CRITICAL POLICY ISSUES FOR SMART GRID ADOPTION BY UTILITIES

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Challenges to electric utilities

- Grid needs major infrastructure upgrades
- Increased concern about reliability, security
- Need to integrate renewables, distributed sources, EVs
- Growing demand reaching limits of capacity
- Customer mistrust of utilities

Smart grid opportunity

- Smart grid has potential to address many of these challenges.
- Federal government has tried to stimulate investment via ARRA grants.
- Still, adoption has been slow and varied greatly across states and utilities.

Research Questions

- What are the critical policy and regulatory drivers and barriers for smart grid adoption?
- How do these factors interact with utility characteristics?
- What policy changes are needed to encourage adoption of economically and socially desirable investments in the grid?

Research methods

- Interviews with
  - 21 utilities, including IOUs, municipals and cooperatives
  - 2 current and former PUC members
  - 2 vendors
- Review of documents from DOE, FERC, PUCs
- Review of professional and academic literature

Policy issues considered

- State PUC regulation
- State legislation
- Federal grants and incentives
- Competition policy
- Relationships between utilities and regulators

PUC regulatory process

- Fit for stable industry, steady growth, long-term investments, slow innovation.
- Formal hearings are highly structured and arms-length. Governed by statute.
- Functions
  - Determine a just, reasonable rate
  - Whether investments are prudent
  - Whether a techology is used and useful
- A few commissions are more proactive to reach out and work on new issues such as smart grid.

PUC regulation and grid modernization

- Revenue models: “cost plus” revenues based on volume delivered discourages efficiency
- Rate recovery for investments: often determined after the fact.
- Criteria: “used and useful” technology and “prudent” investment criteria discourage adoption of unproven technologies
- Pricing: flat retail rate reduces incentives for consumers to engage in demand response

Outcome of regulatory process

- Varies from driver to neutral to barrier of SG adoption
  - "The commission encouraged us to submit the application for the (ARRA) smart grid funding, and once the funding was obtained, we got the approval for moving forward"
  - "We requested a rate increase, but the commission only approved 1/3 of it. This caused us to cancel a smart grid pilot project."
- Relationships can differ even between utilities in the same state.

State legislation

- Renewable portfolio standards require utilities to accommodate variable sources. 30 states.
- California SB17 required PUC to develop smart grid plans.
- State environmental and energy legislation, e.g. CA Solar Initiative, EV targets, climate change laws, energy storage mandates.

Impacts of state legislation

- Implementation of state mandates
  - CA PUC was required to develop SG policy
  - PUC required IOUs to develop extensive plans
- Smart grid as a response to policy
  - "There are aggressive energy policies in California, which could increase the cost of service. We are using smart grid technologies to achieve policy goals at a reasonable cost"

Federal grants and incentives

- ARRA grants for smart grid deployment and demonstration projects. $8 billion including utility matching funds.
- Some utilities made investments that wouldn't have been without ARRA funding.
  - "Would we have done without the ARRA funding? Probably not."
- Others accelerated planned investments.
  - "Yes, we would have done this anyway, but slower, maybe over 5 years rather than 3 years".

Competition policy

- 1978 PURPA forced utilities to buy power from independent producers.
- 1992 Energy Policy Act and FERC 888/889 gave wholesale producers access to investor-owned and public distribution grids.
- Some states have unleashed competition in retail markets. Some have required utilities to divest power plants.

Impacts of competition

- Competition stimulates innovation
  - "In Texas, we now compete with 40 companies every day. We are very innovative. New things we have rolled out include pricing plans as well as technologies and services

Interaction: policy and structure

- Benefits of dynamic pricing may be reduced by divestiture of generation.
  - "We were a fully integrated utility and then part-way through, the commission ruled that we needed to separate our generation from our transmission and distribution businesses. It kind of negated some of the consumer programs that we were exploring. All of the savings for the program were related to shifting load to an off-peak period or pricing based on the actual cost of the electricity in the (wholesale) market. If we're not the generator anymore, that component of the bill went away."

Interaction: policy and ownership

- Regulation of IOUs may hinder innovation. Municipals and co-ops have more freedom.
  - ""IOUs will not make an investment in anything without having a guarantee of return for their stakeholders. We don't have a dividend that we have to pay, our dividend is our decent rates and good service." (Municipal utility)

Implications for regulators: policies

- Delinking revenues from volume can change incentives, reward efficiency and other goals.
  - 18 states provide lost revenue recovery, and 14 have decoupled utility revenues from volume sold.
  - 28 states have adopted performance incentives for efficiency, reliability or other goals.
- Dynamic or time-of-use pricing is needed to realize benefits of smart grid.
- Need to base rates on cost of production, value to customers, and cost of environmental impacts.

Implications for regulators: process

- Rate setting process needs to be revamped.
- Utilities need to be able to experiment with new business models and technologies. Requires regulatory flexibility
- Regulators should be partners with utilities and other stakeholders in problem-solving and innovation.
- Regulators need to close the knowledge gap to understand new technologies. Average commissioner tenure is 3.5 years, often little utility background. Staffers rooted in old cost accounting, rate case environment.

Implications for policymakers

- Mixed evidence on impacts of subsidies.
- Mandates should be flexible regarding technology
  - "**Policies tend to create targets before technology is ready**. The state promotes technologies that are not fully baked…We sometimes have to guess at what the cost will be. When we guess wrong, it becomes incredibly challenging."
- Competition likely to speed innovation
- Loosen rules on PUCs to enable more collaborative role.