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FACT SHEET

Updated Day-Ahead Energy Markets Impact Study

The California Energy Commission (CEC) contracted with the Brattle Group (Brattle) to analyze the potential costs and benefits to California electric ratepayers (i.e. electric customers) of West-Wide energy market participation scenarios in the California Independent System Operator's (CAISO) Extended Day-Ahead Market (EDAM).¹ Results from the preliminary analysis were shared at a January 24, 2025, IEPR Workshop

on Regional Electricity Markets and Coordination.² In response to public comments and stakeholder input on the preliminary study, follow-up studies were completed to better understand the economic and environmental impacts of potential extended day-ahead market outcomes.

What Changed in the Follow-Up Study?

- The **preliminary analysis** compared extensive EDAM expansion ("Expanded EDAM" scenario) to a future limited EDAM footprint in 2032[MJ1] (expected "Baseline EDAM" scenario), not to today's real-time Western Energy Imbalance Market (WEIM).
- The **follow-up study** adds a new "Status Quo" scenario that reflects today's market with only the WEIM.
- Including the "Status Quo" scenario as a reference point helps show the full impact of a West-Wide EDAM footprint, including how it might affect today's WEIM as participants leave to join SPP Markets+.

Key Takeaways from the Follow-Up Study:

- An Expanded EDAM yields \$1,077 million per year in economic benefits to California compared to the "Status Quo" scenario, where the only market operating is the real-time WEIM. This is an increase from the initial estimate of \$790 million per year, which was based on a comparison of the Expanded EDAM scenario to the expected Baseline EDAM scenario.
- Greenhouse gas (GHG) emissions decline 58% and 39% in California and across the West, respectively, from 2024 levels in an Expanded EDAM scenario.
- Re-running the models with lower natural gas price assumptions does not alter the direction or magnitude of economic and environmental benefits as observed in the original study scenarios: an Expanded EDAM still produces the greatest benefits to California with \$897 million per year in savings relative to the Status Quo. The same trend holds true for environmental benefits, with 60% in GHG emissions reductions in California and 40% across the West relative to 2024.
- EDAM expansion creates stronger market conditions for renewables. Revenues for California solar increase approximately \$14/MWh in the Expanded EDAM scenario compared to the Status Quo.

¹ Tsoukalis, John et al. Presentation – Preliminary Day-Ahead Market Impacts Study. California Energy Commission Docket 24-IEPR-01. January 27, 2025. [Presentation- Preliminary Day-Ahead Market Impacts Study.pdf](#)

² Fact Sheet: Preliminary Day-Ahead Energy Markets Impact Study. California Energy Commission Docket 24-IEPR-01. April 22, 2025.

EDAM Formation Provides Important Benefits to California

The preliminary analysis compared energy market participation scenarios to a future where CAISO operates the EDAM – not the real-time energy market operating today (the WEIM). This follow-up analysis adds an additional “Status Quo” scenario which reflects the current WEIM footprint.

Comparing potential energy market participation scenarios to the Status Quo delineates impacts that are more inclusive of those from EDAM formation and any consequences to WEIM as participants join SPP Markets+. As current WEIM participants join SPP’s Markets+, they must exit WEIM and will no longer participate in any market with California.

Study results are consistent with past work demonstrating substantial economic and environmental benefits of establishing CAISO’s EDAM:

- **Economic Benefits:** Relative to the Status Quo scenario that was added in the follow-up analysis, the Expanded EDAM scenario provides \$1,077 million per year in benefits – almost \$300 million more than the preliminary analysis.
- **Emissions Reductions Benefits:** When comparing GHG emission levels of potential market participation scenarios to historic 2024 levels, the Expanded EDAM scenario results in 58% less emissions for California and 39% less emissions WECC-wide. The preliminary analysis, comparing the Expanded EDAM scenario to the expected Baseline EDAM scenario, found that California would have 11.2% fewer emissions and the WECC would have 1.3% more emissions.

Modeling Assumptions: Economic and Environmental Benefits Remain with Lower Natural Gas Prices

To better understand the impact of natural gas price assumptions on potential benefits, each market participation scenario was assessed using an updated gas price forecast. Lower natural gas prices reduce GHG emissions in all energy market participation scenarios, and as a result, we observe similar differences in environmental and economic impacts between the energy market participation scenarios as in the

preliminary study. Even with updated natural gas price assumptions, the Expanded EDAM scenario continues to deliver the greatest economic and environmental benefits to California compared to the Status Quo, with \$897 million per year in benefits and GHG emissions reductions of 60% and 40% for California and WECC-wide, respectively.

California Solar Thrives in Expanded EDAM

Preliminary results showed substantial reductions in curtailments for renewable resources in the Expanded EDAM scenario. The follow-up study analyzed this further to quantify revenue impacts for renewable resources in the state. Market revenues for large solar plants across California increase from about \$-3/MWh in the Status Quo scenario to \$11/MWh in an Expanded EDAM scenario compared to the Status Quo as solar

curtailments fall by more than 10 TWh. California solar is expected to benefit under the Expanded EDAM scenario largely due to the ability to export otherwise unused solar in mid-day hours when solar is abundant. In turn, solar projects become more economically viable, which could help lower energy costs for consumers in the future.

Day-Ahead Markets Drive Economic and Environmental Benefits

The follow-up analysis shows that expanding the EDAM footprint would deliver even greater economic and environmental benefits than previously estimated. By using the current WEIM as a “Status Quo” comparison point, the results are more reflective of the added value to consumers. While adjustments to natural gas cost modeling assumptions

do not alter the patterns and drivers of benefits between energy market participation scenarios, these results show that expanding the EDAM footprint creates a strong investment environment for renewable resources and delivers the greatest economic and environmental benefits for California.



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FACT SHEET

Preliminary Day-Ahead Energy Markets Impact Study

The California Energy Commission (CEC) contracted with the Brattle Group (Brattle) to analyze the potential costs and benefits to California electric ratepayers (i.e. electric customers) of West-Wide energy market participation scenarios in the California Independent System Operator's (CAISO) Extended Day-Ahead Market (EDAM).¹ The study is timely due to energy market governance changes brought forward by the Pathways Initiative, which proposes to create a Regional Organization (RO) with an independent governing board comprised of representatives selected and evaluated by multi-state stakeholders.² California faces two possible outcomes for West-Wide energy market participation that are planned to

launch in Spring 2026 and 2027: 1) an Expanded EDAM Scenario across the Western United States that would be enabled by the independent energy market governance proposed through the Pathways Initiative, and 2) a Split Markets Scenario, which is an erosion of the existing Western Energy Imbalance Market (WEIM) and limited growth of EDAM due to the expansion of the competing Southwest Power Pool (SPP) Markets+ in the rest of the Western United States. The study compares California electric cost, reliability, and greenhouse gas (GHG) emissions impacts of each potential West-Wide energy market participation scenario

Key Takeaways

- The Brattle Study compares potential energy market participation scenarios to a future where CAISO operates an expanded day-ahead energy market with other western entities – not today's existing WEIM, which trades energy in real-time. As such, the study focuses on operational benefits. There are additional benefits of EDAM formation that are not included in this study, such as long-term reliability benefits. Similarly, the impacts of losing WEIM participants due to an expanded Markets+ footprint are not included in this study.
- Expanding the size of the day-ahead energy market in California will reduce in-state greenhouse gas (GHG) emissions by 11% and air pollution from the electric grid. A scenario with SPP Markets+ and minimal EDAM expansion will only decrease in-state GHG emissions by 3.5% and have limited air pollution reductions.
- The study assumes a higher price for natural gas than today. If prices are lower in the future, any GHG emissions will likely be lower than estimated.
- A more expansive day-ahead market via EDAM supports and incentivizes accelerated deployment of renewable resources. With more electric utility and balancing area authority – entities that balance electricity supply with demand in a specified geographic territory – participating throughout the Western United States, a larger EDAM increases economic opportunities for California to build and export excess renewable and clean energy produced in-state.
- California will not import any power from coal-fired generation.

Study Findings are Relative to a Future with Extended Day-Ahead Market

As EDAM and SPP Markets+ are both expected to launch in Spring 2026³ and 2027, respectively, the Brattle study compares all energy market participation scenarios to a baseline EDAM participation⁴ footprint. This baseline is not the status quo as it is today, where there are no interstate day-ahead energy markets operating in the Western Interconnection (i.e., the geographic area containing the electric grid in the western part of North America) outside of the CAISO. Currently, about 80% of the energy demand in the Western Interconnection participates in the WEIM. **The study's results show the benefits relative to a future where EDAM is operating – not the current energy markets today.**

The WEIM has produced \$7 billion in benefits to California since its launch in 2017.⁵ Past studies by Brattle show substantial economic and environmental benefits of EDAM formation in addition to the current benefits of WEIM.⁶ These studies estimate significant cost savings and GHG emission reductions between today's WEIM footprint and an expanded EDAM scenario similar to the baseline cases used in this study.⁷ These benefits are not displayed in the results of this study. Instead, the results outlined in this study are additional to the estimated benefits from EDAM formation. Similarly, the estimated impacts of the Split Markets Scenario do not include the loss in value and reliability of the WEIM as participants join SPP Markets+. To better delineate the total benefits and losses of either Pathways Step 2 implementation or SPP Markets+ expansion relative to the existing energy market operating today, the CEC and Brattle may analyze a “true status quo” scenario for future study.

Decreases In-State Climate Pollution and Preserves State Clean Energy Targets

While EDAM expansion substantially decreases in-state electric grid GHG emissions (11%), the study observes a marginal near-term increase in out-of-state GHG emissions due to an uptick in fossil-fueled generator dispatch in the interior West.⁸ This is driven by factors that are not specific to the Pathways Step 2 proposal and can be observed across all energy market participation scenarios.

Day-Ahead Markets Expand Energy Trading. Energy markets like EDAM and SPP Markets+ optimize trading between energy market participants such that generators can sell the output from renewable energy resources more efficiently. In the Brattle analysis, out-of-state fossil-fueled generation and particular coal-fired generation increases slightly in both the Expanded EDAM Scenario and in the Split Markets Scenario – but more so in the Splits Markets Scenario. The slight increase in out-of-state fossil-fueled generator dispatch is not specific to Pathways Step 2 implementation but instead reflects the day-ahead energy market dynamics with existing fleet of resources in the Western United States. It's also likely that this slight increase in GHG emissions would be offset in later years as more renewable energy resources enter EDAM beyond 2032. Because energy from renewable sources like wind and solar is cheaper to produce than other resources, larger energy markets maximize the use of clean energy, incentivize building of new resources, and ultimately displace costlier and dirtier sources of energy.

Modeling Assumptions: Higher Natural Gas Prices. The Brattle analysis assumes higher natural gas prices in 2032 which is based on their past work analyzing market participation for other entities. During hours of electric grid stress, some out-of-state coal fired generation may be cheaper to operate than other relatively inexpensive out-of-state natural gas fueled generators. Consequently, lower natural gas prices than assumed in the model would likely lead to fewer GHG emissions across the Western Interconnection. Natural gas prices fluctuate often and forecasting natural gas prices is an active area of development by California energy agencies. Assessing the impact of natural gas prices on GHG emissions is a topic for future sensitivity analysis.

Preservation of Clean Energy Targets. Lastly, the Brattle analysis confirms that California would not import power from coal fired generation in either the Split Markets or Expanded EDAM scenarios. Power from fossil fueled generation is costlier to import into California due to the state's carbon price on imported power established by the state's Cap-and-Trade program. In the case of power from coal fired generation, those costs are large enough that “coal power” would not be imported. In the case of “natural gas power”, California's Cap-and-Trade program and associated price on carbon emission ensures that this power is only imported when it substitutes for less efficient in-state natural gas generation. This not only reduces GHG emissions, but local air pollution from in-state natural gas generators as well.

Expanding the EDAM Incentivizes More Renewable Energy. Despite the potential marginal increase of GHG emissions from the dispatch of “coal power” in the Western Interconnection, the Brattle study provides strong evidence showing that expanding the EDAM footprint supports clean energy generation in California. For example, the Brattle Study shows curtailments of renewables fall by 10% and in-state gas generation drops by 31% in the Expanded EDAM Scenario relative to the Baseline+ Scenario. This is because a larger and more diverse pool of energy resources allows the energy market to find cost savings by dispatching the cheapest energy resources – such as wind and solar – while optimizing energy delivery to electric ratepayers. Brattle evaluated in a follow-up analysis the revenues for

5 large solar generation facilities (over 100 MW) across California from the simulated 2032 scenarios and found that these facilities earned **43% more in market revenues in the Expanded EDAM Scenario** than in the Baseline+ Scenario.⁹ These benefits ultimately translate into greater environmental benefits. Lower curtailments and in-state gas generation in the Expanded EDAM Scenario are paralleled by greater GHG emissions reductions, where **in-state GHG emissions reductions are far greater in the Expanded EDAM Scenario (11.2%) than in the Split Markets Scenario (3.5%)**. These findings illustrate that participating in a large and diverse expanded day-ahead energy market with EDAM can provide a stronger investment environment to build new clean energy resources in California.

¹ Tsoukalis, John et al. Presentation – Preliminary Day-Ahead Market Impacts Study. California Energy Commission Docket 24-IEPR-01. January 27, 2025. Presentation-[Preliminary Day-Ahead Market Impacts Study.pdf](#)

² West-Wide Governance Pathways Initiative Launch Committee. Step 2 Final Proposal. November 15, 2024. [Pathways-Initiative-Step-2-Final-Proposal.pdf](#)

³ California Independent System Operator. Fact Sheet: Extended Day-Ahead Market. February 2025. [extended-day-ahead-market-edam-fact-sheet.pdf](#)

⁴ This footprint includes approximately 40% of the load and generation resources in the WECC.

⁵ CAISO Press Release: [WEIM cumulative benefits approach \\$7 billion. January 30, 2025.](#)

⁶ Tsoukalis, John et al. Extended Day-Ahead Market Benefit Study. August 30, 2023. [Extended-day-ahead-market-benefit-study.pdf](#)

⁷ Ibid, slides 5, 6, 11. \$813M in total cost benefits to EDAM participants and 2.4 TWh in reduced curtailments for renewable energy. Emissions decline across all parts of EDAM and WECC-wide.

⁸ The interior West is located between the Rocky Mountains and the Sierra Nevada (Nevada, Utah, Idaho, Arizona, Colorado, New Mexico, and Montana).

⁹ Additional analyses by the Brattle Group.



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