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December 6, 2022

### MEMORANDUM

**TO: Council Members**

**FROM: Jennifer Light, Power Division Director**

**SUBJECT: Markets 101: Exploring Day Ahead Markets**

### **BACKGROUND:**

**Presenter:** Dan Williams, Director and Chris Devon, Director at CES MarketsIQ West.

**Summary:** Utilities in the region are currently exploring two different organized day-ahead market options, one offering from the California Independent Service Operator (CAISO) and another from Southwest Power Pool (SPP). Currently, utilities use bilateral transfers for day-ahead trading. Moving towards an organized day-ahead market has the potential to improve efficiencies and provide other benefits to the region.

Dan and Chris will provide a brief overview of the current market options in the Northwest, including bilateral transfers and participation by many utilities in the organized real-time market EIM (Energy Imbalance Market). They will then touch on what an organized day-ahead market, such as those being proposed by CAISO and SPP, might bring to the region. This presentation is not intended to get into the specifics of either offering, but to provide a broad overview as a way to keep the Council informed on these important efforts.

**Relevance:** The Council's 2021 Power Plan spent significant time understanding the west-wide market fundamentals, with the understanding that decisions outside of the region have impacts on the Northwest power system.

## More Info:

Chris Devon, Director, CES MarketIQ West: Chris joined the CES MarketIQ West team in April 2020 and primarily focuses on resource adequacy, emerging technologies, and transmission policy. Prior to joining CES he was a lead and senior policy developer with CAISO where he led numerous CAISO stakeholder initiatives and developed proposals to enhance and establish new CAISO policies. Before joining CAISO in 2015, Chris held a role as wholesale energy markets advisor to the Michigan Public Service Commission where he represented Michigan interests in the stakeholder processes of MISO and PJM Regional Transmission Organizations. He obtained a BA in Economics from Michigan State University in 2009.

Dan Williams, Director, CES MarketIQ West: Dan joined CES in July 2018 and primarily focuses on wholesale market design and market expansion initiatives at CAISO and in the western interconnect. Prior to joining CES he was a Senior Policy Analyst for Portland General Electric's Power Supply Operations group where he engaged with the CAISO and regional partners to evolve policy and market design components of the CAISO Energy Imbalance Market, and also helped lead the joint-project among Pacific Northwest utilities to develop a security-constrained economic dispatch market through the Northwest Power Pool Market Committee. Before joining PGE in 2012, Dan worked for Puget Sound Energy in their Federal regulatory and compliance group. Dan has also worked as a real-time energy trader for both Puget Sound Energy and Tri-State Generation and Transmission, and began his career in the energy industry in 2005 at PPM Energy in their settlements and contracts division. He received a BA in English from the University of Washington in 2001.

# Western Energy Markets Today and Tomorrow – Thoughts from a Stakeholder's Perspective

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**CES : NW Council**

**December 14, 2022**



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# Customized Energy Solutions

## About Us:

- Established in 1998, Customized Energy Solutions (CES) assists clients in managing and staying ahead of the changes in all North American wholesale and retail electricity and natural gas markets through its MarketIQ service. CES also offers best-in-class hosted energy market operations platforms and services, including scheduling services, energy storage optimization, and congestion revenue rights management in the California markets.
- CES provides its MarketIQ service to a diverse set of clients in the West, from traditional vertically-integrated utilities to innovative energy storage developers, covering market and policy development activity involving the California ISO's markets and Southwest Power Pool's Markets Plus (M+) effort.
- CES's MarketIQ West team includes Dan Williams, Chris Devon, and Brian Rothstein, each of whom bring 10+ years experience in wholesale energy markets, from trading to operations, settlements to policy.



# Why Organized Markets? Why Now?

## Decreasing Costs, Increasing Reliability, Adapting to Change:

- Well functioning organized markets provide several distinct benefits:
  - Reduced production costs through improved least-cost dispatch of resources and transmission utilization.
  - Use of security-constrained economic dispatch software helps identify opportunities in demand diversity and transmission deliverability across a wide-area footprint.
  - Increased visibility and resource availability to respond to emergencies.
  - Transparency into market-based price and congestion data that can inform resource procurement and development decisions.
  - Efficiency improvements in the face of tightening supply conditions and resource mix evolution, even without a centralized capacity market and even with variations in state and regional environmental or other priorities.



# Western Markets Timelines

## Background:

- In 2014, following multiple organized market development efforts in the 2000s and early 2010s, the CAISO Energy Imbalance Market (EIM) was launched with PacifiCorp and has grown in scale since, likely to include approximately 80% of the load in the Western Interconnect by 2023.
- In 2018, a collection of EIM Entities began exploring opportunities to expand EIM benefits through day-ahead unit-commitment and transmission optimization coordination, which became known as the Extended Day-Ahead Market (EDAM) initiative.
- In 2019, SPP launched its Western Energy Imbalance Service (WEIS) market with BAAs on the eastern side of the Western Interconnect and has continued to add members, some of whom are now exploring the opportunity to join SPP's Eastern Regional Transmission Operator (RTO) market.
- In 2021, following positive experiences with SPP's provision of RC services and role as program operator for the Western Resource Adequacy Program (WRAP) and in WEIS, several western stakeholders, including many already in the EIM, supported SPP exploring an alternative non-RTO day-ahead add-on to its WEIS offering, similar in concept to the EDAM, called "Markets Plus".





# Western Markets Today

## CAISO WEIM:

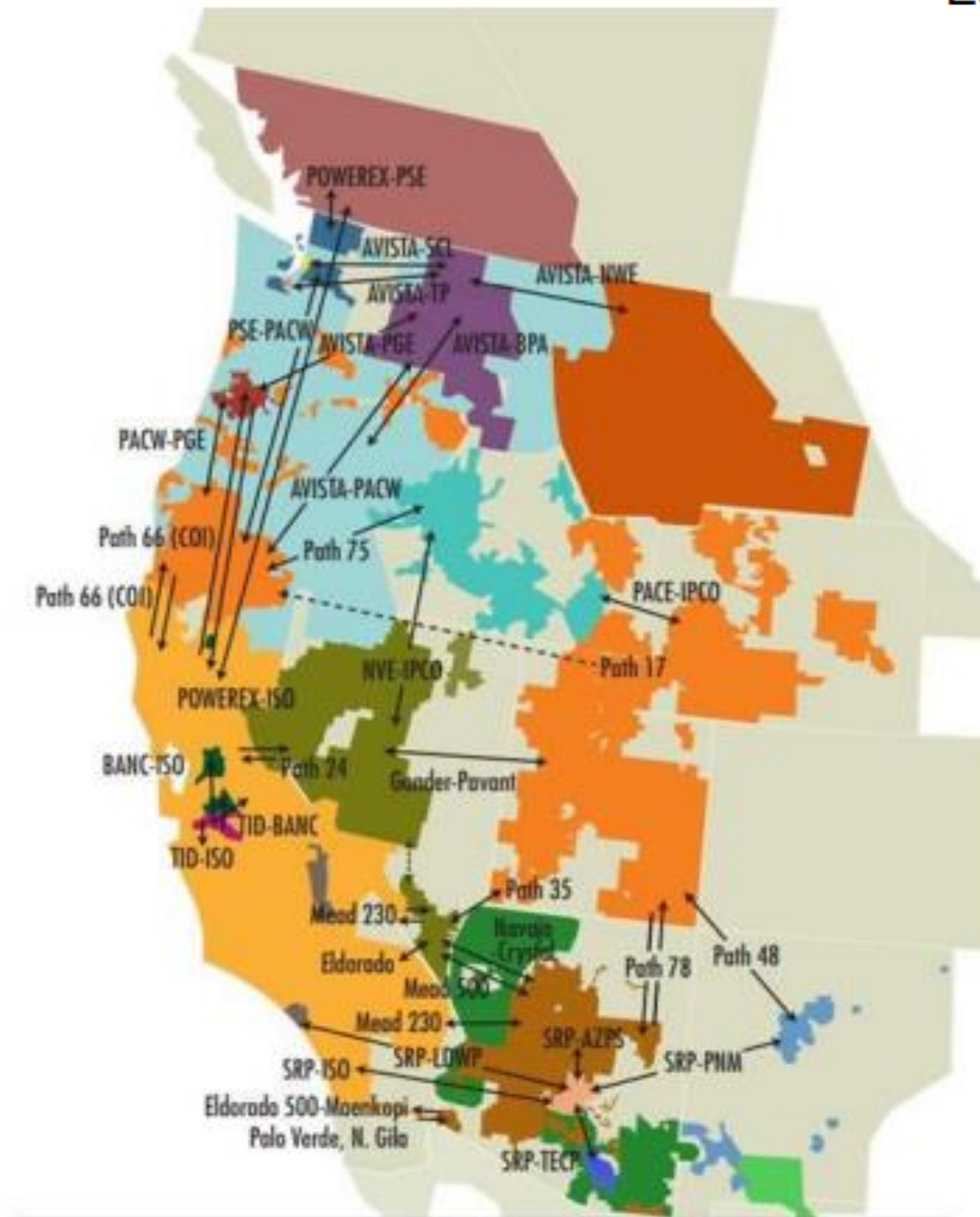
### Market Attributes –

- Real-Time Only: Entities engage in bilateral Day-Ahead and Intra-Day trading to establish Base Schedules for interchange and resources, then EIM engine optimizes the bid-range voluntarily made available to it, constrained by resource characteristics, voluntary transfer capacity, and voluntary greenhouse gas import elections.

### Market Limitations –

- Short-term unit commitment, BA ownership of reliability risk, transfer availability constraints, market price risk and opportunity cost risk, lack of common RA standard, questionable short-term sufficiency checks, quasi-independent Governance, and disruptive to liquidity of bilateral market.

Estimated WEIM maximum transfer capacity



Path	Estimated Max Capacity (MW)
Path 24 (west to east)	100
Path 24 (east to west)	35-90
Eldorado	797
Path 35 (west to east)	580
Path 35 (east to west)	538
Gander-Pavant	130
PACW to PGE	320
Path 66 (ISO to PGE)	627
Path 66 (PGE to ISO)	296
Path 66 (ISO to PACW)	331
Path 66 (PACW to ISO)	432
Path 17	0-400 <sup>1, 2</sup>
PSE to PACW	300
Eldorado 500-Moenkopi	732
Palo Verde, N. Gila	3,151
Path 78 (PACE to APS)	625
Path 78 (APS to PACE)	660
Navajo-Crystal	522
Mead 500	349
Mead 230 (APS <-> ISO)	236
Mead 230 (ISO to NVE)	3,443
Mead 230 (NVE to ISO)	3,476
IPCO to PACW (Path 75)	1,500
PACW to IPCO (Path 75)	400-510
PACE to IPCO	2,557
IPCO to PACE	1,550
NVE to IPCO	262
IPCO to NVE	390-478
Powerex <-> PSE	150
Powerex <-> ISO	150
BANC <-> ISO	2,000-4,000
TID to ISO	1,400
TID to BANC	650
Path 48	2,100
SRP <-> TEPC	9,988
SRP <-> PNM	400
SRP <-> AZPS	10,021
SRP <-> ISO	14,488
SRP <-> LDWP	349
Avista <-> BPA	3,600
Avista <-> NorthWestern	764
Avista <-> PACW	500
Avista <-> SCL	500
Avista <-> TP	500
Avista <-> PGE	500





# Western Markets Today

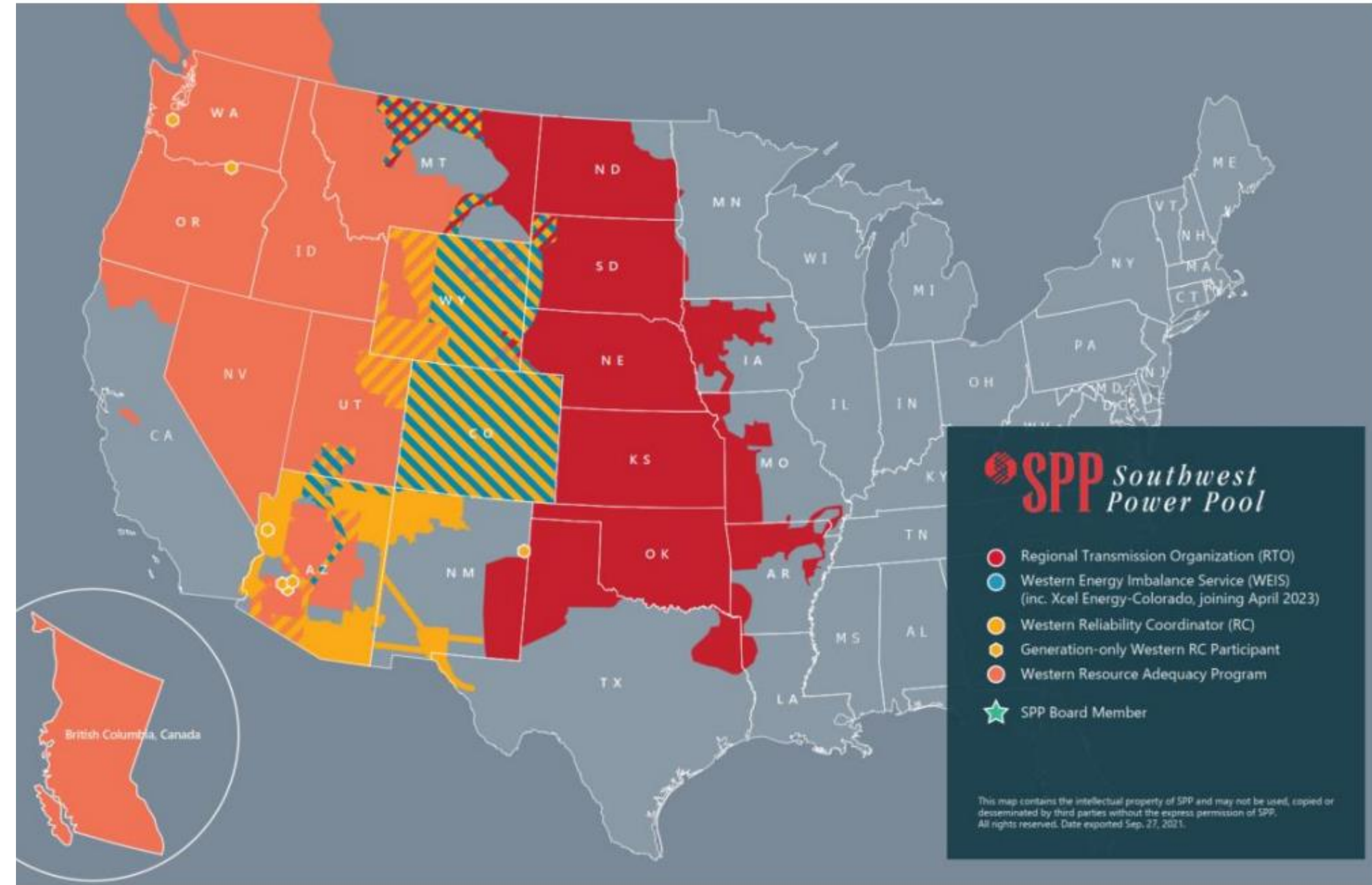
## SPP WEIS:

### Market Attributes –

- Real-Time Only: Same as WEIM at high level but without GHG concerns and with somewhat more constrained transfer capabilities due to footprint and transmission topology and ownership rights.

### Market Limitations –

- Short-term unit commitment, BA ownership of reliability risk, transfer availability constraints, and limited initial market share and resource diversity (4GW Load in 2021, 5GW Load in 2022, projected 13.5GW Load in 2023).





# Western Markets Tomorrow

## CAISO EDAM:

### Value Statement –

- Achieve more reliable and efficient commitment of resources and transmission in the day-ahead horizon that leverages regional diversity in resources and demand without BAA or TSP consolidation (i.e., a non-RTO solution), building on systems and market design already in place for WEIM and the CAISO “full market”, with certain enhancements.

### Challenges –

- California-centric governance model and market design limits future benefits and expansion.
- Complex GHG accounting landscape and frameworks across multiple likely jurisdictions.
- Untested market design elements (e.g., transmission, resource sufficiency, ramping products).
- Disparate RA programs undermine confidence in market equitability and reliability.
- General skepticism and frustration among some parties based on recent market and policy-making experiences.
- WEIM and bilateral market for energy and transmission must be maintained as viable option for existing and future entities.



# Western Markets Tomorrow

## SPP M+:

### Value Statement –

- Achieve more reliable and efficient commitment of resources and transmission “...”, building on systems and market design already in place for WEIS and the SPP RTO, leveraging working relationships and requirements in place for the WRAP, SPP’s multi-state independent governance framework, and more participant-driven market design (market monitoring approach, price formation principles), to deliver a simplified day-ahead market that has a natural path to a full RTO offering in the Western Interconnect should entities wish to evolve the market in future years.

### Challenges –

- Generally less experience with western markets, conventions, and expectations than the CAISO.
- Similar market design element challenges, with some notable differences due to market design fundamentals.
- Need to get commitment and achieve scale early to deliver enough benefits to support the effort and SPP’s involvement.
- Potential longer lead-time to day-ahead market (but may have opportunity for interim real-time market – “WEIS+“?).

# Western Markets – Next Steps

## Timelines:

### CAISO EDAM –

- December 2022: Present draft final proposal to CAISO Board and EIM Governing Body.
- February 2023: Seek CAISO Board and EIM Governing Body approval of final proposal and associated market changes.
- Spring/Summer 2023: Identify EIM Entities interested in moving forward with EDAM, develop business requirement specifications, upgrade systems, engage in FERC tariff process.
- Fall 2023\*: Complete market software release.
- 2024\*: EDAM go-live for interested entities.

\* Most stakeholders expect significant timeline risk from WEIM/EDAM Entity readiness work (tariff changes, systems), FERC approval process, and competing initiative priorities and dependencies at CAISO.





# Western Markets – Next Steps

## Timelines:

SPP M+ –

- December 2022: Final Service Offering published, initial commitments received.
- Q1-2023: Receive final binding commitments to fund next phase (“Phase 1”) from interested entities.
- 2023/2024: Complete Phase 1 items, including market design details and tariff development and filing, while deploying streamlined governance structure and potentially implementing a real-time market option as a bridge to full M+.
- 2024-2026: Complete M+ Phase 2 items, including market implementation and full governance structure, with full binding funding requirement and with M+ go-live likely coordinated with WRAP binding program operations timeline.
- 2028-30: “SPP West” RTO for part/all of M+ footprint?

# Western Markets – Q/A



# Thank You

## CES Market IQ CAISO/West

Chris Devon  
517-294-5473  
[cdevon@ces-ltd.com](mailto:cdevon@ces-ltd.com)

Brian Rothstein  
949-402-5405  
[brian.rothstein@ces-ltd.com](mailto:brian.rothstein@ces-ltd.com)

Dan Williams  
425-449-9731  
[dwilliams@ces-ltd.com](mailto:dwilliams@ces-ltd.com)



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# Western Markets

## APPENDIX:

- Pacific Northwest and California Markets Today: Bilateral, WEIM, and CAISO in-state market.
- Pacific Northwest and California Markets Tomorrow: Assuming WRAP, EDAM and M+ are launched but parts of the Pacific Northwest and/or Western Interconnect remain as bilateral market or WEIM-only.
- Pacific Northwest and California Markets Beyond: Assuming two western ISO/RTO markets and all entities/resources/transmission in one or the other, with associated RA program(s).

# Pacific Northwest / CA Markets Today

## Resource Adequacy

- CA RA Program
- Integrated Resource Planning
- Balance of Month / Year

## Day-Ahead Market

- Bilateral Mid-C
- On-Peak/Off-Peak
- CAISO Intertie Market

## Real Time Market

- Bilateral Intraday
- CAISO Intertie Market
- WEIM Sub-Hourly

- CAISO: Year Ahead and Month Ahead Showing (System vs. Local [CPE]/Flex, CARB/CPUC)
- Bilateral Market: Risk Management, Front Office Transactions (Water Forecast, Outages, Fuel/Transmission Risk), State GHG.

- CAISO: Hourly intertie bids by 10a, IFM/RUC runs, results and tags 1p-3p; driven by regional dynamics and local conditions / constraints.
- Bilateral Market: 18 hr and 6 hr block energy transactions, broker or ICE, early AM plus late-day, Mid-C or "local", tags 1p-3p; driven by hydro availability, renewables, weather.

- CAISO: Intra-Day Short Term Unit Commitment, Hourly Block intertie bids (import/export), zonal CA AS.
- Bilateral Market / WEIM: Intra-day and hourly bilateral trading; T-75 WEIM Base Schedules, Resource Sufficiency Evaluation, T-40 WEIM binding schedules, participating / non-participating resources, WPP Reserve Sharing.

# Pacific Northwest / CA Markets Tomorrow

## Resource Adequacy

- CA RA Program
- WPP Western RA Program
- Status Quo

## Day-Ahead Market

- EDAM / M+
- WRAP Ops Program
- Status Quo

## Real Time Market

- Bilateral Intraday
- CAISO Intertie Market
- WEIM Hourly / Sub-Hourly

- CAISO: Year Ahead and Month Ahead Showing (System vs. Local [CPE]/Flex, CARB/CPUC).
- WPP WRAP: 7 month forward showing, 3-5 month cure period. State GHG. Sets M+ requirement.

- EDAM / M+: Hourly bids for energy and/or flex capacity, self/base-schedules for resources, transmission rights commitments, resource sufficiency check (EDAM), diversity/deliverability checks.
- WRAP Ops Program: pre-market input, holdback/surplus.
- Status Quo: on-peak/off-peak or other trading on contract path transmission.

- EDAM / M+: Schedules from DAM, Intra-Day STUC, intertie bids (import/export) and market-to-market, flow-based transmission on DA commitments (+/-).
- Status Quo / WEIM: Intra-day and hourly bilateral and intertie trading, WEIM conventions persist (RSE and transmission), WPP Reserve Sharing (AS only in CA).



# Pacific Northwest / CA Markets Long Term

## Resource Adequacy

- CA RA Program
- RTO West RA Program

## Day-Ahead Market

- CAISO
- RTO West

## Real Time Market

- CAISO
- RTO West

- CAISO: Likely significant RA reform due to changing supply / demand. Growing CPE from Local to System?
- RTO West: Integrates WRAP forward requirements for capacity and deliverability w full market solution.

- CAISO: Full resource optimization for Energy, Flex Capacity, and AS with full Congestion Revenue Rights “all-in” transmission paradigm.
- RTO West: Same but likely with different inputs and products, and different market rules and design.

- CAISO: Full resource optimization for Energy, Flex Capacity, and AS with full Congestion Revenue Rights “all-in” transmission paradigm.
- RTO West: Same but likely with different inputs and products, and different market rules and design.