

Report Addendum: Analysis of MISO-SPP's 2024-25 CSP Production Cost Savings Results

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Prepared for Southern Renewable Energy Association (SREA)

In our whitepaper “Enhancing MISO-SPP Interregional Transmission Planning: Recommendations for Coordinated System Plan” for SREA, we evaluate the 2024-2025 Coordinated System Plan (CSP) interregional transmission planning study conducted by Midcontinent Independent System Operator (MISO) and Southwest Power Pool (SPP) and provide recommendations to improve the CSP’s analysis and benefits evaluation approach. We highlight in the report that the production cost simulations utilized in the CSP will understate the value of the proposed interregional upgrades. We recommend that SPP and MISO provide more details about their modeling results, so that stakeholders can better assess how realistic the simulations are. This question can be informed by comparing how well the simulated energy prices capture the value of interregional upgrades relative to historical market prices across the MISO-South-SPP South seam.

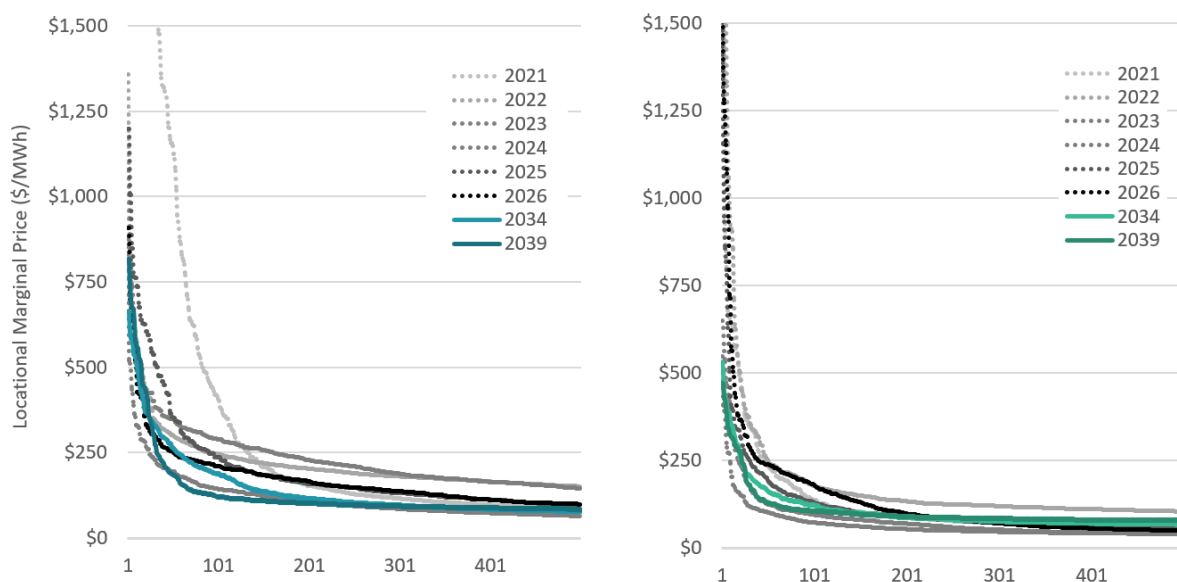
Since the completion of our whitepaper, MISO and SPP provided the hourly energy prices from their market simulations. This addendum to our paper summarizes the results of our analysis of the simulated prices in comparison to historical prices and provides additional evidence that the CSP modeling understates by a factor of two to three the production cost savings of the proposed interregional upgrades.

We assess the CSP simulations by first comparing the hourly energy prices in each market (SPP South hub in SPP and Arkansas hub in MISO) with historical market prices from 2021-2026 and then by reviewing the SPP South-MISO South energy price differentials between the markets.

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Focusing on energy prices during the top 500 hours in each historical year and in the simulations, Figure 1 below shows that the market simulations do not fully capture the periods in recent years when MISO and SPP have been most stressed and interregional upgrades would be the most valuable. The simulated energy prices rise above \$500/MWh in both markets for a few hours, but not as frequently as during actual market conditions. Figure 1A (left chart) shows that historical prices in SPP during 2021-26 have been consistently higher than the market simulations yield for 2034 and 2039. In MISO (Figure 1B on the right), the simulations yield highest-priced hours of about \$500/MWh, while historical prices frequently exceed \$1,000/MWh. Because a large portion of transmission value is concentrated in the most challenging hours of the year, this has clear implications for the extent to which the simulations realistically capture future value.

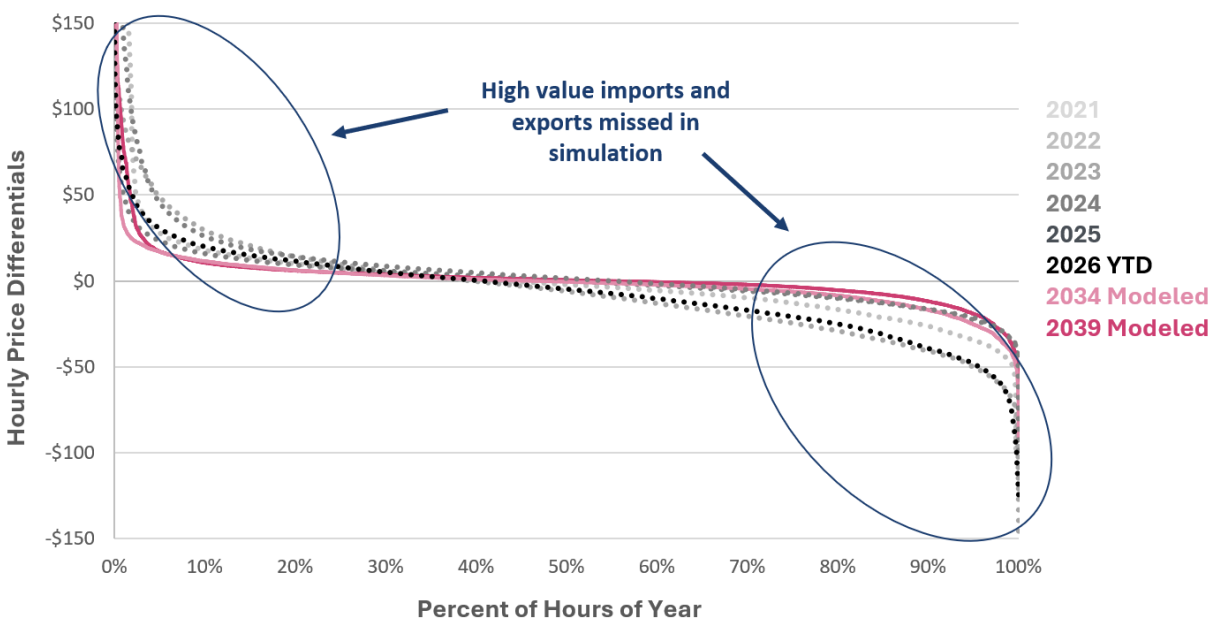
FIGURE 1: SIMULATED AND HISTORICAL REAL-TIME ENERGY PRICES (TOP 500 HOURS)
(A) SPP SOUTH (B) MISO ARKANSAS HUB



Interregional transmission provides the most value when the price differences between the two markets are the largest. Figure 2 below presents “price difference duration curves” based on the differences in the simulated and historical hourly prices of SPP South and the Arkansas Hub, sorted from highest to lowest price differences. As shown, the CSP’s 2034 and 2039 simulated differential duration curves do not fully capture the value of increasing transactions between MISO and SPP observed in the historical market prices. As such, the market simulations are not accurately capturing the opportunity for interregional transmission upgrades to reduce production costs for ratepayers in SPP and MISO. Note especially that the differences between simulated and historical price differentials are the most significant when MISO prices are higher

than SPP, as shown by the values with a negative price differential. This is in contrast to the limited production cost savings identified for the MISO market in the 2024-2025 CSP study.

**FIGURE 2. CSP SIMULATED AND HISTORICAL REAL-TIME PRICE DIFFERENCE DURATION CURVES
SPP SOUTH MINUS ARKANSAS HUB (\$/MWH)**



The magnitude of these differences between simulated prices and historical prices has a material impact on how fully the CSP simulations capture the economics of interregional transmission. When the production cost model understates the market conditions that create the greatest opportunities for interregional transmission, it will also tend to understate the Adjusted Production Cost (APC) savings attributed to additional transfer capability. This is particularly consequential for projects whose modeled APC benefits are lower than their respective project costs: understated production cost savings can cause beneficial solutions to appear uneconomic and lead to projects being eliminated from further consideration before their broader reliability and resilience benefits are fully understood.

Table 1 quantifies the difference in the value of additional interregional transfers at the simulated and historical market prices. At the 2021–2026 historical prices, the average value of additional interregional transfer capability was \$195,000/MW-year based on Day-Ahead (DA) price differentials and \$233,000/MW-year based on Real-Time (RT) price differentials. Historical price differentials were highest in 2021 (\$416,000/MW-year based on DA prices) and 2022 (\$203,000/MW-year), driven in part by extreme prices during Winter Storms Uri and Elliot and higher natural gas prices. These types of challenging market conditions are important to consider even if they happen infrequently. Severe weather and other system stress events are likely to

continue to occur in the future, and the relatively small number of hours during these events can account for a significant share of the value of interregional transmission.

By comparison, the simulated price differentials between SPP and MISO yield values of only \$73,000/MW-year in 2034 and \$82,000/MW-year in 2039. Because market price volatility and associated differences in the RTOs' market prices will likely increase over time as more renewable resources are added and resource adequacy challenges increase, comparing simulated future with historical price differences likely is a conservative bound of the extent to which the simulations understate true transmission value.

TABLE 1. ANNUAL TOTAL ABSOLUTE VALUE OF HOURLY SPP-ARKANSAS HUB PRICE DIFFERENTIALS

Period	Historical DA (\$000/MW-yr)	Historical RT (\$000/MW-yr)
2021	\$416	\$297
2022	\$203	\$314
2023	\$93	\$149
2024	\$136	\$187
2025	\$146	\$214
2026, annualized	\$175	\$238
2021 - 2026 Average	\$195	\$233
2023 - 2026 Average	\$138	\$197

Period	CSP Simulated Prices (\$000/MW-yr)
2034	\$73
2039	\$82
Simulated Average	\$78

Based on these results, we estimate that production cost savings of upgrades between SPP South and MISO South are likely to be about three times higher than captured by the CSP simulations. If 2021 and 2022 are excluded from these historical averages, the difference between historical 2023-2026 prices and simulated 2034 and 2039 prices suggests that the CSP simulations understate production cost savings approximately by a factor of two.

The prices from the CSP market simulations provided by MISO and SPP demonstrate that the estimated production cost savings of the proposed solutions significantly understate the true production cost benefits of the proposed interregional transmission projects. As recommended in our whitepaper, MISO and SPP should continue to study all of the proposed upgrades in the next phase of this 2024-2025 CSP effort to more accurately capture the projects' benefits and

improve its production cost modeling during the upcoming 2026 CSP study to better value interregional transmission upgrades.