



June 26, 2023

The Honorable Kimberly D. Bose
Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Washington, DC 20426

**Re: California Independent System Operator Corporation
Docket No. ER15-2565-____
May 2023 Informational Report
Energy Imbalance Market – Transition Period Report –
Avangrid Renewables WEIM Entity**

Dear Secretary Bose:

The California Independent System Operator Corporation (CAISO) hereby submits its report on the transition period of Avangrid Renewables WEIM Entity during its first six months of participation in the Western Energy Imbalance Market (WEIM) for May 1 through May 31, 2023. The Commission also directed the Department of Market Monitoring (DMM) to submit an independent assessment of the CAISO's report, which the CAISO's DMM will seek to file within approximately 15 business days.

Please contact the undersigned with any questions.

Respectfully submitted

By: /s/ John Anders

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California ISO

Western Energy Imbalance Market

May 1 - May 31, 2023

Transition Period Report

Avangrid Renewables (AVRN) WEIM Entity

June 26, 2023

I. Introduction and Background

On October 29, 2015, the Federal Energy Regulatory Commission (Commission) approved the California Independent System Operator Corporation's (CAISO) proposed tariff amendments to allow a transition period for new Western Energy Imbalance Market (WEIM) entities during the first six months of WEIM participation, effective November 1, 2015.¹ Avangrid Renewables (AVRN), the prospective WEIM Entity entered the WEIM on April 05, 2023, and the transition period will apply to the AVRN balancing authority area (BAA) until September 30, 2023.²

During the six-month transition period, the price of energy in the new WEIM entity's BAA is not subject to the pricing parameters that normally apply when the market optimization relaxes a transmission constraint or the power balance constraint. Instead, during the six-month transition period, the CAISO will clear the market based on the marginal economic energy bid (referred to herein as "transition period pricing"). In addition, during the six-month transition period, the CAISO sets the flexible ramping constraint relaxation parameter for the new WEIM entity's BAA between \$0 and \$0.01, but only when the power balance or transmission constraints are relaxed in the relevant WEIM BAA. This is necessary to allow the market software to determine the marginal energy bid price.

Consistent with the Commission's October 29 Order, the CAISO and the Department of Market Monitoring (DMM) will file informational reports at 30-day intervals during the six-month transition period for any new WEIM entity. The CAISO provides this report for AVRN to comply with the Commission's requirements in the October 29 Order. The CAISO anticipates filing these reports on a monthly basis. However, because the complete set of data is not available immediately at the end of the applicable month,³ and depending on the market performance each month, along with the need to coordinate with the WEIM entity, the CAISO expects to continue to file the monthly reports approximately 25 days after the end of each month in order to provide the prior full month's data.

¹ *California Indep. Sys. Operator Corp.*, 153 FERC ¶ 61,104 (2015) (October 29 Order).

² This follows from the application of CAISO Tariff section 27(b)(1), which refers to a number of months rather than a number of days.

³ The earliest the CAISO can start gathering the data is 10 business days after the last day for the reporting month since this is when the price correction window expires.

II. Highlights

Overall, AVRN's transition into the WEIM was smooth and without significant issues. The market performance highlights for May are as follows:

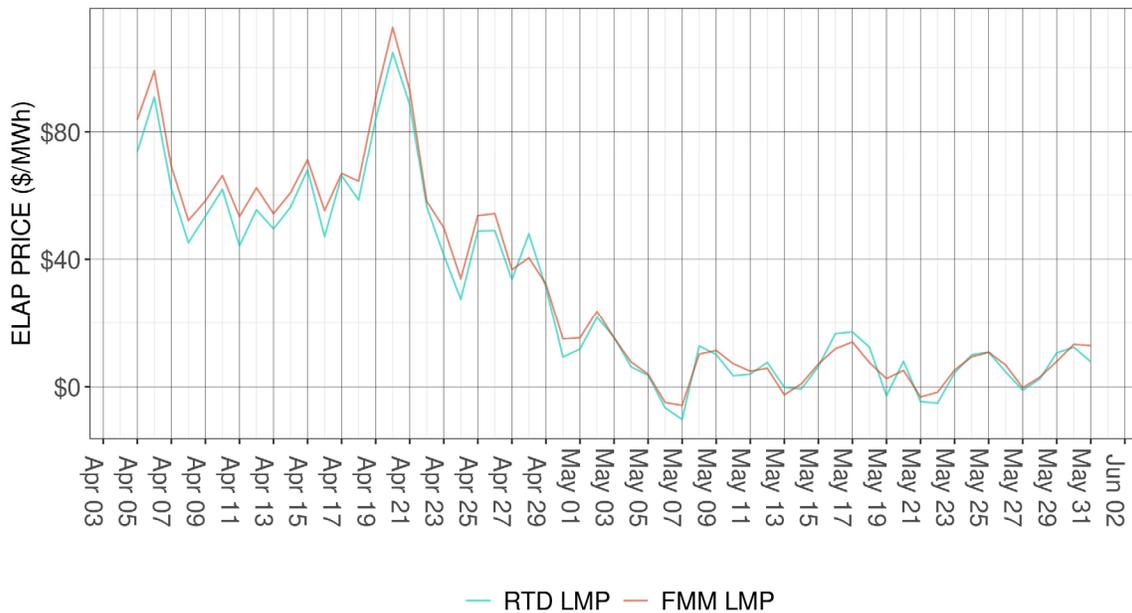
- Prices were stable and within reasonable ranges for AVRN BAA, with a monthly average price of \$6.61/MWh in the fifteen-minute market (FMM) and \$6.07/MWh in the five-minute real-time dispatch (RTD).
- AVRN BAA observed two infeasibilities for undersupply in the fifteen-minute market and 27 instances in the five-minute market.
- As part of the resource sufficiency test performed for each WEIM entity prior to the real-time markets, AVRN successfully passed over 98.38 percent of its balancing tests and 100 percent of its bid-range capacity tests.
- As part of the resource sufficiency test, AVRN passed successfully 99.26 percent of its upward flexible ramping sufficiency tests.
- The price for upward flexible ramping capacity in the FMM for the AVRN BAA averaged at \$1.20/MWh, while prices for the downward flexible ramping product averaged \$0/MWh.

III. Market Performance Related to the Transitional Period

a. Prices

Figure 1 shows the daily average Fifteen-Minute Market (FMM) and Real-Time Dispatch (RTD) prices in the AVRN WEIM Load Aggregation Point (ELAP) for April 05, 2023 to May 31, 2023. May’s monthly average price in the FMM was \$6.61/MWh and \$6.07/MWh in the RTD.

Figure 1: Daily average prices for the AVRN BAA



Under the CAISO’s price correction authority in Section 35 of the CAISO tariff, the CAISO may correct prices posted on its Open Access Same-Time Information System (OASIS) if it finds: (1) that the prices were the product of an invalid market solution; (2) the market solution produced an invalid price due to data input failures, hardware or software failures; or (3) a result that is inconsistent with the CAISO tariff. The prices presented in Figure 1 include all prices produced by the CAISO consistent with its tariff requirements. That is, the trends represent: (1) prices as produced in the market that the CAISO deemed valid; (2) prices that the CAISO could, and did, correct pursuant to Section 35 of the CAISO tariff; and (3) any prices the CAISO adjusted pursuant to the transition period pricing reflected in Section 29.27 of the CAISO tariff.

b. Frequency of Power Balance Constraint Infeasibilities

Figures 2 and 3 show the frequency of intervals in which the power balance constraint was relaxed for under-supply conditions in the AVRN BAA for the FMM and RTD, respectively. The under-supply infeasibilities are classified into three categories: Valid, Corrected and Would-Be-Corrected. Those under-supply infeasibilities, which are impacted by either data input failures or software failures where the ISO performed price correction pursuant to Section 35 of the CAISO tariff, are classified as Corrected. There are other under-supply infeasibilities that were impacted by data input failures or software failures; and which would be subject to price correction, but were not corrected because the price after correction would be the same price as that obtained by the transition period pricing. These instances are classified as Would-Be-Corrected. All remaining under-supply infeasibilities, which were driven by system conditions, are classified as Valid. The two under-supply infeasibilities in FMM were driven by failed Flexible Ramping Sufficiency tests in the up direction paired with low renewable generation. There were 27 RTD infeasibilities in May, the majority of which were caused by failures of the resource sufficiency tests paired with reduction of renewable generation from RTPD to RTD.

Figure 2: Frequency of FMM under-supply infeasibilities in the AVRN BAA

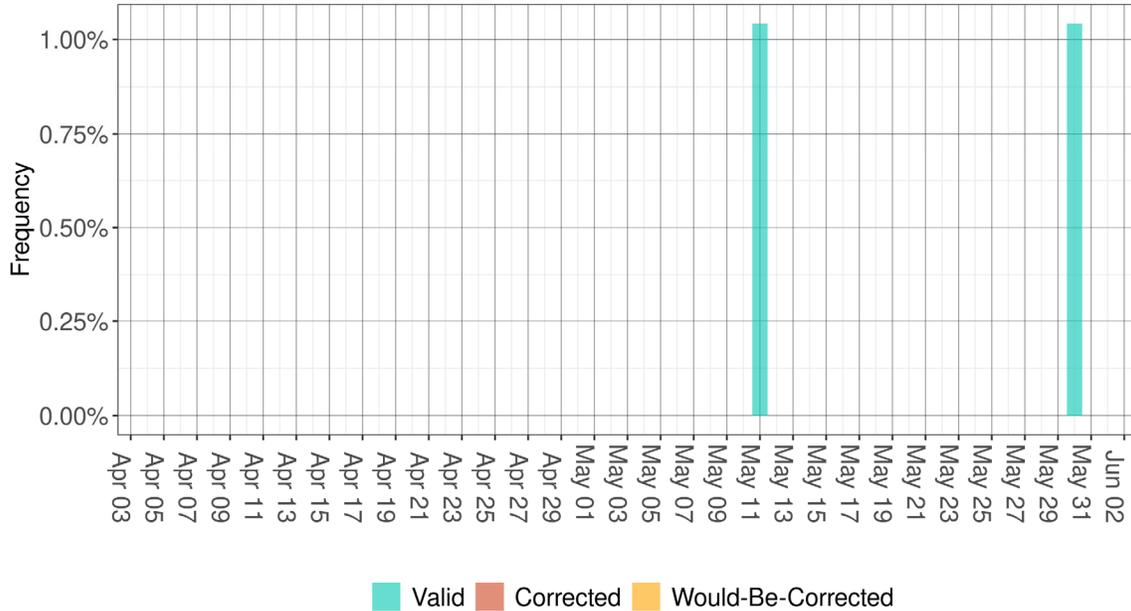
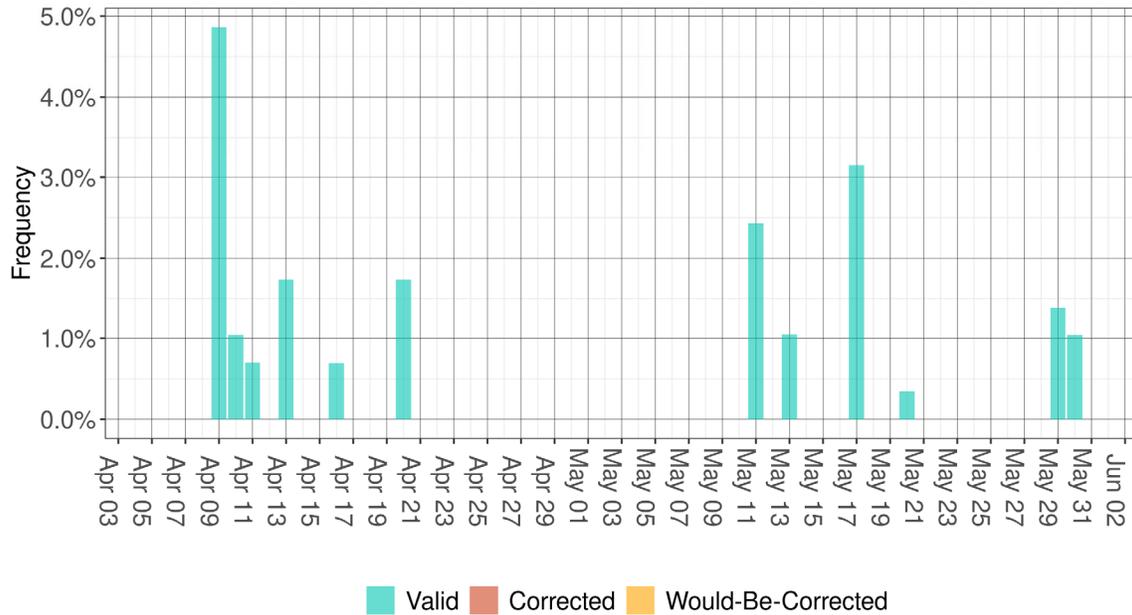


Figure 3: Frequency of RTD under-supply infeasibilities in the AVRN BAA



Tables 1 and 2 list the valid FMM and RTD intervals with infeasibilities observed in May.

Table 1: List of valid FMM under-supply infeasibilities in the AVRN BAA

Trade Date	Trade Hour	Trade Interval	MW Infeasibility	Load Conformance
05-11-2023	24	1	5.30	0
05-30-2023	11	1	4.34	0

Table 2: List of valid RTD under-supply infeasibilities in the AVRN BAA

Trade Date	Trade Hour	Trade Interval	MW Infeasibility	Load Conformance
05-11-2023	24	2	11.6	0
05-11-2023	24	3	7.22	0
05-11-2023	24	4	7.19	0
05-11-2023	24	5	4.18	0
05-11-2023	24	6	4.88	0
05-11-2023	24	7	4.88	0
05-11-2023	24	8	6.53	0
05-13-2023	21	10	211.06	150
05-13-2023	21	11	190.29	150
05-13-2023	21	12	209.75	200
05-17-2023	22	1	18.57	30

05-17-2023	22	2	18.25	30
05-17-2023	22	3	18.7	30
05-17-2023	22	7	27.9	30
05-17-2023	22	8	30.64	30
05-17-2023	22	9	34.39	30
05-17-2023	23	1	29.33	30
05-17-2023	23	2	28.3	30
05-17-2023	23	3	26.98	30
05-20-2023	22	12	3.6	210
05-29-2023	13	1	139.28	70
05-29-2023	13	2	133.56	70
05-29-2023	13	3	144.51	70
05-29-2023	17	5	5.65	20
05-30-2023	11	1	347.97	80
05-30-2023	11	2	267.45	0
05-30-2023	11	3	451.67	200

c. Balancing and Sufficiency Test Failures

The WEIM provides an opportunity for various BAAs to serve their load while realizing the benefits of increased resource diversity. Since the WEIM does not include resource adequacy requirements or obligations for resources to submit bids, the CAISO performs a series of resource sufficiency tests comprised of: (i) a balancing test; (ii) a capacity test; and (iii) a flexible ramping sufficiency test. These tests occur prior to the real-time market. Performance of a balancing test before each trading hour ensures that each participating BAA submits a balanced base schedule of generation and a net schedule interchange to meet its demand. In addition, the participating BAA is required to submit bids with enough ramping capability to meet its net load forecast uncertainty and net load movement requirements. Figure 4 shows the trend of balancing test outcomes for the period of April 05, 2023, through May 31, 2023, and Figure 5 shows the pattern of bid-range capacity test outcomes for the same period.⁴ If a balancing test or the bid-range capacity test is affected by data input failures or a software failures, those test results are shown as correctable events. The AVRN BAA passed the balancing test in 98.38 percent of the intervals in May, which is within the acceptable range of balancing test failures. The balancing test failures were caused by resource outages that limited the energy base schedules. The AVRN BAA passed the bid-range capacity test in 100 percent of intervals.

⁴ The CAISO performs resource sufficiency tests pursuant to Section 29.34(k) of the CAISO tariff.

Figure 4: Frequency of Balancing test failures in the AVRN BAA

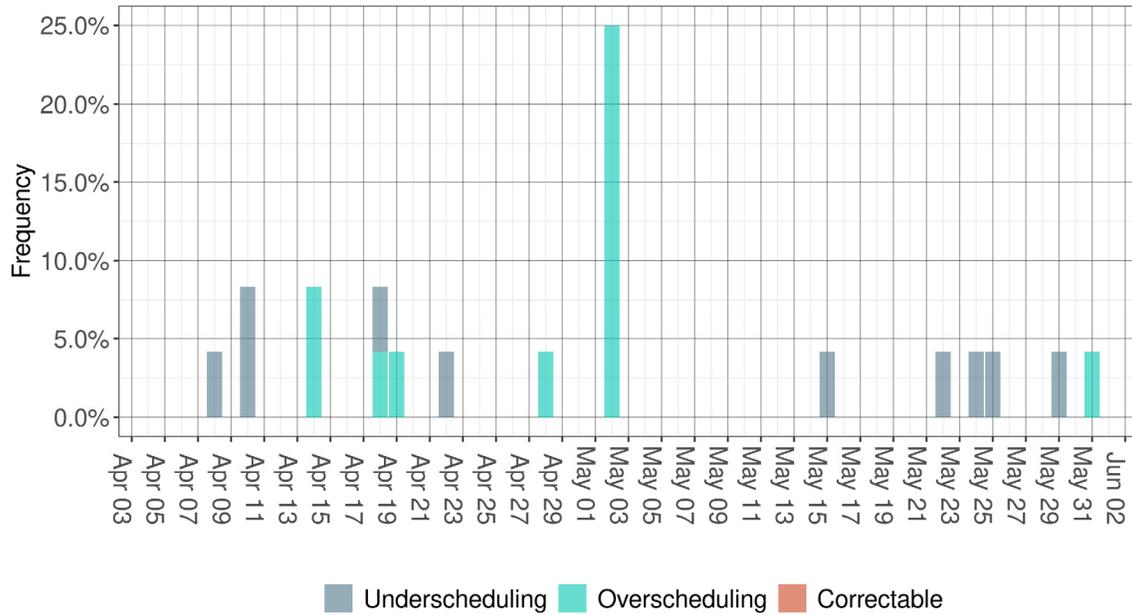
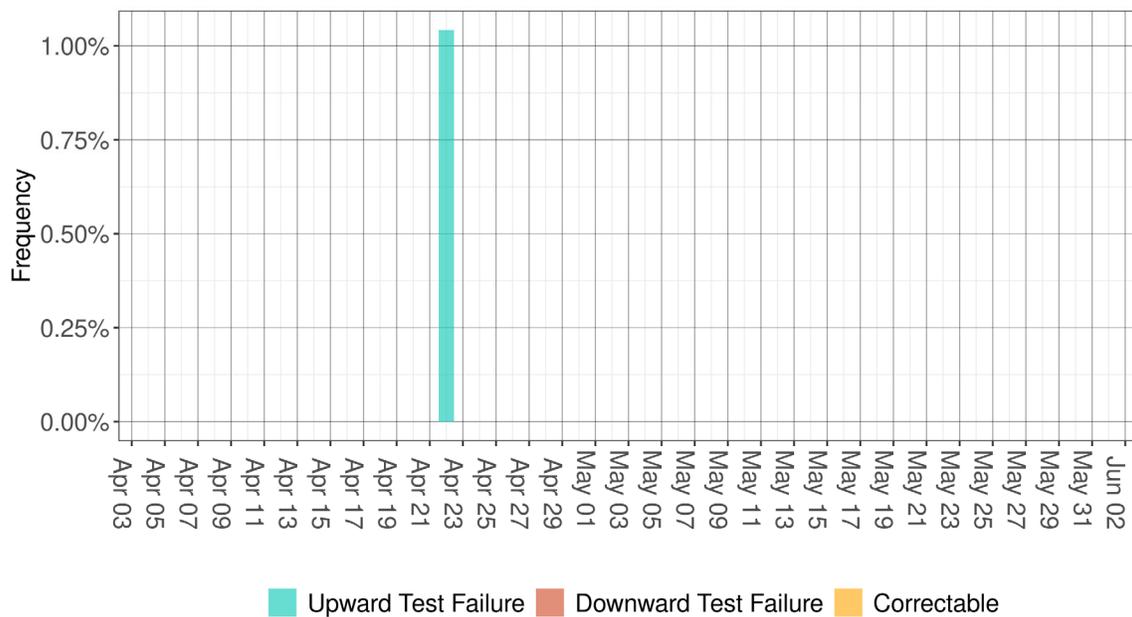
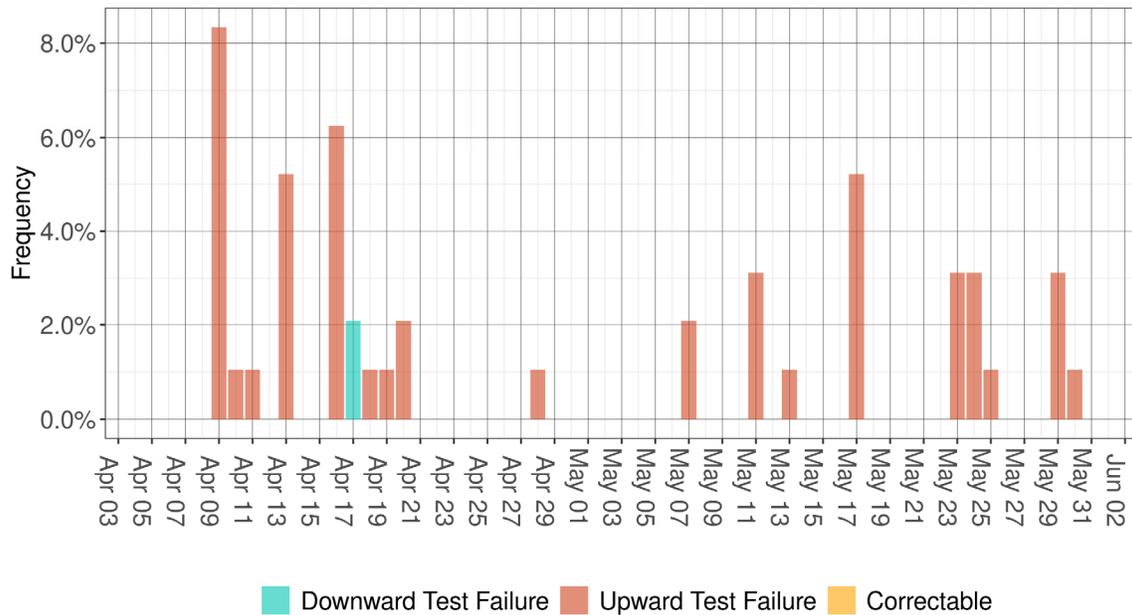


Figure 5: Frequency of Bid Range Capacity test failures in the AVRN BAA



The CAISO also performs the flexible ramping sufficiency test as specified in Section 29.34(m) of the CAISO tariff. Figure 6 shows the trend of the test failures for flexible ramping for the period of April 05, 2023 through May 31, 2023. The AVRN BAA passed the flexible ramp up and down tests in 99.26 percent of the intervals in May. The flexible ramping failures for AVRN were largely the result of trying to balance swings in renewable generation forecasts with hourly block imports and exports, along with relatively little dispatchable generation.

Figure 6: Frequency of Flexible Ramping Sufficiency test failures in the AVRN BAA



d. Flexible Ramping Product

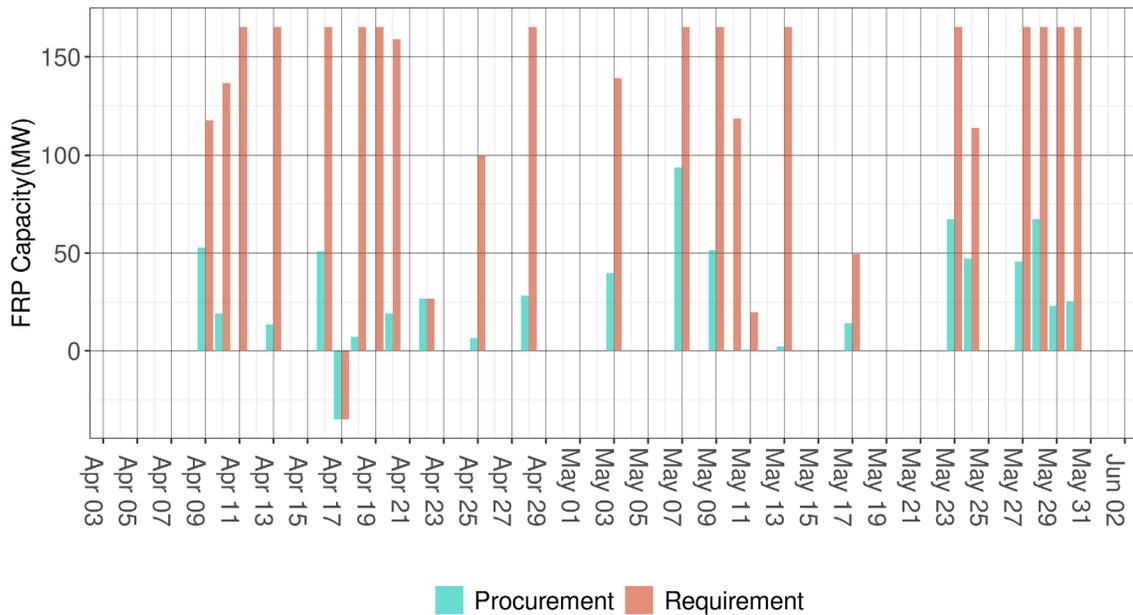
Figure 7 shows the daily average of the upward and downward flexible ramping constraint requirement and procurement in the FMM for the AVRN BAA. Figure 8 shows the daily average of the upward and downward flexible ramping constraint prices in the FMM for the AVRN BAA.

The implementation of the flexible ramping product refinements on February 1, 2023, included changes to the requirement calculation, procurement, and pricing for the flexible ramping product. As part of these refinements, each BAA only needs to procure its own flexible ramping requirement when it fails the flexible ramping test or the bid range capacity test. If the BAA fails the test in the upward direction, it will need to procure its own flexible ramping up requirement, and if it fails the test in the downward direction it needs to procure its own flexible ramping down requirement. When the BAA passes the test, it is pooled with all other entities that pass, and the requirement and procurement of flexible ramping are determined at the pass group level. There are thresholds in place to ensure no single entity procures an outsized share of the pass group flexible ramping requirements. Both the BAA and pass group requirements are set based on historical forecast deviations for load, wind, and solar.

For each interval, a demand curve is created based on the historical cost of the uncertainty, and both the BAA and the pass group can use both the demand curve and their resources to procure their requirement at least cost. This is the main reason why the individual AVRN procurement may fall below the individual AVRN flex ramp requirement. The requirement shown in Figure 7

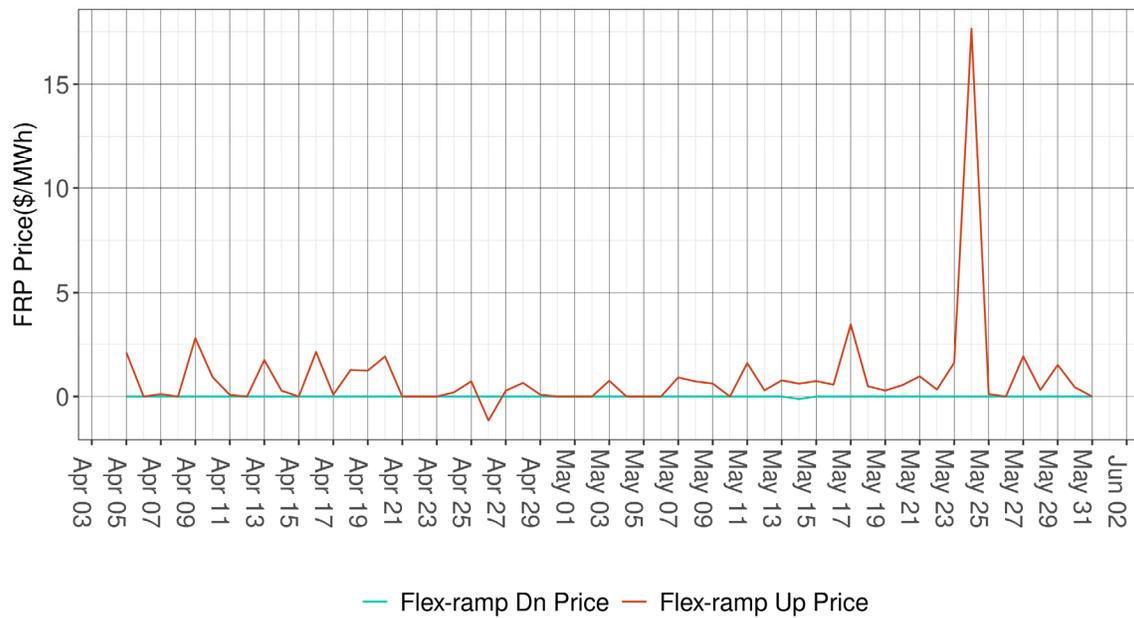
below only includes intervals in which AVRN failed one of the resource sufficiency tests and had to procure their own flexible ramping product, it does not include the requirements when they were part of the pass group. If a BAA fails the flexible ramping test or the bid range capacity test at T-55 minutes prior to the start of the next trading hour, the BAA will have its own FRP requirement and financially binding resource flexible ramping product awards and prices in the first 15-minute interval of the trading hour in FMM as the associated FMM process is executed after the tests at T-55.

Figure 7: Daily average requirement and procurement of upward and downward flexible ramping in FMM



The price trend provided in Figure 8 is the FMM flexible ramping product price applicable to the AVRN BAA in each interval averaged over each day. When the BAA passes the flexible ramping sufficiency test and the bid range capacity test, the price will be set by the pass group flexible ramping shadow price. When the BAA fails either test, the price will be set by the individual AVRN BAA flexible ramping shadow price. In May, the average upward flexible ramping capacity price was \$1.2/MWh and the average downward flexible ramping capacity price was \$0/MWh. The individual BAA or pass group flexible ramping pricing can drop below zero due to the inclusion of congestion in the flexible ramping product price formation as part of the flexible ramping product refinements.

Figure 8: Daily average price for upward and downward flexible ramping in FMM



CERTIFICATE OF SERVICE

I hereby certify that I have served the foregoing document upon the parties listed on the official service list in the above-referenced proceeding, in accordance with the requirements of Rule 2010 of the Commission's Rules of Practice and Procedure (18 C.F.R. § 385.2010).

Dated at Folsom, California, this 26th day of June 2023.

/s/ Ariana Rebanco
Ariana Rebanco