ELECTRICITY MARKET PLAYERS SUBGROUP REPORT

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CONTENTS

Chapter 1

INTRODUCTION

SUMMARY

RELATIONSHIP TO OTHER WORK

In recent years, there has been a lot of attention devoted to discussing, debating and analyzing alternative market organizations for the electric power industry. Typically, the focus is on alternative forms of regulation or deregulation. Recent examples of this activity include the OTA report on transmission Wheeling and Dealing, and the deliberations of the Keystone Group.

While this work also deals with organization of the electric power industry, it has a somewhat different emphasis. Rather than focusing on the pros and cons of alternative regulatory proposals, it focuses on market behvavior and the issues raised by different degrees of competition.

REPORT ORGANIZATION

The purpose of this study is to examine competition in the electric power industry from an "industrial organization" point of view. The remainder of this report is organized as follows.

Chapter 2 describes the "industrial organization" approach used to analyze the electric power market. Industrial organization emphasizes specific market performance criteria, and the impact of market strcture and behavior on performance.

Chapter 3 identifies the participants in the electric power market, grouped primarily into regulated producers, unregulated producers, and consumers.

Chapter 4 describes the varieties of electric power competition, organized along two dimensions: producer competition and consumer competition.

Chapters 5 and 6 identify the issues raised by competition along the two dimensions. These issues include efficiency, equity, quality, and stability.

Chapters 7 through 9 describe market structure, behavior and performance in three competitive scenarios: minimum competition, maximum competition, and moderate competition. Market structure, behavior and performance are discussed, and the issues raised in Chapters 5 and 6 are discussed in detail

Chapter 10 provides conclusions about "winners and losers" and identifies issues that require further study.

Chapter 2

ANALYTICAL APPROACH

INTRODUCTION

As noted earlier, the goal of this study is to examine competition in the electric power industry from an industrial organization point of view. This chapter describes the analytic approach taken.

In the industrial organization field, the emphasis is on how market rules, arrangements and processes affect the relationships among producers and consumers. Conclusions about the size and allocation of economic benefits are typically drawn from examining the effects of market conditions on consumer demand and the activities of producers to meet this demand.

This form of analysis begins with the assumption that society desires "good" operation from producers. Producer operations are normally evaluated using a set of economic performance goals. These include:

Efficiency Resources should be allocated to achieve maximum benefit.

Equity Wealth should be distributed fairly. Quality Quality should increase over time.

Stability Price, quantity and quality should not fluctuate.

These goals are not meant to be precise and axiomatic. They are not independent; efficiency is only achieved when the quality desired by consumers is produced. They may not be achievable, and it may even be difficult to measure precisely the extent to which they are achieved. Nevertheless, they provide good guidelines for judging market performance in general terms.

Performance is the "bottom-line" of an industrial organization analysis. It depends on the **behavior** of producers and consumers in such activities as buying, selling, pricing, and negotiating. Behavior in turn depends on the **structure** of the market, such as barriers to entry of new firms, the ratio of marginal costs to average costs, and the number, size and geographic distribution of producers and consumers. These qualities are further influenced by **world conditions**, such as the supply and demand of raw materials, the rate of economic growth, and advances in new technologies.

Thus, industrial organization studies are typically concerned with the causal relationships flowing from basic world conditions and market structure to industry behavior and performance. This flow is illustrated below. (For a comprehensive review of the industrial organization approach, see F.M. Scherer's Industrial Market Structure and Economic Performance.)

World Conditions
↓
Structure
↓
Behavior
↓
Performance

Our study follows this "industrial organization" paradigm. In particular, competitive scenarios are examined based on structure, the resulting behavior, and then ultimately performance.

STRUCTURE

In considering competition in the electric power industry, two key questions emerge about market structure:

Who are the participants?

What are the rules affecting their participation?

Market structure determines who is permitted in and out of the market, who is allowed to (or required to) sell to and buy from whom, how prices are set, and who is responsible for maintaining market order. To a large extent, market structure specifies the initial political and economic conditions that set the "wheels of competition" turning.

BEHAVIOR

With structure in place, two key questions emerge about the behavior of market participants:

What are the transactions among participants?

How does each participant plan and operate?

Typically, transactions among participants are the key concern regarding market behavior. However, in the electric power industry, internal planning and operation is especially important. The electric power industry is one that plans over the very long term (decades -- far longer than most industries), yet operates in the very short term (milliseconds -- far shorter than most industries). The issue here is how market order is maintained in both the long-run (e.g., ensuring adequate generation and transmission capacity) and the short-run (e.g., preserving voltage stability and maintaining reliability).

PERFORMANCE

The "bottom line" of the industrial paradigm is performance:

What is each participant's economic health?

Performance is not unidimensional. It must be considered over time; that is, both in the short-term -- while the market is in transition from the status quo -- and the long-term -- once the market has achieved some degree of stability. In addition, it must be considered over states-of-the-world; that is, in a broad range of plausible future world conditions. Recent experience with fossil fuel prices, nuclear construction costs and the like has shown how sensitive performance can be to economic and political conditions.

CONCLUSION

The industrial organization paradigm provides a framework for examining competition from the market participants' perspective. The first step in applying this approach is to identify just who these participants are. This is the subject of the next chapter.

Chapter 3

MARKET PARTICIPANTS

INTRODUCTION

Participants in the electric power market are defined as those parties whose economic life involves the buying and selling of electricity. In an earlier era, this universe of participants might have been restricted largely to a few players -- integrated utilities, and their customers and suppliers. With increasing market diversity and competitive forces, this universe has already expanded somewhat to include self-generators, independent generators and the like. In future scenarios, it may expand further to include a wide variety of electricity producers, electricity consumers, and industry suppliers. Some of the key potential participants include:

Investor-owned utilities

Federal agencies

State/county agencies

Municipal utilities

Generating companies/Independent power producers

Transmission companies

Distribution companies

Qualifying facilities

Industrial consumers

Commercial consumers

Residential consumers

Canadian producers

Federal and state regulators play an absolutely critical role in the electric power industry. However, they are not included explicitly as market participants because they are not involved in the buying and selling of electricity. Instead, they set the rules by which these transactions occur. Similarly, suppliers,such as generation equipment vendors, fuel suppliers and energy management firms, also are very important. Again, they are not included explicitly as market participants. Both regulators and suppliers are viewed then as "other affected parties" whose activities are critical under some market conditions.

Rather than study each market participant individually, they have been grouped into three major categories. The lines between these categories are not always clear (for example, some consumers are also producers), but the distinction is still a useful one. The three groups are:

Regulated Producers whose prices for generating or delivering power are dictated primarily by government agencies rather than business arrangements, and whose market responsibilities are set by law rather than by contract. These include government-based (federal, state, county and municipal) power entities, investor-owned integrated utilities, transmission companies and distribution companies.

Unregulated Producers whose prices for generating or delivering power are determined primarily by business arrangements with consumers or other producers. These include independent power producers, qualifying facilities, and Canadian producers.

Consumers who buy and use electric power. These include industrial firms who use electricity as one of many production inputs, commercial establishments that rely on electricity to make operations possible, and residential consumers for whom electricity is one of life's necessities.

Basic background information on these groups is provided below.

REGULATED PRODUCERS

Currently, there are two major forms of regulated producers: investor-owned integrated utilities and government entities. There are approximately 200 investor-owned utilities in the United States, ranging in size from 100 MW to over 15,000 MW in capacity. They generate xx% of electric power in the United States, and are responsible for yy% of the direct sales to consumers. Government entities may be federal (e.g., Tennessee Valley Authority), state (e.g., New York Power Authority), county (e.g., xxxx), or municipal (e.g., Palo Alto Utilities). These entities differ dramatically in size and form of organization. They generate yy% of the electric power in the United States, and are responsible for zz% of direct sales. The relative mix of private and public power varies dramatically from region to region.

Currently, there are no more than a handful of privately-owned transmission or distribution companies. By and large, transmission is handled by the integrated utilities with approximately 10% of consumption now involving "wheeled" power. In the future, private companies devoted solely to transmission and/or distribution companies may emerge as a large force in the market.

UNREGULATED PRODUCERS

Domestic

Currently, domestic energy production includes a small and growing number of qualifying facilities, independent power producers, and self-generators. Qualifying facilities are those defined under PURPA as xxx. Independent power producers, on the other hand, have no special legal status. They simply are businesses that have contracted to deliver power to

regulated utilities or large consumers. Self-generators are consumers who have decided to produce their own power, but who do not sell significant amounts of power to others.

In 1988, unregulated producers generated zz% of electric power in the United States and as high as qq% in some regions. In some future scenarios, new types of unregulated producers may emerge and the role of these producers may grow to dominate the market.

Canadian

From the perspective of the United States, the largest single "unregulated producer" is Canada. As a result, Canadian power may play a unique role in the electric power market.

The vast majority of the electricity generated in Canada is by utilities organized along provincial boundaries. In all provinces, except Alberta and Prince Edward Island, the major utilities are crown corporations. In Alberta, there are two investor-owned and one major municipally-owned utilities. With the exception of Alberta, all provinces adjacent to the United States have transmission lines for the export of power. Alberta has access to the United States through an intertie to the British Columbia system. Much of the power generated in Canada is hydroelectric, with extremely low operating costs.

U.S. imports of Canadian electricity grew from 2.4 terrawatt hours in 1970 (1tWh=1 billion kWh) to 47.4 terrawatt hours in 1987. This represents about 2% of the total electricity consumed in the United States. In some regions, this proportion is much higher. For example, Canadian power accounts for over 15% of the usage in New York and over 5% in New England and the Upper Midwest. With free trade and increased transmission access, these

figures could grow substantially. For example, Alberta and British Columbia utilities may play a significant role in the California by the mid-1990's.

CONSUMERS

Large

Consumers are typically divided into two groups based on size. Large consumers are those whose electricity use is typically sufficient to warrant consideration of self-generation or to attract the interest of independent power producers. Nationally, zz% of electricity sales are to these consumers. However, the relative importance of this group varies substantially by region. Depending on the degree of industrialization, large consumers represent from xx% to yy% of sales.

The use of electricity in this group ranges from lighting and air-conditioning requirements of a commercial building to process heat and pumping in a manufacturing facility. As noted above, some members of this group have adopted self-generation rather instead of purchasing power in the market.

Electric power is not always a high priority on the list of issues these consumers face. However, if the economic impact of electric power increases, their attention will become focused upon it. Generally, these consumers are comfortable joining together in trade associations or groups (e.g., ELCON) with like interests to pursue their own ends.

Small

Small consumers are those whose electricity use is typically insufficient to warrant self-generation or alternatives other than the local utility. This group consists of a large number

of residences, commercial establishments, institutions, small industrial facilities, and small agricultural users. As indicated above, small consumers represent xx% of electricity consumption.

Traditionally, this group has few if any options for electric service other than the local utility. However, this continues to change as cogeneration and self-generation technologies evolve. As a group, these consumers affect the electric power market in two ways. First, their behavior as a large class of consumers affects the market for electricity. Second, small consumers make up a majority of voters -- the ultimate political entities.

CONCLUSION

While there are innumerable individual parties involved in the electric power industry, they can be conveniently organized into three groups for our purposes -- regulated producers, unregulated producers, and consumers. The next step is to understand the types of competition affecting these groups. This is the subject of the next chapter.

Chapter 4

THE DIMENSIONS OF COMPETITION

INTRODUCTION

Competition in the electric power industry is not simple and one-dimensional. There are many forms of competition that affect market participants in different ways. One can easily speak of a change in market structure that creates more competition in some respects and less competition in others. In addition, competition in the electric power industry is affected by the unique technical characteristics of electricity production, transmission, and consumption. For example, it may be difficult (or impossible) to tell whether a transaction has occurred between two parties. This is a problem rarely encountered with other, more standard "products."

In recent years, much effort has been devoted to examining and debating alternative market structures. However, because of the complexity of electric power competition, a framework is needed for organizing and comparing these alternatives. We have divided competition in the electric power industry along two general dimensions: "producer competition" and "consumer competition."

For our purposes, a noncompetitive world is one in which there is a single producer who is obligated to serve and a single consumer who is obligated to be served. In the electric power industry, this is best represented by an isolated utility with a well-defined service territory.

With producer competition, the opportunities for selling electricity are expanded. Some degree of producer competition already exists in today's market. For example, in many regions, QF's have the opportunity to supply much of the local utility's power needs.

With consumer competition, the opportunities for buying electricity are expanded. There is relatively little of this type of competition in today's market. Perhaps the best example is simply that consumers typically have the opportunity to generate power at their own facilities.

While the "producer" and "consumer" dimensions may be separable in concept, they are closely linked in practice. Typically, increased competition along one dimension will imply the same along the other dimension. For example, when an independent power producer and an industrial consumer reach an agreement for a power transaction outside of the traditional "integrated utility" framework, this is an example of both producer (i.e., increased opportunities to sell) and consumer (i.e., increased opportunities to buy) competition. Nevertheless, many of the controversial issues surrounding electric power markets focus primarily on one or the other of these dimensions.

Figures 4.1 through 4.4 illustrate in simple graphical terms the distinction between producer competition and consumer competition. Figure 4.1 is the noncompetitive world. An isolated, integrated utility uses a mix of its own generators to serve a mix of its own customers. The transmission system provides the link between production and consumption.

Figure 4.1 A NONCOMPETITIVE MARKET

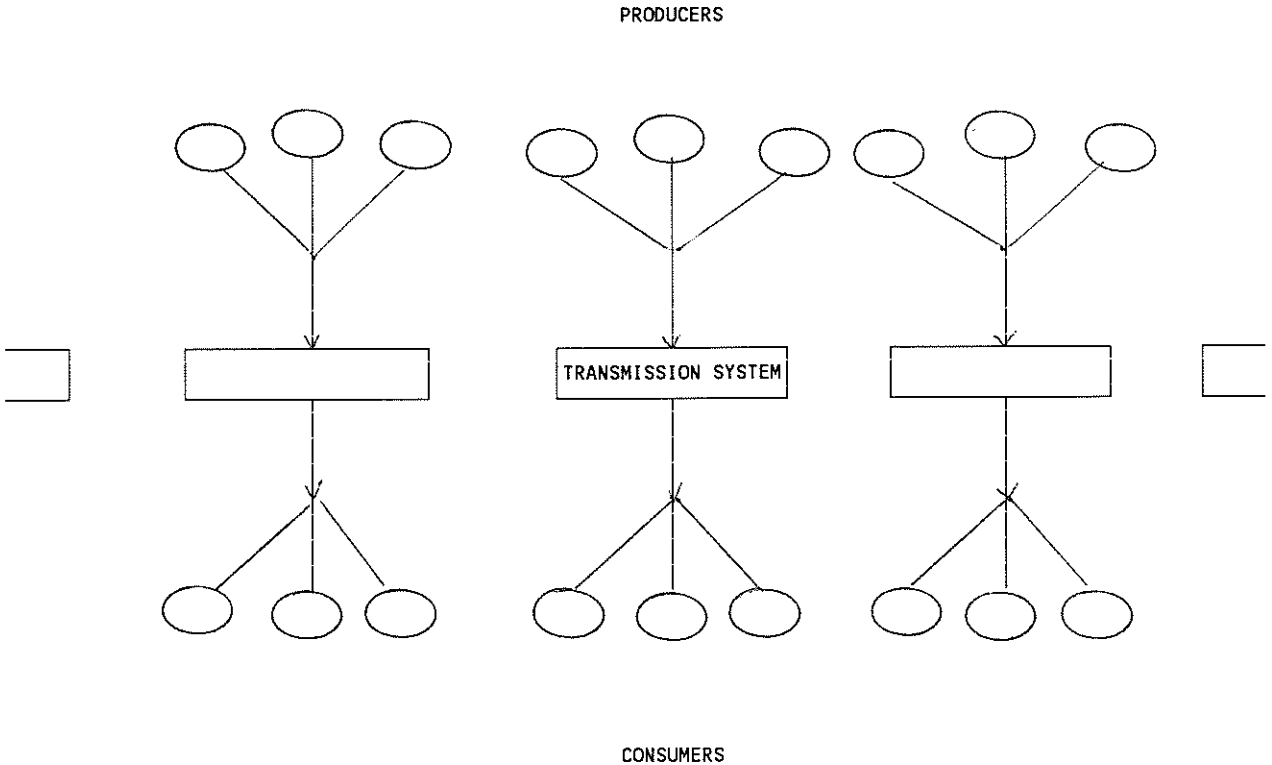


Figure 4.2 PRODUCER COMPETITION

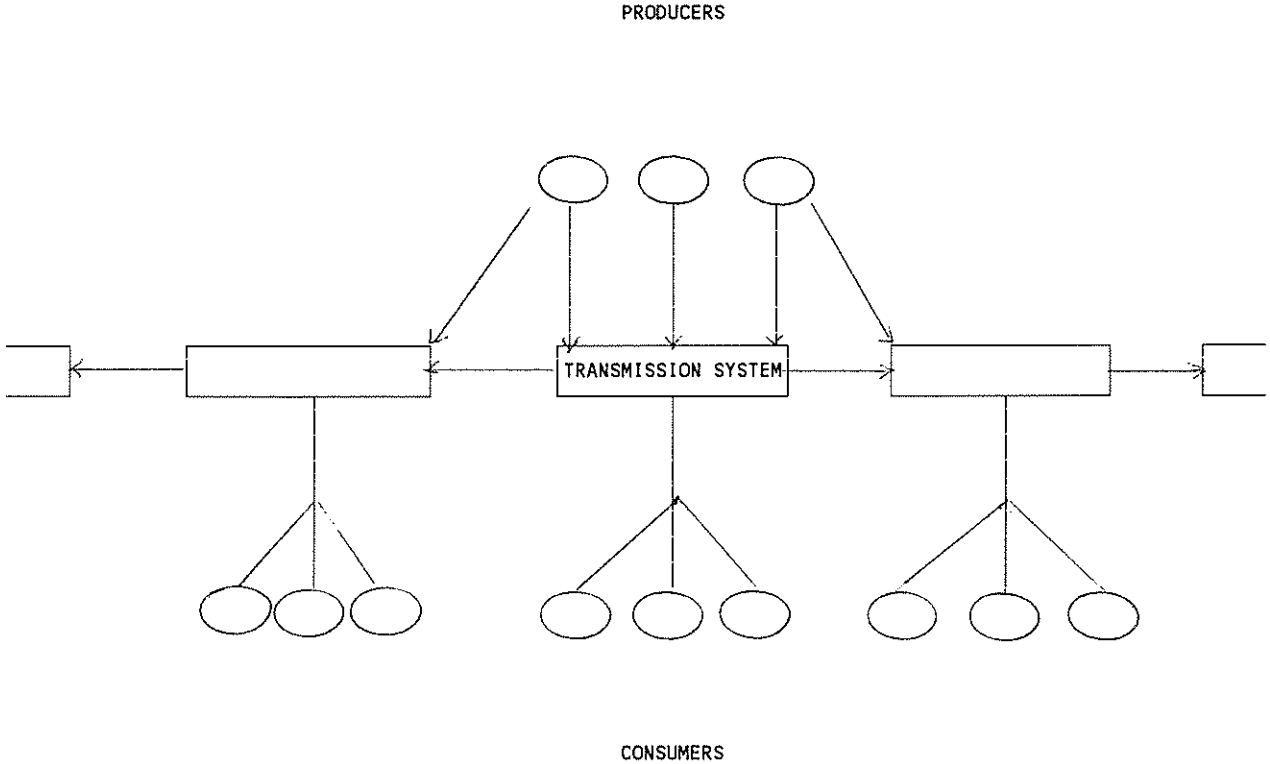


Figure 4.3 CONSUMER COMPETITION

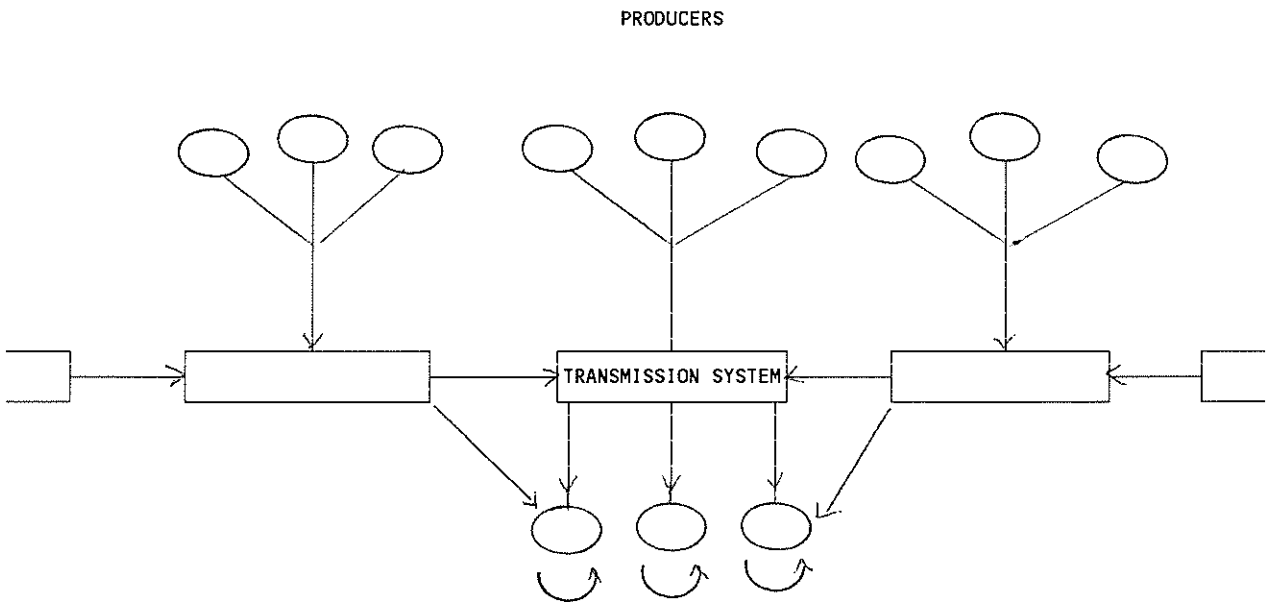
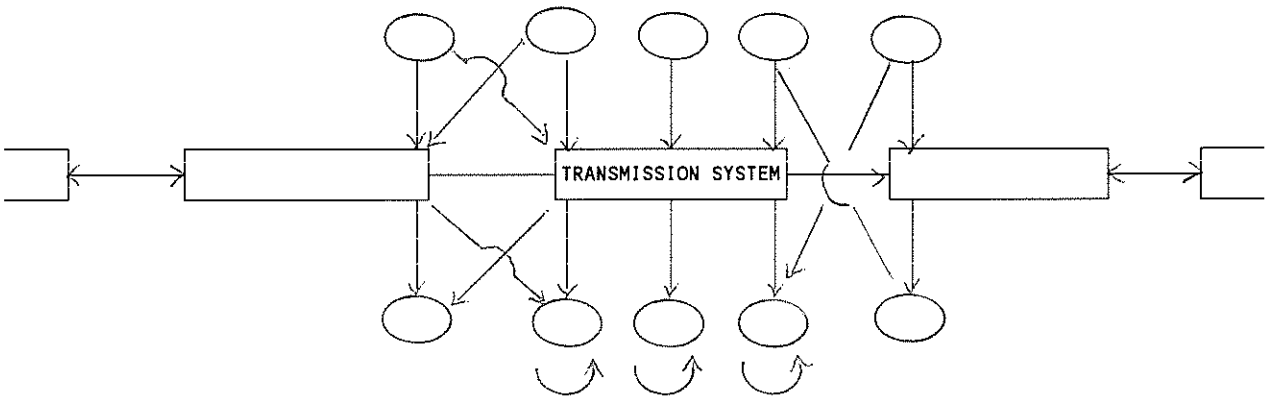


Figure 4.4 MIXED COMPETITION

PRODUCERS



CONSUMERS

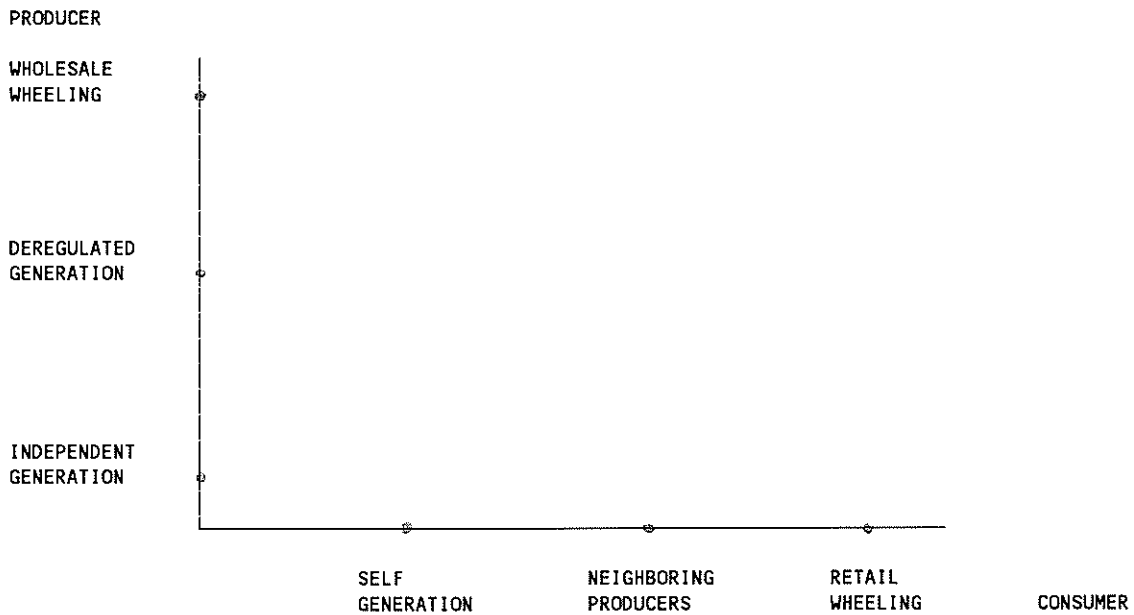
In Figure 4.2, this picture is modified by introducing new opportunities for producers. Each producer (including neighboring transmission systems) has the opportunity to sell to anyone (including the local utility), and one could envision a bidding system for selecting suppliers. No individual producer has the right (or obligation) to serve except as specified in business arrangements. A potential new producer with lower costs would exert substantial "supply-side" competitive pressure.

In Figure 4.3, the original picture is modified by introducing new opportunities for consumers. Each consumer (including neighboring transmission systems) has the opportunity to buy from anyone (including the local utility), and one could envision a bidding system for selecting customers. No individual consumer has the right (or obligation) to be served except as specified in business arrangements. A potential new consumer with greater electricity needs would exert substantial "demand-side" competitive pressure.

Figure 4.4 illustrates mixed competition. In this case, we have multiple producers and multiple consumers. Each producer has the opportunity to sell to any consumer, and vice versa. In this sense, there is both producer and consumer competition.

In Figure 4.5, the space of competitive possibilities is displayed using the axes of producer and consumer competition. The steps of increasing competition are indicated along each axis. Each point in this space represents a different scenario of competition, a market structure dictated by federal and state regulation.

Figure 4.5 COMPETITIVE DIMENSIONS



The extreme lower left corner describes a world of zero competition; that is, the world of an isolated individual regulated utility. The utility is the sole producer and it is has an explicit obligation to serve. Consumers buy only from the utility and have an obligation to be served. The extreme upper right corner of this space represents a world of total competition; that is, a collection of numerous freely-transacting individual producers and consumers.

PRODUCER COMPETITION

Producer competition is represented by the vertical axis. At the origin, the right to sell power is limited to the local regulated utility. Movement along this axis represents an expansion of the options available to potential power suppliers. At the ultimate level of producer-driven competition, anyone can "set up shop" and sell power (to anyone who has the opportunity to buy).

As we move away from the "noncompetitive world" to increased producer competition, the first major step is an expansion of the role of qualified facilities under PURPA. Currently, utilities are required to purchase power from facilities that meet the relatively narrow PURPA standards as interpreted by individual states. To increase competition among producers, the technical standards would be considerably broadened and the ability of individual states to restrict the role of QF's would be reduced. The extent of competition would depend both on the technical standards in PURPA at the federal level, and the implementation of the "avoided cost" pricing concept at the state level.

An additional increase in producer competition would result from an expansion not only of qualifying facilities under PURPA, but independent power producers in general. Currently, utilities are making limited purchases of power from IPP's. To expand this role further, federal

regulation would be modified to require consideration of unregulated production to meet power needs. However, there would still be substantial new generation provided by regulated producers, and no guarantee that regulated and unregulated producers would compete on the same basis.

As independent production becomes important, bidding systems for new capacity take on paramount importance. Most bidding systems under consideration are based on a mix of price and non-price factors, and allow bids from the utility either as a "bidder of last resort" with traditional regulation or through an unregulated subsidiary. However, there are significant issues concerning "self-dealing" in the use of such bidding systems.

The second step beyond substantial independent production is to a market where all generation is obtained through competitive bids from unregulated producers. Each existing integrated utility would be broken into a combined transmission/distribution company (transco/disco) and a set of independent generating companies (genco's). The initial relationship between the genco's and the transco/disco could be governed by long-term contracts or by a combination of spot and future markets. This would help eliminate the problem of "self-dealing" but creates the problem of windfall profits and losses, unless deregulation is accomplished gradually. As with the previous case, bidding systems take on a central role.

The last step towards complete producer competition occurs when all producers with a physical link to a given transco become potential suppliers through mandatory wholesale wheeling. With wheeling, a transmission system transports power that it never owns. Rather than purchase electricity from one neighbor and sell it to another, it lets the two neighbors make their own transaction and charges a wheeling rate for the use of its transmission services.

This type of transaction is not proscribed by regulation, although requiring the pricing of transmission services to be determined by embedded costs creates strong disincentives for placing additional loads on the transmission system.

If appropriate pricing structures can be set for transmission services, wholesale wheeling would increase the pool of potential suppliers. It could create a national market in competitive production.

CONSUMER COMPETITION

Consumer competition is represented by the horizontal axis. At the origin, consumers have the right to buy power only from the local utility. Movement along this axis represents an expansion of the options available to potential power consumers. At the ultimate level of consumer-driven competition, consumers can shop anywhere for power.

The first step along the "consumer competition" axis as we move away from the origin is the introduction of self-generation. In this case, consumers have two choices for power: the local utility and their own facilities.

The second step along this axis is the introduction of transactions with neighboring producers. Consumers would then benefit from less-expensive electric power production in a neighboring region, should they be able to link themselves to that region. Most likely, this represents an option only for the largest users.

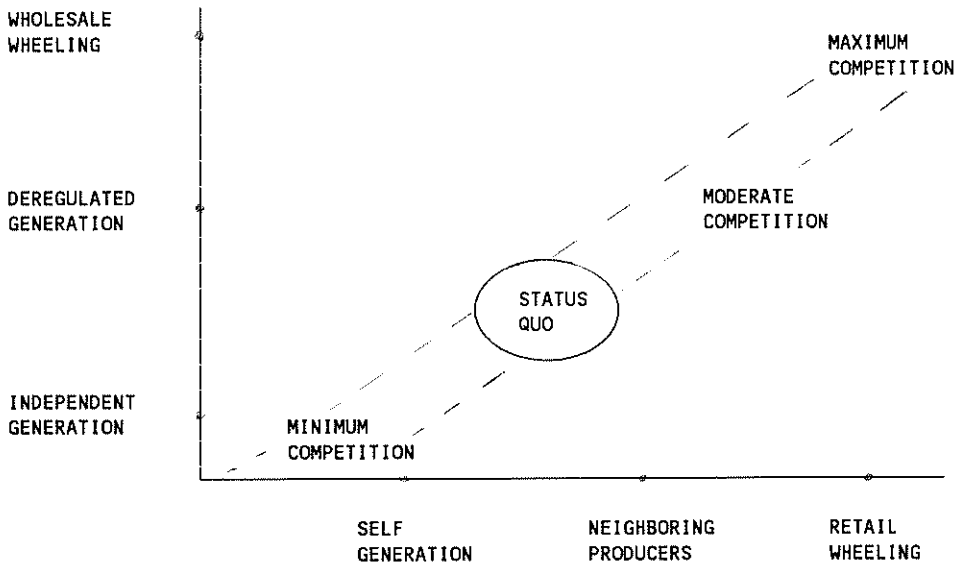
The third step to complete consumer competition is to allow consumers to choose electricity supplies from all possible producers via retail wheeling. Retail wheeling is different

from wholesale wheeling only in that the purchaser is an end-user of electricity. Although simple to describe, retail wheeling raises some fundamental concerns, such as the utility's obligation to serve a customer that decides it no longer wishes to do its own power contracting. The motivation for retail wheeling arises primarily when a utility's retail rates are unduly high, either because of cross-subsidies, poor capacity planning, or other inefficiencies. Consumers in such regions could potentially benefit from electric power production throughout North America.

COMPETITIVE SCENARIOS

The two dimensions illustrated in Figure 4.5 define a space of competitive scenarios. Figure 4.6 places the status quo and three representative scenarios in this space. The status quo is shown as a vaguely-defined area where there is some degree of both producer and consumer competition. On the producer axis, there are some regions where much of the new capacity is being supplied by IPP's. On the consumer side, self-generation is a major factor in many high-cost utility service territories.

Figure 4.6 COMPETITIVE SCENARIOS



Three scenarios that represent significant movement from the status quo are indicated in the Figure. The "minimum competition" scenario is a movement towards the origin, where the options for both producers and consumers are reduced. Virtually all production and consumption involves integrated utilities. The "maximum competition" scenario combines both forms of competition at the extreme. Production and consumption involves numerous independent entities with access to each other through a nationwide transmission system. Finally, the "moderate competition" scenario is between the two. These are the three scenarios examined in this report.

These scenarios share some common features with the scenarios recently analyzed by the Congressional Office of Technology Assessment. OTA's Scenario 1 is similar in philosophy to our "minimum competition" case. OTA's Scenario 2 involves retail wheeling, and is primarily a movement along the horizontal consumer axis. OTA's Scenarios 3 and 4 involve generation deregulation, and primarily involve movement along the vertical producer axis. Finally, OTA's Scenario 5 is similar in philosophy to our "maximum competition" case.

CONCLUSION

In the next two chapters, the issues raised individually by producer and consumer competition are discussed. Subsequently, each representative competitive scenario is examined for its implications for market behavior and performance, and these issues are examined in detail.

Chapter 5

PRODUCER COMPETITION

INTRODUCTION

In Chapter 4, we distinguished two dimensions of competition in the electric power industry: producer competition (i.e., expanded opportunities to sell) and consumer competition (i.e., expanded opportunities to buy). This chapter describes the motivation for introducing more of this form of competition into the electric power market, the effects on market participants, and the key issues raised by producer competition.

MOTIVATION

The current structure of the electric power industry reflects its historical development. In the early days of the industry, markets were localized and generation technologies were improving rapidly. There were strong natural monopoly arguments in favor of regulating all three aspects of the industry: generation, transmission, and distribution. These three elements were inextricably linked and were best developed simultaneously by vertically-integrated utilities.

Although a natural monopoly may still exist in transmission and distribution, fundamental changes in power technology and economics are causing a reassessment of the continued regulation of generation as a natural monopoly.

First, as demand has grown and tranmission technology has improved, the need for close physical proximity between producer and consumer has diminished.

Second, as generation technology has matured, economies of scale have been pushed to the limit (if not beyond). Each generator

represents only a small fraction of the market.

Third, there has been a growing realization that regulation can promote inefficiency.

The third argument is currently at the center of the debate. it can be traced to the landmark 1962 Averch-Johnson article on this subject. The literature contains numerous refinements on their premise that regulation causes a firm to deviate from cost minimization.

As long as power costs were falling due to technological improvements, this argument were relegated to academia. However, as power costs have increased since the early 1970's, regulators and consumers have become very interested in the possibility of increased efficiency through generation deregulation.

In the 1980's, generation regulation has become the focus of enormous controversy, primarily as a result of cost overruns on nuclear power plants. Many utilities are having difficulty convincing regulators that the decisions which caused these cost overruns were prudent. The regulators are, therefore, often disallowing significant portions of the capital costs and utilities are backing away from any major commitments to the construction of new capacity. PURPA initiated a flood of independent power producers, and there were sufficient numbers of projects developed significantly below the utility's cost of new capacity to suggest that independent power could indeed be a source of less expensive new capacity.

In simple terms, recent conditions in the electric power industry have inspired a debate over the "right way" to generate electricity. It was once generally agreed that the right way involved large, regulated utilities taking advantage of natural monopoly conditions. Producer competition is motivated by the more recent belief that the right way involves numerous independent unregulated generators being driven by the market to be efficient. These unregulated producers, it is believed:

- will make the right technology choice and timing decisions based on market signals

- will construct and operate new plants more efficiently

The net effect will be a better electric power system.

REGULATED PRODUCERS

The role of regulated producers in the electric power industry will change dramatically with producer competition. Each regulated producer would be transformed from an integrated utility into a transco/disco. Each transco/disco would still retain the responsibility of delivering power to their customers and their actions would continue to be monitored by regulatory agencies. However, they would meet their responsibilities by securing power from unregulated producers. Some regulated producers may have unregulated subsidiaries, depending on the nature of regulatory restrictions.

The size of the regulated producer's rate base would shrink dramatically. The financial implications of this are hard to estimate, depending on whether the regulated producer chooses to buy back its stock, increases its dividends, spin off subsidiaries in the manner of AT&T, or

fund a major diversification effort. In any case, the short run goals of meeting revenue requirements, retaining market share and fulfilling franchise requirements should not be impaired.

Wheeling orders could increase the efficiency of the nation's regulated producer system, at the expense of regulated producers which now have strategic control of transmission regions. For example, the Bonneville Power Administration has adopted an access policy toward the Northwest Intertie that some argue is aimed at reducing competition among utilities in the Northwest and Canada, in order to increase prices to California customers. Public Service of New Hampshire may be similarly situated along a major North-South transmission corridor in New England. Wheeling could open these markets for Canadian imports and bring about lower costs.

The process of capacity planning would be significantly different. Instead of planning the actual desired mix of new capacity, the regulated producer planners would have to calculate the value of specific attributes, such as dispatchability, fuel diversity, and location. These values would then be used to determine the appropriate weighting of attributes in a multi-attribute bidding system. It can be expected that these weights will be highly interdependent. Most of the planning effort would thus be focused on contracting arrangements, rather than construction. The construction activities of regulated producers would now be devoted to transmission and distribution.

Although the demand forecasting role of the regulated producer would not be affected, the supply forecasting role would be substantially changed. Instead of forecasting the on-line dates and availability of their own new capacity, the regulated producer can be expected to be

very concerned about security provisions in the contracts with producers. These will entail stringent performance bonds and milestone procedures.

Transmission planning will become more important as there will be greater demands on the transmsission system. Technical solutions to problems such as loop flow may reduce the difficulties associated with increasing the use of the transmission system. An increased politicization of the transmission planning process can be expected because transmission expansion decisions will have major impacts on the viability of different projects.

The most difficult issue for regulated producers may be the provision of control area services. Frequency and voltage regulation, emergency planning and maintenance scheduling are examples of issues that are handled internally in the vertically integrated structure but would have to be governed by contingent contracts in a deregulated structure.

UNREGULATED PRODUCERS

With producer competition, all power will be generated by unregulated producers with access to their local transco/disco. There will be some form of "competitive" bidding system whereby the transco/disco selects power providers, both in the long-run and short-run. Currently, the most common form of unregulated producer is a highly leveraged firm that specializes in independent power and utilitzes project financing for a majority of its capital requirements.

In some regions, one could expect to see increased variety in the forms of producers. On the other hand, dominant producers might emerge in other regions. For example, Canadian hydro power may be a major force in some New England areas.

Regardless of the transition process, it can be expected that it may be more difficult to use highly leveraged capital structure. Lenders will require long term contracts as well as large equity contributions. The purchasing transco will also require large equity contributions as a condition for the long term contract and as a form of security that the project will be finished on time and maintained and operated in a reliable manner for the long term.

Unregulated producers do not have guaranteed markets, so long term contracts will be essential for them to enter a market. There may develop a secondary market for partially or fully developed projects where the original investors are either unable or unwilling to continue managing the project. This would create an opportunity for other investors to acquire these assets at discount.

Operationally, an unregulated producer has a stronger incentive to cost minimize. There are numerous contingencies such as maintenance scheduling and emergency conditions where their incentive to cost minimize may conflict with the purchasing utilities interest in maintaining high reliability. Substantial resources will be expended on negotiating contract terms.

As in any competitive market, the efficient unregulated producers should do well while there will be inefficient unregulated producers who will fail. The "winner's curse" is a concern that should be addressed through stringent security provisions. This refers to the possibility that in a competitive auction it is the bidder who most underestimates his true costs that wins the bid. He would then be unable to perform on his contract. As experience is gained this problem should diminish and there would arise a pool of qualified producers who could purchase failing projects.

CONSUMERS

Producer competition does not cause any major structural changes among consumers. They would continue to purchase their power from a regulated disco, and the key effect would be any change in retail rates.

It is not clear what effect producer competition, by itself, would have on a disco's rate structures. The disco may change its rate structure to more closely reflect the rate structures reflected in its contracts with producers. The increase in pressure on producers to cost minimize may create cause consumers to see lower rates, or the lack of coordination among many producers may create inefficiencies that cause rates to rise.

There is one way in which producer competition could directly affect consumers. Some proposed producer-bidding systems have provisions for the inclusion of demand-side measures on a similar basis. For example, a major industrial consumer could offer to provide "negawatthours" by reducing power demand. To this extent, consumers would become directly involved in competition. There are difficult issues of monitoring and control that need to be addressed in order for demand-side measures to participate in a competition with generation projects.

OTHER AFFECTED PARTIES

The role of the regulators who protect the consumers will change. The regulators will be relieved of the difficult problem of determining the prudence of the myriad of decisions involved in a construction project. Reviews of contracts are inherently simpler and less contentious. On the other hand the regulators will have an increased responsibility overseeing

the bidding process. Multi-attribute bidding systems are inherently complex with many opportunities for controversy over appropriate weighting of attributes and their interrelationships.

KEY ISSUES

The issues raised by producer competition can be organized along lines discussed earlier: efficiency, equity, quality and stability. Within each of these categories, there are specific analytic and empirical questions that must be answered about this form of competition.

Efficiency: Generation

Concern that regulations have not adequately promoted the efficient production or use of electric power prompts the desire to change the current market structure. Whether efficiency can be achieved under alternative conditions remains an open question.

Regulatory structures that provide a measure of return commensurate with performance, including opportunities for both rewards and losses, are difficult to design. Increased producer competition could help create incentives for cost minimization and efficient use of energy resources. However, where billions of dollars of investment are required, encouraging the construction of socially-beneficial generating plants without substantial guarantees may be difficult.

Fair and accurate bidding systems will be required to provide incentives to potential producers, and for choosing among producers. These bidding systems raise a number of questions, including appropriate methodology, the problem of self-selection if the regulated

utility proposes its own construction projects, and accounting for non-price components of value in generation.

Efficiency in operations may also be an issue. From an operational point-of-view, the system may suffer if integration is reduced. The increase in the number of separate players may increase coordination and administrative costs, add monitoring costs, and increase the complications for accounting and pricing.

Efficiency: Transmission

The problem of encouraging efficiency is equally troublesome at the transmission level. Without increased transmission access, major opportunities for long-term efficiency gains may be lost. However, requiring some form of mandatory wholesale wheeling may generate significant costs due to pressure for retail wheeling and the resulting bypass.

In generation, design of a bidding system is key. In transmission, design of a bidding or pricing system is similarly important.

Equity

Electricity generation has traditionally been the responsibility of regulated utilities. Because regulators have been reluctant to allow utilities to suffer substantial losses and have traditionally utilized rate of return regulation that passes costs on to consumers, the majority of construction cost risks have historically rested on rate-payers, rather than utility shareholders. The advent of large generation construction cost overruns along with lower electricity demand growth and resulting overcapacity of supply has seen a shift in regulatory incentives. Ex-post prudency reviews and increased competition for generation sources have created a shift away

from regulated utility generation construction. For many utilities, the picture today is one of large downside possibilities from capital investments in generation capacity with little or no upside potential.

The overall effect has been a shift in generation construction risks to the shareholders of non-utility generators. Under PURPA regulation, however, much of the risk of excess capacity still remains with the regulated utility. Complete deregulation of electricity generation is seen as one way to encourage risk management by allocating the risk of losses to those who see profits from good generation outcomes.

In general, unless the rules are the same for all players in the electricity market, there will be opportunities for some category of players to shift risks onto other players, whether between customer classes, or from shareholders to consumers. Even in the case of retail and wholesale wheeling with generation competition, there is still a significant amount of risk associated with transmission systems, and this burden must be shared between many more parties than in the current system - gencos, transcos, discos, their shareholders, and the end-product consumers. A fair allocation of this risk is a complex problem and one which may inhibit transmission system growth.

Quality

Under the current regulatory framework, controlling the quality of the electricity "product" in the long-term and short-term are the function and responsibility of the integrated utility. These responsibilities include assuring adequate capacity and maintaining control of the system in real time. With producer competition, more emphasis is placed on contracts entered into

under competitive conditions. Developing workable systems will require considerable effort, and quality could lost due to lack of integrated planning.

Maintaining system reliability will also be a major concern, particularly in markets calling for disaggregation of integrated utilities. Voltage regulation, controlling loop flow, providing backup power supplies in the case of outages, and ensuring adequate system maintenance are some of the operations which will require development of new procedures to retain quality under new market structures. Designing adequate compensation policies for such services, as well as contractual methods to guarantee the desired quality, raises many questions. The role of regulatory oversight in creating and enforcing these agreements is still uncertain, but most likely will be required as the electric utility industry evolves into more competitive markets. In this sense, a move toward more competition in the electric utility industry may represent only a shift in regulatory control, rather than true "deregulation."

Stability: Sensitivity to Economic Conditions

One of the features of an integrated system is its stability. The stability of each system may be affected by many factors, both from the pressures of producers, consumers, and other players within the market and the external forces of the general economy, alternative energy suppliers, and more general public pressures such as demands for conservation. In analyzing these alternative futures, it is important to recognize the other forces which may affect the operations of this marketplace.

It may be possible to envision a world in which excess electric generating capacity does not exist and technology improvements aid in electric efficiency, but there are many outside factors which could prove to be even more significant for the players in the

electric utility market and the overall use of electricity. Clearly, the economic situation of the United States and other countries must be considered. The prices of alternative fuels, the supply of energy technologies, concern about the natural environment, and other national and international issues will play a part in determining the outcomes of individuals in the electric utility business. An open question concerns whether the regulatory situations envisioned are robust enough to remain stable and support continued growth, or even survival, of all market players under a variety of world conditions.

Stability: Sensitivity to Political Conditions

Some instances of limited competition may be very difficult to maintain as viable electricity markets. For example, deregulation of new generation capacity raises the issue of reclassification of "old" generating units through subsidiaries, retrofitting, etc. Inevitably, as plants are retired and new generation constructed this scenario will evolve into a competitive market for electricity generation. As such, the initial regulatory scheme is transitory. Even after the complete deregulation of the generation side of the market, there still may be significant pressures from end-use consumers to offer retail wheeling and competition for the customers. Thus, producer competition may not be itself a stable situation.

CONCLUSION

Producer competition is motivated by the view that the "right way to generate electricity" has changed. Several key issues emerge when considering how producer competition would affect the electric power market. These issues are discussed in more detail in examining three specific competitive scenarios. Before this, however, the issues

raised by consumer competition must be considered. This is the subject of the next chapter.

Chapter 6

CONSUMER COMPETITION

INTRODUCTION

In Chapter 5, we described the key issues arising with producer competition. This chapter covers the other competitive dimension: consumer competition.

MOTIVATION

Producer competition is motivated by the concept that independent producers represent the "right way" to generate electricity, but that consumers should remain organized into service territories based on transmission systems. Consumer competition is motivated by a different philsophy. The "right way" to generate electricity is in large integrated systems, but consumers should not be restricted to purchasing from the local integrated system. In this way, consumer competition will provide new opportunities and challenges for consumers and producer alike.

Consumer competition enables large integrated producers to retain control over planning and operation for the electric system. However, by favoring the lower cost integrated producers, consumer competition will promote regional economic development, take advantage of imbalances to reduce electricity prices, and level the playing field for producers with excess capacity. Considerable opportunity for business customers to press for lower electricity prices through the threat of self-generation or purchase from other utilities will reduce or eliminate cross-subsidies between customer classes. In general, consumer flexibility leads to a competitive market in which electricity price should move toward a national level at an "average" marginal cost of new power supply. This levelized

price which accurately reflects cost theoretically would also encourage more efficient use of electricity.

REGULATED PRODUCERS

Consumer competition will not directly change the structure of electricity production. Power will be generated primarily by large, integrated utilities. From the point of view of these utilities, retail wheeling is the core issue. Without retail wheeling, relatively few consumers will be able to take advantage of the opportunity to self-generate or buy from neighboring producers. Depending on the local situation, some utilities may benefit from retail wheeling and others will suffer from it. Planning will become harder for all utilities.

Unless the local utility's marginal costs are higher than current rates, a loss of business means a loss of net revenue. With consumer competition, the high cost utility will presumably lose business and revenue, and its ability to meet its financial objectives will be impaired. In addition, as the amount of stranded investment increases, the average cost for the utility's remaining customers may increase, inducing other customers to find ways to leave the local utility's system and creating a death spiral.

The relative importance of electricity production and transmission may also change, depending on the significance of wheeling as a revenue source. If wheeling rates are priced higher than transmission costs, utilities (even those with high production costs) may benefit from the opportunity to provide wheeling services to their neighboring producers. The ultimate status for such a utility will depend on the extent to which lost generation revenues may be recouped from providing transmission services.

Retail wheeling may increase the uncertainty in planning and operating the electrical system. With the consumer's ability to switch suppliers, load forecasting will become harder. Retail customers become "mobile" in the sense that, while they shop for the lowest electrical rates, they may be able to leave and return to the regulated producer system at will.

For producer and consumer alike, the key issue will be how the "obligation to serve/be served" is treated, particularly for consumers who choose to leave the local system. If the local utility has the obligation to serve, large retail customers can use it as a low cost backup and return to the system. On the other hand, if a returning consumer is truly treated as a new customer, service may be denied. Long term contracts may make such movements more predictable, but they require detailed information and more contact with large retail customers.

Even if a utility is not harmed by wheeling in the present, it may oppose wheeling because of the risk it poses for future construction. If utility choices turn out to be bad investments because cheaper alternatives appear, consumers can avoid the cost of such investments by wheeling power from other sources. This opportunity shifts risks of capital investments entirely onto utility shareholders, although shareholders will not necessarily receive all the resulting benefits.

Another major change with consumer competition may be the attitudes of the major utility participants towards each other. Cooperation among utilities on scheduling and long term planning may no longer common. The costs of marketing and market

information could increase substantially. Power pooling arrangements and sharing information to build a more efficient electrical system may be eschewed by competitors, as one tries to avoid aiding one's competition. Also, some cooperation may be avoided because of the fear of violating antitrust laws.

Retail wheeling highlights the importance of transmission pricing. If transmission charges are only based on embedded costs, then the utilities will not be compensated for the lost opportunity of using their own lines. Overuse of the transmission system, because of such improper pricing, could exacerbate the problems of loop flow, reliability, and stability. Product differentiation and the unbundling of services are options the utilities will pursue. Correctly pricing transmission and entry to the regulated producer system to compensate for the problems caused by retail wheeling will require careful consideration and may not be achieved quickly or easily.

UNREGULATED PRODUCERS

Consumer competition does not by itself increase the participation in the generation marketplace. In fact, by leveling prices among regions, consumer competition may make independent power production more difficult. Some QFs and IPPs may face increased competition from regulated producers in other regions. In some regions, lower avoided costs as producers get power from other low cost regulated utility suppliers could destroy much of the incentive for QFs to enter the generation market.

On the other hand, with greater retail wheeling, the pressure for purchases from unregulated producers could increase, leading to changes in regulations for producer

competition. Until such changes occur, unregulated producers should see little effect from consumer competition.

CONSUMERS

The role of consumers in the electric power market is dramatically altered with consumer competition. Consumers will no longer be considered as core versus non-core, as all consumers become mobile. Consumers will be mostly affected if new cheaper supplies are available or if their cheap supply goes to other consumers. Locale will no longer be significant in limiting markets, creating opportunities and difficulties for both producers and consumers.

Electricity brokers may be created to take advantage of the new opportunity for consumer services. They would arrange electricity supply choices and contract negotiations for those customers who prefer not to devote time to the education necessary to ensure the "best" price for electricity in the free market for electricity supply.

One possibility is the formation of retail consumer buying groups to allow smaller retail consumers to take advantage of any savings available from the retail wheeling option. Consumers also have the option of putting pressure on prices by moving, conserving, switching fuels, and regulatory actions.

As mentioned earlier, the key issue will be how the "obligation to serve/be served" is treated for consumers that have chosen to leave the local utility. It is also in the consumer's best interest to be treated like any other new customer when it desires to return to the local system. That is, high stand-by rates or large connection fees for

returning customers are viewed as punitive and discriminatory measures by these customers. This right to return to the utility system poses a key question for regulators, particularly with respect to capacity planning. As long as the local utility has the obligation to serve, large retail customers can use it as a low cost backup and return to the system.

If a returning retail customer is truly treated as a new customer, however, he runs the risk of refusal. In that case, the obligation to serve will no longer mean that new customers will receive service when requested.

KEY ISSUES

Like producer competition, consumer competition raises a set of difficult analytic and empirical issues. They can be organized along similar lines: efficiency, equity, quality and stability.

Efficiency: Transmission

As with producer competition, procedures for maintainng efficiency in transmission are a key issue. Retail wheeling introduces the same type of problems of pricing and access as does wholesale wheeling. Pricing and access may be even more complex, given the increased numbers and types of market participants.

Efficiency: Consumption

With consumer mobility, the concept of obligation to serve must be redefined. Just as a contractual relationship must be established between producers and transcos with producer competition, a similar relationship must be formed between consumers and

their suppliers. This contractual relationship must establish the obligation to serve (if any), the obligation to be served (if any), and any right of re-entry once the relationship is severed. "Consumption pricing" is at the core of the debate over consumer competition.

Retaining obligation to serve only for a specific class of customers may be politically unacceptable, and defining this class could be extremely difficult. Entry and exit barriers may potentially be seen as punitive measures and again be politically difficult to impose. Long-term contracts offer some potential of acceptability, but raise the additional problems of loss of flexibility, and the spectre of enforcement difficulties as evidenced in the natural gas market.

Equity

Consumer mobility raises important issues of equity for consumers and producers alike. Regulated producers face greater volatility and greater risk. High cost producers and their small customers may have the added problems resulting from stranded investment. The remaining customers will face having to pay for the excess capacity that will be created as larger customers leave the system. The stranded investment problem could cause rates for the remaining customers to increase.

Quality

Consumer mobility may create substantial problems with maintaining the quality of the electricity system. Difficulties will be created in developing adequate supply, transmission, and distribution systems. As noted above, dedicated investment in transmission and distribution faces problems of bypass. Pricing and construction becomes more complicated, particularly when transmission lines may be required for mandatory

wheeling purposes rather than providing benefits for a utility's own "customers." In addition, the technical problems in maintaining system reliability are greatly exacerbated by uncertain numbers and locations of users.

Stability: Sensitivity to Economic Conditions

With increased consumer mobility, one gets increased volatility. As prices shift among producers, consumers will presumably shift their suppliers. This could lead to significant fluctuations in prices and quantities.

Stability: Sensitivity to Political Conditions

Maintaining limits on consumer competition may be difficult. Three schemes of limited competition are to restrict wheeling to "public interest" cases, to retail customers over a certain size (e.g. 1MW or above a service load voltage limit) or to only new customers. If retail wheeling becomes mandatory for any particular class of consumers, an unstable situation arises. If wheeling really does produce lower costs for electricity, then proposed limitations which arbitrarily restrict wheeling rights create incentives for avoiding these restrictions.

CONCLUSION

Consumer competition is motivated by the view that electricity can be most efficiently generated by large systems, but that competition among these systems is desirable. Several key issues emerge when considering how consumer competition would affect the electric power market. In the next three chapter, the issues raised by varying degrees of both producer and consumer competition are examined from the point of view of potential market participants.

Chapter 7

MINIMUM COMPETITION SCENARIO

INTRODUCTION

The minimum competition scenario reflects an implicit goal to return the electric power industry to the form that existed prior to the 1970's. On the production side, only integrated utilities and a few qualifying facilities would be allowed to produce power, and qualifying facilities would be required to meet very strict criteria. On the consumption side, consumers would be allowed to obtain electricity from the local utility or, in a few cases, from on-site generation. The "obligation to serve" is balanced by the "guaranteed rate of return." The national market would consist of a number of local monopolies, linked through voluntary arrangements.

This scenario may be traditional, but it represents a significant reversal in the current attempt to introduce more competition into the electricity market. Given the economic and political changes that have already occurred, any return to the "good old days" may be difficult. The transition to minimum competition would require substantial changes and a very strong philosophical commitment at both at the federal and state level. A smooth transition could be problematic, given today's emphasis on the deregulation of generation, transmission, and consumption.

PURPA would have to be interpreted very narrowly or perhaps modified legislatively, and IPP's would have to be subject to PUHCA. Measures for limiting consumer self-generation options, such as entry/exit fees and standby charges, would be required. Disputes over earlier utility investments (particularly in nuclear power) would

have to be settled, and future utility investment would have to be encouraged through rate-of-return guarantees and fewer (if any) ex-post prudency reviews. One option suggested here is to have "rolling" prudence reviews.

The theory behind this proposed market structure is that electricity is a natural monopoly and an "infrastructure" product. It should be produced and delivered by integrated firms that provide efficiency by taking advantage of economies of scale in investment and operation under the supervision of regulatory bodies. This is the industry model still used in many countries, including successful free market economies like Japan.

REGULATED PRODUCERS

Structure

In this scenario, regulated utilities, and integrated utilities in particular, play a dominant role. They will produce, transmit and distribute power. They will be obligated to provide economic service, and will be responsible to their customers through the regulatory process.

Behavior

Most power transactions in this scenario will be between integrated utilities and their customers, with limited wholesale sales among regulated and the few unregulated producers. Because of the possibility of financial return, most integrated utilities will presumably encourage consumption (and consequently, discourage conservation and load management). In some cases, they may also try to keep their retail customers happy (to prevent any return to a more competitive environment) by cost reduction or by delivery of new services.

Rising producer costs are due to many factors, including over-building, plant design changes to accommodate environmental concerns, and cost overruns. The effect of rising costs on rates has been exacerbated by the use of the traditional method of rate basing major capital additions and by the effort to cross-subsidize some groups (residential consumers) at the expense of others (commercial and industrial consumers).

Rising rates have led to bypass cogeneration, the emergence of independent power producers, the threat of consumers seeking the right to obtain power from entities other than the franchised producer, and municipalities trying to secede from a regulated producer's territory. These competitive forces have emerged before, and presumably would emerge under this scenario. In areas where utilities have low costs, these forces can be kept in check. However, in areas where costs are high, political and economic forces may make this scenario unstable. There will be considerable pressure to find solutions (e.g., "deregulation") to the problems of the noncompetitive market.

Utilities will strive to prevent any potential erosion of their market monopoly by getting and keeping costs low. This may be done through efficient management and/or through reductions in capital and operating expenses, possibly at the expense of the quality of service.

With respect to unbundling, utilities may realize that not all consumers may desire the same type of service. With the advent of more sophisticated metering and control devices, utilities may be able to unbundle and rebundle services successfully. For example, some customers (e.g., computer service centers) may opt for extremely high quality service

at a premium and others (e.g., some manufacturers) may opt for lower quality service at a discount. In addition, utilities may reduce charges to some customers by charging others for services (e.g., backup power) that are currently being supplied at no cost.

Planning and operations will remain the responsibility of the regulated producer. These responsibilities include assuring adequate capacity and maintaining control of the system in real time.

Performance

In general, this scenario is a highly favorable one for regulated producers. Producers with no excess capacity and low operating costs will keep their customers and regulators happy, and will undoubtedly do very well. They will maintain their monopoly franchise and will receive the authorized return.

Presumably, producers will high capital or operating costs not due to incompetence will also fare well -- much better than in other scenarios. Their monopoly franchise will remain intact, and their customers will not flee. Producers with high costs due to poor management will do poorly, but perhaps less poorly than in other scenarios. They will suffer financially, but will most likely remain in business as long as they can withstand financial uncertainty and strong political and economic pressures.

UNREGULATED PRODUCERS

Structure

In this scenario, unregulated producers will play a small role in the market. They will not have access to many buyers, and will serve primarily as a supplement to regulated production in high cost areas.

QFs will be required to meet very narrow PURPA technical and ownership criteria. In return, they will have rights to sell power to utilities at avoided cost, as determined by individual states. Clearly, QFs will be most common in areas of high avoided cost.

IPPs will be subject to the Public Utility Holding Company Act of 1935 (PUHCA), which creates a risk of substantive regulation which many corporations find intolerable. In addition, IPP bulk power transactions will be subject to regulation by FERC and possibly by PUCs, depending on whether a particular PUC asserts that it has authority over the transaction and whether FERC successfully contests the assertion. Again, IPPs will be most common where regulated producers have high costs. Canadian producers will face similar conditions.

Behavior

Unregulated producers will sell power to their local utility under limiting rules. These producers will be forced to rely on voluntary wheeling if they wish to sell power outside the local service territory. QFs and IPPs may also be required to provide security provisions on long-term contracts so that power buyers are not suddenly left in a capacity shortfall situation that requires a costly remedy. These security provisions may include damage payments from the unregulated producer to the buyer's assuming ownership of the unregulated producer's equipment.

Because of their supplemental role, unregulated producers will have little involvement in the planning and operations of the electricity market as a whole. Their responsibilities will be spelled out in individual contracts with buyers. In a sense,

unregulated producers will act as suppliers to the industry, like fuel and equipment vendors, with very limited powers.

Performance

As noted above, unregulated producers play a relatively minor role in this scenario. Their performance would depend on the types of arrangements that could be worked out with regulated producers. Where regulated costs are high and conditions are favorable, performance could be very good. In general, however, unregulated production will be a business of limited attractiveness.

CONSUMERS

Structure

In this scenario, virtually all consumers will obtain power directly from integrated utilities. Unlike other scenarios, both large and small consumers will have similar, limited alternatives.

Behavior

Rates will be set based on the regulated producer's overall costs and the allocation of these costs among different customers. As a result, rates will vary widely depending on the cost structure of the local utility. In some cases, where utilities are relatively progressive and remain concerned about potential competition, consumers may be afforded additional types of service.

Consumers will be restricted to buying from the local utility, generating power on-site, or relying on conservation. With entry/exit fees or standby rates, conservation may be the most attractive alternative.

Performance

In this scenario, the performance of an individual consumer will depend entirely on local factors: the rate structure of the local utility and the self-generation/conservation alternatives. Consumers who are lucky enough to be in areas with efficient, low-cost producers will perform relatively well. Consumers in high-cost regions will perform relatively poorly.

ANALYTIC/EMPIRICAL QUESTIONS

As discussed earlier, issues of efficiency, equity, quality and stability are relevant in all competitive scenarios. However, in the minimum competition scenario, two issues are paramount: generation efficiency and political stability. They can be characterized as two analytic/empirical questions:

- Can an essentially noncompetitive electric power market be designed to ensure generation efficiency in the short-term and long-term?
- Can this market withstand inevitable political pressures when conditions become unfavorable?

Generation Efficiency

Much of the reason for interest in competition is that the traditional regulatory approach is perceived to have failed to encourage efficiency in the utility industry. There

are substantial concerns over the investment and operating decisions of monopolistic, integrated utilities. This scenario is based on the assumption that a heavily regulated, noncompetitive electric power market can be efficient. The challenge will be to develop the appropriate regulatory mechanisms.

Perhaps the key issue in generation efficiency is how to encourage the development of needed new capacity. The string of major cost overruns on new power plants has severely strained the traditional regulator-utility producer bargain in this area. Even under the best conditions, it is unclear whether regulators will authorize new utility construction without firm cost caps, and it is equally unclear whether utilities will undertake any but the least risky projects with such caps. Where such caps create risks for utilities, rates of return may have to rise as well, reducing the traditional cost advantages of utility-built plants. New forms of rate regulation in this area may be required.

Political Stability

Even if regulatory systems could be designed to encourage efficiency, there will be times when utilities make imprudent investments or events turn out in unexpected ways. Under these conditions, the embedded cost of electricity may rise well above the level afforded by self-generation, increased independent power production, or even other utility systems. If the philosophy underlying this scenario is correct, it is important to look beyond these local conditions and preserve the basic market structure. The critical question is whether the market is sufficiently robust to survive the inevitable political pressure that will result.

Chapter 8

MAXIMUM COMPETITION SCENARIO

INTRODUCTION

This scenario represents a combination of the maximum levels of both producer and consumer competition. Maximum competition generally has been described as "complete deregulation" of the electric power industry. In fact, in this scenario, substantial regulatory control and oversight remain for transmission and distribution.

With maximum competition, the electric power industry would be completed transformed. The vertically integrated utility will cease to exist. Three distinct and independent entities -- the genco, transco, and disco -- will replace the integrated regulated producer. Gencos would produce power, transcos would transport and control it, and discos (and some consumers) would buy it.

Gencos would be completely deregulated, and wheeling would be available for all wholesale and retail customers. Varying degrees of regulation will still be necessary to ensure that the transcos, owners of the transmission resources, and discos, serving the relatively immobile core customers, will not be able to exploit their market power.

Understandably, a move to maximum competition would involve substantial regulatory change. This change could occur gradually -- for example, by deregulating new generation -- for suddenly -- for example, by requiring immediate divesting of generation resources. PURPA and PUHCA regulations would be eliminated, and all generation facilities would ultimately be transformed into independent power generators. Pricing

and access regulations would be required to ensure that transcos provide wholesale and retail wheeling to any requesting customer. Rate regulation of discos would also be required. All sorts of contractual arrangements would be required among gencos, transcos, discos, and consumers.. To put it mildly, the move from integrated utilities to these separate entities would be a difficult procedure.

The motivation behind this scenario is basic economic theory. Unless there is a natural monopoly, markets should be free to operate as dictated by (non-colluding) buyers and sellers. In this scenario, the natural monopolies, transmission and distribution, would be regulated. Market forces would be used to guide generation and consumption decisions.

REGULATED PRODUCERS

Structure

In this scenario, regulated producers will include transmission companies and distribution companies. Each of today's integrated utilities will have to decide where its comparative advantage lies and choose whether to become a genco, transco or disco. The remainder of the business will ultimately be abandoned. A variety of economic factors, such as comfort with the regulatory environment, the ability to compete, the degree of stockholder/managerial risk adversity and potential profitability, will be important in making that decision.

Transco's will be in a highly regulated environment, and will most likely face little direct competition due to the limited number of transmission paths and the difficulties in providing new transmission facilities. The strategic position of the transco will enable it

to act as a broker, matching the generation (specific gencos) to the load (discos or retail customers)

Disco's will also be in a highly regulated environment, but with substantial competitive pressure. Their larger customers may have attractive options for self-generation, fuel-switching, and bypass.

Behavior

In this scenario, transactions that are currently made within one firm or are dictated by regulation will now be specified in business arrangements. Much of the work of transcos and discos will then be devoted to planning and conducting these transactions. Even if the amount of communication among groups is very high, duplication of effort and lack of coordination may be inevitable. Also, in a competitive framework, the free flow of information among the different groups may be impeded by fears of having information leak to competitors, giving them an unfair advantage.

Daily operations require the instantaneous matching of the loads to resources. To accomplish this task in a safe and efficient way, the interconnected utility commits its resources, transmission, and distribution facilities with those of the third party utilities to a common automatic generation scheme. This commitment defines a control area. The control area is the area for which the regulated producer is responsible for maintaining the frequency at 60 Hz. and balancing actual intertie flows to scheduled intertie flows through the use of its automatic generation control system.

Although the regulated producer has been disbanded, the need for the control area and the associated control area services still remain. In an electrical sense, the system still must be held together. The scheduling, dispatch, transmission security, and voltage control will be contracted for through the transmission broker. Scheduling will be accomplished in a straight-forward manner through spot market purchases, short-term , and long-term contracts.

The transco, possibly with PUC oversight, will be required to provide the appropriate amount of transmission security and voltage control to maintain the integrity of the transmission system. Transmission access and pricing could be determined by the PUC, with the transco earning an authorized rate of return on its investment. Although the integrated utility routinely performed these functions, with a disintegrated market structure these functions may become harder to perform. Changing the status of the transmission system to one of common carrier, allowing retail wheeling, and increasing the number of competing end users (discos), makes the task of coordinating and allocating the use of the transmission system much more complex, time consuming, and potentially costly.

Perhaps the greatest operational problem of the transco would be accounting and pricing. Since power flows re-orient themselves in response to disturbances, any customer connected to the grid would receive a constant supply of power (barring major instability) even if the customer's particular suppliers went off-line. Charging for this reliability function raises some difficult pricing questions. Pricing transmission services efficiently also will raise major challenges.

Longer-term planning, such as deciding when additional capacity is needed, will also be dependent on market signals. For example, rising market prices would signal the need to increase the transmission capability. However, as recent experience has shown, regulating bodies do not always rely on the pricing system when prices tend to rise. If the pricing system is not used, then the method of allocation will be arbitrary and clear signals as to when to increase the transmission capability will be lost. Even with this market signal, increasing the transmission capacity may remain a complex problem, relying on the cooperation of numerous parties for transmission construction.

The situation of the disco would be akin to that of the "local distribution company" in the natural gas market, except that the transco provides a variety of control area services together with the electricity itself. Much of the attention of the disco will be aimed at balancing the requirements of its large and small consumers, and keeping the regulators happy.

Performance

The financial success of the new transmission and distribution companies will vary depending on local conditions. Transmission and distribution companies with access to low cost production, favorable regulation, and continued monopoly power (due perhaps to limited transmission facilities) will presumably fare well. Companies without such features may fare poorly, although they should remain financially solvent except under the most extreme conditions.

UNREGULATED PRODUCERS

Structure

Under this scenario, all production comes from unregulated producers engaged in competition at market-determined prices. All power generators effectively become IPPs, although there are a variety of ways in which these divested generating companies could be formed. After a transition period, the generation business may appear like other capital-intensive competitive manufacturing industries.

Behavior

By and large, the scale of the unregulated power business will change, but not the underlying behavior. In general, gencos will seek out transcos and discos (and vice versa) before going into business. The terms by which power will be produced and sold will be spelled out in detail in advance. It may become more difficult to finance projects on a highly leveraged basis without the price guarantees provided by PURPA. Lenders are likely to require more equity and demand more recourse to the assets of borrowers to secure their loans.

With greater competitiveness, producers may distinguish themselves on a variety of factors (including price). For example, there may be reliability and dispatchability may become relevant factors. Some gencos may be high price, high reliability and high dispatchability producers; others may be low price, low reliability and low dispatchability.

Certain markets will be dominated by new producers. For example, low-cost Canadian producers should do very well in New England and West Coast markets.

Performance

In recent years, avoided-cost rules and tax incentives have allowed some QFs and IPPs to thrive. In this scenario, producers with low costs or unique market niches will do very well. However, producers with higher costs will no longer be able to rely on regulatory forces. These producers will likely fail, as they should in a competitive market.

CONSUMERS

Structure

This scenario is a major departure from the current electric power market. Large consumers will have freedom, within contractual limits, to choose their electricity supplier on a nationwide (or even continent-wide) basis. Smaller consumers will have less freedom, but will still be involved in a competitive market through their local disco.

Behavior

In many cases, consumers will have to relearn their behavior with respect to the electricity market. Many consumers will now have the opportunity (and responsibility) to choose their electricity supplier. Because of this change in mindset, there are likely to be transition problems. In some cases, there may be dissatisfaction and confusion (as in the case of telephone divestiture).

For the system to survive, large customers, at least, will have to accept the notion that they are responsible for securing electricity supplies, like any other input. Smaller customers may band together to gain power in rate negotiations with their discos.

Until business arrangements are worked out over years, there may be opportunities for counter-productive behavior. For example, some consumers may deliberately contract for a smaller degree of control area services than they need, knowing that they can lean on their neighbors because these services will have to be provided to maintain the system. This is the classic free rider problem associated with public goods.

Performance

Some consumers will be situated where they have access to many potential suppliers, including a variety of gencos and transcos. For these consumers, performance will depend less on local conditions than on the overall situation in the market. Other consumers will have less flexibility, and will do well or poorly depending on the ability of their local disco or transco to obtain and manage inexpensive production resources.

In general, prices may be volatile under this system, since surpluses and/or shortages will translate immediately into changes in prices. However, firms may be able to protect themselves through long-term contracts.

In theory, there are substantial advantages for consumers in a system which allows them to make their own supply arrangements. These customers would be able to make their own tradeoffs between risks and costs, and to choose between long- or short-term contracts. However, in return, many consumers may have to absorb substantial "transaction" costs because of the degree of coordination required in the electric power market.

KEY ANALYTICAL AND EMPIRICAL ISSUES

This scenario raises most (if not all) of the issues associated with electric power competition: efficiency (in generation, transmission and consumption), equity, quality and stability. Again, these issues can best be examined in the form of key questions:

- Can pricing and access systems be designed so that efficiency gains outweigh the turmoil inherent in this scenario?
- To what degree will some large consumers benefit at the expense of smaller consumers?
- Can business arrangements be designed to ensure adequate quality control?
- Will the system be stable in response to both economic and political forces?

Efficiency

This scenario attempts a revolution in the power industry. Ignoring the cost of the revolution itself, the first question that must be answered is whether the new market organization provides substantial economic advantages in equilibrium over the current system.

These advantages will only be obtained if new forms of business arrangements can be designed effectively. These include bidding systems for generation, pricing and access for transmission, and pricing of consumption obligations (i.e., the obligation to serve/be served for new and old customers).

Equity

While this system may create efficiency gains, the shifting of benefits from small to large consumers may be significant. Substantial transaction costs will be imposed on all customers (large and small), and the benefits associated with those transaction costs may accrue only to large customers. Careful attention may be required to ensure, for example, that small customers of small discos in isolated areas are not "priced out of the market." The effect of airline deregulation on service to smaller cities may provide an instructive parallel.

Quality

While there may be economic gains associated with a more competitive market, the power industry is unique in the degree of coordination required among market participants. It will be important to determine whether contracts between entities can effectively replace intrafirm coordination. To a great extent, the core concern with this scenario may be the tradeoff between efficiency gains (due to competition) and quality losses (due to lack of integration).

Stability

In this scenario, a great deal of emphasis is placed on business relationships between separate entities. However, it is not clear how robust these relationships may be under political or economic stress. For example, some producers may simply declare bankruptcy rather than continue business under unfavorable conditions. Other markets have developed mechanisms for dealing with this problem; the electricity market in this scenario will have to develop its own.

Chapter 9

MODERATE COMPETITION SCENARIO

INTRODUCTION

The previous chapters described two extremes in the space of competitive scenarios. This chapter describes a scenario squarely in the middle: moderate producer and consumer competition.

In the producer dimension, all new generation will be supplied through a competitive process. Existing integrated utilities would be able to compete either through unregulated subsidiaries or as bidders of last resort. Regulators would have oversight of the bidding process to prevent self-dealing problems. To minimize regulatory delays, all bids would be considered fixed and power purchases resulting from the bidding process would not be subject to prudence hearings.

Existing generation would remain in the rate base until retirement, and would be depreciated in the traditional manner. Investments in transmission and distribution, demand-side measures, and some life-extension or environmental upgrades would be allowed into the rate base.

In order to ensure that the generation market was truly competitive, the transmission system would be treated as a public good and wholesale wheeling would be mandatory where it served the public interest. This could be defined as all cases where the reduction in long-run generation costs exceeded the long-run transmission costs

associated with the wheeling transaction. FERC would establish a value-base pricing methodology for calculating long run transmission costs.

In the consumer dimension, consumers would be free to self-generate or to build their own transmission systems to the extent possible without the power of eminent domain. Those consumers bypassing the local utility T would be required to pay for all reasonable charges associated with providing standby service on a non-discriminatory basis. In return for the utility's obligation to serve, the self-generator would be subject to entry/exist fees to minimize impacts on the utility's other customers. Retail wheeling would not be allowed.

Some elements of this scenario are already in place to a limited extent in the existing market, such as bidding systems for generation and pricing systems for transmission. However, significant regulatory changes would still be required to implement this scenario.

As far as generation is concerned, unregulated utility subsidiaries can now participate in capacity auctions as minority partners, but changes in the PUHCA would be necessary to expand their participation. The policy goals of PURPA would presumably be accomplished through taxes on non-renewable energy or through bidding systems that were weighted to favor preferred technologies.

At the state level, the threat of prudence disallowances is currently discouraging the construction of new generation. A policy that held utilities to their initial cost

estimates in the same way that IPP's are held to their bids could effectively preclude proposals to build new capacity for inclusion in the rate base.

On the transmission side, the institution of mandatory wholesale wheeling would require substantial improvements in the analysis of transmission system dynamics. The basis of transmission pricing would need to change from embedded to long-run marginal costs to approximate market pricing. Distribution of windfalls from the pricing of existing transmission capacity would be controversial, a matter that FERC might be required to address.

The philosophy underlying this scenario is balance. Economic theory favors maximum competition -- market forces should drive markets. Institutional reality favors minimum competition -- integration and coordination are critical elements of the electric power industry. This scenario balances these two considerations: a moderate level of producer competition complements a moderate level of consumer competition and vice versa.

REGULATED PRODUCERS

Structure

Under this scenario, integrated utilities would remain in the generation business for an extended period, but would have a very limited role in the construction of new generation. Over time their generation role would diminish and they would be transformed into transco-discos. In this role, they might continue to retain some generation capacity to provide certain control area services, such as frequency and voltage regulation.

As transmission and distribution functions increased in importance, alternative structures such as holding companies or multi-divisional structures that emphasize the distinction between these services may become common. Although the utility could be expected to expand its transmission, distribution and other demand-side activities, its overall size would likely diminish as the capital-intensive generation function declined.

Over time, as depreciation exceeded investment in new capacity, regulated producers would have excess cashflow which could be diverted into diversification efforts. Diversification could include but would not be limited to unregulated generation subsidiaries.

Behavior

In their relations with their customers, the behavior of the integrated utility/transco-disco would not be darmatically altered. The main change would be the introduction of a bidding system for new capacity, and the maintenance of business relationships with a variety of unregulated producers. These relationships would come under greater public scrutiny.

Construction activity would be limited primarily to transmission and distribution facilities. The construction of generation capacity would be limited to special cases. Unlike the current practice, this capacity would be constructed under fixed price contracts with the architect/engineering firms.

The increased reliance on purchased power would eliminate one of the incentives that utilities have to promote load growth. The increase in the relative importance of distribution and the continuing threat of bypass from self-generation would force the utility to concentrate on demand-side activities, such as negotiated rate reductions and load management. If conservation investments were allowed into the rate base, this could be a significant growth area.

Performance

If effective bidding systems can be designed, this scenario represents a return to a stable, although radically changed, environment for most regulated producers. Regulated producers with moderate fixed and operating costs should do very well. However, regulated producers with high fixed (or even operating costs) would continue to face the financial pressures they do today. However, the expansion in the possibilities for regulated producers to purchase the cheapest availble power should reduce this problem.

Because this scenario removes the responsibility for generation, the riskiest aspect of the utility business, from the arena of the regulated producer, financial performance could stabilize and bond ratings could improve. If excess cashflow were diverted to Increased dividends and stock buybacks, this would also support the market value of the utility.

UNREGULATED PRODUCERS

Structure

In this scenario, unregulated producers would move from a supplemental to central role in electricity supply. Unlike the maximum competition scenario, however, this change

would be accomplished gradually and these producers would remain as participants almost entirely in wholesale markets. With the elimination of the technical standards in PURPA and with the focus on wholesale markets, there would be most likely be a preponderence of large projects in the 100 - 400 MW range.

Behavior

With an increase in competitiveness, the market would place a premium on experience and financial security. Many of the smaller, higher cost participants would be eliminated. More of the players would have prior utility construction experience, utilizing joint ventures with architect/engineerring firms and vendors, for example. Utility subsidiaries would become common, particularly if PUHCA is revised.

Performance

As in the maximum competition scenario, moderate competition would be good for some unregulated producers and bad for others. Financial performance would depend heavily on the cost structure of the producer, and the terms and conditions of the purhcase contract. Those unregulated producers with the greatest access to the highest number of buyers could be expected to do the best. Similarly, unregulated producers with few potential markets for their power (and with high costs) are likely to do poorly and even fail.

The "winner's curse" remains a concern to be addressed with stringent security provisions. As experience is gained this problem should diminish and there would arise a pool of qualified producers who could purchase failing projects.

Performance

As in any competitive market, efficient unregulated producers should do well while there will be inefficient unregulated producers who will fail. Financial performance will also depend on the terms of the purchase contract, and on the size of the market available to the producer. Consequently, the success of individual producers may depend heavily on regulatory oversight of bidding system design and transmission pricing.

CONSUMERS

Structure

Consumers in this scenario are largely unaffected. Only those who pursue self-generation or their own transmission links will see the direct effect of moderate competition.

Behavior

Where opportunities for self-generation and neighboring production are available, consumers can be expected to use these for leverage in exacting rate concessions. Cooperation between the utility and its customers on demand-side management may increase.

Performance

By increasing the efficiency with which power is produced while keeping existing depreciated plants under regulation, consumers should benefit from this scenario. However, with mandatory wheeling, some consumers will lose access to low cost production (via low cost resources) that is now exclusively theirs.

Small consumers could be hurt becuase of concessions provided to large comsumers threatening bypass. This problem will diminish as the extent of overcapacity decreases.

KEY ANALYTICAL AND EMPIRICAL ISSUES

This moderate competition scenario raises most of the same issues raised with maximum competition. However, the key concerns here are generation efficiency (i.e., gidding system design), transmission efficiency (i.e., pricing and access design), and quality (i.e., the effectiveness of business arrangements).