APS RPAC Meeting

11/15/2024

MEETING AGENDA

Welcome & Meeting Agenda
Matt Lind
1898 & Co.

2023 IRP Acknowledgement
Mike Eugenis
APS

ASRFP Update
Dawn Baker
APS

Break

Western Markets Update
Kent Walter & Omaya Ahmad
APS

Next Steps & Closing Remarks
Matt Lind
1898 & Co.

Meeting Guidelines

Member Engagement

RPAC Member engagement is critical. Clarifying questions are welcome at any time. There will be discussion time allotted to each presentation/agenda item, as well as at the end of each meeting.

Action Items

We will keep a parking lot for items to be addressed at later meetings.

Meeting Minutes

Meeting minutes will be posted to the public website along with pending questions and items needing follow up. We will monitor and address questions in a timely fashion.

Preliminary Content

Meetings and content are preliminary in nature and prepared for RPAC discussion purposes.

September Meeting Recap

- APS Director of Resource Planning, Mike Eugenis, shared APS's plans for the for the RPAC in 2025.
- E3 provided an update on the status of natural gas transportation in the Southwest region.
- APS outlined the goals for its Microgrid RFP, emphasized the customer-sited nature of the projects, and provided a tentative timeline.
- APS provided another update on its Western Market decision, refreshing members on its preference for SPP's Markets Plus.

Following Up

- Action Items from Previous Meetings: N/A
- Ongoing Commitments:
  - Distribute meeting materials in a timely fashion
  - Transparency and dialogue

2023 IRP Acknowledgement

Mike Eugenis, APS

2023 IRP Acknowledgement

- During the October 8th Open Meeting, the ACC voted 4-1 in favor of acknowledging APS's 2023 IRP.
- Based their review of the 2023 IRP, Staff's recommendations, and testimony by APS and its stakeholders, the Commission filed its decision on October 21st

Ordered Amendments:

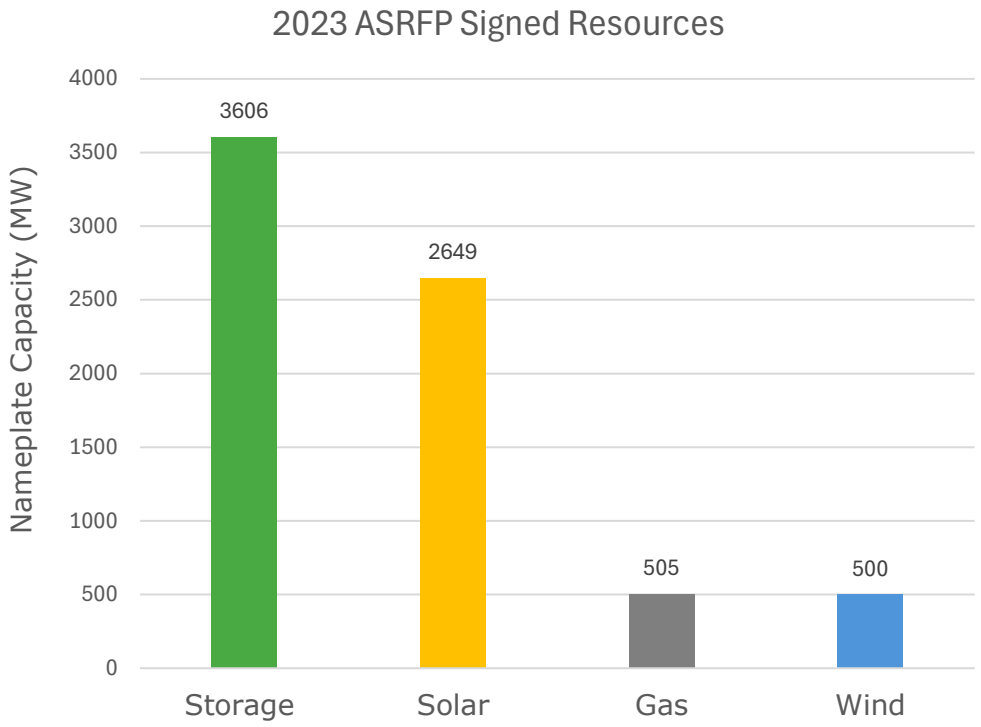
- Consideration of the years **2030** and **2031** in Four Corners Power Plant retirement analysis
- APS shall demonstrate to the Commission in future IRPs that it has acquired a sufficient mix of dependable and dispatchable capacity to ensure resource adequacy **before it may exit Four Corners Power Plant**, which will result in the loss of 970 MW of dependable capacity.
- Analysis of cost savings and other benefits resulting from their participation in Western regional markets.

Docket No. E-99999A-22-0046
Decision No. 79589

ASRFP Update

Dawn Baker, APS

2023 ASRFP – Signed Resources



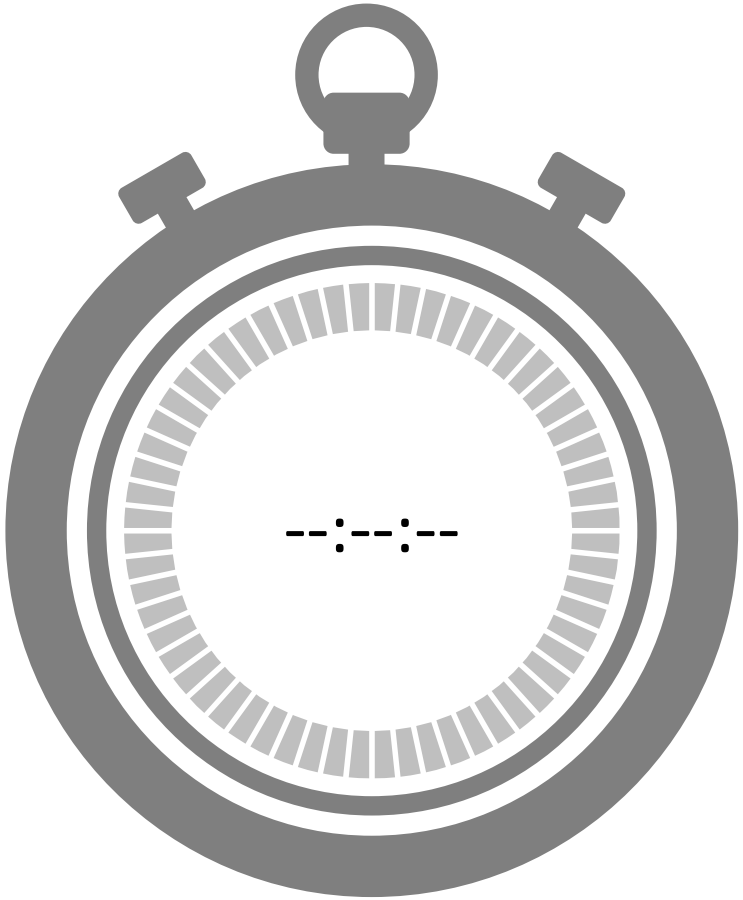
2023 ASRFP by the Numbers

- Sought at least 1,000 MW of reliable Capacity and 700 MW of Renewables.
- Target CODs
  - June 1, 2026 – June 1, 2028
- Contracted 43% Renewable; 93% Clean
- 7,260 MW Total

2024 ASRFP Coming in the next month


aps
Break

Time for a Break



Break Duration 10 min.

Meeting will resume at hh:mm

Western Markets Update

Kent Walter & Omaya Ahmad, APS

APS plans to join Markets+ Day-Ahead Market

- Markets+ maintains best customer benefits and protections
  - Reliability features in market design
  - Customer savings
  - Fair governance
  - Structured like an RTO/ISO market
- Longer-term market trajectory beyond Day-ahead market
- Market Go Live targeting Q2 2027

1. Resource Planning and Procurement in 2021, 2022, and 2023. Docket No. E-99999A-22-0046.

Joining a day-ahead market solves for 3 objectives

1 Reliability

- Access to a **large, diverse regional portfolio of energy resources** above and beyond that provided by a real-time market
- Day-ahead scheduling can help **smooth supply curve at peak load**, improving reliability and **reducing** the degree to which individual **utilities need backup generation**

2 Customer cost savings

- **Production costs saved** from lower spend on fuel and plant startup & shutdown costs (i.e., pooled generation creates access to more low-cost resources)
- **Capital costs avoided** due to lower need for backup generation

3 Clean energy integration

- Day-ahead markets provide **dependable access to diverse clean energy** resources not available or too costly to build in APS territory (e.g., wind, hydro)
- Broader footprint **reduces variability** for weather dependent resources

Decision framework: A day-ahead market should maintain or increase reliability at lowest cost and unlock future market opportunities

Criteria to evaluate against

Footprint	What **entities are committed** to or leaning towards each market? (scale, NW/SW diversity) What is the **load diversity, resource diversity, and renewable mix** of likely participants?
Market Design	How will this improve **reliability?** (e.g., common resource adequacy standards, must-offer requirements, WRAP compatibility, carveouts, etc.) What is the **cost-benefit** of joining the market? (production cost savings vs. market participation fees) How much potential **new generation buildout could be avoided?** (due to regional diversity) What other **economic protections** exist? (e.g., congestion hedging, flow-based system utilization)
Governance & Capabilities	What is the **governance model?** (e.g., governance structure, reform options) What are the **operator's capabilities** and **market trajectory?** (e.g., operator expertise, complementary resources)

In service of APS objectives

1 **Reliability**

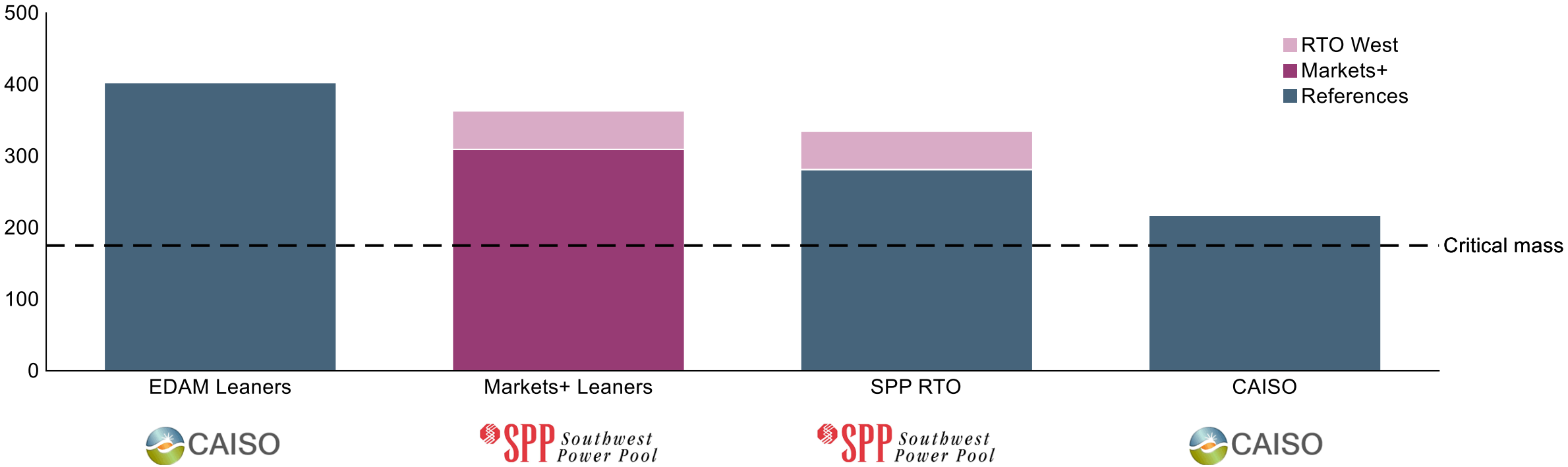
2 **Customer cost savings**

3 **Clean energy integration**

There is sufficient critical mass toward SPP Markets+ participation

FOOTPRINT | COMMITMENTS

Annual demand by market footprint in 2023 (in TWh)

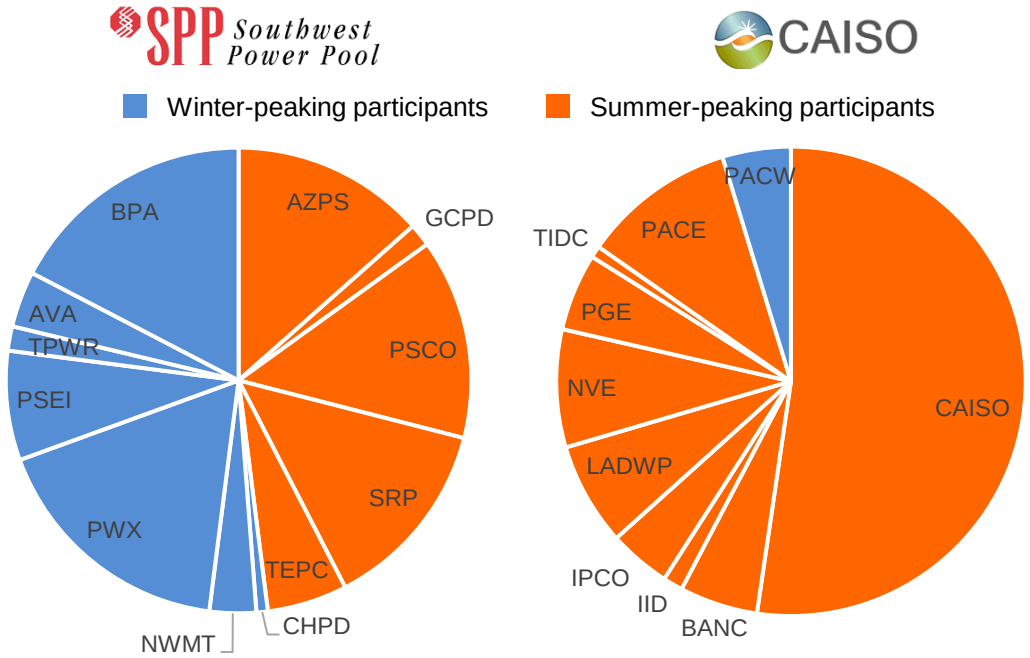


Note: Markets+ Leaners represents the 26 participants in the April 2024 stakeholder leaning letter
Source: EIA

Markets+ expected to provide greater seasonal load and resource diversity for APS

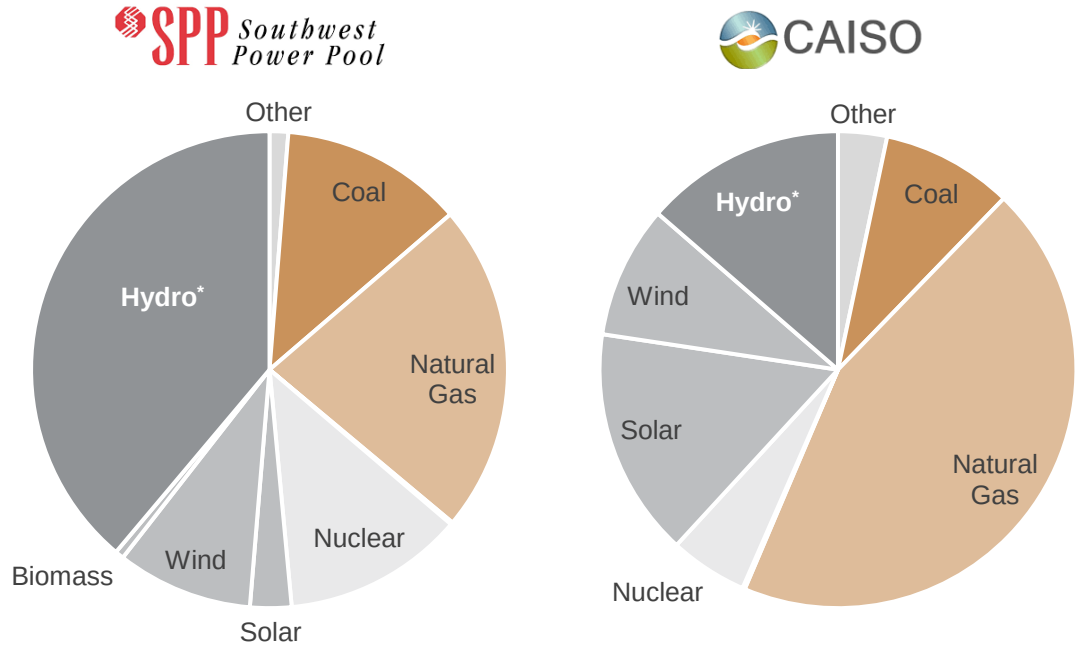
FOOTPRINT | RESOURCE MIX

Markets+ provides better seasonal load for APS...



- **Markets+ has more winter-peaking load than EDAM**, which **complements well** with summer-peaking APS supply

...and has a resource mix complementary to APS



- Markets+ participants' resource mix (substantial baseload hydro and less solar) **peaks less during the day-time and is more reliable**, which pairs well with APS' solar-heavy portfolio that has **excess capacity during the day**

Note: (*) Hydro includes storage hydro, run-of-river hydro, and pumped storage
Source: FERC Form 714, EIA, & BC Hydro

Joining Markets+ improves reliability

MARKET DESIGN | RELIABILITY

SPP provisions optimize for reliability...

Common resource adequacy standards across all Markets+ participants **ensure entities don't lean on others and reliability is prioritized**[1]

"Must-offer" mechanism based on resource adequacy.

Improved access and deliverability through reliability backstop and flow-based transmission[2]

...while EDAM provides limited reliability benefits

Resource adequacy standards vary across the full market footprint given it is established at the balancing authority level

"Must-offer" mechanism could decrease APS reliability due to shared uncertainty with others that do not have the same resource adequacy standards

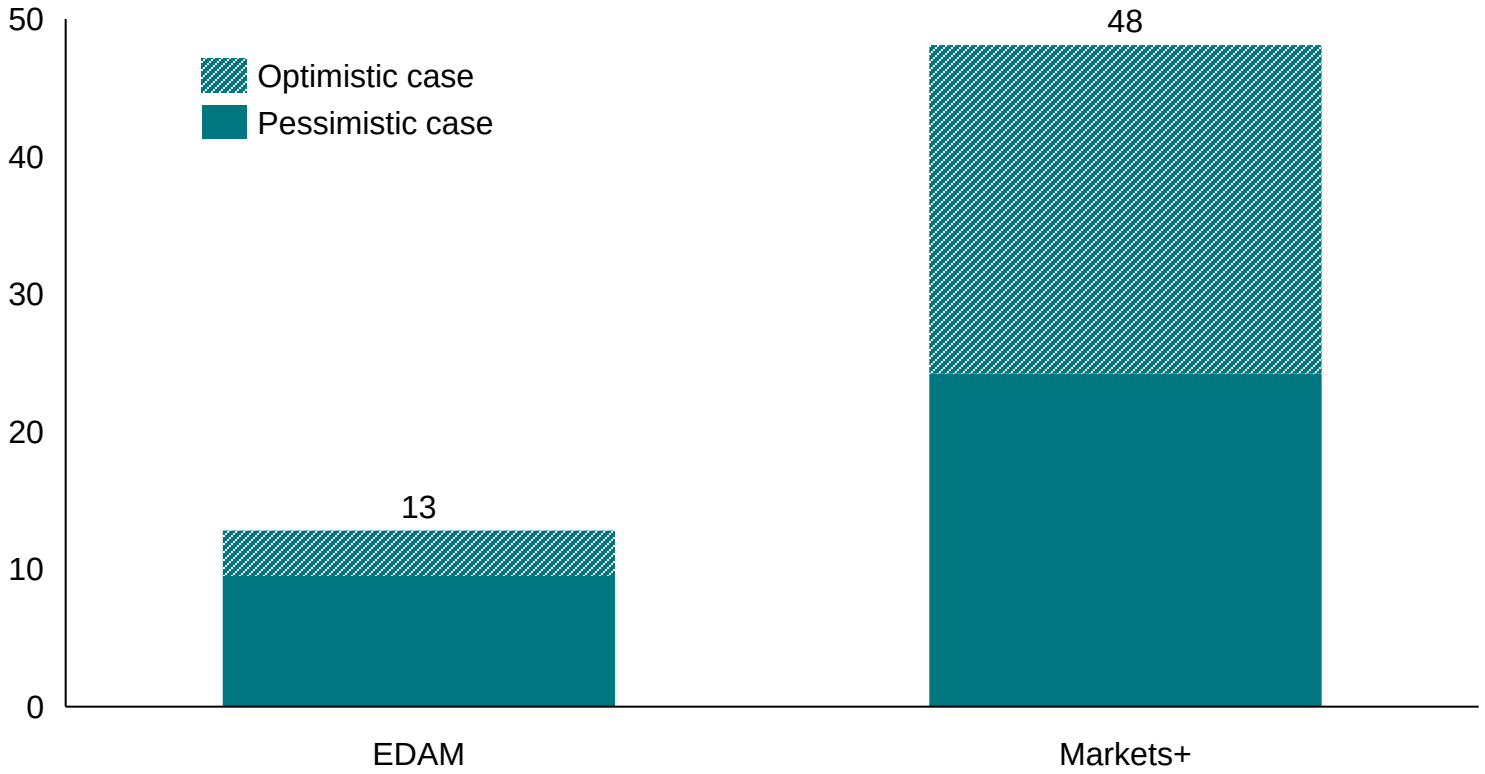
Little incremental reliability benefits given existing access to resources in EIM, expect withholding on day-ahead stress days, and no flow-based transmission / retaining bilateral limitations on delivery between entities

Note: 1. Markets+ participants must adhere to common resource adequacy standards by joining Western Resource Adequacy Program (WRAP); 2. Ability for operator to dispatch at times of grid stress not limited by transmission rights inside market footprint

APS annual production cost savings range ~$25-50M from joining Markets+

MARKET DESIGN | COST BENEFIT

Annual production cost savings to APS ($M)



Takeaways

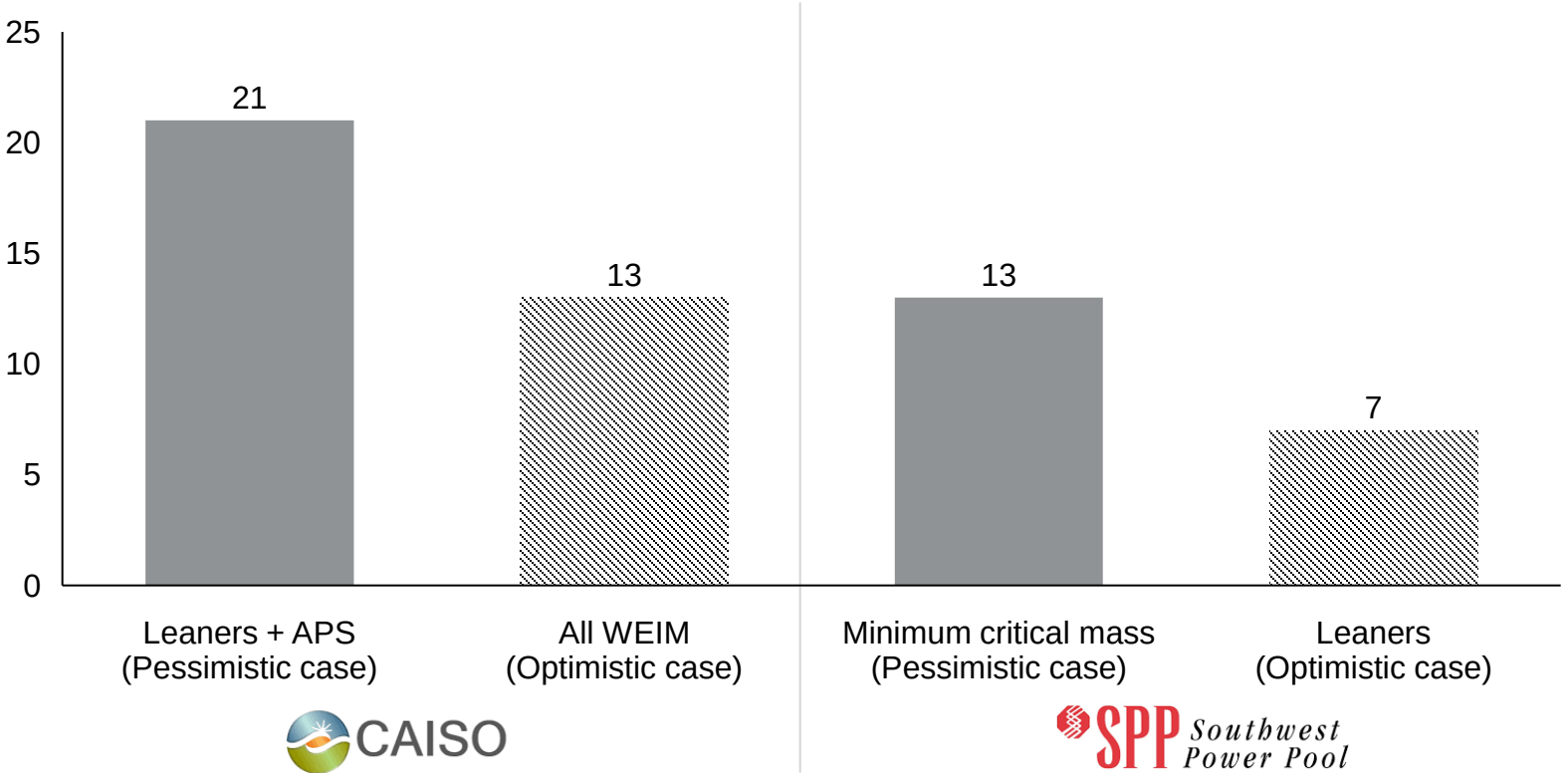
- Production cost savings occur **from purchasing energy from the market at a lower price or selling at a high price** than fuel plus startup & shutdown costs of generating that electricity
- Markets+ presents higher savings as it has a **winter-peaking, hydro-heavy mix that complements well with APS'** summer-peaking, solar-heavy supply
- EDAM presents less savings **due to overlap in resource mix and load needs** between CAISO and APS

Note: Study modeled production cost savings from participating in day-ahead market vs. business-as-usual baseline, including participation in the real-time Western Energy Imbalance Market (WEIM)
Source: Western Markets Exploratory Group (WMEG) Study

APS would pay a lower annual grid management charge in SPP Markets+

MARKET DESIGN | COST BENEFIT

Annual grid management fees paid by APS ($M)



Takeaways

- In both markets, **increasing participation levels decrease annual grid management fees** APS would need to pay
- EDAM costs are before pathways proposal – **expected to increase** after implementation

Note: Markets+ based on cost to run new market, EDAM costs based on costs to run existing CAISO market
Source: APS Resource Planning

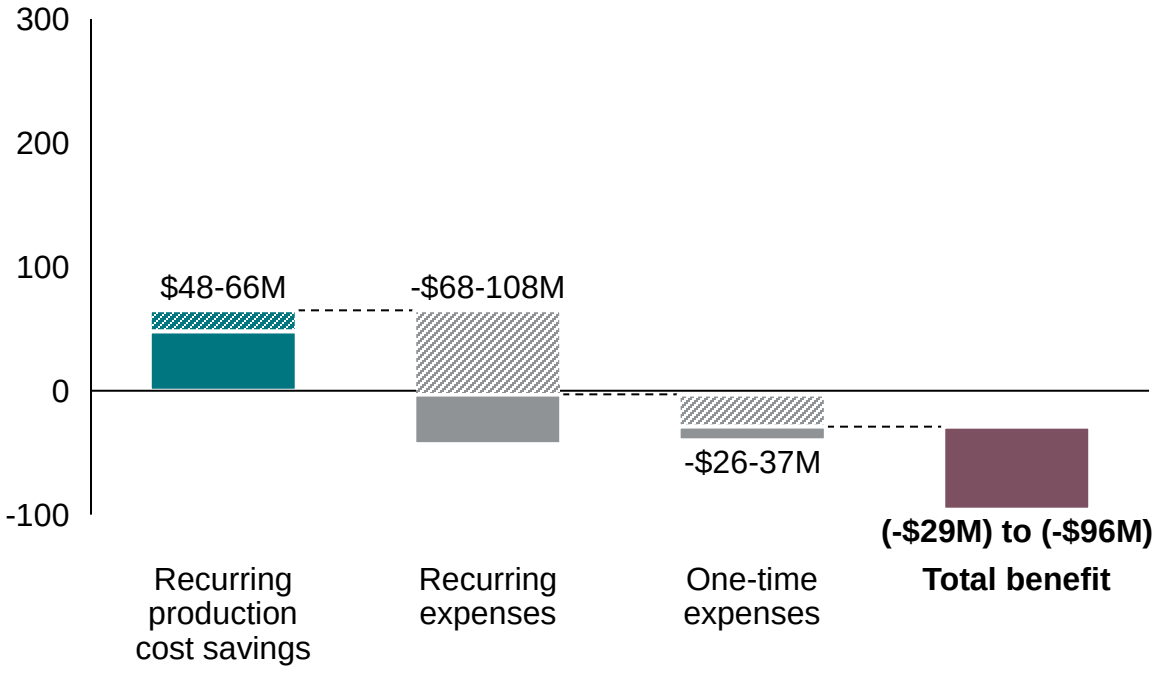
APS would net a return from joining Markets+ whereas EDAM is a net expense

MARKET DESIGN | COST BENEFIT

Key: Optimistic case | Pessimistic case | Range of outcomes

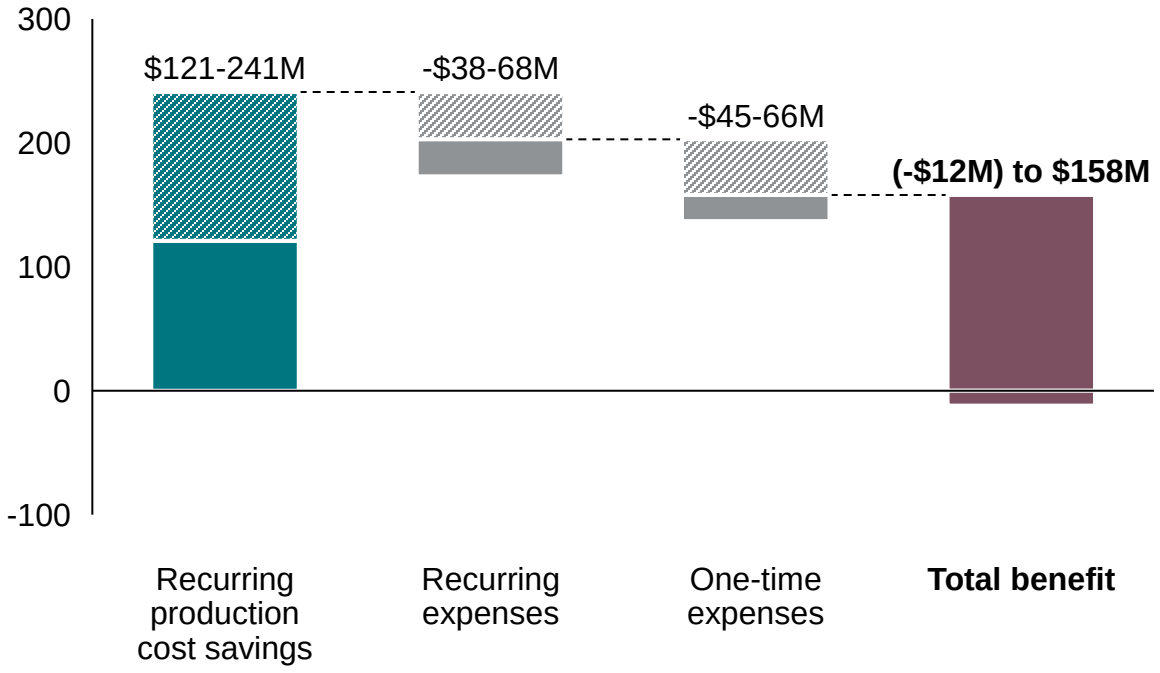
CAISO

5-year benefit to APS from joining EDAM ($M)



SPP Southwest Power Pool

5-year benefit to APS from joining Markets+ ($M)



Source: APS Resource Planning

On top of production cost savings, we explored the potential for APS to avoid new generation buildout

MARKET DESIGN | GEN BUILDOUT

Assumptions that must hold true for APS to avoid new generation buildout	Known risks/gaps
Common reliability standards that all entities participates in	❑ WRAP established common standards among participants
Identified a common resource adequacy level from a coordinated study	❑ WRAP does not study third parties in BAA ❑ Changes to Planning Reserve Margin and Qualified Capacity Contribution up to 17 months before operations – cannot develop resource in that time.
Access to those resources	❑ Sharing limited to volumes above 16% capacity, limited to prior to DA Preschedule (1-4 days in advance of operations) ❑ Deliverability of sharing based on available transmission

APS is more likely to avoid new gen buildout by joining Markets+ vs. joining EDAM

MARKET DESIGN | **GEN BUILDOUT**

Assumptions that must hold true	SPP Southwest Power Pool	CAISO
Common reliability standards that all entities participates in	• Markets+ requires all loads inside the market to be WRAP participants	• No mandatory resource adequacy requirements across participants
Identified a common resource adequacy level from a coordinated study	• Requires all loads in BAA to be WRAP participants • Prevents RA depletion through establishing export priority	• Increased risk through must-offer mechanism that requires offers above load (uncertainty) that can be allocated to participant with inadequate RA
Access to those resources	• Establishes access to RA through real-time through reliability backstop mechanism • Flow-based operation of the market expands and redispatches market resources to expand deliverability	• No flow-based transmission contemplated

Key

- Assumption holds
- Does not hold, likely addressed soon
- Does not hold, unlikely to be addressed

Expect to find new risks/gaps in market participation after go-live. Will explore benefits further through future Integrated Resource Plan

Markets+ protects customers through allocation of congestion revenue

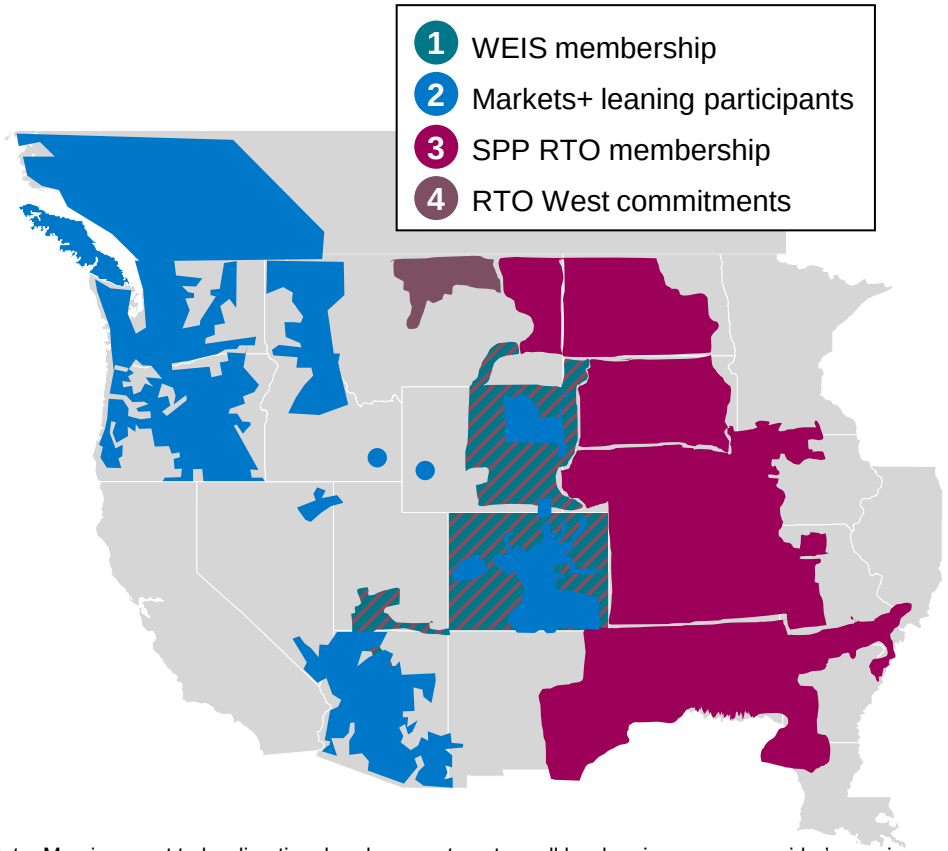
MARKET DESIGN | **ECONOMIC PROTECTIONS**

Key Favorable | Both favorable and unfavorable | Unfavorable

Cost variability	Ideal market structures	SPP Southwest Power Pool	CAISO
Tx congestion costs *Congestion in Tx forces day-ahead market to dispatch local higher-cost power to consumers*	**Congestion revenue allocation** *Financial tool to allow utilities to hedge customers from congestion costs and improve price certainty[1]*	Revenues based on transmission to market and prioritized to longer-term service	Revenues based on transmission to market however shared with short-term service Internal congestion currently being proposed as pro rata allocation – not impacted parties
	Flow-based Tx model *A model that optimizes electricity flow by monitoring real-time grid flow vs. relying on fixed Tx rights*	Reduces instances of congestion internal to the footprint reducing instances of congestion	Maintains existing deliverability limitations at BA-to-BA Seams

SPP manages a broad, growing base of resources

GOVERNANCE | **MARKET TRAJECTORY**



Note: Map is meant to be directional and may not capture all borders in a power provider's service area
Source: SPP State of the Market (2023)

1 WEIS membership

Entities that are part of the real-time market but not part of the SPP RTO

2 Markets+ leaning participants

Entities interested in joining the day-ahead market governed by SPP (reflective of co-signers in April 2024 leaning letter)

Current focus

3 SPP RTO membership

Entities part of the SPP RTO, which spans 14 states with ~66GW of capacity; includes a real-time, day-ahead market and Tx planning

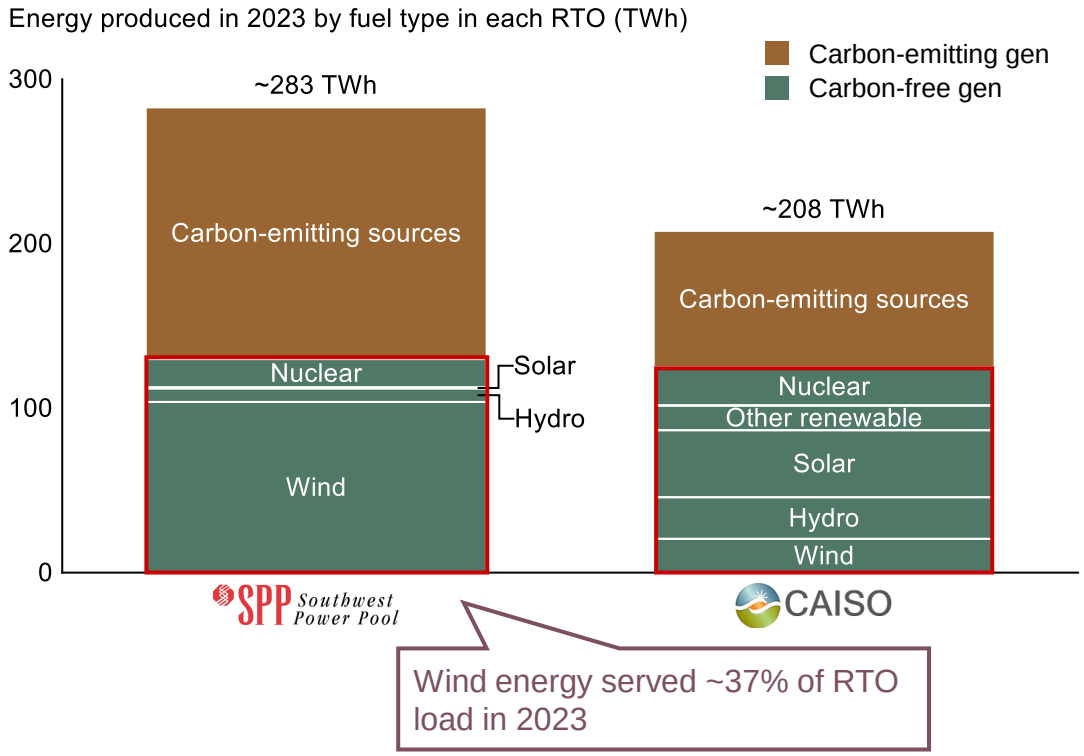
4 RTO West commitments

Entities (currently participating in WEIS market) planning to join SPP's RTO by early 2026

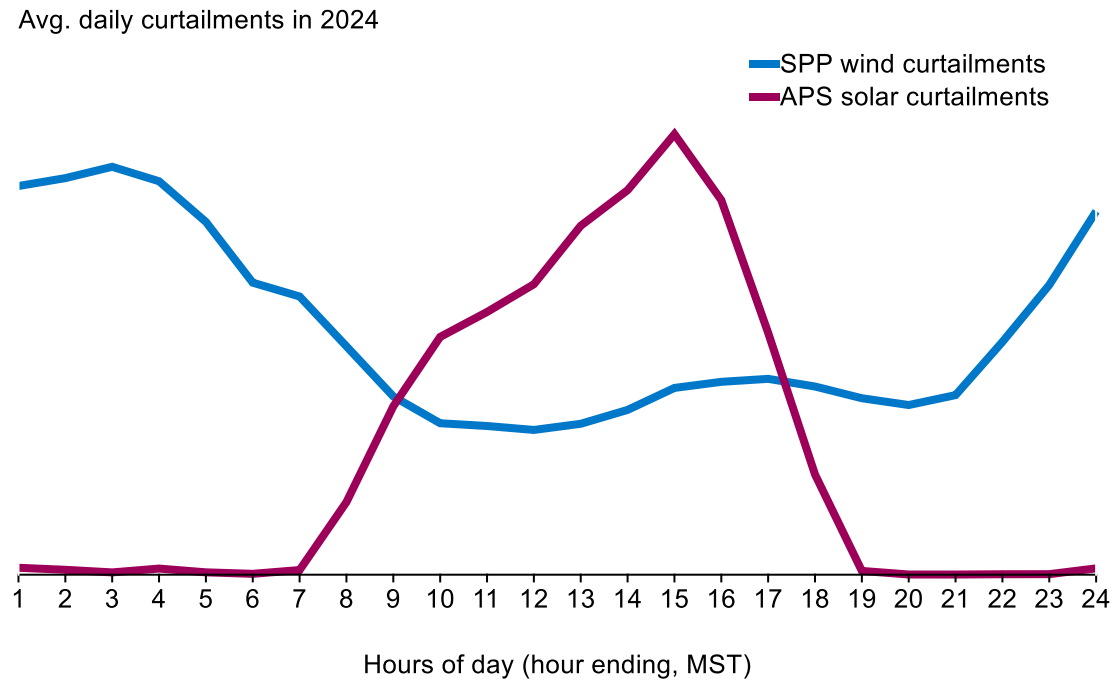
SPP is an experienced wind operator and offers a path to additional resource diversity through the Eastern interconnect

GOVERNANCE | MARKET TRAJECTORY

SPP has expertise in integration of clean energy resources



SPP RTO has wind supply during APS' low-solar hours



Source: SPP Fast Facts, S&P CapIQ (CAISO), SPP Curtailments Database (Jan-Sep 2024), APS Resource Planning (Jan-Jul 2024)

Markets+ has equal participant representation; EDAM influenced by CA entities

GOVERNANCE MODEL

Key
✚ Favorable to APS ▬ Unfavorable to APS

Markets+ governance represents all member entities

SPP Southwest Power Pool

- ✚ **Fair stakeholder representation** as all market stakeholders can participate in the members' committee and serve as advisors to the Markets+ governing board
- ✚ Top Markets+ governing board **filled by nominating committee**
- ✚ **Independent governance** structure employed and already oversaw market design development for Markets+

EDAM governance is likely to remain CA-centric

CAISO

- ▬ Relies on **Joint Authority** framework where CAISO Board of Governors has significant influence over market policies
- ▬ CAISO driven stakeholder process makes it **more challenging for non-CA participants to voice** their priorities
- ✚ Pathways Initiative **proposes a new Regional Organization that would take on governance** for market programs (though initiative dependent on successful California legislation)
- ▬ Pathways Initiative proposal **stops short of independent governance** and does not protect non-CA participants from disadvantaged market representation

Documents following APS's decision analysis appear at the Arizona Corporation Commission[1]

Latest additions include:

1. Interventions and comments at **FERC** in the CAISO and SPP day-ahead market tariff dockets

2. Comments throughout the **West-Wide Governance Pathways Initiative** proposal development process

3. **Issue Alerts** co-authored by entities leaning toward participation in Markets+

The Docket[1] also includes the public report developed by the **Western Markets Exploratory Group** as well as a summary for APS's specific study results.

1. Resource Planning and Procurement in 2021, 2022, and 2023. Docket No. E-99999A-22-0046.

SPP Markets+ is the more attractive option for APS across most dimensions

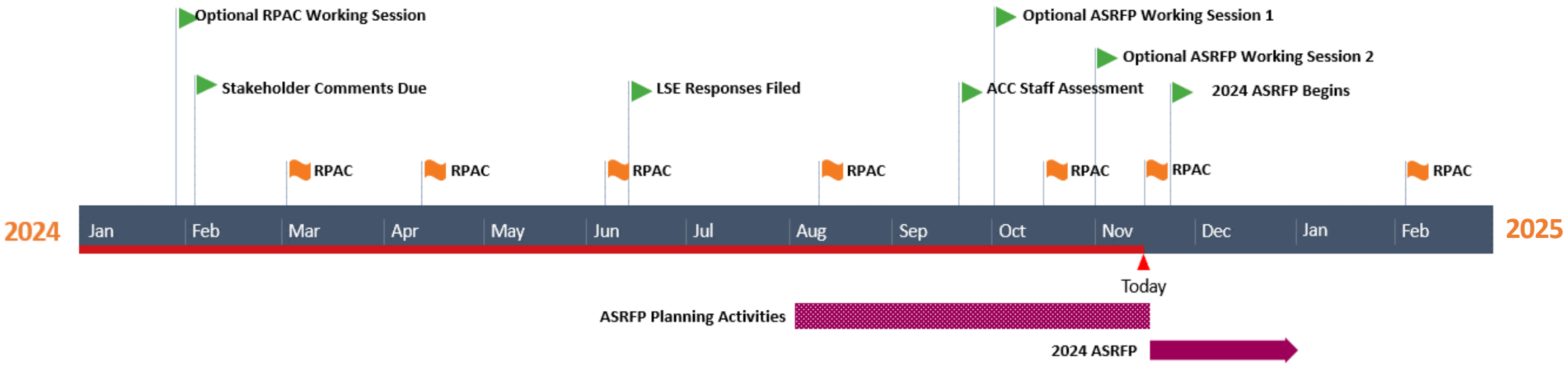
Key | Unfavorable | Both favorable and unfavorable aspects | More favorable | Still developing, impact TBD

Criteria	SPP Markets+	CAISO EDAM
Footprint	**Greater load and resource diversity** however smaller total load and resources in the footprint	**Less load and resource diversity** however larger total load and resources footprint
Resource adequacy / reliability	[+] **Resource adequacy requirements are uniform**, per WRAP [+] "Must-offer" requirement **based on resource adequacy** [+] **Access to RA** through real-time	[-] Requirements not uniform; **established at BA-level** [-] Limited incremental reliability benefits above WEIM [-] Design likely to reduce resource liquidity in stress conditions
Production cost savings	[+] **Higher customer savings** due to Markets+ complementary resource mix and lower participation costs	[-] **Lower customer savings** in CAISO Markets+ due to overlapping resource mix with APS footprint and high participation costs
Generation buildout avoided	[+] **Generation buildout savings likely** due to common resource adequacy standards and access to RA	[-] **Limited generation buildout avoided** due to lack of resource adequacy standard across participants,
Economic protections	[+] Plan to have a flow-based transmission model; **reduced congestion** in the footprint [+] Congestion revenue **designed to hedge congestion**	[-] Does not improve deliverability above bilateral seams [+/-] Most congestion revenue expected to settle as a hedge to congestion
Governance	[+] Proposed **independent governance with fair representation** [+] **Consistent market rules** to all parties in market	[-] **No independent governance**; discretion to CAISO staff [-] CAISO retains **separate rules and charging practices**
Operator capabilities and market trajectory	[+/-] **Variable resource integration leader**; **limited battery** experience [+] **ISO/RTO option** exists and complementary resources	[+] **Variable resource integration leader; strong battery** experience [-] **No current path to RTO**

Next Steps & Closing Remarks

Matt Lind, 1898 & Co.

Forward Plans and Meetings



Key Milestones

February RPAC Meeting: 2/14/2025

Time: 9:00am

(The November RPAC Meeting is the final RPAC Meeting of 2024 - Please reach out to us before the February RPAC Meeting if you have any questions or topics to discuss.)

2024 ASRFP Release: Expected prior to the end of November