

Chapter 6

LESSONS LEARNT FROM THE CALIFORNIA POWER CRISIS

6.1 Overview

The recent power crisis in California is affecting the deregulation processes around the world. Many countries are now re-evaluating their earlier decisions to deregulate the industry. True competition for the electricity market has certainly been held up and to some degree, smeared by the recent events in California. Many countries, including Malaysia, have decided to abolish plans for wholesale electricity market for fears of the same type of pitfalls that had engulfed California. Some of these concerns are indeed valid as policy makers around the world are asking if things can go so badly wrong with a reform that did not involve wholesale privatization of the electricity supply in such a rich and sophisticated economy, what are the implications for much less well-endowed countries embarking on the full menu of reform including privatization?

Nevertheless, it is prudent to note that many of the problems associated with the crisis in California are related to a poor market design structure rather than from the impact of a deregulation. In fact, many observers have concluded that deregulation did not occur in California. Instead, the power market had been restructured in a complicated manner that permits competition halfway.

Therefore, it is premature for developing countries to jump into conclusion that power reform is too risky. Many of the features in the California market design have no immediate or even near term relevance for most developing countries. However, lessons can be learnt from the California debacles. The crisis does provide "expensive" lessons in "things not to be do" in reforming a particular power industry.

This chapter is divided into several parts. The first part will list the chronology of events that lead to the crisis in California. The second part provides an overview of the reform in California and some of the resultant "failures". The third part investigates the factors that lead to the crisis and the final part concludes by examining on the important lessons associated with the California's reform and whether more prudential market design and management could have avoided the crisis.

6.2 California Power Crisis

6.2.1 Introduction

The rolling blackouts in California caused television stations went off the air, traffic lights and cash machines failed and left millions of people in the dark. It also forced many high-tech-industries to switch to back up system to keep computers running. As California's electricity system teeters on the brink of collapse, the Governor of California, Gray Davis declared an official state of emergency.

California's energy crisis has put almost all states in US (except Texas) and the rest of the world to hold back or postponed their deregulation or re-evaluate plans for deregulation. For those states and countries that have been deregulated, are now instead looking to re-regulate the industry completely. What has actually gone wrong with California's deregulation process? A reform program that was once being treated as a model is now seen as a pitfall.

6.2.2 Chronology Events:

On 7th Dec, 2000 due to idle power plants and shortage of power supplies, California declared unprecedented electricity alert, as its power demand on grid had reached 31,600MW and power reserves dipped below 1000 MW. If the reserve is exhausted, power outages would likely to happen. Millions of residential and business customers voluntarily conserved energy triggered by the alert.

California utilities, which try to buy power at least a day in advance to obtain the best price, had purchase power with just one hour lead time, and then shortly after stage 2 alert, the lead time had been cut to 10 minutes. This reflects a dramatic tightening in the power market. The need for electricity has sent wholesale power prices dramatically upward and the utilities are teetering on the brink of financial collapse.³⁸

The governor said:" We are simply not ready for deregulation in California as California is riding point on this deregulation experiment. The flaws in this newly deregulated system was huge increases in the cost of wholesale power." He added. "The problem is, I can't control the process. There are too many players. I am trying to use a combination of reforms, good ideas and guides to produce the desired result of stability and an easing of high rates."(ABC News.Com December17, 2000). PUC commissioner Carl Wood even went as far as declaring "Deregulation is dead." ³⁹

³⁸ Extract from the ABC News.Com (2000), "On Alert Blackouts Feared as California Grid Becomes Overwhelmed," (December 17).

³⁹ Extract from the ABC News.Com (2001), "No Solutions to California Energy Crisis," (January 10).

Stages of Power Emergencies

- Stage 1: Reserves of energy dip below 7%. All power customers are asked to conserve energy.
- Stage 2: Reserves of energy fall below 5%. Customers got lower rates if agreed to go off-line.
- Stage 3: Reserves of energy fall below 1.5%. Blackouts could results and power to different areas temporarily cut off.

6.3 California Reform and Its Failure

6.3.1 Objective of Reform

In mid 1990s, there were serious recession and unemployment in California. Subsequently, California lost its industry investment and jobs to other states. As the electricity prices in California were higher than other states (almost 50% higher than the US national average in 1996) industrial consumers requested for competition in order to reduce the electricity rates or otherwise, high electric price in California would drive many industries out of the state.

California power pool model was initiated in 1996 with the objectives of; lowering the electricity prices for the benefits of consumers through free market competition among existing and new wholesale and retail suppliers, and by reducing regulation.⁴⁰

⁴⁰Extract from Timothy, Karen, Raymond, Vito and Dallas (1996), "A shock to the System, Restructuring America's Electricity Industry," Washington, Kirby Lithograph Company, pp5.

6.3.2 Pre-reform Electric Industry

There were three large vertically integrated private utilities (Pacific Gas & Electric, Southern California Edison and Semptra Energy) that supplied 75% of the state's electricity consumption. 20% was imported and the rest was served by small municipal utilities. High electricity prices were caused by massive cost overruns on two major nuclear power plants and mandated use of green power, which costs more than traditional technologies. The regulatory system, which regulated the three utilities, was commented as "fragmented, outdated, arcane and unjustifiably complex."

6.3.3 Reformed Electric Industry with Its Power Pool Model

California's three giant utility companies, Pacific Gas & Electric, Southern California Edison and Semptra Energy were forced to dispose of much of their power generation assets such as dams and power plants to six energy providers. These three utilities were left to concentrate on the transmission and distribution businesses and purchase electricity on the open market. State government mandated a 10% reduction in retail prices and frozen them for four years or until the utilities recovered their stranded cost associated with the high cost of nuclear plants and green powers. Retail customers were allowed to select alternative electricity suppliers.

A non-profit Independent System Operator (ISO) was created to operate the transmission facilities owned by the private utilities and a bid-based real time energy market to acquire grid support services. The Power Exchange (PX) was also created to operate a bid-based, centralised market for forward (day ahead and day-of) power sales. Power generators would place bids for their price for producing electricity and PX publishes its "spot market" rates hourly. Consumers can then shift their energy use to lower-price periods and allows them to shop around. However, the law prohibited utilities to buy power from suppliers under

reduced, long- term contracts and barred them from increasing consumer rates until 2002. This raise the risk of energy price spikes when demand is higher, or when fuel supplies are interrupted.⁴¹

6.4 Consequence of California Power Crisis

California's power crisis did not happen out of the sudden. There were numerous indicators. When deregulation was approved, the power supply was sufficient. But the state's grid was stressed by higher demand, ageing power plants and less imported electricity. Series of blackouts happened in winter months (Nov 2000 to Feb 2001) forcing temporary closures of business and social institutions. Power outage in Silicon Valley itself in June 2000 had cost almost \$100 million/day in lost output. A severest warning, Stage 3 was declared to power consumers of an impending power system blackout during Jan and Feb 2001. State government had urged consumers to conserve electricity as the power shortage is expected to continue for the next two years, especially during summer months. As a consequence of the power crisis, businesses have threatened to move out from the state, which would cause serious impact on California's economy. Again, natural gas suppliers have threatened to stop supplying gas on the worries of utilities' commitment for payment.

Wholesale prices have increased dramatically since July 2000. With the prevailing power shortage in California, the six energy providers took advantage of the full unregulated control of the generation function, had raised the wholesale electricity prices by as high as 900% above their costs. San Diego Gas and Electricity Co., passed the costs of wholesale electricity on to its customers, resulted in a tripling of customers' bills and prompted state and federal investigations.

⁴¹ Extract from " Electricity Market Reform in California," International Energy Agency.

Pacific Gas and Electric Co., Southern California Edison Co. and Sempra Energy have a rate freeze. As the retail prices were fixed throughout most of California, the three power utilities were unable to pass on the high wholesale cost to consumers, and resulted them in facing US\$ 12 billion losses and possible insolvency. The utilities had sought permission to pass those charges on to their ratepayers but were only getting a fraction of expected rate hikes. Due to soaring wholesale prices and a state-imposed freeze rate that prevented utilities from passing costs on to customers had affected the companies' ability to buy power on credit and avert blackouts. They were basically borrowed on daily basis or going into debt in order to procure electricity. Approved modest rate hike, only half of the amount utilities requested were not enough to keep the faltering utilities afloat. This caused the utilities' stock prices to plummet. Wall Street has threatened to downgrade the utilities' junk bond status. Moreover, Federal Appeal Court had rejected the utilities' request to order the Federal Energy Regulatory Commission to set prices on wholesale electricity.⁴²

The crisis got worst as the three utilities' default on payments. This lead to financial crisis and spread to the banking community as well. Power Exchange ceased to function effectively because of loss of credits of utilities on the exchange, which was moving to long term contracts for bulk power in response to the crisis. Other US states and many other countries including Malaysia reconsider or delay their plans to deregulate their electricity markets.⁴³

Due to the emergency, state government introduced several immediate corrective measures. The Governor, Grey Davis had signed an emergency order authorising the state Dept. of Water resources to buy power, and called on lawmakers to pass legislation to give the state the authority and the resources "to

⁴² Extract from the Associated Press (2001), "Power Woes deepen wall Street Hammers Credit Rating, Stocks of California Utilities" (January 5).

⁴³ Extract from James Griffin (2001), "Energy & the Law: Sending Shudders Around the World," *Journal of Electricity International*, May, pp32-35.

keep the lights on". The state also bought power lines from Southern Californian Edison for US\$2.76 billion, twice at their estimated value as part of plan to keep the company solvent and reorganise its debts. In exchange, S.C. Edison agreed to supply power to consumers for ten year at low prices and drop the suit requesting for increasing tariff.

Californians' electricity bills has risen by 40% since the state government's drastic steps to end the power crisis by agreeing to increase electricity bills (almost US\$5 billion a year) to allow cash trapped utilities to cover their costs. The Legislature might authorise the state to enter long-term contracts with electricity wholesalers to buy power at about one-fifth the going market rate and then resell to consumers through the utilities, at the state's cost, plus a modest administrative charge. Otherwise, power generators threaten to force utilities into bankruptcy. (Latest issue: State bought power for the utility at a cost of \$50 million a day until the end of 2002 when S.C. Edison bought power on its own). The state might also have to negotiate for better price and enter into contracts with electricity wholesaler to purchase power and sell them back to financially unstable utilities, which is now illegal.

If the negotiated price is higher than the market price, power wholesalers would reap the benefits at taxpayers' expense. (Note: Consumer group watches carefully preventing state from paying "artificially high" prices or offers bailouts to utility companies). A bankruptcy Judge could compel generators to continue to provide power to the utilities, but customers would feel the pain of higher bills.⁴⁴

For the long term, the US government is considering a relaxation of some economic sanctions against Iran, Libya and Iraq in order to increase US oil supply so that drop in oil prices.

⁴⁴ Extract from the ABC News.Com (2001), "California Considers Becoming Power Broker and State Buying Wholesale Power to Ease Electricity Woes," (January 14).

6.5 Shortfalls in Reformed Electric Industry that led to Crisis

The root cause of the power system blackout was the failure of planning that led to the shortage of power supply relative to demand. However, design flaws in the power exchange market are no doubt the major source of factors that led to the crisis and coupled with a number of exogenous factors to the market design worsen the situations.⁴⁵

6.5.1 Shortage of Power Supply

The shortage of power supply is caused by the following factors:

6.5.1.1 Lack of Economic Incentives and Planning for Adequate and Reliable Power Supply

The state has never looked ahead and planting up new plants for developing new capacity. Lack of proper energy planning and uncertainty over deregulation of the state's electricity industry, no new power plants were constructed for almost a decade since 1992. This leaving the power supplies stagnant while the state's economy development is growing at fast pace.

Lack of economic incentives for investors and generators from providing adequate capacity to maintain reliable supply also one of the problems. As the long-term forward contracting of energy by utilities was not allowed, finally the lack of forward energy markets for some years ahead denied the price signals, otherwise, it would have help the distributors and investors to assess the need for new capacity.

⁴⁵ Reproduced from John E. Besant-Jones, Bernard W. Tenenbaum, Jamal Saghir, US Energy and Water Dept & World Bank Group (2001), "The California Experience with Power Sector Reform & Lessons for Developing Countries," World Bank, April, pp29-33.

6.5.1.2 Dry Weather

Due to unusually dry weather, little rain and snow caused lower water level, and reduced power generation output in hydroelectric power plant. In winter, the supply capacity has reduced by more than 20%. The situation getting worse during summer as the demand rose to 51,400MW, 30% above average requirement.

6.5.1.3 Unjustified Maintenance of Power Plants

There were unusually large number of power plants, producing about 7,000MW out of 31,600MW were reported down for maintenance or other reasons. State's Public Utilities Commission carried out verification of the legitimacy of their shutdowns after the crisis. There were suspicious about the idle power plants could results in cost spikes that ultimately benefited those plants.

6.5.2 Market Design Flaws

6.5.2.1 Market Governance

Poor governance structure forbidden improvements in deregulation rules. California's stakeholder in the board of ISO and Power Exchange were from generators, consumers, wholesalers, utilities and state government. Every stakeholder representing his owns interest and hampered attempts for getting the market work efficiently. Political influence on governance arrangement provides some parties additional voting power to forbid changes of market rules such as to allow utilities to trade on forward markets. It is alleged that generators have strong political support and too strong the power to block proposals, which forced them to reschedule their entire output in the day-ahead market.

6.5.2.2 Wholesale Price higher than Retail Rates

Californian's power pooling system, which determines the wholesale price, has not been properly structured. Hence, the utilities were unable to pass through the increase in wholesale costs to retail users because of the retailed rate freeze. This flaw becomes obvious when wholesale price is higher than retail rates. The utilities' crisis came when they buy power for roughly 30 cents a kilowatt-hour, but only able to charge customers about a fifth of that amount.

6.5.2.3 Lack of Risk Management for Utilities

Power exchange forced utilities to buy electricity on the power pool spot market, thus discouraged them to stabilize prices through hedging or enter into long-term forward contract and to develop a risk-minimizing power portfolio. The worse was they were not even allowed to sell their own remaining power output as a protection against price volatility of long-term vesting contracts.

With this type of regulation, the utilities were totally relying on volatile spot markets and being force to "sell long and buy short" (which is disastrous for a trader in any commodity). This created a false competitive market. A deregulated market thus was restructured only halfway. Many observers concluded that the electricity industry in California was in fact not deregulated but only restructured. It did not open up to full competition, but only half way.

6.5.2.4 Implementation of "Soft" Price Caps on Bids

During 2000, ISO was authorized by FERC to impose lower "soft" price caps on bids in the real time balancing energy market, that started at \$750/MWh during the summer and dropping to \$250/MWh by the end of the year. \$750/MWh

Would cover the generation cost under normal conditions, but \$250/MWh was insufficient to cover even the variable operating costs of the older plants. This impose provoke generators into raising their bids for supply during off-peak periods to recover their loses under the price caps during peak period.

6.5.2.5 Exploitation of Market Power by Generators

Californian's power market structure was vulnerable and manipulated by the six providers, which leads to excessive electricity prices. With the transmission constraints, generators might create artificial scarcity of power supply to drive up prices and earn huge profits. Repeated rounds of bidding also provide generators to "game" the system by adjusting their strategies to their advance without collusion in the accepted legal sense.

The situation deteriots as power marketers, taking advantage of the shortage in supply, traded at any prices to maximise their gains. Actual profit may nor reflect as shown in market figures but because of everyone is buying and selling at high prices. Therefore generators posted enormous gains in the third quarter of 2000, from 73% to 900%.

6.5.2.6 Market Arbitrage by Utilities

Power exchange capped prices in the day-ahead energy market is much higher than ISO's cap in the real time balancing market. Therefore utilities kept their demand by under scheduling their purchase in the day-ahead market and pay at lower price in real time balancing market. Purchase on real time balancing market constituted higher proportion of total traded energy in Power Exchange and this purchase patterns have contributed to the large volatility in the prices in Power exchange market.

6.5.2.7 Failure in Full Retail Competition – High Switching Price

Less than 2% of customers switched from utilities to other energy distributors due to high switching prices. Failure of policy to encourage full retail competition by charging high switching price onto retailed users caused many smaller competitive energy distributors to exit the market. The lower the switching price, the more intense the competition with more retail users switching to new distributors.

6.5.2.8 Constraints on Expanding Supply

No new power plant has been constructed since 1992 due to the uncertainty of the new market structure. The investors are also deterred from entering the power market by the expense and uncertainty of the extenuated permitting process for new power station and transmission lines. Excessive delays in getting permits increase the operating cost, again investors have to face the consequence of local and environmental group's opposition and numerous legal challenges. The state has licensed few power plants, but they are still under construction and will be able to ease the supply shortage only in about two year's time. Most of the California's power plants and transmission lines are more than 30 years old; hence maintenance of these old plants and lines needs longer outage periods than modern power plants.

6.5.2.9 Inaccuracy in Anticipation of Demand and Supply

From 1988 to 1998, the electricity demand was increased at an average rate of only 1.3% per year, but the demand surged unexpectedly in 1999 and 2000. The demand in June 2000 was 12.5% higher than in June 1999.

The market clearing price at Power exchange oscillated between \$25 and \$50/MWh during 1998, 1999 and the first half of 2000, but rocketed to \$150/MWh

in June, July and August of 2000 because of an extreme heat wave. As electricity cannot be stored, wholesale price increased steeply as supply started to fall below demand and totally out of control as the electricity markets do not have any of prices stabilizing mechanism.

6.5.2.10 Strict Environment and Nox Emission Regulations

High restrict levels of annual emission permits caused old generating plant owner's pay the high price. In July 2000, Nox emission requirement was further strengthened and eventually pushed up the operating cost of a typical power plant by around \$30/MWh. The cost of a vintage 2000 RTC was increased from around \$3/lb Nox between 1997 and mid-2000, to around \$45/lb Nox by end 2000.

6.5.2.11 Loop Hole in Regulation on Utilities' Exodus Fund.

The creation of holding companies leaves a loop hole in the regulation and has enable utilities to keep substantial fund out of reach by their creditors when their debt mounted through 2000. According to independent audits of SCE and PG&E accounts, utilities had transferred billion of dollars to their parent companies during the last years of deregulation between 1997 and 2000. The parent company of SCE received \$4.8 billion and PG&E received \$4.6 billion. These funds were derived from the sale of power plants, surpluses earned through the sale of power in Power Exchange from their remaining generating plant and the recovery of stranded costs.

The parent companies used the cash received financed most of their dividends and the acquisition or construction of power plants in other states or abroad but instituted a so called "ring-fencing" provisions to prevent bankruptcy courts or

anyone else from using the parent companies' unregulated assets to cover utilities' debts.

The current financial crisis would have been deferred if these funds were available. These funds are sufficient to provide some time for implementing corrective measures to prevent the development of the critical financial crisis.

6.6 Summary

California power crisis gave deregulation a bad reputation, but it does not really mean that deregulation is a bad idea. After studying shortfalls in the design of California reform, we noted that the deregulation is still an effective tool to make the electric power industry more competitive and customer oriented. Much of the crisis was actually avoidable if the deregulation is implemented with better market design and management.

Deregulation is a huge and complex issue; it is therefore needs to be constant monitored. California's power crisis is a failure of market design, rather than a failure of deregulation. California reform is more precisely characterized as part deregulation and part re-regulation but not fully deregulation.

The principle lesson of California is that good intention are not enough. For any reform, close attention and monitoring shall be carried out. If there are problems, definitely there are some short falls. Running away from the problem is not an acceptable solution. Appropriate path shall be selected to solve the particular problem. As in Texas that has significant excess capacity, allows forward buys of power to hedge against price fluctuations, and planting up power plants within three years.