Electricity Deregulation: California and Australia

Thomas Mlynarski
University of Illinois at Chicago, Chicago, IL 60607

The twentieth century saw regulation and deregulation of many industries, including transportation, trucking, airline, banking, and media. Toward the end of the century, there was an increased interest in, and implementation of, liberalizing policies in the energy industry. The U.S. and Australian deregulation system has been left mainly in the hands of their states, which has led to many interesting case studies. This paper will focus on two of these case studies, California and Australia. California’s “deregulation crisis” is often cited as an argument against liberalizing energy markets. Comparatively, the eastern provinces of Australia integrated into a single deregulated market, demonstrating some early successes and some difficulties associated with the deregulation model.

History and Background

The size and political composition of the United States allows for a variety of regulatory environments, by region and by state. The electric industry had been consistently treated across the country as a utility, and this regulation encouraged price stability and network reliability. This economic certainty allowed for financing large capital expenditures in energy generation and infrastructure. It was not unusual for these projects to have large cost overruns, with the costs being passed on to consumers. A desire to produce a more efficient allocation of resources and the resulting lower prices for consumers led policy makers to begin considering liberalization of the energy industry in the same way that transportation, airlines, telecommunications and others were being successfully deregulated.

The energy industry can be likened to other industries but has its own unique challenges. For example, demand is not elastic. Demand needs to be instantaneously matched to supply, and the produced electricity cannot be easily stored currently. This combination along with limited production, or capacity constraints, can result in excess demand being curtailed by rolling blackouts rather than the typical reduction of usage by higher prices. Service interruptions also define network reliability and blackouts can have political consequences, both for politicians and the industry. Electricity production is constrained by the available resources, which depends on local conditions, or otherwise necessitates bringing in fuel or electricity by high voltage transmission lines. Different production methods, such as coal, nuclear, solar, etc., vary in risks and costs, so that some energy mix may be more desirable at the national level.

The industry is composed of four parts: generation, transmission, distribution, and retail. The electric utility paradigm has all of these components under one company. In order to foster more competition, the deregulation schema splits the industry both horizontally and vertically, so that each component is separate and each component also has multiple choices, where practical. Generation is the production of electricity, and lends itself well to this process. Under deregulation, generating stations would be privatized and would compete to supply power. Typically an official exchange is created where the generators sell their electricity and the electricity providers purchase it for consumers. The exchange functions like any market exchange, where generators compete on price and buyers may choose depending on their requirements, usually cost, but possibly environmental considerations for example. An official exchange facilitates oversight to analyze market performance and prevent collusion. Transmission refers to the component of the electric industry responsible for transporting produced energy to energy markets, and is one of the most difficult areas to regulate. The infrastructure cannot be easily reproduced, is difficult to price, and can localize generation which will distort market behavior by not allowing generators to compete efficiently. Distribution provides the infrastructure for the final connection to the customer. The infrastructure is similarly difficult to duplicate. For this reason, transmission and distribution continue to be regulated, with the preferred method being performance based regulation (PBR). PBR rewards transmission and distribution firms for achieving some metric, such as achieving a level of reliability while keeping costs below some index of expected costs. Failure to properly implement transmission and distribution regulation can lead to reliability issues by under investment or non-competitive behavior if a single retail utility monopolizes the local infrastructure. The retail component procures electricity from the generators in the electricity market and delivers it to the customers. These companies are the face of the electricity industry for consumers and handle billing, customer accounts, and offer electricity products, such as green energy. Together these changes constitute what is loosely called the textbook case for deregulation in the electric industry. An implementation of deregulation may pick the extent of applying the different aspects.
The California regulatory energy environment was dominated by investor owned utilities Pacific Gas and Electric (PG&E) and Southern California Edison (SCE), and two municipally owned utilities San Diego Gas and Electric (SCG&E) and the Los Angeles Department of Water and Power. Under regulation, the utilities were vertically integrated, controlling their own generation, transmission, distribution, and retail operations. The system was managed so that the California Public Utilities Commission (CPUC) set the electricity rates paid by consumers by considering the investments required in infrastructure. The primary benefit of this type of regulatory system is the reliability of the electric grid. In 1995, the CPUC found that the regulatory system was overly complex, and under pressure from industrial customers and independent generators, California voted to deregulate the industry to promote competition in 1996. Deregulation changed the California electricity landscape. Public utilities were required to divest forty percent of their generating capacity to a new set of five major producers, who were to compete to provide lower wholesale electric prices. A non-profit California Power Exchange (PX) was created where the retail electricity providers, in this case still the same utilities, and the new generators could trade electricity at auction to create a competitive price through supply and demand mechanics. Control of transmission and distribution was transferred to a new entity, the Independent System Operator, who was responsible for keeping open access to the power transmission system. The old utilities would continue to function in the retail electric market, along with new entrants who could compete with them for customers by purchasing electricity on the PX.

The initial electric rate for consumers in the new system was set by CPUC at ten percent below the prevailing rate. This would build support among consumers and assuming lower wholesale electric prices on the PX, would compensate utilities for the divested generation infrastructure. These rates would be in effect for individual utility companies until full divestiture of generation. The relatively small number of generators created opportunities for collusion. Generators found that electric scarcity allowed higher prices, which discouraged investment in new generating capacity and encouraged restricting supply. This produced electricity price spikes and supply shortages. The summer of 2000 saw rolling blackouts, despite an installed capacity of 45 gigawatts and demand peaking at 28 gigawatts. When the first utility (SCG&E) fully divested generation, the electric rates it passed on to customers tripled their electricity bills. Other utilities were not so lucky and had to absorb price differences between the fixed rate they could charge customers and the higher rate they were forced to buy on the PX. In January of 2001, electric utilities exhausted cash reserves and suspended payments to producers. Generators had anticipated this scenario and started taking generation offline earlier. PG&E could no longer afford to buy electricity on the PX and declared bankruptcy, forcing the state to intervene and purchase electricity for delivery to customers. The crisis was finally resolved when California entered a state of emergency, allowing the state to sign a ten year contract to purchase electricity, a solution criticized for locking in high electricity rates. (Figure 1) shows this price behavior for LA County. The crisis was estimated to have cost California $40 billion. California suffered at all levels of deregulation. The lack of sufficient independent generators created market power at the production level, which was magnified by the retention of significant generation capacity by the utilities themselves. In the wholesale market, generators had a disproportionate ability to manage pricing by collusion and supply manipulation. The transmission system created electricity transportation bottlenecks which allowed generators even more market power in local areas. The fixed rate did not allow customers to respond to price fluctuations and priced out retail competition once PX wholesale prices were higher than the fixed rate. The uncertain regulatory environment perpetuated the crisis. Electric utilities failed to sign their own long term contracts with suppliers, not knowing if such action would be viewed by CPUC as circumventing the PX. There was also the expectation that the fixed electric rate as was a floor for customer rates, but CPUC refused to pass the rising costs on to customers.

Australia

Prior to World War II, Australia’s energy markets were geographically localized, with regions producing their own electricity and no way to transport the electricity around the continent. The war brought increased industrialization that required better infrastructure. Australia’s large geographic size but relatively modest pop-
ulation presented formidable challenges for a comprehensive continental infrastructure project. The improvements occurred throughout the fifties and sixties as rapid growth in local coal power plants, a large hydropower and storage project in the Snowy Mountains region, and transmission interconnections between geographically close provinces that connected most of Eastern Australia in the nineties.\(^2\) This system spanned roughly 5,000 km North-South, and connected a population of 16 million. Australia experienced calls for internationally competitive electricity prices contemporaneously with the U.S., despite boasting among the lowest electricity prices in the world, and deregulation began in 1998.\(^2\) Eastern Australias integrated electric system provided a suitable environment for trading electricity among competing generators through a National Electricity Market (NEM) which would be established for this purpose. Each Australian state had an electric utility that comprised the regional electricity industry. These utilities were dissolved into numerous generators, transmission and distribution companies, and retail components. The generators were required to sell their electricity on the NEM by submitting bids to the market every five minutes. The market operator matched the required demand by sending automatic generation control signals to plants that were most economically able to meet demand at the time, with average price behavior shown in (Figure 2). Transmission and distribution networks were available to new generators. Customers were given choice to change their retail electricity provider.

A 2006 government review of the deregulation progress and results showed a decrease in electricity prices to consumers, and increased investment in transmission and distribution networks.\(^10\) The rosy assessment proved premature. By 2013, as the transmission and distribution investment costs were passed onto consumers, the average cost of electricity to retail customers had risen by 70% from 2006, as seen in (Figure 3), with commercial customers slightly behind.\(^11\) The problem was compounded by generous subsidies on photovoltaic equipment. Consumers installed nearly 2,600 MW of solar capacity, or 1.3% of consumption, to avoid the increasing electricity prices, leaving a smaller customer base to pay the fixed transmission and distribution costs.\(^12\) Industrial customers also canceled projects as they became uneconomical in the new environment, further eroding the base. Australia is attempting to remedy the crisis by switching to a performance based regulation for the distributors, where infrastructure improvements are evaluated against a benchmark and efficiency savings are shared with consumers after review by a regulator, rather than reimbursing infrastructure investments at a fixed rate of return.\(^12\) Even today, the wholesale electricity market continues to provide decent electricity prices given macroeconomic conditions in Australia. Nonetheless, the entire energy picture continues to develop.

**Conclusion**

Deregulation affords opportunities to unlock efficiencies from stagnant regulatory systems, or to disturb the semi-functioning electricity production and delivery systems of today. Although status quo is the safe option, regional competition may force a more efficient framework on this existing system. Currently, genuinely practiced deregulation offers the best alternative for consumers, with thirteen US deregulated states (Connecticut, Delaware, Illinois, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Texas) experiencing price increases below inflation in the last year, while thirty US regulated states had just the opposite effect.\(^14\) Although recovering the catastrophic cost of California’s electricity crisis is not realistic through market efficiencies, enough cases and solutions now exist, providing policymakers with
guidance for many situations. In particular, the “textbook model” of an open wholesale market, performance based regulation of transmission and distribution, and allowing retail competition shows considerable promise through its successes.

10 Continuing Medical Education, Electricity Prices in Australia An International Comparison 16 (2012).