

November 8, 2022

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-____
Independent Assessment by the Department of Market Monitoring
September 2022 Western Energy Imbalance Market Transition Period Report for Tucson
Electric Power**

Dear Secretary Bose:

The Department of Market Monitoring (DMM) hereby submits its independent assessment on the transition period of Tucson Electric Power (TEPC) during its first six months of participation in the Western Energy Imbalance Market (WEIM) for September 2022, as TEPC joined the WEIM on May 3, 2022.

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

Respectfully submitted,

By: /s/ Eric Hildebrandt

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California ISO

Report on Western Energy Imbalance Market issues and performance: Tucson Electric Power for September 2022

November 8, 2022

Prepared by: Department of Market Monitoring

Executive summary

Pursuant to the Commission's October 29, 2015 order on the California ISO's Western Energy Imbalance Market (WEIM), the California ISO (CAISO) filed a report on October 25, 2022 covering the period from September 1 through September 30, 2022 (September report) for Tucson Electric Power (TEPC) in the Western Energy Imbalance Market.¹ TEPC joined the Western Energy Imbalance Market on May 3, 2022, and the transition period will apply to the TEPC balancing authority area (BAA) until October 31, 2022.²

This report provides a review by the Department of Market Monitoring (DMM) of Western Energy Imbalance Market performance for the TEPC balancing authority area during the period covered in the CAISO's September report. This is the fifth report for the transition period of the TEPC balancing authority area. Key findings in this report include the following:

- Prices in the TEPC area tracked below prices at the SCE default aggregation point within the CAISO and above prices in the East WEIM region.
- The TEPC balancing authority failed the upward sufficiency test during 11 intervals in September. The TEPC balancing authority did not fail the downward sufficiency or either capacity test during the month.
- In September, TEPC had 12 valid under-supply infeasibility in the 5-minute market and none in the 15-minute market. Furthermore, there were 3 valid over-supply infeasibilities in the 5-minute market and none in the 15-minute market during the month.
- Transition period pricing decreased TEPC area prices in the 5-minute market by \$0.98/MWh and did not impact prices in the 15-minute market.

Section 1 of this report provides a description of prices and power balance constraint relaxations and Section 2 discusses the flexible ramping sufficiency and bid range capacity tests.

¹ The CAISO's September 2022 Report was filed at FERC on October 25, 2022 and posted on the CAISO website on October 26, 2022:
<http://www.caiso.com/Documents/Oct25-2022-Sep2022-WEIMTransitionPeriodReport-TucsonElectricPowerCompany-ER15-2565.pdf>

² This follows from the application of CAISO Tariff section 27(b)(1), which refers to a number of months rather than a number of days.

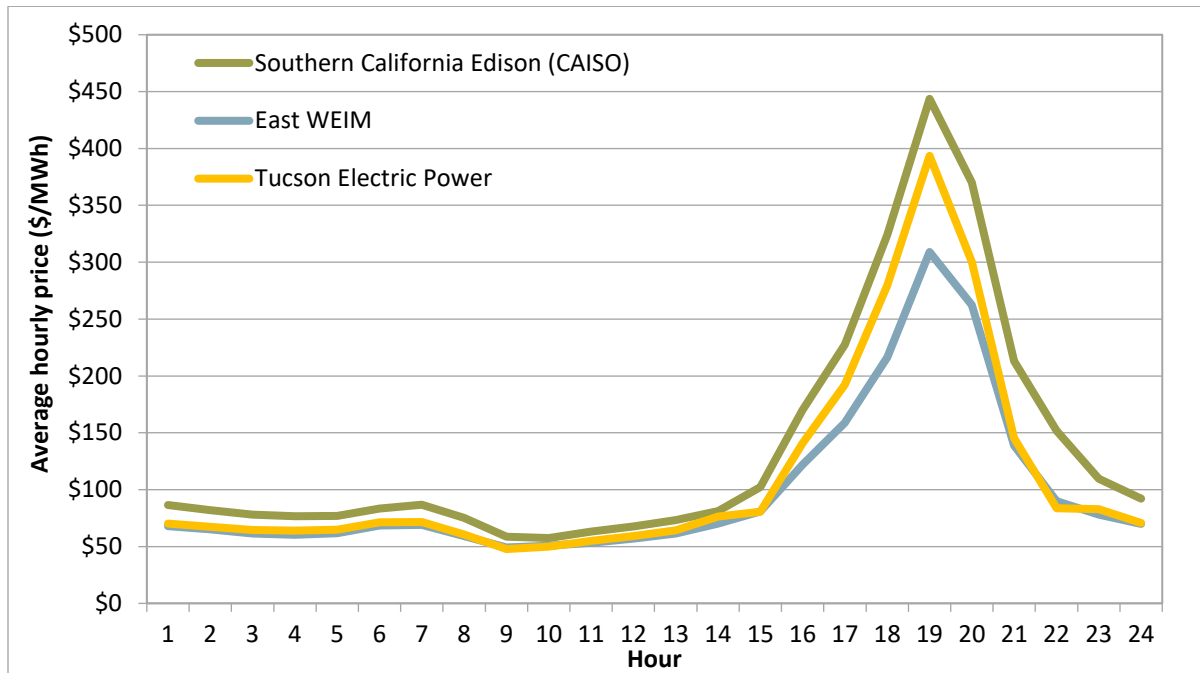
1 Western Energy Imbalance Market prices

Figure 1.1 and Figure 1.2 show hourly average 15-minute and 5-minute prices during September for TEPC compared with prices in the CAISO at the Southern California Edison (SCE) default load aggregation point and the average East WEIM regional prices.³

Figure 1.3 shows the average hourly 5-minute locational marginal price (LMP) by component for the Tucson Electric Power area.

Average prices in the Tucson Electric Power area tracked below prices at the SCE default aggregation point within the CAISO and above prices in the East WEIM region. For the month, TEPC prices averaged \$110.71/MWh in the 15-minute market and \$90.20/MWh in the 5-minute market.

Figure 1.1 Average hourly 15-minute price (September 2022)



³ The East WEIM region includes PacifiCorp East, NV Energy, Arizona Power Service, Idaho Power, Salt River Project, Public Service Company of New Mexico, and NorthWestern Energy. Tucson Electric Power is located in the East WEIM region but is not included in the regional average for this analysis.

Figure 1.2 Average hourly 5-minute price (September 2022)

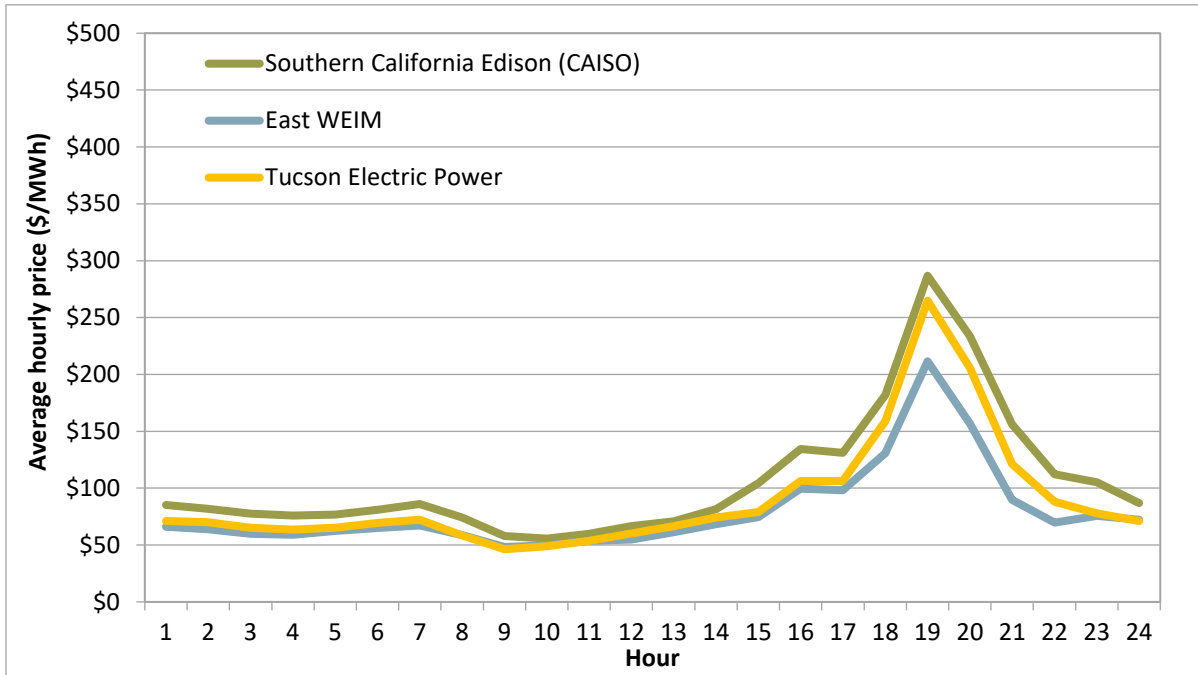
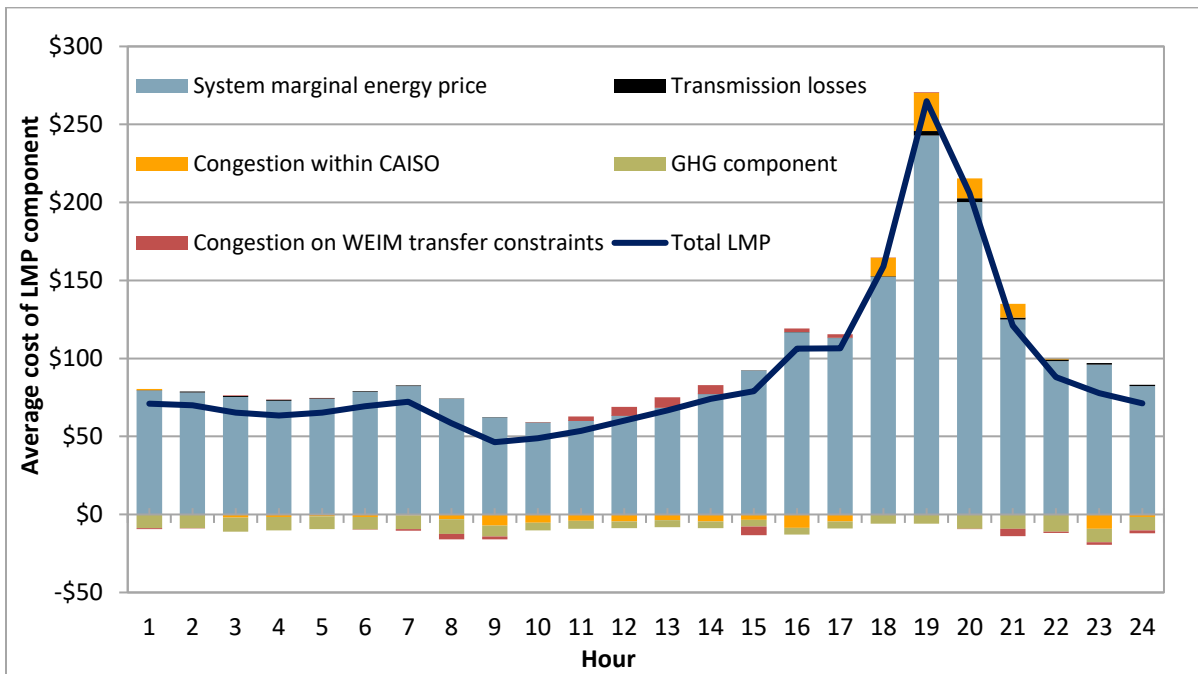


Figure 1.3 Average hourly 5-minute LMP by component (September 2022)



All power balance constraint relaxations that occurred in September were subject to the six-month transition period pricing that expires on November 1, 2022.² The transition period pricing mechanism sets prices at the highest cost supply bid dispatched to meet demand rather than at the \$1,000/MWh penalty parameter while relaxing the constraint for shortages, or the -\$155/MWh penalty parameter while relaxing the constraint for excess energy.^{4 5} 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 CAISO validated that their 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 CAISO validated that their 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 signal when the conditions for the limiter are met.⁶ 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 CAISO 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.⁷

Figure 1.4 and Figure 1.5 show the monthly frequency of under-supply and over-supply infeasibilities, respectively, in the 15-minute and 5-minute markets. In September, TEPC had 12 valid under-supply infeasibility in the 5-minute market and none in the 15-minute market. Furthermore, there were 3 valid over-supply infeasibilities in the 5-minute market and none in the 15-minute market during the month.

Additionally, there were no intervals during September when the load conformance limiter would have triggered for the TEPC balancing authority area, had transition period pricing not been in effect.

⁴ 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.

⁵ The penalty parameter while relaxing the constraint for shortages may rise from \$1,000/MWh to \$2,000/MWh, depending on system conditions, per phase 2 implementation of FERC Order 831.

⁶ The CAISO 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.

⁷ Section 35 of the CAISO tariff provides the CAISO 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 CAISO tariff. During erroneous intervals, the CAISO 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

Figure 1.4 Frequency of under-supply power balance infeasibilities by month Tucson Electric Power (TEPC)

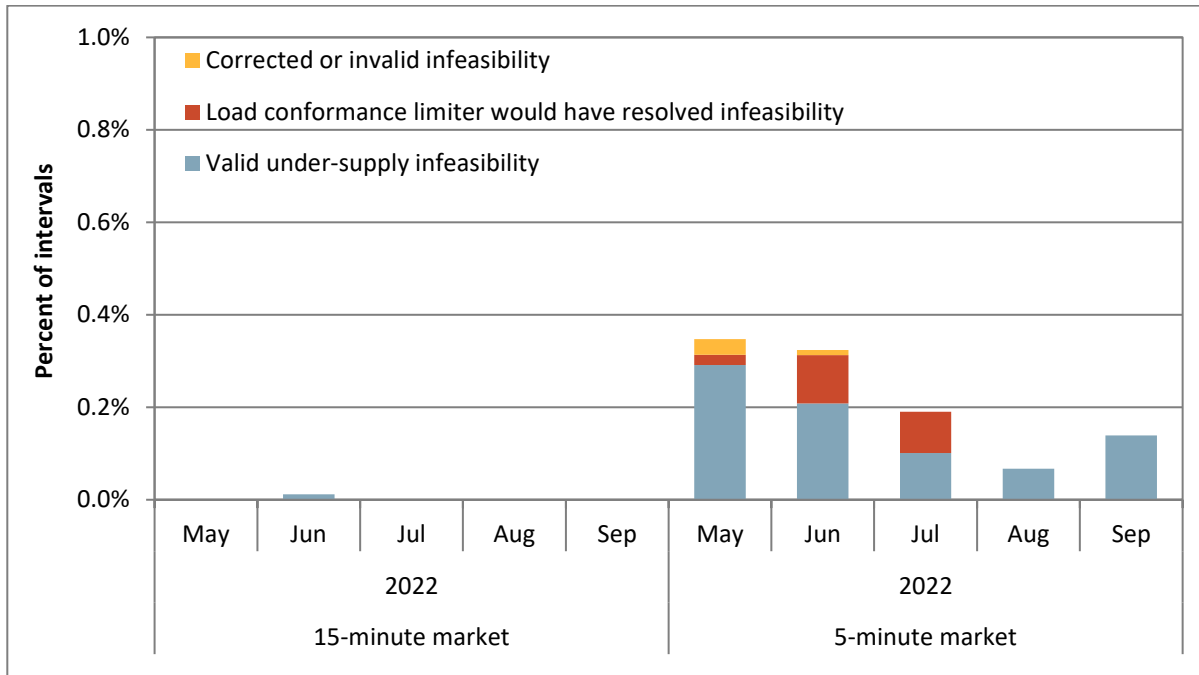


Figure 1.5 Frequency of over-supply power balance infeasibilities by month Tucson Electric Power (TEPC)

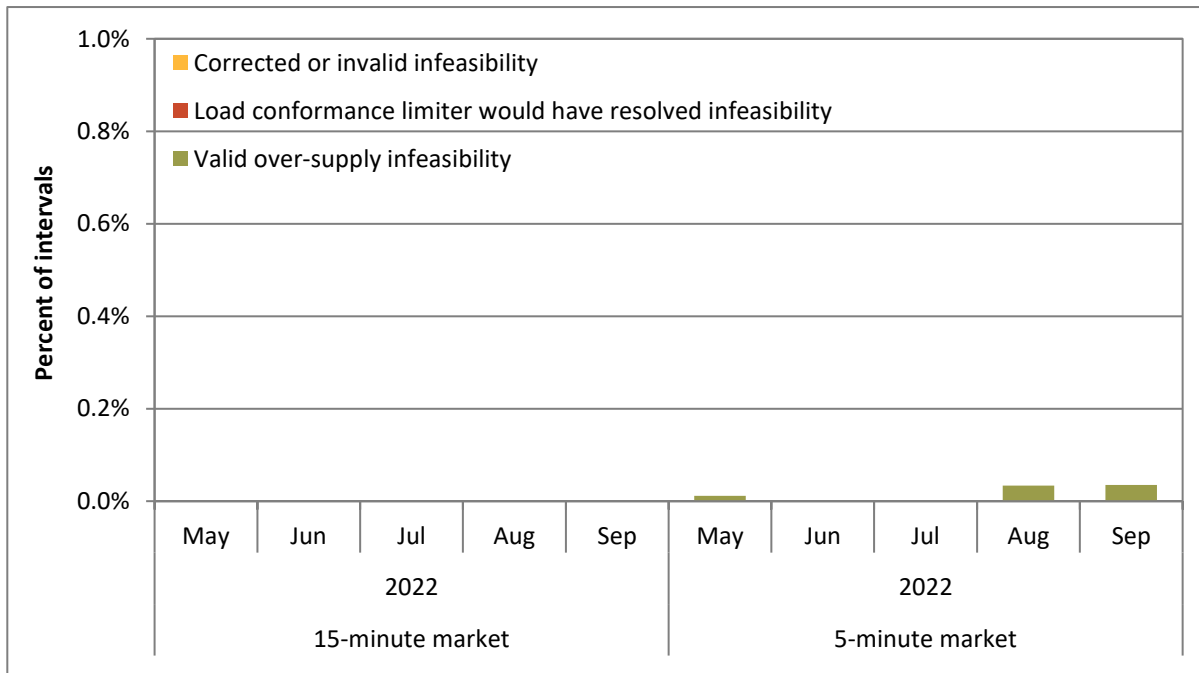
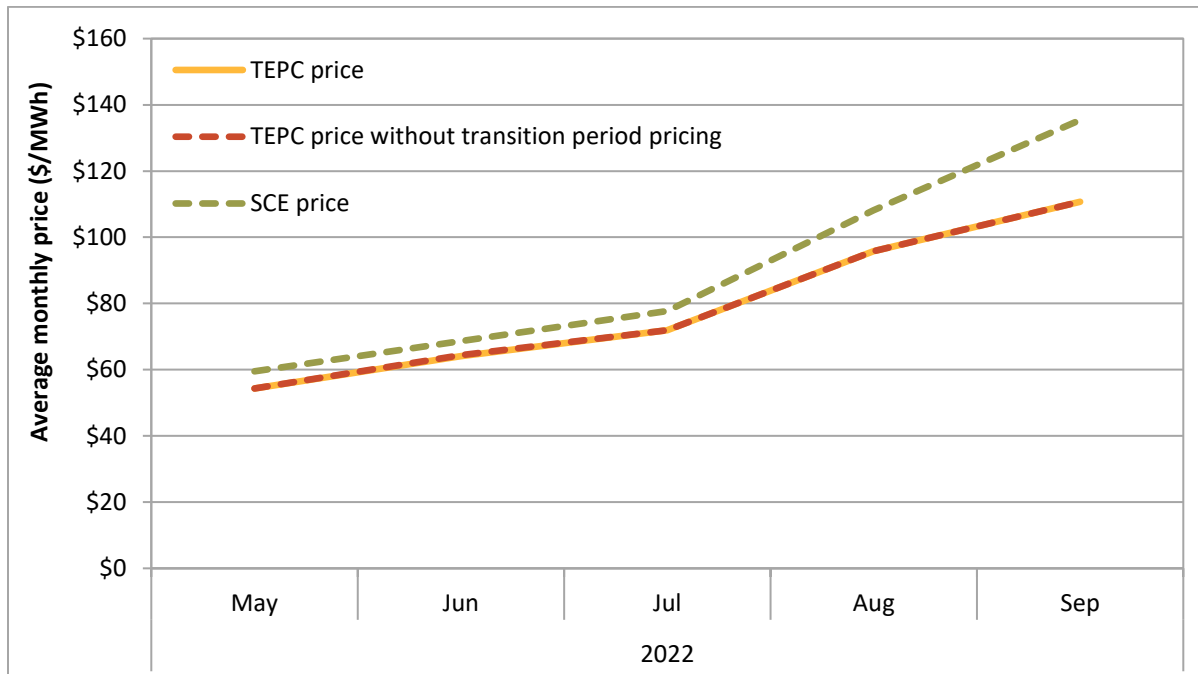


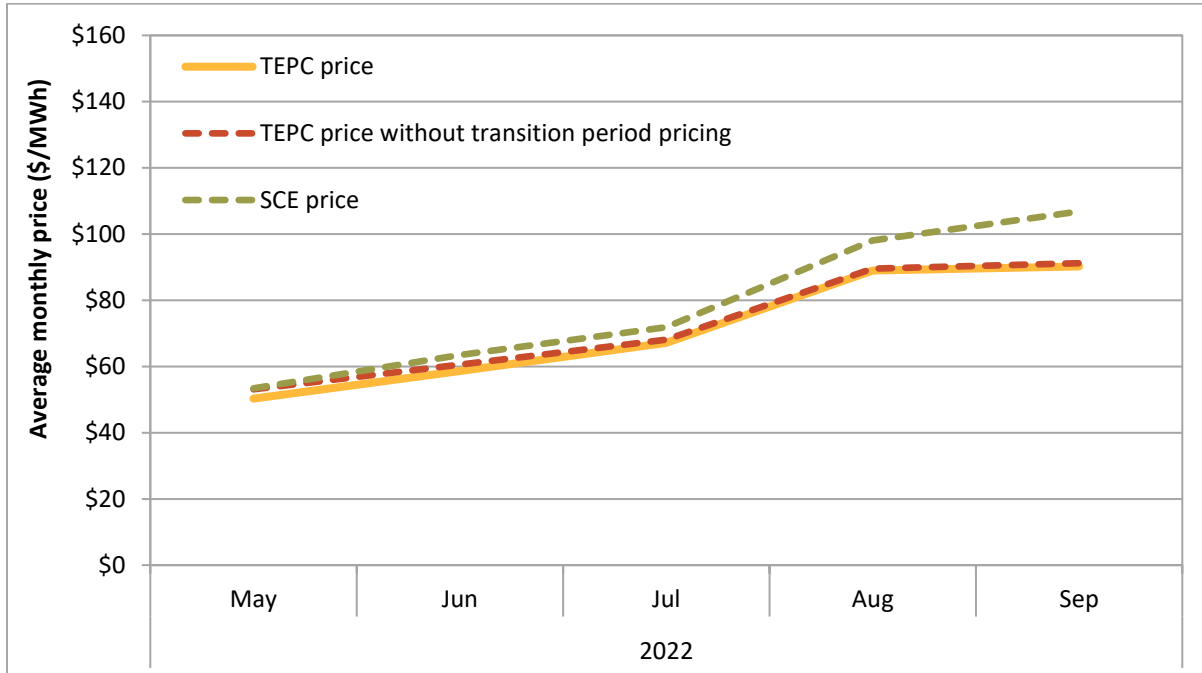
Figure 1.6 and Figure 1.7 show the average monthly prices in the 15-minute and 5-minute markets *with* and *without* the special transition period pricing provisions applied to mitigate prices in the TEPC area during the month.⁸ On average for September, transition period pricing decreased TEPC area prices in the 5-minute market by \$0.98/MWh and did not impact prices in the 15-minute market.

Figure 1.6 Average prices by month – Tucson Electric Power (TEPC) (15-minute market)



⁸ 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 1.7 Average prices by month – Tucson Electric Power (TEPC) (5-minute market)



2 Flexible ramping sufficiency and bid range capacity tests

As part of the Western Energy Imbalance Market, each area, including the California ISO, is subject to a resource sufficiency evaluation. The evaluation is performed prior to each hour to ensure that generation in each area is sufficient without relying on transfers from other balancing areas. The evaluation includes two tests:

- **The bid range capacity test (capacity test)** requires that each area provide incremental bid-in capacity to meet the imbalance between load, inertia, and generation base schedules.
- **The flexible ramping sufficiency test (sufficiency test)** requires that each balancing area has enough ramping flexibility over an hour to meet the forecasted change in demand as well as uncertainty.

If an area fails either the bid range capacity test or flexible ramping sufficiency test, energy imbalance market transfers into that area cannot be increased.⁹ Failures of the capacity and sufficiency test are important because these outcomes limit transfer capability. Constraining transfer capability may affect the efficiency of the WEIM by limiting transfers into and out of a balancing area that could potentially provide benefits to other balancing areas. Reduced transfer capability also affects the ability for an area to balance load, since there is less availability to import-from or export-to neighboring areas. This can result in local prices being set at power balance constraint penalty parameters.

Figure 2.1 shows the monthly frequency of upward and downward flexible ramping sufficiency test failures, while Figure 2.2 shows the number of bid range capacity test failures by month. The TEPC balancing authority area failed the upward sufficiency test during 11 intervals in September. The TEPC balancing authority did not fail the downward sufficiency or either capacity test during the month.

⁹ If an area fails either test in the upward direction, net WEIM imports (negative) during the hour cannot exceed the lower of either the base transfer or optimal transfer from the last 15-minute interval prior to the hour.

Figure 2.1 Frequency of upward and downward sufficiency test failures by month Tucson Electric Power (TEPC)

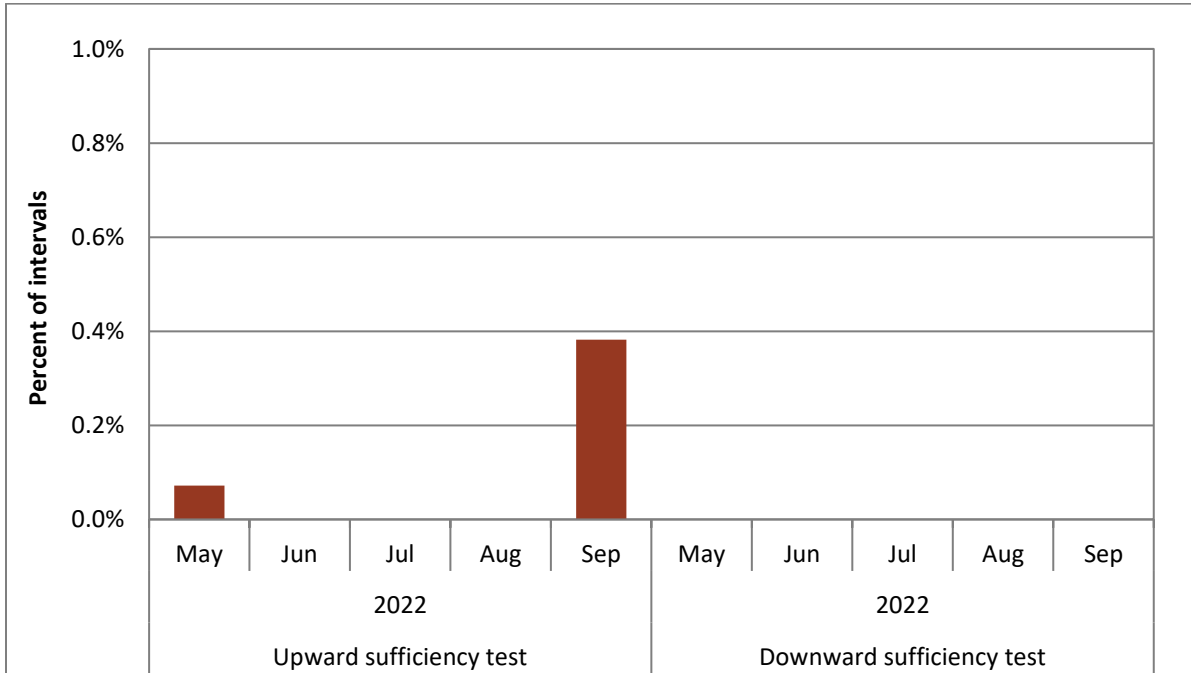
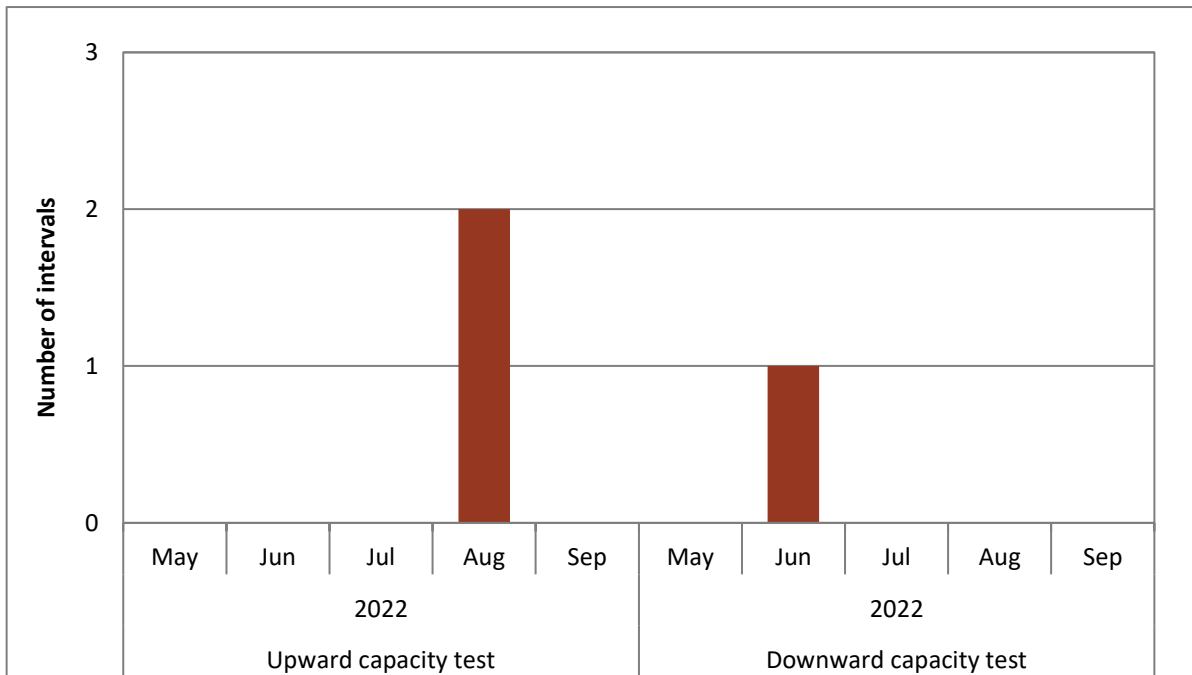


Figure 2.2 Frequency of upward and downward capacity test failures by month Tucson Electric Power (TEPC)



CERTIFICATE OF SERVICE

I 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 8th day of November, 2022.

Jennifer Shirk

Jennifer Shirk