Attachment 1

Maximum Import Bid Price Calculation

Department of Market Monitoring

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Summary

The maximum import bid price (MIBP) is an hourly price calculated by the ISO that is used for assessing the reasonableness of import bid prices over the $1,000/MWh soft cap. The MIBP is also used as the trigger for raising the bid cap and various penalty prices in the market software from $1,000/MWh to $2,000/MWh. As part of the ISO proposal, the MIBP would also be used as a proxy for intra-day opportunity costs on days when the $2,000/MWh cap is in effect.

DMM believes the MIBP calculation currently used by the ISO is not consistent with the tariff and the intended market design, and does not make sense statistically. Given the significant impact this calculation can have on the ISO and WEIM markets, DMM recommends that the ISO address this issue prior to the coming peak summer periods.

MIBP formulation

The MIBP is calculated based on bilateral price indices for multi-hour blocks of energy (e.g., 16 peak hours) that are traded on a day-ahead basis at the Mid-Columbia or Palo Verde trading hubs. The ISO converts these bilateral market prices for multi-hour blocks of energy into hourly prices using an hourly shaping factor that is based on ISO market prices on prior days.

The hourly shaping factor used in calculating the MIBP is defined in the BPM as:

$$= 1 + \frac{CAISO\ Hourly\ DA\ SMEC - CAISO\ Average\ DA\ SMEC_{on\ or\ off\ peak\ hours}}{CAISO\ Average\ DA\ SMEC_{on\ or\ off\ peak\ hours}}$$

Which is mathematically equivalent to:

$$\frac{CAISO\ Hourly\ DA\ SMEC}{CAISO\ Average\ DA\ SMEC_{on\ or\ off\ peak\ hours}}$$

For the <u>denominator</u> of this ratio, the ISO uses the average day-ahead market system energy price from the <u>last high priced day</u>. In the numerator of this ratio, however, the

ISO uses the system hourly marginal energy cost (SMEC) from the previous day.[1] DMM believes that the correct calculation of the MIBP should use the hourly SMEC from the last high priced day in the numerator of this equation. The ISO tariff also specifies that the prices used in the numerator and denominator of this ratio must be from the same previous representative day:

> As described in the BPM the CAISO calculates the hourly shaping ratio for each hour by dividing the Day-Ahead Market System Marginal Energy Cost for the CAISO Balancing Authority Area in that hour of a previous representative Trading Day by the average Day-Ahead Market System Marginal Energy Cost for the CAISO Balancing Authority Area in all on-peak hours of the same previous representative Trading Day.[2]

By using the hourly SMEC from the previous day in the numerator, the ratio that results from the current calculation does not shape the bilateral prices based on the shape of hourly prices on the last high priced day, unless the previous day also happens to be the last high priced day. In addition, the average of these shaping factors across the day generally does not equal one.

The purpose of the shaping factors is to transform the 8-hour (off-peak) or 16-hour (on-peak) bilateral block prices into hourly prices that reflect the shape of prices on the last high priced day, but are still equivalent to the bilateral market price for that trade day. The MIBP should be higher in hours where the SMEC tends to be higher than the daily average, and lower in the hours where the SMEC tends to be lower than the daily average. The average of these 8- or 16-hourly prices should be exactly equal to the bilateral market price for the 8- or 16-hour block of energy being used in the calculation. For this to hold mathematically, the average of the hourly shaping factors must equal one.

While the MIBP was being designed, the ISO initially proposed to shape bilateral prices based on the pattern of prices on the previous day.[3] However, the Market Surveillance Committee (MSC) noted the disparity between peak hour prices and the daily average prices is larger on days when the ISO has higher peak prices, and thus suggested using the last high priced day (rather than the prior day) as a basis for the shaping factor.[4]

As previously noted, the tariff describes the shaping factor as dividing the DA SMEC in that hour of a previous representative trading day by the average DA SMEC of the

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[1] *Market Instruments BPM*, pp 487-489.

[2] Tariff Section 30.7.12.5.3

[3] *Revised Draft Final Proposal – FERC Order 831 Import Bidding and Market Parameters,* California ISO, July 22, 2020, pp 27-29: https://www.caiso.com/InitiativeDocuments/RevisedDraftFinalProposal-FERCOrder831-ImportBidding-MarketParameters.pdf

[4] *Opinion on FERC 831 Import Bidding and Market Parameters*, Market Surveillance Committee, September 9, 2020, p 7: https://www.caiso.com/Documents/MSC-OpiniononFERC831ImportBiddingandMarketParameters-Sep9_2020.pdf

same previous representative trading day. This formulation results in hourly shaping factors for the 8- or 16-hour block that average to one. This formulation also shapes bilateral prices to the pattern of prices on the last high priced day. The current implementation can yield the same result in some cases, but only if the previous day also happens to be the last high priced day.

Analysis of different MIBP calculations

DMM replicated what the MIBP would have been from June 2021 to April 2024 using the hourly and average prices from the same high priced day to calculate the hourly ratios used to shape the MIBP. Results of this comparison indicate that, in general, the current MIBP calculation tends to under-state the highest MIBP of the day, and under-states the frequency of hourly MIBPs over $1,000/MWh during high priced days.

The table below shows instances where one of these MIBP calculations exceeded the $1,000/MWh trigger while the other did not. This analysis highlights that during high priced days, the current MIBP calculation tends to result in fewer hours with an MIBP over $1,000/MWh compared to the MIBP calculation DMM is recommending.

Table 1. Number of hours current MIBP calculation over- and under-states hours with MIBP over $1,000/MWh (June 2021–April 2024)

	Number of Hours	
	Day-Ahead	Real-Time
Current MIBP over-states Current MIBP >= $1,000 Recommended MIBP < $1,000	5	6
Current MIBP under-states: Current MIBP < $1,000 Recommended MIBP >= $1,000	33	19
Total Hours	24,956	25,130

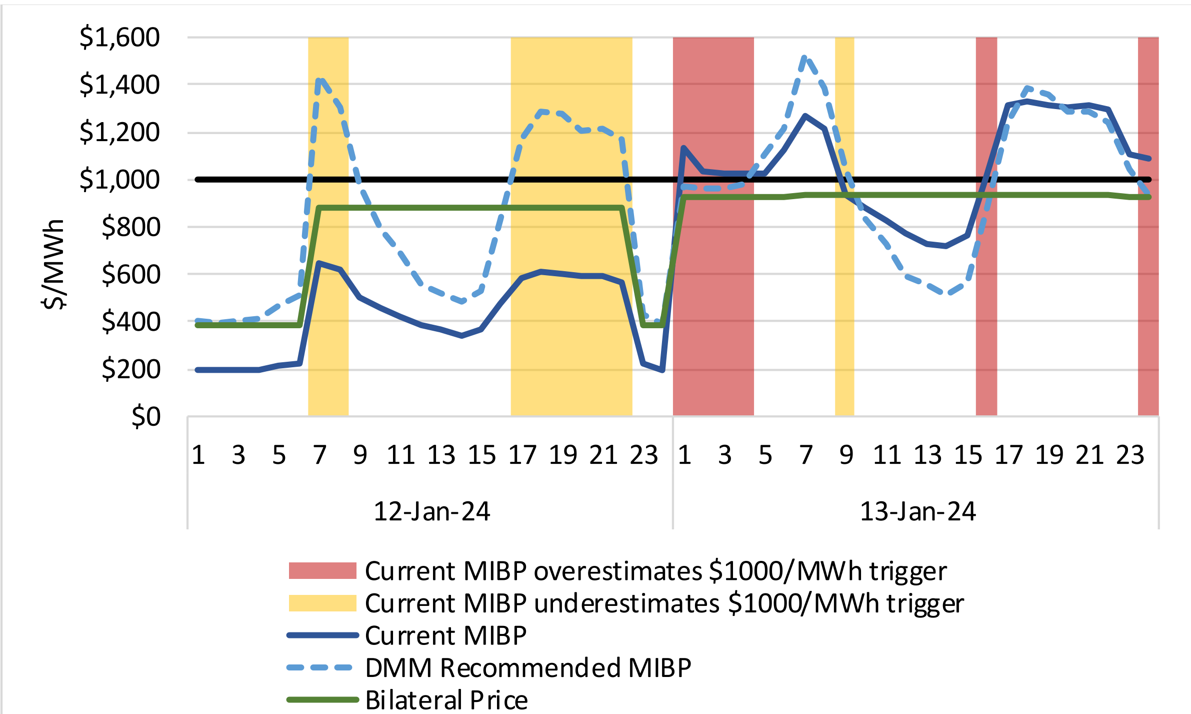
Example 1

This example illustrates how the current MIBP formulation tends to underestimate the MIBP on the first day of a high priced period. Figure 1 compares the current MIBP calculation and the MIBP recommended by DMM across all hours in the real-time market on January 12-13, 2024. These days were during an unseasonably cold storm in the northwest, which led to high bilateral prices, triggering the MIBP to exceed $1,000/MWh in a number of hours. The bilateral price used to calculate the MIBP was $880 on January 12 (for 16 on-peak hours) and around $930 during both on and off peak hours on January 13.

The hours shaded in yellow in Figure 1 represent hours when the current MIBP was lower than the MIBP recommended by DMM and the $2,000/MWh bid cap was not in effect. This was primarily during the morning and evening peaks of January 12, which was the first day of the high bilateral prices.

When the MIBP was being developed, the MSC raised concerns about the shaping factor understating the true extremity of prices during the beginning of a period of very high prices.[5] This example indicates that the current formulation does tend to underestimate the MIBP on the first day of a high priced period.

Figure 1: Real-time market MIBP calculations for January 12–13, 2024



In addition, the hours shaded in red represent hours when the current MIBP was higher than the DMM-recommended MIBP, which incorrectly triggered the $2,000/MWh bid cap. This was primarily from midnight to 4 a.m. on the morning of January 13, a time during which it was likely unnecessary to have the $2,000/MWh bid cap in place.

[5] *Opinion on FERC 831 Import Bidding and Market Parameters*, Market Surveillance Committee, September 9, 2020, p 7: https://www.caiso.com/Documents/MSC-OpiniononFERC831ImportBiddingandMarketParameters-Sep9_2020.pdf

Example 2

This example highlights how the ratio recommended by DMM shapes the MIBP based on the last high priced day, while the current approach does not. This example is for the day-ahead market on October 18, 2023. The last high priced day prior to this trade day was August 30, 2023, when day-ahead prices exceeded $200/MWh in hours 19-20.

Under the current approach by the ISO, shaping factors for peak hours for this day are calculated as the ratio of each hourly DA SMEC from Oct 17, 2023 (prior day) to the average DA SMEC of Aug 30, 2023 (last high priced day) for peak hours. Under DMM's recommended approach, the shaping factors would be calculated as the ratio of each hourly DA SMEC from Aug 30, 2023 to the average DA SMEC of Aug 30, 2023 for peak and off-peak hours.

Figure 2 shows how the two different calculations shape the bilateral prices to hourly values. The blue line shows the prices on the last high priced day (August 30, 2023). The yellow line, which calculates the MIBP using the shaping factor DMM recommends, shapes the bilateral prices (black dashed line) to the same shape as the last high priced day. The green line, which calculates the MIBP using the current shaping factor, does not result in an MIBP that follows the shape of prices on August 30, 2023. This example also illustrates how the MIBP calculation recommended by DMM tends to result in higher prices during some peak hours than the approach used by the ISO.

Figure 2: MIBP calculations for October 18, 2023