Regulating a Thriving Smart Grid

Doing the Unlikely

Presented by Richard Sedano

November 4, 2013
Introducing RAP and Rich

• RAP is a non-profit organization providing technical and educational assistance to government officials on energy and environmental issues. RAP staff have extensive utility regulatory experience.
  – Richard Sedano directs RAP’s US Program. He was commissioner of the Vermont Department of Public Service from 1991-2001 and is an engineer.
Strategic Thinking is Hard

• Routine demands of regulation
• Politics nipping at details
• And the issues are new and challenging
Regulators Need Space to be Strategic

• Pro-active engagement of what is coming
• Comprehensive (avoid silos)
• Far thinking in time
• Cognizant of public policy directions and priorities
• A Group Activity

A struggle to a good end is not weakness
Regulators Pro-Active about the Future
why regulation changing times can be especially hard

• Causes losers

• Causes anxiety
  – Technology driven progress will happen eventually, it is just a question of how fast, how expensive, risks about loss, and how many missed opportunities are allowed

• Yet commission ought to get space - they have no fiduciary interest at stake beyond the public interest
The Commission is the Authority
See the Big Picture
External Forces at Work
no matter what you do

• Large Wind deployment and integration
• PV and CHP deployment and integration
• Customer devices easier to get and to use
  – Retail Choice 2.0
• Communities with climate plans and energy agendas
• Environmental Regulation and Fracking
Permanent Changes from

• Communication
• Computer Processing
• Information Storage and Management
• Materials Science

• ...(more surprises coming)
• Retail choice 2.0 (10’s) is different from retail choice 1.0 (90’s, 00’s)
  – because technology and service differentiation will **add permanent value**
  – not just punish inefficient management
Challenges in the Generation Fleet

Forecasted Gross & net demand in UK_South in 2030…
U.S. PV Capacity Increased Substantially Over Past 5 Years

- Starting in 2007, US cumulative PV capacity was ~500 MW.
- Total installed capacity doubled by 2009, doubled again in 2010 and then doubled again in 2011
- Annual growth rate of PV in the U.S. has exceed 30%/yr since 2001

Source: Barbose et al. (2012)
Energy Efficiency: Leading States 2+% of first year savings over sales

• And demand response is increasingly easy
  – Have you heard about Nest?
• And increasingly valuable/essential at high wind/solar levels
Status Quo Appears Safe to Many

• Is it?
Forces specifically motivating smart grid

- Better Communications
- Faster Computing Processing
- Faster Controls
- Faster Switching
- Lower Costs of renewable energy forms
- ARRA $$$
- Better know how and products
And this does not capture the disruptive force of communities considering microgrids for resilience.

Figure ES-1. Illustrative view of 21st century power systems. NREL
NREL/TP-6A20-57477
Sources of Friction

• Regulation: will it keep up?
• Indifference: will principals respond?
• Legacy interests: will losing strategies win?
• Fear: What will be lost? What protections are at risk?
• Competence: will we be smart or ...?
• Politics: will interference or clarity prevail?
Good Regulation is Critical Always

• Balance
• Protect
• Stabilize
• Invest
• Innovate
• Motivate
All Regulation is Incentive Regulation

• Signals from government
• Utility behavior reflects signals
  – What behavior do you want?
• Politics as nurturer or source of interference
  – what do you think it is in Illinois now?
Roadmap

• A good idea – a strategic platform
• Address key questions
  – Role of the utility?
  – Expectations for customers as resources
  – Metrics for success (cost, reliability, environmental quality, healthy communities)
Tactics

• Programs that promote customer resources
• Rates that promote customer behavior
• Earnings for regulated companies that reflect public values
• Engagement – minimum smart grid requirements, routinely revisited
In your own backyard

• Illinois Smart Grid Initiative
  – A remarkable review of what lay ahead in 2008

• A lot of what you need to hear is already there
Utility: Affected with the Public Interest

• Inspiring
  – Not like other businesses
• Instruments of public policy
• Customers changing role may change the way utility meets its public interest charge
2017

State law will be revised – how can Illinois use this occasion to start now to chart an affirmative course for the future of the Illinois power sector?
Perspective: Massachusetts

• Commission Grid Modernization Docket
  – enhance the reliability of electricity service
  – reduce electricity costs
  – empower customers to adopt new electricity technologies and better manage their use of electricity
  – Also articulated an objective to further state’s climate action goals
  – Took around one year
A Collaborative with Many Views

• Role of the Utility
  – System and Investment Planning
    • Consistent with policy goals and requirements
  – Range of Regulatory Frameworks
    • ‘Utility of the Future, Today’ favored by nearly all parties, but for some utilities and consumer advocates
      – The state, the RTO, NGrid, competitors in support
      – Still an ‘insiders” process
MA Grid Mod Next Steps

• Commission accepted 2013 report of collaborative, framing most options

• Will commence dockets to investigate and implement the report’s elements with the big picture in mind
  – Its role
  – Utility role and compensation
  – Retail pricing
  – ...

Energy solutions for a changing world
Perspective: California

• Rulemaking 08-12-009
• May 2010
Elements of Smart Grid Regulation from California Smart Grid Rulemaking 2010

- Smart Grid Vision Statement
- Deployment Baseline
- Smart Grid Strategy
- Grid Security and Cyber Security Strategy
- Smart Grid Roadmap
- Cost Estimates
- Benefits Estimates
- Metrics
Incomplete Vision

Smart Grid

- Smart Market:
  - Transparent
  - Demand Responsive
  - Pricing
  - Distributed Generation

- Smart Customer:
  - Informed
  - Empowered
  - Efficient

- Smart Utility:
  - Predictive and Enabling
  - Self-healing
  - Resist attacks and protect privacy
CA PUC says Yes to a Roadmap

• Connect to other policy, notably climate
• Providing customers with pricing data

Needs much more substance
Costs and Benefits

• Benefit Categories
  – Achieving policy requirements
  – Difficult to quantify benefits
  – Quantifiable benefits

To their credit - These are hard
“Demarcation Points for Utility Investment”

• Competition for investments on the customer premise deemed good
• Should the utility be allowed or prevented from making investments on the customer premise?
• No final decision
  – Utility view: Yes
  – Many others: No
Generally Unaddressed:

The Role of the Utility

• Future not like the past
  – Technology a fundamental change
  – Effects of environment imperatives

• Low Growth, High DG, Higher EE, Hi Tech

• Priority: Service, not throughput

• Investment remains important but different

• Rates likely to rise
### Impact of Grid Investments due to Public Policy Goals on Retail Electric Rates – Nationwide

- **350 TWh new green energy from state RPS by 2030:** ~$120B
- **Total generation decarbonization:** ~$1T
- **New transmission to integrate renewables and maintain reliability:** ~$250B
- **Replace aging distribution system with smart grid:** $600B
- **Estimated cumulative investment in customer-funded EE programs due to EERS and other policies in 2025:** ~$99.7B

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<th>Rate Component</th>
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**Retail Rate =** \[
\text{Utility Costs} / \text{Billing Determinants}
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*Source: Fox-Penner, P and Chang, J. (2012); Barbose et al. (2013)*
Customer Tools

• If rates are destined to rise...
  – And customers are motivated to manage their costs
• What tools can we give customers to manage their costs and preferences?
  – Automated, easy, recognition of value
• What tools will customers have anyway, whether we offer them or not?
SGIG Recipients with Approved CBSPs: 
Overview by Utility

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<th>Rate Treatments</th>
<th>Sierra Pacific</th>
<th>Nevada Power</th>
<th>OG&amp;E</th>
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Sierra Pacific and Nevada Power are testing the effect of a technology package, including an IHD and a PCT.

* MN Power is also testing the difference between hourly energy feedback and daily energy feedback.
Utility Role Reset

• Incremental changes are useful...
  – Throughput incentive solutions
  – Marginal performance incentives

• ... May not be enough
  – How to reward success in public policy agenda
    • Service, including reliability
    • Climate
    • ...

Energy solutions
for a changing world
Issues: Utility of the Future

• What is the role of the utility in a future with new options for customers?
  – Paternalistic, control, gatekeeper
    • It decides what customers can experience
  – Enabler, facilitator
    • Competitors have access to informed customers
  – Protector, validator
  – Distribution system (wires) operator
    • Reliability is Us
In Any Case

- Utility should
  - Be clear about its missions
    - And who the customer is
  - Be able to organize to be competent-to-excellent in the existing and emerging tasks
  - Have a chance to succeed
    - And be able to show how it is succeeding
  - Be motivated to excel
How will “Utility of the Future” Earn?

• **Investment**, as today

• **Throughput**, works against the trend of on-site generation and energy efficiency

• **Service and performance**, new, growth

Smart grid can produce earnings by adding to asset base (the old way) and by enabling services that customers want (a new way), but will government support this?
Continuum of Utility Business Models: Profit Motivation vs. Profit Achievement

Motivation vs. Achievement

- **Assets**
  - Traditional IOU
  - Ratemaking Variant

- **Commodity**
  - Meters- & Wires-Only T&D
  - Owner/Operator

- **Services**
  - Performance Based Regulation

- **Value**

Lawrence Berkeley National Laboratory
Continuum of Utility Business Models: Combining Existing Models
Continuum of Utility Business Models: Fundamental Paradigm Shift

Motivation

Asset

Commodity

Services

Achievement

Traditional IOU

Ratemaking Variant

Meters & Wires, Only T&D Owner/Operator

Energy Service Utility

Performance Based Regulation
My own view on utility earnings

• Earnings must be based on investment
  – But not as much as it is today
• Earnings can be far more dependent on performance
  – Objective performance standards
  – Standards that represent the full range of what customers and citizens want and need from the power sector
  – Superior performance can produce superior earnings and vice versa (value for money)
Issues: The Government

• What is the role of the regulator
  – Protect customers
  – Assure reliability
  – Enable (fair) competition and innovation
    • Sensitive to competitors and utility (affiliates)
  – Facilitate new technology, innovation that customers want and that is useful for the system
  – Manage transition from throughput/central investment system to a 2-way service system
Comment on Regulation

• Regulators generally have great latitude to encourage the public interest in utility actions
  – Value in regional and national cooperation

• Regulators require guidance and encouragement from the statute to assure that they avoid political snap back
  – Legislators can help regarding smart grid, etc.
Government Readiness

• Ability of state Public Utility Commissions to manage smart grid transition is suspect
  – Skill sets of existing staff focus on existing work
  – Interest of commissioners “what did I get myself into?!”
  – Processes sift evidence, but creativity?
  – Are there “customers” out there?
  – Budgets and staffing: cuts
  – Independence?
    • Or is there “pressure” to go along?
No State is Close to Sorting this out

• Challenge
  – Learn from experience
    • Assess strengths and weaknesses successfully
    • Be Brave, don’t expect to be perfect first time out
  – Look forward
  – Establish a vision
  – Execute the vision through a roadmap
    • Articulate the roles of utility, competitor, customer
    • This becomes the mission of ICC, supported by the rest of government
  – Engage customers and stakeholders don’t forget this!
State that Figures this out first/early

• Attractant for businesses with value-based products and services
• Citizens perceive that government is helping
• Awareness about energy improves, aiding market transformation
About RAP

The Regulatory Assistance Project (RAP) is a global, non-profit team of experts that focuses on the long-term economic and environmental sustainability of the power and natural gas sectors. RAP has deep expertise in regulatory and market policies that:

- Promote economic efficiency
- Protect the environment
- Ensure system reliability
- Allocate system benefits fairly among all consumers

Learn more about RAP at www.raponline.org

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