

Policy and Regulatory Factors Influencing Smart Grid Adoption

Jason Dedrick

School of Information Studies, Syracuse University

Presented at the Industry Studies Association Annual Conference

Portland, OR, May 29, 2014

Based on research supported by a grant from the
U.S. National Science Foundation (SES-1231192)

Challenges to U.S. 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
- ❖ Major customers may disconnect from grid
- ❖ Challenge of reducing carbon emissions

Smart grid opportunity

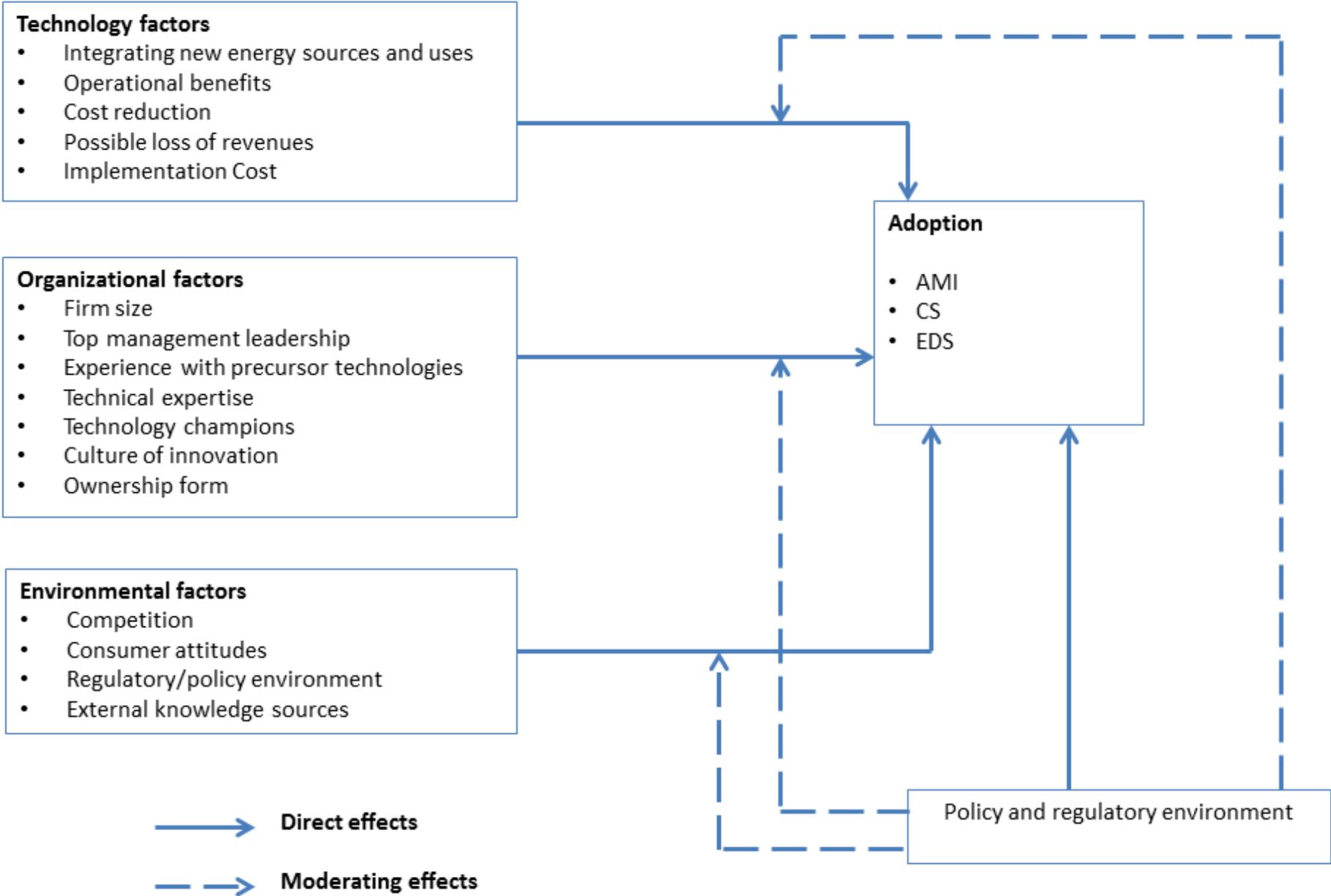
- ❖ Smart grid has potential to address many of these challenges.
- ❖ One definition: “modernized grid that enables bidirectional flows of energy and uses two-way communication and control capabilities that will lead to an array of new functionalities and applications.” (NIST)
- ❖ \$3.4 billion in federal grants from American Recovery and Reinvestment Act of 2009
- ❖ Adoption has varied greatly across states and utilities. Why?

Research Questions

- ❖ What are the critical policy and regulatory drivers and barriers for smart grid adoption?
- ❖ Are current policy and regulatory processes adequate to support smart grid adoption?

Research methods

- ❖ Interviews with:
 - ❖ 21 utilities, including investor-owned (IOUs), municipals and cooperatives in 14 states
 - ❖ Current and former state Public Utility Commission members
 - ❖ Vendors
- ❖ Review of documents from utilities, regulators, consultants, government agencies



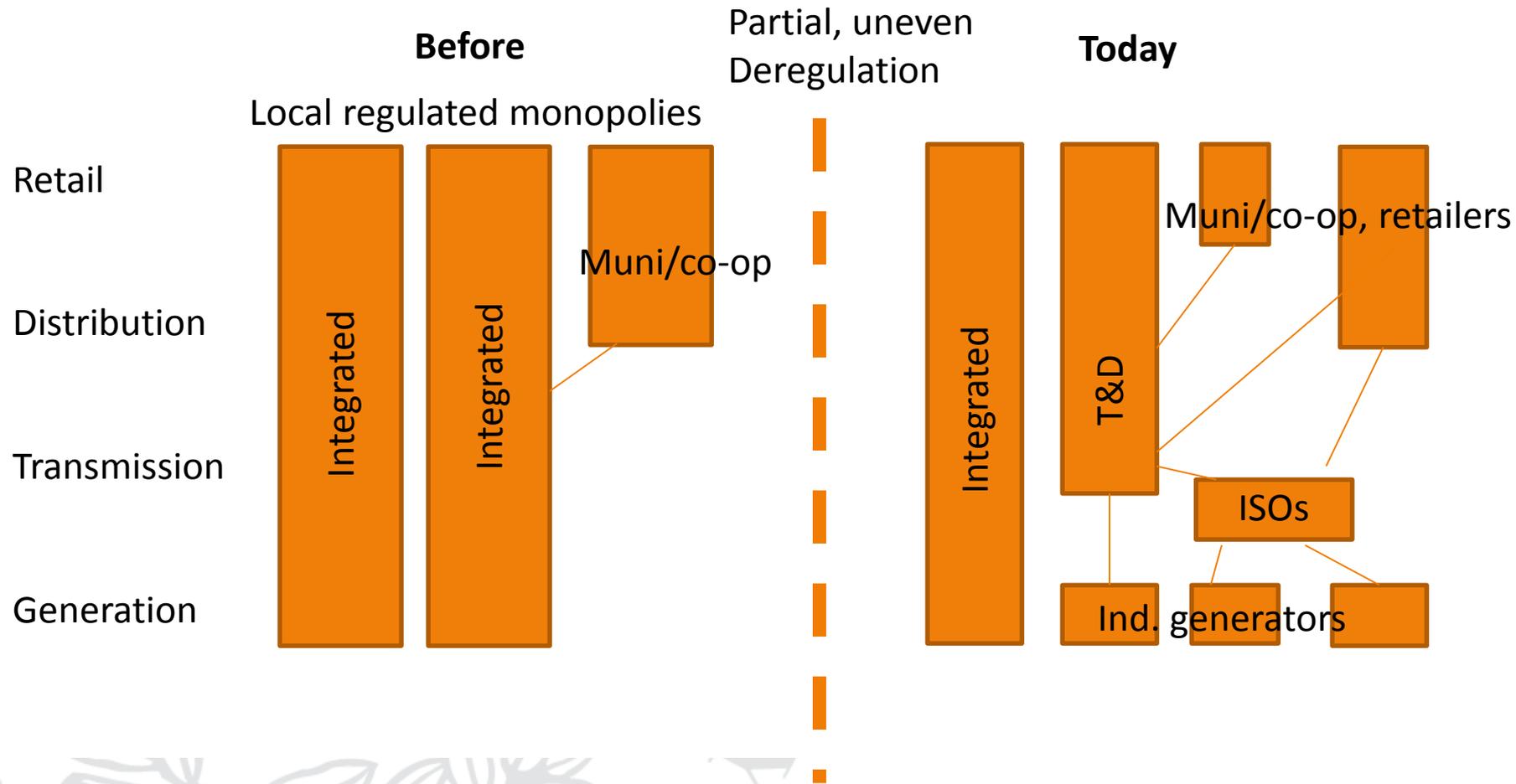
Issues considered

- ❖ Federal regulation
- ❖ State regulatory processes
- ❖ Relationship between utilities and regulators
- ❖ State legislation

Federal de(re)regulation of utilities

- ❖ Public Utilities Regulatory Policies Act 1978
 - ❖ forced utilities to buy from independent producers
- ❖ Energy Policy Act of 1992 and FERC 888, 889
 - ❖ gave wholesale power producers access to utility transmission grids.
 - ❖ Led to divestiture of generation by many utilities
- ❖ Creation of Independent System Operators to manage wholesale markets

Result: an industry in transition



State regulatory process

- ❖ Regulation primarily at the state level by Public Utility Commissions (PUCs)
 - ❖ Formal rate case hearings are quasi-judicial and arms-length. Process can last years
- ❖ Main functions
 - ❖ Determine rates utilities can charge
 - ❖ Determine whether investments can be added to the rate base and cost recovered from consumers
 - ❖ Determine fair rate of return on investments

Regulatory obstacles to smart grid

- ❖ Revenue models: “cost plus” model based on kwh delivered discourages utility efficiency
- ❖ Pricing: flat retail rates reduce incentives for consumers to conserve or shift usage
- ❖ Regulatory review of investments discourages risky investments
 - ❖ Approval usually comes after the fact.
 - ❖ Criteria: “used and useful” technology and “prudent” investments are hard to anticipate

Utility relationship with PUCs

- ❖ **Partner:** “I think the key to this deal is our relationship with the PUC. We were on the same page and worked together before we ever deployed any meters.”
- ❖ **Supporter:** “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”
- ❖ **Obstacle:** “We have to get approval from regulators to cover costs of investments and regulators always want to cut money in cost approval. Because the technology may not be ready, we sometimes have to guess at what the cost will be. Sometimes when we guess wrong, it becomes incredibly challenging”

State legislation: standards, mandates

- ❖ 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.

“We are using smart grid technologies to achieve policy goals at a reasonable cost” (CA utility)

State legislation: competition

- ❖ 17 states have competitive retail markets
- ❖ 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” (electric service company)
 - ❖ “Is dynamic pricing or any kind of pricing available in the Texas? Absolutely. What we are seeing is a more creative marketing approach with free nights, free weekends things like that.” (IOU)

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”.

Implications for regulators: policies

- ❖ Delinking revenues from volume can change incentives, reward efficiency and other goals.
 - ❖ 14 states 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 for successful demand response. Only used in small trials.
- ❖ Need to base electric rates on cost of production, value to customers, and cost of environmental impacts.

Implications for regulators

- ❖ Rate setting process needs to be revamped.
- ❖ Utilities need to be able to experiment with new business models and technologies. Establish general rules rather than holding hearings for every new investment.
- ❖ Regulators need to close the knowledge gap to understand new technologies.
 - ❖ Average commissioner tenure is 3.5 years, often little utility background. Usually lawyers, ex-politicians.
 - ❖ Staffers rooted in old cost accounting, rate case environment.

Change is afoot: regulators leading

- ❖ New York Public Service Commission released “Reforming the Energy Vision” in April 2014.
 - ❖ Encourage distributed energy sources
 - ❖ Utilities as Distributed System Platform Providers (DSPP)
 - ❖ Grid modernization/smart grid
 - ❖ Incentive-based rates
- ❖ Hawaii PUC orders largest utility to help consumers integrate solar

Implications for policymakers

- ❖ Mixed evidence on impacts of subsidies.
- ❖ Mandates should be flexible regarding technology
 - ❖ “The state promotes technologies that are not ready...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.