



April 4, 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-____
January 2017 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 January 2017. 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 15 business 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

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California ISO

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

**Transition Period Report
Arizona Public Service Entity**

April 4, 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 April 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 balancing authority area. 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 APS to comply with the requirements in the Commission's October 29 order. The CAISO will continue to file the monthly reports until the expiration of the transition period for the APS balancing authority area. The timing of the monthly reports may vary according to availability of data and coordination with the EIM entity to whom the report pertains. Because the DMM must review the CAISO's report before completing its own independent assessment, the DMM will file its report approximately 15 business days after the CAISO files its report.

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

II. Highlights

- In January, the APS balancing authority area observed average prices of \$24.84/MWh and \$21.98/MWh in the fifteen-minute market (FMM) and real-time dispatch (RTD).
- The APS balancing authority area passed over 92.34 percent of its balancing tests in January.
- The APS balancing authority area passed in 99.33 percent and 85.45 percent of its flexible ramping sufficiency tests for upward and downward capacity, respectively, in January.
- The APS balancing authority area observed power balance constraint infeasibilities in 0.13 percent of the intervals in the FMM, and it observed power balance constraints in 0.22 percent of the intervals in the RTD.
- The APS balancing authority area observed flexible ramping constraint infeasibilities in 1.18 percent for upward capacity, and 14.82 percent of the intervals for downward capacity in the FMM.

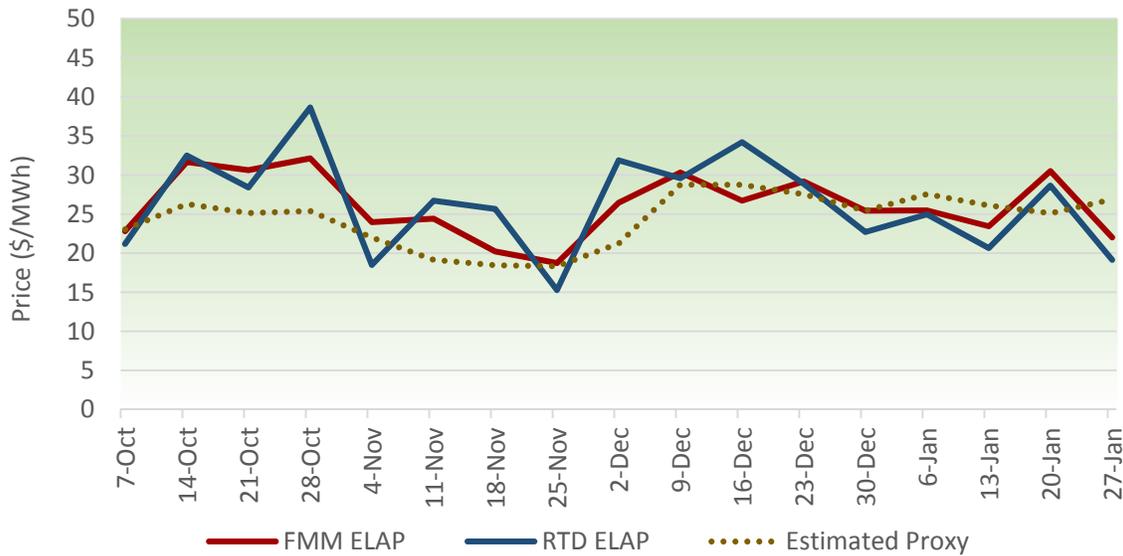
III. Report

a. Prices

Figure 1 shows that average prices in the APS EIM Load Aggregation Point (APS ELAP)² were \$24.84/MWh in the FMM and \$21.98/MWh in the RTD. Prices in the APS balancing authority area were stable during the first months of operation and tracked closely between markets.

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

Figure 1: Daily average prices for the APS balancing authority area.



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 that consistent with the CAISO tariff requirements.³ 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 transition period pricing reflected in Section 29.27 of the CAISO tariff. In January, there was one instance in the FMM and eight instances in the RTD that required a price correction for the APS balancing authority area under Section 35 of the CAISO tariff.

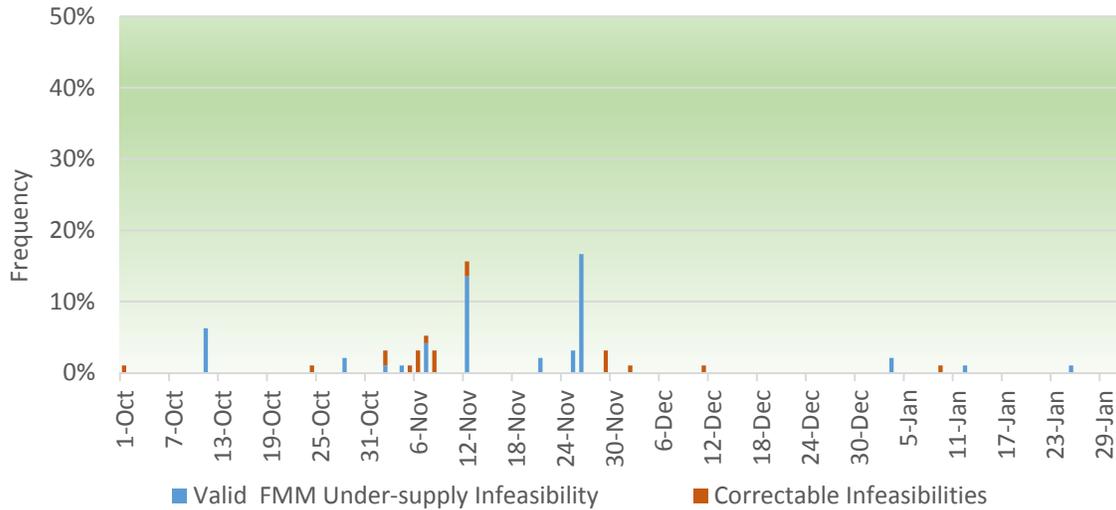
b. Frequency of Power Balance Constraint Infeasibilities

Figures 2 and 3 show the frequency of intervals that the power balance constraint was relaxed for under-supply conditions in the APS balancing authority 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

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

and that are subject to the transitional period pricing. Whereas the CAISO corrected under-supply infeasibilities that fell in the “correctable” category that were due to either a software error or a data error pursuant to Section 35 of the CAISO tariff.

Figure 2: Frequency of FMM under-supply power balance infeasibilities in the APS balancing authority area.



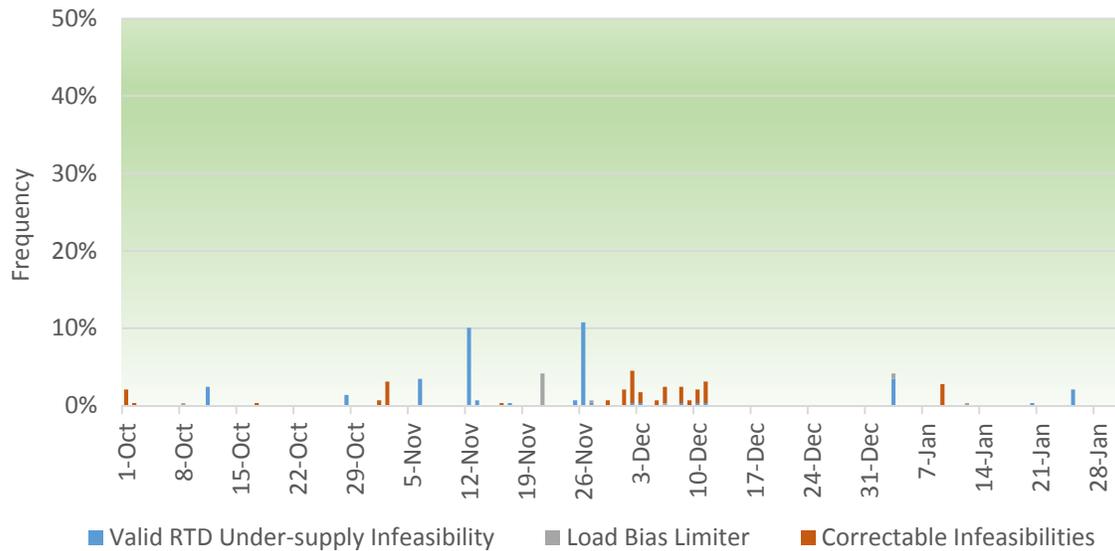
In the APS balancing authority area, there were four (0.13 percent of the time) valid under-supply infeasibilities in the FMM and there were 20 (0.22 percent of the time) valid under-supply infeasibilities in the RTD. The majority of these infeasibilities occurred on two days of the month.

- i) January 3, FMM and RTD. Load forecast higher than base schedules and renewable deviation. This was compounded with the failure of the flexible ramping sufficiency test.
- ii) January 12, FMM. Load conformance was used in this interval.
- iii) January 20, RTD. Deviations of both wind and solar generation.
- iv) January 25, FMM. A few resources operating below the base schedules that represented a reduction of capacity in the market. This was compounded with the APS balancing authority area failing the flexible ramping sufficiency test.

There were three valid RTD infeasibilities in the APS balancing authority area that coincided with the use of load conformance. The CAISO uses a load conformance limiter in the CAISO balancing authority area and in each of the EIM balancing authority areas to prevent over-adjustments through use of load conformance, 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 least the level of 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 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. Therefore, Figure 3 illustrates the infeasibilities that would have been avoided by the load conformance limiter were it in effect during the transition period in the APS balancing authority area.

Figure 3: Frequency of RTD under-supply power balance in feasibility in the APS balancing authority area.



Tables 1 and 2 list the FMM and RTD intervals, respectively, with infeasibilities observed in January, including the amount of load conformance to reflect the instances that the load conformance limiter would have triggered and offset the infeasibility.

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

Trade Date	Trade Hour	Trade Interval	MW Infeasibility	Load Conformance
03Jan2017	8	1	50.08	0
03Jan2017	8	2	52.15	0
12Jan2017	19	1	7.54	150
25Jan2017	9	3	78.34	0

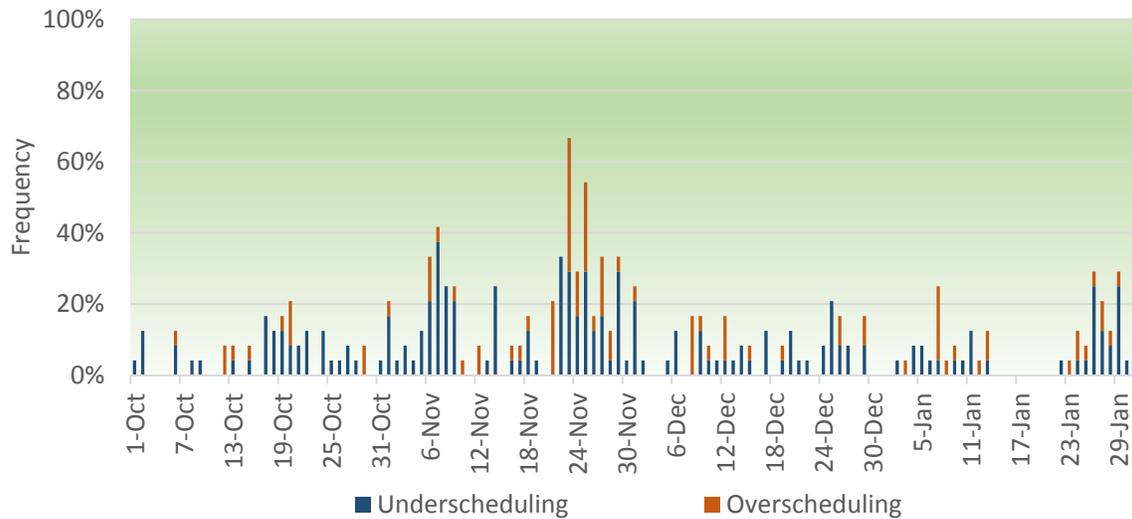
Table 2: List of valid RTD under-supply infeasibilities in the APS balancing authority area.

Trade Date	Trade Hour	Trade Interval	MW Infeasibility	Load Conformance
03Jan2017	8	1	200.61	
03Jan2017	8	2	237.05	
03Jan2017	8	3	179.65	
03Jan2017	8	4	103.61	
03Jan2017	8	5	41.54	
03Jan2017	8	6	33.84	
03Jan2017	8	7	119.43	100
03Jan2017	8	8	115.04	100
03Jan2017	8	9	95.46	100
03Jan2017	8	10	92.26	100
03Jan2017	11	1	12.49	
03Jan2017	11	3	7.57	
12Jan2017	19	1	59.29	150
20Jan2017	11	9	37.54	
25Jan2017	9	1	202.55	
25Jan2017	9	2	252.07	
25Jan2017	9	3	254.87	
25Jan2017	9	4	99.38	
25Jan2017	9	5	34.63	
25Jan2017	9	6	31.2	

c. Balancing and Sufficiency Test Failures

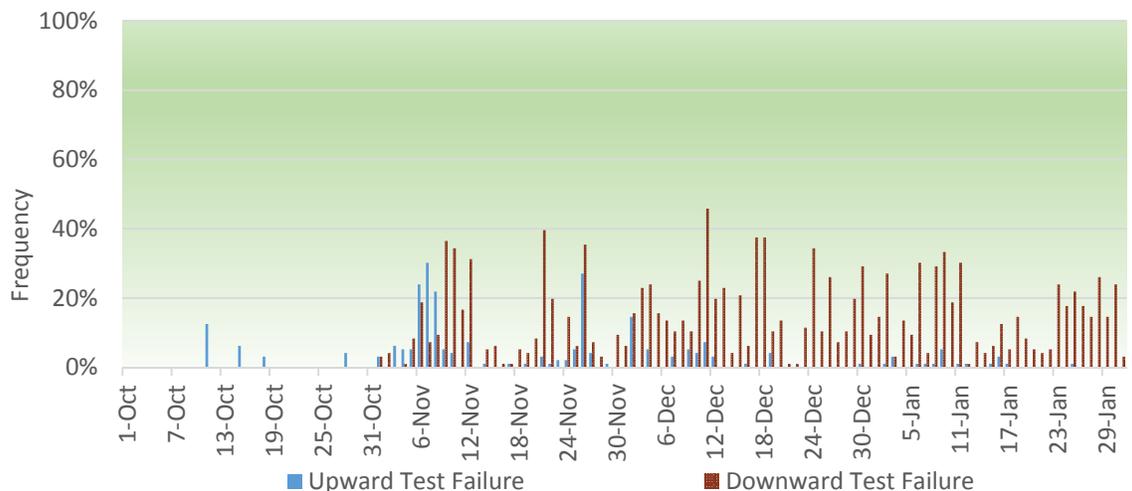
Figure 4 shows the trend of balancing test outcomes for January, which the CAISO performs pursuant to Section 29.34(k) of the CAISO tariff. The APS balancing authority area passed the balancing test in 92.34 percent of the intervals in January. Of the failures, 4.97 percent were due to under-scheduling and 3.63 percent were due to over-scheduling. The frequency of these failures is within historical ranges.

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



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 in January. The APS balancing authority area passed the test in 99.33 percent for upward capacity, and it passed 85.45 percent for downward capacity in January. With the implementation of the flexible ramping product on November 1, 2016, the CAISO conducts the test separately for each direction.

Figure 5: Frequency of flexible ramping sufficiency test failures in the APS balancing authority area.



The APS balancing authority area in particular observed a high frequency of intervals that the APS EIM entity failed the flexible ramping test, predominantly in the downward direction. These issues were driven by software defects

impacting the calculation of the flexible ramping capacity and were resolved in November and December. There were some other issues in the APS balancing authority area that contributed to some of the flexible ramping test failures that were also resolved in November and December.

d. Flexible Ramping Product Infeasibilities

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

In January, the flexible ramping constraint in the APS balancing authority area was infeasible on a daily average in 1.18 percent for upward capacity and 14.82 percent for downward capacity of the FMM intervals. With the implementation of the flexible ramping product, the connotation of infeasibility or relaxation for flexible ramping has changed. Generally, the term of infeasibility refers to the market outcome where the clearing of the flexible ramping product lies on a point of the price-responsive demand curve for flexible ramping rather than a traditional relaxation of the constraint. These infeasibilities were mainly driven by the economics of the flexible ramping constraint and its opportunity cost with respect to energy. Because the CAISO market co-optimizes the procurement of energy and flexible ramping capacity, and given the fact that the flexible ramping product also relies on a demand curve, the overall economics of the system for energy and flexible ramping capacity may find that it is more economical to relax the flexible ramping requirement by clearing at a price-responsive segment of the flexible ramping demand curve, instead of procuring more flexible ramping capacity at a higher cost.

Figure 6: Frequency of flexible ramping constraint infeasibilities in the APS balancing authority area.

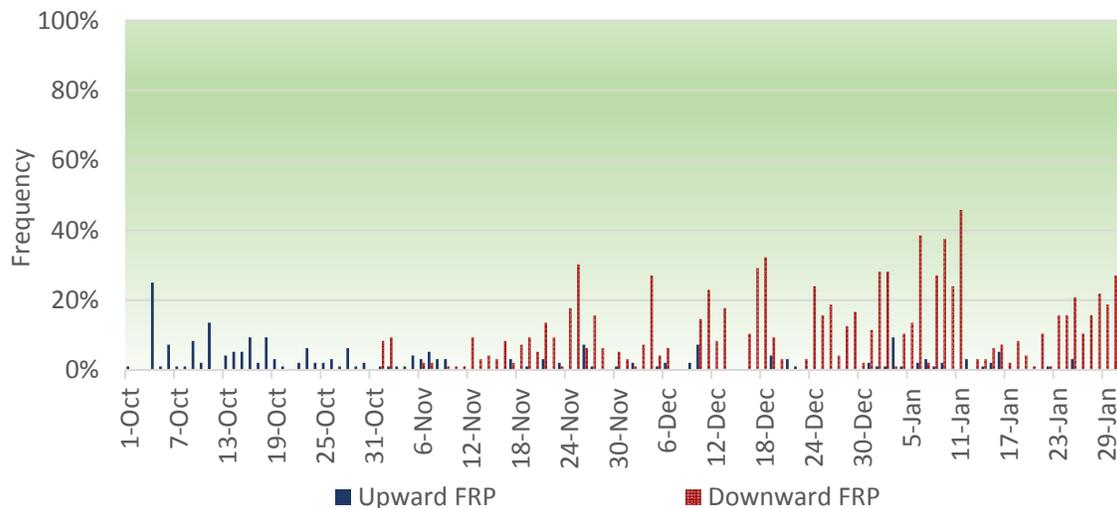
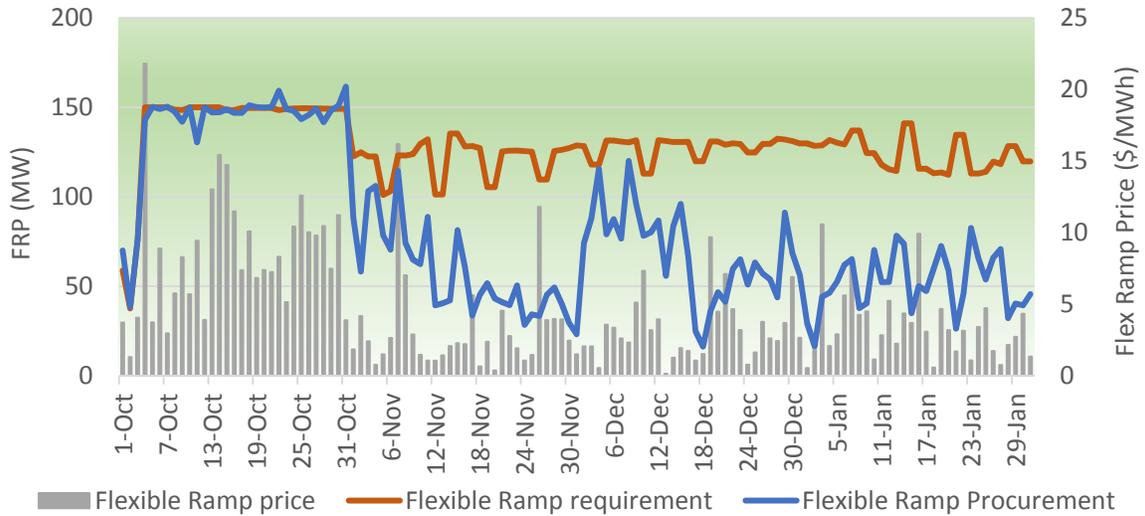


Figure 7 shows the daily average of the flexible ramping constraint requirement and procurement in the APS balancing authority area. In the vast majority of the hours, both the CAISO and the APS balancing authority areas were meeting their flexible ramping requirement. This plot also shows the daily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

Figure 7: Average requirement and procurement of flexible ramping in the FMM in the APS balancing authority 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 4th day of April 2017.

/s/ Grace Clark
Grace Clark