

Comments of Calpine Corporation on the

April 5, 2011

Discussion and Scoping Paper

Renewable Integration Phase 2

Summary:

Calpine applauds the CAISO's willingness to tackle a thorny set of market design issues that are directly related to renewable integration or will be exacerbated by renewable integration. As discussed in more detail below, Calpine encourages the CAISO to focus on three general areas: first, ensure that existing markets fully reflect all relevant operating constraints; second, utilize the renewable integration modeling framework to identify the renewable integration requirements associated with different renewable resources and requirements for capacity that is suitable for renewable integration; and third, either unilaterally or in concert with the CPUC procure capacity that is suitable for renewable integration on a spot and forward basis.

- *Fix existing markets*

The CAISO should focus on problems that should be fixed even in the absence of new operational challenges associated with renewable integration and the solutions to which have benefits that extend beyond their relevance to renewable integration. In particular, the CAISO should ensure that all relevant operating constraints, including minimum on-line commitment and ramping constraints are reflected appropriately in the price of some product. The absence of any reflection of minimum on-line commitment constraints in clearing prices is a problem with which the CAISO has struggled, first through exceptional dispatch and then through the direct incorporation of constraints into IFM algorithms, since the launch of MRTU.

The inability of the MRTU algorithms to commit capacity with sufficient ramping capability (i.e., FlexiRamp) is a newer problem that may grow as renewable integration increases ramps. If it proves impossible to reflect the costs associated with these constraints, and other similar constraints, in the price of existing products, then the CAISO should consider new products.

The failure to incorporate operating constraints in prices undermines CAISO markets in at least three ways. First, capacity is acquired with no price signal. Second, the

minimum load energy associated with the capacity suppresses energy prices. Third, not only does minimum load energy suppress energy prices generally, but it also tends to eliminate congestion and hence locational price signals.

Not only is the incorporation of commitment and ramping constraints into markets an efficiency issue. Calpine believes that it is also a legal and regulatory issue. There is a prima facie case that the CAISO's implementation of MOC in MRTU and its proposal to implement flexible ramping constraints are not just and reasonable. Specifically, these unpriced constraints (i) fail to compensate generators for providing a valuable capacity service; (ii) may result in uncompensated opportunity costs; (iii) alter the value of other load-following services, i.e. operating reserves and regulation; (iv) result in energy market price suppression; (v) bestow unreviewable discretion upon the CAISO to affect market outcomes; and (vi) are satisfied on a non-voluntary basis.

- *Identify renewable integration requirements but defer consideration of cost allocation*

While cost allocation according to "cost causation" has an intuitive appeal, in the renewable integration context, its application is likely to be particularly controversial and complex. For example, even if renewables with certain operating characteristics contribute disproportionately to renewable integration requirements, given the substantial volume of long-term RPS contracting that has already taken place, a direct allocation to the intermittent resources themselves may shift integration costs to generators with no means of recovering the costs or necessitate re-opening contracts.

On the other hand, it is very important that the integration costs associated with different resources be considered in procurement *going forward* so that load-serving entities can make efficient trade-offs between resources with different operating characteristics. The CPUC currently does not allow the investor-owned utilities that it regulates to use "integration adders" in assessing offers in renewables solicitations, not because the CPUC believes that integration costs should be ignored, but because no transparent estimates of such costs exist. Consequently, Calpine encourages the CAISO to use the renewable integration modeling framework that it has developed in collaboration with the CPUC and stakeholders to identify the renewable integration costs associated with different types of renewable resources. For example, the CAISO's renewable integration modeling has identified increased load following and regulation requirements associated with higher penetrations of renewables. The contribution of different resources to these requirements could be derived by modeling and comparing the load following and regulation requirements associated with different portfolios of renewables.

Relatedly, the CAISO should use its renewable integration modeling framework to identify requirements for renewable integration services, such as load following and regulation. Once requirements are identified, they can form the basis for procurement of various terms.

- *Pursue procurement of renewable integration services of various terms*

There is no well-defined revenue stream for renewable integration services and hence no clear incentive to provide these services from new or existing resources. The establishment of spot markets for renewable integration services and/or the reflection of renewable integration costs in the prices and volumes of existing products might encourage the provision of cost-effective renewable integration services. Spot market signals alone, however, are unlikely to provide sufficiently high and stable margins to encourage investment in new or existing resources, especially given recent experience with compensation from CAISO spot and other short-term markets. Only multi-year commitments such as those provided by forward capacity markets or multi-year bilateral contracting mandates are likely to encourage investment in and the maintenance of the resources necessary to ensure reliability in the face of the increased operational challenges associated with renewable integration. The CPUC is actively considering potential long-term contracting requirements associated with renewable integration in the LTPP. The fact that the CPUC is considering such requirements should not deter the CAISO from developing its own long-term products and requirements. Such products and requirements will complement whatever products and requirements are developed by the CPUC and/or provide an important backstop in the event that the CPUC fails to implement such products and requirements in a timely fashion.

It is important to establish multi-year procurement mechanisms for flexible resources soon. As has been documented extensively by the CAISO, the economic viability of existing merchant generation is questionable and is likely to be challenged further as more renewables come on line. These pressures are clearly illustrated in the DMM 2010 Market Issues and Performance Annual Report. At page 53, in Table 2.8 of that report, DMM presents its estimate of the market revenues collected by a new combined-cycle unit as \$30.60 per kilowatt-year. This represents a *drop* of 25 percent in revenues year-over-year while natural gas prices *increased*. This value is significantly below the going-forward costs of a new unit as represented on the previous page, in Table 2.7. The latent flexibility that is inherent in existing conventional generation and/or could be tapped with modest investment likely constitutes the fastest-to-market, least-expensive, and most environmentally preferred source of renewable integration services. Significant changes in ramp rate, start time, cycle time and turndown ratios only await product definition,

demand, price signals and adequate compensation. These low cost sources of flexibility may be lost if they are not tapped soon, i.e., units that have no means of recovering their costs in the near-term may not be available when they are truly needed as renewable integration requirements increase.

Prioritization

In light of the general priorities articulated above, we offer the following list of priorities.

Now (FERC filings by the end of 2011)

1. Price Capacity Constraints
2. Load Following
3. Flexible Ramping Constraint
4. Forward Capacity Markets
5. Forward Reserves Markets

Later (2012)

1. Pay for Performance Regulation
2. System Inertia and Frequency Response
3. Allocation of Integration Costs
4. 15-Minute RT Market

Much Later

1. Hourly Contingency-Only Election
2. Multi-settlement of A/S
3. Enhancements to RUC
4. Integration of VER Imports
5. Full Hour-Ahead Market
6. Uneconomic Adjustment of VERS

Comments on Specific Topics

In this section, we offer justifications for our prioritization beyond the justifications articulated above.

Now

Load (or Generation) Following

Calpine believes that there is already a sufficient indication of the need for a load (or generation) following product. The CAISO's intention to impose the flexible

ramping constraint is but one example. Others can be found in the 20 and 33 percent renewables integration study results. We need not wait until we are 95 percent confident of the specific need; the CAISO should move forward now with a spot market design.

The SP highlights some of the issues that will have to be explored and questions that will have to be answered in designing such a product. Such discussions should take a high priority on the CAISO's plan.

Forward Capacity and Reserves Markets

In this section of the SP, the CAISO asks the questions of "whether the current spot A/S markets offer sufficient revenues to elicit investment in the needed capacity types" and "would it be best to promote such investment through a CCM for RA capacity"?

As Calpine has consistently indicated, the current CPUC RA program in combination with the Long-term Planning and Procurement process ensures significant price discrimination between new and existing resources. This price discrimination forestalls investment in existing resources – the same resources that the CAISO will depend upon day-in and day-out to meet its load-service and integration requirements.

Further investment in these assets -- the cheapest and fastest-to-market path to greater flexibility -- are unlikely to be made without opportunities for existing assets to earn higher and more stable capacity revenues, either through changes in the RA program, changes in the structure of CPUC-mandated long-term procurement, or the introduction of new multi-year capacity markets by the CAISO or some other entity. Spot market reforms alone are unlikely to encourage investment as long as long-term procurement ensures that spot markets are saturated with supply. The CAISO can take an important role in pressing for changes or instituting changes within its own jurisdictional reach that create investment confidence. We encourage the CAISO to continue exploring its options now.

Later

Pay for Performance Regulation ("PFPR")

Calpine does not object to a measured pursuit of PFPR, but places it in a later priority. Nonetheless, given FERC's apparent direction, the CAISO may need to address this issue sooner rather than later.

Calpine finds it rather startling, however, that neither the 20 percent study, nor the results posted from the 33 percent study seem to indicate a need for “fast” regulation – as in regulation that can move in seconds or cycles rather than minutes. And certainly, there is no physical shortage of regulation as represented in the tables of the study with the nearly 20,000 MW of regulation-capable capacity currently in the CAISO.

Finally, the CAISO has indicated no specific concerns with the performance of regulating capacity and has apparently found its bifurcation of the product (up and down) satisfactory.

Without these findings of need, an investigation into PFPR seems to be a solution in search of a problem.

Allocation of Integration Costs (internal and external VERs) (Later)

Allocating costs to those who cause them is generally a solid principle. The use of cost-causation can beneficially affect upfront capital deployment and technology choice and later, can create significant incentives for cost reduction.

The SP focuses on one primary question – how an allocation of integration costs can provide long-term incentives for VERs to manage their own variability and reduce impacts on grid operations. Calpine agrees that the answer to this question, while obviously layered in controversy, is an important task in front of the CAISO.

Calpine supports exploratory discussions to develop a set of common objectives in the pursuit of new allocation methodologies. The range of possible objectives discussed in the initial stakeholder meeting, as broadly summarized below, could lead to very different allocation methods and outcomes.

- Efficient capital deployment
- Minimizing grid impacts and variability
- Reasonable allocation to beneficiaries
- Minimizing competitive distortions
- Avoiding unintended consequences

Time and experience will tell us the degree to which integration costs become significant, separable and unique. Calpine suggests exploration in the near term with a clear indication from the CAISO that integration costs will be allocated to VERs. However, given that we have not defined integration costs or products, it seems pre-mature to consider allocation methodologies.

Despite the complexities associated with *allocating* integration costs, Calpine believes that it is important for the CAISO to begin to develop resource- and/or resource-type specific estimates of integration costs so that, going forward, long-term procurement can consider and reflect estimates of integration costs. Thus far, the CAISO's renewable integration studies have provided estimates of the regulation and load following requirements associated with different portfolios used to meet 20% and 33% RPS requirements. The studies have avoided scrupulously attempting to estimate the impact of specific resources or classes of resources on the associated regulation and load following requirements. Calpine believes that such estimates are increasingly necessary to guide long-term procurement and encourages the CAISO to develop such estimates. Such estimates might be derived from a carefully developed set of simulations that measure the sensitivity of load following requirement and regulation requirements to changes in the portfolio of renewable resources. For example, the incremental load following and regulation impact of a particular wind project may be estimated by calculating the difference in the regulation and load following requirements associated with a baseline portfolio relative to a portfolio that also includes the wind project in question. While Calpine defers to the CAISO on the details of such a calculation, it seems that such estimates could be developed using only the statistical "Step 1" component of the CAISO's renewable integration model rather than both "Step 1" and "Step 2"—the more computationally-intensive production cost simulation component of the CAISO's renewable integration modeling.

System Inertia and Frequency Response (Later Priority)

Calpine generally understands and appreciates the CAISO's concerns with declining inertia and governor response as variable generation displaces conventional generation. We look forward to the results of the pending GE study, but do so with certain trepidation. The solution, of course, to declining inertia is most likely – more online capacity commitments, and absent change, more energy price suppression.

However, if there is a clear path to compensation, and a clear path to product differentiation (e.g., how is an inertial requirement different than a MOC) Calpine will support an aggressive rollout of this new constraint. For this reason, as a predecessor to establishing a new capacity constraint such as an inertial requirement, Calpine encourages the CAISO to find effective ways to "Reflect Constraints in Market Prices."

15 Minute Market (Later Priority)

We place this in the “later” and not “much later” category for only one reason – 15 minute scheduling *at the interties* could offer substantial benefits. Specifically, we see hourly scheduling at the interties as a significant constraint during morning and evening ramps. Likewise, as renewables penetration rises, more flexible imports and exports could facilitate productive interregional diversity. The CAISO should continue to work with regional partners in investigating the benefits of 15 minute intertie scheduling.

Much Later

Calpine views the following as 2013 and beyond projects, if indeed they are found to have value in new circumstances.

Hourly Contingency-Only Designations (Much Later)

Calpine sees little incremental value in this product and believes that staff should be focused on higher priority tasks.

Full Hour Ahead Market (Much Later)

Calpine agrees with the CAISO that the potential benefits of this third market appear much lower than both the direct costs and the lost opportunity of focusing on higher priority items.

Uneconomic Adjustment Priority for VERs (Much Later)

Calpine agrees with the CAISO that there are significant issues of possible discrimination and unintended consequences associated with the proposed preference for VER self-schedules over conventional self schedules. Given the infrequent occurrence of self-schedule cuts, we see little value in pursuing this likely highly controversial proposal at this time.

Multi Settlement System for A/S (Much Later)

The ability to buy back and sell A/S closer to real time might be a useful enhancement in the future, but other more pressing matters should be the current focus of the CAISO

Enhancements to RUC (Much Later)

No party in the stakeholder meeting on Phase 2 indicated a belief that there would be any significant volumes of non-zero priced RUC procurement in the near term. We see no need to focus on RUC at this point in time.

Thank you.