New Objectives and Instruments for Electricity Reform*

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November 20, 1998

Executive Summary

Compared with the historical emphasis on fairness, production efficiency and improved price signals have taken on greater importance as public policy objectives in the area of energy. The evolution of U.S. energy policy illustrates changing attitudes towards the efficacy of competition in promoting efficiency. Multiple goals still complicate the process, however. For example, suppliers have invested in different types of generating capacity partly in response to laws and regulations. Some of these outlays can be translated into "stranded costs" to the extent that incumbents made investments that might have seemed reasonable at the time. Under competitive conditions, incumbents would be unable to generate cash flows adequate to provide the required return on those investments. Similarly, state-mandated conservation programs may not be compatible with competition in electricity generation and retail supply. The one certainty is that continued vertical disintegration and partial deregulation are inevitable.

1. Overview of U.S. Electricity Regulation

The pattern of recent U.S. electricity market reform reflects state electricity prices, with relatively high-cost states willing to experiment with the more rapid introduction of competitive forces. The electric energy industry lags behind telecommunications in terms of competitive pressures, but regulatory roadblocks to competition at various stages of production are beginning to fall. Traditionally, most regulatory authority has been vested in the states, so the system is conducive to regulatory innovation. However, for the past two decades, the Federal Energy Regulatory Commission and national legislation have been major factors shaping entry conditions. The process of evolution within the American regulatory environment is driven by wider adoption of approaches that have been successfully implemented in a few states. This heterogeneity also results in confusing and sometimes contradictory state regulatory regimes. ROR on rate base regulation has characterized the industry, *with* customer-class cost allocation rules, fuel adjustment clauses, and management audits further constraining prices and revenue requirements. However, traditional cost of service regulation is being supplanted by new forms of incentive regulation (including performance-based regulation).

* Presented as "Lessons in U.S. Electricity Market Reform" at the Conference on Deregulation and Institutional Frameworks—Institute for Developing Economies (Tokyo) December 7-8, 1998.

Recent overviews of electricity reform in the U.S. have outlined the costs and benefits of industry restructuring and deregulation. As Joskow notes,

> "While the basic model for structural and regulatory reform in electricity is fairly straightforward, the details of the institutional reforms that are necessary to improve on the performance of the present U.S. system are complex. Moreover, much of the pressure for reform in the United States reflects rent-seeking behavior by various interest groups pursuing private agendas that may not always be consistent with efficiency goals. At the same time, there are good public interest reasons to believe that structural and regulatory reforms that foster competition can lead to real cost savings in the long run ***if*** appropriate supporting institutional arrangements are put in place." (Joskow, 1997, p. 120)

Rather than summarize current observers, this paper attempts to place developments in historical perspective, so lessons for developing countries can be drawn from U.S. experiences over time.

The evolution of U.S. regulatory policy illustrates changing attitudes towards the efficacy of competition in promoting efficiency. At the same time, social objectives and environmental concerns have placed new objectives onto the regulatory agenda; the new instruments for achieving new objectives raise complex issues. For example, state-mandated (utility-funded) conservation programs may be inconsistent with competition at the generation stage, especially if competition becomes a reality at the retail level. As price is driven towards incremental cost, funds for social programs dry up. Similarly, some capacity investments will be unable to have their costs recovered under some deregulation scenarios. The problem of "stranded costs" is being addressed through full or partial "securitization" (allowing cost recovery) and other mechanisms. Most industry observers expect vertical disintegration and partial deregulation to continue.

Regulatory constraints often create incentives for the regulated firm to change behavior. Current interest in "incentive" regulation suggests a desire to avoid negative performance outcomes associated with Rate-of-Return on Rate Base regulation (RORR). RORR is generally characterized by detailed accounting rules, allowed rates of return, and cost allocation procedures. These policies attempt to assure procedural fairness, limit excess profits, and establish “fair” prices across a wide range of customer groups. As problems arose (or new social objectives were identified), new regulatory instruments were proposed to address the concern. The adoption of the new instruments across states, while of substantial interest, is not examined here. Rather, the focus is on how new command and control regulatory procedures have tended to be overlaid upon one another. The negative impacts of mutually inconsistent constraints partially explain the 1992 Energy Act's emphasis on deregulation and increased competition in the electricity sector. Federal Energy Regulatory Commission rulings and investigations have maintained pressure for reform.

2. Fairness: The Traditional Regulation of Profitability

The justification for regulation goes beyond the traditional natural monopoly conditions yielding single suppliers in a service territory. However, the features of natural monopolies characterized the electric utility industry for half a century. Thus, the industry structure was a function of basic industry conditions. In the absence of regulation, the resulting corporate behavior raised public policy issues. Without intervention, industry performance was perceived as being inadequate: social and economic goals were viewed as unachievable without regulation.

Historically, instruments and goals have tended to be added over time, not replaced or eliminated. This process of accretion can cause inefficiencies since some regulatory instruments make it more difficult to achieve particular regulatory objectives. In other cases, the instruments reinforce one another. Some analysts label the accretion of rules as a "tar baby effect" with agencies introducing more and more constraints over time in response to evolving utility strategies and changing regulatory priorities. Note that the complex links between instruments and objectives are often not discovered until after the fact. Furthermore, regulators operated on a case-by-case basis; they tended to prefer having flexibility rather than having to adhere to a clear set of priorities. Thus, a consistent set of trade-offs is not achieved over time.

The growing complexity of the regulatory landscape is depicted in Figure 1. The historical evolution of state and national regulation is far more complex than can be captured in a listing, but this impressionistic characterization sheds light on changing objectives. The time period breakdown focuses on regulatory developments in the last three decades to illustrate recent developments. Figure 1 shows how policy development can be described in terms of two factors: (1) economic (and social) objectives, and (2) instruments adopted to achieve the regulatory goals.

Greer (1993) argues that the answer to the question of why we have regulation revolves around justice (or fairness). He identifies five categories of fairness: to buyers generally, to sellers generally, among different buyers, among different sellers, and as an administrative process. The objectives listed for 1907-1949 (Figure 1) generally fall into the fairness category. For example, setting a maximum price level limits a natural monopolist's ability to obtain excess profits which protects ratepayers in general from high prices.[1] Similarly, the geographic entry restrictions established by state regulatory commissions attempted to limit the likelihood that duopolists would engage in destructive price wars. Such pricing behavior ultimately leads to consolidation when there was excess capacity in the market. Thus, the regulation of service territories protected incumbent firms from entry, leading to a wider range of sustainable price structures. In addition, prices did not reflect incremental costs.

[1] Using data on prices and profits in states where regulation came early (rather than late), Jarrell (1978) argues that early intervention benefited electricity suppliers. Municipalities had been using franchise

FIGURE 1

competition to keep prices down, so early state regulation could be viewed as pro-producer in impact. While

Achieving fairness among customer classes involves sharing the benefits from production economies among customer classes, while allowing investors a fair return on investment. This policy could be labeled the prevention of "undue" price discrimination. Complicated cost allocation procedures have been developed to distribute costs in a politically acceptable manner across residential, commercial, and industrial customers. In addition, within each customer class, cost of service might differ due to location and density of the service area. Averaging across areas leads to different mark-ups of price above marginal cost, but that is accepted in the name of fairness -- as when the same price is charged despite rural vs. urban cost of service differentials. The economic theory of regulation explains such disparities in terms of the power exerted by concentrated beneficiaries relative to the miniscule influence of the many losers (of relatively small amounts). Posner (1971) labeled this "taxation by regulation": the result of a coalition between suppliers and particular customer groups (at the expense of unorganized customers).

Administrative law attempts to address the last aspect of fairness. Standards for regulatory hearings (presentation of testimony and opportunities for cross-examination) and procedures for processing customer complaints both represent attempts to promote procedural fairness. Specification of test years and adherence to accounting rules are additional ways the process can be made open and predictable. Another element of fairness relates to demographic and income distributional concerns. Geographic averaging might promote this objective, as access to electricity has become a national goal. Regulated utilities have an "obligation to serve" at "fair and reasonable prices"; exit restrictions are the quid pro quo for protection from entry.[2]

Figure 1 presents a highly stylized characterization of regulatory instruments and objectives, as they emerged over time. However, to some degree, these objectives remain with us today. This paper does not attempt to examine each instrument, but often the link between the concern and the instrument is tenuous. For example, the inclusion of the "used and useful" test for allowing generating or other capacity in the rate base is listed as an instrument that promotes cost minimization. However, asymmetric treatment with respect to investments can lead to non-cost minimizing behavior. For example, Kolbe and Tye (1991) argue that firms will avoid risky cost-minimizing investments if regulators do not reward good decisions but penalize bad decisions.

3. Instruments for the Promotion of Production Efficiency

The post-war development of regulatory policy continued the fairness objectives adopted earlier, and gave some additional emphasis to production efficiency. Regulatory lag and specific cost disallowances were seen as providing incentives for the prudent

fairness may not be achieved by regulation, it is generally used to justify government constraints!

[2]Owen and Braeutigam (1978) emphasize the role of regulation in protecting the status quo. This equity-stability explanation maintains that regulatory delays and the role of precedent are designed to prevent the sudden capital losses that arise in a competitive market.

acquisition and use of resources. The Public Utilities Holding Company Act (1935) represented an earlier attempt at preventing abuses stemming from intra-company transactions. The same concerns for cost minimization continued to be addressed in the 1950s and 1960s. For example, concern with over-capitalization due to rate-of-return (ROR) regulation led to the formalization of the classic ROR constraint model (Averch and Johnson, 1962).[3] Another regulatory concern surfaced with the New York/New England blackout in 1965. Reliability--one component of service quality -- became the focus of intense interest at the state and national level. One result was the establishment of regional reliability councils and regulatory standards related to outages. In addition, allowed ROR could be lowered if this objective were not reached. Power pools and inter-ties were encouraged both to obtain reliability and reduce operating costs.

Joskow's 1974 analysis of structural change in the electric utility industry identified inflation and environmental concerns as inducing regulatory innovations: fuel adjustment clauses and acceptance of environmental outlays as a cost of service. The latter expenditures were capitalized or expensed, depending on the type of outlay and on regulatory treatment. However, since these outlays raised costs, the industry began to feel pressure from consumer groups. Not unrelated to this was the fact that the thermal efficiency of generating units leveled off after decades of cumulative improvements (Hirsh, 1989, p. 4). Operating cost pressures were compounded by the impact of OPEC on fuel prices. In addition, nuclear cost overruns (stemming from a combination of unanticipated inflation, inept management, and additional mandated safety requirements) combined with slower demand growth to create substantial consumer pressure for disallowances.

A number of states adopted targeted incentives to address continued concerns over whether utility managers were operating generating units efficiently. However, by rewarding utilities for meeting the narrow performance objectives (associated with heat rates and/or generating plant availability) regulators were not necessarily improving cost performance (Berg and Jeong, 1991). Cost component regulation can improve engineering efficiency, but may induce utilities to devote excessive resources to ensuring that a narrow goal is reached.

Pressure for cost containment and for moderating price increases lead state regulators and national policy-makers to identify rate design as an area in need of attention. The National Association of Regulatory Utility Commissioners (NARUC) joined with the Electric Power Research Institute (EPRI) in sponsoring a major study of costing and pricing. Time-of-use rates
found their way into use in a number of states. Spurring this process was the Public Utilities Regulatory Policy Act of 1978 which required state commissions to consider the cost effectiveness of eleven rate-making standards (Joskow, 1979; Acton, 1982).

[3]Subsequent analyses of ROR regulation under demand uncertainty and follow-up empirical tests brought the simple A-J model into question. Nevertheless, there was a heightened awareness of how specific constraints led to adjustments that could run counter to other regulatory objectives.

Production efficiency has taken on more importance as a policy objective, compared with fairness. Price signals are being given greater prominence, although regulators tend to avoid dramatic changes in rate design for fear of political repercussions. Historically, prices for different customer groups were set using cost allocation procedures. Revenue "requirements" were determined from top down -- with minimal attention to incremental cost causation. Today, prices and incumbent investments in generating capacity are constrained by competitive alternatives -- induced by regulatory promotion of cogeneration and independent power producers (IPPs). Thus, in non-core (industrial) markets, customers have alternatives in the form of self-generation or geographic re-location. When revenues from some customer groups fall short of "allocated" costs, utilities experience financial pressures. Core (residential) customers can flex their political muscle to avoid rate increases, resulting in realized returns becoming a residual. Rates of return were never "guaranteed"; rather, they were "allowed". However, they have they have become more problematic in a world where traditional entry restrictions in generation are being set aside.

Nonutilities supply more than ten percent of all electric power in the U.S., and between 1991 and 1994, they built over half of all new capacity. Barriers to effective competition were dramatically lowered by the Energy Act of 1992. As layers of regulations have accrued, and some deregulation has occurred, the overall incentive impacts are difficult to untangle. National regulatory policy has leaned in the direction of pro-competitive market structures at the generation level. Since PURPA's promotion of cogeneration via qualifying facilities (QFs) and of IPPs, national policy has continued to view wholesale competition as stimulating real savings for final demanders. The Energy Act of 1992 created Exempt Wholesale Generators (EWGs) owned by holding companies with regulated subsidiaries. This serves as another vehicle for introducing new players into new geographic areas. When large buyers gain access to alternative suppliers via the transmission network, retail markets change dramatically. Accompanying the new players are potential problems for network coordination, construction, reliability, and pricing. Figure 2 depicts these new features of energy industries.

FIG 2

Perhaps the most important recent developments are the decisions by California, Michigan and other high-cost states to establish programs designed to promote retail competition. The regulatory problems are substantial. Many fear that larger customers who have the ability to shop will tend to pay market-based (incremental cost) prices, leaving core (residential) customers at risk for covering the costs associated with higher cost capacity. The concern over so-called "stranded investment" blunts efforts to open up local markets. The short run impacts of competition differ from the long run impacts. In the short run, the efficiency gains may not be substantial, given the demand elasticities. However, the monetary transfers could be significant. Over the long run, the movement away from cost-based regulation is likely to further stimulate cost-containment and improved price signals.

4. Design Issues for Restructuring

Olson (1998) outlines a number of the design issues facing regulators in the movement to retail competition:[4]

Horizontal market power issues arise in the context of the generation market, including transmission constraints, which determine the players in the geographic and product markets. Market definition and the role of long term contracts and short term hedging instruments are just two areas under investigation by antitrust authorities.

Vertical control issues arise in the debate over whether an ISO or a transmission company should be responsible for pricing and capacity expansion. Three models (along a continuum) are being examined: (1) divestiture (structural separation), (2) operation of transmission system by ISO, (3) functional separation. Are structural safeguards adequate or must divestiture take place? The answers are not obvious, since lost efficiencies from joint planning of generation and transmission could be substantial.

ISO issues relate to the network as a whole. System reliability, non-discrimination among participants, and governance problems are addressed by Massey (1998). Hirst and Kirby (1998) address how ancillary services are going to be provided and priced. These include line losses (about one-third of these costs), load following, spinning reserve, voltage support, and related services. Integrated utilities did not break out nor explicitly price these activities. However, vertical disintegration requires that greater attention be given to the provision of ancillary services. Generating units provide both energy and most of the ancillary services, so system operators must address complex issues in this area. It could be argued that under cost-of-service regulation, incentives for cost-containment in this area were blunted, so re-structuring has focused attention on these services.

[4] The issues relate to transaction cost economies, “These issues include asset specificity, asymmetric and imperfect information, reputation effects, search, information, contract and monitoring costs, the structure and design of bilateral contracts, and *ex post* contract maladaptation issues that arise because contracts are incomplete.” (Olson, 1998, p.64)

Stranded Costs and Securitization represent perhaps the largest dollar value issue in the transition to competitive markets. There is substantial disagreement regarding the legitimacy and scale of stranded costs. Firms have made investments under what some call a "regulatory contract", so they should be afforded the opportunity to recover these investments. The 1996 Report of President's Council of Economic Advisors supports the recovery of legitimate stranded costs.

The future will continue to yield regulatory experiments in different states and regions of the country. Unless states are pre-preempted by federal initiatives, we can expect to see a wide range of policies emerging in various states. Some may focus on wholesale competition, with distribution systems operating as energy portfolio managers. Others are moving towards full retail competition with customer choice.

5. Concluding Observations

Over time, the identification of additional regulatory objectives has led to the introduction of additional instruments (or rules) to enable those issues to be addressed. Some of the new policies reduced the likelihood that "old" objectives could be met. In some states, for example, the requirement that incumbents buy IPP output at relatively high prices promoted the entry of new suppliers -- but conflicted with other objectives. Commissions are beginning to recognize problems with such mandates. More attention is being given to avoiding potentially incompatible goals.

The regulatory community today is the scene of a lively discussion on the possible ways of making the system more efficient without harming core customers who face few alternatives. Clearly, the "devil is in the details," which is one reason why the various stakeholder groups have taken so long in the development of new institutions required for restructured markets. Rapid changes in technology as well as in the structure of the electric industry are likely to cause substantial changes in the near future. In the short term, regulators will continue to prod the industry towards increased competition wherever benefits appear to outweigh the costs.

Bibliography

Acton, Jan, 1982. "An Evaluation of Economists' Influence on Electric Utility Rate Reforms," *American Economic Review*, 72, 114-119.

Berg, Sanford V. and Jinook Jeong, 1991. "An Evaluation of Incentive Regulation for Electric Utilities," *Journal of Regulatory Economics*, 3:45-55.

--------- and John Tschirhart, 1988. *Natural Monopoly Regulation: Principles and Practice*, NY: Cambridge University Press, xii-564.

Greer, Douglas, 1993. *Business, Government and Society*, NY: McMillan.

Hirsh, Richard F., 1989. *Technology and Transformation in the American Electric Utility Industry*, Cambridge: Cambridge University Press, xiv-274.

Hirst, Eric, and Brendan Kirby. 1998. "Ancillary Services: The Neglected Feature of Bulk Power Markets," *The Electricity Journal*, April, 50-57.

Jarrel, G. A. 1978. "The Demand for State Regulation of the Electric Utility Industry. *Journal of Law and Economics*, 21, 269-95.

Joskow, Paul L., 1974. "Inflation and Environmental Concern: Structural Change in the Process of Public Utility Price Regulation, *Journal of Law and Economics*, 17, 291-327.

_____, 1979. "Public Utility Regulatory Policies Act of 1978: Electric Utility Rate Reform, *Natural Resources Journal*, 19, 787-809.

_____, 1997. "Restructuring, Competition and Regulatory Reform in the U.S. Electricity Sector," *Journal of Economic Perspectives*, 11-3, Summer, 119-138.

Kolbe, A. Lawrence, and William B. Tye, 1981. "The Duquesne Opinion: How Much 'Hope' Is There for Investors in Regulated Firms?" *Yale Journal on Regulation*, 8, 1, Winter, 113-157.

Lewis J. Perl (1997), "Regulatory Restructuring in the United States," *Utilities Policy*, 6:1, pp. 21-34.

Matthew W. White (1996), "Playing with Power: Price and Entry Deregulation in Retail Electricity Markets," *Brookings Papers on Economic Activity: Microeconomics, 201-67.*

Olson, Wayne P. 1998, *From Monopoly to Markets: Milestones Along the Road*, NRRI 98-19 Occasional Paper #25, August, ix-82.

Owen, Bruce M. and Ronald Braeutigam. 1978. *The Regulation Game: Strategic Use of the Administrative Process*. Cambridge, MA: Ballinger.

Posner, Richard, 1971. "Taxation by regulation," *Bell Journal of Economics*, 2, 22-50.

Figure 1
Regulatory Policy Development:
Multiple Targets and Instruments

Period	Objective	Instrument
1907-1919	Reduce prices and limit excess profits	Rate of return regulation
	Avoid destructive competition	Entry restrictions
1920-1949	Fairness among customer classes	Cost allocation procedures
	Fairness within customer classes	Geographical averaging
	Procedural fairness	Open hearings/test years
	Universal access	Exit restrictions (obligation to serve)
	Universal access	Used and useful test
	Cost minimization	Rural Electric Cooperatives
1950-1969	Cost minimization	Regulatory lag
	Cost minimization	Cost Disallowances
	Reliability	Alter allowed returns--penalty
1970's	Limit impact of input price instability	Fuel adjustment clauses
	Environmental improvements	Expense/capitalize outlays
	Environmental improvements	Siting constraints
	Innovation	Expense/capitalize outlays
	Conservation	Promotional advertising disallowances
	Safety	Mandates (e.g., nuclear)
	Cost minimization	Targeted incentives (heat rates)
	Energy Conservation	Fuel Use Mandates--no natural gas
1980's	Allocative efficiency	Rate design mandates
	Cost minimization	Banded returns: Profit sharing
	Cost minimization	Unbundling: Cogeneration
	Cost minimization	Vertical disintegration: Capacity Bidding
	Conservation	Demand side management
	Conservation	Revenue decoupling mechanism
	Conservation	Integrated resource planning
	Social cost minimization	Environmental adders for supply options
	Environmental improvements	Emissions Trading
1990's	Competition/Cost minimization	Exempt wholesale generators
	Competition/Cost minimization	Mandate transmission access, Consider ISOs
	Cost minimization	Cost decoupling via yardstick regulation
	Industry Restructuring	Arrangements for addressing "stranded costs"
	Reliability	Performance-based Regulation

Figure 2
New Features of
Energy Industries

REGULATORY POLICIES

Substitutes Promoted
Entry Encouraged--IPP
Transmission Access

STRUCTURE

Multiple suppliers
Entry Barriers Reduced
Vertical Disintegration

BEHAVIOR

Flexibility Introduced
Unbundling Required
Standards Promulgated
Fuel Use Mandates
Structural Safeguards
Service Restrictions
Load Mgt. Incentives
Supplier of Last Resort

Rate Design
Product Mix
Quality
Production Process
Capacity Bids
No Incumbent Entry
Conservation
Exit Limited

PERFORMANCE

Incentive Regulation

Wholesale Price

Residual Regulation (Imputation)
Siting and Integrated Resource Planning

Shared Earnings and Banded Returns
Price Reflects Market Realities
Regulated/Unregulated Services
Environmental Impacts