Flexible ramping product refinements – Implementation Update

May 18, 2022

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1 Introduction

The flexible ramping product (FRP) was introduced into the real-time market to manage energy ramping capability and address forecast uncertainty that materializes between market runs caused primarily by load and variable energy resources. It also compensates resources for being positioned by the market's multi-interval optimization for forecast ramping needs. Prior to the FRP implementation, the CAISO observed that the multi-interval market optimization would solve forecasted net load by utilizing the precise amount of ramp needed across the market horizon. However, when system conditions changed in subsequent market runs, the market would lack sufficient ramping capability in the real-time dispatch.

FRP secures additional ramping capability that can be dispatched in subsequent market runs to cover uncertainty in forecasted net load (i.e., load forecast net of variable energy production). Resources providing this ramping capability are compensated at the marginal opportunity cost (which is related to the cost of energy) for both forecasted movement and uncertainty awards.

Due to issues identified in the September 2019 CAISO Energy Markets Price Performance Report[1] in which a significant amount of FRP capacity procured to address uncertainty is not deliverable because the market awards it to resources behind transmission constraint, the CAISO undertook the *Flexible Ramping Product*

[1] The report is available at http://www.caiso.com/Documents/FinalReport-PricePerformanceAnalysis.pdf

Refinements initiative[2] to develop a locationally modeled FRP as well as make other improvements. The CAISO Board authorized filing tariff changes to implement the enhancements resulting from the *Flexible Ramping Product Refinements* initiative in October of 2020. The CAISO plans to file the tariff changes to implement these enhancements to FRP in the near future so that they can be implemented this enhancement as part of its Fall 2022 market software release.

These refinements are significant changes to increase the effectiveness of the existing flexible ramping product. Those changes can be generally classified as 1) procuring FRP on a nodal basis ensuring deliverability, 2) developing a new methodology to calculate uncertainty, 3) preserving the procured FRP through the real-time pre-dispatch processes buffer interval, and 4) developing a new FRP requirement and cost allocation based on the results of the WEIM RSE.

In the meantime, between the approval of FRP changes and the schedule Fall 2022 implementation, the CAISO undertook an initiative[3] to enhance the accuracy of the WEIM resource sufficiency evaluation (RSE). A key premise in discussions with stakeholders is that a balancing authority area's (BAA's) failure of the RSE would result in its WEIM energy transfers being limited to the amount in the previous market interval before the interval failed. There was general consensus that transfers should not be reduced to zero, as that could jeopardize the failing BAA's reliability.

Elements of the changes developed in the *Flexible Ramping Product Refinements* initiative change the consequences of failure of the RSE in ways that may exacerbate resource insufficiency in emergency conditions. Under the FRP changes, transfers (above base schedule transfers) could be reduced to zero. Further the RSEE initiative has indicated a preference within the stakeholder community to leverage the WEIM to facilitate emergency energy assistance which counters the FRP refinements design of isolating a BAA.

2 FRP Allocation within the WEIM

This section of the paper discusses the current FRP allocation and treatment within the WEIM as well as the proposed change.

[2] California ISO - Flexible ramping product refinements (caiso.com)

[3] California ISO - WEIM resource sufficiency evaluation enhancements (caiso.com)

2.1 Existing FRP Allocation

FRP is currently procured with a BAA-specific requirement for each BAA within the WEIM area, and a system requirement for the entire WEIM area. As part of this, BAAs are then able to get credit for the available NIC/NEC[4] of their BAA to reduce the amount of its BAA-specific requirement that must be met by resources within its BAA. To the extent that each BAA's minimum requirement is met, the system requirement can be met from anywhere within the WEIM footprint. Should a BAA fail the RSE, it will lose credit for the diversity benefit in the derivation of its minimum requirement. However, it will still be available to access WEIM transfers up to the amount cleared in the previous 15-minute interval, and it will receive credit for the ability to ramp down existing WEIM transfers.

2.2 *Flexible Ramping Product Refinements* initiative FRP Requirement Methodology

The changes developed in the *Flexible Ramping Product Refinements* initiative would modify how the real-time market determines the FRP procurement requirement for each BAA in the WEIM. Under these changes, the market would determine an FRP requirement for the group of BAAs that pass the WEIM RSE in a market interval. This would include a diversity benefit that can be accessed through the ability to engage in incremental transfers. The real-time market would calculate a separate individual FRP requirement for any BAA that fails either the capacity or flexible ramping sufficiency tests in the WEIM RSE. To implement this, the market would not schedule energy transfers into BAAs that fail the RSE that are greater than transfers represented in base schedules. In addition, each BAA that fails the WEIM RSE BAA would have a full FRP requirement absent any diversity benefit, and would receive no credit due to its transfers being restricted only to those scheduled as base schedules. i.e. the greater of zero or the net base transfer.

This isolation of BAAs that fail the RSE allows for the settlement of flexible ramp movement and uncertainty in alignment with the drivers of those requirements. The passed group's requirement will be met from resources within that group and the cost

[4] Net Import Capability / Net Export Capability

will be allocated to the drivers of forecasted movement and uncertainty within that group.[5] The failed BAAs would have their FRP procurement costs allocated individually and their FRP requirement would be met in full from their internal resources while the uncertainty requirement would be a BAA-specific individual requirement.

3 Consequences for failure of the WEIM RSE

The WEIM RSE runs a capacity test to ensure each participating BAA brings sufficient supply to meet their forecasted obligation, as well as sufficient flexibility to ensure the supply made available is able to meet forecast variations in net demand in the upcoming hour. Following the failure of either the capacity test or flexible ramping sufficiency test, the WEIM will limit additional incremental WEIM net transfer in the direction of failure to the less restrictive of the net base transfer or the net transfer cleared in the previous 15-minute interval. Limiting net transfer to that in the previous interval ensures that WEIM transfers cannot be used to cure a capacity shortage, while not creating a potential reliability issue by reducing those WEIM transfers during an emergency situation.

The FRP refinements design proposes to change this consequence to ensure the isolation of a BAA that fails the WEIM RSE's capacity or flexible ramping sufficiency test.

4 Conflict with current resource sufficiency evaluation design

The change to isolate a balancing authority that fails the WEIM RSE, and reduce the WEIM net transfer to the less restrictive of the net base transfer or zero, is appropriate to align the FRP cost allocation with the procurement of the FRP product. However, the reduction of WEIM transfers after a WEIM entity fails the RSE has the potential to create reliability issues. For example, to the extent that any import transfers above zero have been scheduled in the previous run for a BAA that has failed the upward RSE in the next interval, reducing the net transfer import in the next run worsens the ability to meet the BAA's demand, potentially causing a reliability problem.

[5] Forecasted Uncertainty Costs shall be distributed to the passed group uncertainty Category (Supply, Intertie, or Load) and then allocated in proration of the resource Deviation to the total category deviation

Forecast Movement Costs shall be allocated in proration of the BAA Metered Demand to the total passed group Metered Demand.

For the CAISO, the interaction of WEIM energy transfers and the real-time market's hour-ahead scheduling process's (HASP's) clearing of non-WEIM exports at the CAISO interties has the potential to create additional reliability issues for the CAISO BAA. HASP exports from the CAISO may be optimally cleared based on advisory WEIM transfers into the CAISO resulting from supply offers from WEIM participants. To the extent that WEIM transfers have cleared to support HASP exports, reducing the WEIM transfers to zero would result in the CAISO BAA being responsible for meeting these HASP exports entirely from resources within its control area or through emergency energy assistance. This increases the risk to CAISO BAA if the available supply is not sufficient to cover all the obligations.

5 Proposed resolution

The CAISO proposes to implement the FRP refinements with a modification to the isolation of a BAA following failure of the capacity or flexible ramping sufficiency tests of the RSE. The CAISO will ensure nodal deliverability by testing the optimal solution in the base scenario, as well as the upwards and downwards FRP deployment scenarios. The CAISO will continue to allow incremental transfers above the base transfer in the base scenario but will implement a constraint within the market that will fix the net transfer in the upwards and downwards FRP deployment scenarios[6] to the net transfer in the base scenario. This will ensure that incremental dynamic WEIM transfers will continue to be limited to the least restrictive of the net base transfer or the net transfer in the previous interval, while not allowing the FRP requirement of the BAA that fails the RSE to be met by FRP awards to external resources. This solution will adhere to the policy objective of ensuring that no FRP procured in the BAA pass group meets any of the requirement of the BAA that has failed the RSE.

The solution preserves the settlement of flexible ramping product for the group of balancing authorities who pass the test, separately from a BAA that fails the test. Due to the multi-interval optimization's knowledge of limitation of transfers in the flexible ramping product deployment scenarios, the optimal solution may increase energy transfers into a balancing authority that has failed the RSE. This is because energy and FRP are fungible commodities; increasing energy transfers into the failed BAA unloads supply capacity inside that BAA that can in turn be used to meet FRP requirements.

[6] California ISO - Draft Technical Description Flexible Ramping Product Procurement and Deployment Scenarios

This solution also affects the pricing signal for FRP. As the FRP price is determined based upon the opportunity cost of preserving flexibility by withholding dispatch for energy, WEIM dynamic transfers into the failed BAA may result in a lower FRP marginal price.