

BAMX Comments on the CAISO Frequency Response Issue Paper and August 13 Stakeholder Call

The Bay Area Municipal Transmission group (BAMx)¹ appreciates the opportunity to comment on the CAISO Frequency Response Issue Paper. The comments and questions below address the Issue Paper and the associated August 13 stakeholder call. BAMx appreciates the importance of adequate levels of frequency response in achieving a robust grid and looks forward to continuing to work with the CAISO on this issue.

Understanding Whether and To What Extent There is an Existing Performance Gap

The Issue Paper summarizes the CAISO's frequency response requirement under NERC BAL-003-1 as both 218 MW/0.1 Hz² and 775 MW of upward response.³ The referenced BAL-003-1 indicates that the Balancing Authority's (BA) Frequency Response Measure (FRM) for the past 12 months will be calculated at the median of the reported Single Event Frequency Response Data (SEFRD) values. As for the past performance, the Issue Paper included a chart in Table 3 that identifies 25 underfrequency events in 2013, the CAISO BA's response and its obligation for each. The chart indicates that at times its frequency response exceeded its obligation and at time its response was deficient. This section should be expanded to include:

1. A discussion of how the Frequency Response Obligation (FRO) shown in the chart, which varies by event, relates to the two static values noted above.
2. A discussion of how the performance shown relates to the FRM, which is the median performance over the identified events.
3. Include additional years to better understand whether 2013 was representative. Ideally this would facilitate understanding the impacts of hydroelectric generation conditions as well as the impact of a growing level of inverter-based generation.

Improved Utilization of Existing CAISO Frequency Response Capabilities

A potential contributing factor to a decline in frequency response identified in the Issue Paper is the use of outer-loop control by generators that tends to counteract the governor droop response by returning the generator to its pre-disturbance generation schedule. Unlike some BAs where there are penalties for deviating from a generator schedule, CAISO does not have such penalties, but rather only accounts for such deviations at the nodal price. Therefore, if generators are not being penalized for governor response, the CAISO should survey existing generators to determine: 1) whether they have such outer-loop controls installed and active, 2) reasons and sensitivities for having such controls engaged, 3) the response time for such controls, and 4) the willingness for the generators to voluntarily slow the response time for any such active control.

¹ BAMx consists of Alameda Municipal Power, City of Palo Alto Utilities, City of Santa Clara, Silicon Valley Power, and the Port of Oakland.

² CAISO Frequency response Issue Paper, p. 4

³ *ibid.* p. 11

Optimization of Generator Droop Settings to Improve CAISO's FRM

Many generators have a governor droop setting at 5% based upon the the old WECC Minimum Operating Reliability Criteria (MORC) requirements.⁴ However, the current WECC PRC-001-WECC-CRT-1.1 (Governor Droop Setting Regional Criterion) allows under WR1 that:

Each Generator Owner shall set the governor droop for each generating unit to greater than or equal to 3 percent but less than or equal to 5 percent.

This requirement includes the following guidance:

The 3-to-5 percent range provides a balance between frequency regulation and system stability. If the setting is too low, there could be system instability and negative damping of low frequency oscillations. If the setting is too high, larger frequency dips could result in under frequency load shedding.

Typically, the droop settings are at 5 percent. It is recommended that hydro units be maintained at 5 percent for stability reasons.

The above requirement allows for a range of droop settings that would potentially yield an improved response over a flat 5% setting for all generators. For example, a CAISO-coordinated plan under WECC PRC-001 recommending response settings of 5% for hydroelectric, 4% for other synchronous generation and 3% for batteries could potentially improve the CAISO BA FRM. Certainly any such settings should be tested through simulations to verify that overall system performance is improved.

Frequency Response from Asynchronous Wind and Solar Generators

The Issue Paper poses the question as to whether the CAISO should explore a requirement that asynchronous generators have primary frequency response capability. Presumably such generators are currently operating to maximize energy deliveries and their instantaneous output is limited by either their inverter capacity or wind/solar energy input.⁵ BAMx supports provision of frequency response in a manner that minimizes the expected overall cost. Therefore, before BAMx can assess its support for obtaining frequency response from asynchronous generators, more development is needed to review how such a requirement fits into an overall plan that minimizes lost opportunity costs.

The Role of Energy Storage in Frequency Response

⁴ To provide an equitable and coordinated system response to load/generation imbalances, governor droop shall be set at 5%. Governors shall not be operated with excessive deadbands, and governors shall not be blocked unless required by regulatory mandates. – WECC MORC, April 2005, p.5

⁵ There may be other possible cases, such as the production being limited by interconnection capacity. However it is expected that such cases would be the exception.

With its fast response capability and its potential to quickly switch from charging to discharging, as well as its potential for dispersed installation, electric battery energy storage would appear to offer much potential in providing frequency response. Except at times of full discharge or lack of charge, energy storage with good control systems should be capable of a response much faster than conventional generation. Such a quick initial response would improve the CAISO BA FRM by responding to a underfrequency event more quickly than other BAs. This fast response would slow the overall frequency decay more quickly, so that the frequency nadir is increased. In such cases a similar frequency response from the CAISO BA could result in an improved FRM since it would be a large part of the overall reduced WECC-wide response. BAMx encourages the CAISO to explore an enhanced role for energy storage in providing frequency response.

The Role of Vehicle Electrification in Frequency Response

While likely not a near term solution, the CAISO should work with the CEC and/or the IEEE to include a frequency response requirement in electric vehicle charging equipment. Similar to battery energy storage, such response could be rapid and dispersed. The short duration of an under-frequency event is unlikely to adversely impact a charging cycle. However, an important element to success is establishing such requirements early in the implementation process before significant penetration of charging stations.

Use of the Existing or Modifying the Existing Spinning Reserve Requirement

The Issue Paper indicated that one option is to use, potentially with modification, the existing spinning reserve procurement in order to meet the NERC frequency response requirement. In order to better understand this option, more information is needed as to how the existing program would be used. For example, would greater amounts of spinning reserve need to be procured? Would the amount of spinning reserve that may be carried on a single unit be impacted by this program? What is the expected cost impact of any such changes?

Lastly, before undertaking the development of a new market product for frequency response, BAMx encourages the CAISO to first leverage its existing frequency response capabilities by developing a metric to monitor its current capabilities, understanding the barriers to obtaining the full response of its existing resource fleet, working to remove or relax any such barriers and exploring the potential for for new technologies to contribute to frequency response.

BAMx appreciates the opportunity to comment on the CAISO Frequency response initiative.

If you have any questions concerning these comments, please contact Robert Jenkins (888-634-0777 and robertjenkins@flynnrci.com)