



May 28, 2021

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-\_\_\_\_  
April 2021 Informational Report  
Energy Imbalance Market – Transition Period Report –  
Public Service Company of New Mexico EIM Entity**

Dear Secretary Bose:

The California Independent System Operator Corporation (CAISO) hereby submits its report on the transition period of Public Service Company of New Mexico EIM Entity during its first six months of participation in the Energy Imbalance Market (EIM) for April 2021. 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

**Energy Imbalance Market**

**April 1 – April 30, 2021**

**Transition Period Report**

**Public Service Company of New Mexico (PNM) EIM Entity**

May 28, 2021

## 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 Energy Imbalance Market (EIM) entities during the first six months of EIM participation, effective November 1, 2015.<sup>1</sup> Public Service Company of New Mexico (PNM), the prospective EIM Entity entered the EIM on April 1, 2021, and the transition period will apply to the PNM balancing authority area (BAA) until October 1, 2021.

During the six-month transition period, the price of energy in the new EIM 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 EIM entity's BAA between \$0 and \$0.01, but only when the power balance or transmission constraints are relaxed in the relevant EIM 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 EIM entity. The CAISO provides this report for PNM 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,<sup>2</sup> and depending on the market performance each month, along with the need to coordinate with the EIM 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.

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

<sup>2</sup> 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, PNM's transition into the EIM was smooth and without significant consequence. The first month's market performance highlights are as follows:

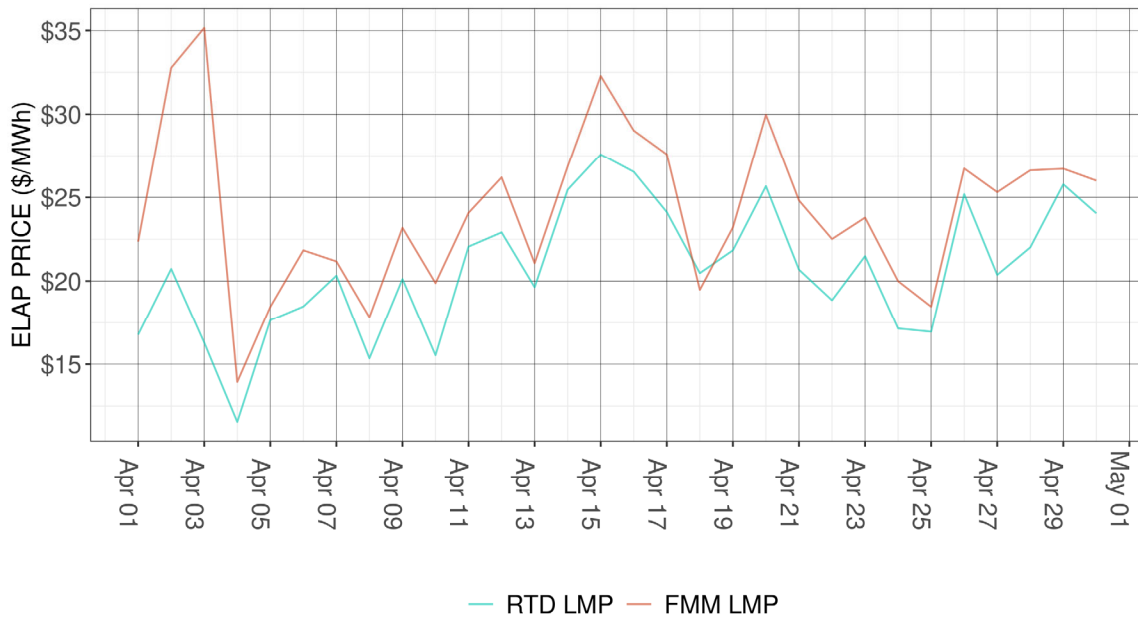
- PNM BAA prices were stable and within reasonable ranges, with a monthly average price of \$24.24/MWh in the fifteen-minute market (FMM) and \$20.72/MWh in the real-time dispatch (RTD).
- Power balance constraint infeasibilities for the under-supply conditions were minimal for the PNM BAA with 0.10 percent of intervals in the fifteen-minute and 0.39 percent of intervals in the five-minute market.
- As part of the resource sufficiency test performed for each EIM entity prior to the real-time markets, PNM successfully passed over 96 percent of its balancing tests and 100 percent of its bid-range capacity tests.
- As part of the resource sufficiency test, PNM passed successfully 99.69 percent of its upward flexible ramping sufficiency tests and 98.81 percent of its downward flexible ramping sufficiency tests in April.
- The price for upward flexible ramping capacity in the FMM for the PNM BAA averaged at \$2.18/MWh in April, while prices for the downward flexible ramping product were \$1.62 /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 PNM EIM Load Aggregation Point (ELAP) for April 1, 2021 through April 30, 2021. The April’s monthly average price in the FMM was \$24.24/MWh and \$20.72/MWh in the RTD.

**Figure 1: Daily average prices for the PNM BAA**

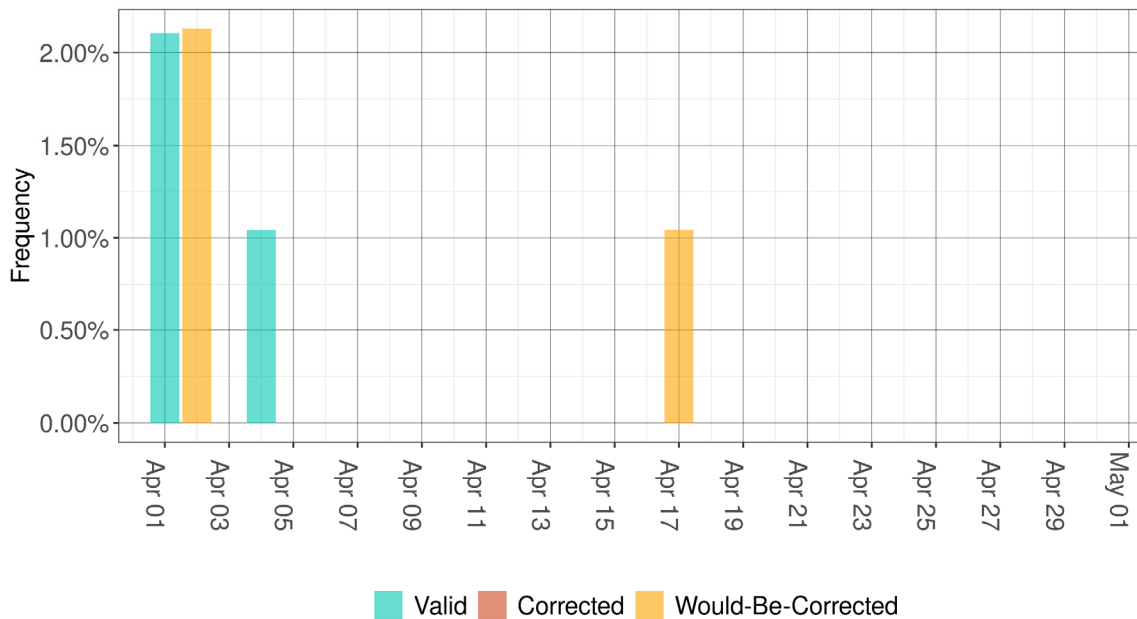


Under the CAISO’s price correction authority in Section 35 of the CAISO tariff, the CAISO may correct prices posted on its Open Access Same-Time Information System (OASIS) if it finds: (1) that the prices were the product of an invalid market solution; (2) the market solution produced an invalid price 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.

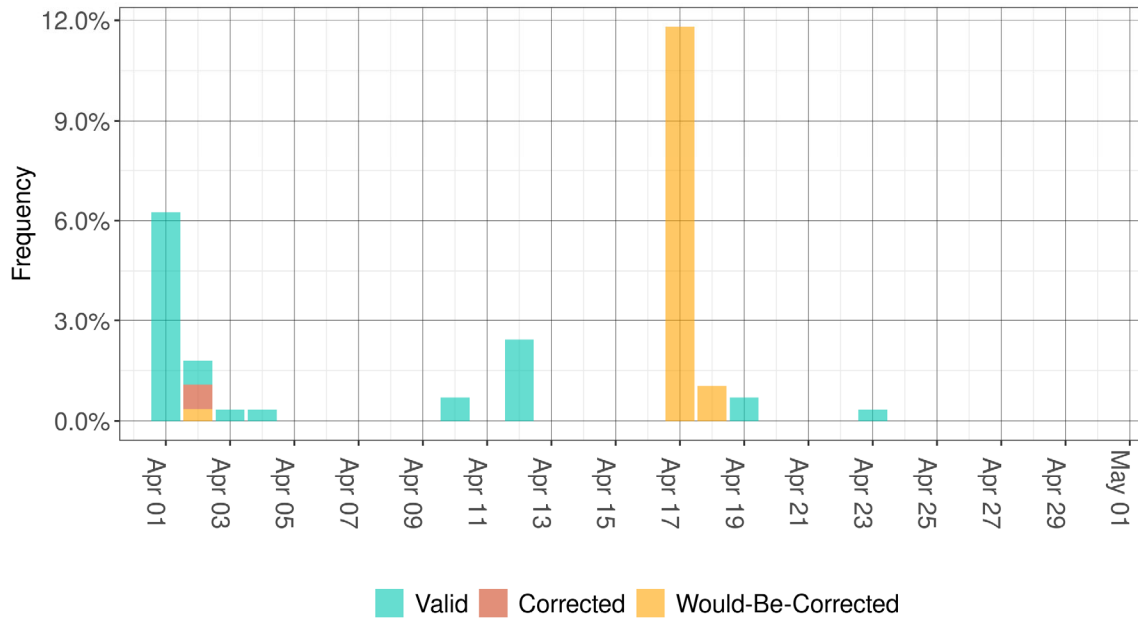
**b. Frequency of Power Balance Constraint Infeasibilities**

Figures 2 and 3 show the frequency of intervals in which the power balance constraint was relaxed for under-supply conditions in the PNM 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 thus 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. In April 2021, the PNM BAA had valid under-supply infeasibilities in 0.10 percent of interval in the FMM and 0.39 percent of intervals in the RTD.

**Figure 2: Frequency of FMM under-supply power balance infeasibilities in the PNM BAA.**



**Figure 3: Frequency of RTD under-supply power balance in feasibilities in the PNM BAA.**



Tables 1 and 2 list the intervals with valid infeasibilities in FMM and RTD observed in April. There were three under-supply infeasibilities in FMM and 34 under-supply infeasibilities in RTD for the month.

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

Trade Date	Trade Hour	Trade Interval	MW Infeasibility
04-01-2021	3	3	6.04
04-01-2021	3	4	16.39
04-04-2021	4	1	5.95

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

Trade Date	Trade Hour	Trade Interval	MW Infeasibility
04-01-2021	2	9	11.07
04-01-2021	2	10	14.82
04-01-2021	2	11	12.96
04-01-2021	2	12	13.82
04-01-2021	3	1	12.02
04-01-2021	3	2	12.34
04-01-2021	3	3	16.04
04-01-2021	3	4	23.85
04-01-2021	3	5	25.24

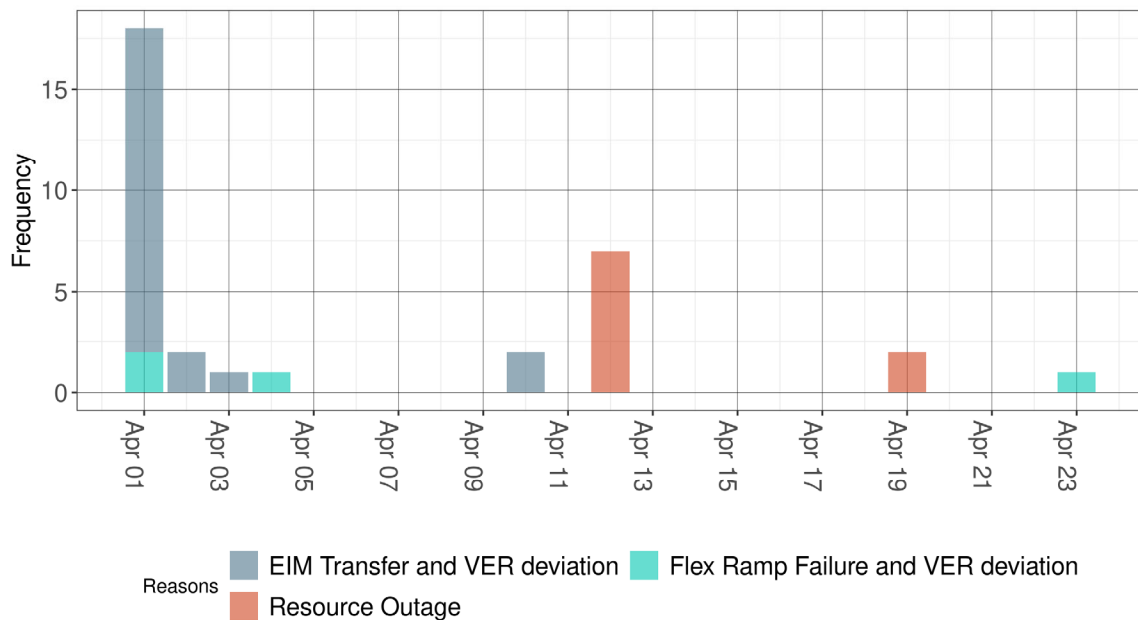
Trade Date	Trade Hour	Trade Interval	MW Infeasibility
04-01-2021	3	6	33.07
04-01-2021	3	7	37.13
04-01-2021	3	8	39.07
04-01-2021	3	9	45.34
04-01-2021	3	10	11.55
04-01-2021	3	11	3.79
04-01-2021	10	12	10.9
04-01-2021	23	1	43.19
04-01-2021	23	2	10.64
04-02-2021	18	8	10.45
04-02-2021	18	9	16.97
04-03-2021	8	3	40.26
04-04-2021	4	2	1.56
04-10-2021	9	1	18.42
04-10-2021	9	3	26.35
04-12-2021	23	11	402.62
04-12-2021	23	12	347.65
04-12-2021	24	1	516.27
04-12-2021	24	2	474.95
04-12-2021	24	3	468.19
04-12-2021	24	4	404.16
04-12-2021	24	5	11.73
04-19-2021	11	9	129.59
04-19-2021	11	10	119.87
04-23-2021	21	1	10.19

In general, under-supply infeasibilities for a BAA could be driven by various changes to either supply or demand conditions for a five-minute market interval. A root cause analysis was performed for all RTD under-supply infeasibilities listed in Table 2 and for each of the instances a primary reason was identified for these infeasibilities. Figure 4 shows the daily count of RTD under-supply infeasibilities categorized into various reasons. The top three reasons identified for under-supply infeasibilities are “EIM Transfers and VER Deviation,” “Resource outage” and “Flexible ramp up test failure and VER deviation.” The RTD under-supply infeasibilities driven by “EIM transfers and VER deviation” are those in which the PNM balancing area had limited EIM transfer capabilities made available to the market and there was a reduction in supply from a VER in the five-minute market compared to the fifteen-minute market. The decrease in supply from VERs in the five-minute market compared to the fifteen-minute



market net of any changes in the demand was higher than available EIM Transfers capacity and incremental ramp capacity from the PNM BAA generation resources, resulting in under-supply infeasibilities. These scenarios mainly occurred during the first two days of EIM implementation when the PNM BAA operators made available limited EIM transfer capability. Operating with limited EIM transfers allows the BAA an opportunity to validate market results with limited impact on grid reliability as the entity transitions into full capability. A total of 21 RTD under-supply infeasibilities were driven by “EIM Transfer and VER deviation” reason. Out of 21 under-supply infeasibilities, 16 of these intervals occurred on April 1, 2021. As PNM operators gained experience in operating in the EIM, they gradually increased the EIM transfer limits, which reduced the frequency of under-supply infeasibilities driven by “EIM transfer and VER deviation.” The “Resource outage” was another reason that resulted in under-supply infeasibility in the PNM BAA. A forced outage on April 12 and April 19 drove nine under-supply infeasibilities in the PNM BAA. Finally, the “Flex Ramp Failure and VER deviation” caused four under-supply infeasibilities. The PNM BAA failed the flex ramp up sufficiency test so its import EIM transfers were capped at the last fifteen-minute interval transfers before the flex ramp up failure. The reduction in VER output in the five-minute market compared to the fifteen-minute market resulted in incremental imbalance requirement, which was higher than available EIM transfers and the ramp capacity from the PNM internal generation resources. Thus, flex ramp failures and VER deviation were the main reason for under-supply infeasibilities in these cases.

**Figure 4: Frequency of RTD under-supply infeasibilities in the PNM BAA categorized by reasons**



### c. Balancing and Sufficiency Test Failures

The EIM provides an opportunity to BAAs to serve its load while realizing the benefits of increased resource diversity. Since the EIM 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 5 shows the trend of balancing test outcomes for the period of April 1, 2021, through April 30, 2021, and Figure 6 shows the pattern of bid-range capacity test outcomes for the period of April 1, 2021, through April 30, 2021.<sup>3</sup> If a balancing test or the bid-range capacity test is affected by data input failures or software failures, those test results are shown as correctable events. The PNM BAA passed the balancing test in 96.72 percent of the intervals in April, which is within the acceptable range of balancing test failures. The PNM BAA passed the bid-range capacity test in all intervals, as shown with no records of failures in Figure 6.

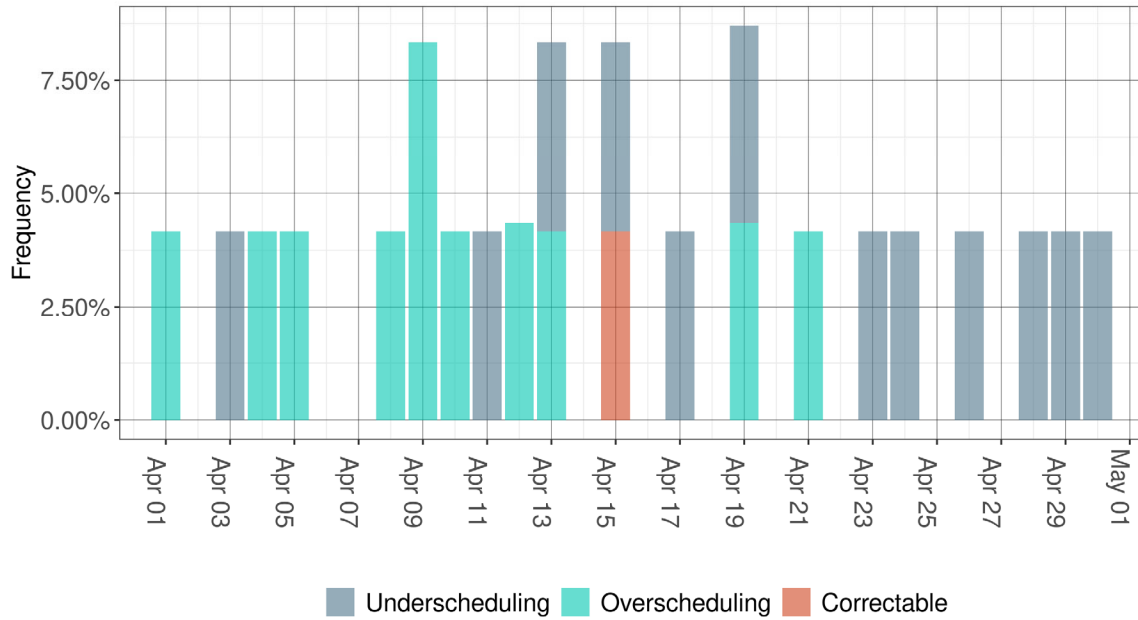
All the balancing test failures in April 2021 are classified into two reasons. First, the PNM BAA uses a software application to submit base schedules; some issues with this software application affected PNM's ability to submit base schedules that caused balancing test failure. Second, in addition to the base schedule submission, PNM operators have to account for resource outages and manual dispatches to ensure these constraints do not affect the generation base schedules. As system conditions change in real-time, it can be challenging for operators to submit base schedules that do not conflict with either an outage or manual dispatch. In April, there were several instances where operators entered base schedules that conflicted with either the generation outage or manual dispatch that caused a balancing test failure. These instances were identified by PNM as opportunities to improve the base schedule submission. On April 15, PNM failed the balancing test due to load forecast from Real-time Balancing Test T-75 (RTBS1) being used in RTBS T-40(RTBS3); due to a payload failure, the use of outdated load forecast resulted in under-schedule balancing test failure for HE19. Since a data input failure affected the balancing test, it is shown as a

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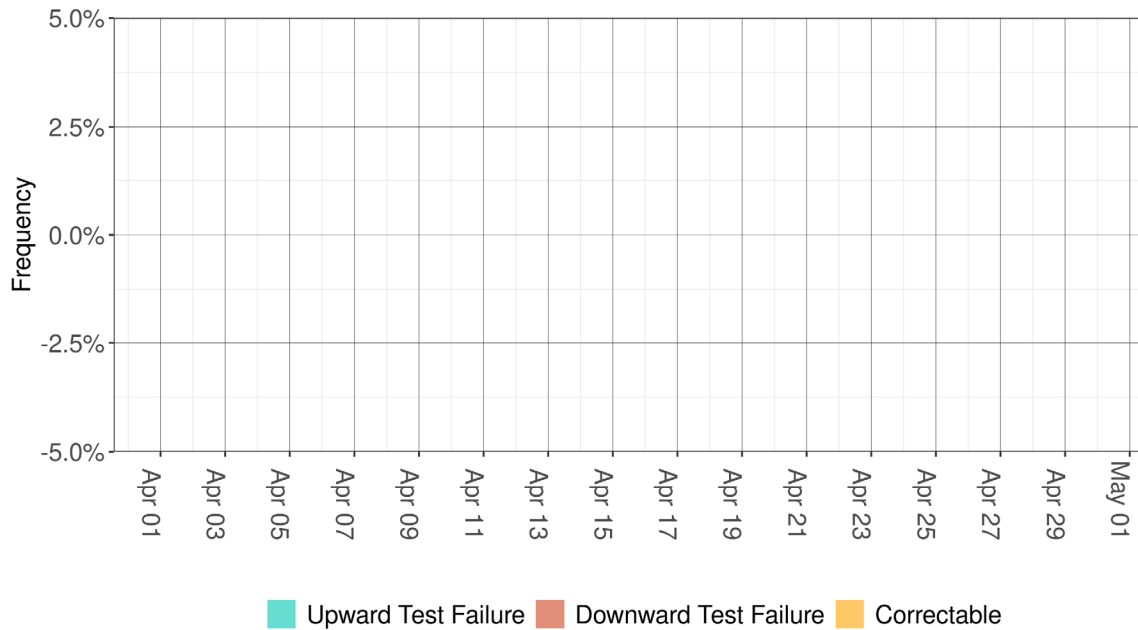
<sup>3</sup> The CAISO performs resource sufficiency tests pursuant to Section 29.34(k) of the CAISO tariff.

correctable event in Figure 5.

**Figure 5: Frequency of Balancing test failures in the PNM BAA**



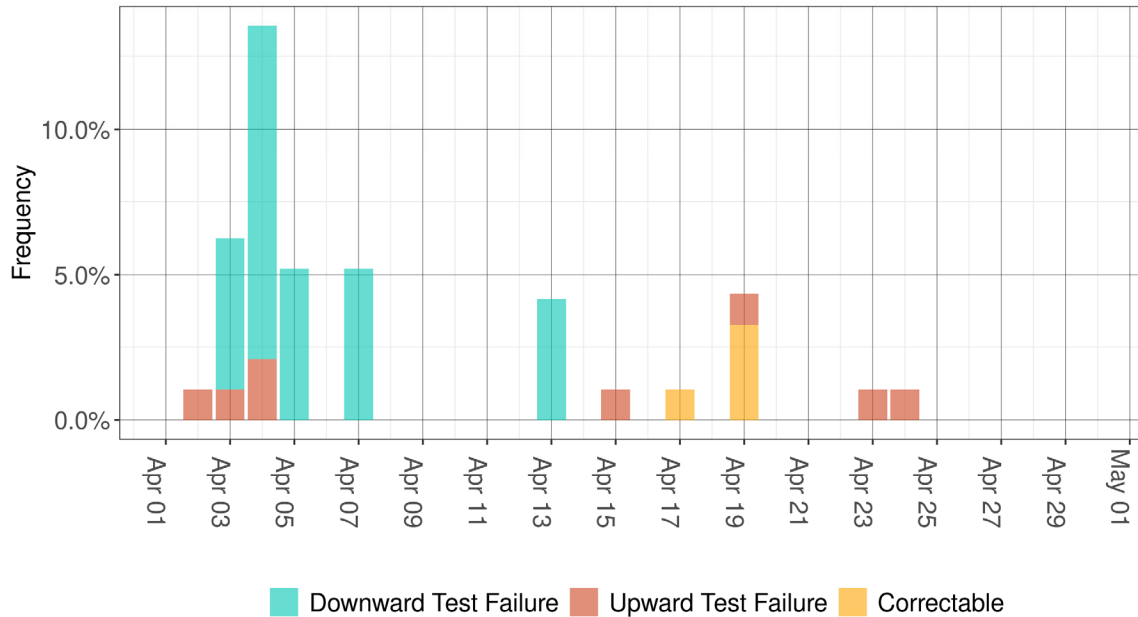
**Figure 6: Frequency of Bid Range Capacity test failures in the PNM BAA**



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 1 through April 30. The PNM

BAA passed the flexible ramp up test in 99.62 percent of the intervals in April and passed the flexible ramp down test in 98.88 percent of the intervals. On April 17 and April 19, there was a data input error in the market application that affected the PNM BAA’s ability to pass the flexible ramp down test. Since a system issue affected PNM BAAs ability to pass the flexible ramp down test, these flexible ramp down test failures are classified as correctable events.

**Figure 7: Frequency of flexible ramping sufficiency test failures in the PNM BAA**



**d. Flexible Ramping Product**

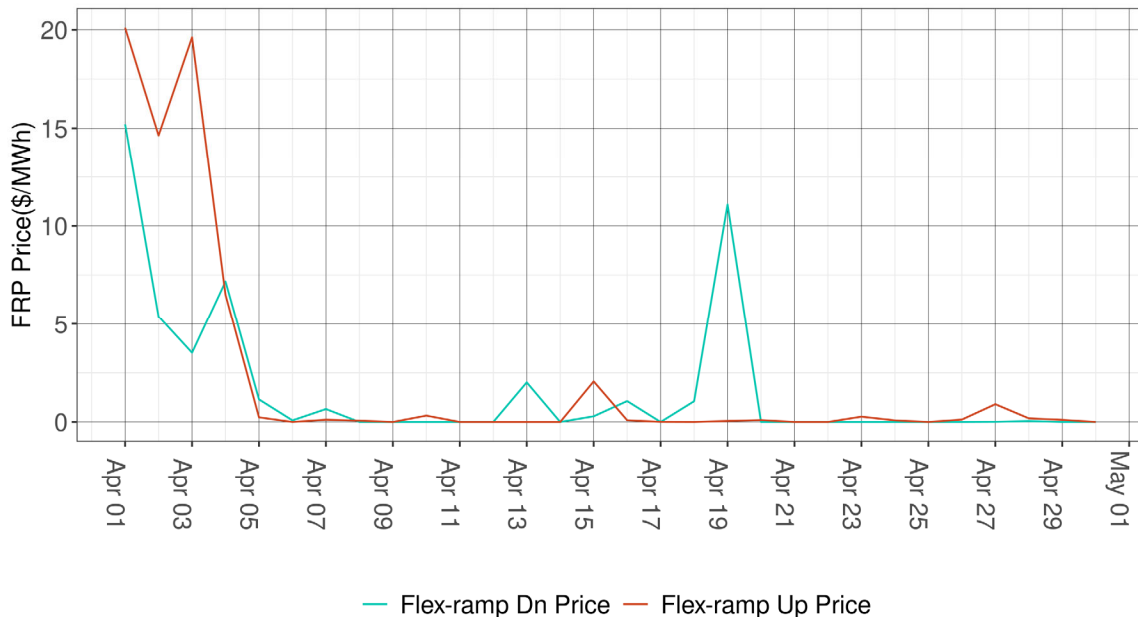
Figure 8 shows the daily average of the upward and downward flexible ramping constraint requirement and procurement in the FMM. Figure 8 shows the daily average of the upward and downward flexible ramping constraint prices in the FMM. With the implementation of the flexible ramping product on November 1, 2016, calculation of the requirements consists of historical data for uncertainty with any applicable net import/export capability or credit. This effectively reduces the amount of flexible ramping the PNM BAA has to procure and, generally, the EIM system-wide area (which includes all the BAAs in the EIM, including the CAISO BAA) will drive the requirements. The market clearing process may result in procuring the PNM BAA capacity towards meeting the overall EIM-system-wide area requirement. This is the main reason why the individual PNM procurement may generally fall below or be above the individual PNM flex ramp requirement. For most of the time, the flexible ramping up procurement was below the area requirements.

**Figure 8: Daily Average requirement and procurement of upward flexible ramping in the FMM for PNM BAA**



The price trend provided in Figure 9 is the nested price determined by the summation of the shadow price of the individual PNM BAA plus the shadow price of the EIM system-wide area. In April, the average upward flexible ramping capacity price was \$2.18/MWh and the average downward flexible ramping capacity price was \$1.62/MWh.

**Figure 9: Daily Average price of flexible ramping Up and Down in the FMM for PNM BAA**



## 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 28<sup>h</sup> day of May 2021.

*/s/ Anna Pascuzzo*  
Anna Pascuzzo