Foundations of Energy Regulation

House Natural Resources and Energy Committee
Montpelier, Vermont

Regulatory Assistance Project

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Why are we going to spend three days talking about the electric sector?

- Electricity is the defining feature of a modern economy
- The industry is undergoing terrific change
  - Technological change, changing the economics of energy, and urgent environmental challenges are driving policy and institutional change
    - Some of this is absolute (technology, consumer activation) and will happen in some manner regardless of policy
    - Some of this seems imperative (address environmental issues, retain fairness) but is a policy choice
- Almost all of the solutions to the challenges we face involve doing a better job of aligning the private interest with the public good, and of balancing regulation with market forces
Vermont Matters

• A state, even a little one, can make a difference
• Exports:
  – Maple syrup
  – Efficiency and integrated resource planning
  – Efficiency Vermont
  – The Regional Greenhouse Gas Initiative
    • Allowance auctions and revenues “recycled” into clean energy investment
  – Geo-targeting
Who are RAP?

• Former utility and environmental regulators, consumer advocates, industry officials, and policymakers
• Non-profit, non-partisan NGO
• Mission: To help governments develop and adopt policies that will ensure the long-term economic and environmental sustainability of the power and gas sectors
• Not advocates:
  – We don’t take positions in regulatory or other litigated proceedings
  – Work directly with decision-makers in government and industry
• Global perspective
  – Programs in the US, China, Europe, and India
  – Lots of frequent flyer miles
The Economics and Practice of Utility Regulation
Economic Regulation

• “When private property is affected with a public interest, it ceases to be juris privati only.” Britain’s Lord Chief Justice Hale, 1670

• Munn v. Illinois 94 U.S. 113 (1876)
  – US Supreme Court finding that states may regulate the use of private property "when such regulation becomes necessary for the public good."

• Economic regulation is the explicit public or governmental intervention into a market to achieve a public policy or social objective that the market fails to accomplish on its own
Reasons to Regulate

• The product is considered essential, and
• The product is most efficiently provided by a single supplier
  – "Natural" monopoly
• Other market failures
  – External (e.g., environmental) costs not full reflected in price
  – Consumer protection
  – Universal service
• Economic efficiency
• Other policy considerations
What is a Utility?

• A natural monopoly; provides an essential service
• It operates under a franchise granted by the state
• It has “an obligation to serve”
  – 30 VSA §219: “Each company. . .shall be required to furnish reasonably adequate service. . . .”
  – This is not necessarily true of utilities in other countries
• It must provide service at posted prices, available to all who qualify for them
  – Undue discrimination is illegal
  – Rate class distinctions are permitted, because they are based on differences in the costs to serve different customer groups
The Utility’s Role

• A utility performs an important function in a society, which is not entirely commercial:
  – Striking a sound balance between its public service role and its compensation enables capital to flow at reasonable costs, and consumer expectations to be reasonably met
  – This marks the line between the utility’s scope of activities and that of the rest of the private sector
What is Regulation?

• An exercise of the police power of the state
  – Constrained by the state and federal Constitutions
    • Takings and due process

• It is not a contract with the regulated entity
  – There is no “regulatory compact”
    • Not necessarily true in other countries, where the terms of regulation are often set out in contracts
The Regulator’s Role

• Extensions of legislatures, executing powers and oversight originally exercised by legislatures
• Independent
  – Removed from the political process to a significant degree, empowered to make decisions that appropriately balance competing interests: they make the hard decisions
    • Not true in all states
• Expert bodies
• Quasi-judicial, not merely tribunals for dispute resolution, but charged with “promoting the public good”
  – This means they can be more than merely reactive
  – They can look forward, anticipate issues and directions, and clarify and, in so doing, minimize risk
  – They can open investigations on their own motion
    • Not true in all states
The Regulator’s Role

• Process is important
  – Provides notice
  – Fair: decisions based on evidence
  – Access
    • Affected parties can participate
    • Visible to the public and press
  – Disciplined: process obeyed and decisions are made
• Regulation is not a popularity contest, and sometimes unpopular choices are the best public interest choice
• There are inherent dilemmas in regulation, balance is typical, courage, leavened with realism, is essential
Regulatory Authority

• Jurisdiction is defined by statute
  – Deliberative tribunal required to exercise judgment, discretion, within the bounds of the law

• The role of the statute
  – Broad grant of authority
  – Policy-setting
  – Resolving some specific controversies is very helpful (e.g., the societal cost-effectiveness test, 30 VSA §218c)
  – Getting too specific in directing decision-makers risks can hamstring action in the face of unanticipated or changed circumstances

• A living process, especially as technology brings new opportunities and challenges

• State and federal jurisdiction
  – Retail v. wholesale
Pricing: The Essential Regulatory Act

• “Just and reasonable” rates
  – Posted tariffs
  – Fair, equitable, based on the general principle that the cost-causer pays
  – Rates sufficient but no more than necessary to cover the costs of meeting demand, including investment and return on investment
  – Most efficient if rates send proper economic signals to end-users, who are making usage and investment decisions routinely
    • “Efficient” means that the cumulative result of regulated prices drives investment by the utility and the consumer that is best for the state as a whole, however “best” is defined (overall cost, or cost plus other factors)

• Rate design
  – Structure and periodicity of prices
Regulatory Concerns

• How does an investor-owned utility earn for shareholders and to reinvest in the business?
  – Nearly 100% is based on a return on invested capital
  – What about performance?
  – Is there a bias toward spending on capital rather than expenses?
    • And if so, does it matter?

• Prudence, used-and-usefulness of utility actions
  – How regulation serves as a proxy for the discipline of the marketplace (or does not)
Conclusion: Objectives of Economic Regulation

- Economic efficiency
- Fair prices
  - To consumers and revenue adequacy for the utility
- Reasonable service, with nondiscriminatory access for all
- Adequate quality and reliability
- Other policy considerations
Traditional Cost-Based Price Regulation
Pricing Authority

• 30 VSA §218(a): “... the Board may order... such rates, tolls, charges, or schedules... as shall... be found by it to be just and reasonable.”

• What does this mean practically?
  – Prices are as low as they can be to produce revenues to cover all the costs (including return of and on investment) prudently incurred by a company to provide safe, reliable, and adequate service to all willing buyers.
The basic formula for determining rates is simple:

$$\text{Price} = \frac{\text{Cost of Service}}{\text{Sales}}$$

But, in its details and nuances, it can be very complicated.
120-Minute Lesson in Ratemaking

• Rate Case:
  – Determine total cost to serve in a rate period (“adjusted test year”)
    • Expenses, depreciation, taxes, undepreciated assets (“rate base”), costs of debt and equity

• Rate Design:
  – Allocate costs among customer classes (groups whose usage patterns are similar)
  – Create pricing structures that reflect cost causation and will fairly recover the costs of service from rate classes
  – Minimize cross-subsidization
    • Subsidies are fine if they are the result of an explicit public policy decision and are, to the degree possible, explicit
What Does This Rate Design Say?

Eat More Ice Cream!

Prices Matter

Energy solutions for a changing world
Bonbright Principles of Rate Design

- Simple, understandable, publicly acceptable, feasible
- Easily to interpret consistently
- Adequate revenue
- Revenue stability over time
- Rate stability

Inherent tension among these, judgment needed to resolve

Plus RAP

- Fairness
- No undue discrimination
- Efficient – discourage wasteful use while otherwise encouraging use
- Reflect non-priced externalities
- Encourage customer investment

Energy solutions for a changing world
Regulating Utility
Financial Commitments
Evolution of the Regulatory Model

• Realization that the entire network, from fuel to end-use, constitutes the thing that is “affected with the public interest” and should be the object of public policy

• Investment and expenditure decisions should be subject to a rigorous public process of input and review
  – Before or after?
Regulatory Oversight

• Physical assets and purchases:
  – Wires, other plant
  – Power plants and power purchases
  – Environmental impacts
  – Economics of investments and purchases

• Financial management
  – Mergers and acquisitions
  – Capital-raising
Things regulators worry about

• Building rate base
  – Bias toward capital investment over expenditure
  – Gold-plating
• Flawed analytical methods
  – Poor risk assessment
• Institutional biases, inertia
• Non-market-based investment decisions
  – Unwillingness to cut losses
• Self-dealing
Competitive Services and Regulated Markets

• Companies that provide monopoly services and competitive services
  – Separations
  – Codes of conduct
  – Effects on markets and innovation

• Competitive providers of services
  – Distributed generation
  – Energy efficiency (and why EE also fails in competition)
  – Demand response
One Solution to the Investment Problem: Integrated Resource Planning

• 30 VSA §218c(a)(1):
  – A "least cost integrated plan" for a regulated electric or gas utility is a plan for meeting the public's need for energy services, after safety concerns are addressed, at the lowest present value life cycle cost, including environmental and economic costs, through a strategy combining investments and expenditures on energy supply, transmission, and distribution capacity, transmission and distribution efficiency, and comprehensive energy efficiency programs.
Cost v. Value: “Compared to What?”

- Resource choices cannot be made simply on the basis of costs (or prices)
- The lower-cost resource is not always the most valuable resource
- How do we determine the value of a resource option? What is its value to us?
- IRP is the process by which resource options are compared and aggregated to meet demand for service to produce the highest value at the lowest total cost over the long-term
Facilities Siting

- The utility system is a network
- Its value lies in its diversity of providers and consumers
- It is also a means by which public interest objectives can be accomplished
- Consumers benefit if resources can access the network, and if the network itself is built to a least-cost ideal
- A dilemma emerges as least-cost methods of generating and delivering energy create problems for all or for some
  - Social justice is implicated if a disadvantaged group tends also to receive the brunt of adverse impacts from utility siting
- States rely on the regulatory process to resolve these dilemmas
  - In many instances, the original intent of a proposal can be preserved while adverse consequences can be removed or reduced with money or ingenuity
  - Sometimes, in resolving such dilemmas, in determining “the public good”, some interests are upset or disappointed
End-Use Energy Efficiency

• Three decades of analysis and implementation have confirmed that energy efficiency is the lowest cost, lowest risk resource

• Barriers to it still remain
  – The “throughput” incentive
  – Higher up-front capital costs
  – Information
  – High private discount rates (short payback periods)

• Aligning private interest with public policy
  – How best to design and deliver EE programs?
Externalities

• A recognition that not all costs are monetized and reflected in market values
• Both positive and negative
  – Improved amenity and health
  – Environmental damage
• How best to account for these costs?
A Layer Cake of Benefits from Investments in System Resources

**Utility System Benefits**
- Power Supply
- T&D Capacity
- Environmental
- Losses and reserves
- Risk
- Credit and Collection

**Participant Benefits**
- Other Fuels
- Water, Sewer
- O&M Costs
- Health Impacts
- Employee Productivity
- Comfort

**Societal Benefits**
- Air Quality
- Water
- Solid Waste
- Energy Security
- Economic Development
- Health Impacts
Wholesale Markets

- Technological change, generation is no longer a natural monopoly
- How wholesale works
  - Bid-based merit order dispatch; locational pricing; capacity markets, ancillary services
- Wholesale markets co-exist with
  - An imperative for reliability
  - With environmental regulation
  - States and their priorities
  - Planning can tie it all together
Supply and Demand in the Wholesale Market

BID PRICES ($/MWh)

ENERGY AMOUNT (GW)

Price-Responsive Demand Bid

Inelastic Demand

Supply Bid
Market zones in NY - Sample Day
Note Western NY at $48/MWH, Long Island at $88/MWH
Carbon prices to generators can increase wholesale power prices with little effect on dispatch or emissions.
Performance-Based Regulation: Aligning Incentives with Public Policy Goals
All Regulation is Incentive Regulation

• The trick is simply to understand what the incentives are and how they affect behavior
How Do Utilities Make Money under Traditional Regulation?

• Under traditional regulation:
  
  \[ \text{Price} = \frac{\text{Cost of Service}}{\text{sales}} \]

• But:

  \[ \text{Actual Revenues} = \text{Price} \times \text{Quantity} \]

  Where: Quantity = actual sales

• Which means that:

  \[ \text{Profit} = \text{Actual Revenues} - \text{Actual Costs} \]

• The utility makes money by:
  – Reducing costs and
  – Increasing sales
Traditional Regulation: The Problem

- Traditional ROR regulation sets *prices*, not *revenues*
  - The revenue requirement is only an estimate of the total cost to provide service, used only as the basis for determining rates
- By themselves, consumption-based rates ($/kWh and $/kW) link profits to sales
  - The more kilowatt-hours a utility sells, the more money it makes
  - This is because, in most hours, the price of electricity is greater than the cost to produce it
    - Utility makes money even when the additional usage is wasteful, and loses it even when the reduced sales are efficient
- The incentive to increase sales is *extremely powerful*
  - This is the “throughput incentive”
# How Changes in Sales Affect Earnings

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<th>% Change in Sales</th>
<th>Pre-tax</th>
<th>After-tax</th>
<th>Net Earnings</th>
<th>% Change</th>
<th>Actual ROE</th>
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What is Performance-Based Ratemaking (PBR)?

• Not a new concept: It refers to any variation on traditional (price-based) regulation that aims to encourage, by the application of specific rewards or penalties, identified outcomes and behavior
  – Used extensively in telecom regulation

• New twist for gas and electric PBR: “Decoupling”
  – Breaking the link between profits and sales
  – GMP and VGS both operate under PBRs that decouple cost recovery of the network (wires and pipes) from sales of kWhs and therms
Decoupling’s Simple

• Prices are set the old-fashioned way: through a rate case
• But now the amount of revenues that the company will receive is fixed
  – The “revenue requirement” becomes the company’s “allowed revenue”
• Differences between actual revenues and allowed revenues are trued-up through periodic rate adjustments (monthly, quarterly, yearly)
Revenue-Sales Decoupling

• Breaks the mathematical link between sales volumes and revenues
  – Makes revenue levels immune to changes in sales volumes
  – It enables recovery of the utility’s costs, including return on investment, in a way that doesn’t create perverse incentives for unwanted actions and outcomes
• Two objectives:
  – To protect the utility from the financial harm associated with least-cost actions and
  – To remove the utility’s incentive to increase profits by increasing sales
• Preserves the utility’s incentive to improve its operational efficiency
• This is a revenue issue, not a pricing issue: it is not intended to decouple customers bills from consumption
  – Customers continue to see the cost implications of their consumption decisions
  – Use more, pay more. Use less, pay less
Conclusions

• Decoupling eliminates the key financial barrier to utility support for customer-sited resources
  – Stabilizes utility revenues
  – Reduces or eliminates a host of risks for both utility and customers

• Decoupling in Vermont has worked well
  – “Now we can focus on customer service instead of worrying about revenue levels.”
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

rweston@raponline.org