Smart Policies for a Smart Grid

CAMPUT Smart Grid Session

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Richard Sedano

The Regulatory Assistance Project

Vermont ♦ Maine ♦ New Mexico ♦ California

- 1. What are the advances in smart grid technologies that are occurring in distribution systems in Canada, across North America and elsewhere, which ones are running and which ones are in the works?
- **2. What are the key stages of implementing smart grid technologies, i.e. from smart meters to smart grid?**
- **3. What are the benefits of these advancements? How are the benefits being identified, assessed and what are the right regulatory tests?**

- 4. What is the business case for these advancements as it concerns affordability?
- 5. What are the security and privacy issues that need to be addressed?
- **6. What, if any, jurisdictional problems could impede progress?**
- 7. What is the status of the NERC standards throughout North America?
- 8. What are the security concerns and how are they being addressed?

About the Regulatory Assistance Project

- RAP is a non-profit organization providing technical and educational assistance to government officials on energy and environmental issues. RAP Principals all have extensive utility regulatory experience.
  - Richard Sedano was commissioner of the Vermont Department of Public Service from 1991-2001 and is an engineer.
- Funded by foundations and the US Department Of Energy. We have worked in nearly every state and 16 nations.
- Also provides educational assistance to stakeholders, utilities, advocates.

Key Points

- Designing Smart Grid to support energy efficiency is important to climate policy
- Smart Grid vision presents a Market Transformation challenge: about **customers**
- Engaging the public is hard and worth doing
- Utility Incentives matter

Working Definition of the Smart Grid

- *The Smart Grid is an interconnected system of **information** and **communication** technologies and electricity generation, transmission, distribution and end-use technologies that will:*
  - *enable consumers to manage their usage and choose the most economically efficient offering,*
  - *maintain delivery system reliability and stability enhanced by automation, and*
  - *use the most environmentally benign generation alternatives including renewable resources and energy storage.*

Adapted from Roger Levy, Smart Grid Technical Advisory Project, Lawrence Berkeley National Laboratory.

Goals and Characteristics of a Smart Grid

1. Increased use of digital information and controls technologies to improve **reliability, security and efficiency** of the electric grid
2. Dynamic **optimization** of grid operations and resources, with full cyber security
3. Deployment and incorporation of **distributed resources and generation, including renewable resources**
4. Development and incorporation **of demand response, demand-side resources, and energy efficiency resources**
5. Deployment of "smart" technologies (real-time, automated, interactive technologies that optimize the physical operation of appliances and consumer devices) for **metering, communications concerning grid operations and status, and distribution automation**
6. Integration of **"smart" appliances and consumer devices**
7. Deployment and integration of advanced electricity storage and peak shaving technologies, including **plug-in electric and hybrid electric vehicles, and thermal storage air conditioning**
8. Provision to **consumers of time information and control options**
9. Development of **standards** for communication and interoperability of appliances and equipment connected to the electric grid, including the infrastructure service the grid
10. Identification and lowering of unreasonable or unnecessary **barriers** to adoption of smart grid technologies, practices, and services. *

*Energy Independence and Security Act of 2007 (EISA), Section 1301.

Key Stages of Smart Grid Implementation

- You are implementing smart grid at the point when you decide what you want the grid to be able to do
  - Smart meter pilots, dynamic rate pilots, market studies to measure responsiveness of customers, business case development to assess utility operations savings – all these are preliminaries when they precede this step

Smart Grid is Ultimately about Customers

Should that be obvious? This means…

- Clean Energy
- Save Money
- Promote Choice (within monopoly)
- System value devolves to customers also
- Position for the Future
- Do no undue harm

Smart Grid Implementation: No Blueprint, but needs…

- Decisions about objectives
- Decisions and protections about information
  - and issues like disconnection procedure
- Standards
- Cost recovery
- Cost allocation
- Rate design

How can the Smart Grid Promote Energy Efficiency?

- Make energy efficiency deployment a fundamental design feature
  - Reform EM&V to use customized baselines
  - New program designs that use Smart Grid features, for example:
    - Continuous Building Commissioning
    - Reduced incremental costs for programs relying on communications and customer information

Another Way Smart Grid Can Promote Energy Efficiency

- Apply time based pricing
  - Associate with energy efficiency programs
  - Enable access to information for customers
  - Particularly useful for building controls
- Retail perspective of Smart Grid:
  - One Big Market Transformation Program!

Market transformation: Key to making it work

- What are customers to think of varying prices and all this information?
- Can better information about consumption change energy use by mass market customers?
- Aggressive **two way** public campaign
  - Expensive and essential to influence behavior

Is Retail Smart Grid One Big MT Program?

- Apply what we know about market transformation energy efficiency programs
  - Lasting, structural and behavioral changes
    - Engaging supporting market delivery channels
  - Resulting in increased adoption of EE
  - Overcome market barriers
    - Lack of awareness (or even resistance?)
    - Lack of information
    - Lack of advice on options to act
    - Lack of availability of products and services

How else can the Smart Grid Promote Energy Efficiency?

- Distribution Automation
  - Enables more precise, effective use of conservation voltage reduction
  - Reduce losses

Energy Efficiency Supports Climate Stabilization

- Smart Grid will enable shifting of demand
- Will that shift increase carbon emissions, or decrease them?
  - Hourly **marginal emissions analysis** will tell and should be part of smart grid deployment and any evaluation of demand shifting programs
  - Find out the MEA that applies to your market

Energy Efficiency Supports Climate

- And then come plug in hybrid vehicles
  - PHVs seem to be coming
    - Big market transformation effort
  - The U.S. has notice and a bit of a head start to get ready
    - Rate design
    - Distribution automation
    - Rules and incentives about charging rate, which affects peak everyone pays for

What Government Can Do

- Design in energy efficiency as fundamental to smart grid
  - Programs with a coherent plan for how customer behavior will change
- Build in a public campaign at an appropriate point in smart grid development to help customers of every type make use of the capabilities of the smart grid
- Deliver quality basic regulation as a basis

Business Case

- A work in progress
- Many states creating data points
  - Every utility is different
  - Utility voice is strong and can dominate
- Utility incentives should promote acceptance of reduced sales

U.S. Jurisdictional Issues

- State and federal regulators share ultimate responsibility for smart grid deployment
  - FERC-NARUC Smart Grid Collaborative represents an agreement on this
- FERC controls national standards, wholesale market rules affecting demand response
- States control business case for investments and will influence how information issues among utilities, third parties and customers are handled

This is complicated!

- Many details, outside comfort zones
- My biggest worry is unintended consequences due to the pace of investment
  - Especially in light of the U.S. recovery act
- Resources
  - http://www.naruc.org/SmartGrid/
  - http://energetics.com/madri/

Thanks for your attention

- rsedano@raponline.org
- http://www.raponline.org
- RAP Mission: ***RAP is committed to fostering regulatory policies for the electric industry that encourage economic efficiency, protect environmental quality, assure system reliability, and allocate system benefits fairly to all customers.***