

**Statement of
Frank A. Wolak
Professor of Economics, Stanford University
Chairman, Market Surveillance Committee, California Independent System Operator
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Chairman Leiberman and Members of the Committee, I am pleased to submit this written statement concerning the role of the Federal Energy Regulatory Commission in the functioning of the electricity market in California. I am a Professor of Economics at Stanford University. I began my work on energy and environmental issues at the Los Alamos National Laboratory (LANL) in 1980. The following year I entered graduate school at Harvard University, where I received a S.M. in Applied Mathematics and Ph.D in Economics. For the past fifteen years, I have been engaged on research program studying the process of privatization, competition and regulation in network industries such as electricity and natural gas. A major focus of my work is the empirical analysis of market power and, more generally, market design issues in newly restructured electricity markets. I have studied the design and operation the PJM (The Pennsylvania, New Jersey, and Maryland Interconnection), New York, New England and California electricity markets, as well as virtually all re-structured electricity markets currently operating around the world. Since April 1, 1998, I have been the Chairman of the Market Surveillance Committee (MSC) for the Independent System Operator (ISO) of California electricity industry.

MARKET SURVEILLANCE COMMITTEE

To provide further background on my expertise on the California electricity market, it is useful to describe the role of the Market Surveillance Committee of the California Independent System Operator and the activities that I have undertaken as its Chairman. The MSC is an independent committee charged with monitoring the California electricity market for the exercise of market power and for market design flaws which may enhance the ability of market participants to exercise market power. The MSC was required by the Federal Energy Regulatory Commission as part of the market monitoring function of the California ISO. Because the California ISO had a board of governors composed of employees from firms participating in the California market, as well as stakeholders from state agencies and regulatory bodies, FERC mandated the formation of an independent market monitoring entity to prepare and file with FERC periodic reports on the performance of the market. This is a major role of the MSC. In this capacity I have written or

coauthored more than ten reports on aspects of the design and performance of the California electricity markets during my three years as Chairman of the MSC. In preparing the MSC reports I have analyzed confidential data made available by the ISO on bidding, scheduling and production by all generation unit owners selling into the California. In addition, the MSC has worked closely with the Department of Market Analysis at the ISO in preparing these reports. These reports, along with other papers I have written on competitive electricity markets, are listed at the end of my testimony.

FEDERAL OVERSIGHT OF THE ELECTRICITY INDUSTRY

In 1935, Congress passed the Federal Power Act which imposed a statutory mandate on the Federal Power Commission, the predecessor to the Federal Energy Regulatory Commission (FERC), to set “just and reasonable” wholesale electricity prices. An accepted standard for just and reasonable prices are those that recover production costs, including a “fair” rate of return on the capital invested by the firm. Moreover, if the FERC finds that wholesale electricity prices are unjust and unreasonable, the Federal Power Act gives it authority to take actions that result in just and reasonable prices. Finally, the Federal Power Act requires that FERC order refunds for any payments by consumers for prices in excess just and reasonable levels.

Approximately ten years ago FERC embarked on an explicit policy to promote wholesale electricity markets throughout the US. The price a generation unit owner receives from selling into a wholesale electricity market is determined by the willingness of all generation unit owners to supply electricity, rather than an administrative process that uses the firm’s production costs and a rate of return on capital invested to determine the price it receives for electricity.

MARKET POWER IN ELECTRICITY MARKETS

The just and reasonable price standard for wholesale electricity prices required by the Federal Power Act presented a significant legal and regulatory challenge for FERC because markets can set prices substantially in excess of the production costs for sustained periods of time. This occurs because one or more firms operating in the market have market power--the ability to raise market prices through their unilateral action and profit from this price increase.

Without proper protective measures in place, spot wholesale electricity markets are particularly susceptible to the exercise of market power because of how electricity is produced, delivered and sold to final customers. The production of electricity is characterized by binding

capacity constraints because a generating unit with a nameplate capacity of 500 megawatts (MW) can produce only slightly more than 500 megawatt-hours (MWh) of energy in a single hour. These capacity constraints limit the magnitude of the short-run supply response of each firm to the attempts of its competitors to raise market prices.

Electricity must be delivered to all customers over a common transmission grid which is often subject to congestion, particularly along transmission paths to major metropolitan areas. Transmission congestion limits the number of generators able to sell power into the congested region. This reduces the potential supply response to the attempts of firms selling into this smaller market to raise prices through the unilateral exercise of market power. Finally, for a variety of reasons, the hourly demand for electricity is virtually insensitive to the value of the hourly wholesale price, so that if all generators bid higher prices they face virtually no risk of selling less electricity in that hour.

When the demand for electricity is high because of hot weather, the probability of transmission congestion is usually very high. During these system conditions, generation unit owners can be confident that least some of their capacity will be needed to serve the price-insensitive aggregate wholesale demand. These firms also recognize that any reduction in the quantity of electricity sold because of high bid prices will be more than compensated for by the significantly higher market prices they will receive for all sales they do make. For this reason, the unilateral exercise of market power by these firms through their bidding behavior leads to higher profits than they could achieve if they did not bid to influence market prices.

The long time lag necessary to construct new generation capacity can result in long periods of significant market power in an electricity market. This feature of the electricity industry makes potential economic damage associated with the exercise of market power extremely large. Even under the most optimistic scenarios, the time from siting a sizable new generating facility to producing electricity from this facility can range from 18 to 24 months. This estimate does not include the time necessary to obtain the permits needed to site the new facility, which can sometimes double the time necessary to bring the new plant on line. For this reason, once market conditions arise which allow existing generating facilities to exercise substantial amounts of unilateral market power, as is currently the case in California, these market conditions are very likely to persist for a long enough period of time to impose substantial economic hardship on consumers. At a minimum,

this interval of significant economic hardship is the shortest time period necessary to site and construct enough new generation capacity to create the competitive conditions necessary to reduce the ability of existing firms to exercise their unilateral market power.

California is currently at the beginning of this time interval of economic hardship. Not until the autumn of 2002 or the winter of 2003 is there a significant likelihood that sufficient new capacity will be on line in California to provide a large enough supply response to discipline the ability of existing firms to exercise their unilateral market power.

PRE-CONDITIONS FOR GRANTING MARKET-BASED PRICING AUTHORITY

Because of this very large potential harm from the exercise of unilateral market power by firms in a competitive electricity market, the FERC has determined that unless a firm can prove that it does not possess market power it is not eligible to receive market-based prices. It can, however, receive prices for any electricity produced that are set through a cost-of-service regulatory process administered by the FERC. An implication of FERC's logic for granting market-based rate authority is that only if all firms participating in a market possess no market power will the price set by the market satisfy the just and reasonable standard of the Federal Power Act.

Specifically, before it allows any market participant to receive a market price rather than a pre-existing cost-based price set through a regulatory process, the FERC requires each participant to demonstrate that it does not have market power. In other words, each market participant must submit sworn testimony to the FERC demonstrating it does not have the ability to raise market prices and profit from this behavior. Those generators unable to demonstrate that they do not have market power or have not adequately mitigated that market power are not eligible to receive market-based rates, but do have the option to sell at cost-of-service prices set by FERC.

Each of the new generation unit owners and power marketers made these market-based rate filings before they began selling into the California market and, in many cases before the California market began operation in April 1998. Each firm had its authority to receive market prices approved by the FERC for a three-year period. Because of the timing of the transfer of assets from the California investor-owned utilities—Pacific Gas and Electric, Southern California Edison, and San Diego Gas and Electric—to the new owners—Duke, Dynegy, Reliant, AES/Williams and Mirant—some these entities did not begin selling into California at market-based rates until a later date. As

consequence, this authority to sell at market-based rates expires before summer of 2001 for a subset of these firms.

These firms have recently filed at FERC to renew their market-based rate authority. According to FERC rules under the just and reasonable rate standard of the Federal Power Act, these firms must once again demonstrate that they do not possess market power or have adequately mitigated this market power in order to be eligible to receive market-based rates for another three-year period. If they are unable to do so, then they are still able to receive prices for their sales set through a cost-of-service regulatory process.

A major source of potential error in determining whether a market participant is eligible to receive market-based rates is the fact that is extremely difficult determine on a prospective basis whether a firm possesses market power. A second source of potential errors is that the methodology used by the FERC to make this determination uses analytical techniques that have long been acknowledged by the economics profession as grossly inadequate. This analysis is based on concentration indexes applied to geographic markets that do not account for the fact that electricity must be delivered to final customers over the existing transmission grid. This analysis does not recognize the crucial role that demand and other system conditions play in determining the amount of unilateral market power that a firm can exercise. Most important, it does not acknowledge the crucial role played by a market's bidding, scheduling and operating protocols in determining the extent market power that can be exercised by a firm in a competitive electricity market. One of the most useful lessons I have learned from my research and experience with wholesale electricity markets, is that very small changes in market rules can exert an enormous impact on the ability of a firm to exercise market power.

EARLY EXERCISE OF MARKET POWER IN CALIFORNIA

As early as July of 1998, there were clear instances of the exercise of unilateral market power in the California electricity market. Since August of 1998, the Market Surveillance Committee of the California ISO, which I chair, has prepared a number of reports on the performance of the California electricity market documenting the extent of market power exercised. In July of 1999, in research with Severin Borenstein and James Bushnell at the University of California Energy Institute, I presented measures of the extent of market power exercised in the California electricity market from June 1998 to September of 1998. Since that time, this analysis has been periodically

updated as more recent market performance data becomes available. This monthly index of the exert of market power exercised in California electricity market currently exists from June 1998 through December of 2000. All the Market Surveillance Committee reports including this research with Borenstein and Bushnell have been filed with the FERC. A chronology of these reports and filing is given below.

EVIDENCE OF MARKET POWER FILED WITH FERC

Before my discussion of the evidence for the exercise of market power in the California electricity market, I would like to describe a particular challenge faced the MSC. As discussed earlier, the primary role MSC as envisioned by FERC is to monitor the ISO markets for the exercise of market power. However I have been unable to find in the ISO tariff or any FERC orders on the California electricity market a standard for the MSC to apply in determining whether the bidding, scheduling or operating behavior of a generation unit owner constituted the exercise of market power that was unacceptable under the just and reasonable rate standard of the Federal Power Act. I have also been unable to find in the ISO tariff or any FERC orders on the California electricity market a standard for the MSC to apply in determining whether market prices violated the just and reasonable rate standard. A number of meetings with staff at the FERC to discuss these issues, failed to elicit either of these standards that the MSC could use to monitor the California electricity market. As late as July 27-28, 2000, in a meeting of the representatives from the market monitoring units of the California, New York, New England and PJM ISOs with staff from the Office of Markets, Tariffs and Rates at FERC at the Baltimore-Washington Airport, I was unable to elicit a clear standard for either unacceptable prices or the unacceptable exercise market power, despite this topic being the first agenda item on the first day of the conference.

For this reason, the MSC decided to use the standard definitions used in the economics profession for determining whether market prices reflected the exercise of market power or a firm was bidding, scheduling or operating to exercise its unilateral market power. All of the discussions of market power and the exercise of market presented in this section are based on these standard definitions from the economics profession.

In July of 1998, California's energy and ancillary services markets experienced the first of many episodes of the exercise of significant market power. Perhaps the most dramatic illustration of this activity took place in the ISO's Replacement Reserve market. A generator providing

Replacement Reserve agrees to provide standby generation capacity available with 60 minutes notice. A generation unit owner providing this service also submits a bid schedule to supply energy in the ISO's real-time energy market if the unit owner wins in the Replacement Reserve market. Because a generation unit owner providing this service has the right to receive the ISO's real-time price for any energy it provided from this reserve capacity, the market price for this product averaged less than \$10/MW during the first three months of the California market.

On July 9, 1998, because of the unilateral exercise of market power by firms selling into this market, the price of Replacement Reserve hit \$2,500/MW. In the following days, the ISO cut its Replacement Reserve demand in half, but these attempts were largely unsuccessful in limiting the amount of market power exercised in this market. On July 13, 1998 the price of Replacement Reserve hit \$9999.99/MW. A rumor circulating at the time claimed that the only reason the market participant had not bid higher than \$9999.99/MW was because of a belief that the ISO's bid software could not handle bids above this magnitude. During this same time period, prices in the California Power Exchange day-ahead energy market and ISO real-time energy market reached record high levels.

As result of these market outcomes, the ISO management made an emergency filing with FERC for permission to impose hard price caps on the ISO's energy and ancillary services markets at \$250/MW(h). The FERC granted this request to give the ISO the authority to impose price caps on their energy and ancillary services markets. FERC also directed the MSC to prepare a report on the performance of the ISO's energy and ancillary services markets. The August 19, 1998 MSC Report noted that the ISO's energy and ancillary services markets were not workably competitive.¹ This report identified a number of market design flaws which enhanced the ability of generators to exercise their unilateral market power in the California electricity market. The report contained a number of recommendations for correcting these market design flaws.

In response to the August 1998 MSC Report, FERC issued an order implementing various market rule changes and asked the MSC to prepare a report analyzing the impact these market rule changes on the performance of the ISO's energy and ancillary services markets. The March 25, 1999 MSC report provided an analysis of the market power impacts of the re-design of the ISO's

¹Available at <http://www.caiso.com/docs/1998/12/18/1998121806493813577.pdf>.

ancillary services markets and its reliability must-run contracts.² The major focus of this report was whether the FERC should continue to grant the ISO the authority to impose “damage control” price caps on the ISO’s energy and ancillary services markets. The MSC concluded that the California electricity market was still not yet workably competitive and was susceptible to the unilateral exercise of market power because of an over-reliance on day-ahead and shorter time-horizon markets for the procurement of energy and ancillary services and the lack of demand responsiveness in the hourly in the wholesale demand. For these reasons, the MSC strongly advocated that FERC extend the ISO’s authority to impose price caps on the real-time energy and ancillary services markets.

On October 18, 1999, the MSC filed a report with FERC reviewing performance of the market since the March 25, 1999 report.³ The focus of this report was a comparison of the performance of the California electricity market during the summer of 1999 versus the summer of 1998. The measure of market performance used in this report is based on the methodology for measuring market power in wholesale electricity markets described in the study by Borenstein, Bushnell and Wolak.⁴

This measure of performance compares average actual market prices to the average prices that would exist in a market where no generators are able to exercise market power. This analysis controls for the changing costs of production for generation owners due to input fuel price changes, forced outages and import availability. This standard of a market in the absence of market power was selected because it is consistent with the standard FERC uses to determine whether market prices yield just and reasonable prices.

Based on this measure of market performance, as well as other factors, the October 1999 MSC report concluded that significant market power still existed in California’s wholesale energy market, despite the fact that the performance of the California electricity market was significantly improved during the summer of 1999 relative to the summer of 1998. The October 1999 MSC report emphasized that a major reason for the superior performance of the market during the summer of

²Available at <http://www.caiso.com/docs/1999/04/06/1999040616452832384.pdf>.

³Available at <http://www.caiso.com/docs/1999/10/20/199910201045345098.pdf>.

⁴Available from <ftp://zia.stanford.edu/pub/papers/elec marg.pdf>.

1999 versus the summer 1998 was the significantly milder weather conditions and corresponding lower peak load conditions during the summer of 1999 versus the summer of 1998.

This report also noted that the major factors allowing generation unit owners to exercise market power in the California energy and ancillary services markets—the lack forward financial contracting by the load-serving entities and the lack of price-responsive wholesale demand—remained unaddressed. The report provided several recommendations for re-designing California’s retail competition policies in order to address these market design problems. This report also noted that if these issues were not addressed as soon as possible or generators would have significant opportunities to exercise market power in the California electricity market during the summer of 2000.

In March of 2000, the MSC was asked by the Board of Governors of the ISO to provide an assessment of whether the California energy and ancillary services markets are workably competitive and offer an opinion on the appropriate level of the price cap on the ISO’s energy and ancillary services markets for the summer of 2000. In its March 9, 2000 opinion, the MSC concluded that these markets were not likely to be workably competitive for the summer of 2000, for the same reasons that it concluded in previous MSC reports that these markets were not workably competitive during the summers of 1998 and 1999.⁵ This opinion also summarized an update of the market power measures of Borenstein, Bushnell and Wolak through the summer and autumn of 2000.

This opinion also provided a prospective assessment of the impact on average wholesale electricity prices of the exercise of market power at various levels for the price cap on the ISO’s real-time energy market during the summer of 2000. Because of a divergence of viewpoints among the members of the MSC about the increased opportunities to exercise market power at a higher price cap during the summer of 2000, the MSC did not offer an opinion on the level of the price cap, but instead explained to the ISO board the tradeoffs it should take into account in setting the level of the price cap for the summer of 2000.

Conditions during the summer of 2000 throughout the entire western US presented generators located in California with many opportunities to exercise market power at levels far greater than those observed during the summer of 1998 and 1999. California historically relies on imports to meet

⁵Available from <http://www.caiso.com/docs/09003a6080/04/30/09003a60800430ed.pdf>.

approximately 25% of its electricity needs. During the summers of 1998 and 1999, the availability of significant amounts of energy outside of California disciplined the attempts of generators located in California to raise market prices through their bidding behavior.

Hydro conditions during the summer of 2000 throughout the Pacific Northwest and demand conditions in the Desert Southwest left significantly less available energy from these regions to import into California. As a consequence, generators located in California faced a significantly smaller import supply response when they attempted raise prices through the unilateral exercise of market power. Consequently, they were able to exercise market power at unprecedented levels during the summer of 2000. A variety of factors contributed to the decline in available import during the summer of 2000.⁶

As a result of conditions in the California electricity market during the early summer of 2000, on September 6, 2000, the MSC filed a report at the request of the chairman of the Board of Governors of the California ISO on the performance of the market during the summer of 2000.⁷ This report quantified the unprecedented levels of market power exercise during June of 2000, the last month of data analyzed. Specifically, this report noted that average prices during June 2000 were 182% above the monthly average price that would have occurred had no generators exercised their unilateral market power. In March 22, 2001 the MSC filed an update of these monthly measures of the extent of market power exercised through December of 2000.⁸ This study showed that these extremely high levels of market power continued through November and December of 2000, months in which generators were historically able to exercise limited amounts of market power.

A number of independent studies have quantified the extent of market power exercised by firms in the California electricity market. Using a similar methodology to that employed by Borenstein, Bushnell and Wolak, Paul Joskow and Edward Kahn quantified the extent of market power exercised during the summer of 2000. Moreover, they provided firm-level evidence of supply withholding to exercise market power during many hours of the summer of 2000. Eric Hildebrandt of the Department of Market Analysis of the California ISO also documented the degree to which

⁶“What Went Wrong With California’s Re-structured Electricity Market (And How to Fix It)” describes these factors in more detail (<ftp://zia.stanford.edu/pub/papers/california.print.pdf>).

⁷Available from <http://www.caiso.com/docs/09003a6080/07/dc/09003a608007dc78.pdf>.

⁸Available from <http://www.caiso.com/docs/2001/03/22/2001032214473821567.pdf>.

prices exceeded levels that would exist in market where no firms exercised market power over period May 2000 to February 2001. Anjali Sheffrin, Director of the Department of Market Analysis of the California ISO examined bidding behavior in the California ISO real-time energy market and found that economic withholding, exercising market power by bidding substantially in excess of production costs was observed in virtually all hours during May 2000 to November 2000.

These studies demonstrated that contrary to their filings stating otherwise, all five of the out-of-state generators—AES/Williams, Duke, Dynegy, Reliant and Southern (recently renamed Mirant) possess and have exercised significant market power in the California electricity market. The study prepared by Anjali Sheffrin also demonstrates that the large suppliers located outside of the California ISO control area also possess and have exercised substantial market power in California electricity market. These entities include British Columbia Hydro, the Los Angeles Department of Power and Water, and the Bonneville Power Administration.

FERC RECOGNITION OF UNJUST AND UNREASONABLE RATES

On November 1, 2000, FERC issued an order proposing remedies for the California wholesale electricity market. In this report, the FERC concluded that wholesale electricity prices during the summer and autumn of 2000 were unjust and unreasonable and reflected the exercise of significant market power. This order proposed replacing the \$250/MW(h) hard cap on the ISO's real-time energy and ancillary services market with a soft cap of \$150/MW(h). This soft price cap requires all generators to cost justify bids in excess of \$150/MWh. If this quantity of energy or ancillary services is needed by the ISO, then this firm will be paid as bid for its sales. This order also proposed to eliminate the requirement that all California investor-owned utilities buy and sell all of their day-ahead energy requirements through the California PX. In addition to several other market rule changes, this preliminary order required that the ISO implement a penalty on all loads of \$100/MWh for any energy in excess of 95% of their actual consumption that is purchased in the ISO's real-time energy market. FERC also invited comment on these proposed remedies.

On December 1, 2000, the MSC filed comments on these proposed remedies.⁹ The MSC concluded that “the Proposed Order’s remedies are likely to be ineffective to constrain market power and, in fact, could exacerbate California’s supply shortfalls and, thereby, increase wholesale energy

⁹Available from <http://www.caiso.com/docs/2000/12/01/2000120116120227219.pdf>.

prices.” The MSC concluded that the proposed remedies would be likely to cause the California Power Exchange to declare bankruptcy with little impact on wholesale electricity prices. The MSC, as well as other entities commenting on the order, observed that the Commission’s soft cap would function very much like no price cap because market participants could use affiliate transactions or other means to make the cost (paid by the affiliate that owns the generation unit) of providing energy or ancillary services to California consumers extremely high. The MSC also argued that the order’s penalty on load for purchasing excessive amounts of energy in the real-time market would do little to solve the significant reliability problems that the California ISO was facing because of the enormous amounts of generation and load that appeared in the ISO’s real-time energy market.

The December 1, 2000 MSC report also proposed a comprehensive plan to mitigate the enormous market power being exercised in the California electricity market. This plan provides guaranteed relief for California consumers from unjust and unreasonable wholesale electricity prices over the next two years. Moreover, it also provides the strongest possible incentives for generators to selling into the California to make their capacity available during high load conditions and therefore minimize the risk of rolling blackouts.

In its final order directing remedies for the California electricity market on December 15, 2000, FERC reiterated its statement that wholesale electricity prices in California were unjust and unreasonable and reflected the exercise of market power. Despite comments from a variety of parties warning of adverse impacts of its proposed remedies, FERC adopted them with only minor modification. On December 8, 2000 the ISO management and board unilaterally implemented the FERC soft-cap at a \$250/MWh level. This meant that from this date going forward, any generator that could cost-justify it bid above \$250/MWh would be paid as-bid for the electricity they supplied in the ISO’s real-time market. Effective January 1, 2001, when all of the remedies ordered by FERC were implemented, this soft cap was set at \$150/MWh.

On February 6, 2001, the MSC filed with FERC a further elaboration and clarification of its proposed market power mitigation plan outlined in the December 1, 2000 MSC report.¹⁰ This report noted that many of the warnings about the likely impact of the remedies in FERC’s December 15, 2000 order given in the December 1, 2000 MSC report had been borne out by the events of January

¹⁰Available from <http://www.caiso.com/docs/2001/02/26/2001022608400127457.pdf>.

2001. The February 6, 2001 MSC report noted that the average wholesale energy price during January 2001 was \$290/MWh, despite the existence of a \$150/MWh soft cap on the ISO real-time energy market. Moreover, California experienced, for the first-time, two days with rolling blackouts due to insufficient generation capacity available to serve the California market.

It is important to emphasize that these rolling blackout occurred during a month when the daily demand for electricity is near its lowest annual level. For example, the peak demand in January 2001 was approximately 30,000 MW. The peak demand during the summer of 2000 was slightly less than 44,000 MW. This occurred during August of 2000 when the average price of wholesale electricity was slightly less than \$180/MWh. Consequently, despite a significantly lower peak demand and significantly less energy consumed daily, prices in January of 2001 (when the FERC's remedies were in place) were more than \$100/MWh more than prices during August of 2000, the month with the highest average price during the summer of 2000. Moreover, the California ISO experienced no Stage 3 emergencies and no rolling blackouts during August of 2000, whereas it experienced almost daily Stage 3 emergencies and two days with rolling blackout during January of 2001.

The February 6, 2001 report also described the perverse incentives the FERC soft-cap created for generators with natural gas affiliates selling into California. This report outlines logic that illustrates how these firms can use affiliate transactions to raise the announced spot price of natural gas in California and thereby cost-justify higher electricity bids under the FERC soft-cap. It also presented evidence that the persistent divergence in natural gas prices in California relative to the rest of the western US could be attributed to this activity. Finally, this report described a fundamental difference in the incentives faced by generation unit owner in wholesale electricity markets and the former vertically-integrated monopoly regime. That is the enormous potential profit increase to generators selling into an electricity market from declaring forced outages at their facilities. By declaring a forced outage, a generation unit owner is able to create an artificial scarcity of generation capacity and therefore pre-commit itself not to provide an aggressive supply response to the attempts of its competitors to raise market prices through their bidding behavior. Under the former vertically-integrated monopoly regime, the generation owner has little incentive to declare forced outages because it still retains the obligation to serve final retail demand. A forced outage

requires this firm to operate more expensive units or purchase power from other firms to meet its demand obligations.

This report also notes the practical impossibility of verifying whether a declared forced outage truly means that the plant is unable to operate. An analogy is drawn to the labor market where an employee might call his boss to claim a sick day. It is virtually impossible for the employee's boss to determine whether that employee can in fact work despite his request for a sick day. Similar logic applies to the attempts of the ISO, FERC, or any other independent entity to verify if a declared forced outage in fact means that the plant is truly unable to operate. By this logic, planned or unplanned outages become very powerful tools that owners of multiple generation units can use to exercise their unilateral market power.

On this point, it is important to bear in mind that the California ISO control area has slightly over 44,000 MW of installed capacity. Consequently, for a capacity shortfall sufficient to cause rolling blackouts to occur when peak demand is 30,000 MW, over 14,000 MW of capacity must be either forced or planned out. For Stage 3 emergencies to occur, only slightly less capacity must be forced or planned out. All of these calculations assume that no imports are available to sell into the California market. With some imports, these numbers must be even larger. California has over 10,000 MW of available transmission capacity to deliver energy into the California market, so that unless the amount of energy available to import in California is limited, as it has been since the summer of 2000, this use of generation outages to exercise market power is likely to be unprofitable. However, these calculations provide strong evidence for the view that the unprecedented level of forced outages over the winter of 2001 may be due in part to the increased ability to exercise market power that limited amounts of surplus energy outside of California and a high level of generation outages within the state provides under the remedies implemented by the FERC in its December 15, 2000 order.

This experience with planned and unplanned outages does not appear to be isolated to just the California market. An increased amount of generation unit outages has also occurred in the New England electricity market. A recent study prepared for the Union of Concerned Scientists finds that the average amount of generating capacity out of service each weekday increased by 47 percent in the twelve months following the opening of the wholesale generation market, as compared to the twelve month period ending at the start of the market.

RESPONSE OF FERC TO EVIDENCE OF MARKET POWER

Despite its own conclusion that wholesale electricity prices in California are unjust and reasonable and reflect the exercise of significant market power and the growing volume of evidence from a number of independent sources on the extent of market power exercised in the California electricity market, the FERC thus far has refused to set just and reasonable prices for wholesale electricity in California. Instead, as discussed above FERC implemented market rule changes that have enhanced the ability of these firms to set wholesale electricity prices that reflect the exercise of significant market power.

On April 26, 2001 FERC issued an order establishing a prospective mitigation and monitoring plan for the California wholesale electricity market that was implemented by the California ISO on May 29, 2001. This plan provides no guarantee that wholesale electricity prices will be just and reasonable during the summers of 2001 and 2002. This plan provides market price mitigation only under conditions of Stage 1, 2, and 3 emergencies but places no requirements on the bid prices of generators during other system conditions. Because of the requirement to limit bid prices during periods of system emergencies, the incentives for generators to supply as much capacity as possible are significantly dulled precisely at the time when this capacity is needed most. Consequently, it is highly likely that this aspect of FERC's market mitigation and monitoring plan will increase the likelihood of rolling blackouts during the summer of 2001.

The National Electricity Reliability Council's *2001 Summer Special Assessment* estimates that there will be 260 hours in which firm demand will be curtailed and that the average amount of curtailed will be about 2,150 MW. By dulling the incentives of suppliers to the California market to sell during these system conditions, FERC's remedy will most likely increase the number of hours of rolling blackouts and the magnitude of load that must be curtailed during these hours.

For many of the same reasons that the soft cap and other market rule changes implemented under the December 15, 2000 FERC order were ineffective at mitigating the significant market power exercised in the California electricity market from January 1, 2001 to the present time, the market rule changes implemented by FERC's recent prospective monitoring and mitigation plan are unlikely to mitigate the significant opportunities generation unit owners will have to exercise market power during the summer of 2001 and 2002. Because this plan provide price mitigation only during system emergencies it leaves unmitigated the vast majority hours that generation unit owners are

likely to exercise market power in the California market. Even when former soft-cap that was in effect, it provided limited protection the exercise of market power by requiring that a generator cost-justify any bid in excess of \$150/MWh.

The March 22, 2001 MSC report describes why this plan will not result in just and reasonable prices for California consumers from the summer of 2001 to the end of the summer of 2002. This report notes that the plan is likely to increase the frequency of rolling blackouts and the magnitude market power exercised during hours without Stage 1, 2, or 3 emergencies. In this way, California may get the worst of both worlds from FERC's market monitoring and mitigation plan—prices that reflect the exercise of significant market power during periods without system emergencies and an overall less reliable supply of electricity.

The expected result of FERC's the market monitoring and mitigation plan is exactly the opposite of that expected from the plan proposed in the December 1, 2000 MSC report and further elaborated on in the February 6, 2001 and March 22, 2001 MSC reports. This plan will limit the prices that consumers must pay for the vast majority of their wholesale electricity consumption over the next to years to prices that equal those that would occur in a market where no firms exercise their unilateral market power. Moreover, this market power mitigation plan would provide the maximum possible incentives for firms to keep their units operating for as many hours as possible during the summer of 2001. This plan also provides the strongest possible incentives for all firms to sell as much electricity as possible into the California ISO's real-time energy market during high demand and system emergency conditions.

THE OPPORTUNITY FOR IMMEDIATE FEDERAL RELIEF

Because several of the five new generation owners must apply for renewal of their market-based pricing authority before this summer, this presents an ideal opportunity for FERC to set just and reasonable prices for wholesale electricity in California. The evidence described above provides ample evidence that all of these market participants possess and continue to exercise market power in the California electricity market. This discussion has also shown that the attempts of the FERC to mitigate that market power with its orders over the past three years that the market has operated have failed to accomplish this goal. As discussed above, there is strong evidence that these remedies have in fact increased the ability of these generation unit owners to exercise market power. Rather than wait for the confirmation that FERC's most recent set of remedies will not limit the ability of

generation unit owners selling into the California electricity market, the most prudent course of action given the enormous potential economic and public health harm associated with the continued exercise of market power in the California wholesale electricity market is to implement a remedy that guarantees that California consumers will not be subject to wholesale electricity prices which reflect the exercise of market power.

The December 1, 2000 MSC report proposes such a remedy that does not impose a price cap on the spot market, but it does require FERC to intervene to make market rule changes that result in just and reasonable rates in California for the next two years. This plan would require all sellers in the California market during 1998 to 2001 (besides the three California investor-owned utilities) to continue to be eligible for market-based rates only if they offer 75% their expected annual sales in the form of two-year forward contracts at a price set equal to the average of perfectly competitive benchmark price over this time period. This is the market price that would prevail under the no market power standard explicitly stated in FERC's competitive market requirement for allowing a market participant to substitute market prices for cost-based prices. The potential upside profits for each market participant is still unbounded, because they have the opportunity to sell any remaining more energy beyond their forward contract commitment at market-based rates. However, because of the significant forward commitments all generators selling into California will have under this plan, the opportunities for these generators to exercise market power in the energy and ancillary services spot markets will be significantly reduced. The details of how each participant's contract quantity and price are set is outlined in the December 1, 2000 MSC Report. The February 6, 2001 MSC Report computed a just and reasonable price of \$54/MWh for these forward contracts for this two-year period using futures market gas prices at that time.

Any market participant that does not offer these two-year forward contracts would lose its market-based rate authority and be subject to cost-of-service rates for all of its sales of energy and ancillary services into the California market and surrounding markets in the Western US for at least this two-year period.

Once these forward contracts are in place, all price caps and bid caps (including the bid caps in FERC market mitigation plan implemented May 29, 2001) on the ISO's real time energy and ancillary services markets would be removed. All market participants still eligible for market-based prices will not be subject to bid caps or price caps in any of the ISO markets. This will maximize

the likelihood that sufficient generation capacity in the western US will be available to serve California's demand during all hours of the summers of 2001 and 2002. Moreover, because all California market participants will face a significant risk of having to purchase out of a potentially very high-priced spot market to fulfill their forward market commitment in the event that they do not have sufficient generating capacity available to meet their forward energy commitments, these firms will have very strong incentives to maintain their equipment in top working order.

All market participants with capacity located in California, including those subject to cost-based rates, would be subject to the following availability standard. All generators would be required to submit on an annual basis planned outage schedules. These would be reviewed by and approved by the California ISO. At all times besides those previously scheduled with the ISO, all generation units would be required to submit standing bids into the ISO's real-time energy market for the difference between the unit's nameplate capacity and its final energy schedule at whatever price the owner chooses. If a unit owner's bid is selected and it is unable to respond to the ISO's dispatch instruction, either with its own unit or some other unit in the same local area, the unit owner will be required to purchase this quantity of energy from the real-time energy market at the current market price. This availability standard effectively assigns the risk of forced outages to the unit owner, rather than the ISO.

With 75% percent of the expected sales of all market participants locked-in for the next to years at a price in the neighborhood of \$60/MWh and 100% of the expected production from the assets of the three investor-owned utilities available at production cost, California will have wholesale price certainly for between 80 and 85 percent of expected electricity consumption over the next two years at a wholesale price of less than \$65/MWh.

California can allow prices in a significantly smaller spot market to rise to the point necessary to attract sufficient supply into state to avoid rolling blackouts and to provide the necessary signals to final demand to cut back during high-priced periods. In order to provide signals to final demand to cut back during these high-priced periods, California should give all customer classes the right to purchase 85% of their 2000 demand each month or hour (depending on the time interval at which that customer's load is metered) at the 2000 retail price. Any additional purchases in that month or hour would be made at the wholesale price for that month or hour (depending on the time interval at which that customer's load is metered) plus the associated transmission, distribution and

supply charges. Any reduction in consumption below this 85% of 2000 demand baseline would be refunded at wholesale price for that month or hour plus the associated transmission, distribution and supply charges. Given the existence of the forward contracts at the price discussed above and the supply of the output of the investor-owned utilities at production costs, this plan should not require the state to spend any tax revenues purchasing power for California consumers.

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