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Commissioner Byron -

Thank you for hosting the July 28 workshop on the energy agencies' proposal for infrastructure planning necessary to implement the Water Board's proposed policy on once-through cooling. The workshop demonstrated the exemplary cooperation among the energy agencies that has been necessary to reach this milestone, and provided a useful forum to discussing the challenges that lie ahead.

One of the topics that came up in the workshop and that we have discussed previously with you is the role of a centralized forward capacity market. Based on the brief conversation that Trent Carlson and I had with you and Yakout Mansour during a break in the workshop yesterday, I'm attaching a paper sponsored by the California Forward Capacity Market Advocates (CFCMA) that discusses how a capacity market can facilitate investment in California's preferred resources. We would welcome the opportunity to further discuss with you the value of a multi-year forward, transparent mechanism for procuring and pricing capacity, so let us know if you have any questions or comments. (CFCMA members include Southern California Edison, San Diego Gas and Electric Company, RRI Energy, NRG Energy and NextEra/FPL).

Thanks again for your leadership in providing a forum to discuss how to assure system and local reliability as the Water Board's policy is developed and implemented.

Eric Leuze
Director, California Regulatory Affairs
RRI Energy
(916) 200-6187
eleuze@rrienergy.com (note new email address)

CFCM will facilitate the Preferred Loading Order

The CFCM design is intended to provide a meaningful, commercially actionable price signal to developers of *all* classes of capacity resources. The CFCM capacity price values the reliability contribution of a resource; other attributes of resources are valued through other market prices (or administrative penalties). The offer price of an existing or planned resource into the CFCM should be its all-in cost *minus* expected net earnings from the sale of energy, ancillary services, and other outputs—including Tradable Renewable Energy Credits (TRECs), steam sales from CHP facilities, and other products not sold through the CAISO markets.[1]

For example, consider the choice between a combined-cycle plant and a simple-cycle gas turbine. Because the capital cost (per kW) of the GT is lower, one might predict that CFCM would elicit nothing but GTs. But CCs have higher expected energy earnings (per kW) than GTs and lower emissions (per MWh). Taking these additional economic factors into account, one would expect a mix of CCs and GTs to enter the market. In fact, all the eastern capacity markets have elicited a broad mix of units, not just GTs.

Extending this example to other attributes beyond energy earnings is equally straightforward. Since all LSEs have a statutory obligation to procure renewable energy, renewable energy suppliers would reasonably expect to earn a premium for their energy, either through contracts or the market value of TRECs. The value of this premium will be directly associated with the scarcity of renewable energy relative to the state's targets. Conversely, the cost of emissions credits for SO_2, NO_X, and (likely) CO_2 will reduce the energy earnings of fossil-fueled power plants; zero- or low-emissions resources, however, do not have this handicap. The combination of premiums for renewable energy and penalties for emissions, taken together with the energy market earnings and fundamental technology costs, will lead to development of an efficient mix of resources that comport with California's preferred loading order and reliability objectives.

If we do not have a transparent market price for capacity, however, the reliability value of competing "green" technologies will not be easily determined, resulting in inefficient investment in renewable resources. For example, 100 MW of wind turbines might produce the same energy and TREC earnings in a year as a 40 MW geothermal unit, but the geothermal unit contributes more to system reliability. Using the CPUC's counting rules that appropriately discount the capacity value of intermittent resources, CFCM gives the market a clear valuation of the incremental reliability of the geothermal plant relative to the wind farm. A transparent market price for capacity is also necessary to accurately and efficiently determine the costs of increased renewable portfolio standards.

Locational capacity values provided by the CFCM will also drive efficient decisions about where resources are most valuable. This locational signal will also help efforts to develop demand-side resources in load centers and to decide where transmission reinforcements are most needed to serve constrained areas.

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1 Some resources may elect to offer at a zero price (i.e., as a "price-taker") to ensure they clear the market.

The State retains significant authority under CFCM to implement energy policy

- **Planning Authority:** The CPUC, in conjunction with the CEC and CAISO, sets the quantity of capacity to be purchased in each year, by location, and the allowed level of imports.

- **Market Monitoring:** After each CFCM auction, the CAISO Department of Market Monitoring will provide CPUC staff a report that describes any competition issues identified in the auction and work with the CPUC and stakeholders to identify appropriate remedies.

- **Utility Procurement:** The CPUC retains its authority over the procurement activity of the state's three investor-owned utilities, including decisions to build, or contract to build, new generation, and to enter into long-term contracts with existing supply. Although the CFCM is designed to be an efficient, cost-effective market mechanism to secure resource adequacy, the CPUC may choose to use the LTPP process to directly influence the IOUs' procurement processes to meet particular policy objectives. The CFCM would complement such procurement requirements by providing a transparent price for the capacity value of resources simplifying the cost allocation of LTPP mandates without compromising the ability of other market participants to hedge their capacity costs.

- **Energy Portfolio Oversight:** The State retains its authority to regulate the energy portfolios of its jurisdictional load serving entities. For example, the CPUC retains its authority to implement and assess compliance with RPS requirements and the CARB will regulate GHG emissions reduction and compliance.

- **Transmission Upgrades:** The IOUs, in conjunction with CAISO and CPUC approval, can bolster their transmission systems to relieve import limitations to load centers. Such transmission directly reduces the need for, and cost of, new generation in these load pockets, which tend to be expensive areas to site new resources. CFCM's forward resource commitment helps better inform and identify areas of need than today's model.[2]

- **Enhanced Demand Response and Energy Efficiency Programs:** The CPUC can work with its jurisdictional LSEs to develop and sponsor enhanced programs to engage customers in load management, through either active demand response (DR) or energy efficiency. Market-based DR programs can also compete with supply-side resources in the CFCM design. All these programs offset the need for new capacity and reduce reliability costs.

State policy goals will still benefit from the correct pricing of capacity under CFCM

- Even if the State were to choose to exercise its authority to achieve specific policy goals as explained in the previous section, having the accurate capacity prices that would be developed by the CFCM would be useful in evaluating the possible options open to the State.

- Should the State decide to direct the utilities to procure new resources for reliability reasons, a transparent capacity price coupled with transparent energy and environmental attribute prices would allow the State and utilities to evaluate the most cost effective resource mix.

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2 Citing and approval of transmission requires additional approvals.

CFCM creates a consistent framework for planning and procurement

A multi-year forward capacity market such as CFCM provides a consistent, CAISO-wide framework for ensuring that all of the planning requirements are being met. The CFCM should simplify resource planning and procurement. Although IOUs may still procure some resources through their LTPPs, and any LSE is free to enter into bilateral contracts for resources, the CFCM effectively acts as a state-wide Request for Offers (RFO). As one would expect through a consolidated purchase process, this single "RFO" should produce better pricing and a broader range of resource offers, resulting in a superior mix of lower-cost resources. Older, less efficient resources, or resources facing high environmental compliance costs, can be displaced by newer, more cost-effective resources. And, by coordinating the resource requests from all LSEs in the control area, the CFCM will ensure that all their procurement plans mesh to provide the correct levels of resources overall and in each location. Additionally, the centralized procurement aspect of the CFCM design obviates the contentious need to allocate various resource adequacy (RA) requirements across all LSEs that exists in the current bilateral RA program.

Another important element of the CFCM design is the multi-year forward element. Planned resources, including renewables and demand-side resources, can therefore compete on level ground with existing resources. The CAISO's transmission planning can be better coordinated with future generation locations (rather than assuming that all existing generation stays in service). Furthermore, because demand modifiers, such as demand response and energy efficiency, can participate in the CFCM auction, the need for transmission reinforcements into load pockets can be assessed with a more accurate picture of the net demand.

Possible extensions of CFCM could further guide procurement

As discussed above, CFCM was designed to work with other markets—energy, ancillary services, TRECs, and emissions credits—to achieve an optimal mix of units to meet targets for energy and environmental security. Many of these other markets are immature, however, and policymakers may prefer not to rely solely on the "invisible hand" of market forces to achieve important state objectives. If policymakers determine that the transparent pricing information resulting from the CFCM is insufficient, then it is possible to adapt the auction design of CFCM to attain these goals directly within the market mechanism.

For example, suppose that policymakers decided that no less than 3,000 MW of Demand Resources (DR) should be included in the state's resource mix. The CFCM clearing process could be adapted to select the most economic 3,000 MW of DR first, and then to clear the remaining market based on least-cost procurement (as CFCM currently would for the entire market). All DR resources would be paid the DR clearing price, while all other capacity supply resources would be paid at the (potentially) lower capacity clearing price. (In eastern markets, however, DR has been more than competitive against traditional capacity resources; in such cases, all capacity resources are paid the clearing price.)

Similarly, although TRECs create an additional revenue source for renewable generators, regulators may want to have more direct assurance that sufficient renewable sources are "in the pipeline" to meet state targets. The CFCM design could be extended to include policy targets for renewable energy sources, supplementing the basic resource adequacy requirement. Renewable resources would bid their expected production levels into the CFCM as part of the basic qualification package. The market could then clear the least-cost combination of resources to meet

the reliability and renewables criteria simultaneously.[3] Alternatively, the market could be designed to clear a minimum amount of renewable capacity, as measured by the RA counting rules then in effect.

Centralized capacity markets have successfully secured new DR, EE, and renewables

Forward capacity markets in PJM and New England have been directly responsible for a sharp increase in demand-side participation in the wholesale energy markets, as well as supporting the entry of substantial amounts of new renewable generation (primarily wind). Commercial demand-response (DR) consolidators, such as EnerNOC and Comverge, have built their business plans in these markets around their new ability in these markets to offer new customers an incentive payment, based on capacity prices, for participating as DR. Utilities and other LSEs have also significantly expanded their DR and energy efficiency (EE) programs, based on the financial savings from reducing their future capacity payments—and, because capacity prices are known years in advance, the LSEs can match their EE programs to future economics.

Demand Response aggregators are playing a major role in increasing the penetration of DR in the eastern RTOs, particularly for Commercial & Industrial accounts. Through the 2012/13 year, the PJM RPM auctions have resulted in a net increase of over 10,500 MWs of offered DR and Energy Efficiency resources.[4] Following a rule change that encouraged greater DR participation in the Base Residual Auction, PJM cleared offers of 7,047 MW of DR and an additional 569 MW of Energy Efficiency reductions for 2012/13; in total, these resources were 5.6% of the total resources cleared in the market.

Similarly, ISO-NE's Forward Capacity Auctions (FCAs) have brought forth substantial increases in demand-side participation. The FCA for 2011/12 continued to attract Demand Resources, with more than 2,900 MW of Demand Resources clearing in the second FCA, up from 2,500 MW in the first FCA held in February for the 2010/2011 Capacity Commitment Year.[5] The clarity of pricing of the capacity value of DR allows a wide range of participation, either directly or through aggregators, rather than relying solely on utility-based programs. A review of the winning demand offers in the ISO-NE auction shows that only a fraction of these offers are directly from the IOUs or municipal utilities.[6] In addition to this important price transparency that generates DR development, a centralized capacity market also provides for consistent application of counting rules and performance metrics much more readily than a purely bilateral market.

Since adoption of the PJM RPM design, there have been new proposals for about 5,000 MW of effective capacity from renewable resources.[7] And even though some eastern US states do not have the same progressive Renewables standards as California, approximately 400 MW of solar and wind renewables have cleared through the 2011/2012 period.[8]

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3 The market rules would have to include a method to verify energy estimates and penalties for under-delivery, comparable to the verification and penalty structures for capacity.

4 PJM Interconnection, LLC. 2012/2013 RPM Base Residual Auction Results.

5 ISO New England, Forward Capacity Auction Results Filing, FERC Docket No. ER09-467-000 (December 2008).

6 Id., Attachment A.

7 The Brattle Group, "Review of PJM's Reliability Pricing Model (RPM)," June 30, 2008, at 4.

8 Id., page 33 (Table 3).

Further, the eastern markets have also demonstrated that the capacity markets are encouraging a diversified portfolio of generating capacity, including gas turbine peaking plants and baseload or intermediate combined cycle plants.

Centralized capacity markets do not increase the price of capacity

A popular misconception is that a centralized capacity market will significantly increase the price of capacity. However, every supplier in a competitive capacity market has the incentive to offer at a price no higher than its cost—and those offers are subject to review by a market monitor. By contrast, in a bilateral market suppliers will necessarily behave strategically, considering how large a premium over cost the buyer will accept, and suppliers with market power may be able to exact a significant premium. Further, in bilateral markets, both buyer and seller must invest in market research, negotiate with many potential counterparties, and eventually carry the additional costs created by counterparty risk. As a result, the market clearing price for a standard capacity product (SCP) in a well-designed centralized capacity market should ultimately be more transparent and lower than the prices in a bilateral capacity market.

The dispersion in market prices of capacity observed in California today is due primarily to the sale of different products, including various lengths of contract term, different credit and performance standards, and delivery obligations. Not only does the endless variation of product change the cost of providing that product, it also means that there is low price transparency: knowing the price of one capacity transaction doesn't provide much information about a reasonable price for a different transaction. After California adopts a SCP, the prices transacted for the SCP will converge as prices do for all standard products. As a result, the market clearing price mechanism of the CFCM design should not be viewed as a negative relative to the evolution of California's existing bilateral capacity market. Indeed, by increasing the transparency of the market and reducing transaction costs for capacity market participants, the CFCM proposal should ensure that the capacity market clears at the lowest cost possible that will still be sufficient to attract necessary investment for the development of new resources and the maintenance of cost-effective existing resources.

Another misconception about centralized markets is that they are inefficient because every supplier is paid the same price, even though some suppliers have lower costs. In particular, those advocating a "pay-as-bid" system seek to pay existing resources less than a market price for their resources, and pay market prices only to new units. Many of the desirable properties of a centralized market are lost, however, in a pay-as-bid system or one with explicit discrimination of some classes of supplier. In a pay-as-bid market, suppliers' rational strategy is to offer the highest price that they believe will clear, but not less than cost. There is no guarantee that the lowest-cost set of resources will clear a pay-as-bid market, resulting in inefficient investment in energy infrastructure going forward. If existing resources are paid less than new resources systematically, older units that might be able to provide capacity at less than market price, but more than their "going forward" price will be retired and replaced with newer, more expensive plants. Also, as soon as producers realize that after their initial contract they will not be paid the market price but only the "going forward" price, they will account for this in their bids for new capacity contracts. Alternatively, those projects could be built by utilities under cost of service regulation with guaranteed returns, but if all capacity is built this way, the objective to rely on competitive markets will be undermined. In short, a competitive, uniform clearing price market provides consumers the best price and ensures the most cost-effective means of meeting California's energy reliability going forward.