June 15, 2021

The Honorable Kimberly D. Bose
Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Washington, DC 20426

Re: California Independent System Operator Corporation
Docket: ER15-2565-__
Energy Imbalance Market Special Report – Transition Period –
April 2021 for Turlock Irrigation District

Dear Secretary Bose:

The Department of Market Monitoring (DMM) hereby submits its Energy Imbalance Market (EIM) special report on the transition period of Turlock Irrigation District during its first six months of participation in the EIM for April 2021. Turlock Irrigation District joined the energy imbalance market on March 25, 2021.

Please contact the undersigned directly with any questions or concerns regarding the foregoing.

Respectfully submitted,

By: *<u>/s/ Eric Hildebrandt</u>*

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California Independent System Operator Corporation

California ISO

Report on energy imbalance market issues and performance: Turlock Irrigation District for April 2021

June 15, 2021

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 May 28, 2021 covering the period from March 25 through April 30, 2021 (April report) for Turlock Irrigation District (TIDC) in the energy imbalance market.[1] TIDC joined the energy imbalance market on March 25, 2021.

This report provides a review by the Department of Market Monitoring (DMM) of energy imbalance market performance for the TIDC balancing authority area during the period covered in the ISO's April report. This is the first report for the transition period for the TIDC balancing authority area. Key findings in this report include the following:

- Prices in the TIDC area were fairly similar to prices within the ISO. During this time period, prices in the TIDC area averaged $38.10/MWh in the 15-minute market and $33.57/MWh 5-minute market.
- The TIDC balancing authority area did not fail any upward sufficiency tests. However, there were 7 intervals where TIDC failed the downward sufficiency test over the time period.
- The frequency of valid over-supply infeasibilities was low, occurring during 5 intervals in the 5-minute market, and none in the 15-minute market. There were no valid under-supply infeasibilities for the TIDC area during this time period.
- Transition period pricing did not impact 15-minute market prices, but did decrease 5-minute market prices by $0.10/MWh for the TIDC area during the time period.

Section 1 of this report provides a description of prices and power balance constraint relaxations and section 2 discusses the flexible ramping sufficiency test.

[1] The ISO's April 2021 Report was filed at FERC and posted on the ISO website on May 28, 2021: http://www.caiso.com/Documents/May28-2021-EIM-TransitionPeriodReport-TurlockIrrigationDistrict-Apr2021-ER15-2565.pdf

1 Energy imbalance market prices

Figure 1.1 and Figure 1.2 show hourly average 15-minute and 5-minute prices during April for TIDC compared with prices in the ISO at the Pacific Gas and Electric (PG&E) default load aggregation point.

Average prices in the Turlock Irrigation District area tracked similarly to prices at the Pacific Gas and Electric (PG&E) default aggregation point within the ISO. Price separations between these two areas occurred primarily during the middle of the day. In the TIDC area during the month, prices averaged $38.10/MWh in the 15-minute market and $33.57/MWh 5-minute market.

Figure 1.1 Average hourly 15-minute price (April 2021)

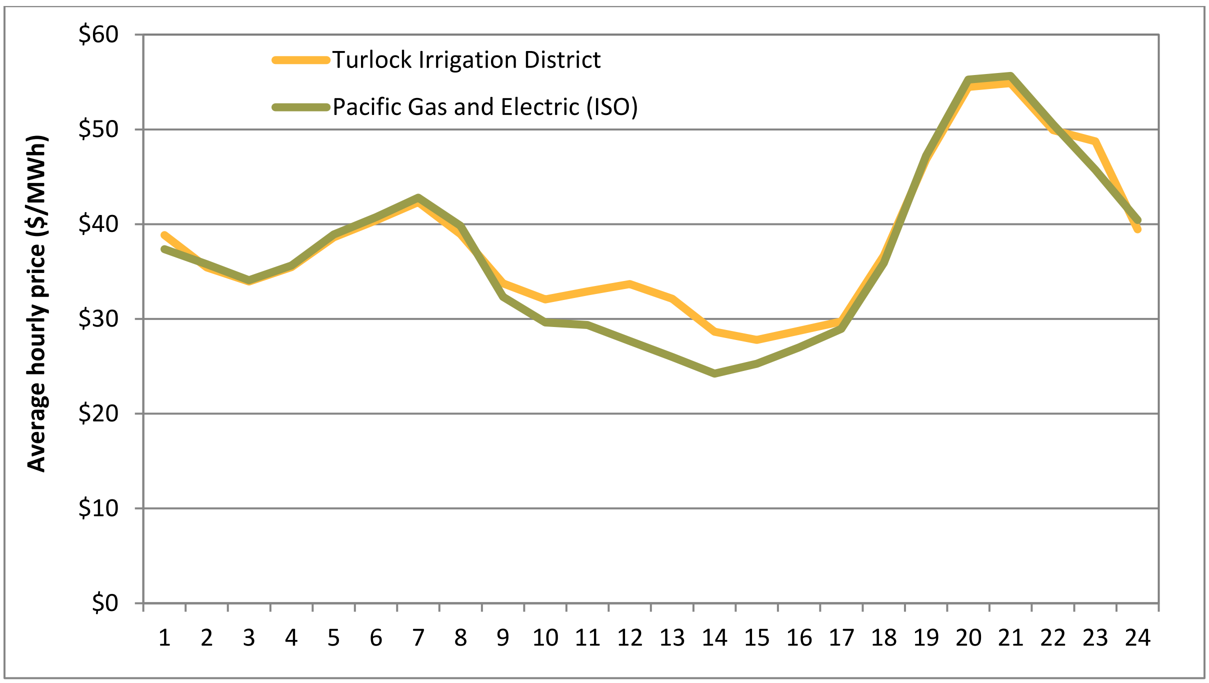
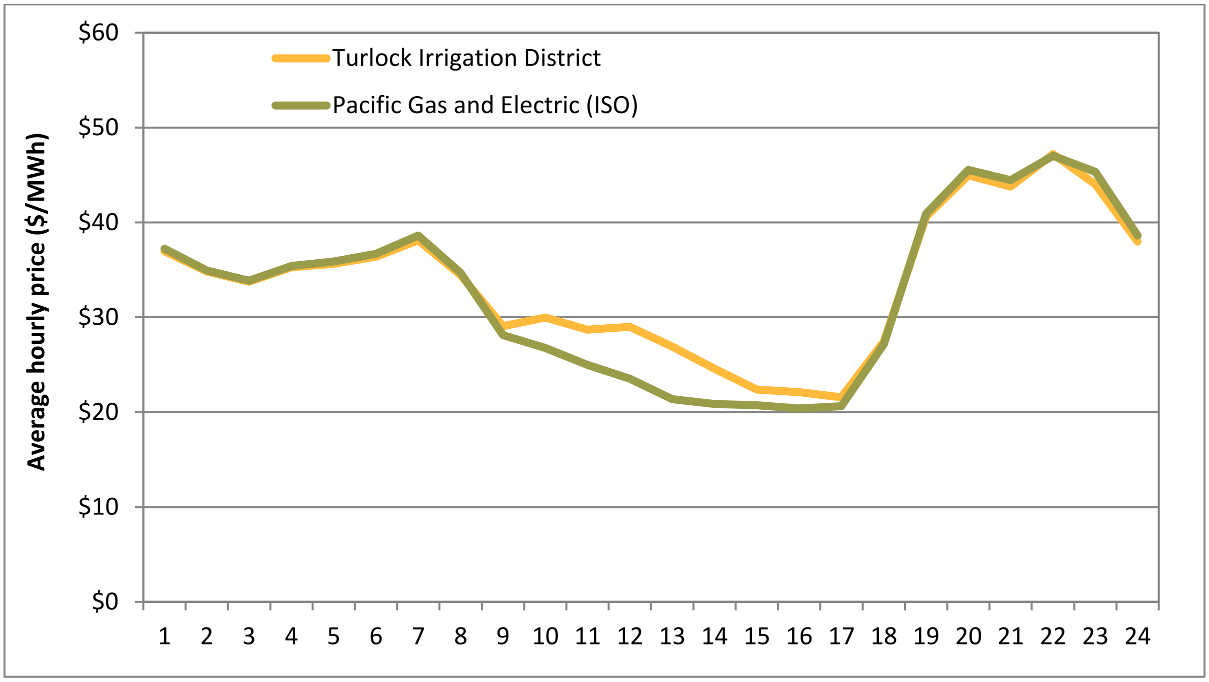


Figure 1.2 Average hourly 5-minute price (April 2021)



All power balance constraint relaxations that occurred in April were subject to the six-month transition period pricing that expires on September 25, 2021. The transition period pricing mechanism sets prices at the highest cost supply bid dispatched to meet demand rather than at the $2,000/MWh penalty parameter while relaxing the constraint for shortages, or the -$155/MWh penalty parameter while relaxing the constraint for excess energy.[2] [3] Power balance constraint relaxations can be grouped in the following categories:

- **Valid under-supply infeasibility** (power balance constraint shortage). These occurred when the power balance constraint was relaxed because load exceeded available generation. The ISO validated that ISO software was working appropriately during these instances.
- **Valid over-supply infeasibility** (power balance constraint excess). These occurred when the power balance constraint was relaxed because generation exceeded load. The ISO validated that ISO software was working appropriately during these instances.
- **Load conformance limiter would have resolved infeasibility.** The load conformance limiter automatically reduces the size of an operator load adjustment and sets prices at the last economic

[2] When transition period pricing provisions are triggered by relaxation of the power balance constraint, any shadow price associated with the flexible ramping product is set to $0/MWh to allow the market software to use the last economic bid dispatched.

[3] The penalty parameter while relaxing the constraint for shortages rose from $1,000/MWh to $2,000/MWh, effective March 21, 2021 per FERC Order 831. https://bpmcm.caiso.com/Pages/BPMDetails.aspx?BPM=Market%20Operations

signal when the conditions for the limiter are met.[4] During the transition period, the limiter does not change price outcomes because transition period pricing is applied during these intervals instead. However, in these cases, the load conformance limiter *would have resolved the infeasibility* had transition period pricing not been in effect.

- **Correctable infeasibility.** These occurred when the ISO software relaxed the power balance constraint concurrent with a software error or data error that resulted in a price correction or would have triggered a price correction if transition period pricing were not active.[5]

Figure 1.3 and Figure 1.4 show the weekly frequency of under-supply and over-supply infeasibilities, respectively, in the 5-minute market and 15-minute market. As shown in Figure 1.3, there were no valid under-supply infeasibilities in either the 15-minute market or the 5-minute market.

As shown in Figure 1.4, valid over-supply infeasibilities were more frequent. These occurred during 5 intervals in the 5-minute market and none in the 15-minute market for the TIDC area during this time period.[6]

There were 3 intervals March 25, 2021 and April 30, 2021 when the load conformance limiter would have triggered in the 5-minute market for the TIDC balancing authority area had transition period pricing not been in effect.

[4] The ISO implemented an enhancement to the load conformance limiter, effective February 27, 2019. With the enhancement, the load conformance limiter triggers by a measure based on the change in load adjustment from one interval to the next, rather than the total level of load adjustment.

[5] Section 35 of the ISO tariff provides the ISO authority to correct prices if it detects an invalid market solution or issues due to a data input failure, occurrence of hardware or software failure, or a result that is inconsistent with the ISO tariff. During erroneous intervals, the ISO determined that prices resulting under transition period pricing were equivalent to prices that would result from a price correction, so no further price adjustment was appropriate. http://www.caiso.com/Documents/Section35_MarketValidationAndPriceCorrection_May1_2014.pdf.

[6] The time frame referenced is March 25, 2021 to April 30, 2021. The weeks indicated in Figures 1.3 – 1.6 reference the starting week of “25-Mar”; this starting week is greater than 7 days, covering March 25, 2021 to April 7, 2021.

Figure 1.3 Frequency of under-supply power balance infeasibilities by week Turlock Irrigation District

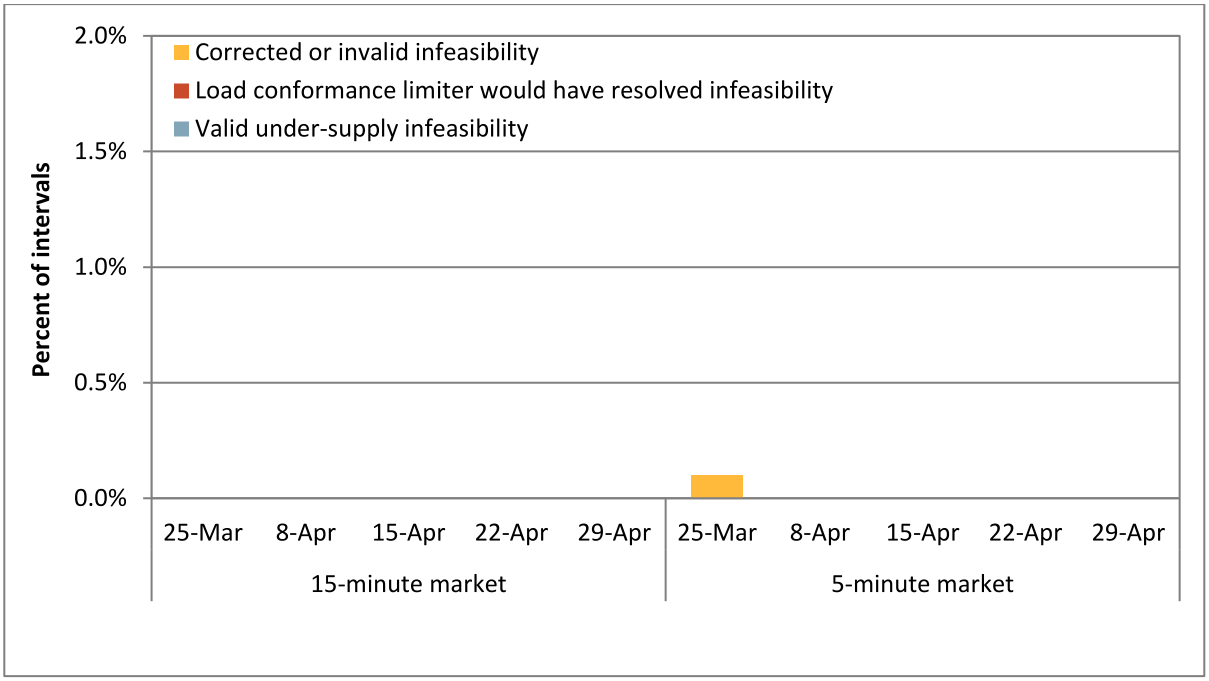


Figure 1.4 Frequency of over-supply power balance infeasibilities by week Turlock Irrigation District

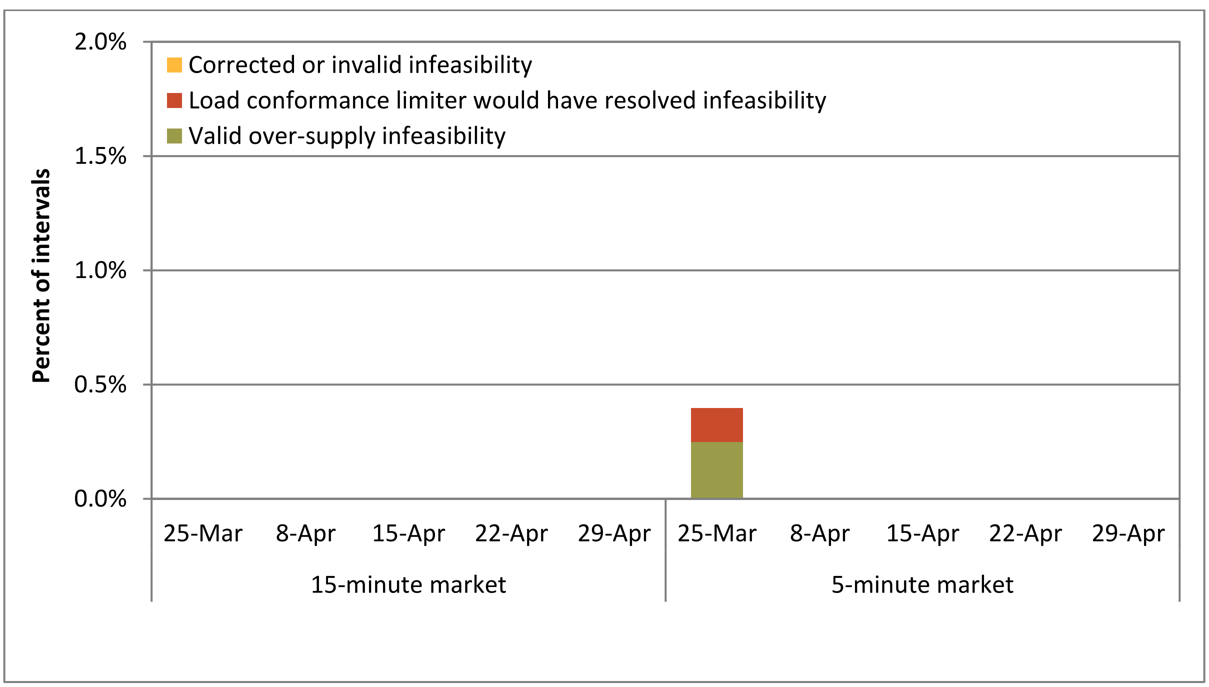
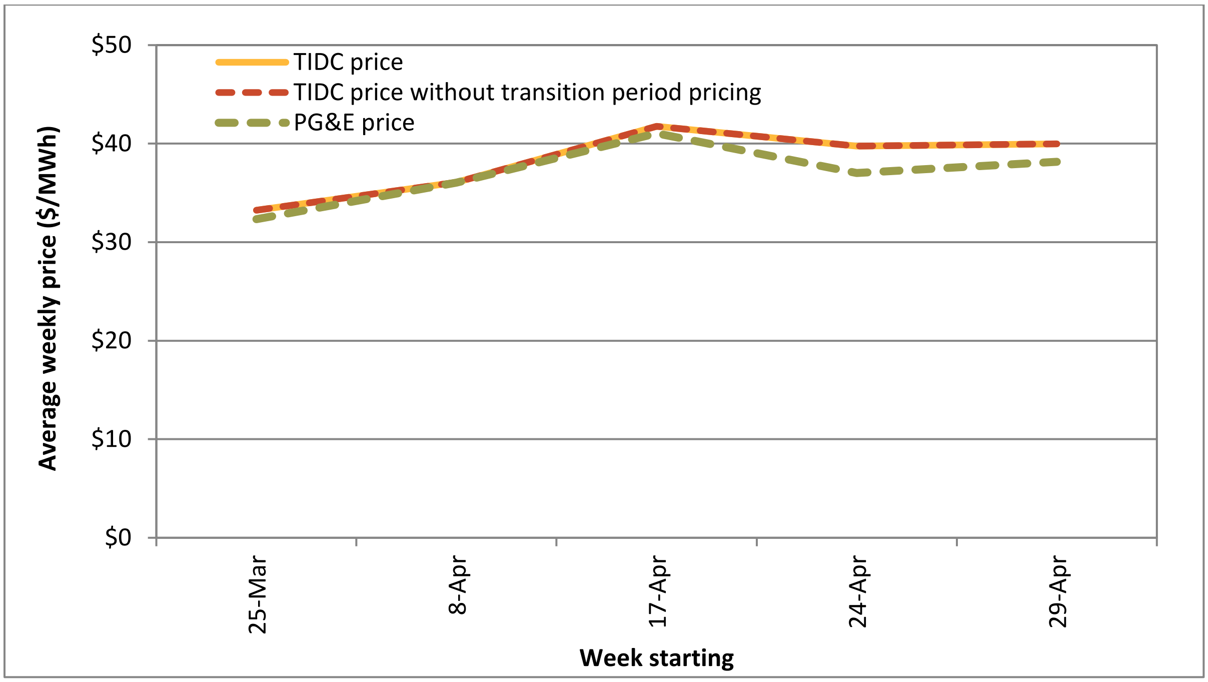


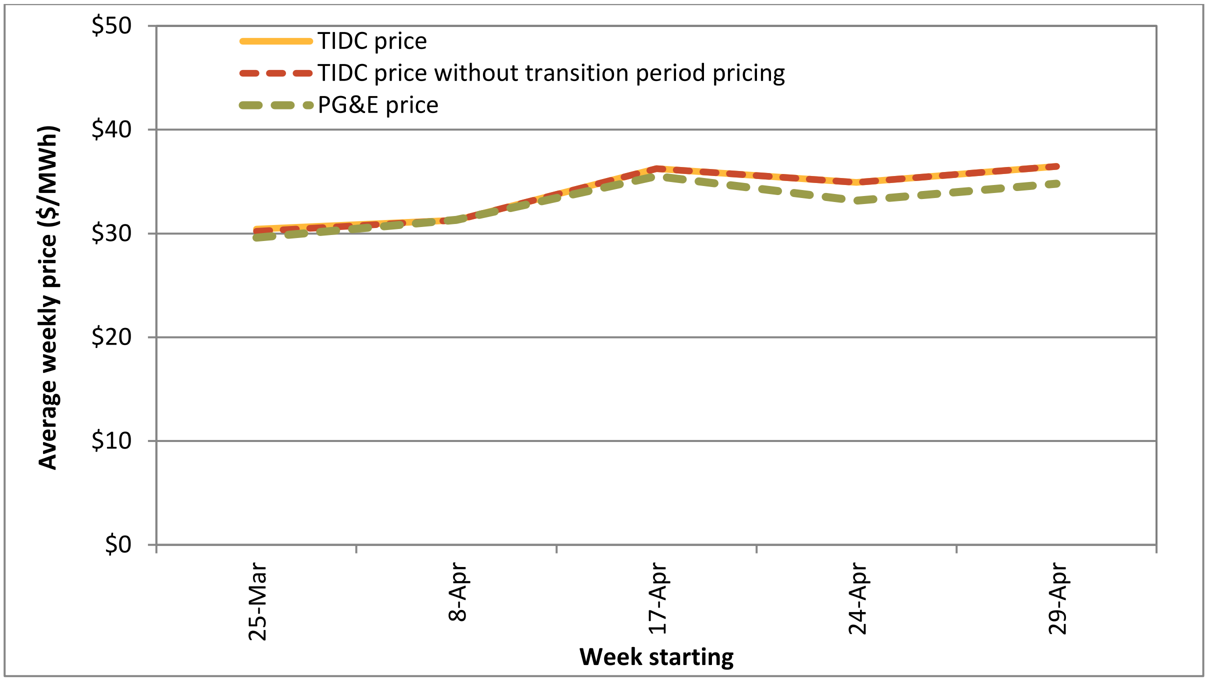
Figure 1.5 and Figure 1.6 show the average weekly prices in the 15-minute and 5-minute markets *with* and *without* the special transition period pricing provisions applied to mitigate prices in the TIDC area during the time frame.[7] On average for the month, transition period pricing did not impact 15-minute market prices, while decreasing 5-minute market prices by $0.10/MWh for the TIDC area during the time frame.

Figure 1.5 Average prices by week – Turlock Irrigation District (TIDC) (15-minute market)



[7] A detailed description of the methodology used to calculate these counterfactual prices that would result without transition period pricing was provided on p. 7 of the January 2017 report for Arizona Public Service from DMM: http://www.caiso.com/Documents/May1_2017_Department_MarketMonitoring_EIMTransitionPeriodReport_ArizonaPublicService_Jan2017_ER15-2565.pdf

Figure 1.6 Average prices by week – Turlock Irrigation District (TIDC) (5-minute market)



2 Flexible ramping sufficiency test

The flexible ramping sufficiency test ensures that each balancing area has enough ramping resources over each hour to meet expected upward and downward ramping needs. The test is designed to ensure that each energy imbalance market area has sufficient ramping capacity to meet real-time market requirements without relying on transfers from other balancing areas.

When the energy imbalance market was initially implemented there was an upward ramping sufficiency test. In November 2016, the ISO implemented an additional downward ramping sufficiency test in the market with the introduction of the flexible ramping product, which replaced the flexible ramping constraint. If an area fails the upward sufficiency test, energy imbalance market imports cannot be increased.[8] Similarly, if an area fails the downward sufficiency test, exports cannot be increased. In addition to the sufficiency test, each area is also subject to a capacity test. If an area fails the capacity test, then the flexible ramping sufficiency test automatically fails as a result.[9]

Limiting transfers can impact the frequency of power balance constraint relaxations and, thus, price separation across balancing areas. Constraining transfer capability may also impact the efficiency of the energy imbalance market by limiting transfers into and out of a balancing area that could potentially provide benefits to other balancing areas.

The ISO implemented multiple enhancements to the flexible ramping sufficiency test during 2019. First, a tolerance threshold was implemented effective February 15, 2019, that allows an energy imbalance market entity to pass the test if the insufficiency is less than either of 1 MW or 1 percent of the requirement.[10] A second enhancement, implemented on May 6, 2019, evaluates sufficiency test results and limits transfers on a 15-minute interval basis rather than for the entire hour.

The TIDC balancing authority area did not fail the upward sufficiency test during any interval between March 25, 2021 and April 30, 2021; however, there were 7 intervals where TIDC failed the downward sufficiency test over the time period.

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8 *Business Practice Manual for the Energy Imbalance Market*, August 30, 2016, p. 45-52: https://bpmcm.caiso.com/BPM%20Document%20Library/Energy%20Imbalance%20Market/BPM_for_Energy%20Imbalance%20Market_V6_clean.docx.

9 *Business Practice Manual for the Energy Imbalance Market*, August 30, 2016, p. 45.

10 Market Notice - EIM Resource Sufficiency Enhancements 1% Threshold Implementation, February 8, 2019: http://www.caiso.com/Documents/EIMResourceSufficiencyEnhancements-1-ThresholdImplementation-021519-Active-MAPStage.html