

March 9, 2016

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 2016 Informational Report
Energy Imbalance Market – Transition Period Report – NV Energy**

Dear Secretary Bose:

The California Independent System Operator Corporation (CAISO) hereby submits its report on the transition period of Nevada Energy during its first six months of participation in the Energy Imbalance Market (EIM) for January 2016. The Commission also directed the Department of Market Monitoring to submit an independent assessment, which the CAISO will file in approximately 8 days.

The CAISO will continue filing such reports, consistent with the Commission's order, until June 1, 2016.

Please contact the undersigned with any questions.

Respectfully submitted

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California ISO

**Energy Imbalance Market
January 1 – January 31, 2016
Transition Period Report - NV Energy**

March 9, 2016

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.¹ The provisions were made effective November 1, 2015, as requested. NV Energy entered the EIM on December 1, 2015, and is the first EIM entity to whom the transition period will apply until June 1, 2016.

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.

In its application for a transition period, the CAISO committed to prepare and file with the Commission reports during the transition period on the types, frequency, and nature of the issues experienced by the EIM entity. In the October 29 order, the Commission directed the CAISO and the CAISO's Department of Market Monitoring (DMM) to file informational reports, consistent with its previous reporting requirements associated with the waiver of the pricing parameters, at 30-day intervals during the six-month transition period for any new EIM entity. The CAISO provides this report for NV Energy 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 of the interceding holiday period with the commencement of the new EIM entity, and 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 start of each month in order to provide the prior full month's data. In addition, because the DMM must review the ISO's report before completing its

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

own, the DMM will file its report approximately eight days after the ISO files its report.

II. Highlights

- In the month of January, prices in NV Energy continue to be on a stable average of \$25.85/MWh and \$25.43/MWh, for the fifteen-minute market (FMM) and real-time dispatch (RTD), respectively.
- In its second month of EIM operations, NV Energy passed the 1) hourly balancing test more than 97 percent of the time and 2) the flexible ramping test more than 98 percent of the time.
- There were 14 intervals (or 0.47 percent of the time) of the FMM for the NVE Energy BAA in which the power balance constraint was relaxed for reasons that are not circumstances for which the CAISO may correct prices pursuant to its price correction authority in section 35 of its tariff. In the RTD, there were 55 such intervals (or 0.58 percent of the time).
- NV Energy experienced one learning/process issue that had an impact on the infeasibilities of January 14. A multi stage generator within the NV Energy Balancing Area tripped offline, which triggered this event. The NV Energy balancing authority deployed its operating reserves, and took actions (using operating reserves and energy from reserve sharing group) that were outside the Energy Imbalance Market. The NV Energy Balancing Authority operator did not provide timely and accurate information to the Market Operator of the actions taken outside the market, resulting in several periods of infeasibility in the Fifteen Minute Market and Real Time Dispatch. This event provides the primary basis for the increase in infeasibilities in January over December that are not subject to CAISO's price correction authority in Section 35 of its tariff.

Report

a. Prices

Figure 11 through 3 show that on average, prices in the NV Energy EIM Load Aggregation Point (NV ELAP)² were stable and on average \$25.8/MWh and \$25.4/MWh in the FMM and RTD markets, respectively. These represent modest increases with respect to the \$24.6/MWh and \$23.3/MWh averages observed in

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

December. On January 19, average FMM prices were higher than the monthly average due to congestion management of a transmission constraint enforced in the CAISO balancing authority area. The FMM dispatched NV Energy resources to manage congestion on this constraint, which caused prices in NV Energy area to reflect the effect of the congestion. Also, on January 5 and 30, NV Energy RTD prices were higher than the monthly average due to tight supply conditions on the broader system wide market; in other words, NV Energy’s prices on those days reflected conditions in the entire EIM and were not reflective of any conditions specific to NV Energy’s BAA.

Under the CAISO’s price correction authority in section 35 of its tariff, the CAISO may correct prices posted on its OASIS if it finds (1) that the prices were the product of an invalid market solution; or (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 Figures 1 through 3 include all prices produced by the CAISO consistent with its tariff requirements. 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; and 3) any prices the CAISO would have adjusted pursuant to transition period pricing reflected in section 29.27.

Figure 1: Daily average price for NV Energy ELAP –Fifteen-minute market

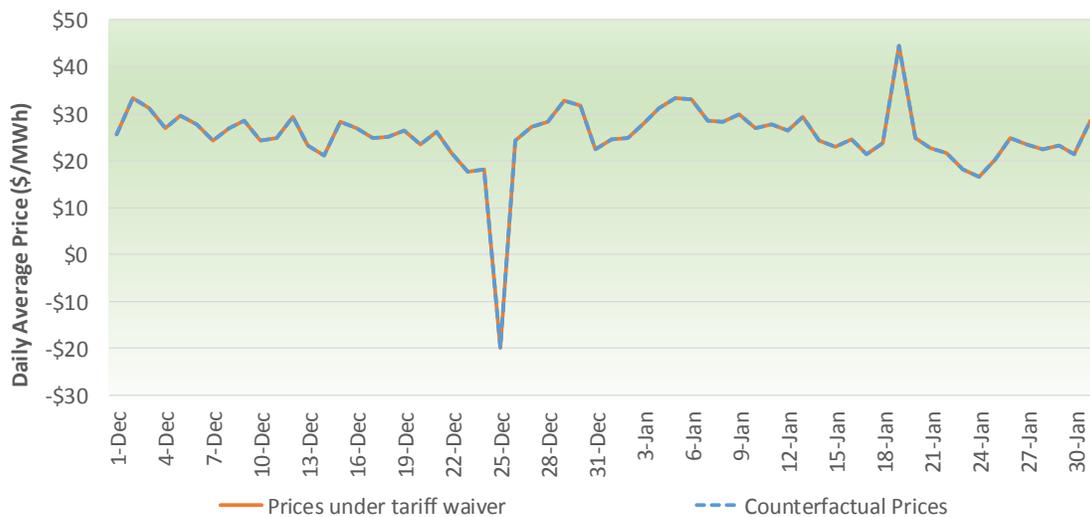


Figure 2: Daily average price for NV Energy ELAP –Five-minute market



In the month of January 2016, the power balance constraint was relaxed infrequently. Consequently, prices under the tariff waiver and those estimated as counterfactual prices without the transition period pricing were essentially the same for most of the intervals, with the exception of January 9 prices when prices would have been \$24.4/MWh higher than the price made effective under the authority of the transition period pricing (see Figure 2). On this day, there were seven consecutive RTD infeasibilities in hour ending 3 when a resource in NV Energy area tripped offline and led to the loss of over 400 MWs of capacity.

The prices obtained under transition period pricing are represented with lines in red while the prices the NV area would have experienced without the transition period pricing are represented with dotted lines in blue.³

³ In Docket ER15-402, the ISO reported on prices based on the price discovery mechanism in effect during the term of the Commission’s waiver granted in that docket and the prices as they would be if the waiver was not in effect. *i.e.*, what prices would have been had they been on the penalty prices in the ISO tariff. Because pricing under the waiver pricing is based on the last economic bid price signal, these prices are a proxy of what the prices would have been absent the seven category of learning curve type issues experience in that market. The difference between the counterfactual pricing and the price in effect during the term of the reports in that docket illustrated the market impact of the waiver pricing.

Figure 3: Monthly average prices for NV Energy ELAP



b. Frequency of Power Balance Constraint Infeasibilities

Figures 4 and 5 show the frequency of intervals in which the power balance constraint was relaxed for under-supply conditions in the NV Energy area for the FMM and RTD markets, respectively.

Figure 4: Frequency of fifteen-minute undersupply power balance infeasibilities.



In the month of January, there were 15 intervals in the FMM, which required relaxation of the power balance constraint (0.5 percent of all intervals of the month). All 15 intervals occurred consecutively (a 3 hour and 45 minute period) on January 14 between hours ending six and ten. The primary factors leading to these infeasibilities was the forced outage of a generation resource in

the Nevada balancing area, compounded with a reduction of net schedules interchange.

A multi stage generator within the NV Energy Balancing Area tripped offline, triggering the event of infeasibilities. The NV Energy balancing authority deployed its operating reserves, started several quick start peaker generators, and requested assistance from Northwest Power Pool (Reserve Sharing Group). Because these actions (quick start generators and energy from reserve sharing group) were outside the Energy Imbalance Market, the operator needed to perform a negative load conformance to inform the market operator. A negative load conformance indicates to the market operator that the NV Energy BA is covering some of its load through resources outside of the market and therefore not seen by the market operator. During the event, however, the balancing authority operators at NV Energy responded to the situation with a positive load conformance, consistent with the actions it should perform if the balancing issue had resulted from a load forecasting error. In the circumstance of the unit trip, however, the positive load conformance signaled to the market operator that the NV Energy BA needed more resources from the Energy Imbalance Market, even though NV Energy had and was deploying the reserves to cover the unit loss. When the market operator received this signal, it also saw that, because NV Energy had lost its multi-stage generator, it did not have the resource bid capacity available to cover the forecasted load plus the additional resources that its positive load conformance seemed to be requesting. Consequently, based on the information available to it, the market saw infeasibilities in the NV Energy BAA.

NV Energy performed accurate operating procedures to manage the contingency for reliability purposes. The system performance during the event remained stable and reliable. It deployed the incorrect operating procedures to manage the market operations reaction to the unit loss and deployment of reserves, however. NV Energy and the CAISO performed a complete analysis of the event in the days immediately following the event and promptly provided information and training on the proper procedure to all NV Energy balancing authority operators and EIM operations engineers.

During the January 14 event, the power balance constraint was relaxed in 42 five-minute intervals because of undersupply infeasibilities. During that period, six of the power balance constraint relaxations happened when a load conformance occurred that was both in the same direction of the infeasibilities and also with a magnitude greater than the infeasibility. Under these scenarios, the load conformance limiter functionality that will be in place for the NV Energy

BAA after the transition period expires would have prevented the infeasibility.⁴ Application of the load conformance limiter prevents supply issues arising from imperfect load conformance that could create invalid infeasibilities inappropriately triggering the parameter price.⁵

An EIM Entity operator may adjust its load forecast – employ load conformance – at times when it believes the CAISO’s forecast for the EIM balancing authority areas may not cover its anticipated system needs. These adjustments are somewhat coarse in that they must be made in increments of 10 to 50 MW. In addition, the operators must act quickly within a relatively short time to ensure the market software appropriately reflects system conditions, but cannot know the system-wide ramp requirements in that short time. Based on these two factors, the adjustment may at times exceed the system’s ability to respond. For example, an adjustment could exhaust five-minute ramping capability and cause an infeasibility; if the adjustment in fact exceeds actual system needs, it has caused an infeasibility that otherwise would not exist.

The CAISO uses a load conformance limiter in the CAISO balancing authority area to prevent such an over-adjustment 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 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 operations rather than because of real supply issues.

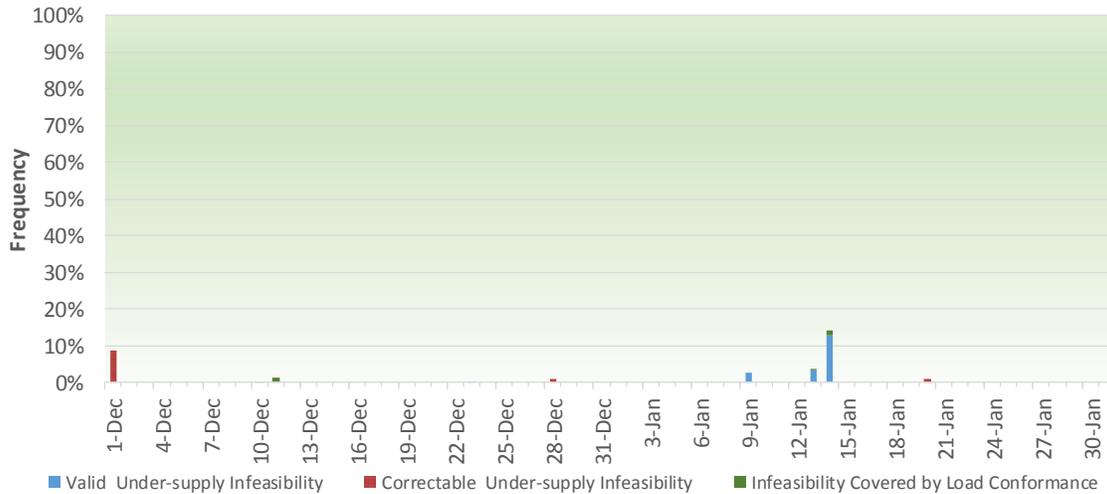
In addition to the 42 five-minute intervals of infeasibilities on January 14, there were also 13 five-minute intervals on January 13 that required relaxation of the power balance constraint, with two of them being covered by the load conformance limiter feature. These infeasibilities were driven by the fact that the

⁴ The load conformance limiter is also sometimes referred to as the load bias limiter. Both refer to the same feature.

⁵ The implementation of the price discovery method during the transition period obviates the need to also employ the load conforming limiter because the price discovery method leads to prices that are based on the last economic signal all circumstances, including when the load conforming is limited by the limiter. Once the transition period expires, the load conforming limiter will be activated for the NV Energy areas as it is for the other EIM areas.

actual market schedules materialized as below the base schedules. There were also seven RTD infeasibilities on January 9 when a unit in NV Energy area tripped offline, resulting in the loss of over 400 MWs of capacity.

Figure 5: Frequency of 5-minute undersupply power balance in feasibilities.



On both January 13 and 14 NV Energy balancing area failed the flex sufficiency test for the hours in which the FMM and RTD infeasibilities occurred.

As specified in section 29.34(n) of the CAISO tariff and section 10.3.2.1 of the Business Practice Manual for the EIM, if the EIM Entity balancing authority area fails the sufficient ramp test, or is deemed to have failed the test because it failed the capacity (resource plan) test, CAISO will restrict additional EIM Transfer imports into that EIM Entity balancing authority area during the hour starting at T beyond the optimal solution for T-7.5 minutes. For the duration of the restricted interval, the market clearing price in the affected EIM Entity balancing authority area will also be based on the last economic bid cleared in the fifteen-minute or five-minute interval in the EIM Entity balancing authority area. The CAISO’s counterfactual prices presented in this report represent prices as they would have been had this procedure been applied. With the implementation of the Available Balancing capacity, the ISO will no longer apply this logic in the real-time markets when there is a flexible ramp sufficiency test.

There were also seven consecutive RTD intervals on January 9, during which the power balance constraint was relaxed because of the loss of over 400 MW of generation when a generation unit tripped offline in the NV Energy area. Tables 1 and 2 list all intervals with infeasibilities observed in both the 15- and 5-minute markets.

Table 1: List of valid fifteen-minute infeasibilities

Trade date	Trade Hour	Trade Interval	MW Infeasibility	Load Conformance
14-Jan-16	6	1	371.05	200
14-Jan-16	6	2	363.71	200
14-Jan-16	6	3	540.11	400
14-Jan-16	6	4	720.39	400
14-Jan-16	7	1	431.83	200
14-Jan-16	7	2	498.29	200
14-Jan-16	7	3	489.95	200
14-Jan-16	7	4	186.01	50
14-Jan-16	8	1	131.34	50
14-Jan-16	8	2	374.79	300
14-Jan-16	8	3	138.33	50
14-Jan-16	8	4	96.51	50
<u>14-Jan-16</u>	<u>9</u>	<u>1</u>	<u>20.51</u>	<u>50</u>
<u>14-Jan-16</u>	<u>10</u>	<u>1</u>	<u>33.22</u>	<u>50</u>

Table 2: List of valid five-minute infeasibilities

Trade date	Trade Hour	Trade Interval	MW Infeasibility	Load Conformance
9-Jan-16	3	2	8.39	0
9-Jan-16	3	3	48.03	0
9-Jan-16	3	5	89.68	0
9-Jan-16	3	6	121.38	0
9-Jan-16	3	7	151.39	0
9-Jan-16	3	8	227.84	0
9-Jan-16	3	9	233.35	0
13-Jan-16	7	2	3.67	0
13-Jan-16	7	3	127.87	0
13-Jan-16	7	4	79.04	0
13-Jan-16	7	5	51.91	0
13-Jan-16	7	6	156.66	40
13-Jan-16	7	7	96.31	40
13-Jan-16	7	8	110.78	40
<u>13-Jan-16</u>	<u>7</u>	<u>9</u>	<u>28.99</u>	<u>40</u>
13-Jan-16	12	1	33.3	0
13-Jan-16	12	2	14.13	0
<u>14-Jan-16</u>	<u>5</u>	<u>6</u>	<u>83.37</u>	<u>150</u>
14-Jan-16	5	7	574.32	200
14-Jan-16	5	8	555.04	200

Trade date	Trade Hour	Trade Interval	MW Infeasibility	Load Conformance
14-Jan-16	5	9	503.36	200
14-Jan-16	5	10	247.46	200
14-Jan-16	5	11	222.43	200
14-Jan-16	5	12	373.27	200
<u>14-Jan-16</u>	<u>6</u>	<u>1</u>	<u>382.32</u>	<u>400</u>
14-Jan-16	6	2	475	400
14-Jan-16	6	3	471.59	400
14-Jan-16	6	4	544.35	400
14-Jan-16	6	5	544.94	400
14-Jan-16	6	6	353.47	200
14-Jan-16	6	7	363.28	200
14-Jan-16	6	8	340.74	200
14-Jan-16	6	9	300.04	200
14-Jan-16	6	10	242.05	200
14-Jan-16	6	11	258.98	200
14-Jan-16	6	12	389.13	200
<u>14-Jan-16</u>	<u>7</u>	<u>1</u>	<u>81.37</u>	<u>200</u>
<u>14-Jan-16</u>	<u>7</u>	<u>2</u>	<u>190.57</u>	<u>200</u>
14-Jan-16	7	3	64.77	50
14-Jan-16	7	4	121.45	50
14-Jan-16	7	5	230.27	50
14-Jan-16	7	6	207.41	50
14-Jan-16	7	7	230.82	50
14-Jan-16	7	8	227.49	50
14-Jan-16	7	9	209.78	50
14-Jan-16	7	10	115.91	50
14-Jan-16	7	11	358.94	300
14-Jan-16	7	12	360.03	300
<u>14-Jan-16</u>	<u>8</u>	<u>1</u>	<u>279.35</u>	<u>300</u>
<u>14-Jan-16</u>	<u>8</u>	<u>2</u>	<u>248.07</u>	<u>300</u>
14-Jan-16	8	3	350.07	300
14-Jan-16	8	4	428.88	300
14-Jan-16	8	5	441.94	300
14-Jan-16	8	6	380.09	300
14-Jan-16	8	7	194.63	150
14-Jan-16	8	8	107.88	100
14-Jan-16	8	9	60.46	50
14-Jan-16	8	10	4.78	0
31-Jan-16	15	10	15.47	0

c. Balancing and Sufficiency Test Failures

Figure 6 shows the trend of balancing test failures for the month of January, which the CAISO performs pursuant to Section 29.34 (k) of the CAISO ISO Tariff. NV Energy passed the balancing test 97.98 percent of the time in January, an improvement with respect to the 95.56 percent of the hours in December. It failed in 1.33 percent and 0.67 percent of the hourly intervals for under-scheduling and over-scheduling, respectively.

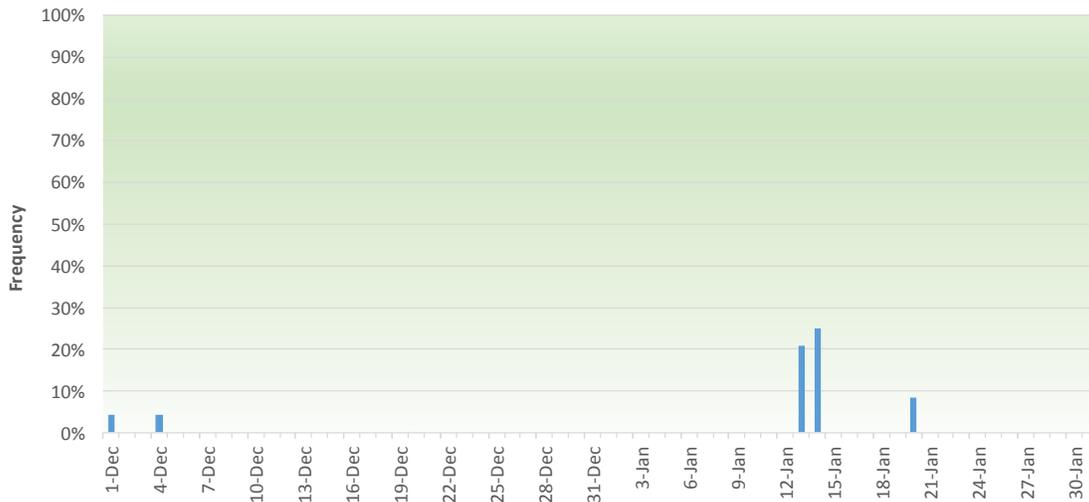
Figure 6: Frequency of Balancing test failures for NV Energy area.



The CAISO also performs the ramping sufficiency test as specified in section 29.34(m) of the CAISO tariff. NV Energy passed the test in 97.98 percent of the intervals in January, or 729 out of 744 total hours (frequency obtained by dividing the number of hours passed by 24 hours/day).

Figure 7 shows the trend of the test failures for flexible ramping for January where most of the test failure happened during January 13 and 14.

Figure 7: Frequency of flexible ramp sufficiency test failures in NV Energy area.



d. Flexible Ramping Constraint Infeasibilities

In this section, the CAISO discusses the frequency with which and the reasons why the flexible ramping constraint was binding in the NV Energy balancing authority area. The flexible ramping constraint is a minimum-requirement constraint that the CAISO enforces in the FMM to set aside flexible capacity in the FMM for use in the RTD to address ramping needs. While this information is not directly related to the reporting requirements under the transition period, the CAISO believes this explanation will assist in understanding the overall performance of the EIM with the addition of NV Energy. As explained below, while the flexible ramping constraint was binding frequently in the NV Energy area, this was an expected outcome of the sharing of the diversity benefits of the EIM. A binding flexible ramping constraint is not an indication of failure of the market or of NV Energy to procure adequate resources.

During the month of January, the flexible ramping constraint in the NV Energy EIM area was infeasible, on a daily average, in 2.5 percent of the FMM intervals, an increase from the 1.5 percent of December; this was mainly driven by the conditions previously described for January 14. When the constraint is infeasible, it is indicating that the system cannot meet the constraint and it must be relaxed in order to clear the market. In addition, the flexible ramp constraint within NV Energy's area was frequently binding. When the constraint is binding, it means that even though the requirement is fully procured, there is an associated opportunity cost to meet that constraint. This constraint, like many others in the CAISO market, has a pricing parameter associated with its relaxation. The parameter price is currently set to \$60/MWh for the NV Energy

area, except that, during the transition period, when the power balance or transmission constraint is relaxed, in which case the parameter will be set to a number between 0 and 0.01. In the cases reported in this part (d) of the report, the power balance and transmission constraints were not relaxed and therefore, the applicable flexible ramping parameter for these intervals was \$60.

With the market co-optimizing the procurement of energy and flexible ramp capacity, an opportunity cost may arise between energy and flexible ramping constraint when the market optimization has to decide whether to dispatch it for energy or reserve it for flexible ramping capacity. This trade-off triggers the shadow cost of the flexible ramping constraint, which represents the cost of reserving the capacity for flexible ramp capacity. This opportunity cost plays an important role between the procurement of flexible ramp capacity in the system overall and determining the amount of economic transfers between balancing authority areas in the EIM, within the limitations of the amount of capacity available for transfers between the participating balancing authority areas.

Because the addition of NV Energy provided significantly more transfer capacity between the EIM areas, the EIM transfer constraint was binding infrequently. When the transfers between the participating EIM balancing authority areas are not binding, the participating EIM entities and the CAISO can share in the benefits of the diversity offered in the various areas. Therefore, the energy bids from all areas are seen by the market as effectively a single bid stack that is composed of bids from all the participating areas below. The composed stack of bids will include bids from the CAISO or other EIM area that is lower than the opportunity cost of the \$60 parameter for flexible ramping constraint relaxation. Therefore, the opportunity cost for flexible ramping constraint in the NV Energy area can be set by resources within the other balancing authority areas, and vice-versa. This means that there may be resources in NV Energy area that are incrementally dispatched to provide energy through economical transfers into the CAISO area instead of procuring flexible ramping capacity for the NV Energy's area. In fact, during the month of January, this is why flexible ramp constraint was binding frequently in the NV Energy area, most frequently during the heavy winter load pulls in CAISO that occur in hours ending 17 and 18.

Figure 8: Frequency of flexible ramp constraint infeasibilities.

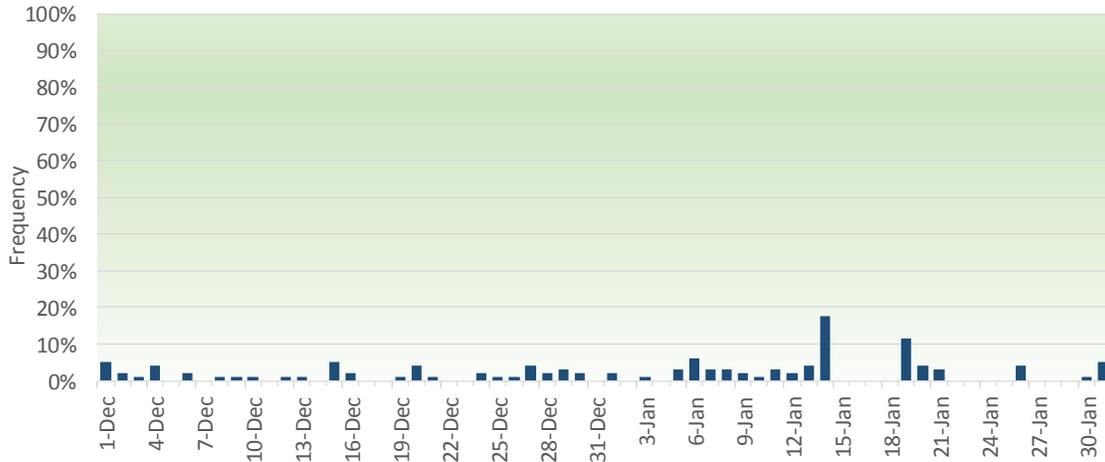
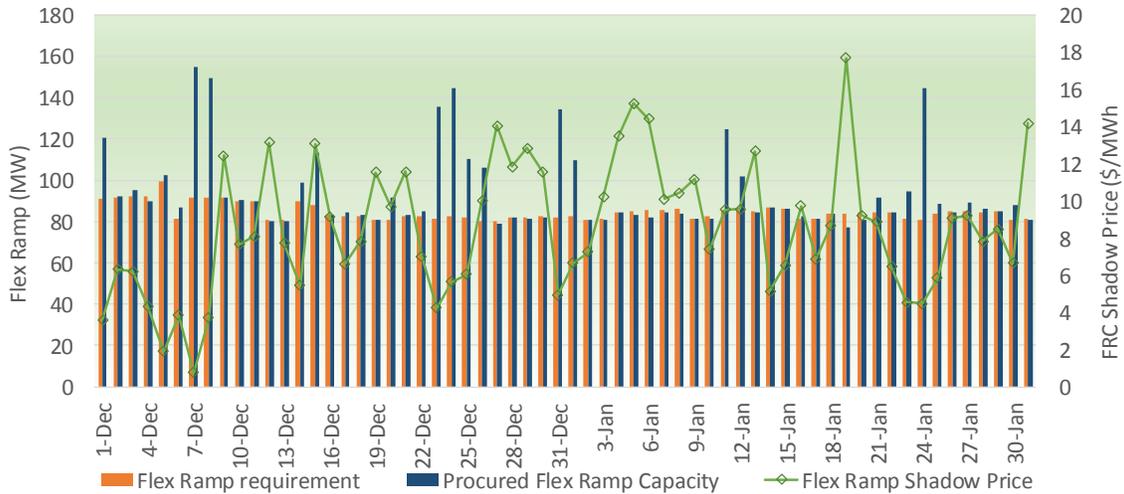


Figure 9 shows the daily average of the flexible ramp constraint requirement and procurement. In the vast majority of the hours, NV Energy is meeting its flexible ramping requirement. In addition, there is an excess of flexible ramp capacity in the NV Energy area during the midday hours. This plot also shows the daily average of the shadow price for the flexible ramp constraint in NV Energy area.

Figure 9: Average requirement and procurement of flexible ramp in the fifteen-minute market.



CERTIFICATE OF SERVICE

I hereby certify that I have served the foregoing document upon the parties listed on the official service list in the captioned proceedings, 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 9th day of March 2016.

Anna Pascuzzo

Anna Pascuzzo