March 22, 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___
Independent Assessment by the Department of Market Monitoring
January 2016 Energy Imbalance Market Transition Period Report – NV Energy

Dear Secretary Bose:

The Department of Market Monitoring hereby submits its independent assessment on the transition period of Nevada Energy during its first six months of participation in the Energy Imbalance Market for January 2016.

Please contact the undersigned with any questions.

Respectfully submitted,

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California Independent
System Operator Corporation

California ISO

Report on energy imbalance market issues and performance: NV Energy balancing authority area

March 18, 2016

Prepared by: Department of Market Monitoring

Executive summary

Pursuant to the Commission's October 29, 2015 Order on the ISO's Energy Imbalance Market (EIM), the ISO filed a report on March 9, 2016 covering the period from January 1 through January 31, 2016 (January Report) for the NV Energy area.[1] This report provides a review by the Department of Market Monitoring (DMM) of EIM performance in the NV Energy area during the period covered in the ISO's December report. Key findings in this report include the following:

- Overall EIM performance went well during the second month of implementation in the NV Energy area. The volume of available transfers between NV Energy, PacifiCorp East and the ISO increased significantly with the addition of the NV Energy area. The resource sufficiency and flexible ramping sufficiency tests were met in all but a handful of hours in the NV Energy area during January. These factors helped keep supply insufficiencies very low and caused prices to be relatively low and track closely in all EIM areas.

- Prices in the NV Energy area tracked closely with prices in the SCE load aggregation area (Southern California) and bilateral trading hub prices during January. Average prices in the NV Energy area used in load settlements, which combine 15-minute market and 5-minute market prices, were about $26/MWh for the month, compared to about $31/MWh in the SCE load aggregation area. Prices in NV Energy were about 15 to 17 percent higher than the bilateral trading hub price range that DMM uses as an additional benchmark for EIM prices.

- The percentage of intervals when the energy power balance constraint was relaxed to allow the market software to balance modeled supply and demand was relatively low in NV Energy during January and were primarily limited to a single day (January 14). Without the price discovery feature, which prevents prices from being set by the $1,000/MWh penalty price during power balance shortages, prices in NV Energy would have been about 15 percent higher in the 15-minute market and 22 percent higher in the 5-minute market.

- During January, the percentage of intervals when the flexible ramping constraint was relaxed – but price discovery provisions were not triggered due to relaxation of the energy power balance constraint – was also relatively low. During these intervals, when there is a shortage of flexible ramping capacity, the energy price in the 15-minute market includes the $60/MWh penalty price for the flexible ramping constraint.[2] This occurred during only about 2 percent of 15-minute intervals during January and increased monthly average 15-minute prices by about 5 percent.

- The flexible ramping constraint was binding, but was not relaxed, during more than 90 percent of intervals during January. During these periods, the shadow price for the constraint often reflected opportunity costs of lower priced resources in the NV Energy area providing flexible ramping capacity rather than energy. This result is consistent with efficient and competitive market outcomes given market conditions within the NV Energy area relative to adjacent areas of the ISO.

[1] The ISO's December Report was filed at FERC and posted in the ISO website on March 10, 2016, http://www.caiso.com/Documents/Mar9_2016_Jan2016_EIMTransitionPeriodReport_NVEnergy_ER15-2565.pdf.

[2] When price discovery provisions are triggered by relaxation of the energy power balance constraint, the penalty price for the flexible ramping constraint is changed from $60/MWh to $0/MWh in the pricing run, so that the shadow price of this constraint is $0/MWh.

- Without special price discovery provisions in effect, the load bias limiter feature would have been triggered in less than 15 percent of intervals when the power balance constraint was relaxed in each of the 5-minute and 15-minute markets in January. When triggered, the load bias limiter would have the same effect as the price discovery feature during power balance constraint shortages. If the price discovery feature was not in effect, the load bias limiter would have reduced 15-minute and 5-minute market prices by only about $0.60/MWh (2 percent) and $0.75/MWh (2 percent), respectively.

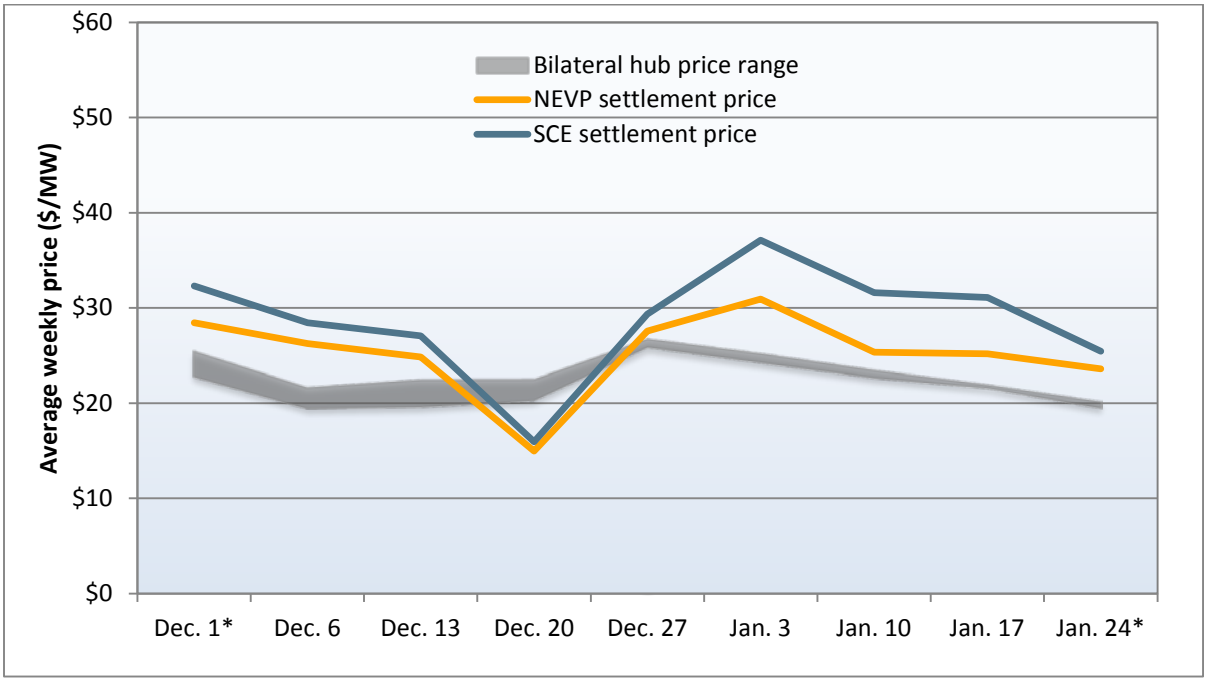
The remainder of this report is organized as follows. The summary section highlights key findings in and trends occurring in January 2016. Section 1 provides a description of prices in the market and impacts from the power balance and flexible ramping market constraints. Section 2 provides information regarding the flexible ramping constraint. Section 3 provides details on the impact of the load bias limiter.

1 Energy imbalance market prices

Figure 1.1 shows weekly average prices used in settlement of loads in NV Energy and SCE load aggregation area (Southern California) prices, along with the range of bilateral trading hub prices DMM uses as an additional benchmark for EIM prices.[3]

The load settlement price is an average of the 15-minute and 5-minute prices, weighted by the amount of estimated load imbalance in each of these markets.[4] The 15-minute market prices are weighted by the imbalance between base loads and forecasted load in the 15-minute market, and the 5-minute prices are weighted by the difference between forecasted load in the 15-minute market and forecasted load in the 5-minute market. The hourly shape and level of these settlement prices tracked most closely with 15-minute prices. This occurs because the settlement prices are weighted more heavily on prices in the 15-minute market (roughly 80 percent) and less heavily on prices in the 5-minute market (roughly 20 percent).

Figure 1.1 Settlement and bilateral trading hub prices – NV Energy



[3] All figures contain disproportionate week lengths for the first and last week shown. The week starting December 1 contains 5 days while the week starting January 24 is joined with January 31 and contains 8 days.

[4] Business Process Manual Configuration Guide: Real-Time Price Pre-calculation, Settlements and Billing, October 29, 2015: https://bpmcm.caiso.com/BPM%20Document%20Library/Settlements%20and%20Billing/Configuration%20Guides/Pre-Calcs/BPM%20-%20CG%20PC%20Real%20Time%20Price_5.9.doc.

Figure 1.2 and Figure 1.3 show the average daily frequency of constraint relaxations in the 15-minute and 5-minute markets in NV Energy by week during January, respectively. These figures also show the average weekly prices in NV Energy in the 15-minute and 5-minute markets *with* and *without* the special price discovery mechanism being applied to mitigate prices in NV Energy, respectively. These figures also include weekly average ranges of firm bilateral trading hub market prices for comparison to EIM market prices, represented by the grey shaded region.

On January 14, a generator tripped in the NV Energy area causing power balance constraint relaxation in 14 of the 15-minute intervals and 41 of the 5-minute intervals on this day. On the remaining days in January, the power balance constraint was not relaxed in the 15-minute market and was relaxed very infrequently in the 5-minute market.

On January 31, high system marginal energy costs, primarily driven by power balance constraint relaxations in the ISO, drove average 5-minute market prices in NV Energy to over $60/MWh. Prices in the NV Energy tracked closely with prices in the ISO on this day due to a combination of large transfer capabilities and little congestion between EIM areas and the ISO. These relatively high prices for January 31 are included in average prices for the week starting January 24 in Figure 1.2 and Figure 1.3.

The overall weekly frequency of power balance relaxations is shown in Figure 1.2 and Figure 1.3 by the blue bars. The infrequency of these events, except during the week starting January 10, caused prices with and without price discovery to track closely throughout January, a trend continuing from the prior month. The power balance constraint relaxations on January 14 caused prices that would have occurred without price discovery to be significantly higher than prices with price discovery in effect during the week starting January 10.

Figure 1.2 also shows an increase in the average number of relaxations per day for the flexible ramping requirement in January. For the month, this constraint was relaxed during about two 15-minute intervals each day, or about 2 percent of 15-minute intervals for the month. During intervals when the flexible ramping constraint is relaxed, market prices with and without price discovery are impacted by the $60/MWh flexible ramping penalty price

Figure 1.2 Frequency of constraint relaxation and average prices by week NV Energy (15-minute market)

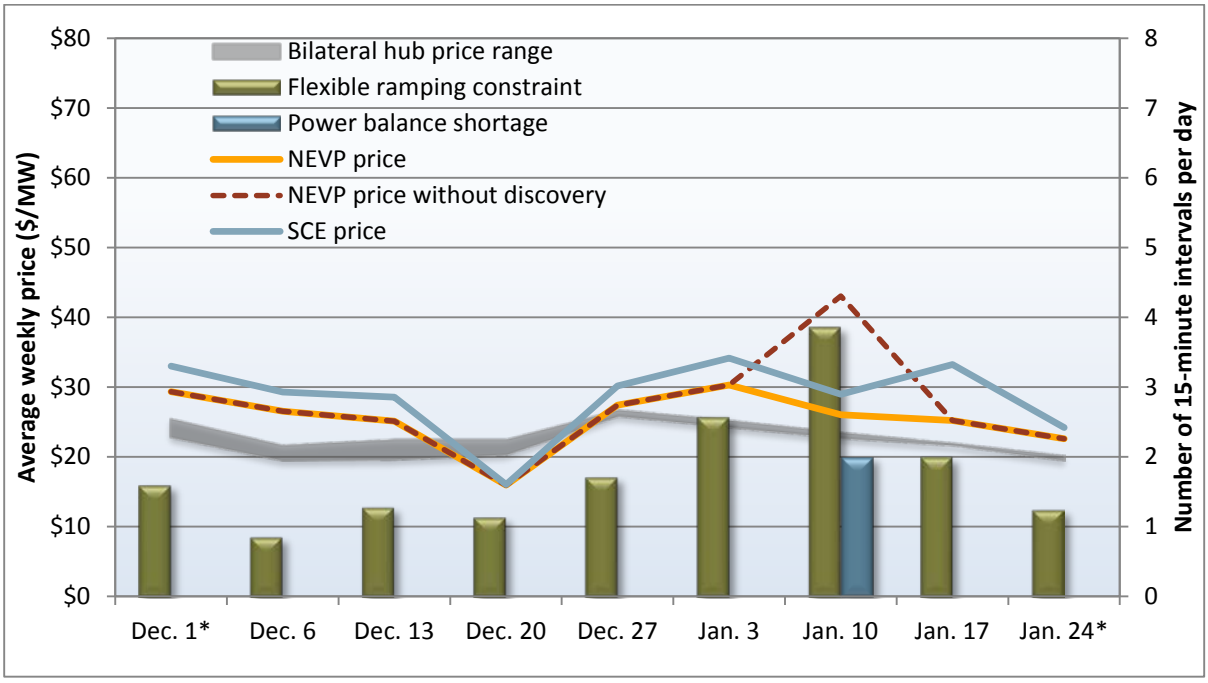
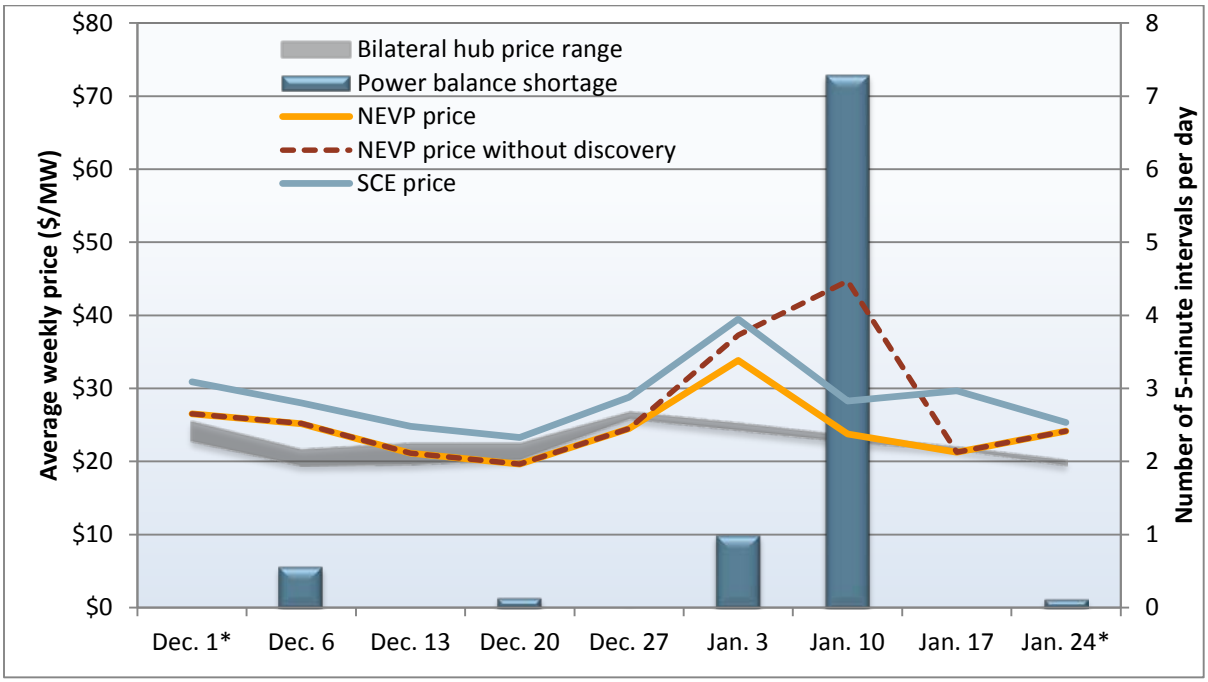


Figure 1.3 Frequency of constraint relaxation and average prices by week NV Energy (5-minute market)



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2 Flexible ramping capacity

This section provides a summary of the number of the flexible ramping constraint relaxations in NV Energy, with figures updated from DMM's December report.[5]

As shown in Table 2.1, the flexible ramping requirement averaged about 84 MW in the NV Energy area during January. As described in prior reports, flexible ramping constraint requirements are calculated based on historical ramping levels for each 15-minute interval by comparing the preceding 40 intervals.[6] DMM has expressed concern about this approach since it is based on a very limited sample and tends to result in a very volatile level of requirements. The ISO addressed this issue by adjusting requirements calculated based on a relatively tight range of minimum and maximum limits.

As shown in Table 2.1, during most intervals the requirements calculated by this tool fall outside of this range and are consequently set equal to these minimum and maximum limits. In January, the requirement calculated by this tool fell below the minimum level established by the ISO during about 77 percent of intervals. The requirement was set to the minimum level of 80 MW during these intervals. Meanwhile, the requirement calculated by the tool exceeded the maximum level established by the ISO during about 14 percent of intervals, with the maximum requirement averaging 100 MW during these intervals. The requirement fell between 80 and 100 MW during only 9 percent of intervals in January.

Table 2.1 Flexible ramping constraint requirements for NV Energy

		Requirement (MW)				Percent of intervals		
Year	Month	Avg	Min	Max	Volatility	Req = Lower bound	Req = Upper bound	Req = bounds
2015	Dec	85	80	100	8%	69%	24%	94%
2016	Jan	84	80	100	9%	77%	14%	91%

Table 2.2 shows that the flexible ramping constraint was relaxed due to a shortage of ramping capacity with a resulting positive shadow price set at $60/MWh during only about 1.9 percent of 15-minute intervals during January. This drove the monthly average 15-minute prices up by about 5 percent. This table also shows that the flexible ramping constraint bound, but was not relaxed, during about 90 percent of intervals in January. Because the constraint is not relaxed, the shadow price for the flexible ramping constraint is not set at the $60/MWh penalty price, but to a smaller amount. This level of flexible ramping constraint activity exceeds levels in the ISO and other energy imbalance market areas and arises because of circumstances in the NV Energy area, as described below.

[5] *Report on Energy Imbalance Market Issues and Performance*, Department of Market Monitoring, December 1, 2015, pp.15-17. http://www.caiso.com/Documents/Dec1_2015_Department_MarketMonitoringReport_Performance_Issues_EIMfromAug_Sep2015_ER15-402.pdf.

[6] Q3 2015 Report on Market Issues and Performance, Department of Market Monitoring, November 16, 2016, pp. 34-36. http://www.caiso.com/Documents/2015ThirdQuarterReport-MarketIssuesandPerformance-November2015.pdf.

Table 2.2 Flexible ramping constraint requirements and market impacts in NV Energy[7]

		Binding flexible ramping constraint (no shortage)		Flexible ramping constraint (shortage)	
	Average flex ramp requirement (MW)	Percent of intervals	Average shadow price	Percent of intervals	Average shadow price
2015 December	85	73.8%	$9.41	1.4%	$60.00
2016 January	84	90.4%	$8.86	1.9%	$60.00

During January, prices for the NV Energy area were frequently set by system marginal prices across the combined EIM and ISO footprint. This was due to the high amount of transfer capability and limited amount of congestion observed between NV Energy, PacifiCorp and the ISO.

Under these conditions, when flexible ramp requirements were fulfilled by less expensive units within the NV Energy area, shadow prices for the flexible ramping constraint roughly equaled the difference between the marginal cost of the unit providing flexible ramping capacity and the prevailing system marginal price. This occurred frequently in NV Energy and is not inconsistent with efficient and competitive market outcomes.

[7] The percent of intervals where the flexible ramping constraint was relaxed due to shortage in Table 2.2 reflect intervals that resulted in a positive shadow price in the pricing run, typically equal to the $60/MWh penalty price. These intervals do not include periods when the power balance constraint was also relaxed, and both penalty prices were set to $0/MWh because of the price discovery mechanism.

3 Load bias limiter

When triggered, the load bias limiter would have the same effect as the price discovery feature by causing prices to be set by the last economic bid dispatched rather than the $1,000/MWh penalty price for energy power balance shortages. A more detailed description of the load bias limiter is included in DMM's April 2 report.[8] The ISO included discussion of the load bias limiter in its recent answer to the comments regarding the ISO's response to the Commission's September 24, 2015 letter requesting additional information on the ISO's August 19, 2015 filing to implement its available balancing capacity proposal in the EIM.[9]

As highlighted in Section 1, the power balance constraint was relaxed during relatively few intervals in the NV Energy area during January, and instances when the power balance constraint relaxation did impact prices were primarily confined to January 14. Figure 3.1 shows that during 5-minute and 15-minute intervals when power balance constraint shortages existed in January, less than 15 percent would have triggered the load bias limiter in each market, and hence the load bias limiter would have a very small impact on market prices. Overall the load bias limiter would have lowered 15-minute market prices by $0.63/MWh (2 percent) and 5-minute market prices by $0.75/MWh (2 percent).

The estimates of EIM prices without price discovery in Section 1 of this report assume that price discovery provisions are not in place, but energy prices would not be set by the $1,000/MWh penalty price when the power balance constraint was relaxed and the criteria for triggering the load bias limiter were met. This reflects that on March 20, 2015 the ISO indicated that the load bias limiter would have been triggered under these criteria, if price discovery provisions were no longer in effect.

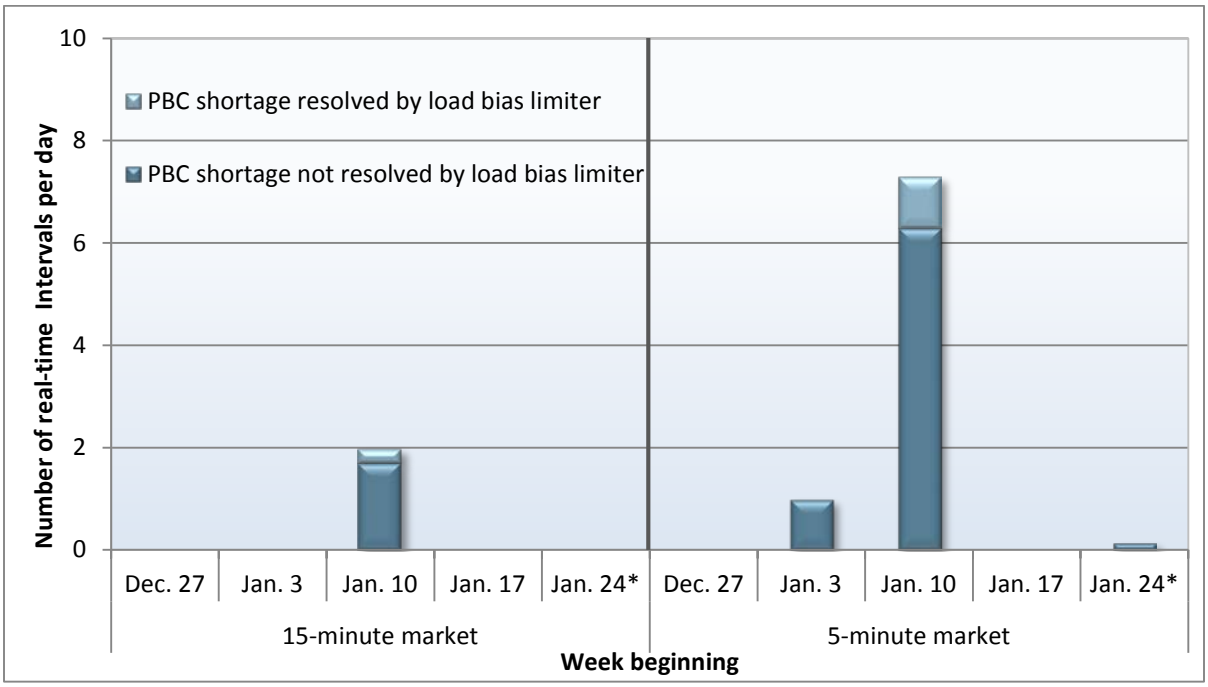
Table 3.1 Impact of load bias limiter on NV Energy prices (January 2016)

	Bilateral trading hub range		Average EIM price	EIM price without price discovery	EIM price without price discovery or load bias limiter	Potential impact of load bias limiter	
	Low	High				Dollars	Percent
NV Energy							
15-minute market (FMM)	$22.24	$22.65	$25.85	$29.69	$30.32	-$0.63	-2.1%
5-minute market (RTD)	$22.24	$22.65	$25.44	$30.96	$31.71	-$0.75	-2.4%

[8] *Report on Energy Imbalance Market Issues and Performance*, Department of Market Monitoring, April 2, 2015, pp.34-35. http://www.caiso.com/Documents/Apr2_2015_DMM_AssessmentPerformance_EIM-Feb13-Mar16_2015_ER15-402.pdf.

[9] Answer of the California Independent systems Operator Corporation to Comments, November 24, 2015, pp. 13-21. http://www.caiso.com/Documents/Nov24_2015_Answer_Comments_AvailableBalancingCapacity_ER15-861-006.pdf.

Figure 3.1 Mitigation of power balance relaxation by load bias limiter NV Energy[10]



[10] The week of January 24 includes January 31 for a total of eight days during the period.

CERTIFICATE OF SERVICE

I 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 22nd day of March, 2016.

/s/ Jennifer Rotz

Jennifer Rotz