

**BEFORE THE PUBLIC UTILITIES COMMISSION OF THE
STATE OF CALIFORNIA**

Order Instituting Rulemaking to Oversee the
Resource Adequacy Program, Consider
Program Refinements, and Establish Annual
Local Procurement Obligations.

Rulemaking 11-10-023
(Filed October 20, 2011)

**COMMENTS OF CALPINE CORPORATION ON
THE JOINT PARTIES' PROPOSAL REGARDING RESOURCE
ADEQUACY AND FLEXIBLE CAPACITY PROCUREMENT**

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Pursuant to the Phase 2 Scoping Memo and Ruling of Assigned Commissioner and Administrative Law Judge ("*Scoping Memo*"), Calpine Corporation ("Calpine") submits these comments on the proposal of California Independent System Operator ("CAISO"), San Diego Gas & Electric Company ("SDG&E"), and Southern California Edison Company ("SCE") (together the "Joint Parties") regarding Resource Adequacy ("RA") and flexible capacity procurement ("Joint Parties' Proposal").¹ While Calpine supports the Joint Parties' Proposal with some modifications as described in Section II below, the proposal does not address the most fundamental flaws with the current RA program.

I. THE JOINT PARTIES' PROPOSAL DOES NOT ADDRESS THE MOST FUNDAMENTAL FLAWS WITH THE CURRENT RA PROGRAM

While the Joint Parties' Proposal attempts to address potential reliability issues associated with the procurement of insufficiently flexible capacity under the current bilateral year-ahead RA program, it does not address two, more fundamental flaws, with the current RA program:

- Multi-year Forward Procurement Requirement. The current RA program neither ensures the continued availability of existing resources required to maintain reliability going forward nor incorporates non-discriminatory

¹ See *Scoping Memo* at Attachment A.

procurement practices that foster competition between new and existing resources.

- Lack of a Centralized Market. A bilateral market is inherently less efficient than a centralized clearing price market for a variety of reasons, including:
 - the transaction costs associated with the fulfillment of increasingly differentiated capacity procurement requirements may be prohibitive;
 - a centralized market facilitates the allocation of the costs of capacity procurement to non-investor-owned utilities, including non-California Public Utilities Commission (“Commission” or “CPUC”) jurisdictional load serving entities (“LSEs”) and potentially other entities such as generators and exporters; and
 - a California Independent System Operator (“CAISO”) mediated market would better align capacity procurement with CAISO reliability requirements and minimize CAISO backstop procurement.

To address these fundamental flaws with the current RA program, the Commission must begin to undertake a broader overhaul of the RA program including consideration of a centralized capacity market.

As Calpine stated at the outset of this proceeding,² as well as in previous RA and Long-Term Procurement Planning (“LTPP”) proceedings, fundamental changes to the current RA and LTPP programs are needed to incorporate non-discriminatory procurement practices that foster competition between new and existing resources, and that such changes must include adoption of multi-year forward procurement requirements or capacity markets.³ While the Commission has signaled on various occasions the need for, and its willingness to tackle, this necessary reform to the RA program,⁴ the *Scoping Memo* yet again fails to address this issue despite the increasingly evident risks of the inefficient economic retirement of existing resources.

² See R.11-10-023, Comments of Calpine Corporation on Order Instituting Rulemaking (November 7, 2011), at 2-4.

³ See R.12-03-014, Calpine Response to PG&E Motion (October 5, 2012), at 1-2.

⁴ See, e.g., D.10-06-018, mimeo at 32-33. (“A multi-year forward commitment has the potential to provide important reliability benefits. It would provide advance knowledge of impending reliability problems years ahead of delivery, allowing planners to address those problems in a timely, cost-effective manner. Additionally, a multi-year forward

The Commission should immediately begin to address the issue of multi-year forward RA procurement, including the introduction of a centralized capacity market, as a means to correct the more fundamental problems with the current RA program. Only then will the Commission ensure the availability of sufficient capacity to satisfy prospective reliability requirements.

II. THE JOINT PARTIES' PROPOSAL IS A MODEST STEP IN THE RIGHT DIRECTION, BUT INSUFFICIENT TO ENCOURAGE RETENTION AND INVESTMENT IN FLEXIBLE CAPACITY NEEDED TO MEET FUTURE RELIABILITY REQUIREMENTS

In the absence of true reform of the RA program and the creation of a multi-year forward procurement requirement, the Joint Parties' Proposal is a modest step in the right direction to encourage retention of, and investment in, flexible capacity. However, the Commission should address a number of weaknesses in the Joint Parties' Proposal.

First, with respect to the specification of the need for flexible capacity, the Joint Parties' Proposal may understate reliability requirements and lead to insufficient procurement of flexible capacity. Second, with respect to resource counting conventions, the Joint Parties' Proposal may over-count comparatively inflexible and/or use-limited resources such as steam and combustion turbines ("CTs") while undercounting relatively flexible resources that are not generally use-limited, such as combined cycle gas turbines ("CCGTs"). Third, the proposal may provide perverse or limited incentives to upgrade existing resources. By modifying the Joint Parties'

commitment would be expected to stimulate merchant generator investment, supporting our policy not to rely solely on Commission-directed forward procurement by IOUs to provide the investment needed for new generation. Further, as the CAISO points out, a multi-year forward commitment would promote competition between new and existing resources as well as competition between transmission upgrades and generation supply additions. Such competition could yield more cost-effective outcomes. Having generation investment commitments made years in advance should also promote more cost-effective backstop procurement decisions. Finally, as CUE notes, a multi-year forward RA commitment applicable to all LSEs could be an effective way to ensure that all market participants shoulder the burden of promoting investments, which in turn would help to achieve the equitable allocation objective.")

Proposal to address these shortcomings, the Commission will further encourage retention of and investment in flexible capacity.

Calpine's responses to the specific questions raised in Attachment B of the *Scoping Memo* follow.

A. Reliability Risk

1. *What is/are the most critical grid reliability risk/risks that should be evaluated and managed through the flexible capacity procurement initiative?*

The risks that are addressed by introducing explicit flexibility requirements into the RA program are the same as the risks addressed by the RA program more broadly (*i.e.*, the risk of involuntary load curtailments). Historically, the probability of involuntary load curtailments was highest during summer peak conditions and was due to insufficient installed capacity. Going forward, involuntary load curtailments may occur in shoulder months and hours, and may be due to insufficiently flexible capacity needed to respond to rapidly-changing system conditions related to large changes in load and intermittent resources.

2. *This proposal attempts to address reliability risk by recommending that the CPUC establish a monthly interim flexible capacity obligation that is based on the ISO's identified flexible capacity needs.*

a. *Identify the key tasks required to implement this proposal. Propose the order in which they should be addressed, and discuss whether they should be taken up simultaneously or sequentially.*

The five key tasks required to implement the proposal include:

- 1) identifying system level flexibility requirements,
- 2) determining how resources count towards satisfying the requirements,
- 3) establishing performance requirements for resources that count towards the requirements,

- 4) determining which market participants are responsible for satisfying the requirements, and
- 5) codifying the procedures through which market participants comply with the requirements.

To some extent, the above five tasks can be completed in parallel, although there are some important interdependencies between the tasks that may require that the tasks be conducted serially. For example, it may be difficult to establish performance requirements for flexible RA before determining exactly how different resources count towards the requirements. Similarly, it may not be feasible to craft the mechanics of compliance with flexible capacity procurement requirements until it is clear which entities will actually have the compliance obligation.

b. Can the difference between load and net-load be met partially by introducing curtailment provisions in renewable contracts (particularly solar resources)? What are the implications of doing so?

Yes. Curtailing renewables may provide a means of limiting the ramping requirements associated with intermittent generation; and thus, limit the need for flexible resources to respond to such ramping needs. For example, consider a hypothetical system with a 100 MW load on-peak and 50 MW load off-peak. The system has a 100 MW conventional power plant and a 50 MW wind plant. The wind plant runs only off-peak. The conventional plant can increase its output only 90 MW from off-peak to on-peak. If the wind plant operates at its full capacity of 50 MW off-peak, then the conventional plant reduces its output to 0 MW off-peak and can serve only 90 MW of the 100 MW load on-peak. On the other hand, if output of the wind plant is limited to 40 MW off-peak so that the conventional plant is producing at least 10 MW off-peak, the conventional plant can increase its output rapidly enough to meet the peak load of 100 MW. Thus, curtailment provisions in renewable contracts may help to meet the difference between load and net-load.

- c. ***What are other options to alleviate the underlying reliability risk(s) (e.g. modified bidding behavior, incentives within procurement programs to procure resources that reduce identified reliability risks)? What are the benefits and drawbacks of addressing reliability risk by developing a flexible capacity obligation for LSEs relative to the alternatives?***

While other modifications to procurement policy and market rules may help address flexibility challenges, there are no obvious drawbacks to incorporating flexibility requirements into RA procurement either independently or in parallel with alternatives. The clear benefit of a flexible capacity obligation is that it would provide the CAISO with forward assurance that it will have an appropriate mix of resources to address flexibility and reliability issues in the operational time frame.⁵ In addition, it may provide additional incentives for flexible resources to remain in operation and for existing resources to invest in upgrades to enhance their flexibility.

There are, however, two potential issues to the *implementation* of flexible capacity requirements that must be considered. First, one potential alternative to a flexible capacity requirement is greater reliance on spot energy and ancillary services (“AS”) markets to encourage flexibility. Ideally, flexible capacity requirements and well-functioning spot markets should be complementary. Flexible capacity requirements should ensure that the CAISO has the appropriate resources available to operate day-ahead and real-time energy and AS markets. If flexible capacity procurement targets are set overly conservatively, however, they may result in excess capacity in the operational time frame and suppress prices in day-ahead and real-time markets.

⁵ As discussed above, multi-year forward procurement requirements are necessary to ensure fully that the CAISO can meet reliability requirements. Nevertheless, more stringent year-ahead requirements such as those in the Joint Parties’ Proposal can be beneficial.

Partly as a legacy of the Energy Crisis, it is not clear that the CAISO or the Commission views low spot prices as undesirable.⁶ Spot prices that reflect actual operating conditions, including potential scarcity, are important for several reasons:

- Unlike forward flexible capacity requirements that target broad categories of flexibility, the flexibility requirements revealed by day-ahead and real-time prices are potentially more granular. For example, a relatively slow resource, such as a steam turbine, may count towards flexible capacity requirements, but may not be committed and able to respond to the rapidly evolving system conditions potentially reflected in robust day-ahead and real-time prices.
- Robust day-ahead and real-time energy and AS prices provide strong incentives for resources to perform that even an enhanced must-offer may not provide.

To the extent the impact of flexible capacity procurement on spot prices is a concern, it can be managed by setting appropriate flexible capacity procurement targets.

Second, to the extent that contracting for flexible capacity turns out to be burdensome, implementation of flexible capacity requirements could lead to significant new transaction costs. However, such costs could be mitigated by the creation of centralized, clearing-price markets for flexible capacity.

Calpine does not support “incentives within procurement programs” that might lead to carve-outs for specific resources that are deemed particularly well-suited to resolving flexibility needs. For example, Calpine does not support a mandate to procure storage and would not support modifications to renewables procurement or other areas of procurement such as demand response to encourage flexibility. The Commission should encourage competition among resources to resolve flexibility needs without artificially incentivizing any specific resource and by establishing clear price signals for flexible capacity regardless of its technology and vintage.

⁶ For example, one of the CAISO’s justifications for its proposal to introduce a Flexible Ramping Product is to limit real-time energy prices. (See <http://www.caiso.com/Documents/DraftFinalProposal-FlexibleRampingProduct.pdf>.)

d. In addition to addressing reliability risk, does the flexible capacity obligation have other market impacts?

See response to question 2.c above.

e. How does this type of proposal, as compared to others, satisfy the Guiding Principles as set forth in the August workshop? (See Draft Guiding Principles in the Appendix to these questions)

A flexible capacity procurement obligation is generally compatible with the Draft Guiding Principles. However, as discussed below, Calpine is not convinced that the Joint Parties' Proposal, as currently constructed, is consistent with Draft Guiding Principles 7 and 10.

Draft Guiding Principle 7 sets forth that “[t]he flexibility needs study should be transparent and consistent with CPUC-approved assumptions.” However, the justification for the recommended flexibility requirements - the largest three hour ramp plus the max of 3.5% of peak load or the most severe single contingency - is unclear. Calpine believes the procurement targets may be too low.

Draft Guiding Principle 10 sets forth that “[t]he rules for generator valuation and LSE allocation should be transparent, consider how to promote efficient procurement, minimize market power opportunities, reward existing flexible resources, and incentivize the appropriate resource mix that results in the type and location of resources that are needed to maintain grid reliability.” However, the Joint Parties' Proposal counts similar resources in a significantly different manner in determining how these resources meet flexibility requirements, and thus may not promote efficient procurement.

In particular, the Joint Parties' Proposal arbitrarily recommends that the PMin of a resource that requires more than 90 minutes to start should not be counted as flexible. Consider two plants that are identical in every respect but their cold start times (*e.g.*, both plants are 500 MW plants with 200 MW PMin). One plant can start cold in 90 minutes while the other

requires 91 minutes. Assuming that both resources could ramp quickly enough to reach their full outputs of 500 MW within three hours, the first plant would have its full 500 MW of capacity deemed flexible, while only 300 MW of the second plant would be deemed flexible. Such a stark difference in the measured flexibility of virtually identical plants seems arbitrary. Similarly arbitrary, and as discussed below in response to question 15.a.1, the Joint Parties' Proposal may also treat resources with widely-varying levels of flexibility roughly equally (e.g., CCGTs as compared to steam units).

B. Interim RA solution (Section 2)

3. *The proposed flexibility procurement initiative institutes an interim RA solution for 2014-2017. What are the anticipated impacts of an interim approach on resource adequacy contracts? What factors should the CPUC consider in deciding whether an interim approach is appropriate?*

The Commission should establish appropriate incentives to contract multiple years forward for flexible capacity. Such incentives would support the continued economic viability of resources that may not be needed in the near term, but may be needed several years in the future, particularly after the expected retirements of once-through-cooling ("OTC") units in 2016 and 2017. In addition, numerous low-cost upgrades to existing resources could significantly improve their flexibility.⁷ However, as the Joint Parties' Proposal does not establish explicit forward procurement obligations and its definition of flexible capacity may be subject to change, suppliers may be unwilling to keep currently uneconomic resources in operation and/or invest in upgrades.

⁷ A number of these low-cost upgrades were described in Calpine's presentation at the September 7, 2012 Storage/LTPP workshop.

4. *Should the flexible capacity start in 2014? Explain why or why not.*

While the Commission should work towards a more permanent long-term solution, an interim solution in 2014 (even if imperfect) is preferable to waiting for a permanent long-term solution to be implemented. Even though current RA markets are over-supplied and generally yield low compensation, they have the potential to become even more over-supplied and yield even lower compensation as increasing amounts of renewable capacity, which counts towards generic RA requirements, comes on-line. Near-term modifications to RA that, at a minimum, differentiate between dispatchable and intermittent capacity will help ensure the continued availability of existing generation on which the CAISO depends to ensure reliability.

C. *Development of Eligibility and Needs Methodology (Section 3.1 and Section 3.2)*

5. *According to the proposal, “flexible capacity need” is defined as the need of the ISO to meet ramping and contingency reserves. (Section 3.1)*

a. *Is this an appropriate definition of flexibility? If not, please explain what might be an appropriate definition and why.*

The Joint Parties’ Proposal does not justify why it determines that the capability to respond to three hour ramps is a key element of flexible capacity need other than its assertion that “[i]t represents a reasonable ramping period that many resources can satisfy and still enable the ISO to meet its maximum continuous ramping and load following needs in the interim 2014-2017 period.”⁸

Absent publicly available data on the characteristics of different resources and the minute-by-minute data used to develop the Joint Parties’ Proposal, it is not possible for most stakeholders to assess whether the combination of its definition of flexibility and its proposed

⁸ Joint Parties’ Proposal at 4.

resource counting rules is likely to lead to procurement of the resources that the CAISO needs to assure reliability.

b. Should flexible capacity needs encompass all of the contingency reserves (e.g. Spin, Non-spin, Regulation up/down)?

Regulation is not a contingency reserve and consequently should be treated differently. Regulation is dispatched to respond to short-term fluctuations in system conditions. In contrast, spin and non-spin are generally only dispatched in contingencies. Hence, the capacity required to meet spin and non-spin requirements is clearly incremental to any capacity necessary to accommodate ramps that are the result of normal operations.

6. Flexibility needs are calculated according to the following formula (Section 3.2)

$$\text{Flexibility Need}_{MTHy} = \text{Max}[(3RRHRx)_{MTHy}] + \text{Max}(MSSC, 3.5\% * E(PL_{MTHy})) + \varepsilon$$

Where,

Max[(3RRHRx)MTHy] = Largest three hour contiguous ramp starting in hour x for month y

E(PL) = Expected peak load

MTHy = Month y

MSSC = Most Severe Single Contingency

ε = annually adjustable error term to account for uncertainties such as load following

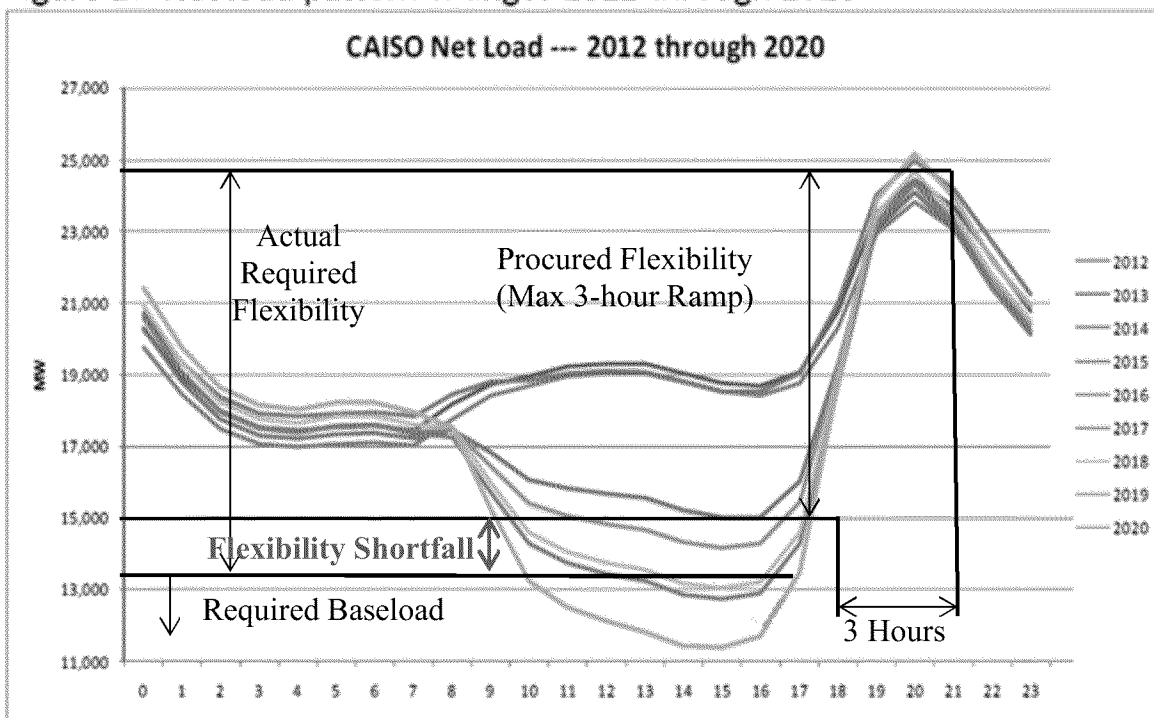
a. Is the above formula an appropriate measure to calculate flexibility needs and why?

By assuming that sufficient flexible capacity is necessary to satisfy contemporaneously ramping requirements as well as peak contingency reserve requirements, the formula implicitly assumes that ramping requirements coincide with contingency reserve requirements. It is at least theoretically possible that the largest ramps occur in hours other than system peak hours in which contingency reserve requirements are highest.

On the other hand, it is unclear that procurement to satisfy the largest three hour ramps would provide flexible capacity sufficient to accommodate larger and longer ramps. As shown

in Figure 1 below for a projection of net load on a “typical” March day in 2017,⁹ procurement to fulfill the maximum three hour ramp on this day might result in insufficient flexibility to satisfy the biggest ramp from trough to peak on the same day (*i.e.*, the maximum three hour ramp is approximately 10 GW while the maximum ramp, trough to peak, is 12 GW).

Figure 1: Net load pattern changes 2012 through 2020



This shortfall is potentially larger in months such as August where the maximum continuous ramp occurred over more than ten hours in 2011.¹⁰ Procured flexibility might only cover a fraction (3 out of more than 10 hours) of the actual required ramping.¹¹ In addition, as

⁹ See R.11-10-023, *RA Flexibility Workshop Flexible Capacity Procurement Proposal* at Slide 10. A copy of the *RA Flexibility Workshop Flexible Capacity Procurement Proposal* is available at: <http://www.cpuc.ca.gov/NR/rdonlyres/52604F31-7290-4C18-BE85-09BAF96671C2/0/RAFlexibleCapacityWorkshopPresentationPublic.pptx>.

¹⁰ See *RA Flexibility Workshop Flexible Capacity Procurement Proposal* at Slide 16.

¹¹ Given the proposed resource counting rules, it is possible that residual flexibility, above and beyond what counts towards the three hour requirement, from resources used to satisfy the three hour requirement or from resources providing generic capacity might be sufficient to accommodate longer and larger ramps.

discussed below, the Joint Parties have not justified the inclusion of only half of contingency reserves in their measure of need.

- ***e.g., The ISO included the max of either a 3.5% of monthly expected peak load (EPL) or Most Severe Single Contingency (MSSC) factor to the need calculation. This is supposed to ensure that the ISO gets 100% of spinning reserve capacity needed to cover the MSSC.***

As explained in the Joint Parties' Proposal, this element is related to North American Electric Reliability Corporation ("NERC")/Western Electricity Coordinating Council ("WECC") reliability standards. However, it is unclear why the CAISO chose to include in its estimate of need the max of the MSSC, which potentially determines the entire contingency reserve requirement, and 3.5% of EPL, which potentially accounts for only a fraction of contingency reserve requirements. Given that contingency reserve requirements range between 5% and 7% of load, depending on the mix of hydro and thermal resources used to meet load, the Joint Parties' Proposal should be modified to specify the contingency reserve requirement element of flexible capacity need as the max of MSSC and 5% to 7% of EPL.

- ***What evidence supports using a 3.5% of EPL to provide the spinning reserve needs in an N-1 contingency?***

The 3.5% of EPL element of the proposed need metric seems to be based on NERC/WECC requirements for contingency reserves equal to the max of the MSSC and 5% to 7% of load, with half of contingency reserves spinning (3.5% is half of 7%).

- ***Is it reasonable to require spinning reserves equal to 100% of MSSC? Please explain.***

As explained in the proposal, to the extent that MSSC is greater than 5% to 7% of load, NERC/WECC standards require spinning reserves equal to 50% of MSSC and contingency reserves, including both spin and non-spin, of 100% of MSSC.

- b. According to the proposal, flexible capacity need is based on how much ramp capability a resource can offer and sustain over a continuous three hour period. Is three hours an appropriate duration in which to measure ramping? Support your answer with empirical data when possible.**

See response to question 5.a.

- c. Is adding an annually adjustable error to ramping requirements term to account for uncertainties appropriate?**
- Should the error factor be capped? If so, what is an appropriate cap level and why?**
 - What criteria should be stipulated to provide appropriate boundaries on what can be included in the error factor (i.e., proportion of wind generation, or distributed generation)?**

The Joint Parties' Proposal suggests that the error factor is intended to account for intra-hour variation in net load. Given that the proposal calculates ramping requirements from 1-minute data that reflects intra-hour variation in net load, it is not clear that the error term is needed. To the extent that it is needed, it requires additional justification.

- d. The ISO proposes to use minute-by-minute estimate of load to calculate flexibility needs. Please discuss the suitability of this approach and if this is not suitable, what are the other options?**

Flexibility requirements should be calculated from the most granular data available. Such data potentially will reveal ramps that are larger than reflected in hourly data. For example, suppose that net load is trending upwards for 1.5 hours from zero to 150 MW after which it returns to 100 MW after another half hour. Calculating a ramp based on values of net load measured instantaneously at the beginning and end of the two hour window would suggest a ramp of 100 MW over two hours. The difference between hourly average values (50 MW for the first hour and 125 MW for the second hour) would suggest an even less dramatic ramp.

- e. It appears flexible capacity procurement is overlapping with the determination of operating reserves. Is this appropriate? Can some amount of the PRM be offset, and how can the CPUC manage the overall RA obligation if portions are met with more flexible resources?*

Flexible capacity procurement requirements do not overlap operating reserve requirements. The two sets of requirements relate to different time frames. The Joint Parties' Proposal is intended to encourage the procurement of sufficient flexible capacity in the year- and month-ahead time frames to ensure that the CAISO can satisfy both ramping and contingency reserve requirements.

Presumably, flexible capacity will also count towards generic RA requirements as well as local RA requirements to the extent that the flexible capacity is located in the relevant local areas. Thus, procurement of flexible capacity will reduce the amount of inflexible capacity that needs to be procured to satisfy system and local requirements. While the procurement of flexible capacity will not reduce the Planning Reserve Margin ("PRM"), it will count towards the PRM.

- 7. *What process(es) or proceeding should be used to calculate capacity flexibility needs as load and supply change over time?***
- a. Currently the annual LCR process results in a determination of local capacity needs on an annual basis. Should flexible capacity needs be included within the LCR process, or should a separate but similar process be established to update flexible capacity needs? Please explain.*
- b. Who should determine flexibility needs annually– the ISO or some other third party?*

The CAISO should establish flexibility requirements on an annual basis either as part of the local capacity requirements ("LCR") process or through a parallel process.

D. Allocation of Flexible Capacity Requirements (Section 3.3 and Section 3.4)

- 8. *The proposal recommends the CPUC allocate flexible capacity procurement obligations to LSEs based on each LSE's relative share of monthly system peak. Is this a suitable approach? Explain why or why not.***
- a. *What other alternatives exist within CPUC jurisdiction that allows LSEs to demonstrate compliance of flexible capacity obligations? Please discuss the relative costs and benefits of different approaches. (Section 3.3)***

In the near term, and in the interest of simplicity, the Commission should allocate flexible capacity obligations to LSEs based on peak load share, just as system RA requirements are allocated. Eventually, flexible capacity costs should be allocated to the loads and intermittent resources that cause flexibility problems.

With respect to resources, flexibility costs could be allocated directly to intermittent resources themselves or to the LSEs to which they are contracted. While the Commission could allocate flexibility costs to the LSEs under its jurisdiction based on the characteristics of their load and the resources that they have under contract, its jurisdiction to directly allocate flexibility costs likely does not extend to suppliers. If LSEs ultimately bear the flexibility costs of the intermittent resources for which they have contracted, the Commission could introduce complementary policies to encourage LSEs to consider explicitly such flexibility costs in Renewables Portfolio Standard procurement. LSEs would then be encouraged to procure renewables that minimize such costs.

E. Flexible Capacity Must-offer Obligations (Section 4)

9. *In addition to the must-offer obligations that currently apply to RA resources, the flexible capacity must-offer obligation for flexible resources would require resources to submit economic bids into the ISO's real-market between a predetermined set of hours (i.e. 5AM to 10PM).*

a. *What is the impact of this more stringent must-offer obligation for flexible resources on specific resources?*

The more stringent must-offer obligation will impose additional burdens on resources that do not always bid economically in the real-time market. For example, Calpine has many CCGTs which are at least partially self-scheduled, partly because CAISO unit commitment and dispatch tends to cycle such units or switch them between different configurations in an uneconomic manner. To the extent that the CAISO commitment and dispatch of such units is improved, the impact of a more stringent must-offer obligation could be managed. In addition, to the extent that it is costly to comply with a more stringent must-offer obligation, the cost ultimately could be reflected in prices for flexible capacity.

b. *Is the proposed set of hours suitable? Does limiting the hours in which a resource must submit economic bids enable more resources to participate in the flexible capacity initiative?*

The proposed set of hours covers the periods in which the CAISO expects large ramps to occur. Large, upward ramps are predicted to occur in the morning, as wind generation decreases and load increases, and in the evening, as solar generation decreases and load remains steady or increases.

c. *Is it appropriate to exclude self-scheduled resources from counting towards flexibility?*

Yes. To the extent that the CAISO is seeking access to flexible resources to manage variability in net load, suppliers should be required to cede control of flexible resources to the

CAISO. Alternatively, the CAISO could rely more heavily on short-term price signals to encourage the provision of flexibility. For example, allowing energy and AS prices to rise when the system is ramp-constrained would encourage suppliers to generate or provide AS in such periods, either through self-provision or by participation in CAISO markets.

A third approach has been proposed in New England and involves penalizing capacity resources that fail to actually deliver (not offer) energy or AS during scarcity conditions, regardless of whether they are dispatched through the market.¹² Under such an approach, the CAISO could claw back capacity revenues from resources that fail to provide energy or AS during periods in which the CAISO is ramp-constrained.

- d. Can this risk be alleviated partially by incentivizing resources with Must-Offer Obligations to submit economic bids in the ISO market instead of self-scheduling? What changes could be contemplated within regulatory proceedings at the ISO and the CPUC, to make it conducive for resources to submit economic bids instead of self-scheduling their energy?***

The CAISO should continue to eliminate and revise market rules that effectively punish suppliers for participating in its markets. For example, the CAISO should refine its Multi-Stage Generation (“MSG”) functionality. Currently, the MSG functionality results in frequent and unpredictable shifts between configurations for Calpine’s CCGTs that both increase costs and impose unwarranted wear and tear. Furthermore, low negative price floors combined with bid cost recovery rules expose suppliers to the risk of losing substantial revenues earned day-ahead or in other hours by making a resource available in real-time to the CAISO in a specific hour. The CAISO should also change Bid Cost Recovery so that losses in real-time are not offset

¹² A copy of *FCM Performance Incentives* (October 2012) is available at: http://www.iso-ne.com/committees/comm_wkgrps/strategic_planning_discussion/materials/fcm_performance_white_paper.pdf.

against profits from the day-ahead market, and losses from a single hour in real-time are not offset against profits from other hours of the real-time market on the same day.

F. Eligibility (Section 5.1)

- 10. *According to the proposal, a resource must be able to ramp and sustain energy output for a minimum of three hours to qualify as flexible. Is this a suitable condition to determine eligibility for flexible resource? (Section 5.1) Please explain why or why not.***

This criterion seems to reflect many of the characteristics of the resources that the CAISO will require to respond to the bigger and faster multi-hour ramps that it expects as more intermittent resources come on-line.

- 11. *Is the ISO proposed mechanism to modify the resource's master file to note flexible capacity as "dispatchable" appropriate? Please explain why or why not.***

- a. *What, if any, capacity procurement impacts on current resources due to the bundling requirement can be anticipated (positive and negative)? (Section 5.2)***

As suggested in the Joint Parties' Proposal, the treatment of existing RA contracts will be complicated for at least two reasons. First, it may be unclear whether existing contracts convey flexibility attributes to buyers. Second, to the extent that only a fraction of a resource that has both flexible and inflexible portions has been sold, determining whether the capacity that has been sold is flexible may be difficult.¹³

¹³ At the CAISO's December 20, 2012 stakeholder meeting, a representative of SCE suggested that it is the intent of the Joint Parties' Proposal to count any potentially flexible capacity under an existing RA contract as flexible and subject it to any enhanced must-offer associated with the sale of flexible capacity. If it is in fact the intent of the Joint Parties' Proposal to impose new performance requirements associated with sales of capacity that occurred prior to the introduction of flexible capacity requirements, Calpine strongly objects to this element of the proposal. Calpine believes that the determination of whether "flexible attributes" have been sold under existing contracts depends on the contracts themselves. To the extent that existing contracts may be ambiguous, any ambiguities should be resolved between counter-parties, not by new Commission rules and/or CAISO tariff provisions.

12. *How can the integrity of the master file be maintained?*

As it is currently, the integrity of the Master File can be maintained by periodic testing to ensure that resources are capable of performance consistent with their representation in the Master File.

13. *“Dispatchability” is as much a contractual term (i.e. bidding behavior) as it is a physical characteristic of a resource. How can generators list contractual terms in the MasterFile?*

Operating characteristics like ramp rates and start times would remain as they are and would reflect the physical characteristics of resources. A dispatchability flag would indicate whether a resource has been committed to provide economic bids that reflect the full flexibility associated with its operating characteristics. However, it is unclear how resources might be sold and committed to offer economic bids into CAISO markets that reflect less than their full physical flexibility.

G. Flexible Counting Conventions (Section 5.3.2)

14. *Joint parties evaluated three options for counting how a resource’s flexible capacity quantity would satisfy a flexible capacity procurement obligation. The three options are: 1) Pro-rata Option: Pro-rata sharing of flexible and generic capacity; 2) Differentiated Capacity Option: Distinguish flexible capacity from generic capacity; and 3) Count-all Option: Count all capacity from “dispatchable” generators as flexible.*

a. *Which option do you think is better and why? (Section 5.3.2)*

The Differentiated Capacity Option provides the strongest incentives to invest in additional flexibility, notwithstanding the potential difficulties in harmonizing must-offer requirements for the flexible and inflexible portions of a resource’s capacity under the approach.

b. What would the impact(s) be on RA contracting for each approach?

The Joint Parties' Proposal appropriately characterizes the contracting issues associated with each of the three approaches. Contracting would be the simplest under the Count-all Option. By not requiring parties to specify whether a MW transacted from a resource is generic or flexible, the Pro-rata Option is less complicated than the Differentiated Capacity Option. With the Pro-rata Option, each sale of capacity from a resource involves sales of a fixed ratio of flexible and generic MW. In contrast, contracting under the Differentiated Capacity Option would require the explicit identification of individual MW as flexible or generic.

Both the Pro-rata and Differentiated Capacity Options may require suppliers to offer capacity to the market that exceeds the capacity that they have sold as RA. For example, in order to ensure the availability to the CAISO of MW that have been sold as flexible RA, it may be necessary to also offer the inflexible capacity associated with a resource's PMin block of capacity, regardless of whether the PMin block has been sold as RA.

c. What would be the impact of each approach on different types of resources, and particularly on preferred resources?

Most preferred resources are unlikely to count as flexible under the CAISO's proposal.

15. Please comment on the proposed counting conventions for –

a. Non-use limited thermal resources (Section 5.3.3.1)

i. The proposal states that resources with start-up times greater than 90 minutes would be eligible to offer flexible capacity between PMin and NQC. Is 90 minutes an accurate threshold for startup time? What resources would be at an advantage or disadvantage if this threshold was adopted?

The Joint Parties Proposal establishes an arbitrary threshold at a 90 minute cold start with respect to whether the PMin block of a resource can be considered flexible. As described in

Calpine's response to question 2.e, a hard threshold at 90 minutes results in disparate treatment for nearly identical resources. In addition, an arbitrary threshold will attenuate incentives to invest in the improvement of the flexibility of resources. Such a threshold will limit incentives to shorten start times to the extent that an investment might fail to lower a resource's cold start time below the 90 minute threshold.

The proposed threshold is likely to favor CTs and relatively new CCGTs, which may satisfy the 90 minute threshold, and disadvantage older CCGTs, which generally do not. In addition, the threshold may also favor steam units relative to older CCGTs. Steam units generally have very long cold start times, but small PMin relative to their net qualifying capacities ("NQC"). Consider a hypothetical 700 MW steam unit which takes a day to start, but has a PMin of 100 MW and can ramp from its PMin to its NQC within three hours. The steam unit would have greater flexible capacity (600 MW) than a 600 MW CCGT that could start cold and reach its NQC within three hours if the cold start time of the CCGT were longer than 90 minutes.

The Commission should not allow for the perverse counting of the flexible capacity of CCGTs versus steam units. Such a counting convention fails to account for the additional flexibility associated with the option to start a CCGT within the operating day rather than day-ahead or earlier. In addition, and relatedly, the counting convention neglects the potential costs associated with operating steam units at PMin to ensure the availability of their dispatchable ranges to respond to ramps.

For instance, the counting convention neglects the cost of operating a resource at minimum load. These costs are generally compensated through Bid Cost Recovery mechanisms and socialized. Thus, there are limited incentives for an individual LSE to consider these costs in

its RA and other procurement. Consequently, rules that limit reliance on slow starting units to satisfy RA requirements may be warranted. Furthermore, operating resources at PMin in a way that is not reflected in clearing prices in CAISO markets potentially depresses clearing prices and reduces the revenues of resources that are committed and dispatched economically. As a result, the viability of resources that are economically dispatched and committed resources may be undermined, which in turn may necessitate additional out-of-market capacity compensation.

The Commission should modify the Joint Parties' Proposal regarding the proposed counting of steam turbines. As tentatively suggested in the CAISO's recently issued *Flexible Resource Adequacy Criteria and Must-Offer Obligation Straw Proposal*,¹⁴ the CAISO could limit the provision of flexible capacity to only those resources that can start within a certain time frame. The straw proposal suggests that "if a resource cannot start in less than 6 hours, then it is not eligible to provide flexible capacity."¹⁵ The Commission should count as flexible the capacity of a resource that could be available within five hours—roughly the time horizon of the CAISO's real-time unit commitment.

Such a limit would shift flexible capacity procurement towards resources that are actually flexible, including the ability to start within the day. In addition, the limit would also facilitate state environmental policy goals by shifting RA procurement away from resources that are likely to retire to comply with limitations on once-through-cooling and towards resources that face no such prospective restrictions on their operation.

¹⁴See *Flexible Resource Adequacy Criteria and Must-Offer Obligation-Market and Infrastructure Policy Straw Proposal* ("RA/Must-Offer Straw Proposal") at Section 9.1.2.2, at 16. A copy of the *RA/Must-Offer Straw Proposal* is available at <http://www.caiso.com/Documents/StrawProposal-FlexibleResourceAdequacyCriteriaMustOfferObligation.pdf>.

¹⁵ *RA/Must-Offer Straw Proposal* at 16.

Alternatively, the Commission could modify the Joint Parties' Proposal to de-rate the capacity of resources with long-start times to account for the fact that such resources may not be available to resolve reliability issues that arise after the day-ahead market closes or that such resources may require potentially uneconomic commitment to remain available. In the methodology that the Commission uses to assess the cost-effectiveness of demand response programs, those demand response programs that can be called day-ahead but not day-of are accorded a fraction of the capacity value of demand response programs that can be called day-of.¹⁶ In one recent application of this methodology, PG&E derated the capacity value of a day-ahead callable program by 12% relative to a similar program that is callable day-of.¹⁷

Instead of derating the capacity of a steam turbine to account for the fact that the resource might not be operating when it is needed, the capacity could be derated to account for the minimum load costs associated with keeping its dispatchable range consistently available. For example, suppose that maintaining the availability of a steam turbine's dispatchable range involves an additional 200 hours/month of operation at PMin relative to another resource that could be started more quickly. Suppose that the minimum load costs are \$3,000/hour,¹⁸ so that the incremental monthly PMin costs are \$600,000 (ignoring potential indirect effects on clearing prices of operating the resource when it is uneconomic).

Further, suppose that the value of the flexible RA associated with the resource's dispatchable range of 600 MW is \$2/kW month or a total of \$1.2 million. Accounting for its

¹⁶ See R.07-01-041, Section 3.C(1) of *2010 Demand Response Cost Effectiveness Protocols* (December 16, 2010). A copy of the *2010 Demand Response Cost Effectiveness Protocols* is available at:

<http://www.cpuc.ca.gov/NR/rdonlyres/7D2FEDB9-4FD6-4CCB-B88F-DC190DFE9AFA/0/Protocolsfinal.DOC>.

¹⁷ See A.11-03-001, *PG&E Application for Approval of Demand Response Programs, Pilots and Budget for 2012-2014, DR Reporting Template*. Compare cell D41 of the CBP_DA and CBP_DO tabs of http://www.cpuc.ca.gov/NR/rdonlyres/728FAD3B-E6F2-4300-8E69-859D36327E4A/0/PGE_DRReportingTemplate_approxDBP_Default.xls

¹⁸ 15 MMBtu/MWh*\$4/MMBtu for each MW of a resource's PMin block of 50 MW.

incremental PMin costs, such a resource has a value of \$600,000¹⁹ or half of its flexible RA value considered in isolation. Consequently, for flexible RA counting purposes, the capacity of the resource arguably should be reduced by half.

ii. *What would be the impact on flexible generators with slightly longer startup time (120 minutes – 180 minutes)?*

Most of Calpine’s CCGTs have cold start times in the 120-180 minute range. Calpine is in the process of exploring upgrades to reduce start times for these units. As discussed above in response to question 2.e, an arbitrary threshold of a 90 minute cold start provides minimal incentives to reduce start times to the extent that the 90 minute threshold cannot be reached.

In contrast, eliminating the 90 minute threshold would provide a marginal incentive to reduce start times. Consider a 600 MW resource with a 300 MW PMin and a 180 minute cold start time that can ramp at 10 MW/minute above its PMin. Under the proposed counting rules, 300 MW of the resource would be deemed flexible unless the start time could be reduced below the 90 minute cutoff. In the absence of the arbitrary threshold, the flexible capacity of the resource would increase by 10 MW for every minute by which the cold start time is reduced, up to the full 600 MW capacity of the resource.

Providing the right incentives for incremental changes in flexibility is important because the costs of improvements in flexibility are highly non-linear, so rewards for improvements in flexibility that are also highly non-linear are unlikely to lead to efficient investment. For example, a plant may be able to reduce its cold start time by 20 minutes for \$1 million in upgrades or it may save 40 minutes off its start time for \$10 million in upgrades. If there is no obvious reward for the smaller, cheaper investment, it may not be undertaken. Conversely, more

¹⁹ \$1.2 million-\$600,000.

expensive investments in flexibility may provide modest reliability benefits relative to their costs.

b. Use-limited thermal resources (Section 5.3.3.3)

The Joint Parties' Proposal acknowledges that must-offer obligations for use-limited resources remain undeveloped. However, the proposal suggests that "use-limited resources will have the opportunity to place economic bids that reflect the cost (including opportunity cost) of each dispatch."²⁰ Thus, potentially, the Joint Parties' Proposal inappropriately allows use-limited resources to comply with the flexible capacity must-offer by bidding sufficiently high such that they are infrequently dispatched. Since large ramps may be relatively frequent, it is unclear that a resource that is offered in a manner to limit its use offers the same value with respect to satisfying ramping-related reliability requirements as a resource that is not use-limited. The same concern is relevant to all use-limited resources including hydro, not only use-limited thermal resources. Such limitations might be addressed by derating the flexible capacity or resources to reflect use limits.

c. Multi-stage generation resources (Section 5.3.3.2)

The Joint Parties' Proposal recommends "combined cycle units base their flexibility on the resource's 1 x 1 configuration."²¹ If adopted, the Joint Parties' Proposal should be clarified to reflect Calpine's understanding of its intent - the capacity of a CCGT between its 1x1 PMin and its NQC, which may reflect capacity in a different configuration, such as 2 x 1, to count as flexible if the resource is capable of ramping and transitioning between 1 x 1 PMin and NQC within the allotted time.

²⁰ Joint Parties Proposal at 21.

²¹ Joint Parties Proposal at 21.

- d. Hydro resources (Section 5.4)**
 - i. The ISO and SDG&E recommend that the ISO establish a baseline output for hydro resources using the average hydro output over the previous five years. Is using an average output appropriate and what are the other approaches that can be adopted to calculate this value?**

See response to question 15.b.

- e. Intertie resources (Section 5.5)**
- f. Any other resources for which counting conventions should be developed.**

16. In order to increase transparency over RA capacity procurement, what data could be made public within confidentiality restrictions?

- a. What constraints should be imposed on sharing data such as ramp rate, PMin, PMax, or other values that may be considered confidential?**

The Commission should allow buyers and sellers of flexible capacity to share such information to the extent that it is necessary to consummate transactions. Sellers should be allowed to share publicly information about their relevant operating characteristics on a voluntary basis.

- b. What are the best options to resolve disclosure concerns?**
- c. What tariff or BPM rules restrict data release?**

The data, including projections of load and renewable generation profiles that are used to develop estimates of need, should be made publicly available.

17. *Should there be different qualitative and quantitative metrics of flexibility for demand response and storage resources?*
- a. *Is so, what characteristics or criteria could be used to quantify flexibility for storage devices and demand response?*
- b. *What demand response programs or types are most suitable for flexible resource eligibility?*

Performance requirements should be technology neutral and uniform.

H. General

18. *What are the specific impacts of the flexible capacity procurement initiative on procurement and contracting on Community Choice Aggregators and Electric Service Providers?*

At this time, Calpine has no specific comments on this question.

Respectfully submitted,

/s/

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