

November 29, 2017

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-\_\_\_\_  
October 2017 Informational Report  
Energy Imbalance Market – Transition Period Report – Portland  
General Electric**

Dear Secretary Bose:

The California Independent System Operator Corporation (CAISO) hereby submits its report on the transition period of Portland General Electric (PGE) during its first six months of participation in the western Energy Imbalance Market (EIM) for October 2017.

The CAISO will continue filing such reports, consistent with the Commission's order, through the six month reporting period.

Please contact the undersigned with any questions.

Respectfully submitted

**By: /s/ Anna A. McKenna**

Roger E. Collanton  
General Counsel  
Anna A. McKenna  
Assistant General Counsel  
California Independent System  
Operator Corporation  
250 Outcropping Way  
Folsom, CA 95630  
Tel: (916) 608-7182  
Fax: (916) 608-7222  
[amckenna@caiso.com](mailto:amckenna@caiso.com)



# California ISO

**Energy Imbalance Market  
October 1 – October 31, 2017**

**Transition Period Report  
Portland General Electric Entity**

November 29, 2017

## 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> Portland General Electric (PGE) entered the EIM on October 1, 2017, and the transition period will apply to the PGE balancing authority area (BAA) until April 1, 2018.

During the six-month transition period, the pricing 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 PGE 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.

---

<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, PGE's transition into the EIM was smooth and without significant consequence, with the exception of some transitional data issues. The first month's market performance highlights are as follows:

- In October, prices were stable and within reasonable ranges, with the monthly average PGE BAA prices being \$25.87/MWh in the Fifteen-Minute Market (FMM) and \$23.65/MWh in the Real-Time Dispatch (RTD).
- Power balance constraint infeasibilities for under-supply conditions in the PGE BAA were minimal with just 0.034 percent of the total intervals in the FMM and 0.034 percent of the total intervals in the RTD. With such low frequency of infeasibilities, the transitional period provisions for price discovery had a negligible impact on market prices.
- As part of the resource sufficiency test performed for each EIM entity prior to the real-time markets, PGE successfully passed over 98.52 percent of its balancing tests in October.
- Also as part of the resource sufficiency test, PGE passed successfully over 98.39 percent of its flexible ramping sufficiency tests in October.
- The price for upward flexible ramping capacity in the PGE BAA averaged \$1.67/MWh in October, while prices for the downward flexible ramping product were zero most of the time.

### III. Market Performance Related to the Transitional Period

#### a. Prices

On October 1, 2017, PGE began participation in the western EIM. During the first couple of hours, the market experienced some data issues, driven mainly by the conditions of the nature of the transition. One specific issue was the large infeasibilities triggered in both the FMM and RTD because some of the PGE BAA's Multi-Stage Generator (MSG) resources were seen as off-line or being dispatched in a lower configuration in the market application, which did not reflect the actual operating configuration of the resource.<sup>3</sup> The initial conditions for some of PGE MSG resources were not synchronized before the first trading hour for October 1, 2017, which resulted in an incorrect dispatch. Therefore, the CAISO performed a price correction for these intervals, based on Section 35 of its tariff, due to a data input error affecting the market solution. Apart from this issue, no other transitional issue influenced the market solution.

Figure 1 shows that average prices in the PGE EIM Load Aggregation Point (ELAP)<sup>4</sup> were \$25.87/MWh in the FMM and \$23.65/MWh in the RTD. The proxy price for the PGE BAA referenced as a grey dotted line; this price is the simple average from the Mid C hub price from Powerdex.

On October 6, 2017, the daily average FMM Locational Marginal Price (LMP) was \$35.11, primarily driven by \$789.9/MWh price for hour ending 3 interval 3, a forced outage on a unit in a neighboring BAA drove this price. On October 14, 2017, the daily average PGE ELAP LMP was \$37.34; this is \$13.36/MWh above the monthly average. Daily average prices increases because of high prices in the PGE BAA at the overall area level between hour ending 19 intervals 12 and hour ending 20 interval 6. For this timeframe, PGE's minimum price was \$624/MWh and the maximum LMP was \$999/MWh, attributed to by the change in net-interchange schedule for a neighboring BAA. Again, on October 17, 2017, the daily average PGE ELAP LMP was \$35.79/MWh, which was \$12.14/MWh above the monthly average, due to \$919

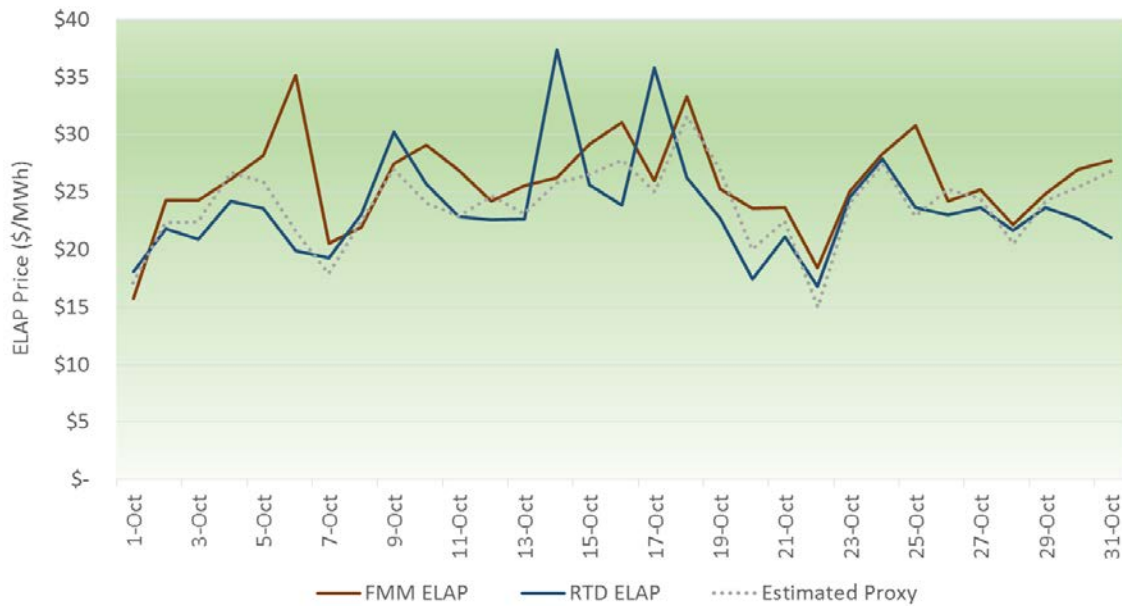
---

<sup>3</sup> An MSG resource by its physical nature has multiple configurations, and the FMM can transition the resource to the optimal configuration based on bid costs. However, if the initial configuration of the MSG resource were incorrect, it would take several intervals to transition the unit to its optimal configuration because the application enforces inter-temporal constraints such as minimum up time, minimum downtime, ramping rates, and transition times. After identification of the issue, the CAISO synchronized these resources to their actual operating condition.

<sup>4</sup> The ELAP provides aggregate prices that are representative of pricing in the overall area of the PGE BAA.

ELAP LMPs in hours ending 20 for intervals 4 through 6. A change in the net-schedule inter-change in the neighboring BAA caused these LMPs to increase. Prices in the PGE BAA were generally stable and reflected overall system conditions during the first month of operation, and tracked closely between markets.

**Figure 1: Daily average prices for the PGE 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.<sup>5</sup> That is, the trends below 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. In October, no intervals in the FMM and 10 intervals in the RTD required a price

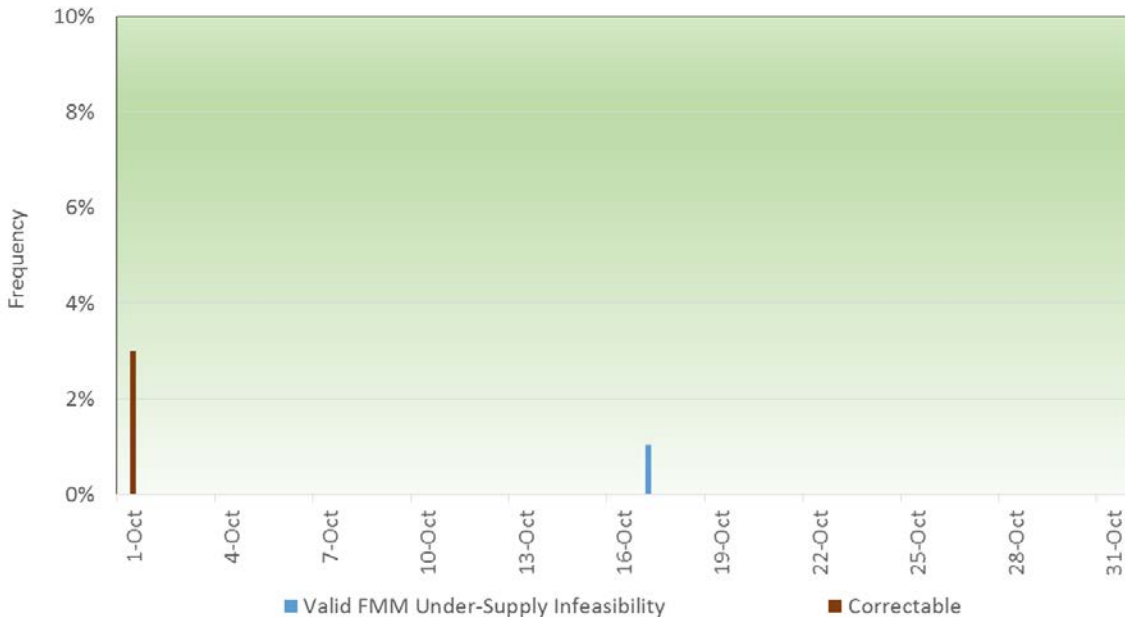
<sup>5</sup> Figure 1 also provides an estimated proxy price, which for PGE is the simple average of Mid C hub price taken from the Intercontinental Exchange (ICE).

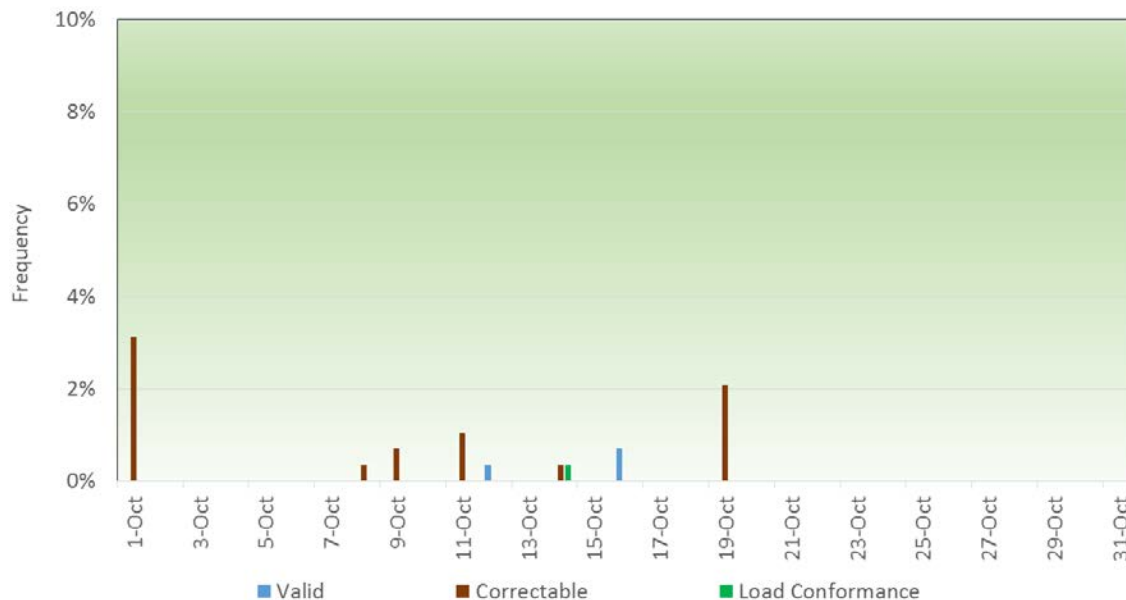
correction for the PGE BAA prices under the CAISO’s price correction authority provided in Section 35 of the CAISO tariff.

**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 PGE BAA for the FMM and RTD, respectively. The under-supply infeasibilities are categorized into “valid,” load conformance, and “correctable” instances. Prices for the intervals that fell in the “valid” category are instances with under-supply infeasibilities that were not in error and are subject to the transitional period pricing. Instances labelled as “load conformance” are the valid infeasibilities observed when a load conformance was in place for that market interval. Whereas the infeasibilities that fell in the “correctable” category had a correction based on the provisions of Section 35 of the CAISO tariff due to either a software or a data error.

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



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

In the PGE BAA, there was one (0.034 percent of the time) valid under-supply infeasibility in the FMM and three (0.034 percent of the time) valid under-supply infeasibilities in the RTD. The reasons for these infeasibilities were:

- i) October 12, 2017, RTD. There was an interval RTD infeasibility for hour ending 8 interval 12. During this interval, two of PGE's MSG units were operating below base schedule because in the FMM it was economic to operate this unit at a lower configuration and import energy through EIM transfers from a neighboring BAA. In the RTD, renewable resources in the neighboring BAA were deviating, causing the BAA to be incapable of supplying the EIM transfers to the PGE BAA, which results an infeasibility of a five-minute interval. Based on market economics, this outcome is not a transitional issue.
- ii) October 16, 2017, RTD. There were infeasibilities in two intervals for hour ending 7 intervals 6 and 9. A resource did not follow its Dispatch-Operating Target (DOT), as the resource was ramping slower than expected, which caused these infeasibilities to occur.
- iii) October 17, 2017, FMM. There was a single interval infeasibility in hour ending 21 interval 1 driven by a reduction in net imports flowing into the PGE BAA due to a net schedule interchange deviation. A driving factor for the change in net imports are the differences in hourly import transactions schedules in the Base



Schedule Aggregation Portal (BSAP) versus the actual tagged energy in the NERC's E-Tagging system, which is communicated to the FMM through the real-time inter-schedule scheduler application. In this particular FMM interval, the net schedule interchange was 125 MW compared to the net schedule interchange at 40 MW before the trading hour.

Market economics and resource deviations are main factors for these infeasibilities. In October, infeasibilities did not originate by any transitional and learning conditions.

There was one interval for the PGE BAA that coincided with load conformance. The CAISO uses a load conformance limiter to prevent over-adjustments, and thus prevent an artificial infeasibility – one that does not reflect actual scarcity. When the quantity of the infeasibility is less than the operator's adjustment, and the infeasibility is in the same direction as the adjustment, the load conformance limiter automatically limits the operator's adjustments to at or below the infeasibility. In the pricing run, the limiter will remove an infeasibility that is less than or equal to the operator's adjustment, *i.e.*, the load conformance. The limiter will not apply to infeasibilities greater than or in the opposite direction of the load conformance. Use of the load conformance limiter in the CAISO BAA has avoided invalid constraints that arise through operational adjustments that do not reflect supply issues. During the transition period, the CAISO does not apply the load conformance limiter because it applies the transition period pricing, which obviates the need for the load conformance limiter. Therefore, Figure 3 illustrates the infeasibilities that would have been covered by the load conformance limiter were it in effect instead of transition period pricing during the transition period in the PGE BAA.

In October, the CAISO corrected prices for 10 RTD intervals due to a software defect, performed for trading dates October 9, 11, 14, and 19, 2017. On October 11 and October 19, 2017, the dispatch of a PGE resource to zero was due to a software defect that resulted in an infeasibility. On October 9 and October 14, 2017, PGE had a power balance infeasibility, however, the application did not set the price using last economic bid. During the transition period for all new EIM entities it is expected that when an EIM BAA has a power balance infeasibility that the last economic signal sets the LMPs. The CAISO corrected the prices for these intervals consistent with Section 35 of its tariff.

As per the reporting requirements set for the transitional period report, Tables 1 and 2 list the FMM and RTD intervals with infeasibilities observed in October, including the amount of load conformance to reflect the instances in

which the load conformance limiter would have been triggered and offset the infeasibility.

**Table 1: List of valid FMM under-supply infeasibilities in the PGE balancing authority area.**

Trade Date	Trade Hour	Trade Interval	MW Infeasibility	Load Conformance
17OCT2017	21	1	9.78	0

**Table 2: List of valid RTD under-supply infeasibilities in the PGE balancing authority area.**

Trade Date	Trade Hour	Trade Interval	MW Infeasibility	Load Conformance
12OCT2017	8	12	86.4	0
14OCT2017	20	4	15.02	20
16OCT2017	7	3	21.47	0
16OCT2017	7	4	3.01	0

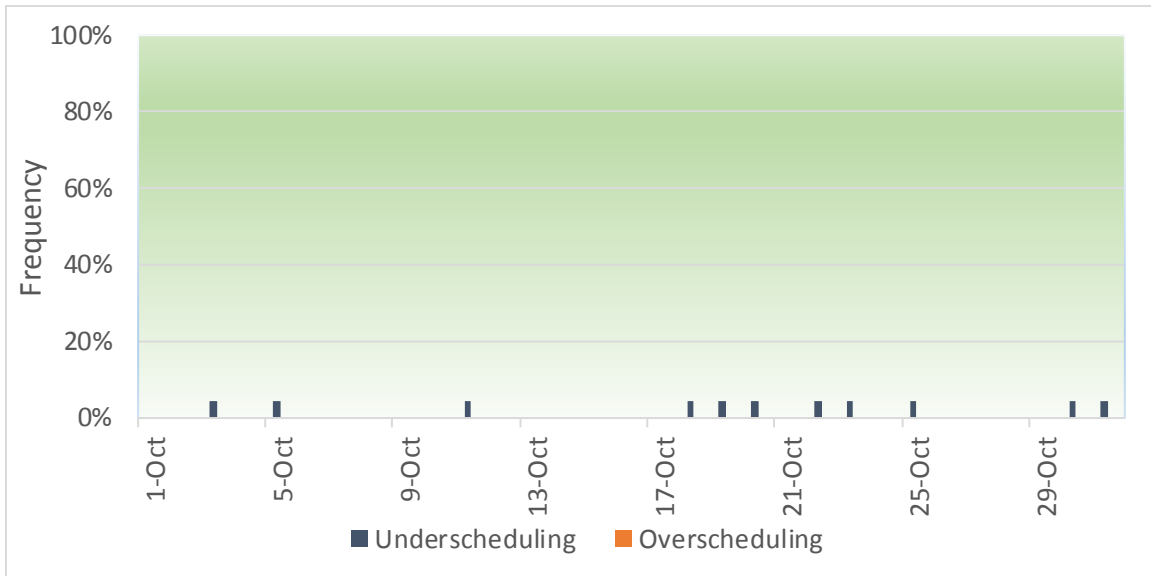
### c. Balancing and Sufficiency Test Failures

The EIM provides an opportunity to various 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 prior to 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 October 2017.<sup>6</sup> The PGE BAA passed the balancing test in 98.52 percent of the intervals in October. The EIM Entity Operator believes that most of the minimal balancing failures are attributable to lags in the PGE's software interfaces. The frequency of these failures are within expected performance tolerances for balancing tests.

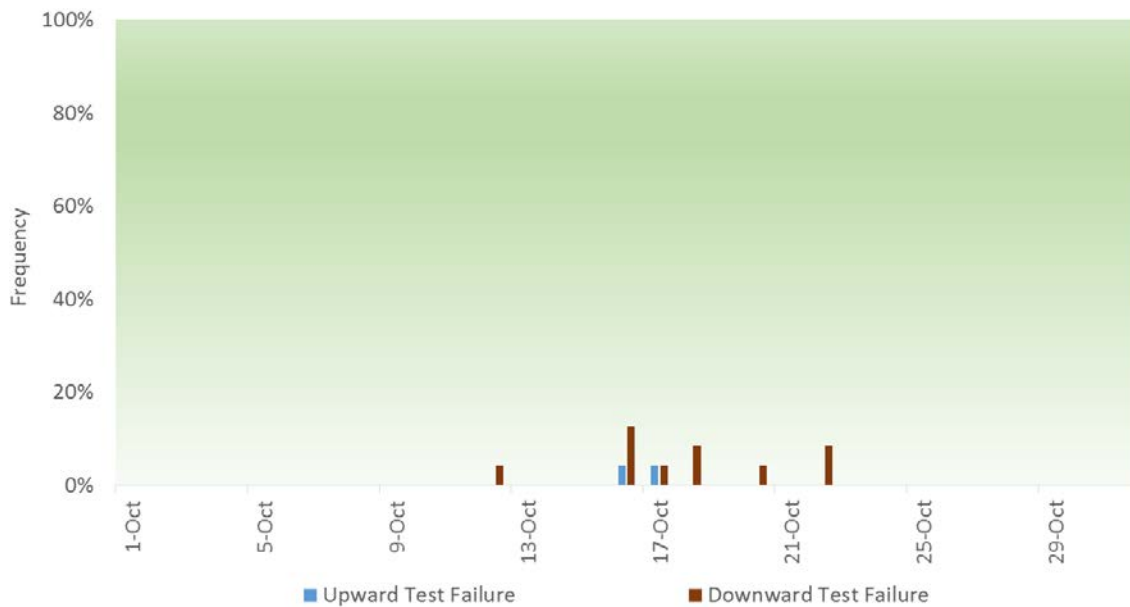
<sup>6</sup> The CAISO performs resource sufficiency tests pursuant to Section 29.34(k) of the CAISO tariff.

**Figure 4: Frequency of Balancing test failures in the PGE BAA.**



The CAISO also performs the flexible ramping sufficiency test as specified in Section 29.34(m) of the CAISO tariff. Figure 5 shows the trend of the test failures for flexible ramping for October 2017. The PGE BAA passed the test in 98.39 percent of the intervals in October. The level of failures of this test is well within the expected and typical rate observed in the EIM.

**Figure 5: Frequency of flexible ramping sufficiency test failures in the PGE BAA.**



**d. Flexible Ramping Product**

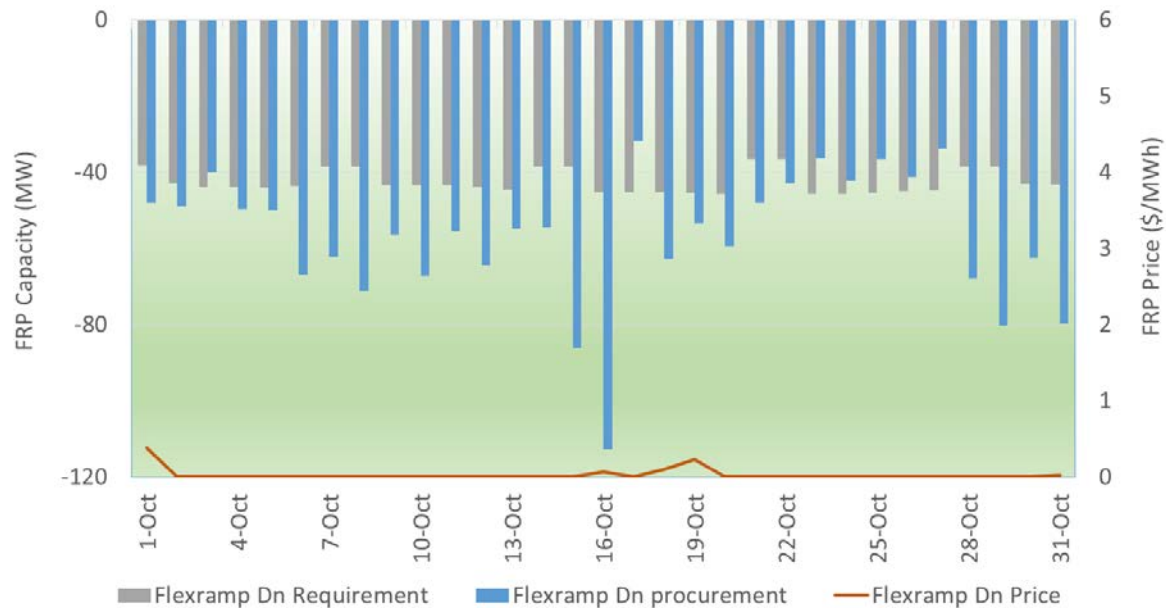
Figure 6 shows the daily average of the flexible ramp-up constraint requirement, procurement, and prices in the FMM. Figure 7 shows the daily average of the flexible ramp-down constraint requirement, procurement, and prices in the FMM. With the implementation of the flexible ramping product on November 1, 2016, calculation of the requirements consists historical data for uncertainty and offset with any applicable net import/export capability or credit. This effectively reduces the amount of flexible ramping the PGE 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 PGE BAA capacity towards meeting the overall EIM-system-wide area requirement. This is the main reason why the individual PGE BAA procurement may generally fall below or be above the individual PGE BAA requirement.

**Figure 6: Daily Average requirement, procurement and price of flexible ramp up in the FMM in the PGE BAA.**



In addition, the price trend provided in Figure 6 and Figure 7 is the nested price determined by the summation of the shadow price of the individual PGE BAA plus the shadow price of the EIM system-wide area. In October 2017, the average upward flexible ramping capacity price was \$1.67 /MWh and the average downward flexible ramping capacity price was \$0.025/MWh.

**Figure 7: Daily Average requirement, procurement and price of flexible ramp up in the FMM in the PGE BAA.**



For most of the time, the flexible ramping procurement was above the area requirements, which naturally will lead to zero prices in the PGE's area. Still, with the EIM area binding, the net price in the PGE's area may be greater than zero.

#### a. Impact on Non-EIM Nodes

With the implementation of the EIM with PacifiCorp's BAAs (PAC East and PAC West) with the first trading day on November 1, 2014, there was an identified pricing reporting issue for shared locations between CAISO market and the EIM. These shared locations schedule energy for the CAISO BAA and are located in the EIM BAA, and have associated mirror resources. In late 2014, the CAISO worked on improving these shared locations' modelling, and reported its progress in the corresponding transitional period reports for the PAC East and PAC West BAAs. Currently, there are no known issues affecting such shared locations that need to be discussed in this report.

## 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 29<sup>th</sup> day of November 2017.

*/s/ Grace Clark*  
Grace Clark