Proposed Market Monitoring and Mitigation Plan

for California Electricity Market

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EXECUTIVE SUMMARY

The Market Surveillance Committee's December 1, 2000 "Analysis of 'Order Proposing Remedies for California Wholesale Electricity Markets (Issued November 1, 2000)'," 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 prices." The events of the past month, in which the remedies in the Commission's December 15, 2000 order have been in place have borne out this statement. The average wholesale energy price in California during January 2001 was $290/MWh, despite the existence of a $150/MWh soft cap on the ISO real-time energy market. California also experienced rolling blackouts due to insufficient generation capacity.

For California and the rest of the western US to be able to deal with the likely system conditions throughout the West during the summer of 2001 the following market power mitigation plan is necessary.

(1) California generators and entities (besides the three California investor-owned utilities) that sell to any California purchaser could continue to be eligible for market-based rates only if they offer a pre-specified portion of their expected annual sales in the form of two-year forward contracts at pre-specified prices. The details of how each participant's contract quantity and price are set is outlined in the December 1, 2000 MSC Report.

(2) Any market participant that does not offer these two-year forward contracts would be subject to cost-of-service rates for all of their sales of energy and ancillary services into the California market for at least the two-year period.

(3) Once these forward contracts are in place, all price caps and bid caps (including the current $150/MWh soft cap) on the ISO's real time energy and ancillary services markets would be removed. All market participants still eligible for market based rates would not be subject to bid caps or price caps in any of the ISO markets.

(4) 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 it 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, then the unit owner will be required to purchase this quantity of energy from the real-time energy market. This availability standard effectively assigns the risk of forced outages to the unit owner, rather than the ISO.

Review of Current Market Conditions and Prospects for Summer 2001

Although all retail electricity prices in California remain frozen at the levels set at the start of the re-structuring process, for the past six months average monthly wholesale electricity and ancillary services prices have been significantly above the implied wholesale price in the frozen retail rates. This has caused the three investor-owned utilities (IOUs) to accumulate the enormous debts that have them on the brink of bankruptcy.

Average wholesale rates reached, by far, their highest level in 2000, during December. The average wholesale cost of electricity and ancillary services in California was 32 cents per kilowatt-hour (kWh) of load. The implied wholesale price of energy and ancillary services in the frozen retail rates of the three IOUs is between 6 cents/kWh and 6.5 cents/kWh, depending on the IOU. If these December 2000 wholesale costs had been passed through in retail rates, this would have caused rate increases of more than 300%.

Average wholesale costs for energy and ancillary services for January 2001 was 31 cents/kWh, despite the imposition of the $150/MWh soft cap on the ISO's real-time energy market given in the Commission's December 15, 2000 order. It is important to emphasize that these extremely high wholesale costs are occurring during months in which California's electricity demand and wholesale prices are usually at or near their annual lows. For example, for December of 1999 average wholesale energy and ancillary services costs were 3 cents/kWh of load. For January of 2000 they were 3.2 cents/kWh of load.

Many observers often cite the need for high prices now to provide incentives for new generating capacity to be built in California. However, this logic fails to recognize that generating facilities take time to build and cannot earn revenues until they are able to generate

electricity. Best estimates of the time to build a substantial generating facility range from 18 months to 2 years, and this assumes the necessary construction and environmental permits have already been obtained. This construction time implies that high prices over the next two years provide absolutely no signal for new investment, unless they convey some information about the likely value of prices after that time period. To take an extreme example, if prospective entrants knew with certainty that wholesale prices would be very low 2 years from now, wholesale prices over the next two years would provide no signal for new investment. To provide the strongest possible signals for new investment a market power mitigation plan should be put in place to provide greatest possible certainty to all prospective new entrants about levels of wholesale electricity prices in California 2 years from now.

If a satisfactory solution to this current dysfunctional spot market is not worked out by the beginning of the summer of 2001, the situation in California could reach catastrophic proportions. Without a well-functioning spot market for electricity and reserves in place for the summer of 2001, is it a virtual certainty that peak demand will go unmet during many hot summer days. It is important to bear in mind that the peak demand levels which triggered the rolling blackouts experienced during January of 2001 were in the neighborhood of 30,000 MW, whereas during the summer months daily demand peaks at levels near 44,000 MW.

It is difficult to understand why average spot wholesale energy and ancillary services prices would be significantly lower during the summer of 2001 than they are at the present time. Futures prices for natural gas at Henry Hub in Louisiana indicate that natural gas prices are not expected to decline significantly until early 2002. Electricity demand during the summer months in California is historically more than one-quarter higher than it is in the winter months, and peak

demand is more than 50% higher than it is in the winter months. All of these factors point to very high spot prices during the summer of 2001.

Despite this expectation of high average spot prices for at least the next six months and most likely for the next two years, the major cost to the California economy from the failure to take appropriate action at the federal level is not larger retail rate increases in the future. The lost economic output due to power outages in throughout California during the summer of 2001 will easily dwarf the cost of significant retail rate increases. Moreover, given its central role in the high-tech economy, significant lost economic output from California could translate into even greater losses in national economic output.

Current water levels and stream flows in California and the Pacific Northwest are significantly below normal. Although the rainy season in California is approximately half over, if current trends continue, supply and demand conditions for electricity in the entire western US for the summer of 2001 could be extremely dire. Even a very efficient spot market for electricity in California would make equating supply and demand during all hours of the summer of 2001 under adverse water conditions extremely difficult.

All observers of the California market agree that without a substantial fraction of the state's load obligations tied up in forward market contracts by the start of the summer 2001, the state will be faced with a choice between two impossible alternatives during the summer of 2001. California can abandon meeting demand levels beyond its in-state capacity and its reliable supply of imports. This would imply rolling blackouts during the peak hours of many days this summer. Alternatively, California could pay whatever wholesale spot prices are necessary for all electricity and reserves necessary to meet its demand, and then pass-through these wholesale prices in retail electricity rates on a monthly basis. Given the level of wholesale prices likely to

occur this summer and the large quantity of California load these prices are likely to apply to, this scheme would result in electricity bills that would almost certainly cripple the California economy.

Voluntary forward contracts between generation unit owners and California load serving entities, as recommended in the Commission's December 15, 2000 order, does not provide a solution to this choice between two impossible alternatives. All generation unit owners selling into California recognize that very high spot prices for electricity are likely in California over the next two years. These generators are aware of the significant unilateral market power that they possess and are able to exercise given the conditions in the California electricity market. It is difficult to imagine that any firm with shareholders demanding the highest possible return on investment would voluntarily offer to sell a forward contract for electricity to a load-serving entity in California at a price that locks-in a lower level of profits over the next two years than the firm expects to earn from selling this energy in the spot market. Moreover, given the well-known fact that forward market financial commitments increase the incentives a generation unit owner has to bid aggressively in the spot electricity market, any forward market price voluntarily accepted by a generation unit owner selling into California is likely to be higher than the firm's expectation of average spot prices without it entering into a forward contract for a significant fraction of its expected sales to California.[1] Consequently, it is no surprise that there was very little progress in the voluntary contract negotiations between the generators and loads during December of 2000 and January of 2001.

[1] For a discussion of this point, see Wolak, Frank (2000) "An Empirical Analysis of the Impact of Hedge Contracts on Bidding Behavior in a Competitive Electricity Market," *International Economic Journal*, Volume 14, No. 2, 1-43.

Negotiating a forward contract of a longer duration than two years does not solve this problem. It only increases the period of time over which the purchaser of the contract must pay for the significant unilateral market power possessed by the incumbent suppliers for the next two years. A simple analogy would be that the generators located in California have private information worth a large sum money. Their shareholders will not let them voluntarily give way this information without receiving at least that same sum of money. Given current level of wholesale energy prices and their likely magnitudes during the summer of 2001, the value to these generators of not signing long-term contracts for the next two years is extremely large. Only if they are paid at least the expected value of their profit stream from selling the same quantity of energy and capacity in the spot market sales over the next two years will they sign forward contracts for this same quantity of sales over next two years. Such behavior on the part of generation unit owners selling into California is required by their fiduciary responsibility to their shareholders to earn the highest returns possible for them.

Without regulatory intervention by the Commission to set forward contracts at just and reasonable rates, any long-term forward contracts signed by generation owners selling into California will reflect the significant opportunities they have to set very high prices, far in excess of any reasonable measure of their production costs, in California's spot energy and ancillary services markets over the next two years. The Federal Power Act charges the Commission with ensuring that all wholesale electricity rates are just and reasonable, and allows it the wide ranging discretion to take action necessary to make them just and reasonable and order refunds for any overpayment beyond just and reasonable rates. Consequently, it is well within the Commission's authority to mandate forward contracts at just and reasonable rates.

The December 2000 FERC report states that FERC finds that rates in California are not just and reasonable, and the "soft cap" remedies it imposed only made matters worst in terms of the extent to which rates are not just and reasonable. This soft price cap mechanism provides generators with the opportunity to create an artificial shortage of natural gas in California. Under this soft cap, generators can store their cheap gas purchased under long-term contracts and then buy their gas needs for electricity production in the spot market. The soft cap mechanism allows them to bid a price into the spot electricity market reflecting this high spot gas price. The Commission's soft cap allows the ISO to accept any bid above the $150/Mwh soft cap that can be cost-justified in this manner. This soft cap scheme even creates incentives for generation unit owners to work deals with their gas affiliates or other gas wholesalers to share the profits earned from inflating natural gas prices in California. A generation unit owner could purchase gas at an inflated spot price in exchange for an invoice showing a purchase at this higher price and an agreement by the gas wholesaler to rebate to the generator (or simply an overpayment to its own gas affiliate) for some of this overpayment. The generator is willing to enter into this deal only because the Commission's soft-cap mechanism allows this invoice for the purchase of gas to be used to cost-justify the generator's bid into the ISO energy market at a price above $150/MWh.

The state of California is currently spending approximately $45 million per day from its general fund to make up the difference between actual wholesale energy and ancillary services costs and the amount revenue available for wholesale energy and ancillary services purchases in the current retail rates of the three IOUs. Even if federal intervention of the form proposed below is obtained, California will bear an enormous cost to fix its energy problems. Without the intervention requested, the cost could, quite simply, kill the patient.

Proposed Market Mitigation Plan

There are three crucial features of this market monitoring plan that must be implemented together, or not all. Picking and choosing aspects of this plan to implement with other plans could have unintended adverse consequences to market efficiency similar to the Commission's soft cap. The first feature is the requirement that all sellers of energy and ancillary services in California, besides the three California IOUs, offer forward contracts for at least 70% of their expected sales into the California market over the next two years at the average competitive benchmark price for this time period computed as described in the December 1, 2000 MSC Report. Offering these mandatory forward contracts is a pre-condition for a market participant to retain the authority to receive market-based prices for any of their sales in California. Those entities that do not offer the required contract quantities at the competitive benchmark price will be subject to cost-based rates for all sales they make into California. The second phase of this plan is to eliminate all price caps or bid caps, including the Commission's soft cap, on the markets for energy and ancillary services in California once these forward contracts are in place. In order for the second phase of this plan to be successful in achieving it goal of workably competitive wholesale energy and ancillary services markets in California, it must be accompanied by an availability standard which assigns all risks of forced outages by generation units to the owners of these units. In light of the rolling blackouts in January of 2001 and the almost daily Stage 3 emergencies in the California ISO control area, this generation unit availability standard is essential to ensuring a workably competitive market in California and a reliable supply of energy and reserves during the summer of 2001.

All electricity industry re-structuring processes around the world and in the US have involved vesting contracts as way to reduce wholesale price risk during the initial stages of the

development of the market. Any generating asset sold by the incumbent investor-owned utility also has an obligation to provide a significant fraction of its available capacity, as much as 90%, in the form of a forward contract at a regulated price.

These vesting contracts provide a number of benefits to the spot electricity market. First, they provide wholesale price certainty for the load-serving entities for a substantial fraction of their load obligations. This substantially reduces the aggregate cost of wholesale price fluctuations, because a very high spot price now applies to only 15% to 10% of the load-serving entities total load obligations. These contracts also provide very strong incentives for generation unit owners to maintain their equipment in top working order at all times. If a generation unit owner is unable to supply its vesting contract obligation with its own production, it must purchase it from the spot market, which is likely to set a very high price because this unit is out of service. Third, with a substantial amount of vesting contracts in place, the social and political consequences of extremely high spot prices are significantly reduced, despite the fact that the spot price for energy or ancillary services could get extremely high. This allows the spot market prices to send the appropriate signals for consumers to reduce their consumption of energy during high demand periods, without having to pay these prices for almost every kWh of electricity consumed, as is currently the case in California.

The proposed quantity of vesting contracts still leaves California with a spot market equal to 10% to 15% of it annual load obligations to manage for the next 2 years. However, with this level of spot market price risk to manage, California has the potential to change from the worst-case disaster scenario for electricity re-structuring to the leading case for successful electricity industry re-structuring. Because it must manage a spot market with significant upward price risk over the next two summers, there will strong economic incentives for price-responsiveness

across all customer classes. The installation of hourly meters throughout the distribution network, the installation of distributed generation technology and other state-of-the-art technologies which allow large consumers to shift their consumption of electricity throughout the day, will enable California to make more efficient use of its existing generation capacity. In addition, the prospect of these vesting contracts ending in two years will provide strong incentives for California to streamline its generation approval and siting process.

The December 1, 2000 Report prepared by the Market Surveillance Committee of the California Independent System Operator, outlines a mechanism to implement these vesting contracts for the next two years. This methodology for determining the regulated price of these mandatory forward contracts has been applied to the time period March 1, 2001 to May 31, 2003 using futures prices for natural gas delivered to Henry Hub in Louisiana from obtained from the New York Mercantile Exchange on February 5, 2001. Adding $0.50/MMBTU to each of these futures prices yields an estimated forward price of natural gas in California for each month during this 27-month period into the future. The $0.50/MMBTU adder is significantly larger than the historical average price differences between Henry Hub and the Topok delivery point in California and Henry Hub and the Pacific Gas and Electric delivery point in California for the period March of 1998 to October of 2000. Using these delivered forward natural gas prices, we apply the methodology outlined in the December 1, 2000 report to compute competitive benchmark prices for each hour during this 27-month period. This process yields an average hourly competitive benchmark price of $54.00/MWh for this entire 27-month period. The hourly values of this competitive benchmark price for this 27-month period would be the regulated forward contract price that all market participants supplying the mandated hourly forward contract quantity would receive during each hour of the 27-month period.

It is important to note that this calculation of the competitive benchmark price does not include the cost of emission permits in the variable cost of any in-state generation units. The reason for this is that it is highly unlikely that any the generation unit owner in California would exceed its pre-existing emission allowances producing only 70% of its expected sales into the California market over the next two years. This 70% of expected sales is the hourly quantity of energy each of the market participants must offer in a forward contract under this mitigation plan. For any incremental sales beyond this contract quantity in any hour, the generation unit owner would, under this plan, have complete freedom to bid into the ISO's markets to recover the costs of acquiring any emissions permits required to supply this incremental energy. If any unit owner did need emissions permits for more than 30% of their expected hourly sales into California, under this mitigation plan they would have the option to elect to receive cost-based rates for all of their sales into California.

The December 1, 2000 MSC report also discusses the necessary retail market infrastructure that should be a pre-condition for any federal regulatory intervention. This retail market infrastructure is necessary to ensure that if federal intervention puts in place the necessary vesting contracts to jumpstart the forward contract market in California, no further federal regulatory intervention will be necessary at a later date.

The second crucial aspect of this proposed solution is a spot market for electricity unencumbered by price caps or bid caps of any sort, particularly the current FERC-imposed soft cap. Because it is a significant net importer in the West, California must have an active spot market and allow high prices to attract generators located outside of the state to sell to California during peak load periods. With a regional price cap, California may be unable to offer sufficiently attractive prices to generators located outside of the state to entice them to remain on

during hours when they might have spare capacity to sell into California. With the prospect of extremely high prices in California, generation unit owners located outside of the state will have the strongest possible incentive to remain on at all times. Given the very tight supply and demand conditions in California and the entire western US this summer, in order to avoid rolling blackouts in California, all generation units throughout the western US must be operated in the most efficient manner possible.

The third crucial aspect of this plan must be implemented without modification or the removal of price caps on the energy and ancillary services markets should not be contemplated. The removal of all price caps or bid caps recognizes that these regulatory restrictions can interfere with the ability of generation unit owners to recover their costs by participating in California's energy and ancillary services markets. A generation unit owner's bid to supply energy could be accepted for only a single hour in the day, yet it must pay the start-up and no-load costs associated with supplying this energy. With the freedom to configure their bids in whatever manner they wish in the energy and ancillary services markets, generators no longer have this as an argument for why they did not bid in a certain market they were physically capable of supplying energy or ancillary services. In fact, with complete freedom to bid whatever price they would like into the ISO's energy and ancillary services markets, generators have no valid excuse not to bid their entire capacity into the market in every hour they are not scheduled to be out for maintenance. During hours they are forced out generators can set their bids sufficiently high to avoid being called to supply energy or ancillary services. However, if their bid is accepted, even if their unit is unable to run, they must either purchase the requested capacity from the ISO's real-time energy market or supply the energy request in that location from other units they or other market participants own.

The events of the past six months and the extremely high forced outages rates that have occurred in the California market and accompanying plant inspections by the California Public Utilities Commission (CPUC) and Federal Energy Regulatory Commission (FERC) Staff have demonstrated the following very important fact about competitive electricity market: it is impossible to determine whether or not a declared forced outage is in fact an actual forced outage. It is impossible to determine whether a declared forced outage occurs because the plant is actually unable to operate or because this action increases the generation unit owner's profits. Electricity generating units are extremely complex pieces of machinery and enormous public safety and public health hazards are associated with operating them if they are not in proper working order. Consequently, even an experienced power-systems engineer brought in to inspect the plant would be unable to determine if a plant that had been declared unable to run could in fact run. Clearly, there is a considerable amount of operator judgement involved in determining whether a power plant should run; nonetheless, we clearly should defer to the judgement of the plant operator for this decision.

A useful analogy to this problem comes from the labor market. We can think of sick days as the analogue to forced outages. It is very difficult for an employee's boss to tell whether the reason the employee has called in sick is because he is truly unable to work or he would prefer to spend a day relaxing at home. The boss could come to the employee's house with a doctor and have the doctor examine the employee. However, given that the human body is not completely understood by the medical profession, the employee could still fabricate some disease unknown to the doctor that prevents the employee from working. The employee's boss recognizes this problem and therefore refrains from questioning the veracity of an employee's claim to a sick day.

Instead, the boss solves this problem by the following. He tells the employee that he can take a sick day, but that he must find someone else in the company to replace him for that day. The analogous solution in the generation outage problem would be to require the generation unit owner to always bid its entire capacity in the market. On those days when it is truly out of commission, the unit owner would bid a high price in hope of not being called upon to produce. However, if the unit owner is called to supply power, it must purchase the requested quantity at the real-time energy price for that hour, which will be above its bid price, or obtain an alternative source of energy to replace the power it is unable to provide. In this way, the generator has the strongest possible incentives to maintain its unit in working order and has very strong incentives not to declare its unit forced-out when it can actually run.

This availability standard would apply to all market participants with generation capacity located in the California ISO control area, including those subject to cost-based rates. All generators would be required to submit on annual basis planned outage schedules before the start of each year. These schedules would be reviewed by California ISO. The ISO can request changes in these planned outage schedules to guarantee available capacity adequacy throughout the entire year. Once the ISO approves all of the planned outage schedules of all market participants these would be fixed for each generation unit in the California ISO control area for the entire year. No changes could be made to these schedules without the advance approval of the ISO.

At all hours besides those previously scheduled with the ISO for planned outages, all generation units would be required to submit quantity bids into ISO's real-time energy market for the difference between the unit's nameplate capacity and it 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 the requested quantity of energy from the real-time energy market. All the risks of forced outages are assigned to the unit owner, rather than the ISO.

This availability standard would apply regardless of the physical characteristics of the generation unit. For example, even if the unit has a minimum start-up time of more than 12 hours, it would still be required to have a quantity bid in the ISO's real-time energy market equal to the difference between its nameplate capacity and its hour-ahead schedule. This is true even if the unit is not currently on-line. In this case, the unit would be required to have a bid into the ISO's real-time market for its full nameplate capacity. If system conditions were such that this generation unit owner's bid was accepted, it would be obligated to either purchase the necessary energy from the ISO's real-time market at a market-clearing price that results from skipping over this unit's bid in the real-time market or supply the requested quantity from some other unit capable of providing energy in that location during that hour. There are no circumstances under which a generation unit owner is not liable to supply energy from any of its bids in the ISO's real-time market. In exchange for giving generators the ability to bid whatever they would like into the ISO's energy and ancillary services markets, unit owners must guarantee 100% availability of energy in all hours but those previously scheduled by the unit owner and the ISO for planned maintenance.

The last phase of this market power mitigation plan should implement that real-time trading charge recommended in the December 1, 2000 MSC report. Without symmetric treatment of loads and generation, and no distinction between instructed and uninstructed deviations from schedules, the current reliability problem plaguing the operation of the ISO's real-time market will continue.

Conclusion

This market power mitigation plan provides much needed regulatory relief for the California market, but at the same time sets in motion the economic forces necessary to solve California's long-term energy problems. The Commission's orders have continually emphasized the importance of significant long-term contracting as the key step in solving California's problems. The Commission's December 15, 2000 order acknowledges that prices in California reflect the exercise of significant market power. Given that it takes approximately two years to install new generation capacity in California, this significant exercise of market power is likely to persist for the next two years. Any generation unit owner attempting to serve their shareholders would therefore be unwilling to supply a long-term contract that did not earn expected profit levels equivalent to what the firm could earn selling in the California spot market over this two-year period. Consequently, without regulatory intervention from the Commission, any long-term contracts signed by California simply mean that California consumers pay up-front or for a very long-time (depending on the contract duration) for the significant amount of market power that will exist in the California electricity market for the next two years. The forward contract prices charged to California consumers will reflect the same market conditions that the Commission's December 15, 2000 stated resulted in unjust and unreasonable wholesale prices in California during the Summer of 2000. For this reason, voluntary forward contracts between generation unit owners represent no real solution to California's current problems.

The events of the past two months have shown definitively that the Commission's soft cap proposal does not limit wholesale energy costs. In addition, the events of the past six months have shown the generation unit outages, whether they are real or not, have significantly contributed to high energy and ancillary services prices in California. For this reason, an

availability standard which requires all risks of unit outages to be assigned to generation unit owners is necessary to solve the problem that it is impossible to determine whether a declared forced outage is real or not. In exchange for taking on this addition risk, generation owners are should then be given complete freedom in setting the bid price they submit into the ISO's energy and ancillary services markets.

With the quantity of mandated forward contracts called for under this proposal at the price given, the spot market for electricity and ancillary services will is made significantly smaller. California will then have a problem that it has the financial means and ability to solve on its own.