

STATUS OF THE FOUR UTILITY SECTORS:

BACKGROUND WRITE-UPS

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PREFACE

These four brief write-ups characterizing the utility sectors--electricity, natural gas, telecommunications, and water--were prepared as background material for use at the NRRI/NARUC summit conference of public utility commissioners entitled "PUCs at 2000." This "commissioners only" conference will be held April 4 and 5 this year in Denver, Colorado. All sitting commissioners are invited.

The idea of the conference is to share and co-create perceptions of what state PUCs should be and be doing in the year 2000, given the changes in the utility industries and the current reconsideration of the need for and nature of regulatory oversight. The conference focus, then, is on PUCs, but some common understanding of the state of the four sectors that are the object of regulation will be helpful to the deliberations. This is the purpose of this background document prepared by NRRI staff experts.

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February 1995

THE FUTURE ELECTRIC POWER INDUSTRY

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1. SYNOPSIS OF THE FUTURE

The electric power industry is quickly evolving away from its historical character. The beginnings of a competitive industry have already emerged in the wholesale market and may well penetrate the retail market in the not too distant future. Competition in the generation sector, nurtured by open transmission access, will allow markets to become the major determinant of pricing and other activities in the wholesale power market. Wholesale competition will likely advance further: little opposition exists to the general consensus that a competitive wholesale market can continue to generate cost savings.

The recent push for retail competition, which raises fundamental regulatory and economic issues, would further expand the reaches of competition in the industry. The ramifications for the electric power industry will be significant.

A new electric power industry will obviously affect public utility regulation. The long-standing rate-making paradigm (that is, rate-of-return regulation) will likely erode, as regulators attempt to accommodate the market forces that will permeate the electric power industry. Regulators will be under increased pressure to shift risks to utilities, allow utilities to earn higher rates of return, and give utilities increased flexibility in their pricing, operation, and planning decisions.

RECENT TRENDS IN THE ELECTRIC POWER INDUSTRY

- *Utility diversification related to core business*
- *Dichotomy of customers into core and noncore groupings*
- *Reassessment of integrated resource planning*
- *Market-based pricing*
- *Performance-based ratemaking*
- *Emphasis on serving consumer interests*
- *Increasing business risk for electric utilities*
- *Utilities entering NUG generation business*
- *Utilities establishing holding companies*
- *Large users seeking lowest-cost generation sources*
- *Gradual shift from old regulatory compact*

In the next few or so years, the electric power industry will continue its transition toward more comprehensive competition. During this period, both utilities and regulators will prepare themselves for the future. Utilities will pursue activities that will position them to compete. They will, for example, reduce their costs, restructure, and seek the approval of their state commissions for less tightly-controlled and more performance-based regulation. Already the fear of competition has brought out responses by utilities that reflect their vision of a highly competitive electric power industry. Regulators will be under pressure to reassess the role of traditional rate-making practices in a competitive environment. Many will experiment with new procedures to achieve more efficient outcomes. These procedures are likely to include broad-based incentive systems, such as price caps.

2. BIG QUESTIONS FOR THE FUTURE

TEN BIG QUESTIONS

- *What will the electric power industry look like in the year 2000?*
- *What role will new technologies play?*
- *What will be the decision rule for pricing and investment strategies?*
- *What new risks will electric utilities face? How should utilities and regulators respond to increased risks?*
- *How will retail core customers be protected?*
- *How will the regulatory compact change?*
- *Which utility services will be competitive? Which ones will continue to be monopolistic?*
- *Will utilities tend to form affiliates and to diversify in other ways?*
- *Will utilities continue to engage in certain socially-oriented activities?*
- *What state/federal jurisdictional issues will emerge?*

This paper addresses ten major questions relating to the future structure, activities, and performance of the electric power industry. Currently, major uncertainties exist over the length of the transition to competition and the ultimate "equilibrium" structure of the electric power industry. Regulators will play a key role in affecting the speed of competitive forces. If history is any guide, regulators will likely favor incremental change toward competition.

Rapid change in advancing competition may conflict with continued concerns over fairness questions and other social objectives.

What is more certain is the fact that competition in the electric power industry will demand utilities to operate and price their services differently. Economic consideration, especially in responding to competitive pressures, will dominate all facets of the industry. Whether the industry becomes vertically disintegrated or utilities establish holding companies to form subsidiaries, for example, will hinge on how compatible these activities are with respect to prevailing competitive forces.

State regulators may view competition with more favor if they believe that competitive pressures can be accommodated in an equitable fashion. For them, the key question is whether small retail consumers can benefit, or at least not be worse off, from a more competitive electric power industry. While regulation will still exist, regulators will face continual pressures to change their long-standing practices and policies.

3. MAJOR HAPPENINGS

Industry Restructuring

Many observers have noted that electric power industry restructuring and the developing competitive generation and wholesale markets are following a more general national trend away from regulation to more competitive markets. Examples include airlines, trucking, telecommunications, and natural gas. Competition is seen as a different means (relative to regulation) to encourage cost minimization by utilities, plan for future capacity needs, and set prices. The fact that markets can be a superior means is well-established. The question is: Can workable and beneficial competitive markets be established in the electric power industry? and, if so, how and where? If the answer is yes to the first question, then undoubtedly, different regulatory approaches are needed to get the full benefits that competition can produce. In short, an overhaul of the industry may require significant regulatory changes as well.

There have been changes in generation and transmission technology in recent years challenging some fundamental assumptions about utility operations. In generation, this has been primarily through the introduction of gas turbines. This technology has made it possible to generate power on a relatively smaller scale and at costs at or below larger central station power plants. The existence of economies of scale in generation (a necessary but insufficient condition for a natural monopoly) underlies the defense for vertically integrated monopolies and profit and price regulation of that monopoly. The current competitive pressures in the industry are largely caused by this change and policy responses to the opportunities it makes possible. Generation, therefore, is an area where competition and markets may successfully develop and provide benefits to electricity consumers.

Technology changes in transmission, however, have lead to a different change in the industry's structure. Here the technology has allowed better coordination and usage (reducing line losses, for example) of utility transmission lines. This has meant that greater access to these lines by others is possible while still controlling transmission system reliability. This has made more wholesale wheeling and coordination sales of power possible. It also suggests the technical feasibility of retail wheeling as well. Transmission service is still considered a monopoly service, however. Consequently, price regulation in some form (now under discussion at FERC) will still be necessary.

Policy changes at both the state and federal levels have spurred further development of noncentral station power and transmission service.

The Public Utilities Regulatory Policy Act of 1978 (PURPA) encouraged cogeneration (sequential

MAJOR EVENTS IN ELECTRIC RESTRUCTURING*

- 1978 *PURPA*
- 1984 *State-initiated competitive bidding (Maine)*
- 1992 *EPAct: Amending PURPA, PUHCA, and FPA*
- 1994 *California "Blue Book" proposal*

* PUHCA is the Public Utility Holding Company Act, PURPA is the Public Utilities Regulatory Policies Act, EPAct is the Energy Policy Act, and FPA is the Federal Power Act.

production of electric and thermal energy) and small power production (from renewable and geothermal sources), in part, by requiring electric utilities to interconnect with and supply backup and maintenance power to qualifying facilities (QFs). The primary impetus for PURPA was to promote energy efficiency and national energy independence. The effect was to increase interest in self-generation and independent power generation. In the mid-1980s, state commissions began to use competitive bidding to acquire new capacity. While many competitive bidding rules limited participation to QFs, some states began to allow other power sources to bid. The Energy Policy

Act of 1992 (EPAct) furthered the decentralization of power production and supply by creating a new category of power generator, the Exempt Wholesale Generator (EWG),¹ and by granting FERC the authority to order transmission access.

In the last fifteen years, the technology change and move to less centralized power production reversed a trend that began late in the last century toward more central-station power production and away from small-scale power production. This technology change, combined with utility reluctance to build new plants because of the disallowances of the 1970s and early 1980s, has led to the current situation where nonutility sources are supplying an increasing portion of the new

TRENDS IN INDUSTRY RESTRUCTURING

- *Smaller scale generation facilities*
- *Open transmission access for third parties*
- *More coordination among utilities*
- *Nonutilities supplying more of the new generation capacity*
- *Utilities establishing domestic and foreign generation affiliates*
- *Utility mergers and acquisitions*

¹ A qualified EWG is exempt from the Public Utilities Holding Companies Act of 1935 (PUHCA). The primary benefit to the utility investing in an EWG is that it will not be considered, nor subject to the requirements of, a holding company.

generation capacity.²

Utilities, to a varying extent, have begun to respond to the industry changes. This has occurred in several ways. First, in order to be more competitive, some utilities have taken steps to cut costs. In this case, just the threat of competition has induced cost and price reductions. A second response of utilities has been to diversify their operation into both areas outside and inside their field of expertise. Most EWG filings at FERC, most nonutility generation and many PURPA QFs are affiliated with an electric utility. Electric utilities are expected to increasingly make use of joint ventures and mergers and acquisitions with other utilities and related businesses.

A third area is international investment. The industry changes described above have occurred at a time when other countries are privatizing and restructuring their electric industries as well, particularly Latin America and eastern Europe. EPAct also changed PUHCA to allow utilities to invest in other countries through Foreign Utility Companies and for foreign organizations to operate in the U.S. This combination of occurrences (privatization and EPAct) has created investment opportunities for both domestic and foreign companies.

Simultaneously with these policy and structural changes, there has been a rising level of dissatisfaction with the performance of cost-based regulation. The planning mistakes that led to the disallowances and general lack of cost-minimizing incentives given to utilities are cited as its limitations. Integrated resource planning (IRP) was largely a response to excess supply and a failure to consider demand-side options and environmental factors. Commissions have also begun to use, to a more limited extent, incentive or market-based mechanisms to supplement traditional rate-making methods.

The combination of power technology and policy changes and questions on the effectiveness of cost-based regulation have called into question both the ideas of state-granted vertically-integrated monopolies for the generation of electric power and the way they are currently regulated.

² In 1995 about 10 percent of total electricity generation will be produced from nonutility generation facilities (NUGs). In 1979, only about 3 percent of the electricity came from such facilities. During 1993 and 1994, independent power producers added more than half of all new generating capacity.

State/Federal Jurisdictional Disputes

In the electric power sector, the implications of where federal and state jurisdictional lines are has great implications on the future of the industry. Like the natural gas industry, a "bright line" was thought to exist between federal and state jurisdiction. In the case of the electric power industry, however, as one regulatory pundit put it, "there may be a bright line, but I don't know where it is."

The following describes the current situation. State regulatory commissions have traditionally regulated vertically-integrated electric utilities selling bundled power service to the ultimate, retail customer. The FERC has jurisdiction to regulate wholesale sales of power, as well as transmission service in interstate commerce. Several United States Supreme Court and federal court cases have made it clear that all power from an interconnected interstate grid is in interstate commerce. This means that, except for the Electric Reliability Council of Texas (ERCOT), Hawaii, and Alaska, all wholesale power sales and transmission service is interstate commerce. At this point, there would appear to be a bright line between federal and state jurisdiction. The location of the bright line becomes less clear, however, because of the enactment of EPAct.

In EPAct, the FERC was given authority to mandate transmission service, under certain situations, and to require utilities to enlarge their transmission facilities to accommodate such service. EPAct also provided that state public service commissions or other state and local agencies still have the authority to site and environmentally review new transmission facilities. Thus, any FERC order to enlarge transmission facilities might be blocked. In such a case, so long as the utility made a good faith effort to get the appropriate approvals to site and build the line but was refused by state or local authorities, there was a good faith exemption from a FERC order to enlarge such facilities and to provide the associated transmission service. The problem here is that a transmission facility is actually a shared facility, being built to accommodate both retail and wholesale service transactions. Federal and state cooperation and coordination are necessary to prevent regulatory bottlenecks from occurring.

In addition, EPAct provides in a "savings provision" that the FERC cannot mandate wheeling services to retail customers, but that states (commissions and legislatures) still have

whatever authority they had previous to the Act. State commissions and legislatures have the authority to define what is covered by exclusive franchise areas or certificates of convenience. In other words, because the regulation of retail service of public utilities is exclusively a matter of state law, state commissions and legislatures have the authority to redefine whether (as well as which) retail customers must take service from their host utility. This raises the issue of "stranded costs." The problem is, if state commissions allow direct access by retail customers to competitive sources of power, then the utility might find that some of its embedded costs incurred under rate-of-return/obligation-to-serve regulation become "stranded." "Stranded," as used in this sense, means that the costs are above those supportable at the market price and that those costs might not be otherwise recoverable. The issue then becomes one of whether these costs are recoverable because they result from customers "stranding" costs undertaken on their behalf under the traditional regulatory compact and, if so, how they should be recovered. Many of the recovery methods that are consistent with the development of competitive markets are within the jurisdiction of state commissions. Here too, there needs to be recognition of the nature of the joint jurisdiction over shared facilities by the FERC and the state commissions. New levels of regulatory cooperation and coordination might be necessary for efficient solutions that allow commissions to design win-win outcomes.

Finally, the FERC is committed to developing competitive wholesale power markets. As such, the FERC has begun to allow the establishment of regional transmission groups that provide comparable transmission service for all users, and it is now examining alternatives to so-called "poolcos."³ Yet, state commissions have a key role to play to assure that traditional (non-QF and non-EWG) utilities under their jurisdiction are key players as both sellers and buyers in the wholesale power markets. Here too, there needs to be recognition of the need for federal-state cooperation and coordination to encourage the development of dynamically competitive markets.

³ "Poolcos" would be an independent entity responsible for dispatching power on a nondiscriminatory basis and for assuring open transmission access.

Changing Regulatory Compact

The traditional regulatory compact provided electric utilities an opportunity to earn a reasonable return on prudently incurred investments and recover their prudently incurred costs in exchange for fulfilling their obligation to serve within their exclusive service territory. In the coming years, the traditional compact will be under pressure and will likely change in response to ongoing industry restructuring. These changes are made more complex by the greater intermingling of federal and state jurisdiction for electric utilities. As noted, there is shared federal and state jurisdiction over the electric power industry. This arises particularly because facilities are often shared that are subject to both federal and state jurisdictions--far more so than for gas, for example.

The traditional regulatory compact is affected by the development of competitive wholesale power markets. As with gas, opportunities to buy less expensive power on the wholesale market mean that electric utilities should do so where such purchases would lower their costs. Most (nearly all) electric utilities regulated by state commissions, however, are vertically-integrated utilities that own generation. Therefore, the tendency of a utility is to generate power internally for customers even if there are less expensive sources of power available on wholesale markets. For state regulators to encourage utilities to make appropriate purchases in the wholesale market, state regulators might want to consider replacing fuel adjustment clauses with some kind of targeted performance-based ratemaking (PBR) to provide utilities with appropriate incentives to purchase on the wholesale market. Because utilities are vertically integrated, PBR should be designed to set the utility's own internal generation on the same basis as power on the wholesale market.

Alternatively, as a more comprehensive incentive mechanism, state regulators might want to consider price-cap regulation to allow utilities to cut their costs and to share the cost savings with their customers. Price-cap regulation provides strong incentives to minimize cost, promotes the development of competitive markets, and can provide utilities with a source of "new" money generated from efficiency that can be used to offset a portion of embedded costs that are "stranded" or not recoverable at market-based prices. Such an approach may be preferable to

shifting so-called stranded costs to remaining core customers. The latter, while seemingly consistent with allowing utilities recovery of their prudently incurred costs, arguably violates the regulatory compact by making the remaining core customers pay a discriminatory price that exceeds the "just and reasonable" level.

State regulators, in considering whether to revise the traditional compact, will likely be forced to address the question of whether retail customers should have direct access to competitive power markets. Perhaps the most significant, but by no means the only, issues that state regulators will need to address in making such a decision are: (1) what to do about the obligation to serve, and (2) how to deal with so-called stranded costs. The two mechanisms just discussed, targeted PBR and price caps, can efficiently provide the utility with revenues that could offset

stranded costs. An additional mechanism that has the same effect involves setting an exit fee based on a percentage of net generation savings that is realized by the transaction on the competitive market. Such a mechanism would directly tie the recovery of stranded costs to the benefits realized by the buyer finding less expensive power from the wholesale power market. Use of such a mechanism, however, requires greater cooperation and coordination of federal and state regulatory policies than what now exists.

Similar to the gas industry, if the underlying regulatory compact changes, the obligation to serve departing customers would become an obligation to deliver (that is, to provide network transmission and distribution service) power to those customers from sources with whom the customer has contracted. If the customer wants assurance from the host utility that it will provide

FEATURES OF A NEW REGULATORY COMPACT

- *More pricing flexibility*
- *Redefinition of reasonable prices*
- *Obligation to deliver electricity to noncore customers*
- *Risk shifting to shareholders*
- *Wider range of allowable profits*

stand-by or back-up power should its contracted source of power fail, then the departing customer should contract for those services by paying an appropriate price.

Core Customers, Noncore Customers, and Competition in the Electric Power Industry

PUBLIC POLICY ISSUES RELATING TO RETAIL COMPETITION

- *Legality with respect to state statutes*
- *Technical feasibility*
- *Effect on the "regulatory compact"*
- *Treatment of "stranded costs"*
- *Effect on the future structure of the electric power industry*
- *Effect on utility-financed DSM activities and the IRP process*
- *Protection of core customers*
- *Comparability of regulation and competition*
- *Appropriate rate-making paradigm*

The emergence of competition in any industry raises expectations for more consumer choices, high-quality products and services, and lower prices. Competition does not merge uniformly, however, across all sectors of the industry. The electric power industry is no exception in this regard. Currently, the electric power industry is experiencing its second wave of competitive pressure. The first wave occurred when the federal government passed PURPA in 1978. The Act reduced entry barriers to cogenerators and small power producers. The second wave followed when the federal government passed EPAct. EWGs can now compete in the industry's generation sector.

Competition in the generation sector has already affected the price relationships among the franchised utility's

customer classes. Retail customers with a credible threat of leaving the utility's system by becoming cogenerators or self-generators have been able to extract price concessions. In the

future, retail customers threatening to access lower-cost power from independent power producers (IPPs) and other generators also will likely receive price concessions. These price concessions and other factors, such as the customer's ability to leave or not enter the franchised utility's service territory, have caused the electric power industry to adopt the literary shorthand of core and noncore customers.

Definitions of Core and Noncore Customers

The following discussion defines individuals and businesses as: (1) core customers when purchasing noncompetitive products and services, and (2) noncore customers when purchasing competitive and emergingly competitive products and services. In purchasing competitive services, noncore customers choose low-price or high-quality products and services from among several well-established firms. The choices of noncore customers who purchase emergingly competitive services represent opportunities to buy products and services from any of several firms with the prior knowledge that some of the firms are not well-entrenched in the marketplace. Finally, in purchasing noncompetitive services, it is assumed that core customers are unable to confidently buy products and services comparable to those supplied by the franchised utility. When core and noncore customers are defined in terms of their purchasing opportunities, it is easy to see why core customers require the protection of regulatory authorities.

Regulatory Protection of Core Customers

Regulators cannot rely on competitive pressures to protect core customers. These customers can be protected using a variant of traditional regulatory practices. The franchised utility and its regulators, for example, can agree to a rate moratorium through a price cap for noncompetitive products and services. This approach freezes prices for core customers, while the utility competes for sales to noncore customers. A rate moratorium will prove to be an unstable mechanism, however, if regulators change the rules for the resale of noncompetitive products and services and for market entry.

Regulators will also attempt to ensure that prices of noncompetitive products and services do not include the sources of subsidy for the prices of competitive and emerging competitive products and services. Open access tariffs will likely be designed to provide some price relief for core customers; that is, profits from the sale of open access services to competitors in the industry's generation sector may be used to keep down the prices of noncompetitive products and services. The prices for noncompetitive services will continue to be based on the criteria of fairness, reasonableness, and nondiscrimination. Similarly situated customers will continue to receive identical prices, terms, and conditions. Further, the terms and conditions of the tariffs applicable to core customers will continue to be restrictive. For example, the termination options available to the franchised utility will remain highly limited, since core customers, by definition, do not have meaningful access to alternative suppliers of comparable services at reasonable prices.

Regulatory Protection of Noncore Customers

Regulators can rely on the marketplace to protect noncore customers purchasing competitive services. Assuming that competition is well-established and no one firm in the market exhibits market power in relation to the other firms in the market, competitive pressures will hold price levels in check and quality at reasonable levels. The protection of the noncore customers purchasing emerging competitive services will prove to be the most difficult task facing regulators. The problem is not that price levels will rise for these noncore customers. Rather, the problem is that not all "similarly situated customers" falling within this classification will receive the same price. Consequently, regulators will have to deal with claims of undue price discrimination and preferential treatments. The likely responses to these claims will be regulatory devices protecting the interests of those noncore customers who are not in the position to command customer-specific tariffs or contracts.

Rate design for competitive and emerging competitive products and services will likely change. Two-part and multi-part tariffs will replace the uniform-rate and block-rate tariffs. Large-volume consumers will face lower usage-based rates and charges. Market-based tariffs, such as customer-specific tariffs, should take on larger roles in the pricing of the noncore

customer's products and services. These tariffs would apply to all similarly situated customers with specific and predetermined usage characteristics, such as those found in metal refining. The customer-specific tariff is likely to be replaced with contracts where the franchised utility and the noncore customer negotiate a set of prices, terms and conditions applicable only to that customer.

Funding for Social Programs

In the presence of core and noncore customers, regulators may try to find new ways to maintain existing social programs. If mandated by state regulators or legislatures, financial support can originate from four sources. First, support may come from the franchised utility introducing new (nonmonopoly) services that earn the utility economic profits. Such profits, which can be a source of funding for social programs, are probable in view of the fact that the

generation sector will at no point in time be perfectly competitive. Second, the franchised utility may cut costs sufficiently to support social programs as a *quid pro quo* for price-cap regulation. Third, the franchised utility may raise the prices of noncompetitive services in order to support social programs. Fourth, regulators may place responsibilities on the franchised utility's competitors with respect to supporting social programs. If so, nonutilities will be subject to the oversight and limited authority of state and federal regulators. All things considered, the emergence of a competitive generation sector does not necessarily foretell the demise of social programs, even if general tax revenues are not used to support them. Social programs could potentially be supported in the four different methods discussed above. None of these funding sources is mutually exclusive.

FUNDING SOURCES FOR SOCIAL PROGRAMS

- *Profits from new services*
- *Efficiency gains*
- *Higher prices for noncompetitive services*
- *"Taxes" to utility competitors*

Obligation to Serve: No Open Access or Comparability

Without open access arrangements and technical parameters for comparable interconnections, the only real threat to the franchised utility in terms of lost load is one of two forms of facilities bypass. In this instance, the franchised utility's obligation to serve will be treated in the context of back-up power. If the noncore customer leaving the system wants back-up power immediately, then a back-up contract can be negotiated with the franchised utility. If the noncore customer wants back-up power at some predetermined time after leaving the system, then the franchised utility could be willing to offer this service through some premium-priced tariff. If the system-leaving noncore customer cannot commit to back-up power until after a prescribed time period, then the franchised utility could have the option to deny service.

Obligation to Serve: Open Access and Comparability

With open access and comparability, the market behavior of noncore customers will make it costly for a franchised utility to function as the provider of last resort. The "provider of last resort" criterion will not be a very compelling public policy position: noncore customers can easily move among electricity suppliers, and electric power will always be available to meet their demand. In other words, the obligation to serve noncore customers will be irrelevant (with the exception of the obligation to provide delivery services). Therefore, the franchised utility's obligation to serve, in this environment, will be restricted to core customers. As said, earlier, core customers lack options in terms of alternative suppliers of electric power. Consequently, the franchised utility will have to serve these customers.

Universality for Core and Noncore Customers

The same arguments offered for the franchised utility's obligation to serve apply to the universality of electricity service for core and noncore customers. The marketplace provides the

market-driven concept of universality for noncore customers. Regulators would continue to define the concept of universality for core customers.

New Risks

In a competitive environment, utilities would face additional market or business risks. These risks can be broken down into three categories: price, supply, and demand risk. A utility could lose market share by allowing costs to become excessive, for example, by purchasing coal or electricity at a price that later turns out to be higher than the market-based level, or by the entry of new competitors in its previously franchised area. It is safe to say that, as a general rule, competitive markets are riskier for utilities than regulated markets or those where utilities have distinct market power.

How utilities and regulators will, and should, respond to the increased risk of a competitive marketplace is an important public policy question. Lowering risk to the utility, per se, may not represent the preferred course of action. A firm only under exceptional circumstances (for example, when no payoff results from risk-taking) would try to minimize risk.

Utilities will attempt to convince their regulators that minimizing the new risks to shareholders is both in the public interest and in the interest of customers. Support for fuel adjustment clauses, allowing construction-work-in-progress in rate base and, more recently, regulatory preapproval of new capital expenditures all hinged on the argument that "what is good for utility shareholders is good for customers." The fundamental problem of shifting risk to customers is that the utility does not take responsibility for its decisions and actions. In the extreme case where customers assume all of the risks, the utility becomes indifferent to the ultimate outcomes. What economists call "moral hazard" becomes a serious problem whenever a utility can shift risks to customers.

Utility managers, as well as individuals in general, look at the risk-payoff relationship for different decisions. Minimizing risk for a utility may mean forgoing potential returns associated with a more risky action. In a competitive environment, utilities would be especially averse to outcomes that result in above-market prices for their services. Firms generally engage in risk

management to control the risk they face, without seriously jeopardizing their expected profits. In a competitive environment, utility investors would take a more critical look at management competence.

Electric utilities in the future may be led to reduce their exposure to price fluctuations in the electric market by using futures and options, or by working with brokers and marketers. These financial instruments will likely develop as the electric markets become more competitive. These instruments are increasingly being used in the natural gas industry. Their usage began after the wellhead gas market transformed from one where prices were tightly regulated to one where natural gas is priced as a commodity. As the same evolution occurs in the electric generation sector, financial instruments to manage risk are likely to emerge.

**REGULATORY ISSUES
ASSOCIATED WITH
INCREASED RISKS**

- *Effect on utility's financial condition*
- *Level of risk tolerance*
- *Allowed utility flexibility to manage or control risk*
- *Allocation of risk to utility shareholders and customers*
- *Allocation of risk among classes of customers*
- *Cost of minimizing utility risk*

As utilities confront the risks of a competitive market, regulators will need to address three broad categories of questions:

1. What effect will this increased risk have on the ability of utilities to maintain financial viability? Some utilities are beginning to argue, and in the future will continue to argue more forcefully, that in the new environment, they should have the opportunity to earn higher profits. Their reasoning is that unless they can financially benefit more from making good decisions, their expected return will fall below the level commensurate with increased risk. Following this argument, should regulators loosen the profit constraints under traditional

regulation to accommodate additional risks? If so, how can this be accomplished in a way that the utility would not earn exorbitant profits?

2. How much flexibility should utilities be given to manage or control their risks?

Utilities will argue that offsetting increased risks can best be done not only by increasing rewards but also by giving them the ability to manage these risks. This implies that regulators, other than providing incentives, should stand back and allow a utility to evaluate market and other kinds of risk in the process of making decisions. In the case of managing supply risk, for example, a utility would have discretion to negotiate terms and conditions in contracts and to choose power sources as part of a portfolio.

3. How much of the increased risk should be assumed by utility shareholders and how much by customers? How should the risk be allocated among the different classes of customers? In a competitive environment, a utility assumes most of the risks in addition to being given opportunities to earn higher profits. That is to say, compared with today, tomorrow's electric utilities operating in a competitive environment will have fewer bounds with respect to both risks and profits. This is compatible with competitive and unregulated markets where firms are generally held accountable for their performance, whether influenced by management or outside forces. From an economic perspective, this is the way it should be. Such a risk-reward relationship provides a firm with strong incentives to operate as efficiently as possible. Further, risk should be shifted to those making decisions and to where it is less costly. It can be argued that utility shareholders can more efficiently bear risk, since they can diversify around most of it. Overall, the argument here is that for the electric utility of the future, incentives and constraints should (and more likely will) look much different than what they do today under traditional rate-of-return regulation.

New Technologies

Ongoing efforts to develop and commercially deploy new technologies for more efficient and less polluting production, delivery, and end uses of electricity will continue into the 21st century. To facilitate the best possible utilization of new technologies from society's perspective, regulators may need to continuously reexamine policies that affect resource choices made by utilities and energy consumption choices made by consumers.

Overview of New Technologies

New generation technologies under development include clean coal technologies (CCTs), innovative renewable technologies, and innovative nuclear technologies. Conventional coal combustion processes for power generation produce sulfur dioxide, nitrogen oxide, and carbon dioxide gases that have been implicated as causes of acid rain and global warming, as well as other pollutants.

CCTs use processes that either improve the fuel-efficiency of, or reduce the level of pollutants produced by, the coal-burning process. Well-known CCTs include atmospheric fluidized-bed combustion, pressurized fluidized-bed combustion, integrated gasification combined cycle, sorbent injection processes, and fuel cells.

Renewable technologies convert natural processes into useful forms of energy without depleting natural resources and imposing large environmental costs. Among these, hydropower, photovoltaics, solar thermal, geothermal, and wind technologies are well known. Except for hydropower, most renewable technologies for centrally-dispatched, large-scale utility grid-connected applications are not yet economically competitive with conventional fossil-based technologies. Current efforts by the federal government and the private sector hope to reduce the cost of renewables and to expand nongrid applications.

Like renewable technologies and unlike fossil-based technologies, nuclear power technologies do not contribute to such well-known environmental problems as acid rain and global warming. Nuclear plants, of course, are susceptible to potential accidents and

malfunctions, and generate radioactive wastes. As a result, nuclear plants have encountered significant safety and environmental concerns. Current development efforts include improving the safety features of conventional nuclear plants. The new technology concepts include evolutionary light-water-reactor (LWR) designs, passive LWR designs, and advanced non-LWR designs.

As open access transmission and wheeling transactions expand, ongoing efforts to develop advanced transmission technologies will continue. The new technologies will attempt to overcome problems associated with voltage stability, loop flow, and line losses when lines become congested. Advances in thyristor switching technology, metal oxide integrated-circuit controllers, and system control software will help enhance the capacity of existing lines and minimize the need to build new capacity.

Over the last decade, a number of end-use technologies that improve energy conversion and produce less pollution have emerged. End-use technologies include energy efficient space heaters, refrigerators and air-conditioners, motors, and lighting devices. The emerging transportation technologies include electric-powered vehicles. Current efforts are devoted to improving both the economics and market acceptance of innovative end-use technologies.

Public Policy Issues

Many of the innovative technologies, particularly generation technologies, require high capital outlays during construction and potentially high initial operating costs. Future prospects for such technologies may be particularly sensitive to regulatory policymaking. Other technologies, such as end-use energy-efficient appliances, are also significantly affected by regulatory policy. Prospects for transportation technologies, such as electric cars, are not directly affected

ISSUES ASSOCIATED WITH NEW TECHNOLOGIES

- *Comparative economics*
- *Treatment of risks*
- *Equity among parties*
- *Potential benefits to consumers*
- *Treatment of external benefits*

by regulation. Regulators will continue to face several issues in addressing new technologies: comparative economics, risks, equity among parties, and potential benefits to consumers and the broad public interest.

Comparative economics will continue to be an important consideration in the choice of a technology. In a resource planning context, the technology with the lower expected cost will likely be selected. The uncertainties associated with estimating costs and other criteria by which technologies may be compared, however, mean that economic comparisons are not straightforward.

The uncertainties in cost estimation, along with other uncertainties associated with future performance of a technology, prices of inputs, project financing, and potential regulatory disallowances impose risks on a utility contemplating commercial deployment of a new technology. The presence of such risks may impede innovation. It can be argued that incentives to offset risks of technological innovation merit strong support if the potential long-run consumer benefits or societal benefits exceed the corresponding costs.

The potential consumer benefit is essentially economic: lower costs to utilities that translate into lower rates to consumers in the long run. It can be argued that this benefit is unlikely to be captured by regulated firms, which generally face an asymmetric risk/reward structure owing to the existence of regulated profit constraints. The symmetric risk/reward structure present in an unregulated market may be more conducive to innovation. For this reason, cost-reducing technological innovations in the energy field are more likely to be initiated by the less regulated or unregulated firms, namely IPPs and other NUGs. But the unregulated market may not capture the larger societal benefits or externalities of innovative technologies. Therefore, even in unregulated markets, adoption of new technologies may occur below what may be considered the socially efficient level. This may call for public intervention to promote the socially efficient level of innovation.

As mentioned above, one form of public intervention would be to offset the risks of innovation to regulated firms. But to offset risks for chosen technologies is to redistribute the risks among various stakeholders. Redistribution of risks often raises equity concerns. These

concerns can be addressed by showing that the underlying societal or public interest rationale is indeed overriding.

Public interest arguments often used to promote a technology or resource option include environmental costs or benefits, local employment, and national energy security. Many state regulators now have special incentives in place to promote energy efficiency and demand-side management, renewables and coal technologies, and higher utilization of existing nuclear capacity. Current incentives include IRP requirements, rate-making mechanisms intended to make supply-side and demand-side incentives equally profitable, environmental adders, favorable cost passthroughs for some technologies, and capacity utilization payments. Use of the public interest argument, rather than economic arguments, for promoting a chosen technology or resource option, however, will continue to cause conflicts among advocates or beneficiaries of competing options.

The foregoing discussion shows that in addressing emerging advanced technologies, state regulators essentially face the same issues that they face in addressing other facets of regulation. For example, the standard regulatory paradigm of balancing the interests of various stakeholders still applies in addressing innovative technologies.

As competition continues to develop in energy markets, state regulators will face new constraints in policymaking. Incentives that cause inefficient or inequitable cross-subsidies across customer groups may be unworkable, if one or more customer groups have access to the newly developing markets. The result may be the departure of price-elastic customers from the utility's revenue base and the loading of higher rates on price-inelastic customers. Therefore, future incentive mechanisms should contain strong cost-minimization properties, safeguards against cross-subsidies, and market-driven risk/reward structures. In other words, future incentive mechanisms need to be focused less on offsetting risks and more on increasing rewards of innovation.

4. SUMMARY

Competition in the electric power industry will intensify in the coming years. Competitive pressures will create new challenges for utilities. For utilities, the key concern is how they can maintain financial viability when consumers have more choices and the risks associated with poor performance are heightened. In such an environment, utilities will be compelled to explore new ways to price and market their services, operate their electric power systems, and strategically plan for the future. A new "equilibrium" condition for many utilities may not arrive before radical changes occur. These changes largely reflect the actions of utilities and other entities in the electric power industry in response to competitive forces.

By the year 2000 it is safe to say that the electric power industry will take on a new appearance. If one believes this to be true, it is not too early today for utilities to develop a new corporate culture geared toward competing in this new environment.

THE FUTURE NATURAL GAS INDUSTRY

Electric and Gas Research Division

1. AN OVERVIEW OF THE FUTURE

FERC Order 636, the natural gas industry restructuring rule, has shifted the focus of the natural gas industry from the pipeline sector to the local distribution sector. Local gas distribution companies (LDCs) are facing new responsibilities and new challenges as competition in the natural gas industry moves to the retail sector. In a more competitive environment, the financial condition of an LDC will largely depend on the performance of its management in acquiring low-cost gas supplies and transportation, reducing costs and increasing productivity, and developing new markets and services. Those LDCs that perform poorly may find themselves in financial distress.

A major task for LDCs will be to manage the new market risks and to adapt to changed market conditions. LDCs will be under great pressure to operate efficiently, offer high-value-added services to consumers, and in general to be consumer oriented. In the future, natural gas services will be priced less on the basis of an LDC's costs than on the value they offer consumers. Especially in noncore markets, prices and other terms of gas service will be set by market conditions. Core markets will diminish as more consumers gain access to alternate sources of gas supplies. Overall, the focus of attention may shift, depending on the degree of less regulation, from LDCs and regulators to investors and consumers.

CRITICAL ISSUES SURROUNDING LDC RESTRUCTURING

- *Degree of unbundling*
- *New service offerings*
- *Deregulation of certain services and markets*
- *Pricing of unbundled, bundled, and new services*
- *Rate-making paradigm*
- *Division of core and noncore markets*
- *Obligation to serve*
- *Definition of comparable transportation-access conditions*

Over the next few years, a major issue will be the restructuring of local natural gas services. The transition to the "ultimate" restructuring will occupy much of the time of LDC

management and state regulators. How this transition is carried out has important implications for the average gas user: LDC service restructuring will directly affect the cost and reliability of distribution services. The full benefits of regulatory reform already in place for the gas wellhead and transportation sectors will unlikely be realized for retail gas customers in the absence of restructuring at the distribution level. The restructuring that will likely occur will transform the LDC from a franchised monopoly providing a uniform bundled service to a consumer-oriented, cost-conscious enterprise delivering unbundled services.

POST-636 ENVIRONMENT

- *New business risks for LDCs*
- *Reallocation of risks to LDCs*
- *Growth of marketers/brokers*
- *Unbundled and new gas services*
- *Market activity for secondary pipeline capacity*
- *More pipeline and retail competition*
- *New LDC market structure*
- *Financial instruments for managing risks*

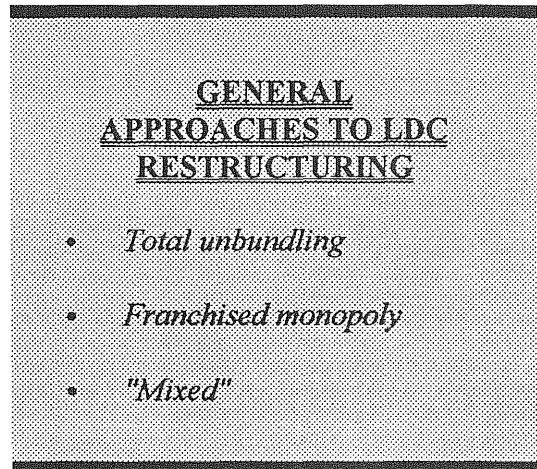
In the post-636 world, LDCs have new gas supply options and service responsibilities. LDCs will assume a critical role in the provision of reliable and economical gas services, as interstate pipelines are relieved of their merchant function and their obligation to serve customers. FERC Order 636 reallocates risks from pipelines to LDCs, in addition to increasing overall risk because of the greater role assumed by market forces.

During the transition period, defined here as the time required for "final" restructuring of the distribution sector, state regulators will have to address several complex issues. Probably the most important and fundamental will be the coexistence of

competition and regulation. For regulators, the key question will be how to achieve a proper balance among the goals of promoting competition, avoiding financial distress for an LDC, and protecting core customers from undue price discrimination and cost shifting. In achieving such a balance, state regulators may have to reassess long-standing practices and policies. One in particular, rate-of-return (ROR) regulation, merits reconsideration in view of the competitive

pressures that will be placed on LDCs. As is likely, LDCs will be petitioning their regulators to replace existing rate-making procedures with those that allow them more pricing flexibility and compensatory profit opportunities as a *quid pro quo* for assuming more of the risks. LDCs will find it increasingly difficult to avoid financial distress in a regulatory environment where they face restricted pricing flexibility and limited opportunities to increase profits from successful performance in operations, planning, and marketing.

Although restructuring of LDC services has already occurred in response to FERC's promulgation of rules in the early 1980s, the restructuring that lies ahead will be more comprehensive. Future restructuring will center on the unbundling of LDC services, the offering of new services, and the deregulation of certain LDC markets and services.



2. BIG QUESTIONS FOR THE FUTURE

LDCs and state regulators face major uncertainties over the character and implications of future restructuring. Key unknowns include the length of the restructuring period and the ultimate "equilibrium" outcome. State regulators will play a crucial role in the transition period. From an LDC's perspective, it has an interest in shaping the restructuring in a manner that maximizes its profits. A regulatory agency, on the other hand, is more concerned with the broader social-welfare effects of restructuring. It would want to consider the benefits and costs to individual groups of consumers, as well as to society at large. For example, an LDC would look more at unbundling gas services or offering new gas services in terms of the profitability to shareholders; a regulatory agency would tend to look more at the effect on consumer welfare.

Although no one has a crystal ball to answer all of the big questions that LDCs and regulators will face in the coming years, certain features of a restructured LDC sector can be identified. First, a more competitive LDC sector will require consideration of a new

TEN BIG QUESTIONS

- *What will the gas distribution sector look like in the year 2000?*
- *What role will new technologies play?*
- *What will be the decision rule for pricing and investment strategies?*
- *What new risks will LDCs face?*
- *How will retail core customers be protected?*
- *How will the regulatory compact change?*
- *Which LDC services will be competitive? Which will continue to be monopolistic?*
- *Will LDCs be attracted to diversification? If so, what activities will they engage in?*
- *Will LDCs continue to engage in certain socially-oriented activities?*
- *What state/federal jurisdictional issues will emerge?*

regulatory rate-making paradigm. Second, LDCs will face new market risks which they will FERC Order 636 shifts to LDCs many of the responsibilities previously held by pipelines. In some cases, these new responsibilities will induce LDCs to more aggressively apply risk-management techniques. Third, LDCs will need to have more flexibility than what they currently have in offering new and different services, the pricing of competitive services, and planning for new investments. Without this flexibility, an LDC will have difficulty in competing. Fourth, an LDC will have different service obligations, depending on whether a customer purchases a core or noncore service. Fifth, LDCs will form a new corporate culture, one that is consumer-oriented and investor-responsive.

3. MAJOR HAPPENINGS

Industry Restructuring

Reorganization

As a result of the many federal and state regulatory reforms in the last twenty years, interstate and local gas distribution markets have gone through some drastic transformations. Total service unbundling and comparable transportation access, which have been firmly

established in the upstream markets (wellhead and interstate), are increasingly being implemented in the downstream market (local distribution). Intensive competition, rather than government regulation, will be the driving force in setting prices and quantities for most, if not all, gas market segments.

The structural transformations of interstate and local distribution markets have followed a parallel path. Open-access transportation service is the most notable example. After the FERC established conditions for interstate open-access transportation services in Orders 436 and 500, many state commissions started developing their own policies and guidelines regarding the provision of open and comparable transportation services by LDCs for end-use customers. A similar diffusion of regulatory initiatives from the federal government to state government is likely to occur in the unbundling of gas services.

The reorganization (restructuring) of the natural gas industry is a continuing process, in which the pace of change may not be uniform among all states or regions of the country. Four general trends, however, are the most prominent in the reorganization process. First, a drastic increase in the amount of gas directly purchased by customers (either LDCs or end users) has occurred. Second, the short-term and more flexible gas procurement and transportation arrangements (such as spot contract and interruptible transportation service) have replaced the traditional long-term contracts with stringent and inflexible take and pricing provisions. Third, gas services are being unbundled and distinct elements of service (such as production, load balancing, transportation, distribution, and metering and billing) are being supplied by different entities. In the future, these services may be deregulated. Lastly, in response to the changes in the gas market, there has been a rapid proliferation of market intermediaries (such as brokers and

FOUR TRENDS IN REORGANIZATION

- *Direct gas purchases*
- *More flexible gas procurement and transportation arrangements*
- *Gas service unbundling*
- *Emergence of market intermediaries*

marketers) that can arrange, facilitate, and rebundle various procurement and transportation arrangements.

Several factors have contributed to the reorganization of the natural gas industry. They include the wide availability of and access to transportation services, the price advantages of spot purchases over long-term contracts, intense interfuel competition, and state regulatory mandates on "least-cost" gas procurement. The availability of open-access transportation services laid out the physical means by which gas buyers (mainly LDCs) could use their connecting pipelines for transportation and to procure gas directly from producers or other pipelines. The cost advantage of spot purchases over long-term contracts provided the economic motivations for LDCs and certain end users to buy gas from entities other than their connecting pipelines. The threats of bypass, in addition to customers shifting to fuels other than gas or to alternate suppliers, have forced LDCs to consider "escaping" from their current pipeline suppliers or using transportation-only service in order to find cheaper gas supplies. Similarly, when LDCs have faced more stringent state requirements on gas procurement, as many have over the last few years, they tended to look for alternate sources to the bundled gas supplied by the interstate pipelines.

New Market Structure

NEW MARKET STRUCTURE

- *Commodity gas*
- *Interstate transportation*
- *Core distribution*
- *Noncore distribution*

In the past, the U.S. natural gas industry was characterized by a rigid three-tier structure with long-term contracts as the dominant form of gas transactions. Three distinct markets (wellhead, citygate, and local distribution) existed. Under this industry structure, gas was provided as a delivered, bundled good from wellhead to burnertip and interstate pipelines played a particularly critical role in the delivering process. Strong technical and economic

reasons underlaid the prevalence of this particular market structure. Under this three-tier structure, the natural gas industry had performed reasonably well over a long period of time. But, this market structure caused substantial distortions and performed poorly during the mid-1970s' supply shortage and during the early to mid-1980s' gas surplus.

Both regulatory agencies and the gas industry have adopted a large number of initiatives in responding to the inadequacy of the traditional three-tier market structure. Over the last ten years, a four-market (commodity gas, interstate transportation, core distribution, and noncore distribution) structure that centered around direct gas purchases and spot contracts with flexible supply and take provisions has emerged. This four-market industry structure is unlikely to change in the foreseeable future.

The commodity gas market includes the wellhead market, spot market, gas futures market, and more recently, the gas options market. The commodity gas market decides the overall level of gas production and the value (price) of gas available at specific time periods and delivery points. There are typically many buyers (such as LDCs, pipelines, industrial and commercial end users, and gas marketers) and sellers (such as producers, marketers, pipelines, and investors and speculators) in the four components of the gas commodity market. It is generally recognized that these markets are either extremely competitive owing to the nature of the transactions or, at the minimum, "structurally competitive" where no single participant can exercise significant market power.

Core distribution service refers to the traditional bundled service provided to customers who are unable or unwilling to switch to alternate fuels or other gas suppliers. This market is on the opposite spectrum to the commodity gas market in terms of the degree of competition and governmental regulation. It has been subject to strict state regulation in the past and will probably remain so, although with some modifications, in the foreseeable future. This market is characterized by: (1) the monopoly of the LDC, (2) the LDC's inherent obligation to serve all customers who demand service, and (3) the provision of gas as a bundled package of transportation, storage, load-balancing, and backup services.

Noncore distribution service refers to the provision of bundled gas sales or unbundled intrastate transportation service to those customers (such as bypassing-capable or fuel-switchable

customers) who have either the ability to switch to another fuel or can arrange to purchase gas from other entities. Under current state regulation, an LDC has the obligation to provide service to these noncore customers; but these customers do not have the obligation to take bundled gas from the LDC. Thus, these noncore customers are in an attractive position to buy the most economical gas services. It is expected that the size of the noncore distribution market will increase in the future.

The interstate transportation market has been the focus of previous regulatory reforms. Yet, the emergence of a market for transportation-only service has been a relatively new development; it is not as well-developed and organized as the commodity gas market. New transaction mechanisms are still being tested and developed. Because of the technical and economic nature of a transportation network, the interstate transportation market will probably never become as competitive as the commodity gas market. (With the emergence of a robust secondary market for pipeline capacity, however, competitive forces will play a role in the pricing and allocation of interstate transportation services.) There may also be considerable regional differences in the utilization of existing transportation capacity. Given the unique features of the gas transportation network, it is difficult to ascertain at this time the exact nature of the future interstate transportation market. Its performance and eventual structure will be known only after more data are collected and studied and FERC Order 636 has been in operation for several years.

Utility Affiliates and Diversification

As the functions of LDCs are redefined and their monopolistic position drastically challenged in the new gas market, they will need to make significant adjustments in their organizational structure and business strategies. This will not necessarily be a smooth transition for most LDCs. Yet, they will have no other choice. At the same time, state regulators will have to pay close attention and provide direction, if necessary, in the adjustment process so that the interests of customers are protected. The prescribed policies of state regulators also will need to maintain a balance between the interests of the LDCs and the interests of customers. A wide

range of options is available to the LDCs, and two broad categories of approaches are often considered. One is the creation of LDC affiliates that can undertake certain functions or provide services that are typically prohibited for a public utility. Another option is for the LDC to diversify itself into other areas of business, not necessarily through an unregulated subsidiary, where the LDC's expertise can be best employed and a higher rate of return received.

In the past, state regulators have performed stringent regulatory oversight regarding the formation of utility affiliates and the transactions between the LDC and its affiliates. The standards of maintaining an arm's length relationship and giving no preferential treatments were typically applied. Nevertheless, state regulators may have little experience in overseeing the creation and management of affiliates that are engaged in business areas not directly related to the LDC or its ratepayers. They include subsidiaries that specialize in the overseas development of gas distribution systems, in natural gas vehicles and fueling stations, and in marketing efforts toward industrial and utility gas users.

Under proper regulatory oversight and corporate organization, the LDC's customers may not be directly exposed to the risks and rewards associated with the operation of these subsidiaries. The LDC's overall operational and financial integrity can still be adversely affected, however, if these nonutility ventures fail. In many instances, customers may be required to absorb some or all of the losses incurred so that the parent company (the LDC) is financially viable and able to continue to provide utility services to its customers.

A total prohibition of establishing LDC affiliates is problematic and very few state regulators have adopted this approach. As the gas market becomes increasingly competitive and the service boundaries of the LDCs and the definition of services they provide are increasingly blurred, an LDC may have to establish a marketing affiliate in order to maintain and protect its competitive position within its own service territory. Similarly, given the more abundant opportunities available in overseas markets and the generally higher rates of return associated with them, many LDCs may find it difficult to maintain their ability to attract new capital at reasonable costs if they choose to ignore these new market opportunities.

A significant number of LDCs have currently established affiliated businesses. The most common affiliated business is a marketing subsidiary that either can sell gas at competitive prices

to a noncaptive customer or can arrange direct gas purchase and transportation services for any customer who needs them. Another kind of affiliated business is a gas purchasing affiliate, which is typically unregulated and is more flexible and responsive to market conditions: it faces fewer constraints than the LDCs in buying gas and transportation services.

The LDCs and state regulators are facing similar issues, whether diversification is done through the LDC directly or through an unregulated subsidiary. Achieving a balance between protecting customers from risky investments and operations and allowing LDCs the freedom to compete with other providers, should remain the state regulator's most important objective in devising appropriate policies with regard to diversification.

State/Federal Jurisdictional Implications

A "bright line" dividing state and federal jurisdictions at the citygate exists. With the exception of Hinshaw pipelines, all pipelines in interstate commerce are regulated by the FERC, while LDCs are regulated by their respective state commission. Pursuant to the Natural Gas Policy Act of 1978 and associated FERC Orders, prices at the gas wellhead are deregulated. Under Order 636, the FERC directed interstate pipelines under its jurisdiction to be regulated as common carriers of gas by providing, among other things, the unbundling of transportation and sales (gas commodity) service, the elimination of the pipeline's obligation to provide bundled gas, and a requirement that gas transportation service be provided on a comparable basis. As a result, LDCs now have complete control and responsibility for securing economical and reliable gas supplies and transportation in competitive wholesale markets. LDCs, which are still the sole supplier of bundled gas service to end users, will continue to be subject to state regulation. Most state commissions allow certain noncore customers to directly purchase gas from the wellhead while obtaining gas transportation service from their LDC.

Changing the Regulatory Compact

Historically, the regulatory compact for state regulation of LDCs called for the LDC to have an opportunity to earn a reasonable return on its prudently incurred investment and to recover its prudently incurred costs in exchange for meeting its obligation to serve customers in its exclusive franchise area. As discussed below, however, the regulatory compact for LDCs is changing in response to the restructuring of the natural gas industry.

Because purchased gas costs comprise a major portion of the cost of gas to the ultimate customer and are volatile, many state commissions have purchased gas adjustment clauses that flow through the cost of purchased gas to the ultimate customer. The cost of purchased gas is subject to periodic review--in some states as a prospective preapproval of the LDC's purchased gas portfolio, in other states as a retrospective prudence review of the LDC's gas purchases. A few states provide incentive provisions for purchased gas. In view of the open and competitive gas commodity market with spot,

CHANGING REGULATORY COMPACT FOR LDCs

- *Obligation to deliver natural gas to noncore markets*
- *Redefinition of "reasonable prices"*
- *Allowing more pricing flexibility*
- *Risk shifting to shareholders*
- *Wider range of allowable profits*

futures, and options submarkets, one possible change in the underlying regulatory compact would be to provide LDCs with performance-based incentives tied to gas market indices. Properly used, such an approach would provide the LDC with a strong incentive to provide reliable service at the lowest possible cost.

Another possibility is for state commissions to require that the LDC could no longer provide merchant service to noncore customers. Those customers who do have choices would purchase gas from gas marketers or brokers or on the open market, unless they opt to have the LDC provide gas procurement services on their behalf. Many state commissions have already

required noncore customers to procure their own gas supplies. In order to minimize the chances of the LDC suffering any adverse financial effects from noncore customers opting for transportation-only service, most state commissions have provided for some form of "top-down" pricing that allows the LDC to recover its non-gas commodity costs from transportation customers. This has the advantage of making uneconomic bypass unattractive to a noncore customer by making it more attractive for such a customer to change to transportation-only service, if a more economical (for example, lower-cost) source of gas can be found. Under this regulatory scenario, the obligation to serve for transportation customers becomes merely an obligation to deliver gas. Those customer who opt for transportation-only service, arguably, should not be covered by the utility's obligation to provide any service other than transportation. Such customers should have other stand-by or back-up service contracts with the LDC if they wish for the LDC to provide service in cases where their supplier fails to do so.

Further still, some state commissions are beginning to discuss whether the LDC should provide the merchant function for any customers, core or noncore. Except in perhaps a few isolated instances, however, buyers' cooperatives or marketers do not yet provide such service to residential and small commercial customers. Yet, one might expect that the availability of competitive sourcing of gas supplies will continue to expand, perhaps to small commercial and residential sectors, leaving the LDC with the provision of distribution service only. Alternatively, an LDC could continue to provide gas procurement for these so-called "core customers."

In most states, base rates are still subject to cost-plus-type regulation. A few states are beginning to discuss whether price caps or some other kind of incentive-based system are a better way to control base rates. Although the provision of gas distribution by an LDC will still be regulated according to the extant regulatory compact, many analysts contend that better incentives would be transmitted to the LDC with respect to controlling costs if the utility were subject to an incentive-based pricing system. For example, state regulators could set some sharing mechanism to allow a portion of the LDC's cost cutting to be passed on to customers, while allowing a portion of the cost savings to go to investors in the form of increased profits. Since the costs that go into base rates are under the LDC's control, incentive-based regulation could result in a win-win outcome.

Dichotomy of Customers: Core and Noncore

The appropriate division of core and noncore customers is a critical issue currently facing LDCs and state regulators. In the interstate market, the distinction between core and noncore customers has always been ambiguous, since in many instances the service territories of interstate pipelines are not clearly defined: one customer may be served by several interstate pipelines. In a sense, there are no core customers in the interstate market with the exception of some "full-requirements" customers, such as small municipal distributors. With the full implementation of FERC Order 636, the need no longer exists for such a distinction. Obviously, there are still some differences in terms of the obligation of interstate pipelines to provide transportation services to different customers. Such differences are decided by the mutual contractual agreement between a pipeline and its customers, rather than through a regulatory mandate.

The situation is quite different in the local distribution market. There are typically many residential and small commercial customers who have no alternative but to purchase gas from the LDC. The segmentation into core and noncore markets is a complex task that requires careful balancing of many competing interests and objectives. For example, on the one hand, state regulators want to make sure that continuing with utility regulation will not hinder the provision of a wide variety of gas services by potential suppliers. On the other hand, state regulators want to assure the continuing supply of reliable gas services to those customers who have no alternative suppliers, while at the same time still restraining any undue exercise of monopoly power by the LDCs in providing these services.

Some analysts would argue that residential access to non-LDC gas merchants is feasible and economical today. They maintain, for example, that no daily metering would be required. Instead, the LDC can statistically estimate a residential customer's daily or hourly gas use based upon weather, economic conditions, and other factors of gas usage.

Two objectives are achieved in the division of a local distribution market. One is to identify the characteristics of customer demand so that the services offered can better meet the customer's particular requirements. This will increase the demand for gas services, which in turn can increase the overall economic efficiency of the local gas distribution market. Another goal is

to divide the market into segments so that the appropriate form of governmental intervention, if any, can be applied.

The concept of market division based on the ability of customers to find alternate suppliers is easy to comprehend. There are, however, several practical difficulties associated with the identification of core customers. First, a particular time period must be specified in determining whether or not a customer is truly a core customer. Also, even for a group of homogeneous customers with very similar gas utilization characteristics, the knowledge and ability to find alternate suppliers among them may vary widely. A previously captive customer, for example, can decide to install a dual-fuel boiler and, thus, may no longer be classified as a captive customer.

Implications of Increasing Competition

Pricing

Cost-based pricing of local distribution services has been the hallmark of traditional utility regulation. It will still be used widely, at least for core customers, in the foreseeable future. For many LDCs, however, new ways of pricing gas services are increasingly being considered and applied. Three different kinds of pricing schemes have become the most popular: market-based pricing, nontariffed pricing (contract pricing), and incentive pricing. They may be used individually or jointly by an LDC for some or all of its customers.

The implications of increased competition for the pricing of local distribution services are best understood within the framework of price discrimination. In the past, price discrimination (for example, firm and nonfirm services pricing, and cost allocation among customer groups) generally was in reference to different services and the basis for discrimination was the differences in end use, energy requirements, and load characteristics. But, for the three new pricing mechanisms, different prices are applied to essentially identical services, where the basis of discrimination would be the customer's ability to switch to other fuels or suppliers.

One reason for the increased popularity of this new pricing is the growing number of fuel-switching and supply-switching (noncore) customers. As a result of the ability to switch fuels and

suppliers, bypass or the threat of bypass becomes a powerful tool available to these customers in obtaining gas services at more favorable terms than under traditional cost-based regulation. Another reason for using a new pricing scheme is the rigidity of the LDC's capital investments and gas procurement commitments. An LDC's capital plant (such as distribution lines, meters, and pump stations) generally has a long economic life with few alternative uses, and is immobile. At any point in time, the LDC's delivery capacity and gas procurement mix may not be optimal for its customers' energy and load requirements. In the past, the LDC's costs of providing services were shared by all customers. As the distribution market becomes more competitive, noncore customers may no longer be willing to share the full costs of gas services. They may decide, instead, to leave the LDC system if they are not allowed to receive services under some different pricing mechanism. New pricing mechanisms should improve the utilization of the LDC's fixed facilities.

Obligation to Serve

The concept of "obligation to serve" in the natural gas industry originated not as a way to enhance service reliability but, instead, as an economic means for assuring mutual commitment and for reducing risks associated with opportunistic behavior in gas transactions. The modification of service obligations in the restructured gas market could be approached similarly. Consequently, the modification of service obligations would not be viewed as a tool to enhance or reduce the reliability of largely unbundled gas services. Rather, it would be used primarily to balance the risk and reward of gas transactions between an LDC and its customers in an increasingly competitive marketplace.

As an LDC's customers can be differentiated, so, too, the LDC's responsibility or obligation to its customers can change. By doing so, a well-defined set of responsibilities will not only restrain the use of the LDC's monopoly power in providing gas transportation but also limit the opportunistic behavior of some end-use customers. Specifically, the LDC will still be obligated to provide a bundled service or stand ready to serve core customers who have no

alternate supplier. In return, the LDC will be assured full recovery of those costs incurred prudently in serving these customers.

Regarding the noncore distribution market, the obligations of both buyers and sellers are better set in contract than through regulation. The noncore customers, by definition, have alternate suppliers and are not required to purchase gas from the LDC. There is no valid reason, therefore, to require the LDC to continue its service obligation to these customers.

Promoting Social Goals

In many instances, the LDCs have been and are required to engage in the promotion of certain social goals, such as low-income energy assistance, lifeline gas service, and lower rates for economic development and job creation. It is unlikely, however, that state regulators will impose additional social-goal requirements on the LDCs as they operate in an increasingly competitive gas market. It is anticipated, in fact, that the LDC's traditional role in promoting certain social goals would be reduced or shifted to other institutions in the future.

Consumer Protection

Two aspects are usually associated with protecting gas-using consumers. One is the safety of producing, transporting, and distributing gas. Another is the avoidance of unexpected service interruptions and planned curtailments by an LDC. In many states, the safety-related issues are handled by the State Fire Marshal, Environment Protection Agency, or other agencies not responsible for the price regulation of public utilities. State regulators may not be involved, or only marginally so, in assuring the safety of gas transportation and distribution. It is not expected that gas safety issues will become a new or a more significant issue in the future.

Protection against service interruptions will likely become more critical in the future. First of all, as LDCs and their customers are given more freedom in arranging unbundled commodity gas and transportation services, the possibility of service interruption is likely to increase. Some observers would argue that, at least in the initial few years, LDCs and end-use customers may be

inexperienced and uninformed in securing reliable gas supplies and transportation. Second, because of intensive competition, LDCs and end-use customers may choose to trade-off a higher risk of supply interruption for a reduction in gas costs. (Of course, this may not be a problem, since it is assumed that these purchasers are making rational decisions.) Third, the unbundling of gas services and the relaxation of the suppliers' obligation to their customers have decreased the availability of back-up services and supplies.

New Risks

RISKS FACING LDCs

- *Availability of gas supplies*
- *Deliverability of gas supplies*
- *Competition from other suppliers of gas and transportation*
- *Regulatory treatment of gas purchases*
- *Prices for gas purchases above current market levels*

LDCs will face higher risks because of FERC Order 636. First, the Order will increase the overall risk of an LDC by strengthening market forces. It has already increased the risk and uncertainty of conducting LDC business. In addition, FERC Order 636 reallocates risks from interstate pipelines to LDCs. For example, LDCs can no longer rely on the pipelines to supply a bundled gas service. The LDCs will have complete control, and consequently, total responsibility, in procuring reliable and economical gas supplies and transportation services. LDCs will also be responsible for

securing traditional back-up, load-balancing, and supplementary-supply services that were previously bundled with a pipeline's sale of commodity gas.

LDCs, as with any firm, are exposed to a number of business risks broadly classified into three groups: price, supply, and demand risk. Price risk refers to the potential earnings losses associated with fluctuations in the price of commodity gas and other inputs (for example, storage and transportation) purchased by an LDC. As an illustration, an LDC may purchase natural gas at

a price that turns out to be unmarketable. When an LDC operates in competitive markets, price risk becomes more acute. Financial instruments have arisen in response to price risk. They include the futures market, the options market, and the swap market. These instruments have allowed both suppliers and purchasers of gas to manage the risk associated with commodity-gas-price volatility and to benefit from changes in market conditions.

Supply risk refers to the inability of an LDC to acquire commodity gas and other inputs needed to meet its demand. An LDC loses revenues anytime it is unable to meet the requirements of its customers. Supply risk can also occur when an LDC has to pay a higher price to procure commodity gas or other inputs from secondary sources. Supply risk becomes especially important during peak periods when LDCs need to have adequate upstream gas supplies. LDCs have reduced this risk largely by diversifying their supply sources, by using portfolio contracting, and by requiring certain clauses and conditions in their gas contracts. As one response to supply risk, LDCs have increasingly relied on storage to improve supply deliverability.

Demand risk occurs when an LDC is uncertain over the future demand of its services. When actual demand is lower than the projected demand, the LDC loses revenues because either a smaller quantity is sold or a lower price is required to prevent a drop in sales. With competition, an LDC's demand projections become more uncertain, as market share now represents an important factor in the calculations.

New Gas Technologies

Developing gas technologies include improved processes for exploration, production, transportation and delivery of gas, and for more efficient end uses. Developing exploration technologies include techniques to measure trace hydrocarbons in sedimentary rocks that more accurately identify the location of tight gas sandstone reservoirs. Developing production technologies include drilling technologies that achieve higher penetration at lower economic and environmental costs. Developing transportation and delivery technologies include new piping material, such as corrugated stainless steel tubing and sound-wave tracers in order to more accurately locate plastic pipes within distribution systems. Developing technologies that

contribute to both improved gas production and transportation include the granular activated-carbon fluidized-bed reactor for treating waste-water streams and groundwater to remove organic pollutants. Developing end-use technologies include transportation technologies (for example, natural gas vehicles) and customer-premises-use technologies (for example, clothes drying, food storage, and space conditioning).

Public Policy Issues

The end-use sector represents the market where technology penetration is most likely to be affected by state regulatory intervention. Investments in production and transportation technologies will largely be affected by market forces and federal support and will essentially fall outside the purview of state regulation. Further, certain end-use gas technologies, such as natural gas vehicles, are not directly affected by state regulation.

In addressing the adoption of new end-use gas technologies, regulators will face several issues: comparative economics, risks, equity among parties, potential benefits to customers, and broad public interest. To examine the issues, it is helpful to divide the new end-use gas technologies into two broad categories: those that put an LDC in direct competition with electric utilities and those that represent more efficient end uses of gas.

Comparative economics should play a clear role in both the utility efforts to adopt a new end-use technology and the corresponding regulatory treatment. For electric utilities, the focus is on capital-intensive innovative generation technologies. LDC efforts to deploy end-use gas technologies are more constrained. They include offering rebates, loans, and other financial incentives to customers to help such deployment, and representations before state regulators, in integrated resource planning hearings, to obtain preferential treatment for such technologies. These represent low-cost efforts relative to the total investments of an LDC. The cost comparison should, therefore, essentially focus on the differences between existing and new end-use technologies for both electric and gas. This cost comparison, although complicated by uncertainties in cost estimation procedures, represents a less difficult challenge than the corresponding comparison for electric technologies. For example, it may not be too difficult to

estimate the cost of advanced gas space-heating or air-conditioning equipment. The end-use customer can probably acquire the necessary information to make the appropriate purchasing decision. Other criteria, such as environmental impacts and the broader societal cost, however, may merit consideration by a regulator to decide whether a certain technology should be given favorable consideration.

When regulatory treatment invokes criteria other than the purely economic, this raises legitimate equity concerns. When such treatment induces a customer to switch fuels --from electricity to gas, for example -- the electric utility will most likely raise objections. When such treatment shifts costs and increases rates to certain customers, such as nonparticipants in an appliance rebate program, such customers may either leave the system if they have access to other fuels or suppliers, or make representations before the state regulator for alleged inequities inherent in such treatment. All of these equity issues may become more salient as competition continues to develop in the retail market for gas. Regulatory intervention to favor the use of certain technologies that promote broader social goals, such as environmental protection, may become either unworkable or patently inequitable. In sum, in crafting regulatory policies to encourage *socially efficient* levels of innovation, state regulators must be responsive to the new market realities and must try to guard against inequitable or *economically inefficient* cost shifting among different utilities, customer groups, and investors.

4. SUMMARY

The evolution of the natural gas industry will greatly affect the pricing, operating, and planning practices of LDCs. Competition along with restructuring will force prices for noncore services to be set on the basis of market conditions, rather than cost-of-service calculations. For LDCs, the offering and pricing of unbundled services will become a major concern.

The natural gas industry has evolved from the traditional three-tier structure to a four-market structure (interstate transportation, commodity gas, core distribution, and noncore distribution) following the FERC's open-access transportation programs in the early 1980s. FERC Order 636 will accelerate the evolution of the natural gas industry by inducing the

restructuring of LDC services. Restructuring, in the coming years, will be the major issue for LDCs.

THE FUTURE TELECOMMUNICATIONS INDUSTRY

Telecommunications and Water Research Division

INTRODUCTION

Of all the industries regulated by state regulatory commissions the telecommunications industry is usually seen as the one undergoing the most rapid and sustained change. Even with the remarkable changes in market structure, technology, and demand experienced by the natural gas and electricity industries, even more pervasive changes have occurred and appear likely to continue at a more rapid pace for telecommunications utilities.

The convergence of new telecommunications technologies, deregulation and relaxed regulation, the emergence in some markets of viable competitors, and the changes in demand for new and existing services have fundamentally transformed the telecommunications industry. Historically, the local exchange company's (LEC) principal service was in providing the POTS dial tone and access that the LEC sold to its residential, institutional, and business customers. The list of possible future LEC and nonLEC telecommunications services is too long to list and seems to grow daily.

INDUSTRY STRUCTURE

An analysis of industry structure still begins with the Bell Regional Holding Companies (RHCs) which, together with GTE, dominate the traditional telephone business. Once an indistinguishable clutch of "Baby Bells," the seven Bell regional holding companies are developing their own personalities as they cope with eroding territorial monopolies in their core business and new opportunities elsewhere.

Traditionally the parent holding companies of LECs were organized to provide services centrally because in doing so the scale economies of central provisioning produced cost savings for each of their operating companies. While unregulated holding company affiliates have always existed, the diversification into unregulated lines of business has dramatically accelerated over the last decade and seems likely to continue for the foreseeable future. New lines of business entered into by the holding companies include financial services, real estate, computer software, and publishing. Yellow Pages, a traditional line of business, seems likely to continue as a perennial profit center. The near-term potential for growth in telecommunications markets, however, may make diversification to "outside" markets loosely related to communications somewhat less attractive, especially since ventures far afield have not been generally successful.

Telecommunications holding companies may:

1. Provide video, data, and voice services
2. Engage in state, regional, national, and international markets
3. See a rapid growth rate in cellular and PCS subscriptions
4. Begin to see viable competition for local exchange services
5. Show increasing sophistication in their joint ventures and in their holding company structure

Foreign markets will continue to be attractive to parent holding companies. Telephone penetration is much lower in the developing world than in the U.S. and western Europe. Thus, it is thought that a greater opportunity for a higher growth rate exists. As many of the telecommunications markets in developing countries are privatized, those markets will be attractive to U.S. companies with the technological expertise and the ability to raise capital. In addition, these markets will be attractive as testbeds for new services. As long as U.S.

telecommunications companies are limited in the services they can provide domestically, they will be attracted to foreign markets in which they can offer services not allowed in the U.S., such as cable television and information services. Regulatory policy concerns arise when LEC infrastructure investment are slowed due to the international or other diversification activities of the holding companies.

Some restructuring of existing U.S. holding companies is also to be expected. The spinoff of Airtouch from Pacific Telesis is an example of restructuring for strategic purposes: wireless operations were completely separated from the regulated telephone operations. Moreover, the spinoff increased PacTel's chances to obtain PCS licenses, because PacTel no longer had an interest in a current cellular provider. Another example of restructuring for strategic purposes is Rochester Telephone's change to a network services company and a service provider under a single holding company. A third example is Ameritech's proposal to open its network to competitors, partially as leverage in request for early entry into the inter-LATA market.

Ameritech's chairman has explicitly stated, "the bulk of the information we'll manage is going to be in the form of video-based information services"⁴ Ameritech intends to restructure its five geographically based operating companies into customer specific business units, supported by a single regionally coordinated network unit. Further, U S West is planning construction for a multimedia network providing home shopping, movies on demand, and interactive games.

Further innovative uses of the holding company structure should be expected. The basic principle apparently being followed is to have parts of the holding company look like a utility when it is advantageous and to look like an unregulated affiliate in all other instances.

Although it is difficult to predict specific restructurings, some restructurings are likely to occur by the year 2000. One force likely to drive restructurings is the interest in delivering new services, such as video dialtone, and inter-LATA toll through subsidiaries that are separated from the LEC. This may or may not be the most efficient organization, but policies aimed at promoting equal access, fears of potential cross-subsidization, and exercise of market power may make such structural separation necessary. What could evolve is a LEC that serves as the junction between its access customers and a variety of providers of toll, video, and information services. Some providers of these services may be affiliated with the LEC or its parent, others may be independent.

Other forms of strategic organization include joint ventures with other providers and purchase of all or part of a provider of nontraditional telephone services. One reason for such

⁴Chairman and President's Annual letter to stockholder, Ameritech annual report for year ended Dec. 31, 1993

actions is for the RHC to gain entry into a market. The other partner in the venture benefits from an infusion of funds and access to the expertise of the RHCs. RHCs can use joint ventures to get into markets outside their home regions, in effect competing with another RHC. The U S WEST/Time Warner joint venture is important because it demonstrates that telephone companies and cable companies can be allies. Even though the Bell Atlantic/TCI merger and the Southwestern Bell/Cox Enterprises merger plans were withdrawn, we are not likely to have seen the end of such pairings.

RHCs can also form joint ventures among themselves to create a more national presence. Thus, multiregional pairings may become common. For example, Bell Atlantic/NYNEX are combining to serve seven of the top twenty metropolitan areas, including the Boston to Washington, D.C. corridor. In addition, they may join with Sprint to form a nationwide wireless operation. Though no longer part of a RHC, Airtouch is joining forces with U S WEST to serve twenty-one states. The ultimate impact of various pairings is uncertain, but it is clear that the RHCs will find themselves competing indirectly with each other in certain market segments and cooperating with each other in other segments. If RHCs are allowed to offer inter-LATA services outside their regions, the competition will be more direct.

Moreover, the phenomenon is not confined to the RHCs: the AT&T/McCaw merger is an example of the acquiring company gaining access to local markets and the acquired company becoming part of an even larger player. MCI also will enter the game. British Telecom's purchase of a 20 percent interest in MCI for \$4.3 billion has given MCI the capital to develop a number of local markets. It may combine with cellular firms, cable firms, PCS providers, or electric utilities.

International activities of U.S. telephone companies will continue. Foreign experiments will be useful in the U.S., and NAFTA may require further integration of North American telephone markets. MCI also will enter the game. Its deal with British Telecom has given it the capital to develop a number of markets. It may combine with cellular firms, cable firms or others.

The desire of all players to be present in as many market segments as possible in order not to be left out of a winner and to keep from being trapped in the role of a niche player is one of the

forces that drives the various combinations. In addition, the desire to establish or protect a presence in fast growing markets may lead firms to make preemptive investments.

EVOLUTION OF THE REGULATORY BARGAIN

In telephony, many parts of the traditional regulatory bargain will be significantly eroded in 2000. Regulators are increasingly unable or do not desire to hinder entry into market segments that were previously subject to exclusive franchises. Concepts such as assured cost recovery and territorial exclusivity may become vestiges of another time. Technology has allowed the forces of

Structural bottlenecks needing to be addressed in renegotiating the regulatory bargain

1. Interconnection
2. Customer data base services
3. Rights-of-way
4. Municipal franchises
5. High-cost areas
6. Citizens with disabilities

competition to leapfrog regulation, and competition from a number of sources is looming. New providers are ready to enter many, but not all, markets and segments, and new services are being developed. Cable television companies, wireless providers, interexchange carriers(IXCs), and possibly electric utilities will have begun to establish themselves in some traditional telephone markets by the year 2000. Electric utility entry into these areas may require some changes in the Public Utility Holding

Company Act, but since a policy environment exists that is favorable to allowing a variety of providers, no particular barriers should be expected to prevail that would keep out new entrants like the electric utility industry. Convergence of technologies will largely eliminate the distinctions between voice, data, and video delivery systems. The only difference between them will be the amount of bandwidth required for a particular use and whether transmission is one-way or two-way, and interactive (two-way) transmission will be increasingly common.

Several states including California, Illinois, Maryland, and New York either have opened or plan to open local telephone markets to competition. By the year 2000, whether through threat

of federal preemption or state action, many states will have opened at least part of local access markets to competition. Because conditions vary across the states, the states are likely to retain some control over the timing and conditions for such entry.

In a world characterized by competitive entry, regulators cannot assure cost recovery. Some companies will complain about stranded investment and uneconomic depreciation but the general trend away from cost-based regulation towards more flexible and incentive-based schemes may allow them to find other and larger efficiencies. Moreover, by the year 2000 no major migration will have taken place from the telephone companies' networks. At the same time, however, the RHCs are ready to expand into additional areas such as video dialtone and inter-LATA toll services. By the year 2000, the RHCs will be active but not dominant players in both of these markets.

CORE CUSTOMERS

Core customers and/or core services are those that regulators are most concerned about and for which competition has not produced genuine cost effective alternatives. In the year 2000, these will include basic residential access services, especially in rural markets that might not attract significant competition. Even if there is more than one provider of access, regulators may continue to establish and enforce standards for quality of service, interconnection, interoperability, and reciprocity among carriers. The trend is clearly toward decreasing direct regulatory oversight of services in markets considered more competitive. Nevertheless, even in a market characterized by competition, regulators may wish to oversee the provision of those services that fall under the definition of universal service, whatever that definition might become. Although many geographic markets and services will be more competitive in the year 2000, the incumbent LEC or its parent company will still have a dominant market position in the vast majority of these market segments.

COMPETITIVE OPPORTUNITIES

Currently, about 2.1 percent of U.S. household income is spent on telecommunications, and the share may rise as individuals and businesses find new uses for communications. Competition and new service offerings should result in lower prices, which will stimulate demand. The notion of the telecommunications system as providing a gateway through which individuals, businesses, and institutions, such as schools, hospitals, and governments, access each other and information sources will be an accepted concept, even if not the prevailing practice, in the year 2000. Most customers will not be using the advanced features, and most parts of the National Information Infrastructure (NII) will not be in place, but significant parts of the basic framework may exist and be effectively operable by 2000.

In the year 2000, regulatory flexibility will be the rule. Price caps, incentive regulation, flexibility, and infrastructure investment plans are in. The movement towards loosening traditional regulation appears irreversible. Accordingly, there will be less direct regulation of prices, and the tariffing process will be less important. Tariffs will be filed, but there will be greater flexibility to change them at will, especially for nonbasic services. Regulators will continue to be concerned with the possible exploitation of captive customers: price freezes and the like can offer some limits on the ability of providers to exploit core customers.

Regulation will increasingly focus on setting and enforcing the rules of the game. For instance, regulation will still be very much concerned with implementing policies that promote competition, universal access, interconnection, and high service quality. Moreover, the concepts of universal service and quality of service will have been further redefined by the year 2000. Universal service is likely to be redefined by a combination of federal legislation and state and federal commission actions. Quality-of-service standards and policies are more technical in nature and will probably be decided directly by commissions.

To the extent that competitive markets emerge, the markets themselves may set their own quality/price tradeoffs. Among the items with which regulators will be concerned is establishing a system of symmetric regulation under which similar services would be similarly regulated, regardless of the provider, as it would be unwise to allow providers of equivalent or competing

services to engage in "forum shopping" for sympathetic regulation. Other issues include such equal access issues as access to rights of way, number assignment and portability, seamless interconnection and interoperability, and promoting infrastructure standards that facilitate competition by making it technologically easy for all providers to interconnect.

Competition is expected to produce lower prices, higher quality, and more services. The presence or absence of these desired outcomes is a good practical measure of the competitiveness of a market in the year 2000.

The issue of symmetric regulation is also related to universal service. If competitive providers become a significant factor, the current system of universal service funding and subsidies to high-cost companies may need review. It is possible that

universal service funds could be available to any provider serving designated high-cost areas and that vouchers could be used to help designated individuals obtain service. Both of these programs can be administered in a provider-neutral way. Another possibility is that universal service support might be made available only to carriers that were willing to undertake common carriage and "carrier of last resort" obligations.

If consumers exhibit a preference for "one-stop shopping" for a variety of telecommunications services, regulators might consider allowing the sale of packages of services (such as local access and usage, toll, video, information and enhanced services). Non-LEC providers might create a significant advantage for themselves if they are allowed to offer bundled services. The LECs or their parent firms will attempt to offer equivalent package deals. This could be done by the LEC's own reselling affiliates and by others. Although there would only be, at most, a few physical networks, there could be numerous packagers and resellers. Cellular services are sold in this manner at present.

The ultimate goal of policy should be to give customers the maximum range of choice as to which services they will buy and from whom they will buy them. This will allow them to benefit from new technologies and competition without imposing too many additional costs and inconveniences.

By the year 2000, the line of business restrictions imposed under the modified final judgement will probably be eliminated, either by legislation or by court action. The RHCs will then be allowed in inter-LATA toll markets, manufacturing, and information services. There may be some restrictions, possibly including structural separations, and continued oversight will be needed. Especially, the RHCs will be in the inter-LATA toll market, possibly first outside their own regions, then within their regions. The timing of such of entry is a problem, and there is a question as to whether it will be before, after, or simultaneously with opening their own markets to equal access intra-LATA competition. Inter and intra-LATA competition should put downward pressure on toll rates. The larger IXC's are fairly well positioned and are combining with other providers. The second tier of smaller IXC's are most threatened by the potential for RHC entry into inter-LATA markets. Some of them may affiliate with cable television providers or competitive access providers.

It may be that monopoly control will focus on integration technology - interconnection equipment used to create a ubiquitous network demanded by customers of most telecommunications suppliers. Another bottleneck that could slow the development of local competition could be how customer data base services (that allow for direction of transmission, billing, number portability), personal communications services mobility ("roaming"), and directory assistance are made available. Nondiscriminatory access to valuable customer information is going to be an increasingly necessary condition for the operation of a truly ubiquitous network.

Remaining a monopoly market will be defined more narrowly than today.

Both systems integrators and customer data base service providers will be in an advantageous position to become market makers or brokers of least-cost telecommunications services used by end consumers. This type of brokerage service can help customers select those companies best able to accommodate their personal communications needs at the lowest price. Telecommunications market makers will be analogous to travel agents for airline service. Potential anticompetitive concerns arise if brokerage service markets become dominated by

systems integrators and data base service providers. Similar anticompetitive problems have been uncovered in vertical relationships between particular airlines, reservation data system companies, and travel agents.

Other monopoly bottlenecks that are likely to remain after complete entry deregulation include rights-of-way and municipal franchises. One of the greatest potential barriers to local exchange competition may come from the strategic control of rights-of-way by incumbents and the creation of exclusive municipal franchises for companies laying fiber optic cable. Although this concern may, in part, be circumvented by increased competitive pressure from wireless service providers, monopoly (or oligopoly) control of local rights-of-way will remain an important competitive issue insofar as land line service is concerned. Finally, rural and small town telecommunications markets may not support competition due to lack of demand. That is, some of these markets may be natural monopolies.

Finally, two important hallmarks of competition are excess capacity and failure. The telecommunications industries have invested in digital and fiber technologies and should have huge amounts of excess capacity (e.g., dark or unused fibers). This extra capacity is important as it gives resellers and facilities-based providers the physical ability to carry whatever increased traffic they may obtain through superior pricing and service offerings. Failure is also an important feature as not all vendors, resellers, or local operating companies (or every service offering) will survive. A rising tide of demand will float more boats (services), but some will necessarily do better than others and some boats will sink. Given the newness of the many joint ventures, allowances, and new source offerings, it may be that not enough time will have elapsed by 2000 to see some of these "certain to occur" failures.

CONSUMER REPRESENTATION

In the year 2000, commissions will still serve a significant function in settling consumer complaints about utility service and prices. As market segments become more competitive, however, market forces will allow consumers to choose a new provider if they are not well treated by the LEC. Depending on the extent of competitive entry, some customers will be able

to purchase telephone services (access, intra-LATA, inter-LATA, video, and enhanced services) from different providers. If consumers have a preference for "one-stop shopping" for telecommunications services, it is possible that value-added bundlers will act on consumers' behalf to obtain an appropriate set of services at the best rate. In effect, as competition increases, the "final customers" may find themselves well represented by technically competent resellers that can better monitor and resolve quality-of-service and pricing issues with the local exchange carrier. It is uncertain whether resellers need to be included under commission quality-of-service standards as long as competitive alternatives exist.

While the ability to monitor quality may increase due to the presence of resellers, access to cost and profitability data may continue to decrease. Holding company structure, flexible regulation, and the genuine difficulty of separating cost-of-service data (however calculated) should make it even more difficult for commissions to resolve reseller complaints about cost-based prices and nondiscriminatory access. Powerful incentives will continue to exist for LEC management to frustrate the flow of information to regulators and resellers with credible arguments that disclosure will compromise their ability to compete. Many of the same incentives will exist for nonLEC telecommunications providers.

Privacy issues will arise as new providers emerge that are unfamiliar with the privacy rights and expectations of customers. Common carriers can be expected to follow existing privacy standards, it is the unregulated entrant that may not fully appreciate the privacy obligations incurred.

CHANGING RISKS AND RETURNS

The market for telecommunications services (broadly defined) is expanding. It is widely believed that there are large rewards to be reaped by firms that bring to market those services for which significant demand develops. On the other hand, those firms that bring to market services for which no significant market develops will suffer. Few, if any, of the currently proposed services are guaranteed winners. Even the traditional regulatory bargain did not guarantee that a utility would be made whole if it took a chance that failed, and the proper and symmetrical

erosion of the willingness and ability of commissions to assure cost recovery will accentuate that tendency. Commissions do need to ensure that actions taken by a RHC in the enhanced services market do not hurt the LEC's ability to meet its obligations to its customers or raise costs to those customers.

In the transition from regulated to more competitive markets the industry's average credit rating could decline one notch from its current Aa3 to A1.⁵ Credit pressure will come from efforts LEC's make to protect their core revenues from challenges in

Holding Company	Estimated 1998 ROE (%)	Estimated earnings per share growth 1994-1998 (%)
Ameritech	20.5	7.5
Bell Atlantic	17.3	8.1
BellSouth	17.7	7.7
Nynex	17.3	6.3
Pacific	16.0	4.0
Telesis	21.4	8.8
SBC	16.6	6.8
U S West	20.0	9.0
GTE		

their carrier access and business markets. A second area of risk will occur if current restrictions are lifted and allow LEC entry into cable television and long distance toll markets.

INDUSTRY TECHNOLOGY

Over the past decade enormous technical advances in microelectronics, computer technology, and communication technology have led to high levels, numerous types, and huge amounts of information that can be transmitted, received, exchanged, and interactively transformed by users.

More than 20 million Americans now have cellular telephones. New wireless services and increased competition are leading to new strategies by the holding companies. U S West and Airtouch have agreed on a merger of cellular assets and Bell Atlantic has allied with Sprint. The consummation of these and other alliances would mean that twenty-one out of the top twenty-five

⁵ Moody's Investors Service Global Credit Research, *Moody's Industry Outlook U.S. Telephone* (September, 1994)

cellular markets would be held by one or more of these partnerships.⁶ Because of its lower cost and the ability to make more efficient use of frequency, PCS has a larger potential customer base than does current analog cellular.

Nicholas Negroponte, an MIT technologist, has predicted that a time will come when services that historically have been wire-based—such as voice telephony—become wireless and services that have previously been wireless—such as television—become wire-based. The year 2000 is too soon for such a "switch" in delivery mode, but competition from wireless providers will increasingly be effective. PCS may provide the bridge technology for this switch, because a PCS receiver may be able to function as a portable phone when used at home, as part of a "smartbuilding" PCN at work, and as part of a cellular network. It is clear that wireless technologies are becoming increasingly capable and cost effective for some uses and users.

Wireless carriers are trying to join with others in order to obtain access to the capital necessary to build necessary infrastructure. An example of this is the AT&T / McCaw Cellular merger. Regional pairings will be common. Bell Atlantic / NYNEX are combining to serve seven of the top twenty metropolitan areas including the Boston to Washington, D.C. corridor. In addition, they may join with Sprint to form a nationwide wireless operation. Airtouch (the PacTel spinoff) and U S WEST are joining forces to serve twenty-one states.

We probably have not seen the end of such pairings.

Telecommunications is a declining cost industry such that unit cost declines over time, although this is often obscured by the additions of new services. This trend line should be expected to continue. Declining maintenance costs are an important source of savings for new telecommunications technologies. The ability of new fiber technology to concentrate traffic is another important source of savings but may lead to reliability problems, as one line fault has the ability to interrupt more traffic than ever before. Fiber-rings and other engineering solutions are evolving to meet the advantages and disadvantages of concentrating traffic.

⁶"Cellular Giants Rush for Alliances" New York Times, Sept. 14, 1994

The order of new technology and service deployment should continue to be urban, suburban, and rural. The cost and revenue considerations that enforce this ordering should not be expected to change even with the emergence of wireless and satellite technologies.

MARKET STRUCTURE

In the year 2000, LECs will still be the dominant providers of local access services. The LECs and their affiliates will also be dominant in the intra-LATA toll market, although the entry of the IXC's into that market will have eroded, but not eliminated, their dominance. The LECs and their affiliates may begin to have a significant, but not dominant, share of inter-LATA toll traffic. The continued growth of toll traffic will be sufficient for the major current IXC's to be viable.

Although competition will be more pervasive and intense than it is at present, the extent and intensity of competition will vary considerably from location to location and by market segment. The denser urban markets will be characterized by intense competition by several players, especially for medium to large business customers. For small businesses and residential customers, the competition will not be as intense. Although alternative access providers, such as cable firms and, increasingly, wireless providers, will be active in the residential and small business market, the year 2000 is too soon for a major migration to take place.

Opening markets to competition does not make them instantly competitive. In the year 2000, regulators will still be taking actions to ensure that all providers

Bell Weather Telecommunications Industry Indicators

1. Cost and availability of satellite-based services
2. Extent of electric utility entry in telecommunications markets
3. Declining prices
4. Pervasiveness of interconnection complaints
5. Improved service quality
6. Increased number of ubiquitously available services
7. Availability of resellers and access providers

have equal access to customers. In doing this, regulators may act increasingly like antitrust referees. Regulators may be more concerned with policing equal access and ensuring interconnection, interoperability, and reciprocity among the various parts of the "network of networks" that will be evolving than with setting specific prices.

CONCLUSION

The full deployment of an information highway may take thirty years, so viewed from this perspective, only a small portion of the advanced telecommunications infrastructure will be in place by the year 2000. This perspective, however, is somewhat misleading as nearly irreversible steps have been taken by essentially all forms of telecommunications providers that will permanently change the costing, pricing, variety, quality, and availability of telecommunications services. Regulators have also significantly changed the rules and encouraged pricing flexibility, the development of new services, and competition. Consumer expectations have begun to change, but not at the same rate of change as the providers and regulators. Indeed, by the year 2000 one of the key issues will be the extent to which consumer service and price preferences match the offerings of telecommunications providers. Where the supply and demand for telecommunications services are congruent, all parties will be better off. Mismatches of supply and demand create obvious problems, only some of which will be of concern to regulators.

THE FUTURE WATER UTILITY INDUSTRY

Telecommunications and Water Research Division

INTRODUCTION

Water supply is an essential service because water itself is essential to life and modern sanitation. Water delivery mechanisms are substitutable to some minor extent (for example, bottled water for drinking or self-supplied water). However, water itself has no substitutes.

There is a strong public health dimension to community water supply. The consequences of failing to meet drinking water standards, as recent episodes have confirmed, can be dire.

Regulatory authority in the water area extends to the quantity of water withdrawals, the quality of water provided, and the economic behavior of water supply utilities. Regulatory authority also extends to standards for waste. Finally, the quality and availability of the nation's drinking water are intrinsically related to water pollution policies and practices.

While the water industry can appear small through the lens of the state public utility commissions, it actually is very large and complex industry. In the United States, nearly forty billion gallons of water per day are withdrawn for public supply purposes. Sixty-one percent of public supplies come from surface sources; the rest comes from groundwater sources. By one estimate prepared in the middle 1980s, the U.S. water economy, encompassing all public and private facets of water, accounted for annual expenditures exceeding \$77 billion (about 2.5 percent of the gross national

Total U.S. Water Withdrawals and Public Supply Withdrawals in Billions of Gallons Per Day BGPD for 1990

	BGPD	Percent
Total offstream withdrawals	108.0	100%
Public supply	38.5	9%
Rural & domestic livestock	7.9	2%
Irrigation	137.0	34%
Thermoelectric power	195.0	48%
Other industrial use	30.0	7%
Public supply withdrawals	38.5	100%
Domestic	21.9	57%
Commercial	5.9	15%
Public use and losses	5.5	14%
Industrial	5.2	13%
Thermoelectric power	<.1	<1%
Source of public supplies		
Surface water	23.5	61%
Groundwater	15.1	39%

Source: Wayne B. Solley, et al., *Estimated Use of Water in the United States in 1990* (Washington, DC: U.S. Geological Survey, 1993), 22 and 65.

product).⁷ Much of the economic activity in the water sector is at the local level. Of the \$77 billion, \$12 billion were attributed to local water supply operations, \$14 billion were attributed to local wastewater operations, and \$2.5 billion were attributed to other local water management activities. Water supply and wastewater treatment also account for significant demands on the economy in terms of electrical energy and chemicals.

INDUSTRY STRUCTURE

The water industry in the United States is very fragmented and pluralistic, as is the regulatory process. That is, a large number of different kinds of water systems are regulated in a variety of ways by the different levels of government. Virtually all water utilities are regulated with respect to federal and state drinking water standards pursuant to the Safe Drinking Water Act (SDWA) and related legislation. Standards related to water pollution and the wastewater industry are derived from the Clean Water Act (CWA). Generally, state drinking water regulators have primacy for implementing SDWA standards, which are proffered by the U.S. Environmental Protection Agency (EPA). Most water utilities also are subject to environmental regulations governing water withdrawals and pollution control. Thus, a state's primacy agency or another state agency (such as a department of natural resources) may issue permits or other forms of regulatory control. Additionally, many water utilities are subject to regulation by interstate organizations (such as the Delaware River Basin Commission) or intrastate organizations (such as the Florida water management districts).

Although their authority varies, these regional regulatory bodies may have substantial authority over utility decisionmaking.

The U.S. EPA counts nearly 200,000 water systems, although fewer than 60,000 are

Approximate Distribution of Water Systems in the United States

	Number
Total water systems	200,000
Total noncommunity systems	142,000
Total community systems	58,000
Commission-regulated systems	11,200
Investor-owned systems	6,700

Source: U.S. Environmental Protection Federal Reporting Data System and 1994 NRRI Survey on Commission Regulation of Water Utilities.

⁷ Neil S. Grigg, *Water Resources Planning* (New York: McGraw-Hill, 1985), 54.

community water systems. One of many distinguishing features of the U.S. water industry is the prevalence of public ownership. Although the vast majority of water utility customers are served by municipal water suppliers, a large number of U.S. water systems are privately owned. These privately owned systems typically are much smaller in size than their municipal counterparts. Investor-owned water systems, of course, are regulated by the state public utility commissions.

Forty-six states regulate prices and other economic activities of water utilities (including wastewater utilities) that meet the criteria for economic regulation, although the scope of jurisdiction varies from state to state.

Small and Nonviable Water Utilities

Investor-owned small water utilities can be characterized as belonging to one of two groups. The primary feature separating each group is the intent of the founders. One group is formed for the expressed purpose of serving as a water utility and has credible and viable management and access to necessary financial resources. These are the type of utilities that participate in state chapters of the National Association of Water Companies (NAWC) or American Water Works Association (AWWA). Their "size problems" are largely due to their small scale, their particular geographic circumstance, and the size of their nonresidential

demand. Otherwise, these small water utilities are best regarded as effective and stable central provisioners of water that just happen to be small. Like any business enterprise, some percentage will be successful and some will not, although it appears that management skills and the existing

Water Systems Regulated by the State Public Utility Commissions, 1994

	<u>Number</u>	<u>Percent</u>
Water systems		
Investor-owned	6,650	59%
Municipal	1,680	15%
Water districts	1,270	11%
Cooperatives/homeowners	970	9%
Others	650	6%
Total water systems	11,200	100%
Wastewater systems		
Investor owned	2,450	74%
Municipal	630	19%
Water districts	190	6%
Cooperatives/homeowners	20	1%
Others	10	<1%
Total wastewater systems	3,300	100%

Source: 1994 NRRI Survey on Commission
Regulation of Water Utilities.

regulatory framework are two key factors ensuring that most of these small water utilities are successful.

The other group of small water utilities was formed in order to minimize or avoid costs to the owner.⁸ As such they are generally under capitalized, inadequately managed, and are, only through circumstances beyond their control, forced to act as utilities. A developer of a housing tract, or trailer park, or commercial or industrial park can avoid paying monies to the closest public or investor-owned water utility if it can build its own water system: it makes this decision exclusively to save money. The main way the fledgling candidate utility can have lower costs is to avoid investing in those features that characterize successful utilities: engineering, management, dedicated financial resources, and an intent to serve as a utility. In addition to these problems, the cost-avoiding utility has all of the scale, geographical, and demand problems noted above. Because of their weak-to-nearly nonexistent management structure, these entities do not participate in NAWC or AWWA and interact ineffectively with state regulatory commissions, health agencies, and state water primacy agencies.

The distinction between these two types of water utilities is important because not all small water utilities are troubled or nonviable. Equally, even a well-run small water utility may still find it somewhat more difficult to do things that its larger brethren can easily do: such as monitor, test, and maintain water quality, raise capital, and interact with commissions and other governmental agencies. The key difference is that one grouping can function effectively, while the cost-avoiding small water utility is effectively nonviable and only the timing of its demise is unknown.

States have made progress in reducing the number of nonviable utilities created and have begun to fashion effective strategies that have reduced the number of nonviable small water utilities. These actions include encouraging mergers and acquisitions, as well as preventing the initial certification of nonviable providers. Another effective tool is the use of interagency

⁸Cost minimization, of course, is a desirable attribute and is a principle hopefully followed by all water utilities. The cost avoidance dimension of this group of utilities is important because it overwhelms all other considerations to the extent that the utility formed is inadequate to the task of providing safe, reliable, and affordable water to its customers.

agreements. State commissions have also streamlined their regulatory processes and offered technical assistance where appropriate to deal with viability problems. The number of small water utilities has declined over the past decade and this trend should be expected to continue.⁹

The importance and impact of each of these features is discussed briefly below. Three major contextual events effecting all water utilities, as noted earlier, are the SDWA, the aging infrastructure, and the pricing of water. Factors 1-3 (below) apply to all small water utilities, while factors 4-9 apply specifically to cost-avoiding small water utilities.

1. **Economy of scale** means that it may cost a small utility more per gallon treated or per dollar of revenue to meet SDWA requirements and replace infrastructure. In order to recover these cost increases a utility generally seeks rate relief, which may or may be granted to full extent requested by the utility. Rate shock concerns can result in longer payback periods and a utility seeking waivers from SDWA requirements.
2. **Geographical location** of a utility directly impacts the quality and quantity of the water available, as well as the cost of treating and delivering the water. A larger water utility may have multiple sources of water, for example, and can minimize its cost by placing less reliance on a high treatment cost source. A small water utility may not have that option. It can also be the case that a "one source" utility has an especially high quality source of water and benefits accordingly.
3. **Customer demand profile** of a small water utility may be entirely residential or have only a very small number of commercial customers. This lack of variety means a more uniform demand pattern and set of price elasticity preferences. As large water users may be more price sensitive than residential customers, some of the innovative rate design options used by large water utilities with their more heterogenous mix of customers may not (for all practical purposes) be available to small utilities. Also the loss (actual or threatened) of a large nonresidential customer for a small water utility may cause a significant increase in residential rates.

⁹See Diane K. Kiesling *The Reauthorization of the Safe Drinking Water Act: Costs and Risks*, paper presented at the Annual Meeting of the National Association of Regulatory Utility Commissioners, Reno, Nevada, November 15, 1994.

4. Engineering resources for "cost-avoiding utilities" are inadequate as most of this effort ends with the design of a low-cost system. Onsite or oncall engineering expertise is quite rare and contributes to the quality of water problems observed.

5. Management of cost-avoiding utilities can be a problem as the owners may be absentee landlords, or be engaged full-time in running another business. Problem prevention, conformance to standards, and response to consumer concerns is likely to be haphazard.

6. Access to financial resources is a serious problem because the cost-avoiding utility has been intended from day one to maximize the profits of the developer or landlord. Committing additional assets, or managing depreciation practices, or making new investments are unlikely in this environment. This is a contributing factor when water quality or reliability declines.

7. Intent to operate as a utility is lacking and while this may seem to be a fine point it has consequences in terms of customer relations, resources available, responsiveness to commission policies, and having a long-term commitment to operating the utility.

8. Participation in water industry professional associations is generally absent for cost-avoiding utilities and so they even lose out on free or low-cost planning, management, or technical assistance often available from the state chapters.

9. Interaction with state regulatory commissions and other state and local governmental agencies occurs after problems have occurred. Where a state does not prohibit the formation of nonviable utilities, remedial "bandaid" solutions may be all that are available to cure a "patient that is slowly hemorrhaging to death." Commissions that can order or encourage mergers, acquisitions, and other long-term solutions can save the patient and protect the consumer.

Recent state and federal policies emphasize the importance of establishing and maintaining water systems that the population served can support the cost of water service. The emphasis on water system viability will make it harder for providers to get operating certificates and special financing. Potential suppliers face considerable barriers to market entry, including the rising cost of meeting drinking water standards and acquiring water supply permits. In some states, growth

management policies are calling for consolidation of water supply through interconnection with existing systems. All of these institutional factors are combining to gradually reduce the number of water systems in the United States, although a very large number of systems remain.

Demand Characteristics

Water supply utilities are designed to meet the basic parameters of water demand. For many water utilities, domestic or residential demand takes the lion's share of total water demand. For residential customers, most of the quantity of water demanded is for indoor use, which is considered less discretionary and a relatively price-inelastic consumer good. In other words, while changes in water prices affect water use, the magnitude of this effect may not be substantial. By comparison, industrial water use is considered more responsive to changes in price. Industrial customers may be more likely to seek cost-effective alternatives (such as efficiency improvements or even self-supply) as the cost of water rises. For water utilities, this raises the possibility of system bypass, stranded investment, and the need for remaining customers to cover fixed costs. Some water utilities offer economic development rates (which they believe to be cost justified) to retain large-volume customers.

The peaking characteristics of water demand strongly influence the design of water systems and can limit the potential for conservation savings in certain areas. Raw water storage facilities, such as reservoirs, generally are designed to meet average annual demand; transmission and treatment facilities, as well as major feeder mains, pumping stations, and local storage facilities, are designed to meet maximum-hour demand, or maximum-day

Typical Residential Water Use in Gallons Per Capita Per Day (GPCD)

	<u>GPCD</u>	<u>Percent</u>
Total water use	123.3	100%
Indoor use	78.2	63%
Outdoor use	45.1	37%
Indoor water use	78.2	100%
Toilets	27.4	35%
Laundry	17.2	22%
Showers	14.1	18%
Faucets	10.2	13%
Baths	7.8	10%
Dishwashing	1.6	2%

Source: William O. Maddaus, *Water Conservation* (Denver, CO: American Water Works Association, 1987), 22.

demand plus fire protection flow requirements, whichever is greatest.¹⁰ Precipitation rates can affect both the supply and the demand for water. Traditional water supply planning placed a high emphasis on supply reliability, particularly for mitigating the impact of droughts. Certain areas of the country are now experiencing nearly critical constraints on readily available water supplies. Some previously far-fetched water supply options, such as desalinization, are being more seriously considered because the cost of conventional supply options is increasing and the cost of some unconventional options is decreasing.

Demand management for the water sector is being recognized as an increasingly cost-effective resource option in comparison to conventional water supply options. Water conservation can be especially helpful in managing seasonal variations in demand and long-term growth in demand. Although conservation generally will not allow utilities to significantly downsize their *existing* operations, it can be instrumental in forestalling the expansion of source-of-supply and treatment capacity, and calibrating *future* operations to reflect demand patterns modified by permanent efficiency improvements. Demand-management and conservation-oriented planning and pricing are gaining increasing importance in the water sector, although far more aggressive urban water conservation programs can be found in the municipal sector than in the private sector. Some large municipal systems (such as New York, Boston, and San Diego) are facing severe resource constraints and already recognize demand management as a least-cost alternative for meeting demand.

Cost Characteristics

Drinking water is a value-added commodity. The value of publicly supplied water derives almost entirely from the cost of withdrawal, treatment, and distribution of water by vertically integrated utility monopolies. Water utilities remain one of the more tried and true monopolies in

¹⁰F. Pierce Linaweaver and John C. Geyer, "Use of Peak Demands in Determination of Residential Rates," *American Water Works Association Journal* 56, no. 4 (April 1965); and Charles W. Howe and F. Pierce Linaweaver, "The Impact of Price on Residential Water Demand and its Relationship to System Design and Price Structure," *Water Resources Research* 3 (First Quarter 1967): 13-32.

terms of basic economic characteristics. The technology of water supply clearly demonstrates economies of scale, meaning that unit average costs decrease with the quantity of water provided. The prevalence of many small utilities undermines the industry's overall efficiency.

Even in comparison to other fixed utilities, water utilities require substantial investment in fixed assets relative to the variable costs of production (including the cost of raw water, energy, and treatment chemicals). Using the standard of capital investment per revenue dollar, the water supply is among the most capital-intensive of all utility sectors. Capital investment in water supply mainly is a function of the need to establish production capacity; maintain a complex storage, transmission, and distribution network; and meet both fire-protection specifications and peak demands. In general, the water supply industry has high fixed costs and low capital-turnover rates. However, the capital intensity of the water supply industry explains the industry's relatively low variable (operating) costs, which often translate into relatively low operating revenues.

Investments in water supply tend to be large and indivisible, the "lumpiness" feature that also is typical of other public utility industries. Many of these capital investments, including treatment plants and the transmission and distribution infrastructure, may have very long service lives. Because capacity is added in large increments, there may be periods of underutilization, which can pose significant financial problems in terms of cost recovery. Of course, the utility with plentiful capacity is in a good position to accommodate demand growth, if indeed growth is on the horizon. In reality, many water utilities are not well positioned to deal with demand growth

**Ratio of Utility Plant to Operating Revenues
for Major Public Utilities**

	<u>Ratio</u>
Telecommunications	
AT&T	.7
Local exchange carriers	2.8
Telegraph carriers	2.5
Natural Gas	
Distribution	1.6
Transmission	2.4
Integrated companies	1.7
Combination companies	1.5
Total investor-owned	1.9
Electricity	
Major investor-owned	2.9
Publicly owned generating	3.9
Water Supply	
Major investor-owned (NAWC)	3.9

Sources: Janice A. Beecher, et al., *Meeting Water Utility Revenue Requirements* (Columbus, OH: The National Regulatory Research Institute, 1993), 5.

(through surplus capacity) or the other additional cost pressures (through surplus financial resources). The potential result is cost shock for the utility and rate shock for customers.

Primary Cost Drivers

Water supply is a rising-cost industry. Water supply utilities, and their regulators at the federal, state, and local levels, are increasingly aware of the water supply industry's changing revenue requirements. Three key forces affecting the industry's costs are (1) the need to comply with regulatory provisions of the Safe Drinking Water Act (SDWA), (2) the need to replace and upgrade an aging water delivery infrastructure, and (3) the need to meet growing water demand associated with population growth and economic development. In addition, water utilities face a variety of secondary cost forces. These include the sometimes high cost of borrowing to finance capital projects (especially for small systems) and the shift to nonsubsidized, self-sustaining operations (especially for publicly owned systems).

The concurrent and mutually reinforcing impact of these forces on many utilities presents a substantial pressure on both capital and operating costs, a pressure not previously experienced by the water supply industry. However, the nature of these costs should not be taken for granted but should be closely scrutinized. Moreover, the water supply industry must be held accountable for making prudent decisions in response to its changing cost profile. The industry must be able to fully justify the use of alternative approaches to

meeting revenue requirements (such as automatic adjustment mechanisms and pass throughs, as well as cost allocation and rate design methods). Water utility regulators should be open to the consideration of alternatives but vigilant about how these methods are applied. Regulators will

Estimated Distribution of Required Water Utility Expenditures by Cost Driver and Affected Facilities

Type of cost driver	Percentage
SDWA compliance	8 to 13%
Deferred infrastructure	37 to 49%
Meeting growth	39 to 55%

Affected facilities	Percentage
Source and transmission	14 to 21%
Distribution system	29 to 48%
Water treatment	24 to 57%

Source: Wade Miller Associates, Inc., *The Nation's Public Works: Report on Water Supply* (Washington, DC: National Council on Public Works Improvement, 1987), 42.

want to be especially cautious about affecting the incentives that determine whether utility costs are effectively managed. Thus, the industry perspective on rising costs and how to address them should be tempered by a reasoned regulatory perspective.

Each of the three sources of cost pressure has distinctive relevance. No unique factor, including federal drinking water quality regulations, can be singled out as the principal determinant of the industry's financial situation. Despite the political fervor over "unfunded mandates," regulatory compliance costs associated with the SDWA (which are manifested primarily in the water treatment area) pale somewhat in comparison to other projected water capital and operating costs associated with infrastructure improvement and demand growth needs.

Meeting additional revenue requirements in the already capital-intensive water supply industry depends on the optimal integration of financing and ratemaking strategies. A number of strategies are available, some conventional, some unconventional, and others untried by water supply utilities. For all types of utilities, regardless of their ownership, the emphasis on least-cost financing and ratemaking options is growing.

Importantly, not all forces affecting the water supply industry contribute to the upward pressure on costs and revenue requirements. Some forces have the potential to exert significant downward pressure on costs. First, *technological innovations* in water treatment and other aspects of utility operations can be expected. Second, water utilities can adopt *efficiency improvements* to

Average Operation and Maintenance Expenditures for NAWC Investor-Owned Water Utilities in 1991

	<u>Average Expense</u>	<u>Percent</u>
Production 31.2%	\$3,738,930	
Administrative and general	3,377,746	28.2%
Transmission and distribution	2,254,609	18.8%
Customer accounting	1,397,040	11.7%
Purification	1,290,213	10.8%
Total 100.0%	\$11,972,771	

Source: Authors' calculations based on *National Association of Water Companies Financial Data for 1991* (diskette version).

reduce waste, conserve resources, and lower production costs (such as energy costs for pumping). Third, water system consolidation can facilitate the achievement of *economies of scale* in source development, water treatment, and utility management and operations. Fourth, *market forces* can lower costs by fostering competition for contracts and services among vendors. Fifth,

strategic management by water utilities can yield savings in such areas as financing, administration, and purchasing. Finally, *integrated resource planning* by water utilities, including a balanced consideration of supply-management and demand-management options, can promote least-cost strategies.

Pricing and Affordability

Water pricing generally reflects the basic cost characteristics of the industry. Water rates generally take the form of a fixed charge that does not vary with usage plus a variable charge that does vary with usage. In water utility rate design, regulatory analysts sometimes become frustrated by the fact that traditional cost-of-service principles can lead to very high fixed charges and very low variable charges for water utilities. This problem can seem to undermine the price-signal purpose of the rate and run contrary to conservation goals. When utility costs are shifted from fixed to variable charges, as may occur with conservation-oriented pricing, revenues can become less stable and predictable.

Water utilities are facing some considerable pressure to reexamine their cost allocation and rate design practices. Many publicly owned systems can no longer rely on funding sources other than user fees. All types of water utilities are beginning to adopt rate structures that recognize modern pricing principles and the role of pricing in promoting conservation. The use of decreasing-block rates has declined in all but the Midwestern region of the country, where water supplies are considered plentiful.¹¹ Some utilities are using seasonal or increasing-block rates as part of their demand-management strategies. Finally, the interest in other rate structures, such as lifeline rates, also is mounting.

For many water customers, the affordability of water service is a growing problem. The problem of affordability affects customers in terms of increased arrearages, late payments, disconnection notices, and actual service terminations. Affordability affects utilities in terms of

¹¹Ellen M. Duke and Angela C. Montoya, "Trends in Water Pricing: Results of Ernst & Young's National Rate Survey," *Journal American Water Works Association* 85 (May 1993): 55-61.

expenses associated with credit, collection, and disconnection activities; revenue stability and working capital needs; and bad debt or uncollectible accounts that other customers must cover. Other ramifications of the affordability issue also are becoming apparent. If a customer base cannot support the cost of water service, potential lenders may be concerned about the utility's financial viability and ability to meet debt obligations. Moreover, service disconnections can present a public relations nightmare for utilities, particularly because they involve essential services. Increasingly, problems of bad debt also extend to nonresidential utility customers. Financial distress and bankruptcies in the commercial and industrial sectors can leave utilities holding the bag. However, the larger issue of affordability is primarily a concern with respect to low-income residential consumers.

*Mounting evidence suggests that rising water prices exceed both average growth in income and the general rate of price increases.*¹² For low-income customers, who have little choice but to buy service from the local utility, paying more for basic water service means going without less essential and more discretionary products and services. Thus, rising water prices, can contribute to a deterioration in the quality of life for low-income utility customers.

EVOLUTION OF THE REGULATORY BARGAIN

Economic regulation of water utilities is seen as necessary and in the public interest when a firm provides an essential service and has the properties of a natural monopoly. Water utilities satisfy these criteria. While state regulation can be regarded as a substitute for competition, regulation of a private or investor-owned utility can just as well be viewed as a substitute for public ownership. This aspect is more apparent in the water sector than the other utility sectors.

In regulating water utilities, the appropriate scope of regulation is the central issue. Generally, commissions recognize that methods of oversight appropriate for larger utilities may not be appropriate for smaller utilities. Because so many regulated water systems are small, the commissions have developed a variety of regulatory techniques specifically for the water industry.

¹² Scott J. Rubin, "Are Water Rates Becoming Unaffordable?" *American Water Works Association Journal* 86, no. 2 (February 1994): 79.

These include simplified procedures for rate filings and reports, and exempting very small systems from regulation based on size. Municipalities usually are exempt from regulation. However, in some states municipal water systems are regulated if they serve outside of municipal boundaries. Finally, a few state commissions defer to local governing bodies to set rates for certain systems but review cases on appeal.

Although the states have strived to *simplify* water utility regulation, few have actually surrendered *jurisdiction* for water utilities. Instead, the states have used selective criteria to exempt some utilities from regulation or certain aspects of regulation as long as the specified criteria are met. A change in circumstance, such as an increase in the number of regulated customers or a petition by ratepayers, can often bring a water system back into the regulatory process.

Critics of regulation sometimes argue that too many regulatory resources are devoted to the water sector relative to the apparent economic impact of the sector in comparison to the other major regulated industries. A competing view, however, is that even small utilities have monopoly power over their customers and that every utility customer deserves protection.

One option for changing the character of governmental oversight of the water utility industry is for the state public utility commissions to relinquish some or all of their current regulatory responsibilities. Exemptions can be viewed as a form of conditional and temporary deregulation. However, deregulation can be a rather ambiguous concept. Regulated private utilities can either become unregulated private utilities or publicly owned utilities. Only utilities that remain privately owned are truly deregulated. In the case of municipal ownership, state regulation is replaced by local governmental control. Deregulation affects utilities, ratepayers, and regulatory agencies. The market for water service is not competitive. Thus, the market does not provide an effective check on monopoly power. There is a strong tendency to maintain the status quo in regulation because the uncertainty surrounding deregulation is substantial. Areas that would be affected by deregulation include: consumer protection, compliance with standards, cost control, financial viability, industry restructuring, resource planning, and institutional roles and responsibilities. In analyzing deregulation as a policy option, each of these areas should be carefully considered.

Today's institutional climate may be especially suitable for examining alternative regulatory approaches. In the generally monopolistic area of water supply, for example, a keen interest in incentive regulation is emerging. One reason for this interest is the emergence of alternatives to ratebase/rate-of-return regulation in the wider community. Further, the commissions already use certain kinds of performance benchmarking in regulating water utilities. Examples include the use of customer complaints to trigger regulatory intervention and the use of industry-based cost-indexing methods to set rates.

CORE CUSTOMERS

Regulators have begun making distinctions between core and noncore customers for electric, gas and telecommunications utilities. Generally, the distinction is that for captive or core customers a commission will allow prices to be set within specific narrow parameters. Noncore services are those facing competition and the utility is allowed considerable pricing latitude as long as no cross subsidies occur. No similar effort has yet occurred in this regard in water. Large water utilities do, however, have unregulated affiliates that supply engineering and other services, but these services have never been subject to regulation and there appears to be no call to extend regulation to these services. Further, while competition is possible for a water distribution system, the economics underlying central provisioning make it unlikely in the short term. Self-supply by a very large user, however, remains a real possibility. The threat to depart or the actual departure from a water system of a large user means fixed costs could increase for the remaining customers. The consequences of this are not unlike the impacts that can occur when a large user engages in significant water conservation. It may be, however, that the monitoring and compliance components of the SDWA are a considerable disincentive for a large user to begin a self-supply effort.

COMPETITIVE OPPORTUNITIES

The monopolistic character of public utilities undermines opportunities for competition, leaving public ownership and regulation as the usual alternatives. In some important respects, publicly and privately-owned water utilities compete for market shares, although rarely for the same customers. Further, at any given time, some water utilities are being privatized; others are being transferred from private to public ownership. Accordingly, a clear trend does exist as the solutions fashioned depend on pragmatic, case-by-case, evaluations.

Forces of competition are affecting the water industry. Water systems in many parts of the world are run by national governments, making them very large public utility monopolies. In the past decade, however, many of these systems have been privatized. The reasons for privatization vary from country to country, but the key reasons seem to be ideological and partisan political movements, governmental reform, the need to reduce government debt, and the desire to attract private capital for building

Global Comparison of Economic Regulation

United States	Ratebase/rate-of-return regulation by state public utility commissions
Great Britain	Incentive-oriented price caps by a single-administrator agency
France	Municipal contracts with reviews, indexing, and negotiations
Chile	Yardstick competition reviewed by a national tariff board
Argentina	Price-cap agency regulation with operational contracts and long-term planning

Source: World Bank (Workshop, 1994).

utility infrastructures. Great Britain, France, and Latin American stand out in the privatization movement, although examples can be found in virtually every corner of the world. Rather quickly, some of the newly privatized utility monopolies have become effective global competitors. French and British firms, in particular, have an increasing presence in other parts of Europe, in Latin America, and in the United States. In some cases, these international firms are leading the way to competition by marketing operation and maintenance services; in other cases, they are actively seeking to assume ownership and control of water utilities.

While global competition in the water supply industry is increasingly evident, U.S. firms are relatively new entrants on the global scene. At this time, many of the large engineering firms

are more active competitors for contract maintenance and operations agreements with government entities both here and abroad. As U.S. investor-owned water utilities join the competition, regulatory issues related to holding company organizations, affiliated interests, and protecting core customers undoubtedly will arise. In general, competition and privatization are expected to have positive, but not necessarily widespread, economic benefits for the investor-owned water industry and ancillary industries.

CONSUMER REPRESENTATION

The water industry has developed consumer and educational programs. The National Association of Water Companies has developed awards programs to recognize these. Utilities with water conservation programs are particularly active in this area. Because no effective competitor exists, consumers must seek redress of complaints with the monopoly supplier. State commissions can then be asked (in various ways) to fix unresolved complaints. Absent the development of competition for residential water customers, this step complaint resolution process seems likely to continue. Of course, state offices of consumers counsel (and their various counterparts) include water regulation as part of their consumer protection responsibilities along with electric, gas, and telephone.

CHANGING RISKS AND RETURNS

The increasing capital and operating requirements of the water utility industry raises the question of whether the industry is becoming more risky and whether increased risk will be translated into higher costs of equity capital for investor-owned water utilities and higher costs of debt capital for government-owned water utilities. In the context of utility regulation, the perception of higher risk translates into higher authorized rates of return. As a general rule, water utilities face three principal sources of risk: business risk, financial risk, and regulatory risk.

Understandably, representatives of investor-owned water utilities believe that their industry is becoming more risky. The argument for increased business and financial risk for the

industry flows from several factors associated with the three major cost pressures on the industry. First, much uncertainty continues to surround reauthorization and implementation of the SDWA, as well as other federal and state environmental mandates; the ultimate compliance cost impacts still are unknown. Second, even more uncertainty exists over the actual condition of the water supply infrastructure and what improvements will be necessary. Third, considerable uncertainty regarding future demand exists given the potential for demand elasticity effects from instances where large rate increases are necessary. Uncertainty also surrounds the availability and reliability of water supplies for meeting demand growth. All of these factors can complicate forecasting and planning.

The water utility industry also faces regulatory risk, which indeed may be the kind of risk that concerns its representatives the most. Like most forms of risk, regulatory risk is about uncertainty, in this case the uncertainty associated with the treatment of costs by regulatory agencies. Regulatory risk accompanies not only SDWA costs but *all* water utility costs, including those associated with infrastructure improvement and demand growth. Regulatory risk is manifested in various approval processes, prudence and reasonableness reviews, and general regulatory lag and delays. The prospect of rate-base exclusions and cost disallowances which would significantly affect the revenue requirement is especially disconcerting to utility managers. The water supply industry strives to reduce regulatory risk through the establishment of certain and expeditious cost recovery mechanisms.

From an economic regulatory standpoint, the SDWA may not be the source of risk it sometimes is portrayed to be. In essence, the states are preempted by federal drinking water regulations. The implications of preemption for economic regulators are significant. In fact, mandated investments are in some ways *less* risky than other expenditures in the context of utility regulation. It might even be asserted that the SDWA actually provides water utilities with a unique opportunity to expand the rate base with relatively little regulatory risk. Moreover, the cost impacts associated with the initial scope of the SDWA are gradually becoming more known and predictable. The argument that these costs pose special regulatory risks should be viewed with caution. In the long term, infrastructure improvement and meeting demand growth may prove to be far riskier for the water supply industry.

INDUSTRY TECHNOLOGY

Water supply technology and cost characteristics greatly limit opportunities for many forms of competition. Water is supplied almost exclusively through a vertically-integrated public utility. That is, a single entity controls all of the assets necessary to supply consumers with water (from the source-of-supply to the delivery process). The economies of scale in water supply development and in treatment are substantial. Achieving economies of scale in water treatment are more important than ever because of rising treatment costs. More stringent drinking water standards place a disproportionate burden on small systems.

MARKET STRUCTURE

The market structure and regulatory structure of the water industry are evolving in significant ways. Through mergers and acquisitions (including regulatory induced takeovers of small systems), consolidation is occurring slowly but surely. In addition, much attention is being paid to the potential development of regional water supply and water treatment. An increasing interest in privatization also is apparent. Regulation of the water industry remains very pluralistic and sometimes very inefficient. Different regulatory agencies sometime send utilities competing signals about their performance. The potential for conflict between health regulators and economic regulators is still a relevant concern. Memoranda of understanding and other formal and informal methods of interagency coordination are beginning to overcome these institutional barriers to more effective regulation of the industry. Modern information technologies, such as geographic information systems that incorporate market and regulatory data, would be extremely beneficial for the purposes of coordinated state regulation.

CONCLUSIONS

In sum, public water supply is considered an essential service and water utilities traditionally have been viewed as natural monopolies. These realities are not likely to change.

Given these monopoly characteristics, regulatory protection of captive or core customers is a salient concern. It is a concern made more salient by the fact that the cost of providing water is rising and the reality that the demand for water is relatively price-inelastic. It follows that economic regulation of water utility monopolies to protect ratepayers and promote the public interest is a legitimate concern of the state.

This is not to say that the economic regulation of the water supply industry cannot or will not evolve in significant ways over the coming decades. Rising costs, industry restructuring, and emerging competition will pose special challenges for economic regulators. The role of the state public utility commissions will have continuing importance in meeting these challenges and setting standards of analysis and performance not only for the regulated sector but for the water industry at large.

Water Issues for the Year 2000

- Setting and meeting environmental standards
- Infrastructure replacement and improvement
- Demand growth and resource constraints
- Rising prices, affordability, and consumer protection
- Financial viability and related small-system issues
- Changing risk profile of the water industry
- Economic efficiency and marginal-cost pricing
- Structural change, regionalization, and consolidation
- Privatization of water and wastewater services
- Water conservation and efficiency technologies
- Least-cost and integrated resource planning
- Performance benchmarks for water supply utilities

ERRATUM

The table on page 61 is incorrect. Please substitute the following table.

Holding Company	Estimated 1998 ROE (%)	Estimated earnings per share growth 1994-1998 (%)
Ameritech	20.5	7.5
Bell Atlantic	17.3	8.1
BellSouth	17.7	7.7
Nynex	17.3	6.3
Pacific Telesis	16.0	4.0
SBC	21.4	8.8
U S West	16.6	6.8
GTE	20.0	9.0

Source: Smith Barney, Telecommunications Service
Companies Outlook, Nov. 11, 1994.

