BEFORE THE PUBLIC UTILITIES COMMISSION

OF THE STATE OF CALIFORNIA

Order Instituting Rulemaking to Promote Policy and Program Coordination and Integration in Electric Utility Resource Planning.	Rulemaking 04-04-003

WEST COAST POWER COMMENTS ON CPUC STAFF CAPACITY MARKETS WHITE PAPER

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I. INTRODUCTION

On August 25, 2005 the Chief Administrative Law Judge issued a Ruling requesting comments on the California Public Utilities Commission (CPUC) staff white paper on capacity markets. In response to that Ruling, West Coast Power LLC[1] (WCP) hereby submits its comments. In addition to general comments, WCP specifically addresses the issues that are contained in the following sections that are the recommended focus by the Ruling; (1) Section VI,E - "Lessons Learned and Related Policy Questions"; (2) Section VII - Staff's Recommendations; and (3) Section VII - Appropriate roles and responsibilities of the CPUC and CAISO in the development, design, and implementation of capacity markets in California.

II. GENERAL COMMENTS

California needs new investment in generation and demand side resources now. Otherwise, reliability will suffer and weaken the rebound of the state's economy. In attracting this needed new investment, the state needs to avoid the cost pass-through mechanism of the past which resulted in excessive stranded cost burdens on ratepayers. Instead, needed generation should be procured through competitive processes where entrepreneurial firms compete vigorously to build and operate the plants. In various parts of the country, capacity markets have developed that are beginning to attract needed new resources needed for reliability, while

[1] West Coast Power LLC is a partnership equally owned by subsidiaries of Dynegy Power Corp. and NRG West Coast LLC.

ensuring the continued efficient operation and maintenance of existing generation. Such capacity markets offer California the opportunity to meet its reliability needs on the basis of the "best practices" that are being tested and proven in eastern markets.

WCP commends the CPUC on initiating this process to implement a capacity market in California. WCP agrees with President Peevey's February 28, 2005 Assigned Commissioner Ruling (ACR)[2] that directed Staff to "evaluate the prospect of moving forward with a capacity market approach to enhance the resource adequacy program under development in this proceeding." For several years, WCP has been urging the state to design and implement a capacity market in order to attract and sustain the investment needed to meet California's reliability requirements.[3]

Establishing a tradable capacity market in California has been a staple of WCP's Energy Policy Recommendations for the last few years. WCP has been a vocal proponent of capacity markets and has provided both oral and written testimony in the California Energy Commission's Integrated Energy Policy Report (IEPR) proceedings as well as the Joint Energy Agencies meetings on the Energy Action Plan.

In California, recognizing a potential for deadlock on the many energy policy initiatives in the state, WCP partner companies NRG Energy, Inc. and Dynegy, Inc. are participating in the ad-hoc Coalition for Energy Market Reform comprised of customer groups, utilities and suppliers that are working together to craft a pragmatic energy policy roadmap for the state. A well-designed capacity market is critical part of that road map. As part of its adopted Principles, the Coalition stated:

> **Develop A Functional, Competitive Capacity Market**
> The development of a capacity market is a logical and necessary next step for the reform of California's electricity markets. Under any market structure that caps energy prices to levels lower than those which can attract new-entry, or sustain existing capacity, a functioning capacity market is a necessary condition for infrastructure investment and, ultimately, competitive wholesale and retail electricity markets. California has created a Resource Adequacy (RA) program wherein all CPUC jurisdictional LSEs are obligated to demonstrate resource adequacy in advance of real time. Experience in other unbundled, competitive power markets

[2] Rulemaking (R.04-04-003.)
[3] For example, in May of this year WCP submitted a paper to certain Commissioner Advisors and key staff titled "The Role of Capacity Markets in California". (Attachment B.)

> has demonstrated that the most efficient way to achieve adequacy is through the creation of a standardized capacity product and a complementary, comprehensive capacity market that fully supports bilateral capacity contracts. **The design and implementation of a durable "end state" capacity market suitable for the California environment must begin now, and be completed as expeditiously as possible.**

The specific set of principles adopted by the Coalition relating to capacity markets is attached. (Attachment A.) Although the Coalition continues to work on broadening its membership and further refine its principles, the document attached herein was accepted by the Coalition. The members of the Coalition at the time these principles were adopted were SCE, PG&E, AES, Duke, Dynegy, NRG Energy, Reliant, and Mirant. These principles are largely compatible with the discussion included in the staff white paper, including staff's recommendations.

<u>WCP Response to Key Issues Raised in the White Paper</u>

In WCP's view, the most critical question raised by the White Paper is "…whether it supports a public centralized capacity market in addition to the private bilateral markets as a means of efficiently implementing the Resource Adequacy requirements adopted broadly in October and which are being finalized in the forthcoming Resource Adequacy Phase II Decision."[4] The answer to this question is clear: resource adequacy needs will best be met if private bilateral contracts are accompanied by a centralized capacity market. If properly designed, such a market simultaneously helps ensure that adequate capacity is procured, while providing the liquidity and transparency that allows LSEs accommodate changes in load growth and customer migration. Further, a well designed centralized capacity market will support bilateral contracting and increase the efficiency of bilateral markets which will serve to hedge price risk faced by buyers and sellers in the capacity market.

Section II, Page 4 states that adopting an organized *spot* capacity market could complement California's existing Resource Adequacy Requirements and provide benefits to the state. We agree, but there are additional benefits that should be realized through the development of longer-term forward capacity markets.

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[4] CPUC Capacity Markets White Paper, Pg 3.

Section IV, E, 1, Page 22 suggests that a well designed capacity market helps limit market power. A well-designed capacity market can prevent market power abuses by sending transparent price signals designed to attract and sustain long-term investment. The demand curve construct highlighted in the White Paper can provide for sufficient fixed cost recovery when the market is in balance, but appropriately reallocate capacity price revenue when markets are over or under supplied to discourage and encourage new investment respectively.

Procedural Roadmap is Needed

Before addressing specific questions posed by the staff white paper, WCP would emphasize the importance of setting up a procedural road map in this case. WCP along with the Coalition is committed to the development of capacity markets as expeditiously as possible. The Commission needs to make two fundamental decisions. First, the Commission needs to rapidly reach a determination to implement a capacity market by 2008. Second, the Commission should continue to develop the design and details, considering lessons learned in other markets and the comment and suggestions of stakeholders and market participants. WCP supports a joint effort between the CAISO and the CPUC to develop this market with the goal that the CAISO would be the actual market operator.

In addition to determining to proceed with capacity market design and implementation, the CPUC has the opportunity to ensure that its resource adequacy rules and requirements support a smooth and effective transition from a purely bilateral reliability requirement to the combination of bilateral, spot and forward obligations that will be supported through a capacity market.

III. POLICY QUESTIONS FOR CALIFORNIA

The following are WCP's responses to the policy questions for California from the experiences from other states and ISO/RTOs contained in the White Paper.

1. Would a downward sloping demand curve capacity market construct, similar to the New York approach, be an appropriate mechanism to support California's resource adequacy program?

WCP Response - In this approach, the demand curve (or price schedule) is located to meet the minimum reliability threshold, and the capacity market price clears at the level needed to just cover the fixed costs of a new peaker, considering the contribution of energy revenues. When there is a shortage of capacity, the vertical supply curve shifts to the left, and results in prices above the cost of entry. This sends a price signal for additional generation investment. When there is more capacity than the minimum reliability threshold, the vertical supply curve shifts to the right and results in prices below the cost of entry, triggering a decrease in new capacity prices and signaling the need for retirement or mothballing of less efficient capacity. Such capacity markets replace the surplus capacity "price cliff" of the resource adequacy requirement with more moderate price changes as supply varies due to additions, retirements, and load growth. While in theory extreme price spikes in the energy market could, over time, provide the same investment signal, it is unrealistic to think that the California marketplace is ready to accommodate such price volatility. A demand curve market structure properly designed should allow investors to expect that capacity prices will fluctuate over time around the long run marginal cost of efficient capacity resources. Further, to protect against the high side of this fluctuation cycle, customers will have an incentive to contract for supply, while suppliers and developers will have a similar incentive to contract for protection against the low side of this expected price fluctuation. As a result, competitive development will be enhanced, and bilateral contracts for repowering and new development should develop to hedge both buyer's and seller's risk in the capacity market.

<u>2. Would a capacity market, such as in New York, assist LSE's to make adjustments by being able to sell excess capacity or buy it when they are short?</u>

<u>WCP Response</u> – Yes, in at least two ways. First, large and small bilateral contracts for capacity can be traded in a centralized spot market more readily than in a bilateral market. A centralized spot market provides liquidity needed so that buyers and sellers can make such deals without extreme price risk and overwhelming transactions costs. Second, a well-designed demand curve market provides a more stable price path, further removing the price risk that would otherwise make entering and exiting capacity positions unattractive to all LSEs.

<u>3. Would this mechanism assist California in meeting its goals to be resource adequate and reach a minimum of 15-17% reserve margins?</u>

<u>WCP Response</u> – Yes. A resource adequacy requirement alone creates poor incentives for investment, due to the extreme price volatility, high transactions costs, and high risk created by

the "vertical demand curve" that is implicit in a resource adequacy requirement. A well-designed demand curve market reduces this risk and creates much more favorable incentives for incentives and long-term bilateral contracts. Further, assuming California continues to allow for direct access and community choice aggregation, the resource adequacy requirement alone will fail to offer the level playing field needed for effective competition between utility and non-utility LSEs. A centralized capacity market allows large and small LSEs to hedge their price risk exposure by entering into bilaterals, allows for customer migration and facilitates the provision and trading of capacity positions, whether small or large. Further, we agree that such a capacity market helps prevent "free-riding," so that no LSE can escape its procurement responsibility since the centralized market will automatically procure for any residual net short capacity needs.

<u>4. To address deliverability concerns and meet the ISO's requirements, is it appropriate to investigate solutions for local areas as a first step?</u>

<u>WCP Response –</u> It is highly appropriate to focus quickly on identifying and defining local areas that require local capacity to meet reliability requirements. A capacity market and the bilateral contracts it supports will be far less cost-effective if it is designed in a way that does not efficiently target investment to the locations that need it most. As a practical matter, the CPUC should view California's interconnected loads and resources as a set of inter-related load pockets, many of which cannot rely on capacity outside of the load pocket to meet local reliability requirements. Cost-effective solutions to the need for capacity in these load pockets should be the focus of both the RAR process and the ISO's Local Area Capacity Requirements ("LAR" or "LCR") process. Accordingly, the locational requirements of the RAR and LARs process should be based on, or be able to readily transition to, the locational requirements of the capacity market. The CPUC should guard against setting up an RAR requirement that is inconsistent with the transition to an efficient locational mechanism for the capacity market. Thus, one of the first steps the CPUC should take is to explore the locational characteristics of the current capacity markets and proposals that are pending in other regions, to consider how the RAR requirement may best adapt to the ultimate deliverability tests or other means that will be used in its capacity market design.

One of the benefits of adopting the demand curve concept is its particular advantage in the context of load pockets. It is within load pockets that concerns over the exercise of market power are most likely to be raised. To the extent that transmission truly constrains the number of resources that can serve a significant tranche of load, these concerns may be well founded. A demand curve will inherently limit the exercise of market power within a load pocket. WCP cautions however that the demand curves in constrained areas are in all likelihood going to be higher than in unconstrained areas, for the very reasons that adequate transmission is not there in the first place—high development density, few siting opportunities, and environmental and development constraints imposed by the local, state or federal government. These constraints are likely to result in higher costs for any identified proxy resource that forms the basis of the demand curve. High costs do not necessarily imply market power, but the use of a demand curve should help minimize concerns over the exercise of market power.

5. Do capacity markets in local areas that are designed with downward sloping demand curves significantly mitigate market power concerns? What are other appropriate steps (e.g. subtraction of peak energy rents)?

WCP Response – As noted above in response to Question 4, smaller locational zones create more market power concerns than larger ones, even with a downward sloping demand curve. Any market power mitigation measure for capacity markets should be based on the standard economic definition of market power – namely, the ability to profitably cause the market price to deviate from competitive levels.

Regarding energy markets, the claim has been made that subtracting Peak Energy Rents (PER) can reduce the incentives to exercise market power in the energy market; that ample mitigation of energy markets will continue to exist in California. Price caps and local market power mitigation are core features of CAISO existing and proposed energy market designs. Further, market monitoring should identify any such behavior, and establish review protocols that will quickly remove any improper impacts on prospective market prices. Although it is appropriate to adjust the cost of a proxy capacity resource for *expected* peak energy net revenues (“rents”),[5] it is inappropriate to make such an adjustment “Ex post” or retrospectively in an effort to get a third- or fourth-bite at the energy market mitigation apple. As

[5] The removal of peak energy rents from a proxy new resource is simply a way at getting at a reasonable estimate of the cost of “pure” capacity. WCP notes that for a marginal peaking resource used as reserve capacity, its marginal energy revenues should be relatively small.

a practical matter capacity market demand curves are likely to be adjusted on a periodic basis making the likelihood for an ex ante energy price adjustment to be significantly "wrong" very small. Allowing some degree of energy price variability will have numerous benefits, such as helping "true up" the demand curve's prices to meet the system's real dispatch needs; providing better price signals and incentives for demand response and energy conservation; creating better incentives for operational efficiency and performance, and encouraging the development of secondary markets while reducing reliance on the capacity market for fixed cost recovery.

WCP cautions the Commission that although a demand curve has the ability to mitigate the exercise of market power in the provision of capacity; it does not eliminate all concerns, especially on the demand side. WCP notes that, with a downward sloping demand curve, market power can be a problem on both the seller's side (withholding of capacity drives prices above the cost of entry) and on the buyer's side (building excessive capacity that drives prices substantially below the cost of entry). On the supply side, suppliers are subject to FERC and CAISO tariff behavior rules to prevent withholding. WCP maintains that significant issues remain, however on the demand side. Although forward procurement of capacity by load can help prevent excessively high prices by allowing new entrants to compete with incumbents, it should not become a tool to allow a few megawatts to suppress market prices that prevent the profitable operation of all other capacity. An important part of the Commission's effort to design capacity markets in California will be to address concerns over this asymmetry and to address the ability of buyers to price discriminate and exercise market power in the purchasing of capacity.

IV. STAFF RECOMMENDATIONS

The following are WCP's responses to Staff recommendations contained in the White Paper.

Recommendation 1: Adopt a short-run capacity market approach with a downward sloping capacity-demand curve for the CAISO.

WCP Response - This staff recommendation regarding a short-run approach is a good first step. Capacity markets with a shorter time horizon, such as one year, can be considered in the earliest stage of capacity market development. Considering the construction lead time for new-entry capacity resources (whether new generation or dispatchable demand response), a forward commitment period of three or more years out should be considered to increase market liquidity and attract additional competitive supply alternatives. A capacity-demand curve should be relied upon along with supply to establish clearing prices for the forward procurement period. To the extent possible, such methods for setting price should rely on market indicators for long run marginal cost,[6] e.g. the outcomes of RFOs for the procurement of capacity resources. In all events, the capacity market should be designed to moderate price swings and produce a stable investment climate rather than one characterized by "boom and bust" cycles.

Recommendation 2: Further investigate alternative availability metrics (e.g. UCAP v. ISO-NE's proposed metric based on performance during shortage conditions) and ensure development of an availability metric that is applicable to hydro, wind, thermal and other generation technologies, and to appropriate demand response products.

WCP Response - WCP agrees with this recommendation. Availability metrics should not conflict with the goal of ensuring that investors can reasonably expect to recover their costs and earn a return on needed, efficient generating equipment. There is an interplay between the value of different capacity metrics, pricing for capacity (i.e., level and slope of demand curve), and the reserve margin target. For example, a capacity product that is strictly measured on peak (as was initially proposed in New England) should be priced to reflect the cost of assuring such highly reliable product. Similarly, reserve margins based on installed capacity should be higher than those based on some sort of guaranteed availability product. WCP is open to the definition of the capacity product, provided that it is internally consistent and compatible with new investment.

WCP notes that significant progress has been made in California in defining a capacity confirm within the state. As a practical matter and one that will be most compatible with acceptance of already entered into bilateral agreements, the CPUC should use as a starting point the resource adequacy capacity product confirms that are being developed as part of resource adequacy.

Recommendation 3: Consider subtraction of peak energy rents from the capacity payment.

WCP Response - Offsets to the demand curve vs. the expected energy margin revenues over the fixed-cost of a typical peaker plant are clearly necessary. It should be done in advance of the operating period by adjusting the demand curve downward by the forecasted energy margin.

[6] Long Run Marginal Cost includes the return of and on capital.

This approach is preferred to subtracting peak energy rents (PERs), since it recognizes that energy market signals adjust and correct underlying errors in the estimation of the required reserve margin.

Recommendation 4: Adopt reasonable locational installed capacity requirements with locally varying demand curves.

WCP Response - WCP agrees with this recommendation.

Recommendation 5: Consider protecting against capacity exports during times of tight supply through the use of capacity prices that fluctuate seasonally.

WCP Response - WCP is not opposed to seasonally fluctuating capacity prices; however the underlying concern here, as in Recommendation 6, is integration of regional supplies into the California capacity market. This involves considering the role of resources outside of California in establishing the required reserve margin and the location of the demand curve; and establishing commercial guidelines for the participation of specific non-California resources in the California capacity market in a manner that is competitively fair and consistent with reliability needs. Both aspects must be addressed carefully.

Recommendation 6: Investigate the dependability of capacity import contracts during times of high West-wide load.

WCP Response - WCP supports the CPUC's investigating capacity import contracts. There are two concepts to dependability that need to be examined. The first is the transmission import capability, and the second is the availability of the imported resource. Both must be considered in treating imports in a manner that neither favors nor disfavors them relative to capacity located in California.

Recommendation 7: Make the fixed-cost recovery curve explicit.

WCP Response – By this, WCP assumes that the demand curve's parameters must be clearly and reasonably determined. The demand curve market should be designed that when the market is balanced, all efficient generation can recover its fixed cost through market prices. The demand curve should be periodically evaluated to determine if it is achieving this goal.

Recommendation 8: Strive for regulatory credibility.

WCP Response - WCP supports all efforts by the CPUC to strive for regulatory credibility and stability.

V. APPROPRIATE ROLES OF CPUC AND CAISO

There is a definite role for both the CPUC and the CAISO in designing and implementing capacity markets. On this point, WCP agrees with the white paper;

> "If the preceding discussion is used as a framework, the Commission should adopt a policy to move to a capacity market and set the broad state policy in this regard. In addition, the Commission should set the reliability target that the capacity market is intended to meet. Once the state has formulated its policy, Commission and CAISO staff should work collaboratively to develop a market design proposal which will ultimately be submitted for FERC approval."[7]

WCP would add to that the CAISO have a joint role in setting the reliability target. WCP recommends that the capacity market should be operated by the CAISO, subject to FERC-approved tariffs governing its design and operating rules. The CPUC should provide guidance on the policy goals and overall resource adequacy requirements of the demand curve, and should pursue a collaborative approach to development and design details.

VI. CONCLUSION

WCP commends the Staff in their thoughtful preparation of this White Paper. The staff recommendations along with stakeholder feedback should give the Commission guidance as it decides on an implementation plan for Capacity Markets in California. As stated earlier, since this issue has been thoroughly debated through formal workshops at the CPUC and the CEC as well as many private meetings, the issues are well known and this proceeding should move directly to comments with an ALJ ruling to follow. There is no need to have workshops or extensive hearings on this topic. As WCP has stated repeatedly, market reforms must be instituted immediately in order to avoid a second energy crisis in California.

The State desperately needs new investment in generation and related resources, just as it needs to ensure that its essential existing working generation earns enough revenue to

[7] CPUC Capacity Markets White Paper, Pg 43.

be efficiently operated and maintained by competitive merchant firms. Energy-only electricity markets and prices are insufficient to achieve these ends, unless energy prices are able to regularly rise to levels far above currently existing price and bid caps. Resource adequacy requirements alone will be unlikely to produce enough revenue to attract and sustain the levels of resources needed for reliability. By contrast, the capacity markets developing in the Northeast contain key design elements that, if adapted to California's needs and circumstances, will ensure that the State has sufficient new and existing competitive resources to keep the lights on while avoiding the risks of cost overruns, excess capacity, and the pass-through of these excess costs to retail consumers.

Respectfully submitted this September 23, 2005 in San Francisco, California.

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Attachment A

COALITION FOR ENERGY MARKET REFORM
PRINCIPLES FOR CALIFORNIA CAPACITY MARKET DESIGN

1. Capacity markets should produce a single transparent clearing price for capacity procured through those markets within defined procurement regions.

Capacity market prices should be transparent, non-discriminatory, and reflect the value of capacity within procurement regions characterized by relatively few internal transmission constraints. All capacity resources procured through the same regional market should be eligible to earn the same price.[1] Within each region, price should reflect supply-demand fundamentals and the long-run marginal cost[2] of capacity in that area.

2. Capacity markets should be comprehensive (no "free riders") and fully support load-serving entity bilateral capacity contracts.

Until targeted load shedding can be practically implemented, the reliability created by the investments and commitments of one load-serving entity (LSE) benefits all LSEs in the same region. The capacity market should be operated by the CAISO and be comprehensive in order to eliminate the ability of one LSE to lean on neighboring LSEs. The CAISO should operate the market by conducting periodic, appropriately structured auctions that clear all qualified and offered capacity against load's cumulative Resource Adequacy obligation.[3] The auction will produce a binding financial obligation that participating sellers will be paid if they meet their performance obligation. LSEs representing all load in the region will be obligated to pay for their load allocated share of the total capacity requirement in that region at the time the requirement is met. LSEs will be able to hedge expected obligations created in the CAISO auction with bilateral contracts.

3. The capacity market should support and encourage efficient long-term contracts between LSEs and suppliers.

The capacity market design in California should encourage long-term bilateral contracting between LSEs and suppliers. A capacity market should be designed to work in parallel and be entirely compatible with bilateral markets for capacity resources. Long-term contracts will assist the financing of new physical capacity as well as enable LSEs to hedge the cost of meeting RA obligations. Long-term contracting provides price

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[1] In addition to the locational capacity requirements, the system operator may require additional services, such as load following, fast start up capabilities, and cycling abilities, to meet operational needs within a region. As with capacity, the same price should be paid for each of those separate services. .

[2] The long run marginal cost of capacity is the full economic cost of "pure" capacity resources, e.g., the most cost-effective reserve unit such as a peaking gas turbine, net of that facility's expected or realized gross energy margin.

[3] "Resource Adequacy obligation" or "Resource Adequacy requirement" as used herein refers to the forecasted load plus the adopted planning reserve margin for each capacity procurement region.

stability and can provide benefits with respect to non-price terms and conditions, such as in contractual provisions for credit or settlement.

4. The centrally administered capacity markets should be sufficiently forward looking.

The CAISO capacity market should include mechanisms that forward-commit capacity to satisfy RA obligations. Considering the construction lead times for new-entry capacity resources (whether new generation or dispatchable demand response), a forward commitment period of three or more years out should be considered to increase market liquidity and attract additional competitive supply alternatives. Capacity markets with a shorter time horizon, such as one year, can be considered in the earliest capacity market iterations.

A "demand curve" should be relied upon along with supply to establish clearing prices. To the extent possible, such methods for setting price should rely on market indicators for long run marginal cost[4] including the outcomes of RFOs for the procurement of capacity resources. In all events, the capacity market should be designed to moderate price swings and produce a stable investment climate rather than one characterized by "boom and bust" cycles.

5. The centrally administered capacity market should support a standardized capacity product definition.

Capacity should be defined as physical generation capability or dispatchable demand-response resources that are capable of meeting reliability needs at a defined delivery location within a defined delivery period. Capacity offered and accepted in a capacity market will assume the obligation to offer its energy into the CAISO energy markets as well as meet a pre-defined availability obligation. Only the qualified capacity of certified generation resources[5] and dispatchable demand-response resources should be allowed to participate in the forward capacity clearing process and counted toward meeting LSE's capacity obligations.[6] In addition, a capacity resource can only count as capacity within those capacity procurement regions for which the capacity resource meets the all locational and deliverability requirements.

6. Capacity markets should support retail competition.

Wholesale competition is enhanced by the existence of many buyers and sellers, which in turn is enhanced by retail competition. A properly designed RA program should support a robust competitive retail market. Any centralized capacity market model should:

- Allow retail providers to fulfill forward capacity obligations at known prices;
- Include standardized creditworthiness provisions; and

[4] Long Run Marginal Cost includes the return of and on capital.

[5] Capacity imported from neighboring regions can also qualify for participation in the capacity auctions. Qualification and performance requirements for imports will need to be defined.

[6] To the extent that an LSE has forward-contracted with a qualified resource or dispatchable demand-response resource, the LSE would be allowed to submit the contracted capacity into the Capacity Market.

- Have reasonable provisions to accommodate customer migration.

Attachment B

West Coast Power

Blueprint for Effective Markets

The Role of Capacity Markets

I. Introduction

California's energy policy has begun to reflect the lessons learned over the last five years, primarily through challenging experiences within the state. On the supply side, the lesson is simple: supply must be adequate for the lights to stay on and prices to be competitive. California also has learned that the relationship between prices and supply is a two-way street, in that supply can only be adequate if prices are sufficient to attract and sustain the investment needed to keep the lights on.

To ensure grid reliability and support its continued load growth due to a rebounding economy, California needs new investment in generation and demand side resources now. In attracting this needed new investment, the state needs to avoid the stranded costs and the pass-through of excess costs experienced in the past. Instead, needed generation should be procured through competitive processes where low cost entrepreneurial firms compete vigorously to build and operate the plants. In various parts of the country, capacity markets have developed that are beginning to attract needed new resources needed for reliability, while ensuring the continued efficient operation and maintenance of existing generators. Such capacity markets offer California the opportunity to meet its reliability needs on the basis of the "best practices" that are being tested and proven in other eastern markets.

This paper examines the basics of why such capacity markets are needed, how they work, and concludes that such markets should be adopted rapidly in California.

II. Investment at risk – why generation investment is a market design challenge

Electric generation is highly capital intensive -- a single 400 MW power plant may well cost over $400 million to build, depending on its location and technology. Investors will be reluctant to put that much capital at risk unless they can expect a reasonable return of and on their investment. Otherwise, they will simply invest in something else that offers a more attractive return. While the problem applies to all types of generation, it is easiest to demonstrate for a "peaking" facility; that is, a generator that is designed to run only a few hours each year during extreme high demand, hot weather conditions. To be reliable, the bulk power system must have enough "peakers" to be able to meet all unplanned outages and sudden spikes in energy use.

For example, a single, 100-megawatt peaking plant might cost $50 to $60 million dollars to construct. Over a 15-year life time, these initial costs, plus debt service, depreciation and a return, and fixed operating and maintenance costs, could result in annual fixed costs of between $10 and $12 million dollars per year. Under California's current market design, the only income stream such a facility can reasonably expect to receive under a a Participating Generator Agreement (PGA) is energy revenue[1] – that is, revenue from the sale of electricity actually produced at the power plant. Assuming that the new peaker will operate 100 hours in a year, it is easy to calculate how high the price of energy would have to be in those hours to allow investors to expect to recover their costs. For example, let's assume the new peaker's fixed costs are $10 million per year, or $100,000 per MW. To recover all of those costs in 100 hours, the price of electricity would have to be $1000 per hour more than the generator's fuel and other variable costs. Since these variable costs are about $100 per MW per hour, energy prices would, on average, have to reach $1100 per MWH in 100 hours every year to allow the investor to recover the costs from an energy-only market. An energy-only market that cannot be expected produce such prices when supply and demand are just in balance will fail to attract new investment.

There are three basic ways that policy makers could allow investors to expect to recover their investment plus a reasonable return.

First, they might set up an energy market pricing system that allows energy prices to reach the actual price levels consumers are willing to pay to avoid having their power interrupted during periods of extremely high demand. This "value of lost load" or "VOLL" pricing ensures that there will periodically be very high energy prices, such as the $1100 per MWH prices identified above, which will in turn establish a balance and mix of competitive generation that relies on the periodic price spikes to recover fixed costs. While several other countries have experimented with VOLL pricing in a relatively successful manner, California has not been willing to experience even temporary price spikes in its electricity markets.

Second, policy makers might grant a monopoly charter to suppliers and give them a guaranteed return of and on their investment, in return for a commitment to serve customers' needs at such regulated rates. This approach has been proven to attract investment, but it has also been proven to attract too much, excessively costly, and at times inoperable investment, due to the cost-plus guarantee of monopoly regulation. In California and many other parts of the US, this alternative left a legacy of billions of dollars in stranded costs as a burden for ratepayers. .

A third approach is to create a second market, outside of the energy market, that sends the price signals needed to attract and sustain needed investment, but that does so without creating the high and unpredictable price spikes of a VOLL energy market and without burdening ratepayers with stranded costs.. Capacity markets are the best example of this third approach.[2] Capacity market design is evolving in the US to better support efficient, competitive investment and operation of power plants, without the risk of cost overruns and inefficient monopolies.

This paper lays out the key characteristics of such a capacity market.

III. Efficient, competitive cost recovery – capacity market design in theory

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[1] Includes Ancillary Services revenues. Also assumes no out-of market RMR or bilateral contracts.

[2] Capacity is a measure of how much output an electricity generator is able to produce at any given time. It is measured in watts (kilowatts or megawatts), and consists of actual generation that is capable of being operated and relied on to produce power on demand. In most capacity markets, the actual amount of capacity is based on periodic testing to determine the megawatts of output, and is then adjusted to account for forced outages, typically through the NERC availability metric termed Equivalent demand Forced Outage Rate ("EFORd").

Starting from the absence of a capacity market, it is challenging to think about what the key elements of such a market should be. Since the goal is to attract competitive investment, the design should focus on the following objectives:

1. Create a price signal that elicits new capacity investment when there are shortages and that discourages investment when there are surpluses of capacity needed for reliability.
2. Focus investment in generation in the locations where it is needed, rather than in areas where it is easy to build.
3. Support and be coordinated with effective transmission planning and expansion.

The first objective requires the determination of how much generation is needed for reliability, and the creation of a market pricing mechanism that signals the need for ongoing investment when supply is at or slightly below this level. The second objective calls for identifying regional and local reliability needs, given existing load, generation supply, and transmission system capabilities. The third objective requires coordinated evaluation of the cost of capacity, energy production, and transmission system expansion. Established and developing approaches to achieving each of these objectives are discussed below.

A. Reliability requirements and price signals

i. The Minimum Reliability Threshold for generation investment

Throughout North America, the electric industry has developed what is often called the "one day in ten year" contingency or "one in ten" standard for resource adequacy.[3] This standard is met when there is enough installed and operable generating capacity so that the expected frequency of system operators having to intentionally shed load is only once in ten years.[4] While many observers have argued whether the one day in ten years standard is too much or too little generation, this paper assumes that it is the "right" level for reliability. Though there are other ways to view the proper capacity level, the same basic market design principles would apply to those levels.

A typical approach to establishing the "one in ten" level is to use a computer simulation model of a given electric system. Such models consider existing generators and their outage rates, potential generator additions and assumed outage rates, and potential demand levels. Transmission interfaces with neighboring regions are assigned a megawatt level and a reliability factor based on historical experience. By calculating the probabilities of various combinations of demand levels, and various generator outages, these models can calculate the expected frequency of high levels of demand exceeding all available generation. Because load must be shed when demand exceeds all available generation, this expected frequency is called a loss of load expectation (LOLE). Generation is added or subtracted until the expectation of such events is only once per ten years. This basic level of generation may be further adjusted for additional generation needed to maintain the system in a reliable state of operation, for example to maintain

[3] The North American Electric Reliability Council (NERC) Glossary of Terms defines adequacy as "the ability of the electric system to supply the aggregate electrical demand and energy requirements of the end-use customers at all times, taking into account scheduled and reasonably expected unscheduled outages of system elements."

[4] Reliability standards call for shedding load when there is insufficient generation to meet demand levels, or when there are other bulk power system conditions that could lead to widespread blackouts if load is not shed in a manner that prevents such blackouts.

voltage and manage transmission thermal and stability constraints. The final overall level should be sufficient to cover peak load plus reserve requirements in the region.

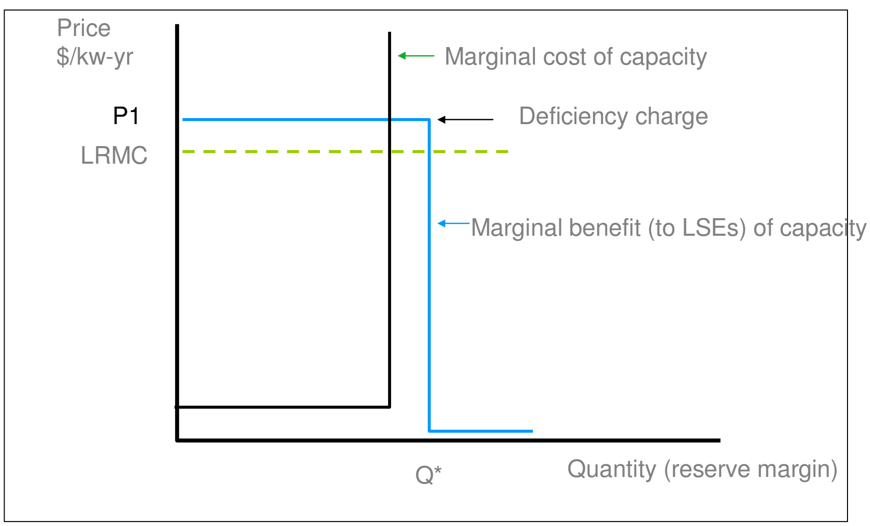
It is useful to think of the "one in ten" standard as identifying the minimum reliability threshold (MRT) for generation investment. Additional investment may provide additional reliability or market benefits, but less generation typically means reliability problems will be encountered with increasing frequency.

ii. Price signals and the MRT

For market forces to produce and maintain enough investment to meet the MRT, it is necessary for investors to expect, over time, that the sum of capacity and energy revenues will just be sufficient to recover their fixed and variable costs, including an economic return. Otherwise, rational investors will choose to invest in assets other than electric generating facilities.

Historically, the first approach tried in at least four US markets has been to require each load serving entity to acquire enough capacity to cover its share of the amount of generation needed for resource adequacy, or face a "deficiency penalty" set at or above the estimated cost of building new capacity, typically the annual carrying cost of a new peaker.[5]

Figure 1. "Resource adequacy" based capacity market: price during shortage



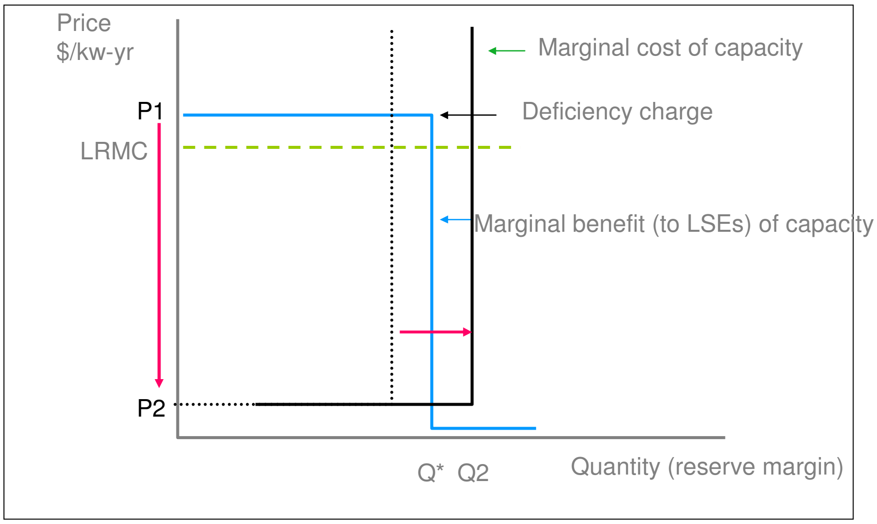
Such markets are intended to produce prices, such as P1 in Figure 1, that are above the cost of new capacity whenever there is a shortage. In concept, this should encourage additional investment until the MRT (Q* in Figure 1) is reached.

The core problem with this approach is that the only motivation for each LSE to acquire capacity is to avoid the deficiency penalty. Once that amount has been exceeded, the economic demand (that is, the willingness to pay) for capacity falls to zero. In other words, the implicit demand curve for capacity in such a market is essentially vertical at the MRT. Since the marginal cost of

[5] This approach has been used in both centralized ISO markets (NYISO, ISO-NE, PJM) and in bilateral "markets" where each LSE must contract on its own (MAPP).

existing capacity is nearly zero[6], while the marginal cost of new capacity immediately increases to the full cost of a new generator, the supply curve in such a market is also vertical. As a result, when the supply of capacity even slightly exceeds the MRT, the price of capacity in such a market collapses to nearly zero, as shown in Figure 2.

Figure 2 "resource adequacy" capacity market: price during slight surplus



As Figure 2 shows, even slight increases in the amount of capacity above the MRT, say to Q2, causes the supply curve to shift to the right and, as a result, the price collapses down the vertical demand curve to P2. Because of this "price cliff", the only way investors can expect to recover their costs is when the supply of capacity remains below the MRT for extended periods of time. This creates a disincentive for investment at or even near the MRT level, and thus jeopardizes reliability. The result has been a widespread concern that such "vertical demand curve" markets merely pay existing generators, but does little to attract needed new investment.

In an effort to prevent this chronic underinvestment, the NYISO and the New York Public Service Department, together with other market participants, developed a variant that is widely called "the demand curve" capacity market. In this variant, the vertical demand curve that is implicit in the resource adequacy approach is replaced with a sloping price schedule designed to mimic the effects of a downward sloping demand curve in standard economic theory. In this approach, the demand curve (or price schedule) is located so that when there is just enough generation to meet the MRT, the capacity market price clears at the level needed to just cover the fixed costs of a new peaker, considering the contribution of energy revenues.[7] As shown in

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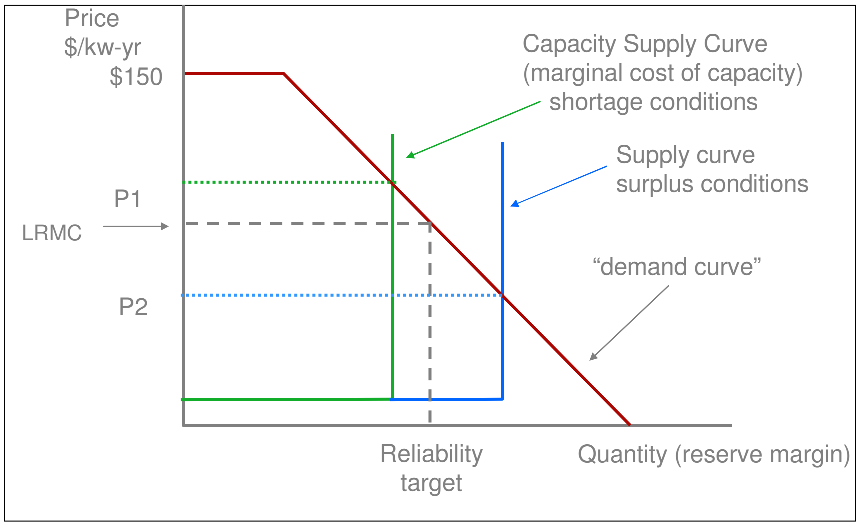
[6] In other words, the change in total cost associated with bidding an existing, operable generator into the capacity market is nearly zero, while the change in total cost associated with bidding a new, as yet un-constructed generator into the capacity market is the full fixed cost of the new generator.

[7] In practice, this requires an offset from the capacity price of the estimated energy margin that would be earned by the marginal new peaker unit in the market. Otherwise, the marginal peaker would recover all of its fixed costs in the capacity market, all of its fuel and variable costs in the energy market, and would keep some additional revenues

Figure 3, when there is a shortage of capacity, the vertical supply curve shifts to the left, and results in prices above the cost of entry. This sends a price signal for additional generation investment. When there is more capacity than the MRT, the vertical supply curve shifts to the right and results in prices below the cost of entry, turning off the investment in new capacity and signaling the need for retirement or mothballing of less efficient capacity.

Figure 3. Capacity markets: "demand curve" concept



Such capacity markets replace the surplus capacity "price cliff" of the resource adequacy type of capacity market with the slower price declines during modest oversupply created by the demand curve. In concept, this market structure (if properly designed) should allow investors to expect that capacity prices will fluctuate over time around the long run marginal cost of efficient new technologies. Without such price expectations, rational investors will not be able to invest. Further, to protect against the high side of this fluctuation cycle, customers will have an incentive to contract for supply, while suppliers and developers will have a similar incentive to contract for protection against the low side of this expected price fluctuation. As a result, competitive development will be enhanced, and bilateral contracts for repowering and new development should develop to hedge both buyer's and seller's risk in the capacity market.

This approach has been functioning in New York since 2003, and since then a number of load-serving entities have issued RFPs for competitive bids to supply new and existing generation to meet current and anticipated capacity needs. A similar model is being developed through litigation at the FERC for the ISO-NE. PJM is considering a related approach.

B. Focusing revenues where capacity is needed most.

Because capacity markets are designed to attract and sustain the right amount of capacity, they must be able to provide high prices in regional or sub-regional locations where capacity is short, while at the same time, producing lower prices in locations where there is a surplus of capacity.

due to energy margins. This would create a continual incentive for overinvestment, and could lead to an inefficient and excessive supply of generation.

For example, in New England there is a large surplus of capacity located in Maine, much of which cannot be exported to other parts of the region due to limited transmission. At the same time, there is not enough capacity in southwest Connecticut and the Boston area, due to limited generation investment and an aging and insufficient transmission system connecting those regions to the rest of New England.

Both New England and New York have determined the amount of capacity needed for reliability in each region or sub-region by considering (a) how much generation can be imported into each sub-region across the transmission links that connect it to the rest of the region; and (b) how much generation must be located within the region so that, together with the transmission capability described in (a) above, the sub-region just meets the 1 day in 10 year standard, as discussed above. A separate demand curve for each sub-region is then set so that the LRMC is realized in this sub-regional capacity market when the amount of supply just equals the sum of (a) and (b). In an urban area, the LRMC may be considerably higher, due to higher land values, stricter air emission standards, and other higher costs associated with building and operating a new power plant.

C. Coordinating with transmission expansion and planning

Planned transmission upgrades, by increasing the amount of generation that can be brought into a regional market from outside, may reduce capacity prices by increasing the supply available on a local or regional basis. Higher capacity prices in one location versus another can help identify the potential need for such transmission upgrades and can help assess which combination of planned, regulated transmission and competitive generation will provide the most economic solution to reliability needs. Transmission planning, in general, should identify regions where additional generation alone will not satisfy reliability criteria, and should be coordinated with market-based generation and demand response development.

IV. Potential further refinements.

Experience and theory suggest several areas where such locational "demand curve" markets could be improved:

- Substantial price variability in response to small additions or retirements of capacity, especially in small markets.
- The potential for either buyers or sellers to engage in strategic behavior that can either elevate or suppress prices away from the long-term competitive level
- The need to set the reference price and the entire demand curve through administrative rather than through market means
- Creation of improved incentives for reliability, resource selection and operation.

Several approaches have been proposed for addressing these concerns. For example, holding the auction for a future period that is far enough away to allow new facilities to compete is considered by some to offer increased supply options and holds the potential for more finely "tuning" the amount of supply to the overall reliability needs.[8] This approach, however, has the disadvantage of relying on forecasts of demand and on contractual obligations to perform. If the winning new facility fails to complete its development, or if the forecast demand levels are

[8] For example, some have suggested a "dutch" or "descending clock" auction that elicits supplier bids, starting at a high announced price, and reducing the price for new rounds of bidding until the amount bid just meets the pre-determined reliability target.

wrong, this approach could produce ineffective and inaccurate price signals and fail to support reliability.

Alternatively, a combination of market power monitoring and mitigation provisions to protect against uneconomic behavior by both buyers and sellers, coupled with a stable and transparent demand curve setting process and market clearing mechanism, should provide the regulatory and market predictability to encourage efficient competitively procured bilateral contracts, both long and short term, and to give customers the choice between spot market and contracted capacity prices.

Similarly, the ISO-NE has argued strenuously that the EFORd approach to calculating availability provides poor incentives for installing, designing and operating plants that minimize the cost of reliability. Instead, the ISO believes capacity payments should be weighted by the unit's actual availability during periods of high demand, high prices, or low reserve levels. This concept may prove to have merit and become more widespread. However, it will be important to ensure that any such adjustments still provide incentives for investors to develop and maintain the right amount and mix of generation, at a minimum overall cost to consumers.

V. Conclusion

California desperately needs new investment in generation and related resources, just as it needs to ensure that its essential existing working generation earns enough revenue to be efficiently operated and maintained by competitive merchant firms. Energy-only electricity markets and prices are insufficient to achieve these ends, unless energy prices are able to regularly rise to levels far above currently existing price and bid caps. Resource adequacy requirements alone will be unlikely to produce enough revenue to attract and sustain the levels of resources needed for reliability, either. By contrast, the refined capacity markets developing in the Northeast contain key design elements that, if adapted to California's needs and circumstances, will help ensure that the State has sufficient new and existing competitive resources to keep the lights on while avoiding the risks of cost overruns, excess capacity, and the pass-through of these excess costs to retail consumers.

CERTIFICATE OF SERVICE

I, Melinda LaJaunie, certify that I have on this 23rd day of September 2005 caused a copy of the foregoing **WEST COAST POWER COMMENTS ON CPUC STAFF CAPACITY MARKETS WHITE PAPER; R.04-04-003** to be served on all the parties via Electronic Mail and/or Hand Delivery.

I declare under penalty of perjury that the foregoing is true and correct.

Executed this 23rd day of September 2005 at San Francisco, California.

*S/Melinda LaJaunie*_________
Melinda LaJaunie

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