DEREGULATION OF THE ELECTRIC UTILITY INDUSTRY – IMPLICATIONS FOR NUCLEAR POWER

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ABSTRACT

The deregulation movement sweeping the international electric utility community represents a dramatic shift from the traditional utility business model. This paper will focus on deregulation in the United States and the new challenges for nuclear power plant operators. An overview of the new operating models being implemented in the US will lead into a discussion on new economic and operating concerns for nuclear power plant operators.

INTRODUCTION

Electric utilities companies in the United States have traditionally been a favorite investment for pension funds and retirees, judged as a safe industry with a guaranteed rate of return and regular dividend distribution. Over the past few years, that reputation has faded. The deregulation trend has hit the electric utility industry and the future of the industry is uncertain.

The deregulation of the electric utility industry is often compared to the deregulation of the telecommunications industry a few years ago. Telecom deregulation resulted in new improved services, new features, and a general decline in consumer pricing. It is the hope of legislators that deregulating the electric utility industry will have a similar impact for electricity – new services, new features, and lower prices.

BACKGROUND

All electric utility systems consist of three main components: Generation, the production of kilowatts; Transmission, high-voltage transportation of the power; and Distribution, delivery of the power to customer facilities. The traditional United States utility company was vertically integrated, or composed of all three components (Figure 1). In this traditional marketplace, the utility owned all generation facilities, all transmission facilities, and all distribution lines within its service area. Additionally, there were no requirements for the utility to provide the access to transmission lines that would allow a competing supplier to service the area. Thus, all traditional utilities enjoyed a regional monopoly.

In a competitive market, forces of supply and demand determine the price for a product. However, since customers living in a utility's service area had no choice but to use power from the local utility, a completely different process was developed. On roughly an annual basis, the utility would determine all projected costs and sales for the upcoming year and present a formal "Rate Case" to the Public Utility Commission. The utility was allowed to consider everything from fuel costs to new furniture in the headquarters building as part of the total cost of providing service. The Public Utility Commission, or a similar organization, was charged with balancing the interests of the utility with the interests of the general public. In addition to the approved costs of service, utility companies were guaranteed an acceptable rate of return on any capital investment made for the purpose of serving customers.

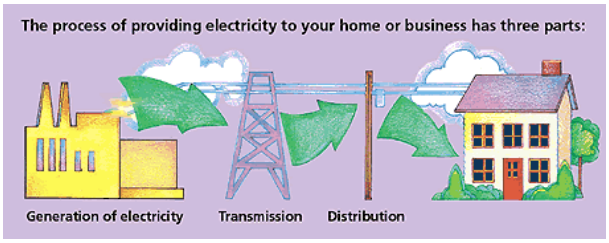

FIGURE 1. The three components of the electric utility industry

This market structure of guaranteed returns removed the requirements that a company must be efficient, customer-focused or well run to be profitable. This led to an industry focused on reliability, availability and safety at whatever cost required. Additionally, the emphasis on reliability at any cost led to the construction of excess capacity and redundant systems.

The past 25 years have seen the passage of several key regulations that have set the stage for the current changes in the electric utility market. These regulations include the Public Utility Regulatory Policy Act of 1978 (PURPA), the Energy Policy Act of 1992 (EPAct), and FERC Orders 888 & 889 in 1996.

The first piece of legislation to start the deregulation trend was Public Utility Regulatory Policy Act of 1978 (PURPA). PURPA led to the development of Independent Power Producers (IPP), generation facilities owned and

operated by non-utilities as a moneymaking venture. One of the main functions of PURPA was to require the local utility company to hook these IPPs up to the grid. The passage of PURPA spurred the development of many new IPPs across the country; the generation component of electricity was no longer exclusively performed by traditional utility companies.

The Energy Policy Act of 1992 (EPAct) was the second major piece of legislation in the development of the deregulated marketplace. EPAct established a mechanism for energy wholesalers to petition FERC for access to Transmission facilities. Under these new rules, a wholesaler who wanted to transport a large amount of energy across a utility's Transmission lines have a clearly defined mechanism to gain access to the lines. EPAct led to the development of a competitive wholesale market, as wholesalers were now able to transport their product from source to end-user. However, EPAct was not the final solution. For example, if a wholesaler needed to transport power across the service territories of multiple utilities for final delivery, access to each utility's lines was gained individually. Since there was no guarantee that access would be granted, a deal might be lost because transport over one utility's line was not granted.

It was not until FERC orders 888 and 889 were enacted in 1996 that the framework for deregulation was really put in place. FERC orders 888 and 889 lead to a functional unbundling of traditional utility services by requiring each utility to establish a separate transmission tariff. Furthermore, nondiscriminatory and open access to all transmission lines was mandated, at the rates established in the tariff. Wholesalers were made free to transmit power across multiple utility service territories without petitioning for access to each territory individually. Additionally, the pre-determined price set forth in each utility's Transmission Tariff removed significant variability in arranging for long-term transmission arrangements.

Since the passage of FERC Orders 888 and 889, individual states have examined the topic of deregulation. A state-by-state status of deregulation legislation is provided as Figure 2. As may be expected, states with electricity costs above the national average have been the first to enact deregulation in an attempt to lower costs for consumers. States with relatively low electricity costs have chosen to move more slowly.

One of the most contentious issues associated with deregulation has been stranded cost recovery. Since many utility companies made large capital investments (such as nuclear power plants) under the traditional market model of guaranteed capital recovery, the switch to a competitive market leaves utility companies with large "stranded"

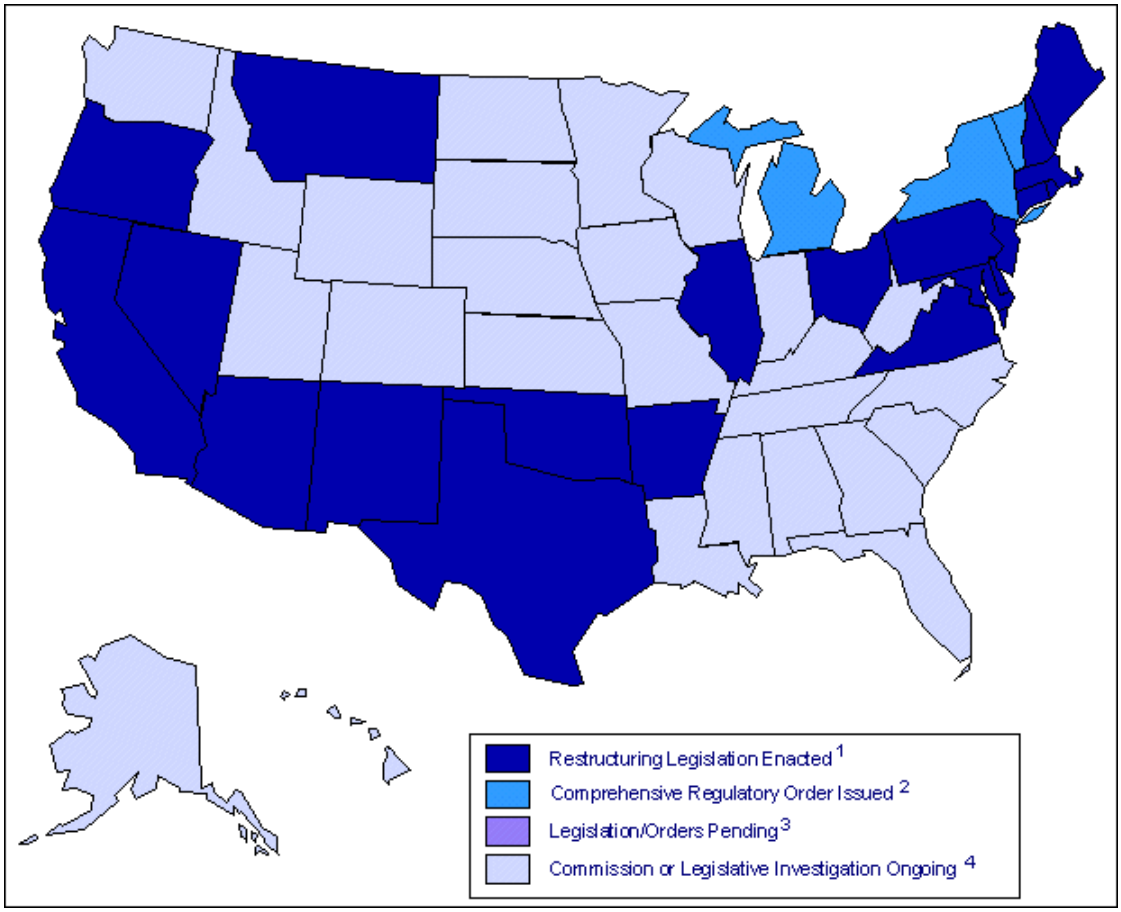

FIGURE 2. Status of State Electric Industry Restructuring Activity as of March 2000 (www.eia.doe.gov, 2000)

costs that may not be recovered in a purely competitive marketplace. Each state is determining a method to compensate traditional utility companies through the use of a Competitive Transition Charge (CTC). The implementation and magnitude of CTC charges varies state-to-state depending on the relative successes of the utilities and consumer groups fighting on either side of the issue. The common factors are that there is a maximum dollar figure utilities are allowed to collect through CTC charges and that the charges will be phased out within the first 10 years of the competitive market.

THE NEW MARKETPLACE

As one of the first states to enact complete deregulation of the electric utility generation market, California is often looked at as a sample case of deregulation implementation. Although it is one of the largest states in the U.S., only 3 large investor-owned utility (IOU) companies serve most Californians. The California market was officially opened to competition on April 1, 1998 and established a couple of new market players.

A new corporation, the California Independent System Operator (www.caiso.com), or ISO, now operates the electrical grid in the state of California. The responsibility for insuring grid reliability and availability shifted from each of the large utilities in the state to the ISO. The ISO is responsible for scheduling all transmission within the state and to plan for future system upgrades. To accomplish its mission, the ISO runs competitive markets for Ancillary Services and Real Time Energy on an hourly basis. The ISO must continuously monitor the energy generation and consumption in the service area and work with generators to keep the supply and demand balanced. The ISO also maintains contracts with the key generators required to ease congestion on the state's limited transmission lines.

Another new player in the California deregulated market is the California Power Exchange (www.calpx.com), or PX. The PX runs Day-ahead, Day-of and Forward markets to determine a market-clearing price for each hour. These markets function under the same basis as other commodity markets – suppliers announce how much power they have to sell and what price they are willing to sell it at and consumers announce the amount of power they want to buy and the price they are willing to pay. The intersection of these supply and demand curves determines the market-clearing price for the hour. In order to guarantee the volume required for this market to function, all generation from the 3 large IOUs is required to pass through the PX. A sample relationship between volume and price for a summer day is displayed as Figure 3.

As an additional means of encouraging competition, the 3 IOUs in California were instructed by the PUC to divest a percentage of generation capacity. This has led to the sale of most fossil plants in the state of California. It is anticipated that the increase in market players will result in greater cost savings for consumers as suppliers increase competitiveness. As a result of the increased number of competitors, new companies are starting to consider

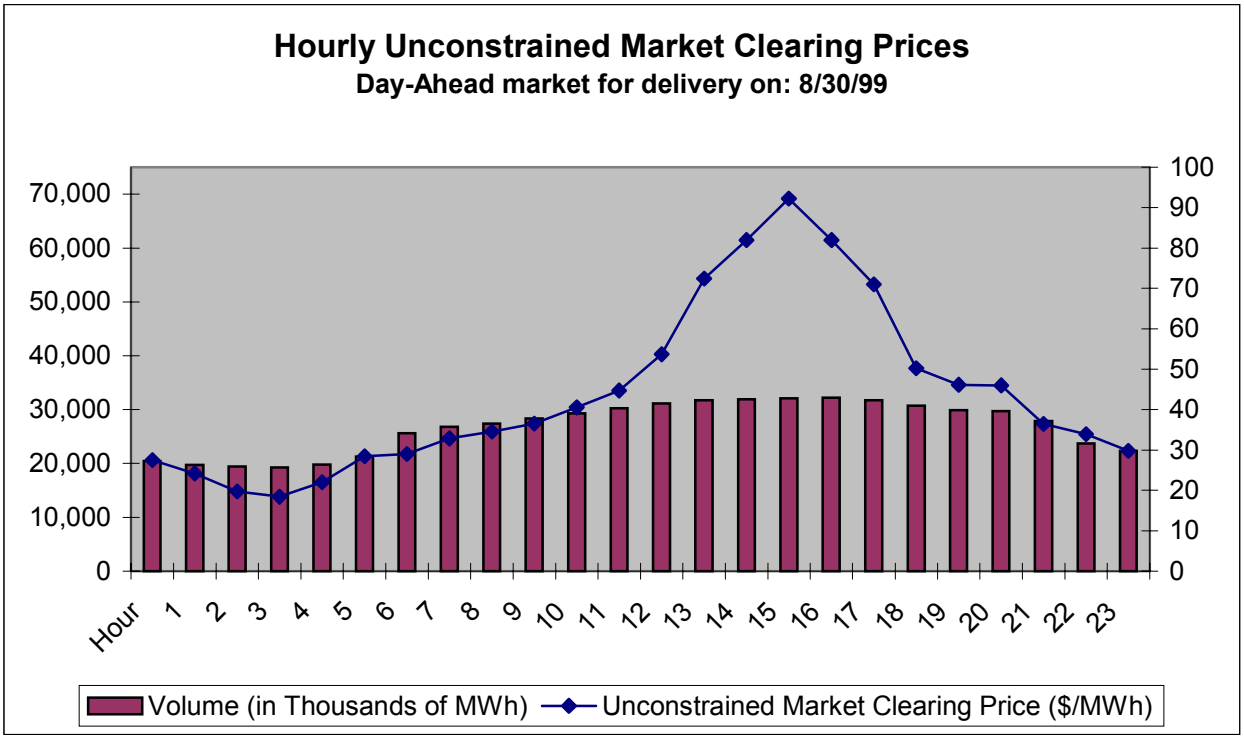

FIGURE 3. Typical summer-time Day-Ahead price fluctuations in CA market

building new generation capacity in the state to take advantage of what can be high market clearing prices.

Although the Pennsylvania electric utility market was deregulated shortly after California, the marketplace was established in quite a different fashion. Pennsylvania was already part of an Independent System Operator, the PJM (www.pjm.com). Also Pennsylvania chose to implement a "Shopping Credit" concept for comparison of different energy options.

The PJM, roughly standing for Pennsylvania, New Jersey, Maryland, was initially established in 1993 as the ISO for an area spanning parts of 5 states and covering 8% of the US Population. The existence of the PJM eased Pennsylvania's transition to a competitive market, as there was already an independent organization in control of the area's power grid. PJM also maintains the settlement process for participants transferring power over the grid.

The Shopping Credit concept employed in Pennsylvania is used in several other East Coast states. The Shopping Credit concept requires each utility to determine a "Price to Compare" for the generation component of each rate schedule. Any customer who chooses to receive energy service from an alternate supplier is credited the Shopping Credit amount on each bill received from the utility. Thus, if a customer can find a supplier who charges less than the shopping credit, the difference between the shopping credit and the supplier's charges are pocketed as savings. This idea is displayed in Figure 4.

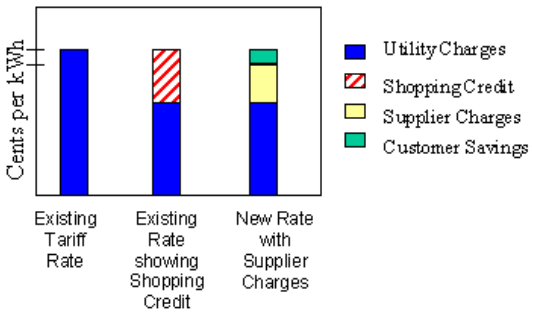

FIGURE 4. Illustration of Shopping Credit methodology used in Pennsylvania

The implementation of the Shopping Credit concept has produced mixed results. Since all suppliers wishing to serve the market are also required to publish a Price to Compare for each rate schedule, the consumer has a clear metric for comparing costs of service among suppliers. However, the utilities have been permitted by the Public Utility Commission to establish Shopping Credit figures below typical market rates for power in the region. This price structure makes it virtually impossible for an alternative supplier to cover costs involved with procuring power while still offering savings to customers.

All of these market changes create new players with specialties that never existed before. Deregulated affiliates of regulated utilities have purchased generation capacity with the intention of operating for a profit. Power marketers, companies that buy and sell power with the intention of providing a value-added service to the customer while making a profit on the margin between purchase and selling price, have entered the scene.

The electric utility industry has become like any other competitive marketplace, it is not enough to simply produce a product. To be successful in a deregulated environment, new electric providers must offer the consumer choices, reliability, and savings, or lose the customer to a competitor who will. These choices include new methods for communicating with the customer, expanded options for billing and rates, and flexibility. Many new companies are fulfilling this niche for customers, including my company, Utility.com.

Utility.com offers the small customer choice, convenience, and savings. Customers have 24-hour access to up-to-date account information via the online web site and have the flexibility to pick which date their bill is due. By leveraging electronic communications, savings that cannot be obtained with traditional utilities are passed on to the customer.

IMPACT ON NUCLEAR POWER

These market changes necessarily impact the Nuclear Power Plant (NPP) owner. Each NPP operator must review all current operating assumptions to assess the potential for success in the new market. One result of the new competitive market is fairly significant price fluctuations on an hourly basis. This model does not meld with the traditional NPP role as base-load capacity with limited ability to follow load. In fact, in California, NPPs are consistently bid into the market at a price of $0 while the plant is operating because it is cheaper to operate the plant for no compensation than to shut down the plant until the price improves.

The current trends of improvement in the nuclear power industry typically discussed in scientific meetings gain a new sense of urgency when a competitive market is factored in. Goals like longer fuel cycles and shorter refueling outages are not just engineering goals to strive towards, but a necessity for keeping a plant even moderately competitive. NPPs in the US have personnel costs much higher than other generation sources because of the number of people involved in nuclear plant operations. There is new increased pressure to reduce the staff required to run a NPP in order to lower costs and attempt to operate competitively.

The push to lower costs leads to business maneuvers commonly found in the competitive industries. We have already seen consolidation among nuclear power plant owners. If successful, these companies will be able to achieve economies of scale by sharing administrative, operations, and engineering staffs between multiple facilities. By sharing best practices among all plants in the portfolio, they will become a strong competitor with the ability to generate large amounts of power with low

operating costs. Additionally, when these companies are able to purchase new plants for less than the book value as we've seen recently, there is strong potential for future profit.

Both these new consolidated operators and single-plant operators face new challenges in meeting regulatory requirements created for a different world. In the vertically integrated environment, an operator could count on a grid operator and neighboring plants to guarantee regulatory requirements such as offsite power and voltage support. In this new market, a competitor, who is not obligated to provide the required levels of voltage support, owns the generation plant down the street. NPP Operators may have to start paying for the voltage support that was once provided at no cost. Providing access to off-site power is not of primary concern to an Independent System Operator as operating constraints of a NPP are secondary to insuring overall grid reliability and stability.

The NPP operator must balance the push to reduce costs with the existing regulatory requirements. As the market progresses, NPPs operators must petition the regional ISOs to guarantee certain levels of support and potentially set up new contracts to pay for these services. NPP operators will also continue to encourage the Nuclear Regulatory Commission to examine new forms of regulation that reduce the drag on earnings due to regulatory burdens.

Finally, any proposed new nuclear power construction in the U.S. market must meet an even stricter set of financial targets. Since the utility is no longer guaranteed a return on capital investments, a nuclear plant must deliver an acceptable rate of return, without the benefit of formal rate case proceedings. To meet these goals, the time from commitment to grid-connection must decrease significantly. To accomplish this, all aspects of the process must be shortened: site selection, final design, licensing, construction, and final approval. To truly encourage the construction of new nuclear generating capability, the costs per kWh must actually be lower than the cost associated with other generation sources as a guarantee against licensing delays and insurance against unknown decommissioning costs. Although the nuclear power industry is working to improve these metrics, even higher goals must be set and reached before new nuclear generation capacity is considered in the U.S.

CONCLUSION

Although no one knows exactly what impact the deregulation of the electric utility industry will have on nuclear power plant operators, it is recognized that all current operating models and assumptions must be reevaluated. This new competitive marketplace creates a new set of challenges for the nuclear industry. These challenges are not insurmountable, but they do acknowledge the importance of economic targets, even while striving to reach new engineering and operating goals.

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