Comments on the Load Conformance Limiter Enhancement

Department of Market Monitoring
May 19, 2017

The ISO proposed enhancements to the *load bias limiter* feature of the ISO's real-time software in a technical bulletin published in December of 2016.[1] The proposed changes were discussed on a conference call on January 11, 2017. The ISO proposed changing the load bias limiter to focus on the effect on market infeasibilities of load adjustments changes between market intervals rather than on the magnitude of the load adjustment in each interval. DMM is very supportive of this proposed enhancement, which we believe is a significant improvement over the current approach.

Background

In December 2012, the ISO implemented the *load bias limiter* feature to limit the impact of excessive load adjustments by grid operators on market prices. DMM first reported on this feature in our 2012 Annual Report.[2] The load bias limiter (also known as the *load conformance limiter* and the *load adjustment limiter*) limits the effects of load adjustments on extreme market impacts.[3] Specifically, when there is a power balance relaxation for insufficient energy and the size of the load adjustment is greater than the power balance relaxation and is in the same direction as the power balance relaxation, the load bias limiter sets price to the value of the highest priced bid dispatched, rather than to the $1,000/MWh power balance relaxation penalty parameter. When the power balance constraint is relaxed due to excess energy, a similar logic is applied which can result in prices being set by the lowest priced bid dispatched rather than to the -$155/MWh penalty price for excesses.[4]

In prior quarterly and annual reports, DMM has recommended that ISO staff consider modifying the load bias limiter to focus on instances where power balance relaxations occur as the result of a *change* in load adjustments, rather than as a function of the *magnitude* of the change.[5] Specifically, we observed instances where large changes in load adjustments started from a negative value and switched to a positive value and the load bias limiter was not triggered.[6] Furthermore, we also observed instances where persistent load adjustments would resolve power balance relaxations that did not

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[1] *Load Conformance Limiter Enhancement,* Technical Bulletin, December 28, 2016. http://www.caiso.com/Documents/TechnicalBulletin_LoadConformanceLimiterEnhancement.pdf.

[2] See *2012 Annual Report on Market Issues and Performance*, April 2013, p. 189: http://www.caiso.com/Documents/2012AnnualReport-MarketIssue-Performance.pdf.

[3] The ISO uses the term *load conformance limiter*, whereas DMM has historically used the term *load bias limiter*. For the purposes of these comments, the terms are interchangeable.

[4] This pricing mechanism is essentially the same as the *price discovery* mechanism the ISO applies when the power balance constraint is relaxed during the transition period for each new balancing area in the energy imbalance market.

[5] *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.

[6] For example, the load adjustment could go from -500 MW to 50 MW and result in a power balance shortage relaxation of 75 MW. Under the current approach, the load bias limiter would not activate.

appear related to the load adjustment.[7] For instance, load adjustments could be static for a period of several hours. However, if after a few hours a power balance relaxation occurred that was less than the load adjustment value, the load bias limiter would reduce the price.[8]

DMM believes that in both of these instances the application of the load bias limiter was not appropriate. However, application of a methodology to consider the *change* in the load adjustment would have been appropriate in both of these cases.[9]

ISO proposal

The ISO proposal is very consistent with DMM's recommendation. The focus of the load bias limiter would be primarily on the change in load adjustments from one interval to the next as opposed to the current methodology that considers the magnitude of the load adjustment.

The ISO proposal also allows for the potential persistence of the load adjustment to effect the application of the load bias limiter. For instance, if a load adjustment results in several consecutive intervals of power balance relaxations, the ISO's proposed approach would attribute the power balance relaxations to the load adjustment under specific conditions as long as they were consecutive intervals.

A potential limitation to this approach is that something transient, such as a brief change in wind output, may resolve the power balance and break the persistence for an interval. However, the transient event could revert back to its original state and the power balance relaxations would recur. In this instance, the ISO's proposed approach would not activate the load bias limiter, though the instance may have been attributable to the load bias limiter. Even so, we believe the persistence approach to be consistent with our recommendation and believe that the ISO's proposed methodology is a significant enhancement to the current approach.

Impact of proposed load bias limiter logic

The ISO's proposed logic will result in a significant reduction in the number of power balance constraint relaxations resolved by the load bias limiter and could have a significant impact on prices given current use of the load bias feature by ISO operators.

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[7] For example, assume the load adjustment was set to 400 MW for 6 hours. Then, during an interval in the fifth hour, the power balance constraint was relaxed 150 MW. In this case the load bias limiter would reduce prices to the highest dispatched bid under the current approach.

[8] In an extreme hypothetical example, if operators decided to make a 600 MW load adjustment in every interval, the load bias limiter would trigger every time a power balance shortage relaxation occurred. In this case, prices would always be set by the highest dispatched bid rather than by the penalty parameter because the load adjustment would always exceed the size of the power balance relaxation.

[9] For instance, the 550 MW change would have exceeded the 75 MW relaxation and would have resulted in the activation of the load bias limiter in the first example. In the second example, because the load bias would have not changed from one interval to the next, the change in load adjustment would have been 0 MW and the load bias limiter would not have activated.

Figure 1. Frequency of load bias limiter being triggered in 5-minute market (2016)

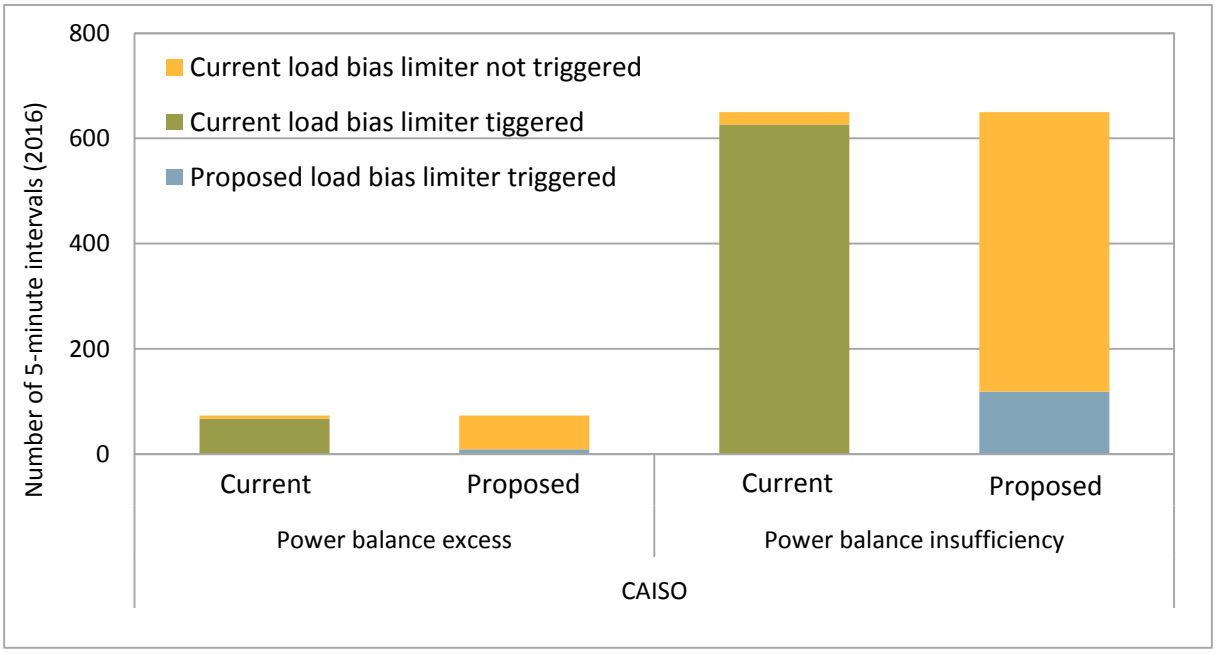
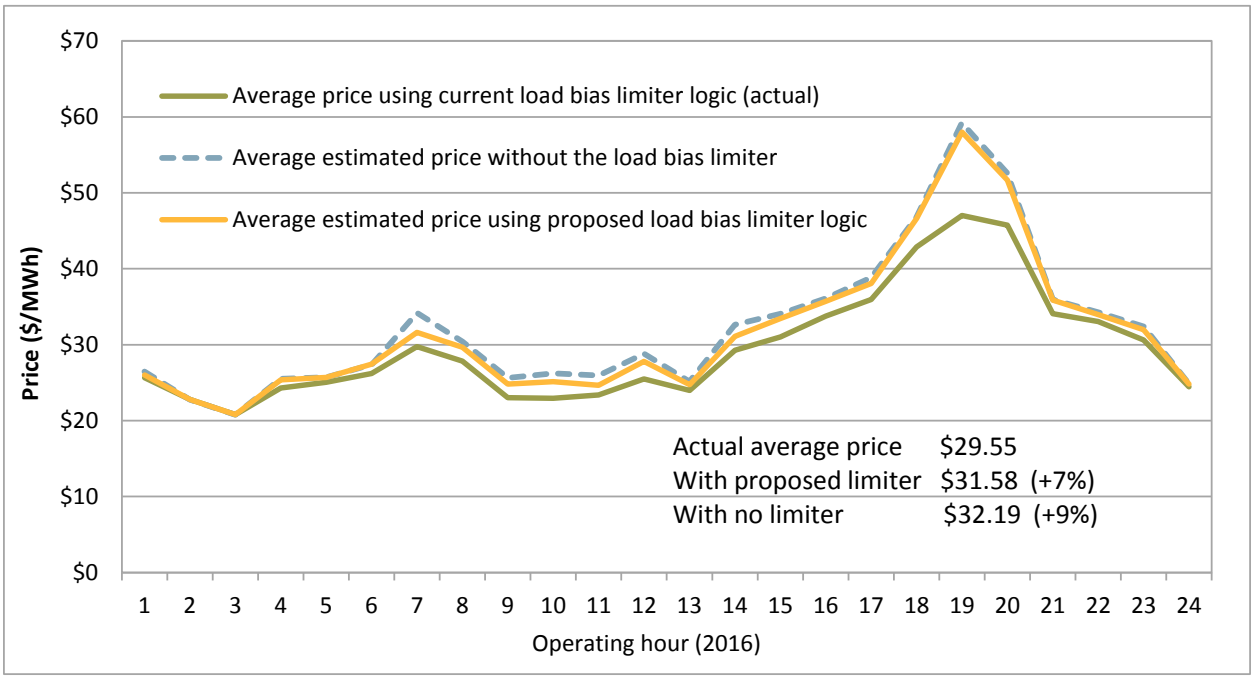


Figure 2. Impact of load bias limiter on average 5-minute prices (PG&E LAP)



As shown in Figure 1, in 2016 the current load bias limiter logic was triggered during about 92 percent of the 5-minute intervals in which the power balance constraint was relaxed due to an excess of supply and about 96 percent of 5-minute intervals in which the constraint was relaxed due to insufficient supply. If the proposed changes to the logic were in effect, the load bias limiter would have been triggered during only 12 percent of intervals the constraint was replaced due to surplus supply and only 18 percent of intervals with insufficient supply to meet the power balance constraint

Figure 2 shows the impact of the load bias limiter on average 5-minute prices for the PG&E load area during 2016.[10] On average, prices in the 5-minute market would have been about $2.03/MWh higher (7 percent) if the changes being proposed to the load bias limited were in effect, with the greatest price impact being during the upward ramping hours. Average 5-minute prices would have been about $2.653/MWh higher (9 percent) if no load bias limiter was in effect during 2016. [11]

When the load bias limiter is triggered based on the load bias entered by the ISO market operators, this impacts prices throughout the ISO including the different balancing areas in the energy imbalance market areas. As shown in DMM's *2016 Annual Report*, the load bias limiter did not have a significant impact on prices when triggered within an individual balancing areas in the energy imbalance market due to a load bias entered by energy imbalance market operators within each of these areas.[12]

Recommendation

The ISO's proposed approach addresses DMM's concerns with the current implementation of the load bias limiter. Furthermore, we stress that DMM believes there is a role for the load bias limiter given that operators have significant discretion to set load adjustment values and the lack of precision with which operators set these values. This lack of precision is partly a result of a lack of visibility to operators on the issues they are working to resolve through load adjustments. These can include both supply and demand variances as well as input timing issues.

To the extent that load adjustments are more automated and provide more visibility to operators, the need for the load bias limiter would be reduced. However, until that time, we believe that it is just and reasonable to have a mechanism in place to limit unintended market impacts of changes in load adjustments. After implementation of the new approach, we recommend that the ISO review and report on the results of the new approach, particularly the persistence mechanism, to market participants in an appropriate forum.

[10] DMM used PG&E load area prices for this analysis. These are representative of the impact on system market energy prices throughout the ISO system almost all intervals.

[11] At the May 12 Market Surveillance Committee meeting, Chairman Ben Hobbs cited analysis indicating the average 5-minute price would be about $5/MWh higher in the fourth quarter of 2016 if the load bias limiter had not been in effect. These results are consistent with DMM's analysis, but reflect the fact that the load bias limiter was triggered during many more 5-minute intervals in Q4 compared to the other nine months of 2016. See *2016 Annual Report on Market Issues and Performance*, May 20176, Figure 4-7, p. 105. http://www.caiso.com/Documents/2016AnnualReportonMarketIssuesandPerformance.pdf

[12] See *2016 Annual Report on Market Issues and Performance*, May 20176, Table 4-1, p. 108. http://www.caiso.com/Documents/2016AnnualReportonMarketIssuesandPerformance.pdf