Institutions and Long Term Planning Lessons from the California Electricity Crisis

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INSTITUTIONS AND LONG TERM PLANNING:  
LESSONS FROM THE CALIFORNIA  
ELECTRICITY CRISIS  

ASHUTOSH BHAGWAT*  

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INTRODUCTION  

Between the spring of 2000 and the spring of 2001, the electricity industry in California suffered through one of the worst regulatory crises in modern American history. In a few months, five years of painstaking and revolutionary reform were wiped out, and two of the three large private utilities in the state were forced into insolvency. At the end of this period of crisis, California was left with an electric power sector that was largely dominated by the state government, and faced electricity rates far above national averages (and above pre-reform rates), rather than the decentral- 

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ized, market-dominated industry and low, cost-based rates that had been the objective of the reform efforts begun in 1994.

The details of precisely what went wrong in California have already been discussed extensively by a range of actors, from politicians crying "Enron!"\(^1\) to a careful and detailed scholarly evaluation of the progression of the crisis by the economist Paul Joskow.\(^2\) This Article seeks to supple-
tment these efforts by focusing not on the details of the meltdown that occurred from 2000 to 2001, but rather on more fundamental concerns about the reform model adopted by California, which were exposed by the crisis. The thought behind the Article is that such a focus will provide lessons for future reform efforts in California and elsewhere. In particular, this Article draws upon the teachings of the New Institutional Economics\(^3\) to gain a better understanding of the basic institutional and structural problems with the energy markets put into place in California as a result of the 1994 re-
forms.

The Article begins by briefly describing the traditional structure of the electricity industry in California (and elsewhere in this country), as well as the reforms implemented by California during the mid-1990s. The Article then proceeds to recount the events that occurred during the electricity crisis which exploded in the spring of 2000, and during its aftermath through the summer of 2001. Finally, the Article turns to the institutional lessons that can be learned by studying the details of the crisis, analyzing which basic institutional structures failed during the crisis period, and relating these failures to the teachings of the New Institutional Economics.

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1. See Joseph Kahn, Californians Call Enron Documents the Smoking Gun, N.Y. TIMES, May 8, 2002, at A1 (discussing investigations into energy trading companies for ma-

ipulative trading strategies).


dressing proposed remedies to California's energy crisis at both state and federal levels). I rely heavily on Professor Joskow's description and analysis of the California crisis in the early portions of this paper and am indebted to him for his careful and thorough work.

3. The "New Institutional Economics" is a school of thought that has its roots in the ideas of Nobel Laureate Ronald Coase of the University of Chicago and has been further developed by Oliver Williamson and others at the University of California at Berkeley. See infra notes 44-49 & accompanying text.
I. THE TRADITIONAL STRUCTURE OF THE ELECTRICITY INDUSTRY

The electricity industry is composed of three basic physical components and associated functionalities, each of which must continuously coordinate and interact with the others in order to permit the provision of electricity to retail customers. First, there is generation: the actual creation of electricity. Electricity is generated in a variety of different kinds of plants, including fossil fuel (i.e., coal, oil, and natural gas) fired plants, nuclear plants, and hydroelectric plants. Generation plants can be very large and capital intensive (such as nuclear plants), in which case they tend to have low marginal costs of operation, or they can be relatively small and inexpensive (such as “peaking” natural gas fired plants), in which case they tend to have high costs of operation. Most generation plants, especially the large, capital intensive ones, which provide the “base load” of electricity, tend to be located in rural areas some distance from the centers of consumption for some combination of economic, environmental, safety, and (in the case of hydroelectric power) geographic reasons.

Because most electricity is generated some distance from where it is consumed, the electricity must be moved from the generating plants to where most customers exist. This process constitutes the second component of the industry—transmission. Transmission of electricity over long distances occurs through the use of high-voltage electric lines, which can be seen criss-crossing the countryside. There are inherent limits to how far electricity may be transmitted economically because of inevitable physical losses that occur during transmission. During recent decades, however, there have been very significant technological improvements in our ability to transmit electricity over very long distances without suffering uneconomical losses.

Once electricity has been transmitted to the vicinity where it will be consumed, the electricity must be distributed to end-use customers. This process involves several steps. First, voltage levels typically (except for large, industrial customers) must be reduced to the level at which the electricity will be consumed (110 volts in the United States). Then, the electricity must be distributed over a local network of low-voltage electric lines to the actual homes and commercial establishments where the electricity will be used. These functions, along with the associated ministerial functions of metering the amount of electricity used by each customers, billing for use,

and maintaining and repairing lines, constitute the third component of the
electricity industry—local distribution.

This basic industry structure (consisting of production, wholesale trans-
portation, and retail distribution) does not seem terribly different from other
products. Electricity, however, is fundamentally different from other prod-
ucts in a number of ways. Most importantly, electricity cannot be stored in
significant quantities. This is the one basic and overwhelmingly important
physical fact about electricity that defines the structure of the electricity in-
dustry and distinguishes it from most other sectors of the economy. The
inability to store electricity means that it must be generated at the same
time that it is consumed; this in turn requires every electricity system to
have a central controller who ensures that as levels of consumption increase
or decrease, the amount of electricity being pumped into the system is ad-
justed to conform to demand. In addition to the problem of storage, an-
other distinctive feature of electricity is that the transmission of electricity
is a highly complex, interdependent phenomenon which obeys physical
laws having little or no connection to economic relationships. In particu-
lar, the interconnected nature of electric grids (itself an important con-
tributor to safety and reliability) results in very significant network interac-
tions between different users of grids, and therefore once again necessitates
a central coordinator to ensure that grid interactions are minimized or coor-
dinated in such a way as to maximize economic efficiency (by minimizing
the combined costs of generation and transmission).

Very early on in the history of the electricity industry, competition ex-
isted in every sector of the electricity industry. For most of the Twentieth
Century, however, it was assumed (probably correctly) that because of
economies of scale in the generation of electricity combined with limits on
the ability to transmit power significant distances, all three components of
the industry were naturally monopolistic. As a result, the electricity indus-
try as it has developed in this country is dominated by fully integrated, pri-
ately owned (but publicly regulated) utilities controlling all three func-
tions and serving local areas on a monopoly basis. This vertically
integrated structure permitted the industry to minimize the potential prob-

5. For a more comprehensive discussion of network interactions, see William W. Ho-
6. Regulatory power over private utilities has been exercised primarily by state gov-
ernments through Public Utilities Commissions or similar regulatory bodies. The federal
government, first through the Federal Power Commission (FPC) and then through the Fed-
eral Energy Regulatory Commission (FERC), exercises jurisdiction over wholesales of
electricity between utilities (or between independent power generators and utilities). During
much of the relevant period of time, such wholesales were a very small portion of the mar-
et. As discussed below, however, in recent years a thriving wholesale electricity market
has emerged, increasing the importance of federal regulatory authority.
lems inhering in the coordination needs discussed above, because each of
the functions requiring coordination was performed internally by utilities
which themselves owned and controlled all of the affected components of
the system. Because of the ability of integrated utilities to provide these
coordination functions, and because of rapid technological advances lead-
ing to steadily declining real prices, until the 1970s, the existing structure
of the electricity industry was considered highly successful (though it is
likely that even during this period, technological improvements were
masking underlying structural inefficiencies).

In the 1970s, however, complacency with the existing electricity indus-
try’s structure and performance began to evaporate. In particular, the En-
ergy Crisis triggered by the formation of OPEC and the 1973 Arab Oil Em-
bargo led to sharply increasing electricity prices beginning in the mid-
1970s. In addition, during the 1970s, electricity utilities in this country en-
gaged in a massive program of building large generation plants (many of
them nuclear) in order to meet anticipated demand. By the end of the dec-
ade, however, rising energy prices and related conservation efforts had led
to substantial declines in predicted demand. As a consequence, when the
power plants begun in the 1970s were finally completed (often hugely over
budget due to changes in safety regulations for nuclear plants stemming
from the Three Mile Island incident), their capacity was not needed. The
result was a regulatory battle royale during the 1980s, which produced
sharply increasing rates as the costs of these plants were incorporated into
the utilities’ ratebases, massive regulatory disallowances in some instances
of the costs of building the new plants, and consequent financial woes (in-
cluding some bankruptcies) for electric utilities.7

In addition to this regulatory crisis, other events were also setting the
stage for the regulatory reforms of the past decade. First of all, there were
significant technological developments during this period, the result of
which was to make long distance transmission of electricity far more effi-
cient than was previously the case, and to reduce the size of efficient gen-
erating plants significantly (i.e., by the 1990s, electricity could be gener-
ated at low cost at plants which were much smaller, and less expensive,
than similarly efficient plants in the 1960s). As a result, by the 1990s, there
was reason to think that because of improved transmission (increasing the
size of geographic markets) and declining economies of scale, at least the

7. See Richard J. Pierce, Jr., The Regulatory Treatment of Mistakes in Retrospect:
and analyzing the events in more detail); see also Richard J. Pierce, Jr., Public Utility
Regulatory Takings: Should the Judiciary Attempt to Police the Political Institutions?, 77
GEO. L.J. 2031, 2047-53 (1989) (discussing possible judicial responses to regulatory disal-
lowances).
generation of electricity no longer displayed natural monopoly characteristics, and so there was at least the potential for competition among electricity generators.

Accompanying these technological changes were regulatory changes and legislation, which made the possibility of competition in the electricity industry seem more likely. In 1978, Congress passed the Public Utility Regulatory Policies Act (PURPA),\(^8\) which effectively required regulated electric utilities to purchase power under long term contracts from qualifying (QF) cogeneration and environmentally friendly independent power generators. During the 1980s, the combination of PURPA and other technological, regulatory, and economic changes led to the creation of a growing wholesale market for electric power, in which utilities were increasingly willing to, or required to, purchase their power needs from others rather than simply self-supplying by building generation facilities. In the 1990s, this trend has continued to expand, aided by the Federal Energy Regulatory Commission’s (FERC’s) Order 888 issued in 1996, which required “wholesale wheeling”—i.e., that electricity utilities must provide equal access to their high-voltage transmission facilities for others who wished to use the transmission lines to transact wholesales of electricity, where the buyer and seller are separated by the high-voltage lines of third-party utilities.\(^9\)

The status of the electricity industry in California provides the final, necessary background to understanding the reform efforts of the 1990s. Until the mid-1990s, California’s electricity industry had a classic, vertically integrated structure, dominated by three investor owned utilities (IOUs): Pacific Gas & Electric (PG&E), Southern California Edison (SCE), and San Diego Gas & Electric (SDG&E), each of which served a distinct geographic region.\(^10\) However, California suffered from the problems described above, and to a greater degree than most of the country. In particular, California IOUs had made very expensive investments in nuclear capacity, and the California Public Utilities Commission (CPUC) had aggressively implemented PURPA, resulting in very high-cost, long term

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\(^10\) It should be noted, however, that California was unusual in that publicly-owned municipal utilities also played an important role in the market, in particular serving the largest city in the state, Los Angeles.
contractual commitments imposed on the IOUs to buy "co-generated" electricity. The result of all of this, combined with a sharp recession in the early 1990s, was that California had massive overcapacity in electricity as of 1993, which was expected to last for at least ten years, as well as some of the highest electricity prices in the country.

II. CALIFORNIA'S REGULATORY REFORMS

In 1994, the CPUC initiated regulatory proceedings designed to radically reorganize California's electricity industry. The gist of the CPUC's proposals was a complete separation of the potentially competitive generation sector from the still monopolistic transmission and distribution sectors, thereby permitting competition in generation to flourish while maintaining needed, centralized control over the high-voltage transmission network and local distribution monopolies—a scheme which was clearly the most radical electricity reform attempted to date in this country. After two years of negotiations and revisions, in late 1995 to early 1996, the CPUC announced its decision on electricity reform; and later, in 1996, the California legislature passed legislation essentially codifying the CPUC's plan. As finally adopted, the legislation: (1) created a nonprofit Independent System Operator (ISO) to control the high-voltage transmission networks previously owned and controlled by the IOUs; (2) created a nonprofit Power Exchange (PX), an electricity market into which the IOUs were required to sell the power they generated, and from which they were required to purchase all of their power needs; (3) encouraged the IOUs to sell most of their generating assets and encouraged other power generators to enter the California market; and (4) created a complex series of mechanisms which provided IOUs with the opportunity to recover their "stranded costs" during the transition to full competition. The following are the major elements of California's reforms:

1. Creating a nonprofit Independent System Operator (ISO). Transferring control (though not ownership) of transmission networks owned by the three IOUs to the ISO which would: (a) operate the system on a nondiscriminatory equal access basis, permitting all generators and purchasers of electricity to access and use the network on equal terms; (b) schedule electricity sales arranged by others (as discussed below); and (c) organize pay-
ments for power sales made through its markets. The ISO would also be responsible for managing congestion on the network, charging extra for transmission during congestion periods, balancing supply and demand on a real-time basis by operating a real-time spot market to make sure loads remained balanced, and operating a market for "ancillary" services, which most importantly would ensure that reserves remained available in case of unexpected outages or other events.

2. Creating a nonprofit Power Exchange (PX), which would operate hourly day-ahead and hour-ahead forward markets for electricity. Prices on the PX were to be determined by receiving demand and supply bids for each hour of the day, stacking up the bids on each side, and clearing the market at the point where the total supply bids equaled the predicted demand. All suppliers would then receive the market clearing price, which is the price bid by the last supplier (i.e., the highest bid price) necessary to satisfy demand. The theory behind this pricing scheme was to establish prices at the true, marginal cost of electricity, an approach well-supported by theory so long as the exchange market remained competitive and therefore supplier bids did in fact reflect marginal costs of production. The ISO would then arrange to schedule all electricity sales made through the PX forward market, as well as any sales arranged through independent bilateral contracts (which were permitted for all parties except IOUs, for reasons discussed below). The purpose of the PX market was to provide more predictability and planning than a pure real-time spot market would—but because the PX was limited to day-ahead sales, obviously it provided no long term planning capacity.

3. Mandating that all retail customers be provided "direct access" to competitive wholesale power markets, by requiring the IOUs to provide equal access to their (still monopolistic) retail local distribution networks as well as to the wholesale transmission systems operated by the ISO, so that retail customers could purchase electricity supplies directly from competitive generators or market intermediaries (jointly called competitive Electric Service Providers or ESPs). However, IOUs remained responsible

15. It is important to understand that the transactions made through the PX did not necessarily result in actual provision of power through the ISO—such actual planning is physically impossible because of the system interaction and congestion issues discussed above, which might require a central system operator (the ISO in the case of California) to rearrange supplies. So in effect, a PX transaction is a financial guarantee by the seller that if the buyer ends up having to pay more for electricity, the seller will cover the difference (and in reverse, if the real-time price is lower than the PX price, the PX seller pockets the difference).

16. In mid-2000, just as the power crisis was beginning, the PX did begin to permit some longer term forward contracts (through the end of 2001), but they turned out to be quite limited in scope.
to provide "default" service for all customers who chose not to migrate to ESPs. For nonresidential customers, the price for this default service was based on the wholesale spot prices for electricity on the PX. For residential and small commercial customers, the price of default service would also eventually be based on spot prices; but for the first four years of the reforms, prices for default service were frozen at levels ten percent below pre-reform prices (as discussed in more detail below).

4. Strongly encouraging the three IOUs to divest their remaining electricity generating capacity to independent entities in order to try and create a viably competitive market for generation. Eventually, the IOUs did in fact divest essentially all of their fossil fuel fired generators (i.e., everything except for their nuclear and hydroelectric facilities). In addition, the IOUs were required to bid the output from all of their remaining generating capacity into the PX's day-ahead market in order to provide the market with liquidity. Finally, and most importantly, the IOUs were required to purchase all of their power needs for retained, default customers through the PX. In effect, the IOUs bid their power into the PX, and purchased power out of it. Their purchases, however, were always greater than their sales, because they had divested their fossil-fuel plants but (as discussed further below) ended up retaining almost all of their pre-reform customers.

5. Creating a complicated set of mechanisms that would provide IOUs with at least the opportunity to recover 100 percent of their "stranded costs," which primarily consisted of the difference between the market price of divested generating assets and their "book value" according to traditional regulatory methods. Most importantly, the CPUC and legislative proposals created a "rate freeze" for all residential and small commercial customers, at a level ten percent below prevailing rates, with the idea that the new retail rates would remain above wholesale prices, so the IOUs could use the differential to recover their stranded costs. This gap or "headroom" was uncircumventable, and was billed as a "competitive transition charge" to all customers, regardless of whether they migrated to ESPs.

6. Finally, entry into the generation market was "deregulated" by permitting any new generation facility that met ISO rules to hook into its transmission system. However, the reforms adopted by the legislature and CPUC did not alter in any way the zoning, siting, and environmental rules governing building a new power plant, thus making the "deregulation" of entry somewhat fictitious.

In short, the regulatory reform model adopted by the CPUC and the California legislature constituted a move from a completely integrated, traditional utility model to a radically decentralized market model, with all of its strengths and weaknesses.
Figure 1 illustrates the structure of the pre-reform industry, while Figure 2 illustrates the post-reform structure of electricity markets in California.

Figure 1: Pre-Reform California Electricity Industry
Obviously, the California reform program was extraordinarily complicated, with essentially every sector of the industry being radically overhauled. In fact, for the first two years of its operation, from April 1998 (when the reform proposals first went into effect) to April 2000, the new system seemed to be working fairly well. Wholesale prices fell, retail competition was beginning to take hold (albeit very slowly), and new entry
into generation seemed to be developing. There were, of course, some problems: for example, the ISO's congestion management systems required constant tweaking, ancillary and reserve service markets were not functioning entirely properly, wholesale prices did not fall as much as expected, and at very high-demand times there were signs that markets were not operating competitively. But on the whole, things went reasonably well until May of 2000.

Not only did California's reformed markets seem to be operating fairly successfully, but it is also important to recognize (without the benefit of hindsight) that there were likely to be important positive results from the kind of market-oriented reforms adopted in California. Most significantly, generating costs and prices in such a system were likely to end up significantly lower than in a traditional, regulated and integrated system, as cost-cutting was rewarded by the market and prices tended to be bid down towards the marginal cost of generation. In addition, the replacement of regulatory oversight by market forces would tend to eliminate the sorts of political gaming, which were the bane of California's pre-reform experiences. In particular, in a market driven system regulatory interference (either ex ante or ex post, through regulatory disallowances) in investment decisions regarding building generation capacity would be reduced as those decisions became driven by market, not political, motives, leading to quicker entry and more efficient decision making. Additionally, in principle the IOUs themselves should have been more financially stable in a market system because their rate of return would no longer be subject to the whims of regulators disallowing the costs of constructing generating capacity (as happened to many utilities in the 1980s), but rather would be based on fairly stable income from transmission and distribution services. Finally, insofar as retail prices were permitted to reflect market prices (a big "insofar" in the California system, admittedly), demand was likely to be more elastic and responsive to changing costs, thereby limiting the social waste of excessive consumption during peak demand and supply shortage periods (and conversely, too little demand during non-peak and surplus supply times). In other words, the benefits of the reforms were expected to be the usual combination of higher efficiency, more responsiveness, and lower prices associated with markets. Because California's system seemed to maximize those benefits, it received a fair bit of praise from across the field during its planning stages.

However, there were also problems brewing during this period. In particular, the retail rate freeze combined with customer loyalty or "stickiness" made it very hard for ESPs to compete with the IOUs' default service for

17. Joskow, supra note 2, at 21-23.
customers, so that at its peak only three percent of customers, representing twelve percent of electricity consumption, migrated from IOUs to ESPs. This resulted in two very bad things. First, it meant much more reliance on IOU spot market purchases than was planned, because IOU default obligations were much higher than expected. On the flip side, real ESP entry would have lead to more long term planning because ESPs necessarily would have ensured they had either actual generation or contractual commitments to meet their obligations (something the IOUs were forbidden from doing because of their obligation to purchase on the PX). One further complication here is that under the California scheme, consumers were always permitted to return to “default” service from the IOUs. This had the perverse effect of discouraging commitment by ESPs, who knew that they could always return their customers to IOUs at will; and during the crisis that is precisely what the ESPs did, since they found it more profitable to sell their power into the PX at sky-high prices than to sell it directly to their own customers at previously agreed upon rates. But of course this behavior further increased IOU obligations, and so their reliance on the PX spot market.

The practical impact of the very high level of IOU default service, combined with the IOUs’ obligation to rely on spot markets to purchase their default energy obligations, was that IOUs were highly vulnerable to spot market volatility—and price volatility is of course a common characteristic of spot markets. Combined with the retail rate freeze, this also meant that the IOUs were subject to enormous potential liabilities if wholesale prices rose (as they did), a possibility that no one seems to have contemplated at the time the reforms were designed.

A question one might ask at this point is: why did the IOUs agreed to the ten percent rate reduction and four-year rate freeze? The freeze was, after all, what ultimately led them to bankruptcy, and it seems completely inconsistent with the idea of competitive markets that transmit price signals. The answer is complicated. At first, the IOUs were in fact opposed to the CPUC’s reform proposals. Once the inevitability of reform became clear, however, the IOUs’ priority in negotiating over the CPUC proposals became to ensure that any reforms adopted did not wipe out their existing “stranded” book costs of assets (these costs were considered “stranded” on the theory that the assets would be worth less than their depreciated book value in a deregulated environment). Given this, the rate freeze seems to have been the quid pro quo the IOUs provided for the opportunity to recover 100% of their stranded costs. The idea was that lower wholesale prices would more than compensate the IOUs for the rate reduction, and

18. Id. at 28.
that permitting the IOUs to continue charging old rates was to their benefit because it would provide excess revenues—though, of course, this scheme provided no guarantee of stranded cost recovery, since the size of the gap between wholesale and retail prices was not assured. However, the IOUs simply do not seem to have considered, or did not take seriously, the possibility of high wholesale prices and the resulting potential price squeezes they would face. In other words, the (what was in retrospect) shortsightedness and riskiness of the reforms as designed were not simply a product of legislative and regulatory error. The California IOUs signed up to the CPUC reform plan because they got something very valuable out of it, and in doing so, ignored some very serious risks.19

III. THE ELECTRICITY CRISIS STAGE 1: MARKET FAILURE TO INSOLVENCY

By May of 2000, the stage was set for the serious shortcomings of California's reform efforts to emerge. The actual events that transpired, however, were a far greater disaster than anyone could have expected. This occurred because in the summer of 2000 a largely unpredictable (and certainly unpredicted) concatenation of events came together to create what Michael Yuffee describes as a "perfect storm":20 a worst-possible-circumstances scenario in which all of the inherent flaws in the California design combined with sheer bad luck to create catastrophe. In fact, several exogenous trends came to a head together during 2000 in a way which would have created severe difficulties no matter what the structure of the California electricity industry. It was just California's bad luck that these events happened to interact with the most precarious features of the California reforms.

The first and undoubtedly most important exogenous event occurred on the demand side of the market.21 Throughout the late 1990s, demand for electricity in California grew far faster than expected, rising over ten percent from mid-1999 to mid-2000 alone.22 The exact reasons for this explosion in demand are not certain, but the economic and Internet boom/bubbles of the late Clinton Administration surely played a role. Generation capacity in California did not grow to keep up with this demand, and indeed, did not grow at all during most of this period. Part of the reason for the failure to add capacity was simply that (as noted above) by the early 1990s California had substantial excess capacity which was

19. See Duane, supra note 4, at 501-03 & n.108 (noting utilities supported rate freeze because they saw it as advantageous to them).
20. See Yuffee, supra note 2, at 65.
21. In describing these events, I borrow heavily from Paul Joskow's work. See supra note 2.
22. Jaskow, supra note 2, at 62 tbl.3.
expected to last ten years, and so there was no perceived need to build power plants. As demand grew faster than projected, however, the failure to keep up could not be so easily excused and must be attributed to some combination of poor planning (indeed, a complete failure of planning, as will be discussed later), delays in regulatory approval processes, the uncertainty engendered by the regulatory reforms themselves, and the sheer time span necessary to construct a major generation facility.

Second, just as demand was growing and capacity remained stagnant, in 2000-2001 imports of power into California from other western states were severely restricted, falling by over fifty percent from the summer of 1999 to 2000. These shortfalls occurred because the other western states also faced very high and increasing demand during this period, and also (more significantly) because the Northwest suffered a serious drought during this time, leading to a big shortfall in hydroelectric supplies.

A third, unrelated but very significant set of events affecting electricity prices in California involved the price of natural gas-fired electricity. In the year 2000, especially at the end of that year and the beginning of 2001, natural gas prices rose sharply throughout the United States, and spiked dramatically higher than even the national averages in Southern California. At the same time, the cost of environmental permits necessary to operate natural gas-fired plants (NOx emissions permits, to be precise) rose by a factor of ten, once again causing massive increases in costs for gas-fired generators. Because natural gas-fired generation provides essentially all marginal capacity in California, these cost increases translated directly into the marginal cost of electricity, and thus into the market clearing price in the PX market during the crisis period.

Finally, from late 2000 through the spring of 2001, there were enormously large outages of generator supplies at levels many times the historic norm. As a result, supplies were heavily squeezed. Again, the precise reasons for these outages are not entirely clear and indeed hotly contested (the generators claim they were a result of running their equipment excessively during the summer of 2000). Evidence, however, suggests that these outages were at least in part attributable to generators intentionally withholding supplies because they knew that in a very tight market, such withholding would cause spikes in spot market prices and thus would be profitable to all.

23. *Id.* at 63 tbl.4.

24. *Id.* at 32-34.

The result of these events, combined with the structure of the California markets (especially the PX’s bidding and pricing system), was an explosion of wholesale electricity prices (both on the PX and in the ISO’s real-time balancing market), from a typical pre-crisis level of $30/MwH to levels as high as $400/MwH in December of 2000 as well as a series of rolling blackouts.\(^\text{26}\) Moreover, throughout this period the three IOUs remained obliged to purchase essentially all of their electricity requirements on the PX, and to resell that electricity to default customers at frozen retail rates equivalent to about $65/MWh.\(^\text{27}\) In addition, during this period the IOUs continued to face residual demand at levels far greater than expected because so few customers had migrated to ESPs (and indeed, most of the few that had were returned to IOU default service by the ESPs during the crisis, so that the ESPs could sell their electricity at PX prices).\(^\text{28}\) As the level of their default obligations, and thus their exposure to the PX spot market became clear, the IOUs might have been able to protect themselves somewhat from these events by entering into long term contracts with generators to purchase electricity, to hedge their exposure to volatile spot prices on the PX. And indeed, beginning in 1999, the IOUs asked the CPUC for permission to enter into such contracts. However, the CPUC at first completely refused such permission, presumably because of the Commission’s desire to retain liquidity in the PX market which depended so heavily on IOU purchases, as well as an ideological commitment to “markets” and marginal cost pricing.\(^\text{29}\) The CPUC eventually granted permission for long-term contracts, but on such a limited basis that the IOUs remained essentially unhedged.

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\(^\text{26. }\)Joskow, supra note 2, at 18 tbl.2.\

\(^\text{27. }\)To be absolutely precise, one of the IOUs, SDG&E, had actually been released from the retail price freeze at the beginning of 2000, and thus was charging customers retail prices based on wholesale PX rates in the summer of 2000. However, once wholesale prices began to explode, the legislature rolled back and froze SDG&E’s rates to the same level as the other IOUs.\

\(^\text{28. }\)The author was one of those customers who was unceremoniously dumped by an ESP, and can testify that it was not a mutually agreed upon transaction.\

The result of all of this was a price squeeze imposed on the IOUs (the product of buying electricity at hundreds of dollars per MWh and selling at $65), which by the end of the year made the two largest IOUs, PG&E and SCE, insolvent and unable to purchase further electric supplies or even pay for supplies already delivered. Meanwhile, the state government did essentially nothing throughout the end of 2000 despite repeated pleas from the IOUs to release them from the retail rate freeze, and FERC imposed entirely ineffectual market mitigation mechanisms which failed to address any of the underlying problems (though to be fair, it is not entirely clear that FERC could have prevented the meltdown given the existence of real cost increases and shortages as well as frozen retail rates).

IV. CRISIS STAGE 2 AND THE AFTERMATH: CREEPING SOCIALISM

As a result of these events, by January 2001, the lights were on the verge of going out in California since generators were no longer willing to do business with the primary procurers of power, the IOUs, because of their lack of creditworthiness. At this point, the government of the state of California—in particular, the California Department of Water Resources (CDWR)—stepped in and began purchasing electricity to ensure that the IOUs could supply their customers. These purchases were made at first on the spot markets, but by the spring, as spot market prices remained at extraordinarily high levels and the peak-demand summer season approached, the CDWR began negotiating long term contracts of up to twenty years to provide some protection against the even higher summer spot prices (and massive blackouts) that were predicted. Thus by the spring of 2001, the electricity industry in California had been converted from one of the least centralized electricity markets in the world into an essentially state-run sector, with the IOUs relegated to the minimal tasks of distribution and billing. Nonetheless, the State's taking over of the industry was largely unchallenged, as it at least provided some stability to the industry and averted further blackouts.

As it turned out, however, the spring of 2001 was the worst possible time to enter into long term contracts to purchase electricity. When the state entered into these contracts, spot and futures prices for electricity were at some of the highest levels ever and the contract prices of course re-

30. PG&E eventually declared bankruptcy, as did the PX (which had been deprived of its primary customers). SCE did not declare bankruptcy, and as of this writing appears to be on the path to financial recovery. But see S. Cal. Edison Co. v. Lynch, 307 F.3d 794 (9th Cir. 2002) (raising doubts about the legality of the settlement between SCE and CPUC which permits SCE to repay its creditors).

31. See Joskow, supra note 2, at 377; Yuffee, supra note 2, at 75-78, 81-83 (describing regulatory responses during this period).
flected this. Soon after these contracts were signed, in the early summer of 2001, spot prices began to drop rapidly, and eventually reached pre-crisis levels, where they remain as of this writing. The reasons for this reversal were the inverse of the original reasons for the price increases: substantial reductions in demand due to very aggressive conservation efforts (and probably the “Dot-gone” bust), increases in supply because outages had been reduced, and big drops in natural gas prices. The state of California, however, remained locked into very high-priced long term contracts to purchase electricity and thus is likely to remain the primarily supplier of electricity to consumers for many years. Also, there is essentially no functioning spot market in electricity left in California. Furthermore, in June 2001, a forty percent price hike on retail rates (as approved by the legislature) was implemented to cover the state’s high procurement costs, thereby raising retail electricity rates to levels far above current wholesale market prices. Finally, in September 2001, the CPUC announced the end of all Direct Access to competitive electricity sources for retail customers (though existing Direct Access contracts continue in force). This change in policy was necessary because once the State had committed itself to above-market price purchases by contract, large customers had a huge incentive to avoid those higher prices by turning to ESPs (which could price based on current, much lower market prices). As a result, if Direct Access were permitted, the largest, most lucrative customers would flee (as they did in droves during the summer of 2001), leaving smaller customers to bear the entire burden of the State’s contracts.

Thus, what the state of California was left with in the fall of 2001 (when other, far more terrible events shifted public attention dramatically away from the electricity crisis) was a state-controlled power sector where the two largest IOUs were still struggling to regain solvency and the government was likely to remain the primary supplier of power. Furthermore, because of the nature of the long term contracts entered into in the spring of 2001 by the CDWR, California seems to be bound for ten to twenty years to electricity prices at three times current market levels. In response to that situation, the state of California filed a complaint with FERC seeking to revise or rescind its long term contracts on the grounds that the contractual prices agreed to by California were the product of market manipulation because they reflected the artificially high spot prices during the spring of

32. Interestingly, imports of power into California did not increase from 2000 to 2001 and indeed decreased further. However, the other factors listed in the text more than made up for the loss of imports.

33. In addition to the PX’s bankruptcy, the real-time ISO balancing market has also basically collapsed because no one will do business with the IOUs.
2001, and therefore were not “just and reasonable”. The likelihood of success on this complaint, however, remains at best uncertain. In the meantime, presumably the state government at some point will wish to phase out its dominant role in the power sector and restore some sorts of private institutions (whether market-based or not remains to be seen). But given the collapse of the PX and the insolvency of the major IOUs, as well as ongoing litigation over the reorganization of PG&E, it is hard to say exactly how the state will proceed and what the ultimate structure of the California electricity industry will look like.

V. INSTITUTIONAL LESSONS FROM THE CALIFORNIA CRISIS

It is time to consider what “lessons” might be gleaned from the California Electricity Crisis—lessons which might benefit future planning for regulatory reform in California and elsewhere. Any discussion of “lessons”, however, must be built on an understanding of what precisely went wrong in California. The answer to that latter question turns out to be quite complex, not least because, in fact, there were two distinct phenomena at work in California during the crisis months. Indeed, in a very real sense, California suffered through two distinct energy crises. First, there was the financial meltdown that led to the insolvency of the two largest IOUs (PG&E and SCE) as well as the PX. Second, there were the severe power shortages during 2000-2001 that led to spiking wholesale prices, and ultimately blackouts.

Much of the focus of discussion in both the press and the literature has been on the financial crisis and its consequences. In fact, the financial crisis is in some ways the least interesting aspect of the California experience because the reason for it is quite clear: it was the retail rate freeze. The California reform program required the IOUs to purchase power at spot-market, wholesale prices (an approach perfectly consistent with the market-oriented structure chosen by the CPUC and legislature), but then forced them to resell to consumers at fixed, regulated retail prices (a provision entirely inconsistent with reliance on market forces). The inevitable result was that when wholesale prices rose, the utilities suffered an unsustainable price squeeze. The ultimate cause of the financial meltdown of California’s IOUs and PX was thus the original decision to combine floating wholesale and fixed retail rates for IOU default service—a decision for which blame can be freely passed around among all of the major actors in


35. See Rossi, supra note 29, at 1778, 1785 (identifying retail rate freeze as source of IOUs’ financial problems).
the original negotiations including the IOUs themselves, consumer groups, the CPUC, and the legislature.

It is equally obvious, however, that the state of California could have avoided the financial meltdown (which eventually forced it to take over the industry) by permitting retail prices to float with wholesale prices after the price squeeze on utilities materialized in the summer of 2000, as the utilities requested (by declaring their stranded costs “fully recovered”). Governor Davis’s failure to support such a step in retrospect was undoubtedly a mistake, as it intensified the meltdown of the newly reformulated power industry. Admittedly, permitting prices to float was hardly a painless alternative—after all, wholesale prices had gone up by a factor of ten by the end of 2000. What exactly the effect on the economy and politics of California would have been of permitting such cost increases to pass through to electricity consumers is hard to say, but it certainly would not have been trivial. Nonetheless, the bottom line is that as of late 2000, as a result of the surge in prices, California was left with two very unpalatable options. It chose the option which was politically more expedient but probably worse in the long run. The immediate cause of the meltdown was thus political, a combination of a failure of will and a great deal of wishful thinking on the part of the political leadership at the crucial moment when the IOUs might have been saved. I doubt, however, that there are any deep lessons to be derived from this experience (other than, perhaps, the inevitability of such failures of will).

The more interesting question posed by the California crisis was why exactly wholesale electricity prices rose so sharply in the first place, because after all, absent the price rises there would have been no price squeeze, no financial meltdown, and no need for the State to step in. There are two types of causes that have been identified for the California crisis: flaws in the institutional structure of the California reforms, and abuse of market power by electricity generators during the crisis. For practical and ideological reasons, most political and regulatory actors have chosen to focus on one or the other explanation (California officials on the latter, federal officials on the former). In fact, there seems little doubt that both factors played a role. As noted above, empirical studies suggest that market manipulation may have contributed significantly to the increase in wholesale prices. It seems clear, however, that the ability of generators to engage in market manipulation without actual collusion (which would violate

36. One caveat is necessary here—permitting retail price increases would no doubt have reduced demand, and so perhaps limited some of the wholesale price rises by reducing the gap between demand and supply. Given the short term inelasticity of demand for electricity, however, it is difficult to believe that this effect would have been significant.

37. See supra note 25 and accompanying text.
the antitrust laws) was itself the result of very tight conditions in electricity markets.38 Thus, the root cause of the electricity shortages must lie elsewhere, in institutional flaws inherent to California’s market design.

At some level, the cause of the power shortages that occurred in California from 2000 to 2001 is as simple as the cause of the financial meltdown: the supply of electricity in California simply did not keep up with demand.39 The reasons for that failure, however, are somewhat more complex, and lie in the nature of electricity and its social and economic role. As discussed above, the most important trait of electricity is that it cannot be stored and so must be generated at the same time that it is consumed. In addition, electricity demand is highly volatile, both in the short run (across the time of day and time of year) and over longer periods of time. Furthermore, the available supply of electricity is quite inelastic in the short run because there is a very long lead time required to construct an electricity generation plant and imports of electricity are often unavailable during the times of greatest need. As a result of these factors, without careful planning shortages are predictable. But because of its key importance to both industry and everyday life, electricity shortages (and price hikes) are also extremely disruptive and unpopular. Thus, electricity is an industry where planning is essential.

Having identified the importance of planning in the electricity industry, it seems equally clear that the root cause of California’s crisis was clearly a failure of long term planning, to ensure that supply kept up with demand. Long term planning is a function that in a traditional, regulated, and vertically integrated system would have been performed in-house by a regulated utility, with the oversight of regulators.40 The California reforms, however, relied entirely on decentralized decisionmaking and market-based incentives to ensure that entry into generation occurred in sufficient quantities (and with sufficient timeliness) to avert shortages. In particular, the utilities were completely removed from any such planning process through a combination of the requirements that the utilities divest most of their generating assets (which of course effectively forbade them from building new

38. See Duane, supra note 4, at 531 (noting that when tight market conditions eased in the summer of 2001, suppliers’ ability to manipulate market prices decreased). The conditions themselves cannot be attributed to anticompetitive behavior without falling into circular thinking.

39. See Rossi, supra note 29, at 1780 (identifying “the now widely known source of California’s power woes” as “demand for power outstripping supply”).

40. Admittedly, as noted above, such planning was done with mixed effectiveness in the two decades prior to California’s reforms; however, insofar as planning failures occurred, they tended to result in excess capacity rather than shortages because of risk aversion on the part of utilities and regulators, a failure which can be economically costly but not nearly as disruptive as shortages.
capacity), and that they rely on spot markets for all of their electricity purchases. Having removed the actors traditionally responsible for long term planning from the equation, California governmental and quasi-governmental officials (in which I include the ISO and PX staffs) also failed to engage in such planning in a serious way. 41 Finally, the state's hostility to IOUs entering into long term contracts to hedge their retail obligations (against exposure to spot market prices) prevented the IOUs from engaging in long term planning by any method other than construction of new generation. 42 The result was that California's reformed market structure delegated to no entity the responsibility for long term planning to ensure adequate supply.

To understand why the institutional structure adopted by California in 1998 failed so abysmally to engage in effective long term planning, it is useful to take a step back and think more broadly about institutional structures and their relationship to regulation and reform. Over the years, the debate over regulatory reform efforts, in the electricity industry and elsewhere, have tended to become rather one-dimensional arguments between proponents of "efficiency," who tend to favor replacing traditional regulatory systems with market structures and proponents of "fairness," who tend to favor preexisting, top-down regulation. After the New Deal Era, the regulatory side was dominant for a long period of time because of widely held perceptions of endemic market failure generally, but especially in so-called naturally monopolistic industries. As faith in government controls has ebbed since the 1970s, however, pro-market forces have become dominant, triggering important waves of deregulation and regulatory reforms in the transportation, the telecommunications, and ultimately the energy sectors. 43 But in fact, both sides of this debate are missing important nuances. Advocates of regulation ignore the fact that insofar as traditional regulation has produced unnecessarily high energy prices, this harms everyone, both directly and through the inefficiencies and higher prices imposed throughout the economy as a whole. Indeed, such higher prices are likely to have a regressive effect given the proportionately higher share of income spent by the poor on energy. And if anything was clear by the early 1990s, it is that

41. Joskow notes that the ISO staff did make some efforts beginning in 1999 to contract for peaking capacity to avert shortfalls, but those efforts were ineffective, and in any event probably could not have prevented the very significant shortages observed in the crisis period. See Joskow, supra note 2, at 26.
42. See supra note 29 and accompanying text.
traditional regulation was highly inefficient. Thus, traditional regulatory schemes can hardly be described as advancing "fairness."

If regulatory advocates have tended to ignore the fairness consequences of regulatory inefficiency, deregulation advocates have demonstrated an even larger blind spot by ignoring deep ambiguities about the meaning of the term "markets," and the relationship between "markets" and "efficiency." In understanding this point, the teachings of the school of economic analysis which has come to be known as the "New Institutional Economics," are useful. The New Institutional Economics (also sometimes described as Transaction Cost Economics) has its roots in two path-breaking articles by Nobel Laureate Ronald Coase of the University of Chicago: "The Nature of the Firm" published in 1937,44 and "The Problem of Social Cost" published in 1960.45 While very different in emphasis and scope, both these articles identify and analyze the role of "transaction costs"—which can be broadly defined as the expenses and barriers associated with engaging in either market or nonmarket transactions—in influencing the use of price and market mechanisms versus alternative, command and control structures (such as internal firm management controls, or governmental intervention) in organizing economic activity.46 In recent years, the insights which earned Coase his Nobel Prize have been further developed and given empirical rigor by a group of scholars lead by Oliver Williamson of the University of California at Berkeley,47 creating what has become a broad intellectual movement within economics.48 The key insight underlying all of the work grouped together in this movement is that in analyzing the "efficiency" of particular market and nonmarket arrangements, it is essential to focus on the actual institutional structures which operate in market economies and the transaction costs associated with different institutional structures. More concretely, much of the scholarship in this area develops and builds on the idea that while spot markets oriented around immediate, exchange transactions are very good at certain types of functions—such as using price signals to allocate resources to their most socially valuable use in the short run—they are not good at other, more

complex functions. The reason is that the use of discrete, market exchanges entails significant transaction costs, including search and information costs, exposure to opportunism, difficulties in planning for the future, and the inability to control risk and thereby maximize investment. That is why many economic functions are not performed in pure, contemporaneous exchange (i.e., spot) markets, even in a completely free economy. Instead, functions which create high transaction costs in a market environment might be: (1) performed directly by the government, performed by private firms under governmental supervision; (2) engaged in internally by firms; or (3) arranged through longer term contractual relationships between firms.

What does all of this have to do with electricity? In short, transaction cost economics suggests that there was a reason, not mere anticompetitive conduct and/or regulatory inertia, why the electricity industry has traditionally been vertically integrated. The kinds of coordination, reliability (including assurances of adequate reserve capacity), and long term planning functions which are essential to a properly functioning electricity system have not traditionally been amenable to market mechanisms. As a result, internal firm command-and-control hierarchies evolved to handle them and because of the naturally monopolistic structure of the resulting firms and industry (which was itself a product in part of vertical integration), governmental regulation followed. The deeper point is that on its face the traditional structure of the electricity industry seemed inefficient from a static, price theory perspective because it seemed to ensconce unnecessary, "unnatural" monopolies in certain sectors of the industry (notably generation). In fact, the need for vertical integration due to transaction cost barriers to the use of spot markets or contractual arrangements in coordinating the different parts of the industry might well have meant that the traditional industry structure was the most efficient one at the time.49

This basic (and hopefully uncontroversial) conclusion has important implications for the events in California. If in fact the traditional structure of the electricity industry was a product of the need to minimize the transaction costs of coordination and planning, then moving away from such hierarchical structures was inevitably going to risk introducing inefficiencies by using markets to perform functions traditionally (and perhaps better) handled by direct controls. Of course, California's failure to designate in its reforms any entity responsible for long term planning of electricity supplies was entirely consistent with the State's decision to rely completely on

49. This point is developed in detail in Paul L. Joskow, Introducing Competition Into Regulated Network Industries: From Hierarchies to Markets in Electricity, in FIRMS, MARKETS AND HIERARCHIES 237-78 (Glenn R. Carroll & David J. Teece eds., 1995).
an atomistic, decentralized spot market mechanism in the electricity generation sector. It was, however, risky.

It is important not to overstate this point, or to claim certainty in the face of deep ambiguity. Whatever the most efficient industry structure for electricity was until the 1960s, there is no doubt that technological innovations since the 1970s, including the reduction in the efficient size of generation plants, the increase in transmission efficiency, and most importantly, the computer revolution, made possible the development of complex coordination mechanisms among independently owned electricity facilities as well as the running of efficient real-time spot markets in electricity, and thereby alleviated many of the coordination problems which earlier required vertical control. However, in retrospect it seems clear that these developments did not eliminate even those coordination issues; rather, they (arguably) tipped the balance of efficiency (taking into account transactions costs) against complete vertical integration.50

Aside from the general, lingering coordination problems that remain in the electricity industry, the more important conclusion from the above analysis for our purposes is this: the events in California suggest that even if short term coordination concerns have been alleviated in recent decades, technological innovations did not eliminate the long term planning and reliability benefits of vertical integration, benefits that California sacrificed through its decision to move away from a vertically integrated electricity industry. Again, this point should not be overstated. Vertical integration is not the only institutional structure through which long term planning can be accomplished. In particular, it is long been recognized that long-term contracts provide an alternative, sometimes more efficient institutional mechanism for firms to engage in such planning. As noted above, however, the CPUC prevented the IOUs from entering into such contracts for the acquisition of electricity,51 thereby disabling the primary market mechanism for long term planning. Instead, the California system depended entirely on spot market mechanisms and incentives, on the “Invisible Hand” to perform the long term planning function of ensuring that sufficient generation supplies were available to meet demand. Especially in an industry like electricity generation, where the capital expenditures and the lag-time needed for entry are very significant and supply is otherwise inelastic, institutions such as spot markets based on pure exchange mechanisms are not good at planning to prevent all shortfalls, though they do ultimately respond to shortages by encouraging entry, absent regulatory or economic

50. See id. at 271-76 (providing a similar argument).
51. See supra note 29 and accompanying text.
barriers. As a consequence, during the critical period leading up to the California Electricity Crisis when consumer demand for electricity was growing rapidly and entry lagging, the decision to rely on spot market mechanisms to ensure adequate supply turned out to be disastrous, resulting in a severe shortage. And as discussed above, all of the other elements of the Crisis were a product of, or exacerbated by, this underlying shortage.

In addition to the failure of long term planning for sufficient generation capacity, another related problem that emerged very early on in the California system involved the adequacy of reserves. In order for an electricity system to run reliably, it must have access to reserve capacity to ensure that demand and supply can be balanced on an ongoing basis in light of unexpected outages and other events. California relied on a market to provide such reserve services (the ISO was responsible for procuring these and other "ancillary services"). However, it turned out that the market for reserves was dysfunctional from the start, producing prices far higher than expected and forcing the ISO to impose price caps very early. Furthermore, these problems should not have been a surprise because providing reserve capacity, which is not expected to be used and thus is more in the nature of an option, is a very difficult function to sell in a market given the well known difficulties in properly pricing options. Additionally, reliance on short term market exchanges for reserves is problematic since reserves are most likely to be unavailable when they are most needed (i.e., when supplies are short), because obviously the market for reserves and for real assets was not able to function correctly.

52. As Paul Joskow points out, the risks of relying on market forces in electricity generation (and transmission) did not emerge starkly before the California experiment because most of the previous wholesale power markets in the United States operated only at the margins of the existing, vertically integrated structure. See Joskow, supra note 49, at 253-54.

53. A caveat is necessary. Part of California's problems were undoubtedly a result of its own flawed implementation rather than a basic drawback of spot markets. By retaining a fantastically complicated and burdensome regulatory process to build new power plants (i.e., by limiting supply elasticity), California placed artificial barriers in the path of the market's capacity to avoid shortages. Furthermore, by insulating most demand from price signals (through the rate freeze) California exaggerated the consequences of the supply shortfall by eliminating demand elasticity. In short, the way in which California implemented market reforms substantially interfered with the market signals, which tend to assure that demand and supply equalize. But it is my view that the problem California faced was more fundamental than these details of implementation.

54. See Joskow, supra note 2, at 22-24.

55. The standard work on options pricing theory is Fischer Black & Myron Scholes, The Pricing of Options and Corporate Liabilities, 81 J. POL. ECON. 637, 637-54 (1973). However, the proper pricing of options remains a controversial subject and the Black-Scholes model is not universally accepted. See, e.g., Coming Clean on Stock Options, THE ECONOMIST, Apr. 27, 2002, at 71.
power are closely linked. Thus, once again, in the area of reserves the California system relied on market forces where they are not institutionally well suited.

Given these serious and probably predictable risks and pitfalls, why did the CPUC and California legislature adopt a system which relied so heavily on unsupervised markets? No complete answer is of course possible, but several reasons do suggest themselves. First and foremost, the designers of the California system appear to have shared a deep, ideological commitment to "market forces," a commitment which sometimes operated at the expense of careful consideration of how actual markets perform (which is, of course, the focus of the New Institutional Economics). In particular, throughout the years leading up to the Crisis, the CPUC unwaveringly pursued the goal of developing a transparent spot market for electricity in order to create true, marginal-cost-based pricing, and to send clear market signals to consumers and producers (the classic benefits of an efficient market). However, in the CPUC's view this goal required it to ban the IOUs from entering into long term contracts, which might have protected against supply shortfalls over the medium to long term. Second, the CPUC and legislature clearly shared an unwillingness to accept the full implications of adopting a market design, one of the most important of which is that all consumers must be exposed to true, market based prices, or else supply and demand cannot be trusted to clear. This unwillingness was rooted in an understandable desire to shield smaller customers from highly volatile prices (hence the rate freeze, which the State refused to lift during the crisis), but it was completely inconsistent with the desire to adopt spot markets as the primary institutional structure for running California's electricity system. Finally, there was a gaping failure on the part of all industry participants to consider the possibility that the glut of power in the early 1990s could translate into a shortage by the end of the decade. In conditions of oversupply, after all, markets are likely to perform well from the point of view of consumers because, absent market power, prices will tend to fall to marginal cost, and long term planning to avoid shortages is unnecessary. Of course, as events actually took shape, the glut did evolve into a shortage, and the benefits of a market system rapidly transformed into weaknesses.

56. Paul Joskow describes the process as dominated by "mindless free-market rhetoric." Joskow, supra note 2, at 51-52.

57. See supra notes 51-52 and accompanying text.
VI. IMPLICATIONS FOR FUTURE REFORMS: THE PROMISE OF LONG-TERM CONTRACTS

What exactly are the implications of all of the above for future reform efforts in California and elsewhere? Is it that deregulation and the dismantling of vertically integrated industry structures are inconsistent with the need for long term planning and protection of consumers from volatile prices in the electricity industry? In other words, must we conclude that the only way to retain and reestablish reliability and consistency is to return to a world of regulated, vertically integrated, monopolist utilities? In fact, that does not appear to be the case—which is indeed fortunate because, it must be remembered, the performance of regulated, integrated monopolies in recent decades has hardly been ideal. However, it does seem clear that reliance on pure, spot markets as the primary mechanism for distributing electricity is deeply problematic because such institutions are not well suited to provide the kinds of long term planning necessary to ensure stability and reliability. So what is the alternative?

If we desire to retain the benefits of reliability and stability and the efficiencies of markets, the most workable compromise appears to be to return to (or retain) a system of monopolist utilities who have responsibility to ensure a reliable supply of electricity within their service areas, but to require utilities to rely primarily on long term contracts, rather than on vertically integrated ownership of generation facilities, for the procurement of electricity, with shorter term contracts and spot market purchases being used to balance out short term swings in demand. In such a system monopoly ownership and control of local distribution networks is retained, but the generation sector is not designed to be either monopolistic or integrated into utilities. And indeed, in such a system divestiture of generation assets by utilities will probably be required, to ensure that utilities do not self-prefer in the procurement process. The primary advantage of such an institutional design is that long term contracts can provide much of the stability, protect against short term price swings, and long term planning capacity for future needs which is possible within a fully vertically integrated system. In particular, because retail prices would be based on an average of contractual and spot-market acquisition costs, even sharp short-run swings in spot market prices will not cause significant retail price swings. At the same time, because the procurement of long term contracts is a

58. See supra notes 6-9 and accompanying text.

59. It is almost certainly sound financial planning for a utility to employ a mixture of long term contracts, shorter term contracts, and spot purchases to produce a balanced electricity portfolio. See Yuffee, supra note 2, at 86-87. The analysis in the text suggests, however, that in order to maximize reliability and permit planning, portfolios should be heavily weighted towards longer term commitments (and guarantees).
competitive process, such contracts permit competitive pressures to discipline the generation industry, and thereby avoid the enormous inefficiencies observed in vertically integrated utilities. In this respect long term contracts represent an institutional compromise: insofar as they build stable, long term relationships they resemble vertical integration (and indeed have been described by some economists as a form of integration); but insofar as they are entered into competitively, they resemble market transactions.

The hybrid structure described above appears to provide an excellent compromise between traditional industry structures and radical decentralization on the California model. It must be acknowledged, however, that the very compromise nature of the proposal entails serious costs. In particular, like full vertical integration, an institutional structure reliant on long term contracts to procure electricity (and which sets retail prices based on the average cost of such contracts) fails to provide the kinds ongoing, transparent price signals based on marginal costs provided by the spot markets which were at the heart of the California reforms. Of course, acquisition contracts entered into by IOUs could be structured so that wholesale prices varied based on cost-of-production at different times of day and year, and retail rates could be designed to reflect those changing costs; but such contractual provisions are undoubtedly more complex (and error prone) than market signals, and the requisite adjustments to retail rate design have proven very difficult and controversial to implement. As a result, in a system of long term contracts consumers are likely to end up somewhat isolated from the actual costs of the service they are provided. This is particularly problematic in the electricity industry because the marginal cost of producing electricity varies sharply over the course of the day, the year, and over longer periods of time, and in a well designed market system (which California's was not), consumers should be exposed to all those price signals, permitting them to adjust their consumption patterns in a socially efficient manner. A system based on long term contracts does not easily lend itself to such efficient pricing.

Another drawback of a system of long term contracts, as opposed to spot markets in electricity, is that because the responsibility for seeking out and negotiating such contracts lies with local utilities (with regulatory oversight, of course), in such a system entry into the generation market becomes completely dependent on decisions by utilities to acquire new power.

60. In California, a transition to a regime based on long term contracts entered into by utilities requires of course that the current contracts entered into by the State be displaced. If the State is able to avoid or renegotiate these contracts they will not pose a substantial barrier to further reform. Otherwise, any new regime will have to be phased in over time, as the state contracts expire.
rather than on direct market signals. Of course, as noted above, it was the very failure of market signals to produce timely entry which was at the root of the California crisis; but insofar as market signals reduce the risk of human error or political interference, a move away from markets and towards central planning entails risk.  

Finally, and perhaps most significantly, reliance on long term acquisition contracts effectively means that retail customers cannot have any access to competitive electricity markets (i.e., that utilities must be provided a legal monopoly over electricity distribution, as was traditionally done). This is because utilities will be entering into long term commitments to purchase power on behalf of their customers, something which they can only do if they have a stable demand base. Without such assured demand, utilities that make firm commitments to purchase power risk being stuck with unneeded power during periods when spot prices are below long term contractual prices, and so customers flee to competitive providers.

CONCLUSION

California’s experience during its Electricity Crisis suggests that an electricity industry organized around long term electricity procurement contracts may perform in a substantially more efficient manner than either a traditional, vertically integrated industry or a radically decentralized industry of the sort created by the California reforms. An institutional model for the electricity industry based on long term contracts is, however, a compromise, seeking to gain some of the benefits of market competition without sacrificing all of the benefits of integration, but as a consequence losing some of the benefits of each. The deeper lesson here is that in the spectrum between spot markets at all levels at one end, and regulated, integrated monopolies at the other, there are many intermediate options. These range from the authorization of wholesale spot markets without any limits on vertical integration, to a mixture of contracts and self-provision of generating capacity, to exclusive reliance on long term contractual relationships and/or wholesale spot markets for power acquisition. Each represents a different set of compromises between the benefits of integration and the benefits of competition. In California, the authorities responsible for the State’s reform efforts decided to adopt a fully market-based approach, with essentially no contingency arrangements. And under different circum-

61. The use of long term procurement contracts also does nothing to resolve the problem of ensuring adequate reserves (one of the earliest failures of the California system), which presumably should be supplied by utilities internally (or perhaps by the ISO) rather than through a market structure, given the great difficulty the ISO experienced in running an efficient market in reserves during the pre-crisis period.
stances the California system might have worked perfectly, providing precisely the mixture of efficiency and flexibility that was its objective (though the risk of collapse would of course always have remained in such a system). But given the confluence of events that occurred in California between the springs of 2000 and 2001, California’s choice turned out to be a disaster.