July 12, 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
April 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 May 2016.

NV Energy entered the Energy Imbalance Market on December 1, 2015 and completed the six month transition period on May 31, 2016. This report marks the end of the monthly reporting requirement set forth in the Commission's October 29 order.

Please contact the undersigned with any questions.

Respectfully submitted,

By: *<u>/s/ Anna A. McKenna</u>*

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

July 12, 2016

Prepared by: Department of Market Monitoring

Executive summary

Pursuant to the Commission's October 29, 2015, Order on the ISO Energy Imbalance Market (EIM), the ISO filed a report on July 1, 2016, covering the period from May 1 through May 31, 2016, (May 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 May report. Key findings in this report include the following:

- Overall EIM performance was good during May in the NV Energy area. Since the addition of the NV Energy area to EIM in December 2015, significant transfer capability continues to be available between NV Energy, PacifiCorp East and the ISO. This added transfer capacity and low congestion continues to result in NV Energy area prices set at the competitive system marginal price effective throughout the ISO footprint during most intervals.

- Prices in the NV Energy area tracked closely with real-time energy prices in the Sothern California Edison area within the ISO. The average price in the NV Energy area used for load settlement, which combines 15-minute and 5-minute market prices, was about $19/MWh during May and about $20/MWh in the Southern California Edison load aggregation area for the same period. Settlement prices in NV Energy were about $2/MWh more 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 very low in NV Energy during May and was limited to the 5-minute market. 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 remained unchanged in the 15-minute market and increased by only $0.50/MWh in the 5-minute market.

- The ISO implemented the available balancing capacity mechanism in March 2016, but this mechanism had little impact on market outcomes in NV Energy during May. There was no upward available balancing capacity offered into either real-time market during the month. While some downward capacity was bid into the market, it was dispatched during less than 0.2 percent of all intervals.

- During May, the percentage of intervals when the flexible ramping constraint was relaxed increased to about 3 percent of intervals. 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] DMM estimates that the flexible ramping constraint increased monthly average 15-minute prices by about $2/MWh in May.

[1] The ISO's May Report was filed at FERC and posted on the ISO website on July 1, 2016: http://www.caiso.com/Documents/Jul1_2016_May2016_EIM_TransitionPeriodReport_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 does not impact prices.

- The flexible ramping constraint was binding frequently in May. The constraint was binding, but was not relaxed, during about 80 percent of 15-minute intervals during the month. During intervals when the constraint was binding 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 generating energy. This result is consistent with efficient and competitive market outcomes given market conditions within the NV Energy area relative to the ISO.
- The flexible ramping sufficiency test was met in all but six hours in the NV Energy area during May. This helped keep supply insufficiencies low and prices close to benchmarks.

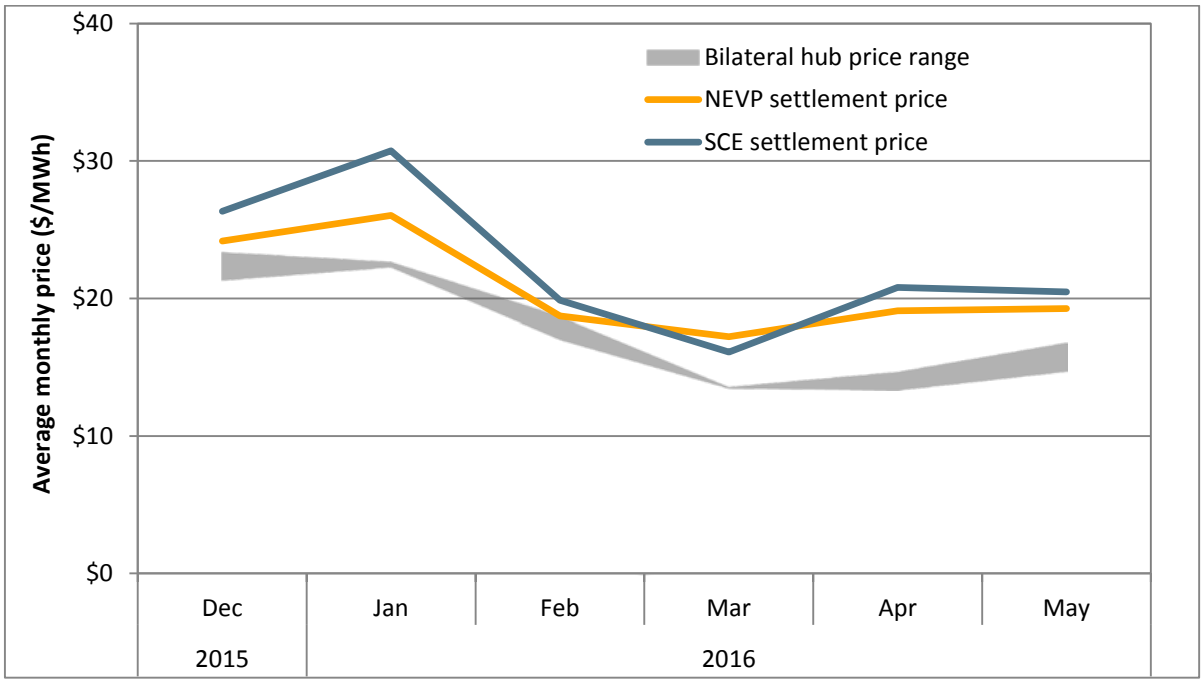
The remainder of this report is organized as follows. The summary section highlights key findings and trends occurring in May 2016. Section 1 provides a description of prices in the market and impacts from the power balance and flexible ramping market constraints. Section 2 provides information regarding 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 monthly average prices used for the settlement of loads in the NV Energy and Southern California Edison (SCE) load aggregation areas as well as 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 load and forecast load in the 15-minute market, and the 5-minute prices are weighted by the difference between forecast load in the 15-minute market and forecast load in the 5-minute market. The hourly shape and level of these settlement prices track most closely with 15-minute prices. This occurs because settlement prices are weighted more heavily on prices in the 15-minute market as imbalance is generally greater between base load and forecast load in the 15-minute market than between forecast load in the 15-minute and 5-minute markets.

Figure 1.1 Settlement and bilateral trading hub prices – NV Energy[5]



[3] The bilateral hub price represents average of prices for two major western trading hubs (Mead and Mid-Columbia), and the range is constructed using differences between prices from the ICE and Powerdex indices.

[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_5.13.doc.

[5] Settlement prices are computed using 15-minute and 5-minute prices weighted by respective real-time imbalance energy. Because real-time imbalances vary, settlements prices may differ somewhat from 15-minute and 5-minute prices discussed throughout this report.

The average settlement price for NV Energy during May fell between the Southern California Edison price and the bilateral hub price range. High transfer capacity available from the entry of NV Energy into EIM and infrequent congestion continues to set prices in the NV Energy area at the same competitive system marginal prices effective throughout the ISO footprint during most intervals. The average monthly settlement price in NV Energy for May was about $19/MWh, compared with about $17/MWh at the upper bound of the bilateral price range and about $20/MWh in the Southern California Edison area.

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

Prices in both the 15-minute and 5-minute markets during May continued to remain relatively low at less than $20/MWh. Prices in the 15-minute market were slightly above the bilateral hub range while prices in the 5-minute market were within the bilateral hub range. Without price discovery, prices in the 5-minute market would have been just above the bilateral hub range during May. The flexible ramping constraint bound and was relaxed during about 3 percent of 15-minute intervals in May. 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.

The blue bars in Figure 1.2 and Figure 1.3 show the overall monthly frequency of power balance relaxations. The power balance constraint bound very infrequently in the 5-minute market and did not bind in the 15-minute market. Therefore, convergence between prices observed with and without the special price discovery mechanism in place was significant within each market.

The ISO implemented the available balancing capacity mechanism in March 2016. This feature is designed to enhance EIM functionally by allowing the EIM to automatically recognize additional upward and downward capacity that participants have available to maintain reliable operations in their own balancing authority areas, but is not bid into the real-time market.[6]

NV Energy did not offer any upward available balancing capacity in the NV Energy area in the 15-minute or 5-minute market in May. NV Energy offered downward available balancing capacity during about 98 percent of real-time intervals in May, offering 32 MW on average. However, the ISO only dispatched downward available balancing capacity during less than 0.2 percent of intervals during the month.

[6] Further details regarding available balancing capacity implementation and the related FERC Order may be found here: http://www.caiso.com/Documents/Aug19_2015_ComplianceFiling_EnergyImbalanceMarketEnhancements_AvailableCapacityAmendment_ER15-861_EL15-53.pdf.

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

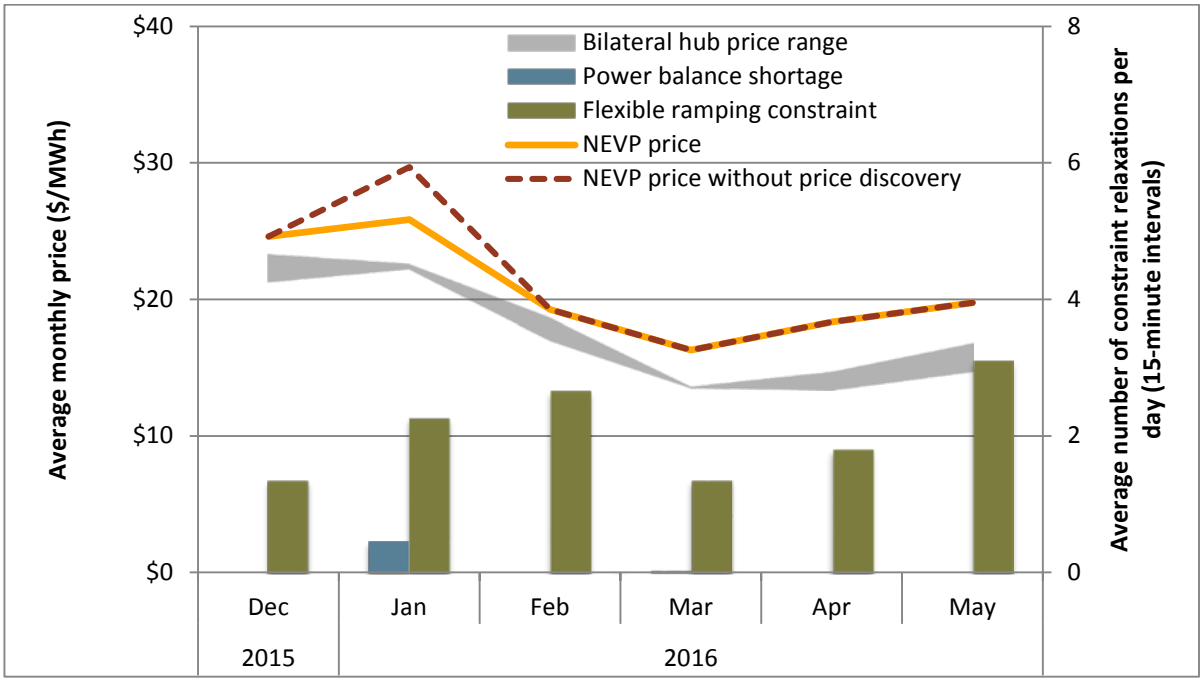
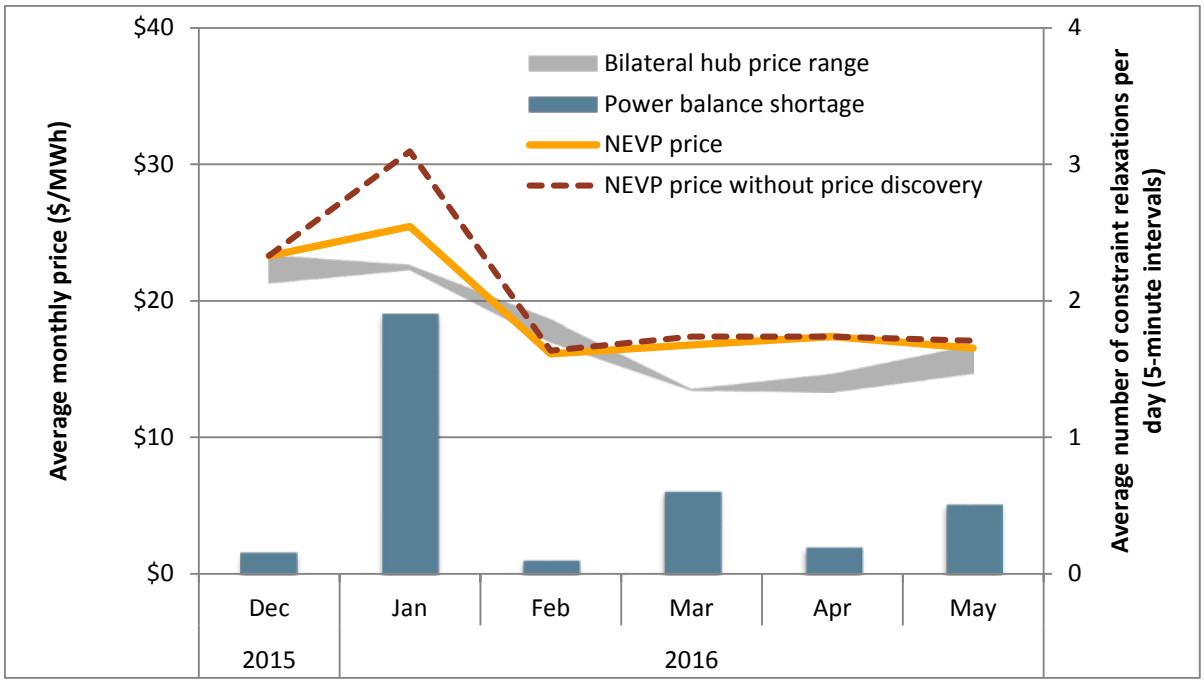


Figure 1.3 Frequency of constraint relaxation and average prices by month NV Energy (5-minute market)



2 Flexible ramping capacity

This section provides a summary of the number of flexible ramping constraint relaxations and associated impacts on NV Energy markets.

As shown in Table 2.1, the flexible ramping requirement continued to average about 90 MW in the NV Energy area during May. As described in prior reports, the ISO calculates flexible ramping constraint requirements based on historical ramping levels for each 15-minute interval by comparing the preceding 40 intervals.[7] DMM has expressed concern about this approach since it is based on a very limited sample size and tends to result in highly volatile requirements. The ISO addressed the volatility caused by this methodology by imposing upper and lower bounds after the requirement is calculated.

As shown in Table 2.1, during most intervals the requirements calculated continued to fall outside of the upper and lower bounds imposed by the ISO, and consequently the requirements were frequently set at either the minimum or maximum limit. In May, the requirement calculated by this tool fell below the minimum bound established by the ISO during about 42 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 44 percent of intervals, with the requirement set to the maximum level of 100 MW during these intervals. The requirement fell between 80 and 100 MW during only 13 percent of intervals in May, when the calculated requirement was unchanged by the boundaries.

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%
	Feb	84	80	100	9%	78%	15%	93%
	Mar	86	80	100	10%	65%	21%	86%
	Apr	90	80	100	9%	44%	41%	85%
	May	90	80	100	9%	42%	44%	87%

Table 2.2 shows that the flexible ramping constraint was relaxed because of a shortage of ramping capacity, with a resulting positive shadow price set at just over $60/MWh, during about 3 percent of 15-minute intervals in May. This increased the monthly average 15-minute prices by about $2/MWh. The table also shows that the flexible ramping constraint bound, but was not relaxed, during about 80 percent of intervals in May. Because the constraint was not relaxed, the shadow price for the flexible ramping constraint was not set at the $60/MWh penalty price, but to a smaller amount. This level of

[7] 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.

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.

Table 2.2 Flexible ramping constraint requirements and market impacts in NV Energy[8]

	Average flex ramp requirement (MW)	Binding flexible ramping constraint (no shortage)		Flexible ramping constraint (shortage)	
		Percent of intervals	Average shadow price	Percent of intervals	Average shadow price
2015 December	85	74%	$9.41	1%	$60.00
2016 January	84	90%	$8.86	2%	$60.00
February	84	82%	$7.90	3%	$60.21
March	86	69%	$9.74	1%	$62.30
April	90	69%	$9.66	2%	$60.80
May	90	81%	$9.42	3%	$60.03

During May, prices for the NV Energy area continue to frequently be set by system marginal prices across the combined footprint, inclusive of PacifiCorp and NV Energy, and ISO. This is because of the high amount of transfer capability and limited amount of congestion observed between NV Energy, PacifiCorp and the ISO.

Under these conditions, when local flexible ramp requirements are fulfilled by less expensive units within the NV Energy area, shadow prices for the flexible ramping constraint equal the opportunity cost for the unit providing flexible ramping capacity instead of generating energy. This occurred frequently in NV Energy and is not inconsistent with efficient and competitive market outcomes.

[8] The percent of intervals where the flexible ramping constraint was relaxed due to shortage in Table 2.2 reflects 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, 2015, report.[9] The ISO included discussion of the load bias limiter in its 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 the available balancing capacity proposal in the EIM.[10]

As highlighted in Section 1, the power balance constraint was relaxed during few intervals in the NV Energy area during May. As shown in Figure 3.1, during the few intervals in the 5-minute market when the power balance constraint was relaxed, the load bias limiter would have resolved about 38 percent of the shortages in the absence of price discovery. Because of the infrequency of power balance constraint relaxations in May, the load bias limiter would have had a small impact on market prices. In the 15-minute market, the power balance constraint was not relaxed and therefore the load bias limiter would have had no impact on prices. In the 5-minute market, prices would have decreased by only about $0.50/MWh (3 percent) in the absence of the price discovery mechanism.

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 are met. This reflects the ISO's indication that the load bias limiter would have been triggered under these criteria, if price discovery provisions were no longer in effect.

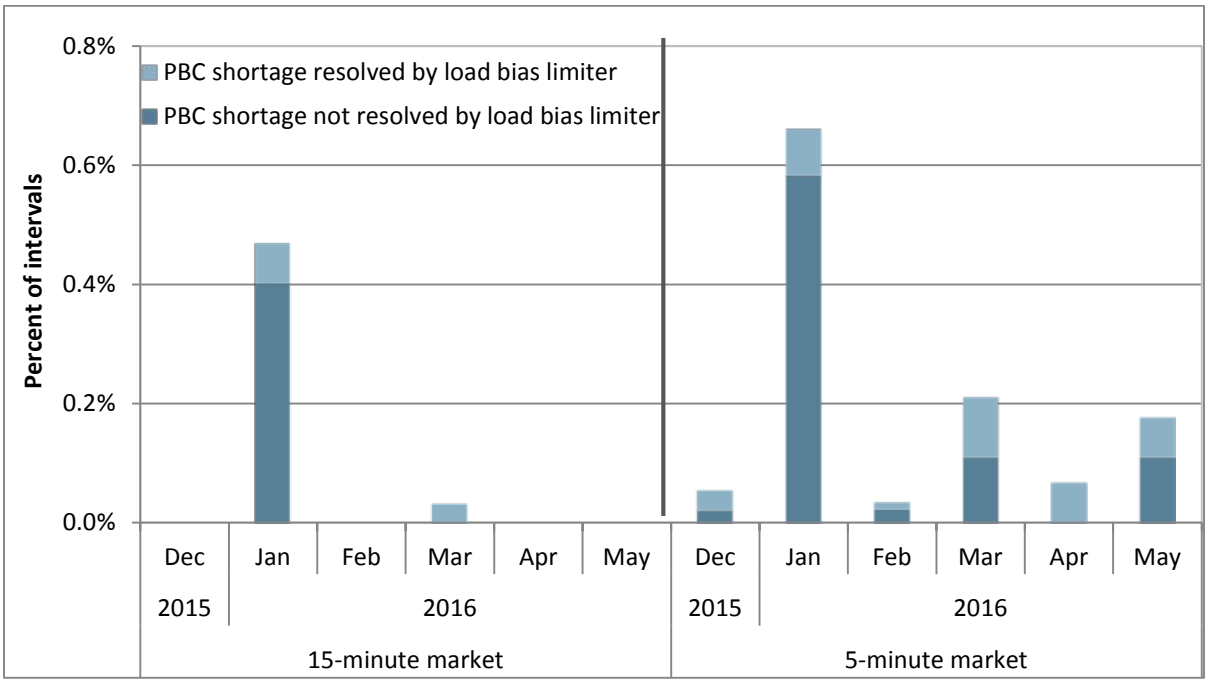
Table 3.1 Impact of load bias limiter on NV Energy prices (May 2016)

	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)	$14.76	$16.87	$19.75	$19.75	$19.75	$0.00	0%
5-minute market (RTD)	$14.76	$16.87	$16.53	$17.09	$17.61	-$0.52	-3%

[9] *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.

[10] 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



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 12th day of July, 2016.

/s/ Anna Pascuzzo

Anna Pascuzzo