart Grid
  - Smart Systems
  - Smart Meters
  - Smart Homes/Buildings
  - Smart Appliances
Demand Response

- **Time-based focus**
  - 1% of the annual hours create 10-20% of the overall costs

- **Dynamic, controllable efficiency**

- **Dispatchable, e.g. a virtual power plant**

- **Measurable and verifiable**

- **Automated and embedded or actively managed**

- **Technology examples:**
  - Smart Meters
  - Smart Thermostats
  - Distributed Storage
  - Home area networks and displays

- **Information and feedback**
  - The “game-changer”
The Prius Effect

- Consumers and businesses get less information about their electricity purchasing and consumption than in any other product area.

- Consumers have been shown to reduce their consumption of electricity from 5-20% based on informational feedback.

- Customers like having the technology in their home or business.

- Smart Grid technologies and operations present an opportunity to get to one of the “Holy Grails” of energy efficiency:
  - i.e., institutionalizing it in the way we operate our homes and businesses, and making it sustainable over the long run.
The Green Smart Grid

- The challenges of adding and integrating renewable energy
  - Timing
  - Variability
  - Intermittency

- The additional energy efficiency gains from the information effect and automated DR

- Gains all up and down the chain
- Possibility of environmental dispatch
Why the Smart Grid will Win

- Utilities realize the benefits for them
  - Modernization of their infrastructure
  - New means of operating their business
  - New options for maintaining reliability and security
  - New information about their customers
  - Ability to offer new choices to customers
  - Increased customer satisfaction

- Inevitable that technology available elsewhere will be applied to electricity

- Measurement and Verification will require it
  - CFLs vs Plasma TVs

- Customers “get it”...they see it elsewhere...they will want it
National Town Meeting

- June 26-28 in Washington
- Presented by Association for DR & Smart Grid (ADS)
- Gathering of the DR and Smart Grid community
- Full Day of roundtable sessions with no power points, and Full Day of Case Study-type presentations
- High, diverse attendance from utility, technology and policymaker sectors
Thank you

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www.drsgcoalition.org
www.demandresponsesmartgrid.org
www.greensmartgridinitiative.org
www.smartgridtownmeeting.com