



**Customized
Energy Solutions**

CESA SPOTLIGHT PROGRAM

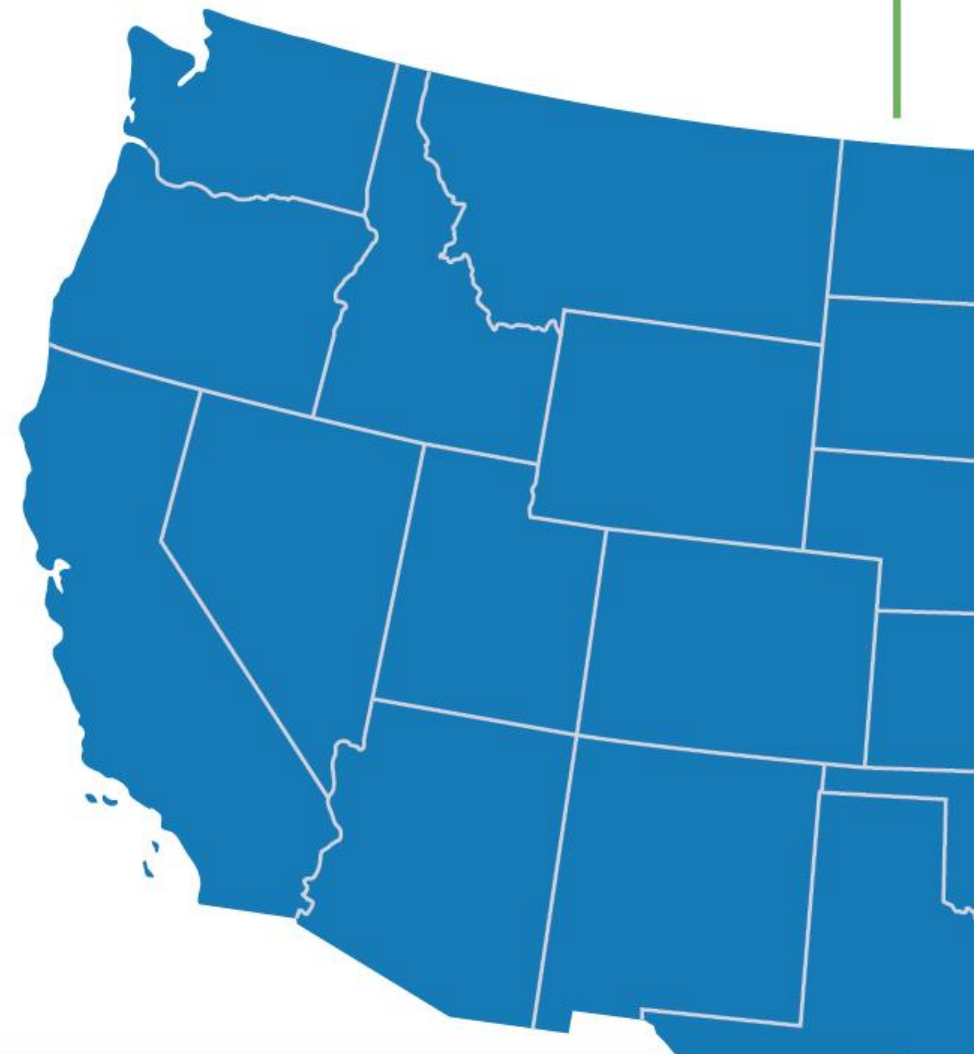
Charging Ahead: Positioning Storage for Success in EDAM

June 25, 2025 | 11:00 AM – 12:00 PM Pacific

Virtual Webinar



CALIFORNIA ENERGY STORAGE ALLIANCE



Explore how battery storage can thrive in CAISO's new Extended Day-Ahead Market (EDAM) — with insights, modeling, and revenue strategies

Customized Energy Solutions – Primary Business Lines

Established in 1998, Customized Energy Solutions (CES) is a global energy advisory, software and services company that works with clients to navigate the wholesale and retail electricity markets across the United States and globally. CES offers software solutions, back office operational support, advisory and consulting services focused on emerging technologies, asset optimization and wholesale energy market participation. CES is headquartered in Philadelphia, USA with other global offices in India, Japan, Vietnam.



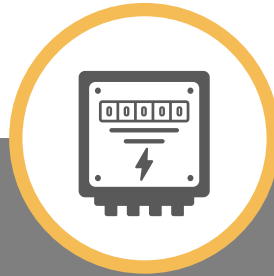
Wholesale Services

Our 24-hour Market Operations Center provides full-service scheduling coordinator and asset monitoring services to over 28 GW of assets across wholesale markets



Market Intelligence

Our flagship informational product MarketIQ provides crucial analysis of wholesale market rules changes & stakeholder activities in a timely and cost-effective manner



Retail Services

Our hosted platforms provide specialized services for market entry, registration, EDI data management, billing, forecasting and scheduling and reduce bill-to-cash cycle



Demand Response

Our services support clients with demand response, peak load management, and bidding for energy and capacity in major ISOs/RTOs in North America



Consulting

Our consulting services help clients understand complex market rules, forecast project revenues and optimize investments in energy storage, e-mobility, and clean hydrogen projects

6 Global Offices | 350+ Associates | 1000+ Global Clients | Best-in-Class Software | 24x7 Market Operations | Consulting & Advisory

CES Consulting is focused on providing industry leading advisory and services for the three pillars of energy transition

Energy Storage, E-Mobility and Green Hydrogen

We have an integrated ecosystem spanning market intelligence, policy expertise, modeling and optimization software platforms, technical capabilities and market operations to provide spectrum-wide consulting services to our clients



Energy Market Advisory

Market Overviews, Rules and detailed intelligence from across all North American ISO/RTO regions to help clients navigate through competitive markets



Price Curves & Revenue Forecasts

Power Market Fundamentals, Research, Production Cost Modeling, Market Price Forecasts, Asset Dispatch Optimization using CES CoMETS



Financial Services & Valuation

Financial Modeling, Project Valuation, Technical and Commercial Due Diligence and Bid support services to help clients compete in solicitations



Battery Supply Chain & Manufacturing

Market Research, Assessment, Value Chain Analysis, Business Planning, Strategy Consulting, Collaborations, Expert Advisory and Partnerships



Technical Services

Technical Due Diligence, Testing, Performance Validation, Expert Recommendations for battery cells, packs and associated systems

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CES Team



Devin Gaby

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Clean energy valuation expert with extensive experience supporting developers, utilities, co-ops, CCAs, and utility commissions to identify the right solutions for their system.



Prashant Anand

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Supports clients with long-term market price forecasts, scenario modeling, and asset valuations.



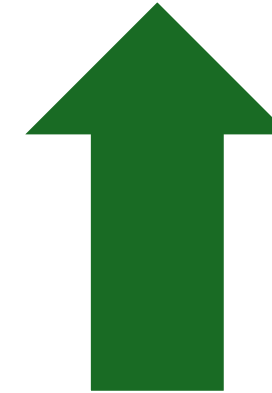
Agenda

1. What is the CAISO EDAM?
2. New Opportunities for Development in WECC
3. Forecasting Energy Prices in EDAM
4. Revenue Projections for EDAM Batteries

EDAM Background

What is EDAM?

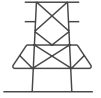
- The CAISO Extended Day-Ahead Market (EDAM) is a voluntary day-ahead electricity market designed to deliver significant reliability, economic, and environmental benefits to balancing areas and utilities throughout the West.
- Each participant will bid its generation and load into the market. CAISO will then schedule resources across the entire market in the day-ahead and real-time to serve the total participating load.
- EDAM is not a full RTO; each Balancing Authority Area (BAA) will remain responsible for managing its own transmission and reserve margin.



Included:

- **Energy Market**

Day-ahead and Real-Time



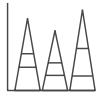
Excluded:

- **Ancillary Market**

Each BAA must provide their own

- **Capacity Market**

Each BAA responsible for own, CA LSE's must still procure RA

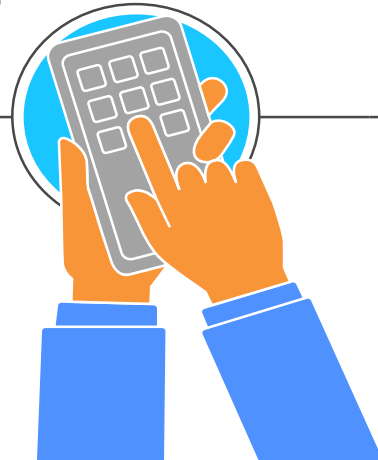


Participants Commitment Levels

Fully Committed



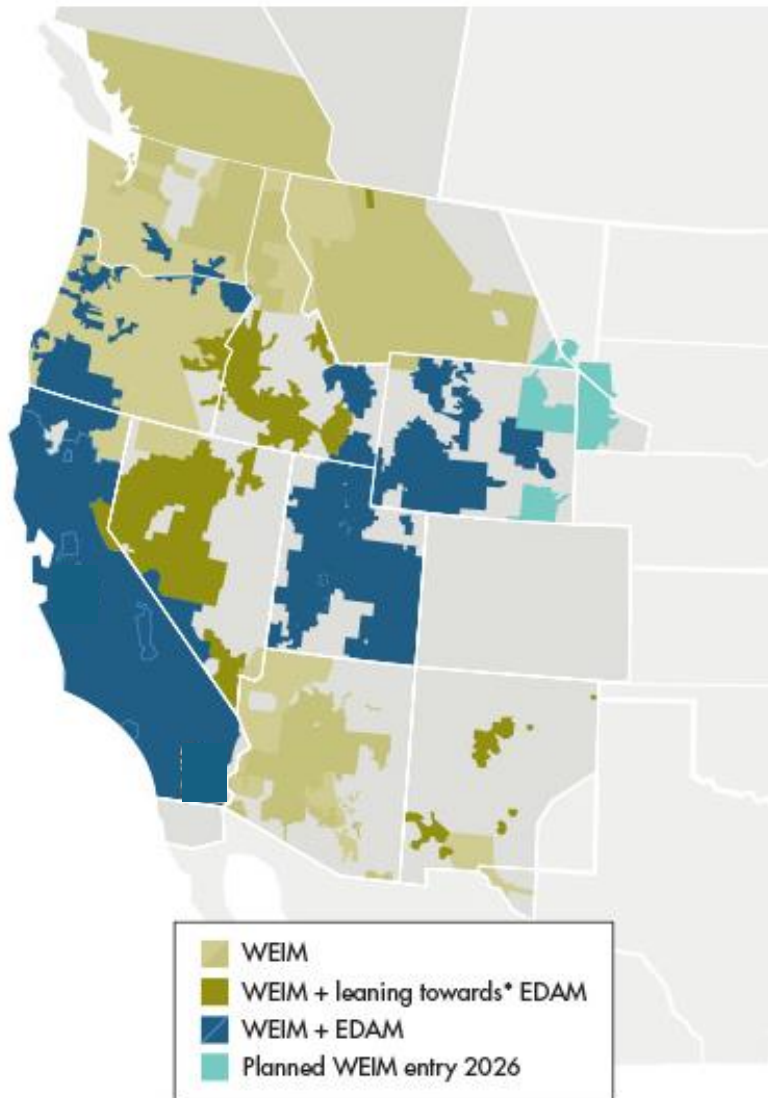
CAISO
PacifiCorp
PGE
BANC
LADWP
TID
IID



Likely to Join

NV Energy
Idaho Power
PNM
BHE Montana
Arizona G&T Co-ops
WAPA Sierra Nevada

Key Milestones



**These entities have publicly indicated a leaning towards EDAM as their preferred day-ahead market.*

Key Milestones

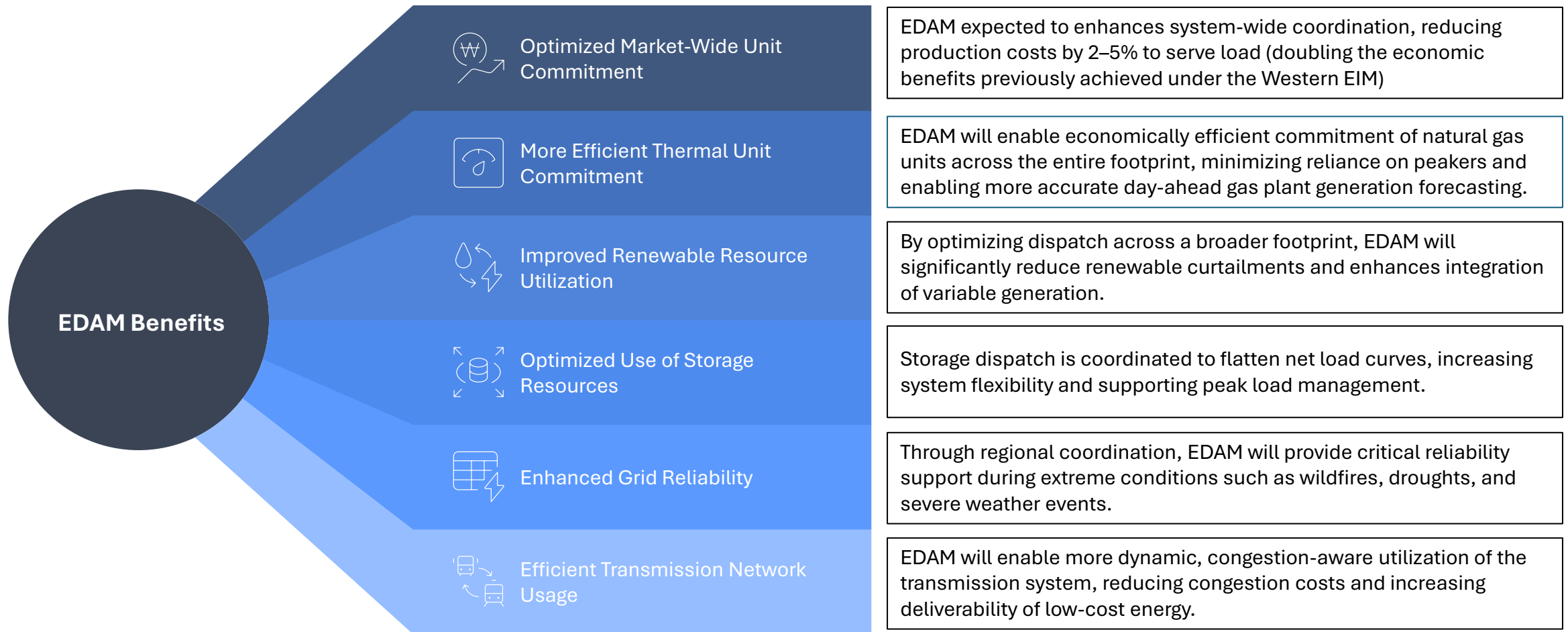


- FERC approved the EDAM design in December 2023.
- CAISO plans to launch EDAM in 2026 to optimize commitment of generation in the day ahead timeframe.

EDAM vs Other Markets

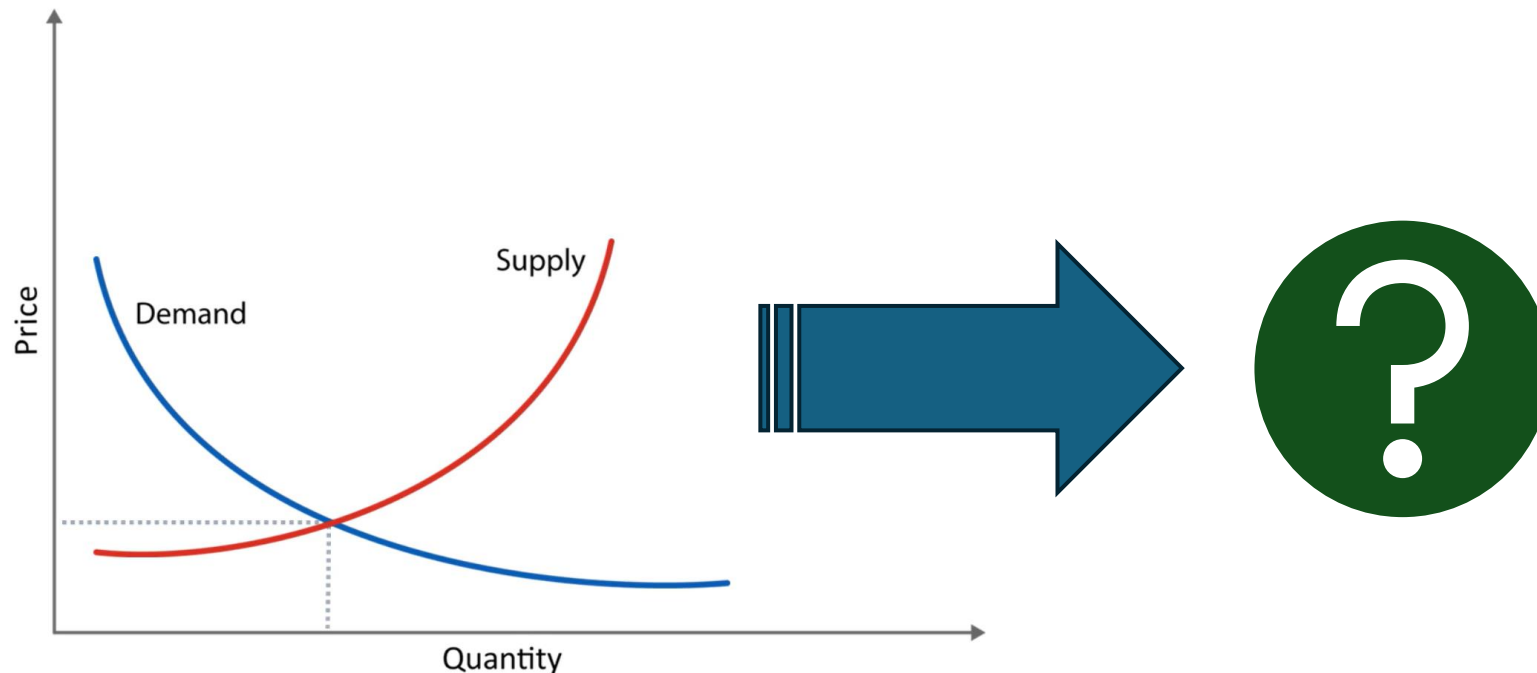
Type	WEIM	EDAM	SPP Markets+	SPP RTO West	WRAP
Type	Real-time energy imbalance	Day-ahead and Real-time energy	Day-ahead and Real-time energy	Full RTO	Resource Adequacy Program
Participants	CAISO, LADWP, TID, BANC, PacifiCorp, PGE, Avangrid, Tacoma Power, SCL, PSE, Powerex, Avista, BPA, BHE Montana, NEW, Idaho Power, NV Energy, APS, SRP, TEP, PNM, EPE, WAPA, and IPPs.	Fully committed: - CAISO, PacifiCorp, PGE, BANC, LADWP, TID, IID Likely: - NV Energy, Idaho Power, PNM, BHE Montana, Arizona G&T Co-ops, WAPA Sierra Nevada, and IPPs.	Likely: - APS, SRP, TEP, BPA, Xcel (PSCo), PSE, Tacoma, Chelan County PUD, Grant County PUD.	Basin Electric Power Coop, Colorado Springs Utilities, Deseret Power Electric Coop, Municipal Energy Agency of Nebraska, Platte River Power Authority, Tri-State, WAPA (Upper Great Plains, Rocky Mountain, Colorado River Storage Project), and IPPs	APS, Avista, BPA, Calpine, Chelan PUD, Clatskanie PUD, Eugene WEB, Grant PUD, Idaho Power, NWE, NV Energy, PacifiCorp, PGE, Powerex, PNM, PSE, SRP, SCL, Shell Energy, Snohomish PUD, Tacoma Power, The Energy Authority, Inc.
Market Products	Real-time Energy only	Energy only - CA entities must procure RA - Generators providing RA are required to bid into all approved products. - BAs must provide own ancillaries	Energy only - Participants required to join WRAP - BAs must provide own ancillaries	Energy, Ancillary services, RA through bilateral transactions - Generators providing RA are required to bid into all approved products. - Full grid operations	Resource adequacy - 7 month forward showing - Daily/hourly capacity operations - WRAP is not a market. Utilities participate and may procure RA outside of the program to remain compliant.
Key Milestones	Active since 2014	Trial run Fall 2025. Operations begin Spring 2026. - PacifiCorp spring 2026 - PGE fall 2026 - BANC spring 2027 - LADWP mid-2027 - Others likely 2027-28	Operations begin early 2027. - Most utilities expected to begin in 2027 - Xcel likely in 2030	Operations begin Spring 2026 for all members. (pending approval from FERC)	- Notice of intent to bind due Jan 2026. - 1st forward showing Q4 2026. - Operations begin Summer 2027.

Why EDAM?



How Does EDAM Impact Developers in California?

- While the market rules and operations will essentially remain unchanged for assets within CAISO, *the market fundamentals are new.*
- If you have a project in operation or in the interconnection queue, your revenue forecast likely only considered market prices based the CAISO supply stack and demand forecasts of California.
- When EDAM begins operations, the CAISO energy prices will be dependent on resources and load across all BAA participants, changing the underlying fundamentals of long-term forecasts.



How Does EDAM Impact Developers in Regulated States?

Historically, projects in western regulated states were essentially limited to signing fixed-price PPAs with the local utility.



The expansion of the CAISO day-ahead market opens new opportunities for both the types of offtakers and the available pricing structures.

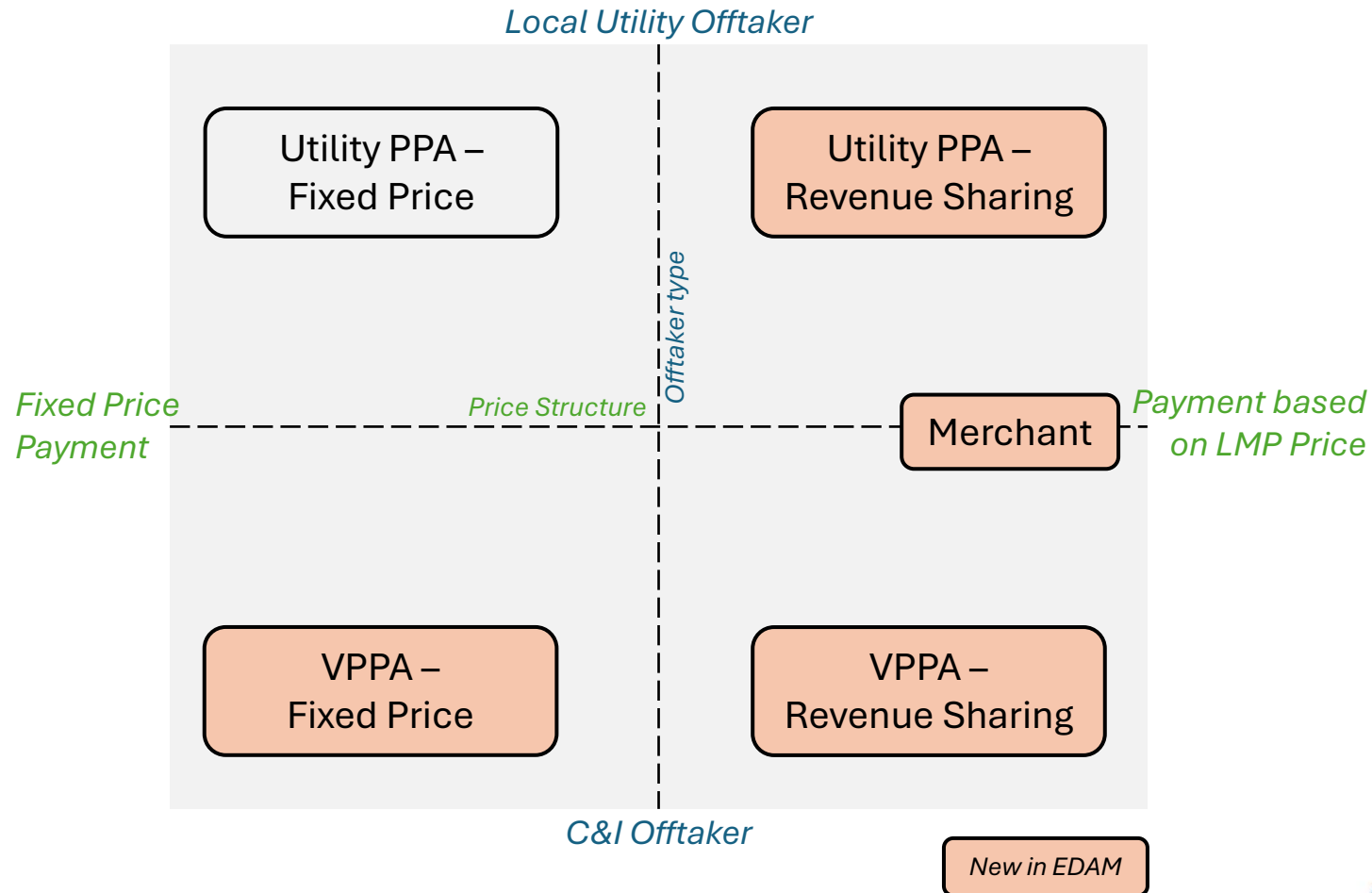
Independent power producers (IPPs) may participate in EDAM without signing a contract with their local utility. They can participate as a pure merchant resource, or sign a virtual PPA (VPPA) with an offtaker elsewhere in the market.



Note- all interconnection requests must still go through local Balancing Authority.

Offtake Opportunities in Regulated States

Both VPPA and local Utility PPAs can now be indexed to LMP prices, opening opportunities for revenue-sharing structures. Along with merchant participation (in energy-only market), developers have the following options:

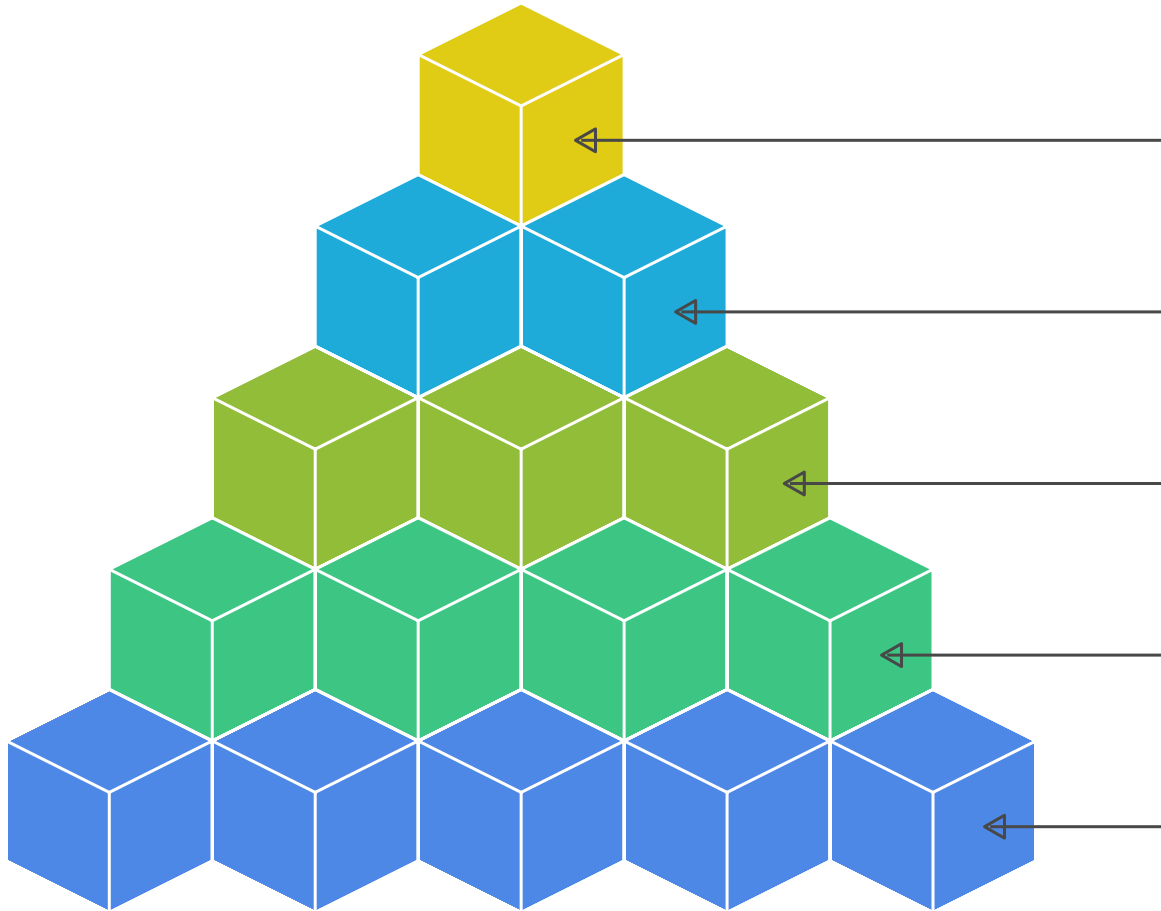


Now that we know what EDAM is, what do we do with this information?

- As developers, independent power producers, load-serving entities, etc., it is crucial to understand the economic impacts of this new market on your assets in order to properly value them for development prioritization, financing, and contract negotiation.
- Asset valuation is critically dependent on accurate and robust energy price forecasting, which is done via production cost modeling (PCM).
- PCM analysis considers the supply and demand problem across the entire market in order to determine the marginal cost of electricity to serve load in every hour.
- Incorporating transmission and nodal-level details into the model allows you to simulate the congestion and losses, with the output of nodal LMP pricing.
- The next section will outline CES's PCM methodology and price forecast results for EDAM.

Forecasting Energy Prices in EDAM

Modeling Framework & Key Assumptions



Simulation Setup

2028-2045 simulation timeframe

Simulation Tool

Plexos Nodal software

Transmission

Reflects WECC-wide nodal topology using updated transmission limits and network configurations + CES's market intelligence

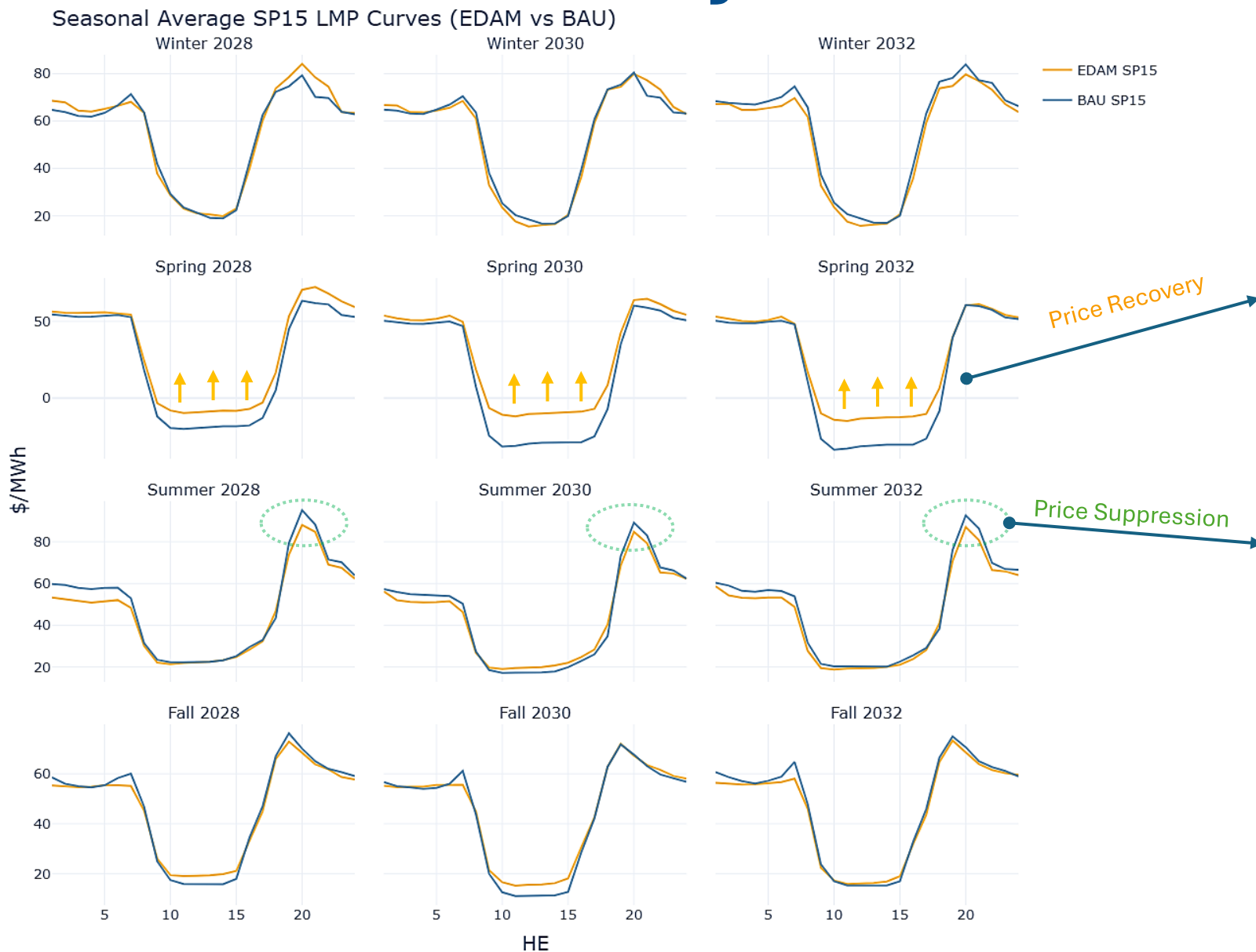
Generation & Demand

Based on CAISO's long-term planning, utility IRPs, representative levels of out-of-state wind, CEC's long-term demand forecasts, and CES's market research.

Modeling Scenarios

- **EDAM** as the CAISO-led market design scenario
- "Business as Usual" (**BAU**) as the counterfactual scenario where CAISO remains independent.

EDAM Alters Price Dynamics

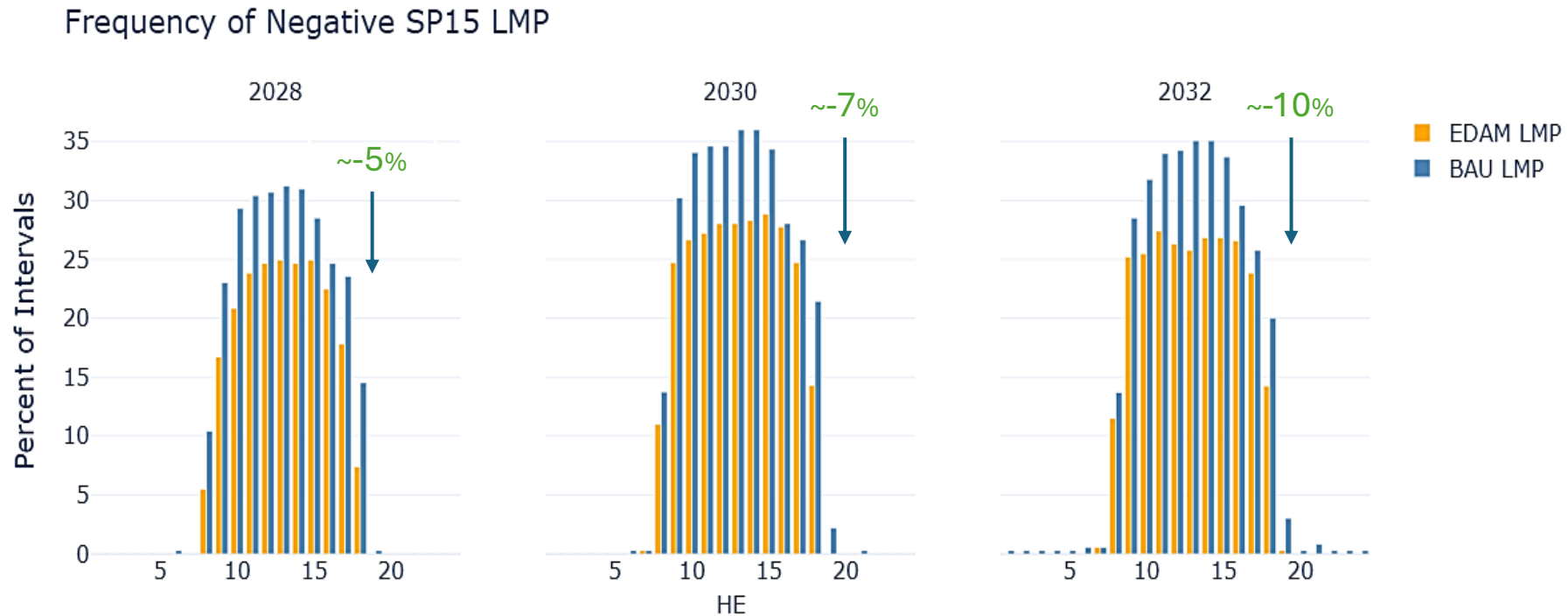


- EDAM consistently results in higher midday prices during spring, helping to mitigate solar-driven price suppression.

- Excess energy in CAISO is sold to other BAAs with fewer solar resources.

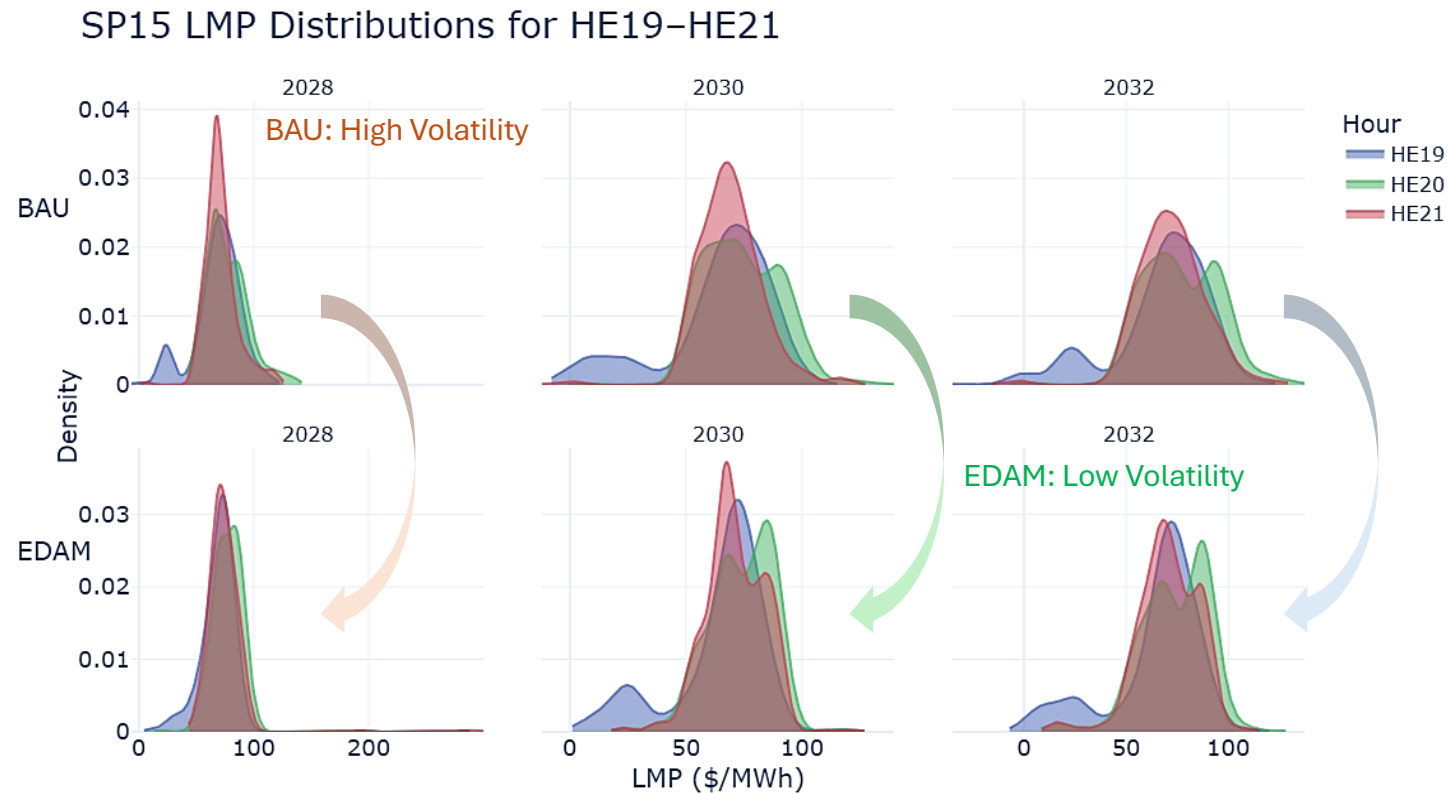
- Summer evening prices trend lower under EDAM compared to BAU, indicating improved supply-demand balance. Cheaper peaking resources across EDAM can meet demand.

Spring Prices Recover Under EDAM



- Notable decline in negative price hours, supporting midday price stabilization
- Increase in battery charging costs, causing potential reduction in arbitrage revenue

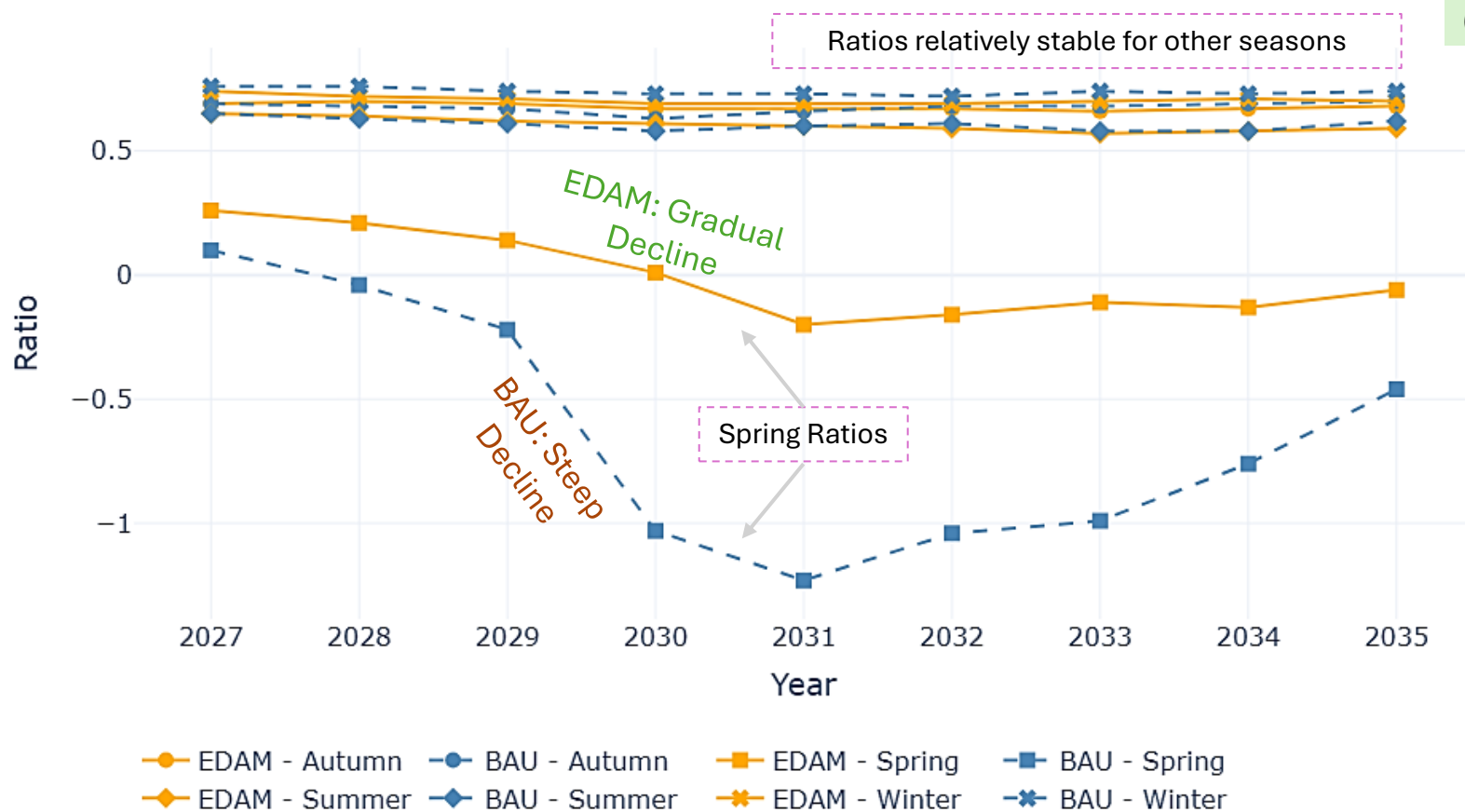
Evening Peaks Stabilize Under EDAM, Despite Rising Wind Spread



- EDAM exhibits a more centralized price distribution than BAU, implying reduced volatility during evening peak periods
- Evening prices peak around HE20, so no major shift in the timing of evening peak
- Price spread widens over the years, due to increasing wind penetration and variability in the wind output during evening peak hours

How EDAM Reshapes Solar Revenues?

Seasonal Ratios (HE10-17/HE7-22): EDAM vs BAU SP15 LMP

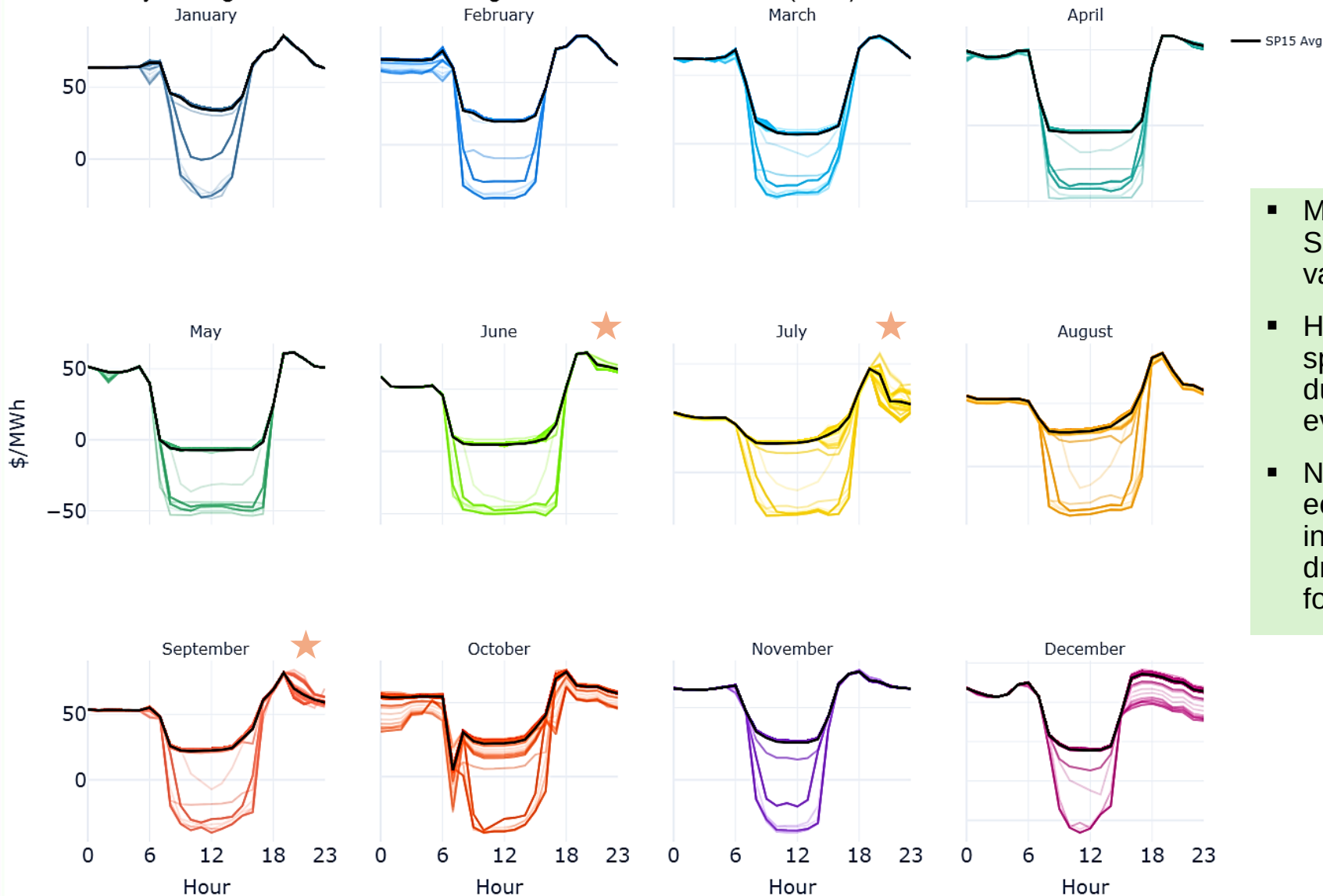


“Seasonal Ratio” is defined as the avg. price from HE10-17 divided by the avg. price from HE7-22 (i.e., solar hours / on-peak hours)

- Seasonal ratios show how growing solar capacity reduces its revenue over time
- Solar value erosion in spring is milder under EDAM than in BAU, where it declines sharply through 2031

Post-EDAM Nodal Price Trajectories

Monthly Average LMP Curves: SP15 Avg. vs 1100+ Nodes in SP 15 (2030)



- Most nodes are tightly clustered around the SP15 average LMP, indicating limited price variation across the region.
- However, a subset of nodes shows a wider spread from the SP15 average, particularly during midday across the year, and during evening hours in most summer months.
- Nodal-level analysis is crucial to forecast the economics of generation and storage projects in EDAM. Nodes with deep midday price drops will provide great revenue opportunities for storage projects.

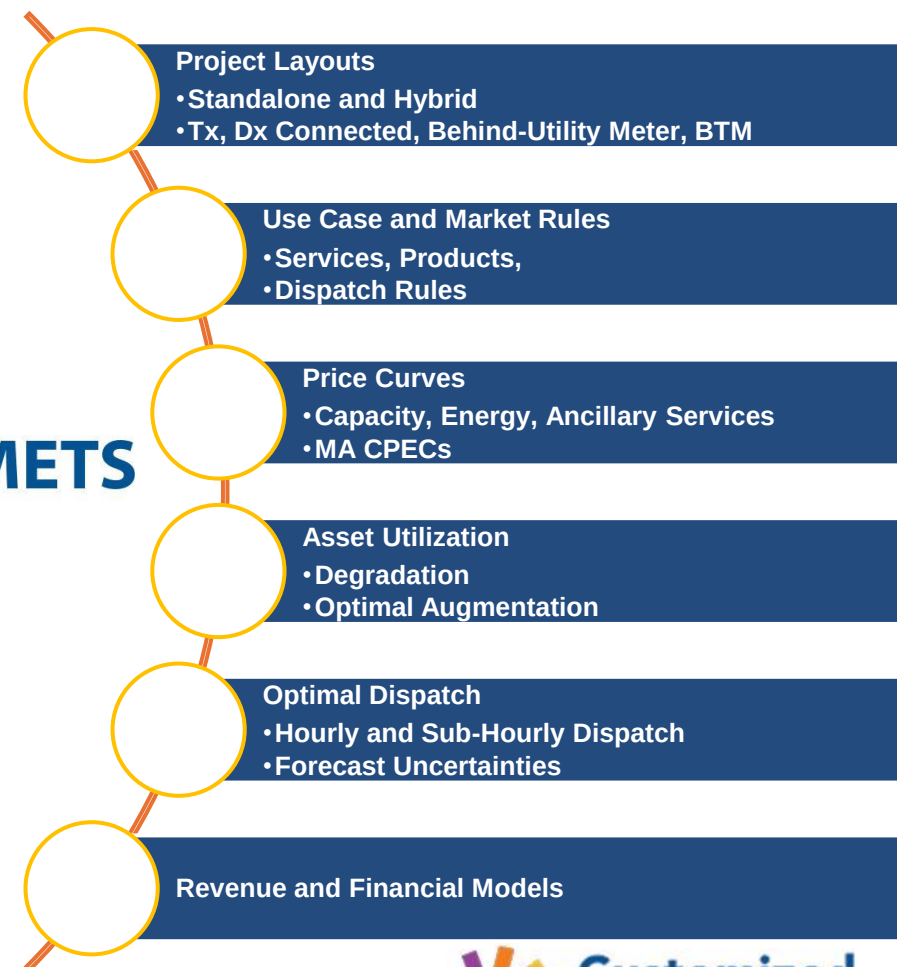
Revenue Projections for EDAM Batteries

CES CoMETS has supported project developers, investors, off-takers and technology developers with investment grade revenue forecasts and financial analysis of energy storage project capacities exceeding 20 GW across all North American ISOs

CES CoMETS

CoMETS (Comprehensive Market Evaluation Tools) is CES's highly customizable price taker dispatch optimization model and offers revenue forecasts, financial optimization and valuation for projects with energy storage based resources.

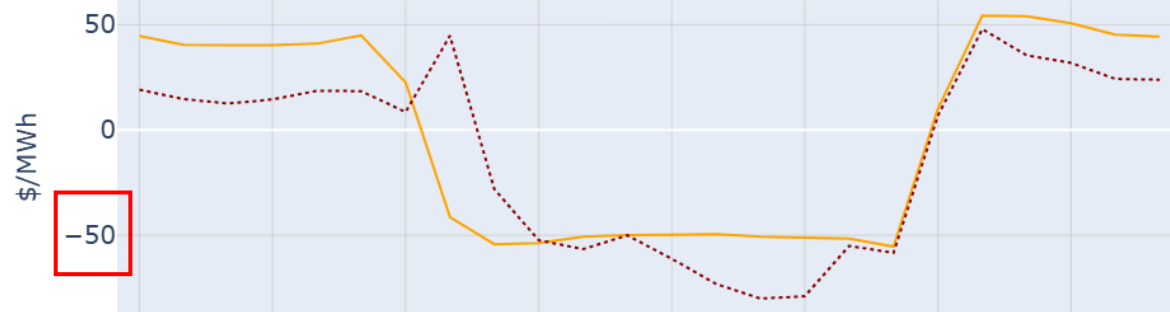
- **Front of the Meter Model:** For hourly and sub-hourly dispatch optimization of transmission and distribution grid connected standalone and hybrid energy storage based projects
- **Behind the Meter Model:** For analyzing behind-the-meter projects and forecasting savings from demand charges mitigation, peak shaving, retail arbitrage, self-consumption and demand response
- **Microgrid Model:** For analyzing microgrid layouts with a variety of generators such a solar, wind, diesel coupled with energy storage systems
- **EV Charging Station Model:** For analyzing optimal utilization of aggregate storage capacity from fleet of EVs, onsite solar and stationary storage and estimate savings potential
- **Green Hydrogen Model:** For analyzing optimal operation of electrolyzers with contracted renewable energy supply and considerations to hydrogen storage, transportation and reconversion to power using fuel cells



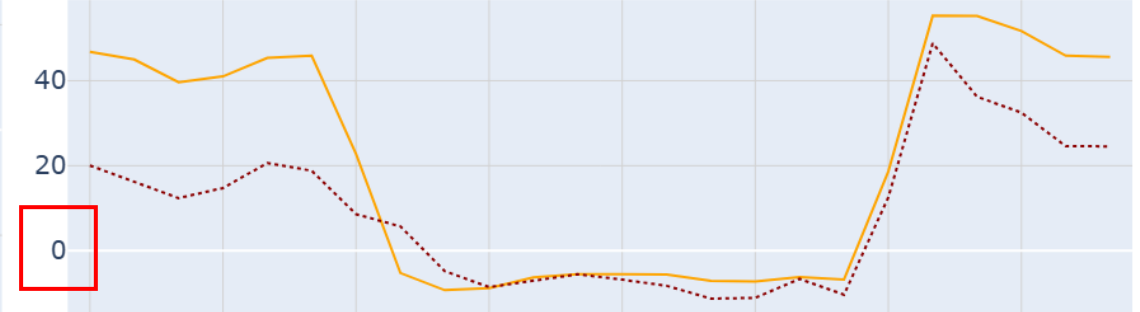
How the Same Day Plays Out Under BAU vs EDAM

BAU vs EDAM: Prices and Dispatch

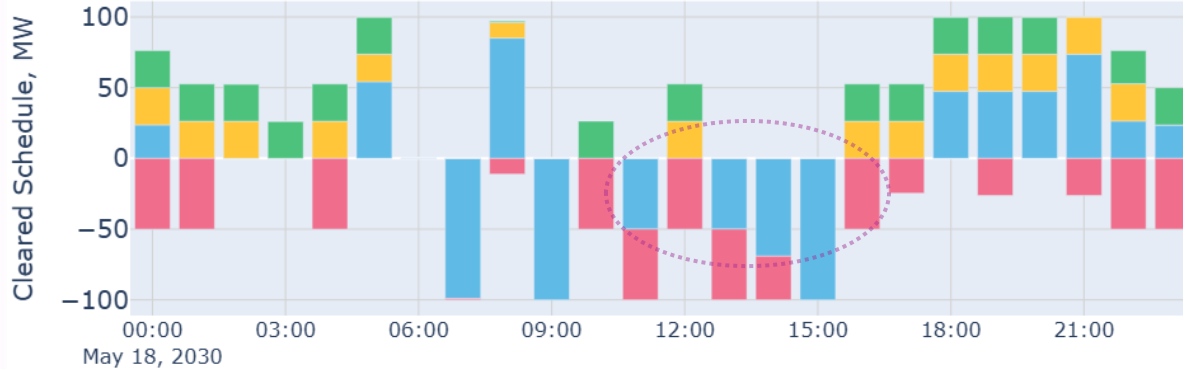
BAU LMPs (DA & RT Avg.)



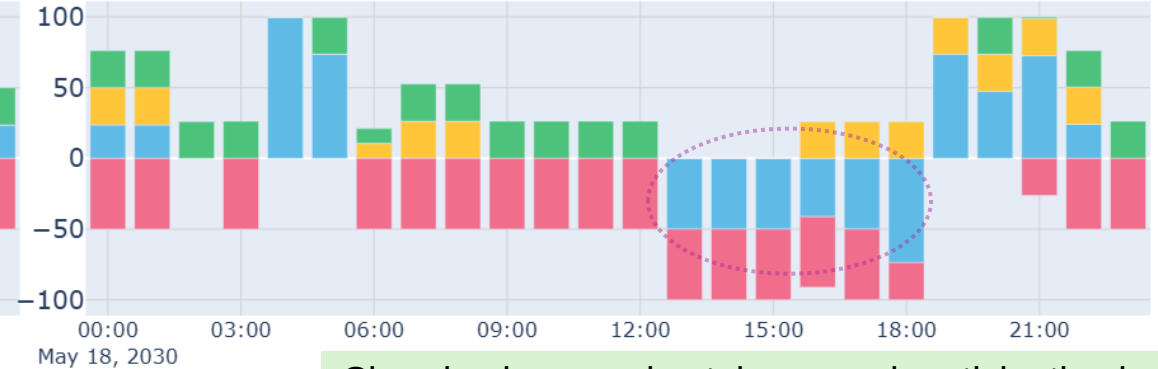
EDAM LMPs (DA & RT Avg.)



BAU Dispatch



EDAM Dispatch



Charging is spread out, increased participation in Reg Down due to higher charging costs

— BAU DA LMP - - - BAU RT LMP — EDAM DA LMP - - - EDAM RT LMP ■ Energy ■ Reg Up ■ Spin ■ Reg Down

BESS Revenue Forecasts in EDAM

Please reach out to CES for details

Key Takeaways

Battery Developers

Revenue Decline: EDAM reduces price volatility, increases battery charging costs, leading to narrower arbitrage spreads

Fewer Price Extremes: Regional dispatch trims the gap between peak and off-peak prices, affecting usual bidding strategies.

Location is Key: Zonal volatility is down, but increased value may come from strategic positioning near congested nodes.

Ancillaries: Ancillary services remain a CAISO-only market, so the revenue opportunities for batteries will be similar in EDAM.

Outside of CA: New revenue off-take and contract structure opportunities with access to variable charge/discharge pricing.

Solar Developers

Midday Price Recovery: EDAM boosts midday prices by reducing curtailments, supporting better solar economics.

Curtailment Risk Mitigation: EDAM's stronger regional exports reduce oversupply risk, especially during high-solar months.

Stable Revenue Outlook: Solar value erosion trends are milder under EDAM, especially post-2030 as exports grow.

Better Integration: Solar projects with paired storage may benefit from higher dispatchability and market access.

Outside of CA: More competition from CA solar may diminish opportunities depending on the location.

Questions?

Project Revenue Forecasts and Market Analysis –

CES Consulting

EDAM Rules & Regulations –

CES Market IQ

Scheduling Coordinator Services –

CES Wholesale Services

Thank You

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