

STATEMENT OF PROFESSOR PAUL L. JOSKOW¹
BEFORE THE COMMITTEE ON GOVERNMENTAL AFFAIRS
UNITED STATES SENATE

JUNE 13, 2001

Thank you for giving me the opportunity to appear here today to discuss economic issues associated with the restructuring of U.S. energy industries. My statement will focus on the electricity sector. I have been working on the challenges associated with introducing competition into the U.S. electricity industry for 20 years.² During the last ten years I have also been involved in electricity market design and performance assessment initiatives in several regions of the U.S., including California, and in several other countries.

I continue to believe that if properly implemented, wholesale and retail competition in electricity can bring real benefits to electricity consumers in the long run. I also continue to believe that creating well functioning competitive electricity markets is a very difficult challenge, that we will make mistakes along the way, and that mid-course corrections will be necessary. I am anxious to see these competition and regulatory reform initiatives succeed. However, as I look around the country at the states which have restructured and introduced wholesale and retail competition programs, it is quite clear that things are not going nearly as well as many had hoped only a couple of years

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²My book (with Richard Schmalensee) *Markets for Power: An Analysis of Electric Utility Deregulation*, MIT Press, 1983 was my first major publication on this subject.

ago.³ We need to identify the nature of the problems, do what is necessary to fix them, and demonstrate that when electricity reform programs go bad responsible federal agencies will not abandon the states with which they worked to implement them but rather will work closely with them to find and apply solutions.

The development of competitive wholesale and retail electricity markets in the U.S. is a work in progress. The events in California and the rest of the West during the past year have, properly, attracted enormous attention and concern. This is not what California's electricity consumers, utilities, or its government officials bargained for when their innovative electricity restructuring and competition reform program was initiated in 1994. (I have attached a table of average hourly wholesale prices in California for each month from April 1998 through April 2001.) The causes of California's electricity crisis are complex, reflecting a combination of bad market design, bad regulatory decisions, unanticipated changes in basic supply and demand conditions, and supplier behavior which rationally took advantage of opportunities created by these conditions to further increase market prices.⁴ Some progress has been made in mitigating the short run and long run problems in California. However, both federal and state government officials can and should do more. The restructuring program developed and implemented in California was the outcome of a close cooperative relationship between FERC and California officials --- they called it "cooperative federalism." FERC approved California's new wholesale market institutions before they went into operation

³ Expectations were probably unrealistic rosy. However, nobody expected the kind of mess that we have seen in the last year in California and the West generally. There are aspects of these reforms that are going well. A large amount of new merchant generating capacity has been attracted to the market and is in the construction or site approval stage around the country, including in California.

⁴ My views on what happened can be found in my paper "California's Electricity Market Meltdown," June 7, 2001. A copy can be obtained by sending an email to [pjioskow@mit.edu](mailto:pjoskow@mit.edu).

in April 1998. Both federal and state officials enthusiastically took credit for the restructured wholesale and retail electricity markets they were creating. However as problems emerged, and especially when the market exploded during the summer of 2000, FERC was not as closely involved in solving the problems as it should have been. The cooperative relationship between Federal and California government officials quickly deteriorated into a hostile relationship that focused on finger pointing and sloganeering rather than on finding practical solutions. We need to do better.

There are a number of useful lessons to be learned from the California experience. (I have attached a list of some of the useful lessons to be learned from California as an Appendix to this statement.) These lessons are important because competitive electricity market performance problems, including market power problems, are not unique to California during the last twelve months. Numerous market performance problems became evident in California as early as the summer of 1998, long before the meltdown in 2000. There have been market performance problems requiring market reforms and mitigation measures in the new wholesale markets in New York, New England, and PJM. Moreover, large portions of the country have not yet embraced comprehensive electricity restructuring and competition programs. They are unlikely to do so unless we can convince responsible state officials and the public that we have figured out how to make electricity market institutions yield results in terms of prices and reliability that are superior to traditional industry structures and regulatory institutions.

The fact that market performance problems have occurred and mitigation measures have been necessary in all of the newly created wholesale markets should not be surprising. Electricity has unusual physical attributes that make the design of well

functioning competitive wholesale power markets a significant technical challenge. It is impossible to get it right the first time around. Electricity markets with good performance attributes do not create themselves and do not fix themselves. They must be created and reformed by people with appropriate technical expertise and experience working together and must ultimately be approved by responsible government agencies. Accordingly, mid-course corrections have almost always been necessary after competitive electricity markets first go into operation. Ongoing market reforms and regulatory “mitigation” initiatives designed to remedy serious market performance problems should be an *expected* feature of the *process* of creating efficient competitive wholesale electricity markets. Price caps, bidding rules, cost-based contracts and a variety of other mitigation mechanisms have been used or are being used in most new wholesale markets in the U.S. as short run mechanisms to protect electricity consumers from serious market imperfections until longer term fixes can be developed, introduced, and evaluated. Most other countries that have introduced competition into wholesale and retail electricity markets have confronted similar problems and relied on similar mitigation methods.

From this perspective, one should be very skeptical of the knee jerk rejection of calls for FERC to adopt price mitigation mechanisms to deal with the evident performance problems in California’s wholesale electricity market.⁵ Of course, we need

⁵ The typical knee jerk reaction is that price caps necessarily cause shortages and are always an unreasonable intrusion into “free markets.” This is simply not true if the markets at issue are characterized by significant supplier market power and the price cap is set high enough so that markets can clear at competitive prices. A properly designed price mitigation program designed to mitigate market power will both increase supplies and reduce prices in the short run. Ironically, one of the reasons for restructuring the electricity industry to rely on competitive wholesale markets was the view that cost-of-service regulation of monopoly suppliers led to excess generating capacity. Moreover, the vast bulk of the electricity generated in the U.S. continues effectively to be subject to cost-based regulation since it is produced by vertically integrated firms supplying their retail customers at regulated rates.

to be sensitive to the possibility that mitigation measures can make things worse rather than better if they are poorly designed. Of course, we must be concerned that mitigation mechanisms do not discourage new investment in generating capacity. Of course, the proper long term strategy is to fix the features of the markets and regulatory framework that are broken. But we also must be concerned about the interim costs to consumers and the economy of unmitigated market failures.

The new wholesale market that began operating in California in April 1998 is not an “unregulated” market that has been operating smoothly for decades under the guidance of the “invisible hand” of competition. Rather, it is a newly created market that most knowledgeable people expected would have at least some problems that would need to be fixed and over which FERC had and has continuing regulatory authority and responsibility. Before the new market began to operate FERC wisely created the Market Surveillance Committee (MSC) of the ISO and the Market Monitoring Committee (MMC) of the PX to monitor the performance of the California markets and to make recommendations for mitigation when serious problems emerged. Outstanding independent economists were appointed to lead each of these monitoring committees. FERC created these institutions precisely because the performance attributes of these new market institutions were very uncertain and they had been the subject of extensive criticism and controversy before they went into effect. It would have made no sense to create these monitoring organizations if FERC did not expect that it might need to make reforms and implement mitigation measures if market performance problems emerged after the market began to operate.

Accordingly, it appears that prior to 1998 FERC understood that market monitoring and at least some mitigation measures and market reforms would be necessary *after* experience was gained with California's new wholesale market institutions. At the time, I thought that the MSC would be FERC's "eyes and ears" at the center of the new market institutions and would provide information, analysis and problem solving ideas which FERC could use quickly to resolve market performance problems. The MSC and MMC did their jobs admirably. However, for some reason FERC did not make effective use of the market monitoring institutions it created or of the analysis and recommendations that they produced. It should not have taken FERC so long to evaluate the performance of California's markets when they exploded during summer 2000. FERC should have relied much more on the extensive analyses performed by the MSC at that time and worked closely with it and the ISO's Department of Market Analysis. It should also have given more serious consideration to constructive mitigation proposals put forward by the MSC and the ISO well before FERC got around to finishing its own study.⁶ Why did FERC create the MSC if it was then going to ignore it when serious unexpected problems became evident?

I was especially disappointed by FERC's response to abundant evidence that market power problems were exacerbating an already bad situation caused by rising natural gas prices, reduced imports of power, higher demand and rising prices for NOx

⁶ It is not my intention to place all of the blame on FERC for prolonging or exacerbating the crisis. There is plenty of blame to go around and policy makers have spent too much time looking for parties to blame and too little time fixing the problems. The CPUC's slow reaction to the problems, its failure to increase retail prices, the ensuing utility credit problems, and the legitimate reluctance of suppliers to supply without some assurance of getting paid certainly worsened the underlying wholesale market problems. The failure of FERC and the CPUC to find a way to work together constructively to find practical solutions in the early Fall of 2000 made the crisis much worse than necessary.

emissions permits.⁷ There is a very basic problem here. FERC does not appear to have a clear definition of market power, has not identified the empirical indicia it will use to measure the presence and extent of market power, does not routinely collect or analyze the data necessary to draw conclusions about market power, has not defined how much market power is too much market power to satisfy its obligations to ensure that wholesale electricity prices are just and reasonable,⁸ and it does not appear to have a well developed set of mitigation measures that it can choose from if it indeed finds that there is a significant market power problem. This is not a prescription for success in the identification of and effective response to serious market power problems.

By delaying its analysis of the problem, by failing to specify a clear definition of market power, by failing to specify or apply clear numerical criteria for evaluating market performance generally, and by ignoring constructive comprehensive proposals for mitigation, FERC did not in my opinion properly fulfill its responsibilities to respond to the California's market meltdown adequately or in a timely fashion. As summer is now upon us, the practical mitigation options for this summer are limited. At the very least, I would like to see FERC extend the number of hours to which the current mitigation rules apply, identify remaining loopholes, and close them. I also hope that California continues its efforts to remove unnecessary barriers to construction of new generating plants, to raise retail prices to reflect wholesale market prices, to restore credit to the system, and to continue its energy efficiency and conservation efforts. I would also like

⁸ A "perfect competition" standard would not be appropriate, but benchmarking market performance off of textbook competition models can be very useful. The question then becomes how to use the benchmark information to determine whether there is too much market power necessitating some kind of mitigation response.

to see Federal and California officials bury the hatchet and start to work more closely together in a cooperative fashion to find practical solutions to market performance problems

Until Congress amends the Federal Power Act to direct otherwise, FERC has the responsibility to guide restructuring and the expansion of competition in wholesale markets to achieve widely shared public interest goals, including reasonable wholesale prices for electricity. As FERC tackles this challenge it is important to keep in mind that “deregulation” is not a goal in and of itself. The goal is to create well functioning *competitive* markets that perform better than the regulated structures they replace.⁹ Significant market power problems must be addressed both before suppliers are given market-based pricing authority and, *if necessary*,¹⁰ after markets begin to operate as evidence about actual market performance and supplier behavior emerges from market experience.¹¹ Responsible regulators need to be in a position to evaluate alternative market design frameworks and to agree to allow only those to go forward that are likely to perform well. They must have the capabilities to identify serious market performance problems and to develop and apply reforms to fix them.

⁹ Neither regulation nor competition can yield “perfect” textbook outcomes. The goal is to do the best that we can in an imperfect world.

¹⁰ Clearly, it is also highly desirable for market rules to be sufficiently stable so that investors are not subject to unnecessary regulatory uncertainty. This suggests that reforms should be focused on serious market performance problems, that comprehensive rather than piecemeal reforms should be undertaken, and that legitimate investor expectations should be respected in the reform process.

¹¹ In this regard, FERC’s current “hub and spoke” method for evaluating potential market power problems in the context of market-based pricing applications is clearly outdated. Structural screens applying the methodology FERC uses in merger applications would provide better structural indicia of market power. These screens should be supplemented by information about the extent and nature of longer term hedging contracts in the relevant markets (e.g. what fraction of retail demand is covered with longer term contracts?), retail procurement arrangements, and on analyses of wholesale supplier and market behavior and performance based on actual market information. These analyses should encompass both generators and marketers of power.

If FERC is successfully to perform on its obligations it will have to change as well. FERC needs to become an agency with the human resources, organizational structure, administrative procedures and leadership that allows it to play an active constructive role in guiding resolution of wholesale market design issues, to be actively involved in ongoing monitoring of market performance, to develop and effectively apply objective market performance indicia, and to act quickly and cooperatively with the relevant state agencies, Independent System Operators, Regional Transmission Organizations, and market participants to fix serious market performance problems quickly once they have been diagnosed. FERC must also play a more active role in creating new organizational structures and regulatory institutions to govern the nation's currently balkanized transmission system.

As you evaluate how well FERC is doing in performing on its responsibilities, both with regard the mess in California and the evolution of wholesale markets in the rest of the country, I suggest that you seek answers to the following questions:

1. What specific market performance attributes does FERC believe characterize a well functioning competitive wholesale electricity market that meets its obligations under the Federal Power Act? For example, what is FERC's definition of market power?
2. What numerical indicia does FERC use to measure these attributes of competitive market performance based on actual market experience? For example, what indicia of market power does FERC rely on and how does it measure them empirically?

3. Does FERC have ready access to the data, and the human resources to make appropriate use of these data, necessary to construct and evaluate these indicia of market performance?
4. Does FERC interact closely with the market surveillance committees and market monitors that have been set up in some parts of the country, sharing analytical techniques, and data, to find solutions to market performance problems?
5. What criteria does FERC use to determine whether and when these numerical market performance indicia indicate that market performance does not meet the requirements for “just and reasonable rates” under the Federal Power Act? For example, what would lead FERC to conclude that there is too much market power in a market based on its evaluation of actual market experience?
6. Does FERC actively monitor market performance and take action on its own initiative or does it wait for complaints?
7. Does FERC feel the need to find that individual suppliers have done something “wrong” and are “at fault” to conclude that there are market performance problems or can it simply proceed with mitigation measures based on general evidence of market performance failures?

8. What menu of mitigation tools does FERC expect to rely on, in the short run and the long run, when these performance indicia indicate that the market is performing poorly?

CALIFORNIA PX DAY-AHEAD HOURLY PRICES
(\$/Mwh:Weighted Averages 7 x 24)

	<u>1998</u>	<u>1999</u>	<u>2000</u>	<u>2001</u>
January	-	21.6	31.8	260.2
February	-	19.6	18.8	363.0 (ISO)
March	-	24.0	29.3	313.5 (ISO)
April	23.3	24.7	27.4	370.0 (ISO)
May	12.5	24.7	50.4	
June	13.3	25.8	132.4	
July	35.6	31.5	115.3	
August	43.4	34.7	175.2	
September	37.0	35.2	119.6	
October	27.3	49.0	103.2	
November	26.5	38.3	179.4	
December	30.0	30.2	385.6	
AVERAGE	30.0	30.0	115.0	326.5

LESSONS LEARNED FROM THE CALIFORNIA ELECTRICITY CRISIS

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- Electricity has unusual physical attributes that make the design of well functioning competitive wholesale power markets a significant technical challenge. Electricity markets don't design themselves via "the invisible hand." Effective market design requires substantial technical expertise and careful application of lessons learned from international experience. Market institutions and residual regulatory mechanisms need to be designed to be robust to extreme contingencies. Market and regulatory institutions need to be designed to be robust to extreme contingencies. Market power problems must be addressed both initially and as evidence about actual market performance and supplier behavior emerges as the markets operate. Responsible regulators need to be in a position to evaluate alternative market design frameworks and to approve only those that are likely to perform well. They must have the capabilities to identify serious market performance problems and to develop and apply reforms to fix them. California relied on "market design by committee" and allowed mindless free-market rhetoric and interest group politics, to ignore technical realities, international experience and common sense.
- Competitive electricity markets will not work well if consumers are completely insulated by regulation from wholesale market prices. California deregulated wholesale prices, but failed to deregulate retail prices or to allow the utilities to use forward contracts to hedge their default service supply and pricing obligations. The terms and conditions of default service made it necessary for utilities to buy at an unregulated hourly wholesale spot market price and to sell at a fixed regulated retail price for up to four years. Not only did this drive the utilities to the point of insolvency after wholesale prices rose above the fixed retail price in June 2000, but it has also made it very difficult for competing retail suppliers to attract customers or for consumers to respond to high prices by reducing consumption.
- Spot electricity markets work very poorly when supplies are tight; the combination of relatively tight supplies and extremely inelastic demand means that prices can rise to extraordinary levels and are much more susceptible to market power problems than when supplies are abundant. One way to help to protect consumers from volatile and excessive spot markets for electricity is to ensure that a large fraction of consumer demand is covered by longer term fixed price contracts negotiated under competitive conditions well in advance of spot market crises. These contracts both protect consumers from price volatility (they act like an insurance policy) and reduce incentives suppliers have to exercise market power when supplies get tight. Such contracts can also facilitate financing of new power plants. A good retail procurement framework, whether it relies of utility distribution companies, competitive electricity service providers (ESPs), or

a combination of both, must assure that a large fraction of retail demand is being met with longer term fixed price contracts and only a small fraction fully exposed to the spot market.

- In addition, the default service option for larger commercial and industrial consumers should be to purchase their electricity at real time prices. Real time pricing at the retail level introduces demand elasticity into the spot *wholesale* market and this in turn dampens price volatility and helps to mitigate supplier market power. (These customers should also have the option of hedging some or all of their demand with contracts purchased from electricity marketing intermediaries or their distribution company.) California both refused to allow the entities (the utility distribution companies) with the responsibility to procure supplies for 85% to 90% of the retail demand to enter into forward contracts *and* ignored proposals for demand response programs that would allow customers to respond to wholesale price spikes by reducing consumption.
- The primary benefits of electricity sector reform will occur in the long run as a consequence of investments in new more efficient power plants, the introduction retail risk management, demand management and energy efficiency services, and continuing innovations on both the supply and demand sides. Speeding the ability of developers to site and build new generating plants and providing good incentives to expand transmission networks, all of which meet reasonable environmental standards, is essential for good long run market performance. Removing unnecessary administrative barriers to entry allows supply to increase more quickly as market conditions make it profitable to do so and will reduce the likelihood of extreme contingencies. California focused too much on illusive short run gains from low-priced power that was available when there was excess capacity and focused too little on creating sound institutional arrangements to support investments in new generation and transmission facilities.
- All electricity market reform programs have experienced some problems at the outset. Mid-course corrections have almost always been necessary to mitigate market performance problems. When market performance problems emerge, government officials must act quickly and decisively to fix the problems. Ongoing market reforms and regulatory “mitigation” initiatives designed to remedy serious market performance problems should be an *expected* feature of the process of creating efficient competitive wholesale electricity markets. If the California and federal regulators had done so in September 2000 when the current problems became crystal clear, they would have reduced significantly the ultimate magnitude of the crisis. Unfortunately, both the CPUC and FERC acted too slowly and ineffectively as the crisis deepened and spent most of their energies pointing fingers of blame at one another rather than working together cooperatively to find a solution.
- The recent events in California, as well as less severe problems in other electricity markets in the U.S., also raise questions about whether federal (FERC) regulators

are up to the task of supervising the design and diffusion of well functioning competitive electricity markets, effectively monitoring market performance, identifying and measuring performance problems, developing and implementing reforms to fix them. FERC's responses to the problems in California, as well as to problems that have emerged in other regions, have not been satisfactory. FERC needs to become an agency with the human resources, organizational structure, administrative procedures and leadership that allows it to play an active constructive role in guiding resolution of wholesale market design issues, to be actively involved in ongoing monitoring of market performance, to develop and effectively apply objective market performance indicia, and to act quickly and cooperatively with the relevant state agencies and Regional Transmission Organizations to fix serious market performance problems when they emerge.

Related Papers By Paul Joskow

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