



California Independent System Operator Corporation

California ISO

**Assessment of potential competitiveness
in the western energy imbalance market:
El Paso Electric Company Balancing Area**

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Department of Market Monitoring

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1 Introduction

This report provides an analysis of potential market power in the western energy imbalance market (WEIM) within the El Paso Electric Company (EPE) balancing authority area (BAA). The analysis uses data provided by EPE for the 18 month period November 2020 to April 2022. The report assesses the potential competitiveness of the EPE area in the WEIM based on the expected amount of competitive supply that may be transferred into the EPE area from the broader WEIM footprint, compared to an approximation of imbalance demand that is expected to be served by the WEIM in the EPE BAA.¹

This analysis indicates that the EPE area will likely be structurally competitive in most intervals in the WEIM when WEIM transfer capacity is available in the range of the estimated levels provided by EPE.² The analysis further indicates that during the likely limited number of intervals when the EPE area may be structurally non-competitive, the CAISO's market power mitigation processes provide highly effective mitigation of the potential to exercise market power.

1.1 Western energy imbalance market

In the California ISO area, the majority of demand is met by supply procured or scheduled in the day ahead market. The CAISO's real time markets serve primarily to adjust and optimize unit commitments and dispatches in response to changes in system and market conditions and information.

In the WEIM, however, almost all system load is served by resources identified in the base schedules of the WEIM entities in each BAA. These base schedules are not determined by the automated market systems of the CAISO and are not settled by the CAISO or paid the WEIM prices. The WEIM is a real time market which starts from the base schedules for these BAAs and then adjusts and optimizes to best meet the imbalance needs of the aggregate WEIM area.

In all WEIM areas, only a small portion of total energy produced and consumed is settled by the CAISO and paid based on WEIM prices. Generating resources that receive or pay the WEIM price are scheduled by the WEIM entity. The only generation settled on WEIM prices is the incremental amount scheduled in the WEIM relative to each resource's base schedule. If market power is exercised in the WEIM, it is exercised on those WEIM imbalance quantities. Any measure of competition or market power should be centered on those quantities as the measures of supply and demand.

For a seller to have structural market power in the WEIM, some kind of barrier must limit supply from new or outside (third-party) entities. The limited nature of electric transmission can create potential market power in some regions. Any area that can be isolated by limited transmission can be subject to

¹ The report uses hour-ahead forecast and hourly actual data provided by EPE for total BAA load and losses to estimate hourly imbalance demand for the BAA. These data approximate the 15-minute and 5-minute imbalance demand that will be served by the WEIM.

² Before participation in the WEIM begins, only an estimate of WEIM transfer limits is known. Actual transfer capacity available to EPE in the WEIM will vary by hour and interval, based on available ATC on the applicable transmission paths. However, due to the significant amount by which the estimate of WEIM transfer capacity exceeds estimated imbalance demand, the findings of this analysis are likely robust to some degree of inter-hour variation in WEIM transfer capacity.

high prices and the effects of uncompetitive behavior if a single seller controls enough generation in the area behind the constraint.

Transfers in the 15-minute and 5-minute WEIM processes allow competitively priced sources of power to flow between BAAs, providing access to the BAA for competitive resources from outside areas. The limits of the transfers cap the amount of competitive supply that can be supplied from outside the BAA. In the WEIM's 15-minute market and 5-minute market, competitive supply available to meet incremental demand is the transfer capacity that is incremental to the quantity of transfers occurring the prior market. If the imbalance demand in a given market is greater than the incrementally available import transfer capability, some supply from within the BAA is necessary to meet imbalance demand.

A market is not structurally competitive if a single producer can determine market outcomes. In a structurally competitive market, demand can be met without supply from that single producer. If demand cannot be met without that key producer, that producer is said to be *pivotal*. They can effectively dictate the market price. A *pivotal supplier* test compares demand to competitive supply in order to determine if the key supplier is pivotal. Competitive supply used in the pivotal supplier test consists of supply that can reach the market but is not controlled by the key supplier.

In most WEIM areas, the additional imbalance needs that cannot be met by transfers from other areas would have to be met by the WEIM entity's generation. In an interval where the imbalance demand is greater than the incremental transfer limits, the WEIM entity could theoretically set prices up to the bid cap, knowing that they are pivotal and at least one of their resources would need to be dispatched to meet imbalance energy demand. In such intervals, the WEIM entity could determine market outcomes and set market prices at extremely high levels in the absence of any special market power mitigation provisions.

1.2 Demand for imbalance energy

The relevant demand for each portion of the CAISO's multi settlement markets involves the sum of *changes* between two market solutions. In the CAISO, the 15-minute market demand is equal to (1) the sum of all generation in the 15-minute market *minus* (2) the sum of all generation in the day-ahead market. This represents the incremental energy dispatched by the 15-minute market to meet incremental demand in the 15-minute market. Using the changes to generation to quantify imbalance energy demand accurately captures the quantity of imbalance energy dispatched by the market. This approach is preferable to comparing load forecasts across markets, as the load forecast in each market can underestimate or overestimate the actual market demand due to possible changes in self-schedules, renewable output, resource outages, and other factors.

In the WEIM, entities do not participate in the day-ahead market, but instead submit hourly base schedules that are treated very much like day-ahead market schedules in the CAISO. For each WEIM BAA, the imbalance quantity demanded in the 15-minute WEIM market is equal to changes made by the market between base schedules and the final 15-minute schedules. Similarly, the imbalance quantity demanded in the 5-minute WEIM market is equal to changes made by the market between the 15-minute and 5-minute schedules.

For an entity that has not yet begun participation in the WEIM, there are no historical data of WEIM base schedules, 15-minute WEIM generation dispatches, or 5-minute WEIM generation dispatches from which to estimate imbalance demand. In lieu of actual WEIM market data, we can approximate the

imbalance demand expected to be served by WEIM through the use of historical hourly imbalance demand data provided by the incoming WEIM entity. Where generation schedule data are not readily available, deriving imbalance demand from data on forecasted and actual load and losses may be used as a reasonable approximation. Supply is scheduled and produced in these quantities to maintain control area balance.

2 Supply and demand in the energy imbalance market

For this report, DMM analyzed historical imbalance demand derived from data provided by EPE, expected WEIM import transfer limits, and generation ownership in the EPE BAA.³ These data are compiled for the 18 month period from November 2020 through April 2022.

2.1 Demand for imbalance energy

Figure 1 shows the distribution of the hourly demand for imbalance energy in the EPE BAA for this 18 month period (in MW). Figure 2 highlights the distribution of hourly imbalance energy demand over this period as a percentage of total load in the EPE BAA. Actual WEIM imbalance demand will occur at 15-minute and 5-minute granularity, and the amount of intra-hour variation is unknown. However, assessing the best available hourly data is likely to provide a reasonable approximation of what may materialize in WEIM. Table 1 and Table 2 provide summary statistics for these data.

As seen in Figure 1, historical hourly demand for imbalance energy in the EPE BAA is approximately normally distributed. Hourly imbalance demand averaged 0 MW with a median value of 1 MW (see Table 1). The close values for the average and median suggest a symmetric distribution.

As shown in Table 1, the demand for imbalance energy was positive during about 51 percent of hours. During hours with positive imbalance demand, the average imbalance demand was about 21 MW. Table 2 shows that the median hourly imbalance demand as a percent of total demand was about 2 percent.

Table 1. Hourly imbalance demand (MW)

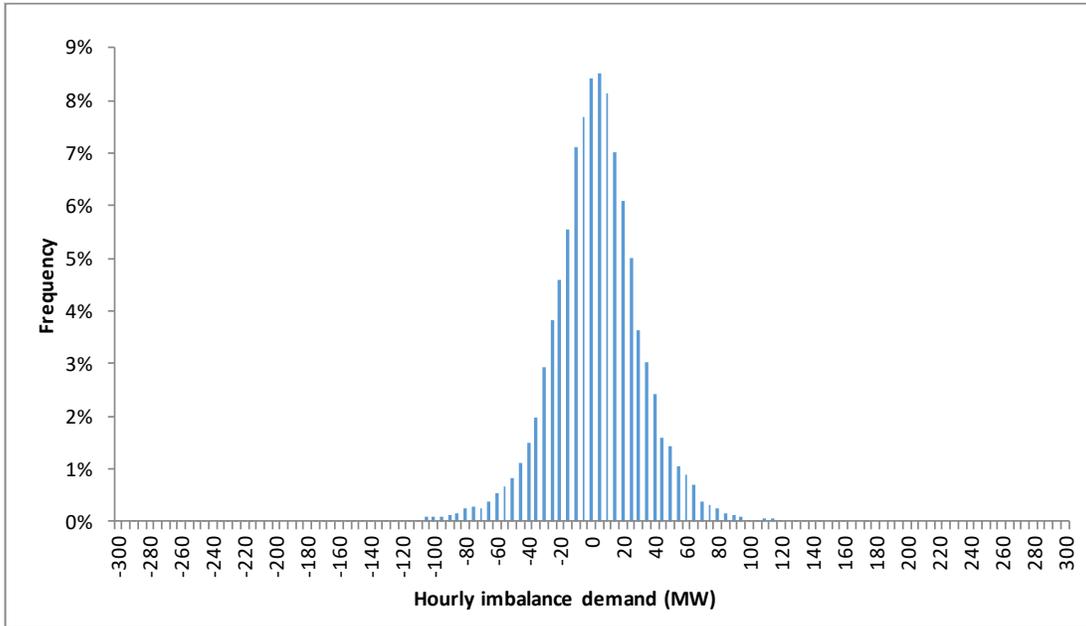
Average	Median	Intervals demand positive	Average positive demand	Percentiles		
				90th	95th	97th
0	1	51%	21	34	47	56

Table 2: Hourly imbalance demand as share of total load (absolute value)

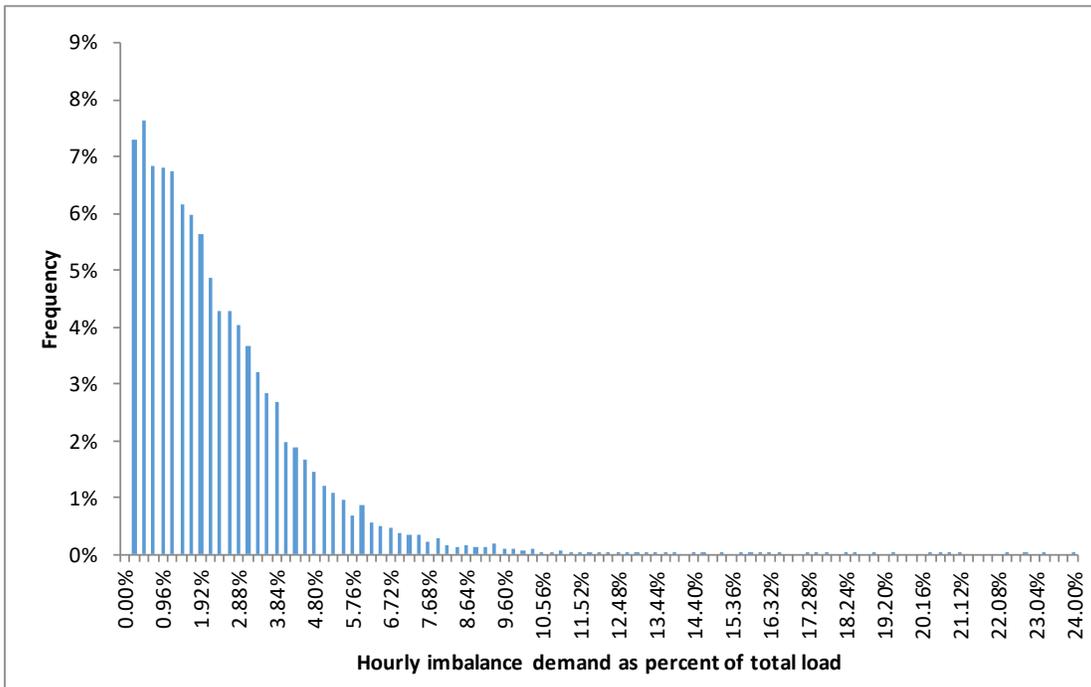
Median	90th	95th	97th
1.8%	4.8%	6.1%	7.2%

³ For this analysis, hourly demand for imbalance energy in the EPE BAA is calculated as the difference between actual and hour-ahead forecasted control area load and losses. Data were provide directly to DMM by EPE.

**Figure 1. Hourly demand for imbalance energy for the EPE BAA
November 2020 to April 2022**



**Figure 2. Hourly imbalance energy demand compared to total load for the EPE BAA
November 2020 to April 2022**



2.2 Competitive supply of imbalance energy

The competitive supply available to meet WEIM internal demand consists of supply that is not controlled by the generation arm of the WEIM entity for that BAA or one of its affiliates. In many WEIM areas, most or all of the available competitive supply is from outside the WEIM BAA in the form of WEIM transfers. WEIM import transfer capacity represents supply that is incremental to base schedules and available to meet imbalance demand.

To determine the competitive supply that will potentially be available to the EPE BAA in WEIM, we consider the WEIM import transfer capacity that EPE expects to be available in WEIM. These data provided by EPE represent an estimate of expected import transfer capacity for study purposes. Actual WEIM transfer capacity will vary by hour and interval, based upon available ATC on the relevant transmission paths. Table 3 shows an estimate of WEIM import transfer capacity expected by EPE from all interconnected BAAs.⁴

Table 3. Potential competitive supply from WEIM into EPE (MW)

Source	Limit
TEP and PNM via WECC Path 47	645
PNM - Other	810
Total	1,455

EPE expects to have WEIM transfer capacity with the PNM and TEP BAAs in WEIM. As shown in Table 3, total estimated competitive supply through WEIM import transfer capability is expected to significantly exceed historical hourly imbalance demand for the EPE BAA, shown in Table 1.

Table 4 summarizes the ownership of incrementally dispatchable generation expected to participate in WEIM in the EPE BAA.⁵ As shown in Table 4, all expected dispatchable WEIM participating capacity in the EPE BAA is owned by EPE. This implies that competitive supply for imbalance energy in the WEIM will come only from WEIM import transfers. There is no expected competitive supply for imbalance energy for the EPE BAA from within the EPE BAA.

Table 4. Ownership of dispatchable generation in EPE BAA expected to participate in WEIM

Fuel Type	EIM participating capacity (MW)
	EPE
Natural gas	1,434
Total	1,434

⁴ EPE imports on WECC Path 47 are limited to 645 MW. EPE has access to additional WEIM generation within the PNM BAA that is not subject to Path 47 limits. For those transfers from PNM not subject to Path 47 limits, EPE provided a historical monthly estimate of total ATC that would be available for WEIM import transfer capacity for the period March 2022 – May 2022. Estimated total monthly values of WEIM import transfer capacity that may be available, as indicated by historical ATC, range from 804 MW to 823 MW. Our analysis assumes the average of 810 MW as an estimate of WEIM import transfer capacity that may be available from these sources.

⁵ Capacity from WEIM participating resources that are not expected to be available for incremental dispatch is not reflected here. This includes solar and other renewable resources.

3 Structural market competitiveness

3.1 Pivotal supplier test

The pivotal supplier test for structural market power in WEIM asks this question: could imbalance demand within the WEIM BAA have been met by transfers of competitive supply from other unaffiliated BAAs? If so, then the WEIM entity was not pivotal in that interval and could not have successfully raised prices at that time. In a structurally competitive market, the exercise of market power would be difficult and opportunities to do so would be rare.

The pivotal supplier test can be performed using historical data for individual intervals in WEIM by calculating how often the estimated competitive supply was able to meet imbalance demand in the EPE BAA. When the level of competitive supply is below imbalance demand, EPE would be pivotal.

In the absence of WEIM market data for the EPE BAA, we estimate the expected outcome of this test for the EPE area using currently available data. This estimation compares the historical hourly imbalance demand data for the EPE BAA to an estimate of the WEIM import transfer limits EPE expects will be available in the WEIM.

This analysis shows that over the 18 month period examined in this report, there were no hours where the estimated hourly imbalance demand was greater than the estimate of expected WEIM import transfer supply. This suggests that EPE may be reasonably expected to have access to competitive supply in the WEIM that significantly exceeds typical imbalance demand.

As noted above, WEIM import transfer limits can change hourly and across intervals, based on available ATC on the relevant transmission paths. Further, imbalance demand may vary intra-hour by an unknown amount. Despite these caveats, the estimate based on available data should provide a reasonable expectation of overall competitiveness of the EPE area in WEIM.

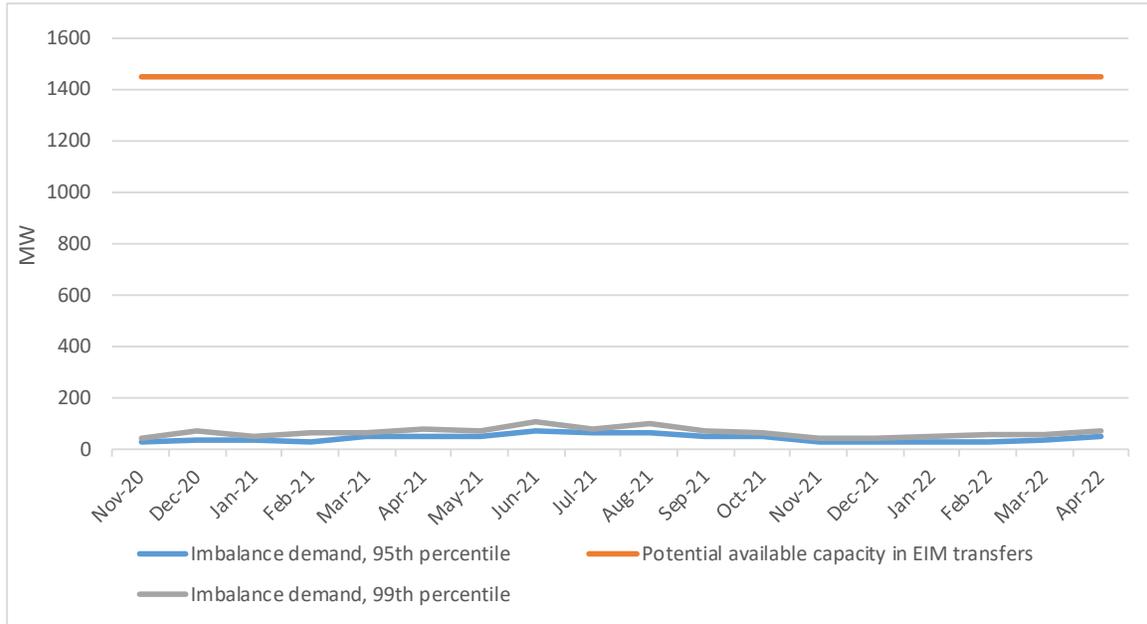
The expected structural competitiveness of the EPE BAA in the WEIM can also be estimated based on statistical values of supply and demand. Figure 3 provides a comparison between estimated expected WEIM import transfer capacity, representing competitive supply, and the 95th and 99th percentile of historical hourly imbalance demand.⁶

Estimated competitive supply exceeded both the 95th and 99th percentile of imbalance demand during each month of the study period. In the closest months, expected competitive supply was about fourteen times the volume of the 99th percentile of imbalance demand.

These results show that estimated WEIM supply and demand conditions were competitive during the study period for the EPE BAA. Import transfer capacity at the estimated level, and values significantly below the estimated level, would have allowed resources from other parts of WEIM to compete with resources controlled by EPE in all hours.

⁶ If we use the average demand over some period of time to compare to average transfer capacity, we will include the negative intervals and may provide an underestimate of the size of the market. Therefore, instead of comparing average competitive supply to average demand, we compare average competitive supply to imbalance demand during intervals with particularly tight supply conditions.

Figure 3: EPE hourly imbalance demand and expected WEIM import transfer capacity



3.2 Energy bid mitigation

This analysis based on estimated historical hourly imbalance demand and expected WEIM transfer capability suggests that the EPE BAA is likely to be generally competitive in the WEIM. However, there still exists the possibility in WEIM that during some intervals, EPE may become a pivotal supplier and competitive supply from the broader WEIM into the EPE BAA may be limited by congestion. When this occurs, this potential structural market power would be mitigated by the CAISO’s real-time market power mitigation procedures. These bid mitigation procedures are triggered when congestion is projected in the real-time market.

When bid mitigation is triggered, bids of all supply within a BAA that is separated from the CAISO BAA are automatically subject to bid limits based on each resource’s marginal cost and competitive system prices. Thus, even when access to competitive supply is limited by congestion, effective market power mitigation ensures that the resulting price is typically still competitive.

DMM analysis shows that CAISO’s market power mitigation processes have a high degree of accuracy of congestion estimation for all existing WEIM transfer constraints. This reduces the possibilities of missed mitigation to a very low level for each of the existing WEIM BAAs in both the 15-minute and 5-minute market, as shown in Table 6 and Table 7.

**Table 6: Accuracy of congestion prediction by region on EIM transfers, 15-minute market
November 2020 – April 2022⁷**

	Accurately predicted	Predicted but resolved	Under predicted
PACE	87%	10%	4%
PACW	88%	6%	6%
PGE	89%	5%	5%
BCHA	89%	6%	5%
PSEI	90%	5%	5%
IPCO	89%	7%	5%
TWPR	90%	5%	5%
SCL	90%	5%	5%
PNM	78%	16%	6%
AVA	89%	7%	4%
BANC	97%	1%	3%
NWMT	88%	8%	4%
NEVP	94%	2%	4%
TIDC	89%	7%	5%
SRP	95%	2%	3%
AZPS	80%	12%	8%
BANCSMUD	98%	0%	2%
LADWP	91%	4%	5%

⁷ Data for BANC end March 2021, and are thereafter included with BANCSMUD. Data for BANCSMUD and TIDC begin March 2021. Data for PNM begin April 2021. Data for NWMT begin June 2021. Data for TPWR and AVA begin March 2022.

Table 7: Accuracy of congestion prediction by region on WEIM transfers, 5-minute market November 2020 – April 2022⁸

	Accurately predicted	Predicted but resolved	Under predicted
PACE	67%	26%	8%
PACW	75%	17%	8%
PGE	76%	17%	7%
BCHA	71%	20%	9%
PSEI	77%	16%	8%
IPCO	78%	16%	6%
TWPR	82%	13%	5%
SCL	77%	16%	8%
PNM	46%	46%	8%
AVA	84%	12%	5%
BANC	77%	17%	7%
NWMT	76%	19%	6%
NEVP	68%	27%	5%
TIDC	73%	20%	7%
SRP	78%	19%	4%
AZPS	56%	35%	8%
BANCSMUD	81%	13%	6%
LADWP	71%	23%	6%

4 Conclusion

This report provides analysis by DMM evaluating the potential for market power in the WEIM in the EPE area. Although EPE has not yet begun participation in the WEIM and no market data are yet available, we analyzed estimated hourly imbalance demand derived from data provided by EPE, generation ownership in the EPE BAA, and an estimated amount of WEIM import transfer capacity that EPE anticipates will be available in the WEIM.

This analysis indicates that the EPE BAA is likely to be structurally competitive during almost all intervals in the WEIM. The estimated competitive supply expected to be available for transfer into EPE from the rest of the WEIM significantly exceeds estimated imbalance demand in the EPE BAA.

The report also shows that CAISO's real-time market power mitigation procedures provide assurance that any potential market power in the EPE BAA will be effectively mitigated when the EPE area is separated by congestion from the CAISO and other WEIM areas.

⁸ Data for BANC end March 2021, and are thereafter included with BANCSMUD. Data for BANCSMUD and TIDC begin March 2021. Data for PNM begin April 2021. Data for NWMT begin June 2021. Data for TPWR and AVA begin March 2022.