BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

Order Instituting Rulemaking to Integrate and Refine Procurement Policies and Consider Long-Term Procurement Plans	Rulemaking 13-12-010 Filed December 19, 2013

REPLY COMMENTS OF THE CALIFORNIA INDEPENDENT SYSTEM OPERATOR CORPORATION

Pursuant to the Administrative Law Judge's November 16, 2015 Ruling (Ruling) Requesting Comments on Modeling Methodology Staff Proposal (Staff Proposal), the California Independent System Operator Corporation (CAISO) hereby files these reply comments.

I. Introduction

On December 4, 2015, the CAISO and other interested parties filed initial comments on the Energy Division Staff Proposal (Staff Proposal) regarding the long-term procurement plan (LTPP) modeling methodology. The CAISO's reply comments respond to issues raised by parties in their initial comments.[1] The CAISO's reply comments focus on the following issues: (1) the definition of "loss of load event" for deterministic modeling; (2) the recommendation to allow renewable generators to provide upward ancillary services; and (3) recommendations to use traditional loss of load probability (LOLP) modeling to determine future capacity shortfalls.

II. Discussion

A. Deterministic Loss of Load Event Definition

UCS/SC, Calpine, and PG&E all note that the definition of "loss of load event" in the Staff Proposal does not reflect the priority order of ancillary services and load following maintained by the CAISO.

1) UCS/SC:

> "UCS/SC observe that the event definitions with respect to reserves should be made consistent with the violation order for reserve products that has been implemented in the models. This is especially important for the deterministic

[1] These reply comments address issues raised by Calpine Corporation (Calpine), the Office of Ratepayer Advocates (ORA), Pacific Gas & Electric Company (PG&E), The Utility Reform Network (TURN) and the Union for Concerned Scientists/Sierra Club (UCS/SC).

definition of an event, as the staff proposal suggests that some load following-up shortfalls will be counted as events, but not non-spinning shortfalls or a portion of the spinning shortfalls (the spinning reserve requirement is 3% of load and the event threshold is 1.5%). However, the order in which the models will violate reserves is, from first to last: load following-up, non-spinning, spinning, regulation up, and finally unserved energy. The Commission's proposal for a deterministic event therefore skips over non-spinning reserves and half of the spinning reserve requirement."[2]

2) Calpine:

"Calpine does not understand the Staff Proposal's justification for including an allowance for load following-up but not non-spinning reserves in its "loss of load event" definition for deterministic modeling. At least in the California Independent System Operator's ("CAISO") deterministic simulations, when reserve shortages arise, load following-up is depleted first, followed by non-spinning reserves, spinning reserves, and finally regulation. Staff's definition of a loss of load event should reflect the same hierarchy."[3]

3) PG&E:

"The CAISO invokes Stage 3 (rolling blackouts) when spinning reserves fall below about 3 percent of load. The CAISO also protects regulating reserves (about 1.5 percent of load) in addition to maintaining a minimum of 3 percent spinning reserves with Stage 3 rolling blackouts."[4]

These comments correctly point out that the proposed "loss of load event" definition for deterministic modeling does not correctly reflect the priority order of ancillary services and load-following in the CAISO market and in the CAISO's LTPP modeling. In the CAISO market, in the event there is an insufficient supply of ancillary services, the CAISO will first deplete non-spinning reserves, while maintaining sufficient capacity to meet the requirements for spinning and regulation-up. If there is still insufficient supply after the CAISO has depleted all non-spinning reserves, the CAISO will then deplete spinning reserves, which will trigger a Stage 3 Emergency, thereby allowing the CAISO to shed load to restore lost spinning reserves. Even in a Stage 3 Emergency the CAISO market will strive to maintain resources to meet regulation-up requirements.

[2] Comments of UCS/SC on Proposed Revisions to LTPP Modeling Methodology (UCS/SC Comments), p. 7.
[3] Comments of Calpine on Modeling Methodology (Calpine Comments), p. 4.
[4] Comments of PG&E on Energy Division Proposal RE Long-Term Procurement Plan Modeling, p. 6.

This priority order is also reflected in the CAISO LTPP model. In the model, load following-up has lower priority than non-spinning reserves. The CAISO must completely deplete load following-up before a shortfall in non-spinning will occur. The Commission's proposed standard does not correctly reflect the priority order of ancillary services and load following-up in the model. The CAISO continues to support its initial proposal defining a loss of load event, which would define a loss of load event as a loss of more than 50 percent of load following-up, any contingency reserves, regulation-up or unserved energy. To the extent that the Commision adopts a lesser threshold to define a loss of load event, the order should be consistent with CAISO practices and modeling.

B. Allowing Renewable Generation to Provide Upward Ancillary Services and Load-following

In its initial comments, UCS/SC suggests "that the Commission work with stakeholders and modelers to determine a set of reasonable assumptions with respect to which renewable generators can provide reserves, and in what magnitude, and at what cost."[5] To do this, UCS/SC suggests that the Commission use the following assumptions: (1) "most or all renewables installed from present day forward would be able to contribute to load following;"[6] and (2) "any incremental renewable energy installed to meet RPS targets above 33% could contribute to all reserve products (load following, regulation, spinning, and non-spinning)."[7]

The CAISO agrees that it is possible to use renewable generation to provide upward ancillary services and load-following. However, there are challenges that need to be addressed prior to relying on a signficant portion of renewable generation to meet reserve requirements. For example, under the CAISO tariff, to qualify to provide upward ancillary services—including regulation-up, spinning and non-spinning reserves—a resource must be able to be dispatched to and maintain its output for at least 30 minutes at its awarded output level (awarded output level level includes generation schedule plus the awarded capacity for non-spinning, spinning and regulation-up).[8] For a

[5] UCS/SC Comments, p. 3.
[6] Id.
[7] Id.
[8] CAISO Tariff Section 8.4.1.1 ("Regulation capacity offered must be dispatchable on a continuous basis for at least sixty (60) minutes in the Day-Ahead Market and at least thirty (30) minutes in the Real-Time

renewable resource to satisfy this requirement, the resource must be curtailed or held back below its forecast production, but the maximum amount of reserves the resource provides may be less than the amount held back because available resources will be limited by the minimum forecast level over the subsequent 30 minute interval. As a result, accurate and reliable renewable generation forecasts are necessary to determine the reserve capability of renewable generation. The table below provides an example:

Table 1

A Total Generator Capacity (MW)	B Curtailment (MW)	C (A – B) Actual Generation (MW)	D Forecast Minimum Generation over Subsequent 30 Minutes (MW)	E (D - C) Reserve Capability (MW)
100	10	90	95	5

Table 1 also illustrates the potential economic limitations that would impact a renewable generator's desire to bid reserve capabilities into the CAISO market. In the example above, the generator curtailed output by 10 MW but was only able to provide 5 MW of reserve capacity. Typically, this would be an uneconomic decision because the revenue from providing 5 MW reserves may not be sufficient to recover the loss of revenue from holding back 10 MW of generation. However, in circumstances where the renewable generator expects to be curtailed to maintain reliability, it would be reasonable to assume that the renewable generator would be able to provide upward reserves with the curtailed generation. The CAISO supports exploring the possibility of using renewable generation to provide upward ancillary services in these circumstances. The CAISO suggests to begin with an approach that considers providing upward reserves from renewable generation that is otherwise being curtailed in the model for either

Market after issuance of the Dispatch Instruction."); CAISO Tariff Section 8.4.3 ("Spinning Reserve and Non-Spinning Reserve Capability. Each resource or external import of a System Resource scheduled to provide Spinning Reserve and each resource providing Non-Spinning Reserve must be capable of converting the full capacity reserved to Energy production within ten (10) minutes after the issue of the Dispatch Instruction by the CAISO. Each resource scheduled to provide Spinning Reserve and each resource scheduled to provide Non-Spinning Reserve must be capable of maintaining that output or scheduled Interchange for at least thirty (30) minutes from the point at which the resource reaches its award capacity.")

economic or reliability purposes. The CAISO also supports exploring a sensitivity that will allow renewable resources to provide upward ancillary services at other times, but with a cost comparable to the cost of renewable curtailment. To that end, the CAISO is exploring a pilot program to gain operational experience regarding how renewable generators can participate in the ancillary services markets or provide other reliability services such as frequency response.

C. Using Traditional LOLP Models to Determine Capacity Needs

Several parties suggest using traditional LOLP models to address future capacity needs.[9] The CAISO supports the parties to conduct their analyses using traditional LOLP models in the LTPP proceeding. However, the Commission should use the results of such modeling only as a supplement to the results of the production simulations. Traditional LOLP modeling focuses on meeting load during peak load hour and does not consider the effects of variable resources or flexibility needs. As a result, traditional LOLP approaches are unable to accurately and reliably assess capabaility needed in a system with large quantities of renewable energy. Most traditional LOLP models rely on an assumed net qualifying capacity (NQC) for variable generation resources (including wind, solar and hydro). The NQC represents an average value over a defined time period. Accordingly, it does not accurately reflect the actual output of the variable generation resources at specific system peak time. Assessing flexibility and capacity needs requires a production simulation.

The CAISO's modeling in this proceeding illustrates the importance of continuing to use the production simulation modeling. The CAISO modeling consistently found capacity shortfalls in hours 18-20. These shortfalls occurred after the peak load hour when solar generation production dropped and prior to the evening reduction in load.[10] Analysis that does not consider actual production shapes for variable generation resources will not capture such capacity shortfalls.

[9] Calpine Comments, p. 1-2; Comments of TURN on Modeling Methodology Staff Proposal, p. 2.
[10] Nov. 20, 2014 Phase 1.A. Stochastic Testimony of Dr. Shucheng Liu, p. 11.

III. Conclusion

The CAISO appreciates this opportunity to provide reply comments and looks forward to the Commission's decision regarding LTPP modeling methodologies.

Respectfully submitted,

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Dated: December 11, 2015