

**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

**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 comments.

**I. Introduction**

The CAISO generally supports the Energy Division Staff’s efforts to develop common definitions, metrics and standards in this proceeding. It is necessary to clearly define the circumstances in which the Commission will authorize procurement to meet reliability needs. The Staff Proposal makes significant progress in advancing a comprehensive framework that will allow all parties to better (1) understand the deterministic and stochastic study methodologies and the results produced, and (2) identify need based on those results. In these comments, the CAISO provides suggestions regarding how and when modeling should be used to determine procurement needs and resource authorization.

**II. Discussion**

**A. Staff Recommendation on Loss of Load Event (Section 3.4.1)**

The CAISO appreciates Staff’s effort in clearly defining a loss of load event while taking into account numerous diverging viewpoints. The CAISO addresses the following issues require further clarification in Section 3.4.1: (1) the amount of spinning reserves available during a “loss of load event;” (2) calculating load following-up reserves; (3) when the Commission will authorize additional capacity procurement; (4) need for a set reference case; and (5) the additional capacity needed for “unsolved over-generation.”

*i. Minimum Spinning Reserves*

The CAISO believes that the Staff Proposal regarding the amount of spinning reserves to be depleted to prior to identifying a “loss of load event” is incorrect and does not reflect the

relevant reliability requirements. The Staff Proposal defines a “loss of load event” in stochastic models as a condition in which “effective operating reserves deplete to 2.5% of hourly load or less (1.0% regulation + 1.5% spinning reserves).”<sup>1</sup> The Staff Proposal similarly defines a “loss of load event” for deterministic models as a condition that occurs “when effective operating reserves deplete to 3.5% of hourly load or less (1.0% regulation + 1.5% spinning reserves +1.0% load following-up).”<sup>2</sup>

The Staff Proposal developed these definitions based on proposals by the CAISO and The Utility Reform Network (TURN) and comments by other parties involved in the Working Group One process. Additional clarification of the original CAISO proposal is necessary to accurately reflect the North American Electric Reliability Corporation (NERC) and Western Electricity Coordinating Council (WECC) reliability standards. Section 3.3.3 of the Staff Proposal states that the CAISO’s proposed definition of a “loss of load event” is properly characterized as being based on WECC operating reserve requirements.<sup>3</sup> This section notes that an “Emergency Stage 3” occurs when the spinning reserve portion of contingency reserves depletes, or is anticipated to deplete below the WECC operating reserve requirement and cannot be restored. The Staff Proposal also correctly notes that WECC requires spinning reserves to be no less than 50% of total operating reserve requirements.<sup>4</sup> However, the Staff Proposal incorrectly states that the CAISO’s operating reserve requirements are not “directly mandated by WECC.”<sup>5</sup>

To the contrary, Standard BAL-002-WECC-2 requires the CAISO to maintain contingency reserves “equal to the sum of three percent of hourly integrated Load plus three percent of hourly integrated generation.”<sup>6</sup> This results in a requirement for the CAISO to maintain contingency reserves equal to approximately six percent of load. The same standard further requires that fifty percent of these reserves must be met with spinning reserves, which are defined as being both “immediately and automatically responsive to frequency deviations through the action of a governor or other control system” and “capable of fully responding

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<sup>1</sup> Staff Proposal, p. 14.

<sup>2</sup> Id.

<sup>3</sup> Id at p. 11.

<sup>4</sup> Id.

<sup>5</sup> Id. at 12.

<sup>6</sup> BAL-002-WECC-2(B)(R1). <http://www.nerc.com/files/BAL-002-WECC-2.pdf>.

within ten minutes.”<sup>7</sup> To maintain this level of contingency reserves in compliance with WECC standards, CAISO Operating Procedure 4420 allows the CAISO to initiate firm load interruptions. Because this is the point at which firm load interruptions may occur, it is proper to define a “loss of load event” as the depletion of spinning reserves below 3.0% of load rather than the 1.5% as indicated in the Staff Proposal.

The CAISO also notes that maintaining spinning reserves at 3.0% of load does not constitute “double-counting” of forced outages.<sup>8</sup> As stated above, once spinning reserves drop below 3.0% of load, the CAISO may interrupt firm load. Although these reserves are intended to address contingency events, BAL-002-WECC-2 requires the CAISO to maintain reserves *even after* the contingency event has occurred. The standard provides a very narrow exception that total contingency reserves may fall below required levels in the 60-minute window after the contingency event, but even in that 60-minute window the CAISO may shed firm load to regain the required level spinning reserves to avoid cascading outages. If the Commission chooses to make procurement decisions designed to maintain spinning reserves at only 1.5% of load, its procurement will not be designed to meet NERC and WECC requirements.

*ii. Clarification Regarding Load Following-Up Reserves*

As stated above, the Staff Proposal “loss of load event” definition for deterministic modeling includes maintaining load following-up reserves at 1.0% of hourly load. The CAISO notes that its Step 1 process calculates hourly load following-up requirements to meet intra-hour variability based on actual system conditions. This may result in load following-up requirements greater or less than 1.0% of load. Load following-up requirements are not directly proportionate to load; rather, such requirements vary largely based on both load and supply variability. Hence, in certain low-load conditions prior to an expected ramp up in load, load following up requirements may be relatively high. Conversely, in certain high load conditions where little change is expected, load-following up requirements may be relatively low.

The CAISO will continue to calculate load following-up requirements based on expected system conditions. The CAISO’s original proposal indicated that load following-up reserves should be maintained at fifty percent of the CAISO calculated requirement to avoid a “loss of load event.” The CAISO continues to believe that this standard better reflects system needs than

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<sup>7</sup> BAL-002-WECC-2(B)(R2). <http://www.nerc.com/files/BAL-002-WECC-2.pdf>.

<sup>8</sup> Staff Proposal, p. 14. *See also*, Staff Proposal, p. 13, FN 44.

a requirement based on hourly load conditions because the calculation is tied to both load and supply intra-hour variability. If the Commission chooses to adopt a load following-up requirement based on hourly load, it should be aware that this requirement will not be suited to meet actual intra-hour variability load levels are not proportional to variability.

*iii. Clarification Regarding Additional Capacity Procurement Authorization*

For deterministic models, the Staff Proposal indicates that “Additional capacity to meet standard” will be equal to the “loss of load event” magnitude of the hour with the largest “loss of load event” in the modeling. The Staff Proposal is not clear whether any identification of need for additional capacity based on the deterministic results will directly trigger the consideration of a procurement authorization by the Commission. The CAISO recommends that the Commission clarify that it intends to authorize additional procurement for additional capacity required to meet its defined reliability standard for a loss of load event from the deterministic results. This clarification is necessary in order to provide clear expectations regarding when additional capacity is necessary.

The CAISO notes that the procurement requirements based on stochastic modeling are even less clear. Though the Staff Proposal notes, and the CAISO agrees, that deterministic studies will be used for procurement in the near future, the stochastic modeling metrics should be clarified in the expectation that stochastic modeling will be used for procurement at some point going forward. For stochastic modeling, the metrics for loss of load expectation (LOLE), loss of load hours (LOLH),<sup>9</sup> and normalized expected unserved energy (EUE) each have separate standards that might indicate additional capacity need. The Commission should clarify that a failure to meet *any* of these separate standards will result in authorization to procure additional capacity to meet the identified standards in the event that stochastic modeling is used for needs determination in the future.

*iv. Need for a Reference Case*

Consistent with the CAISO’s section A.iii above, the CAISO also recommends that the Commission adopt a clear reference case for making procurement decisions going forward. In past proceedings, the Commission has studied multiple cases to provide a broad set of possible

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<sup>9</sup> The CAISO notes that the LOLH metric identifies a need for additional capacity to reduce LOLH to 2.4 hours per year. The CAISO proposed metric recommended that additional capacity should be required to reduce LOLH to 0.7 hours per year based on the studies performed by Roy N. Billinton and others. Because the 2.4 hours per year limit is not independently supported, the CAISO continues to recommend use of a 0.7 hour per limit.

future grid conditions. The Staff Proposal contemplates continuing this path while also incorporating a number of “sub-cases” with varying load, wind and solar profiles. In this context, the CAISO believes it is increasingly important to identify a reference case that can be used to identify needs and authorize additional capacity. Failing to identify a reference case could result in a proliferation of information that is not necessarily probative in determining whether additional capacity procurement is necessary. Further, a reference case can provide the most likely set of conditions that can then be tested with sensitivity studies. This approach provides the benefit of clarity in determining when additional resources will be procured.

v. *Unsolved Over-Generation*

Currently, the Table 4 of the Staff Proposal notes that additional capacity to meet “unsolved over-generation expectation” in stochastic modeling is “not applicable.”<sup>10</sup> CAISO believes that the Staff Proposal should also note that further work is required to develop standards to identify additional capacity necessary to address unsolved over-generation because as it currently reads, Table 4 seems to indicate that there are no circumstances in which additional capacity will be needed to address “unsolved over-generation.”<sup>11</sup>

The Commission should also work to develop a maximum upper bound for allowable renewable curtailment. Development of this upper bound should focus on consideration of economic cost and operational challenges of frequent and large-scale over-generation.

**B. Staff Recommendation For Modeling Techniques (Section 4.1.1)**

The CAISO strongly supports the Staff Proposal’s finding that it is most appropriate to rely on deterministic models to inform procurement in the near future. The Commission should continue to pursue stochastic modeling but for now, determinations regarding additional capacity needs should be based on deterministic modeling because the inputs, the methodologies and outputs are currently more accepted by the stakeholder community. The Commission should not use the results of the stochastic modeling to delay identifying reliability needs and authorizing future procurement.

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<sup>10</sup> Staff Proposal, p. 18.

<sup>11</sup> Id. at 17.

### **C. Staff Recommendation on Accounting For Greenhouse Gas Emissions (Section 4.2.1)**

CAISO agrees with the Staff Proposal’s recommendations to use deterministic models as the primary tool for reporting greenhouse gas (GHG) emissions and look at WECC wide impacts on GHG emissions in those deterministic studies. As pointed out in the Staff Proposal, it is important to understand how California policies affect GHG output in the greater western United States. Considering California GHG emissions in isolation would not accurately reflect broader GHG reduction efforts. Deterministic modeling is better suited to provide detailed WECC-wide information related to GHG emissions and to incorporate GHG cost in the simulation when information becomes available. The stochastic models do not currently provide sufficient GHG granularity outside of the CAISO footprint.

### **D. Staff Recommendations of Iteration Specific Results (Section 4.3.1)**

The CAISO agrees that the Staff Proposal’s identification of iteration-specific results will provide a robust and transparent data set for evaluation, but cautions the Commission that collecting, processing, and producing this detailed data on an hourly level will require significant time and effort. The CAISO looks forward to working with the Commission and other parties to determine how to most efficiently produce and share this information.

### **E. Deterministic Modeling (Section 6.1)**

During the normal long-term procurement plan cycle there is typically only sufficient time to study a few scenarios based on a single year historical profiles. The deterministic model validation in the Staff Proposal indicates that “multiple historically based deterministic load profiles for a future year” will be created. The CAISO cautions that this process will take time and may not be accomplished within a single long-term procurement plan cycle.

### **F. Stochastic Modeling (Section 6.2)**

As with the deterministic model validation discussed above, the CAISO notes that the evaluation of overall probability distributions and profiles and “deep dives” that extract and analyze key modeling variables recommended in the Staff Proposal will take considerable time to develop and report.

### **G. Regional Generation Requirement Modeling (Section 6.4)**

The CAISO notes that it is currently working to replace the regional generation requirement with a frequency response requirement that will more accurately reflect system

needs. The CAISO will work with the Commission and stakeholders to determine how to best model the frequency response requirement and identify what resources can meet the requirement.

### **III. Conclusion**

The CAISO appreciates Energy Division Staff's efforts to develop clear metrics and validation techniques for long-term procurement plan modeling. The CAISO believes that the clarifications above are important to ensuring that the modeling accurately reflects reliability requirements.

Respectfully submitted,

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