



January 17, 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 2016 Informational Report
Energy Imbalance Market – Transition Period Report – Arizona Public
Service**

Dear Secretary Bose:

The California Independent System Operator Corporation (CAISO) hereby submits its report on the transition period of Arizona Public Service during its first six (6) months of participation in the Energy Imbalance Market (EIM) for October 2016. The Commission also directed the Department of Market Monitoring (DMM) to submit an independent assessment of the CAISO's report, which the DMM will seek to file within approximately 14 days.

The CAISO will continue filing such reports, consistent with the Commission's order, through the six (6) 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



California ISO

**Energy Imbalance Market
October 1 – October 31, 2016**

**Transition Period Report –
Arizona Public Service Entity**

January 13, 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, 2015.¹ Arizona Public Service Company (APS) entered the EIM on October 1, 2016, and the transition period will apply to its balancing authority area until May 1, 2017.

During the six-month transition period, the pricing of energy in the balancing authority area of a new EIM entity 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 balancing authority area between \$0 and \$0.01, but only when the power balance or transmission constraints are relaxed in the relevant EIM area. This is necessary to allow the market software to determine the marginal energy bid price.

The Commission's October 29 order directed the CAISO and the Department of Market Monitoring (DMM) to file informational reports at 30-day intervals during the six-month transition period for any new EIM entity. The CAISO provides this report for APS consistent with the Commission's requirements in the October 29 order. The Commission noted that it expected that the first report would be filed 30 days from the commencement of financially binding operations for any new EIM entity. Because the complete set of data is not available so soon after the end of the applicable month, the CAISO could not submit the report at that time. The CAISO will continue to file the monthly reports but expects that it will do so approximately 15 days after the end of each month in order to provide the prior full month's data. In addition, because the DMM must review the CAISO's report before completing its own, the DMM will file its independent report within 14 business days after the CAISO files its report.

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

II. Highlights

- APS had a smooth transition period into the EIM on October 1, 2016. The first hours experienced minor transitional issues that resulted in a few power balance constraint infeasibilities that were subject to the price correction provisions under Section 35 of the CAISO tariff.
- APS passed over 90 percent of its balancing tests during the month of October.
- APS passed over 99 percent of its flex ramp sufficiency tests in October.
- APS observed power balance constraint infeasibilities in less than 1 percent in the intervals of both the fifteen-minute market (FMM) and the five-minute market.
- With the low frequency of power balance constraint infeasibilities experienced in October, the transitional period pricing had little impact on the EIM prices.
- APS observed flexible ramp constraint infeasibilities in 4 percent of the intervals in the FMM.

III. Report

a. Prices

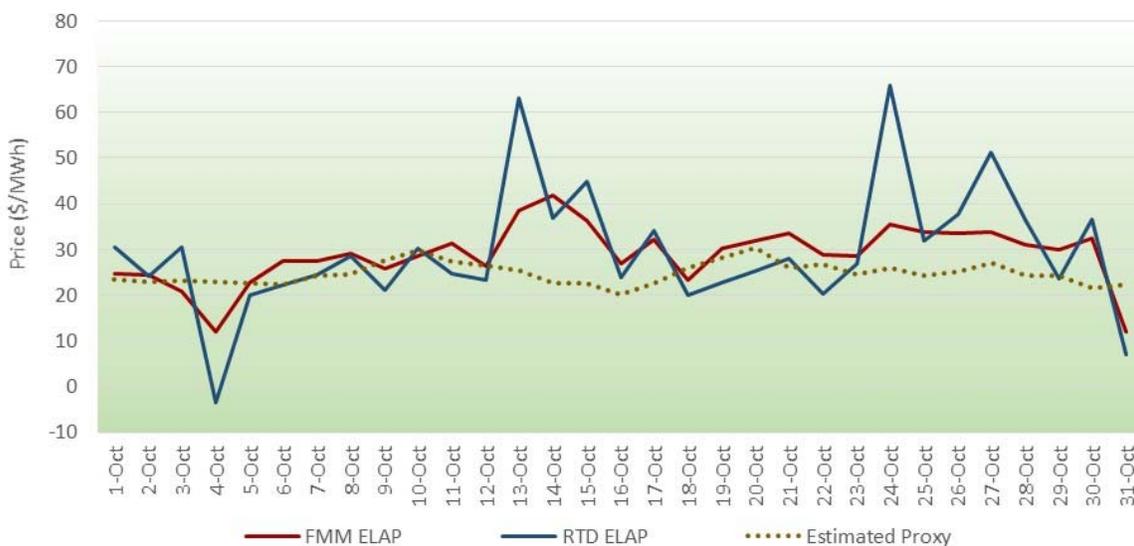
Figure 1 shows that average prices in the APS EIM Load Aggregation Point (APS ELAP)² were on average \$28.85/MWh in the FMM and \$29.42/MWh in the Real-time Dispatch (RTD).

Under the CAISO's price correction authority in Section 35 of its 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

² The ELAP provides aggregate prices that are representative of pricing in the overall area of APS area.

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 includes all prices produced by the CAISO consistent with its tariff requirements.³ That is, the trends below represent: (1) prices as produced in the market for which 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 transition period pricing reflected in Section 29.27 of the CAISO tariff.

Figure 1: Daily average prices for APS.



For the month of October, there were two instances in the FMM and eight instances in the RTD market that required a price correction for APS under the CAISO’s price correction authority in Section 35 of the CAISO tariff.

Prices in the APS balancing authority area observed some degree of variability, with prices going over \$50 in certain days. The transfer capabilities between the APS and the CAISO balancing authority areas are large enough that usually the EIM transfers are not binding or limited. When the EIM transfer limits are not binding between the two areas, both balancing authority areas become effectively one single larger area where the economics are driven by the overall supply. Under this scenario, when the larger area observes temporary tighter ramp capability conditions, the prices of both APS and the CAISO will go

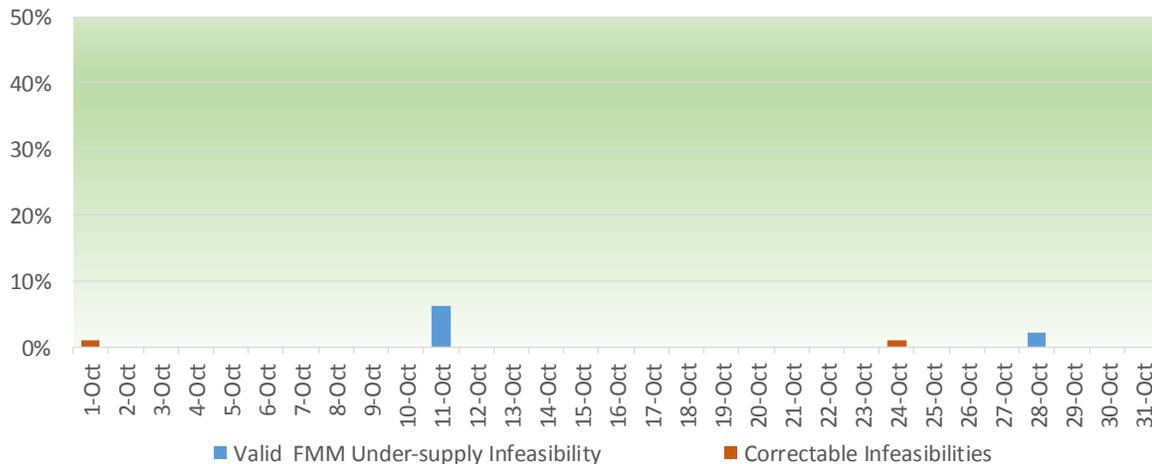
³ Figure 1 also provides an estimated proxy price for APS, which for APS is the weighted average the day-ahead price for PaloVerde, Four Corners, and Mead hubs from the Intercontinental Exchange (ICE).

concurrently higher. Usually, the five-minute market price will vary more than the fifteen-minute prices given the fact that is more ramp-limited within a five-minute horizon.

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 APS area for the FMM and RTD, respectively. The under-supply infeasibilities are grouped into “valid” and “correctable” instances. Prices for the intervals that fell in the “valid” category are instances with under-supply infeasibilities not in error and that are subject to the transitional period pricing. Whereas those intervals that fell in the “correctable” category were corrected based on provision of Section 35 of the CAISO tariff due to either a software or data error.

Figure 2: Frequency of FMM under-supply power balance infeasibilities in APS.



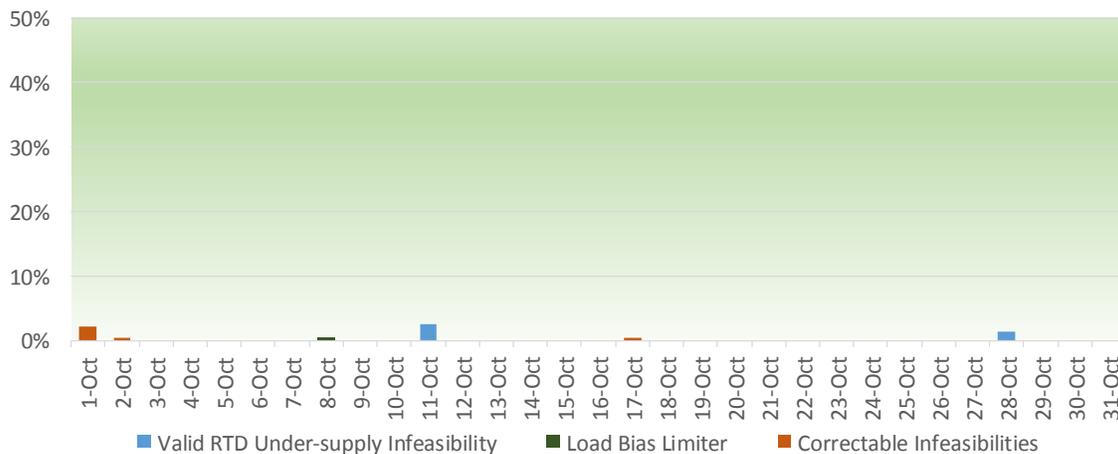
In the month of October, there were 8 (0.26% of the time) valid under-supply infeasibilities in the FMM and 11 (0.12% of the time) valid under-supply infeasibilities in the RTD. The reasons for these infeasibilities were:

- i) October 8, FMM. Infeasibilities were due to changes in variable energy resources and load forecast.
- ii) October 11 and 28, FMM and RTD. APS missed its submission of bids for certain participating resources for hour ending 5, which resulted in the market observing insufficient capacity in its area to meet its load requirements. This was a transitional/learning issue

and training materials and communications for operators have been updated to address this finding.

The CAISO uses a load conformance limiter in the CAISO and in each of the EIM balancing authority areas to prevent over-adjustments through use of load conformance, and thus prevent an artificial infeasibility – that is, 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 feasibility. 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 balancing authority area 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. Figure 3 also indicates the infeasibilities that would have been avoided by the load conformance limiter were in effect during the transition period in the APS balancing authority area.

Figure 3: Frequency of RTD under-supply power balance in feasibilities in APS.



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 triggered and offset the infeasibility. Only in one instance in the RTD would the load conformance limiter have actually been triggered had it been applied during this time.

Table 1: List of valid FMM under-supply infeasibilities in APS.

| Trade Date | Trade Hour | Trade Interval | MW Infeasibility | Load Conformance |
|------------|------------|----------------|------------------|------------------|
| 11-Oct-16 | 5 | 2 | 44.9 | 0 |
| 11-Oct-16 | 5 | 3 | 48.7 | 0 |
| 11-Oct-16 | 5 | 4 | 36.67 | -90 |
| 11-Oct-16 | 6 | 2 | 35.8 | 0 |
| 11-Oct-16 | 6 | 3 | 96.35 | 0 |
| 11-Oct-16 | 6 | 4 | 113.04 | 0 |
| 24-Oct-16 | 1 | 4 | 0.18 | 0 |
| 28-Oct-16 | 5 | 4 | 133.4 | 0 |

Table 2: list of valid RTD under-supply infeasibilities in APS.

| Trade Date | Trade Hour | Trade Interval | MW Infeasibility | Load Conformance |
|------------|------------|----------------|------------------|------------------|
| 8-Oct-16 | 18 | 9 | 36.0 | 100 |
| 11-Oct-16 | 5 | 1 | 34.8 | 0 |
| 11-Oct-16 | 5 | 6 | 31.2 | 0 |
| 11-Oct-16 | 5 | 9 | 2.9 | 0 |
| 11-Oct-16 | 5 | 10 | 5.6 | 0 |
| 11-Oct-16 | 5 | 11 | 14.6 | 0 |
| 11-Oct-16 | 5 | 12 | 77.1 | 0 |
| 11-Oct-16 | 6 | 10 | 3.2 | 0 |
| 28-Oct-16 | 5 | 10 | 464.8 | 0 |
| 28-Oct-16 | 5 | 11 | 556.5 | 0 |
| 28-Oct-16 | 5 | 12 | 597.4 | 0 |
| 28-Oct-16 | 9 | 2 | 1.6 | 0 |

c. Balancing and Sufficiency Test Failures

Figure 4 shows the frequency of balancing test failures for the APS balancing authority area for the month of October, which the CAISO performs pursuant to Section 29.34(k) of the CAISO tariff. APS passed the balancing test in 94 percent of the intervals in October. The frequency of these failures is within expected performance tolerances for balancing tests. The CAISO also performs the 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 ramp sufficiency for the month of October for the APS balancing authority area. APS passed the test in 99.95 percent of the intervals in October.

Figure 4: Frequency of balancing test failures in the APS area.

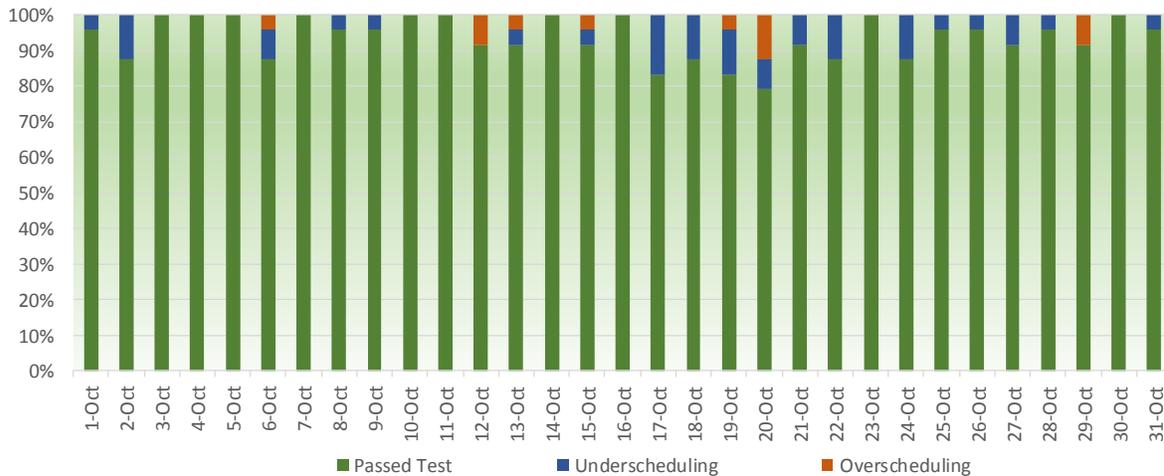
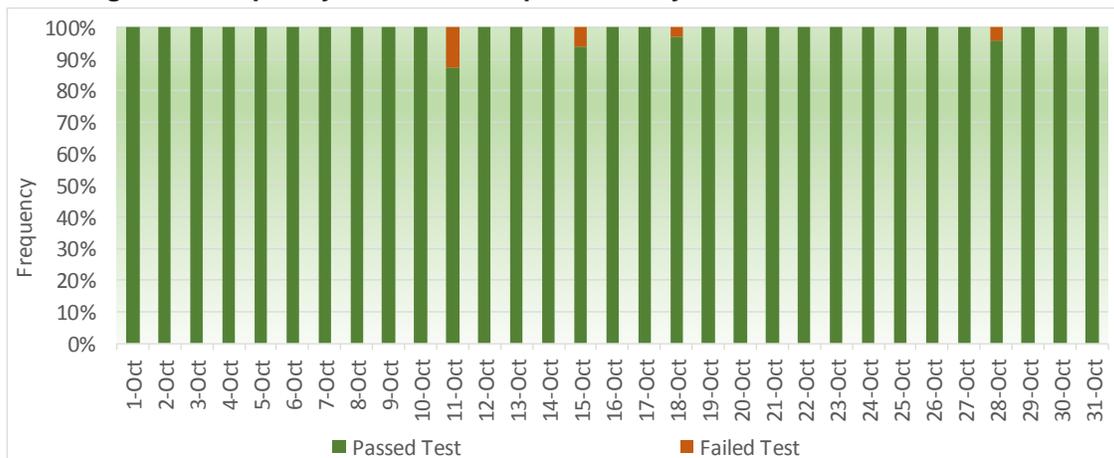


Figure 5: Frequency of flexible ramp sufficiency test failures in the APS area.



d. Flexible Ramping Constraint Infeasibilities

In this section, the CAISO discusses the frequency and the reasons why the flexible ramping constraint was binding in the APS balancing authority area.

During the month of October, the flexible ramping constraint in the APS balancing authority area was infeasible on a daily average in 4 percent of the FMM intervals. The flexible ramping constraint infeasibilities observed on October 11, 14, and 19 coincided with the power balance constraint infeasibilities described in previous sections and are driven by the same factors. The remaining infeasibilities were mainly driven by the economics of the flexible ramping constraint and its opportunity cost. Because the CAISO market co-optimizes the procurement of energy and flexible ramping capacity, resources in one EIM balancing authority area may be incrementally dispatched to provide

economic transfers to another rather than to provide flexible ramping capacity for the APS area. Consequently, these economics sometimes cause flexible ramping scarcity that results in the constraint to bind in the APS balancing authority area. Figure 6 shows the frequency of flexible ramp constraint infeasibilities in the APS balancing authority area for the month of October.

Figure 6: Frequency of flexible ramp constraint infeasibilities in the APS area.

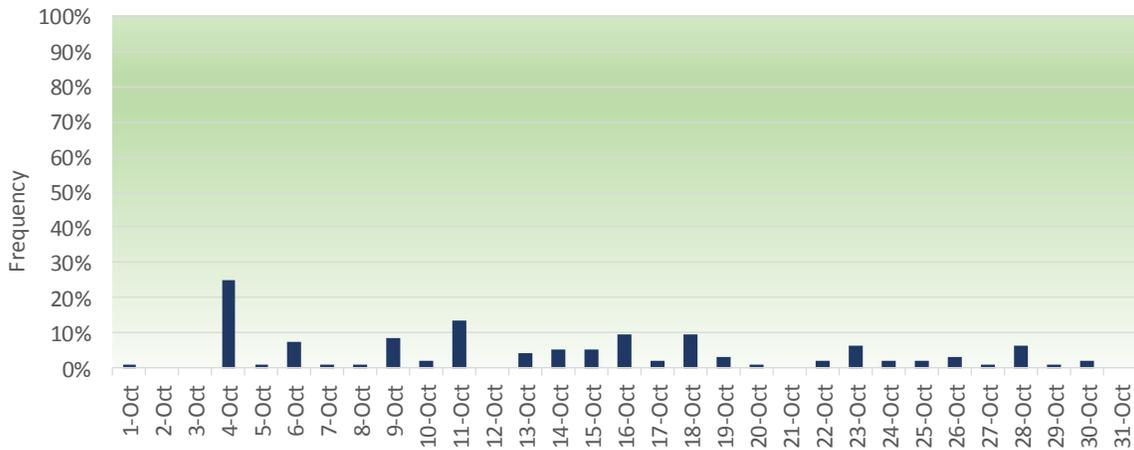
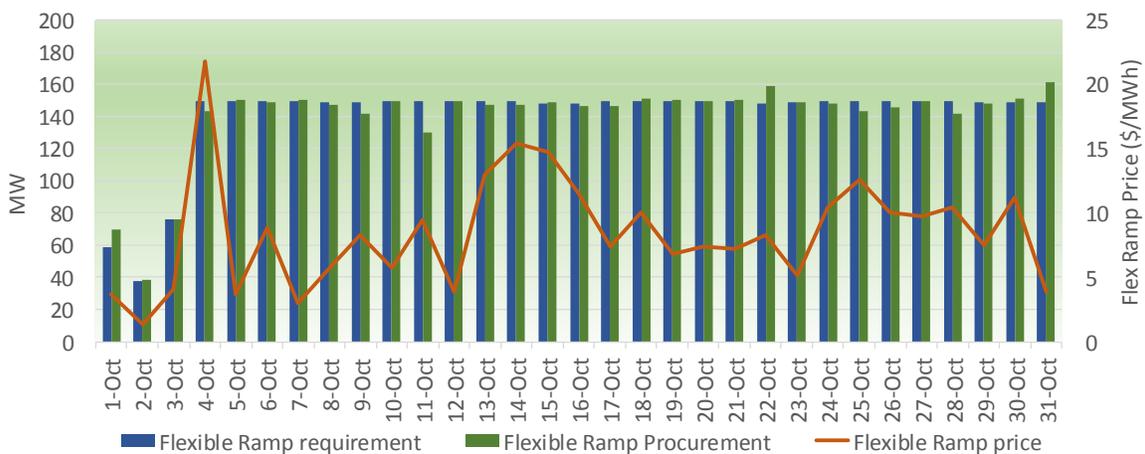


Figure 7 shows the daily average of the flexible ramp constraint requirement and procurement for the APS balancing authority area for the month of October. In the vast majority of the hours, both areas were meeting their flexible ramping requirement. This plot also shows the daily average of the shadow price for the flexible ramp constraint in APS area.

Figure 7: Average requirement and procurement of flexible ramp in the FMM in the APS area.



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 17th day of January 2017.

/s/ Grace Clark
Grace Clark