

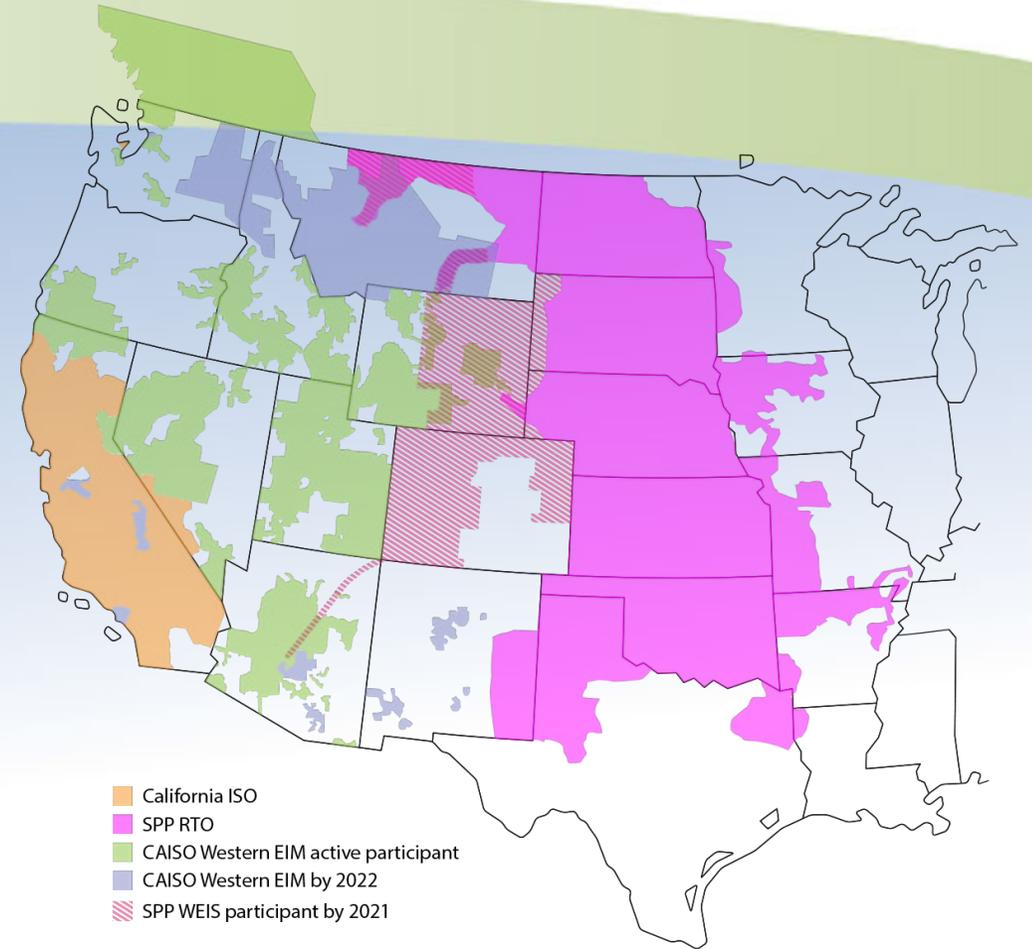
Colorado River Storage Project Market Activity and UC Basin Fund Updates AMWG February 10, 2021

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Market Activity Across the West

- WAPA-Upper Great Plains East Region joined SPP RTO in 2015
- WAPA-Colorado River Storage Project, Rocky Mountain Region, and Upper Great Plains West joined SPP Western Energy Imbalance Service (WEIS) on February 1, 2021
- WAPA Sierra Nevada Region to join CAISO Western Energy Imbalance in April 2021



What happens on the grid and why do we need markets?

- On an electric grid, generation must match demand at all times.
- Why? Because the grid must maintain a frequency of 60 hertz to remain stable. Our electric infrastructure is designed to run on 60 hertz. If not maintained, generators will trip offline to protect themselves and blackouts can occur.
- Too much generation causes the frequency to be too high, too little causes frequency to be too low.

What are these energy markets that we speak of?

Markets, in general, dispatch power plants by economics

- Least cost generation first
- Cost of last MW of energy produced sets the market price

example:

10 MWs wind at \$0,

10 MWs hydro at \$12

10 MWs of gas at \$25

Total energy required on grid + 30 MWs

All generators are paid at \$25, All load (demand) pays \$25

There are two types of markets:

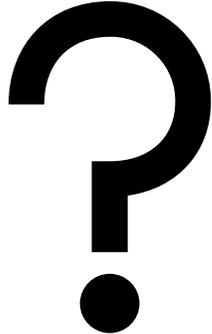
1. Energy Imbalance Market (“market light”)
 - Only operates in real time
 - Impacts ~5% of generation and load (demand) in the market footprint
2. Regional Transmission Organization (“full market”)
 - Operates in day ahead and real time
 - Schedules and optimizes most generation for the entire next day
 - Plan transmission upgrades and build out to relieve long term congestion from load growth and to facilitate market footprint expansion.

*There is a hybrid version – the California Independent System Operator’s proposed “Extended Day-Ahead Market”

WEIS

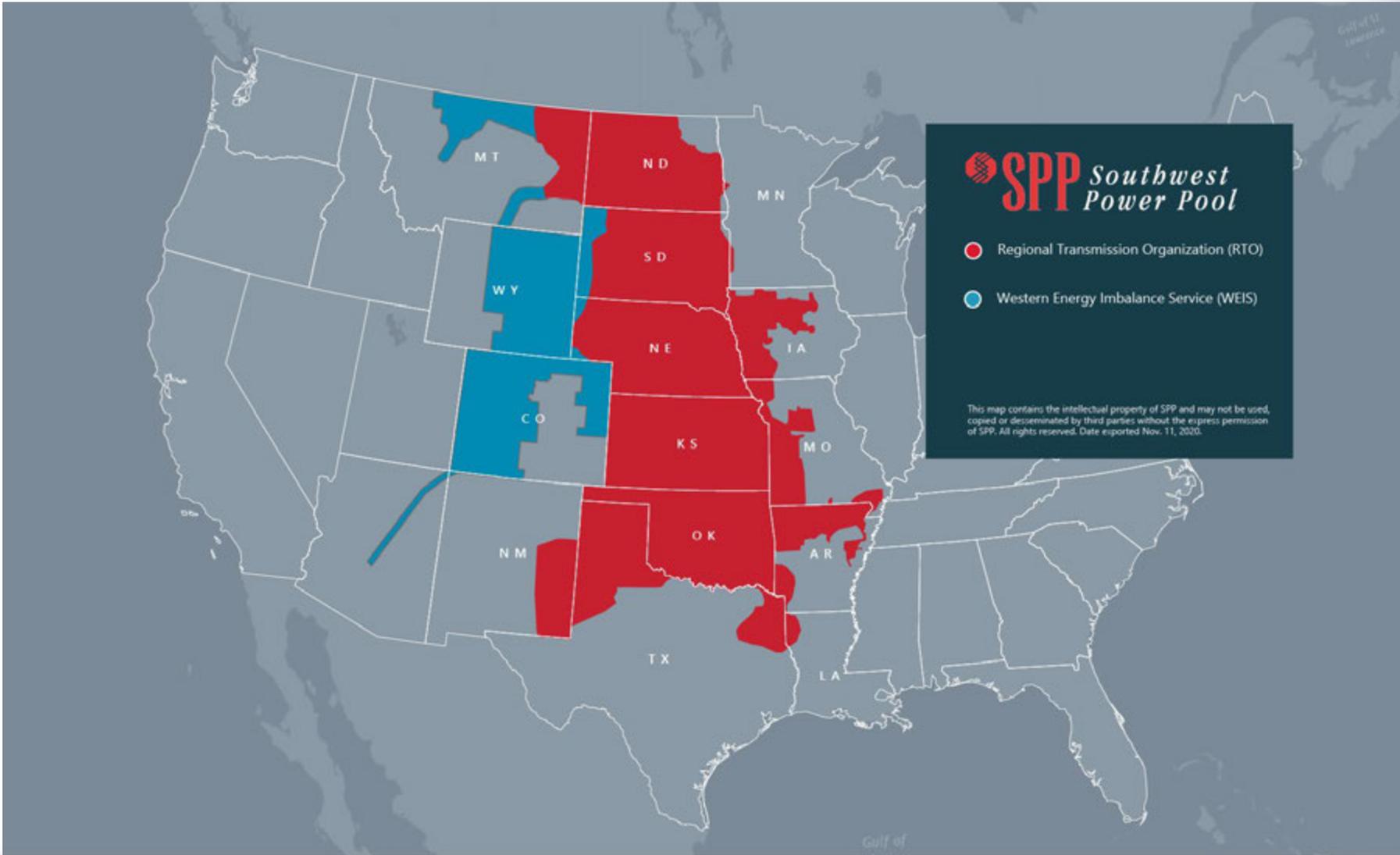
WEIM

SPP RTO



**CAISO
EDAM**

**CAISO
Resource
Adequacy**



the “why”

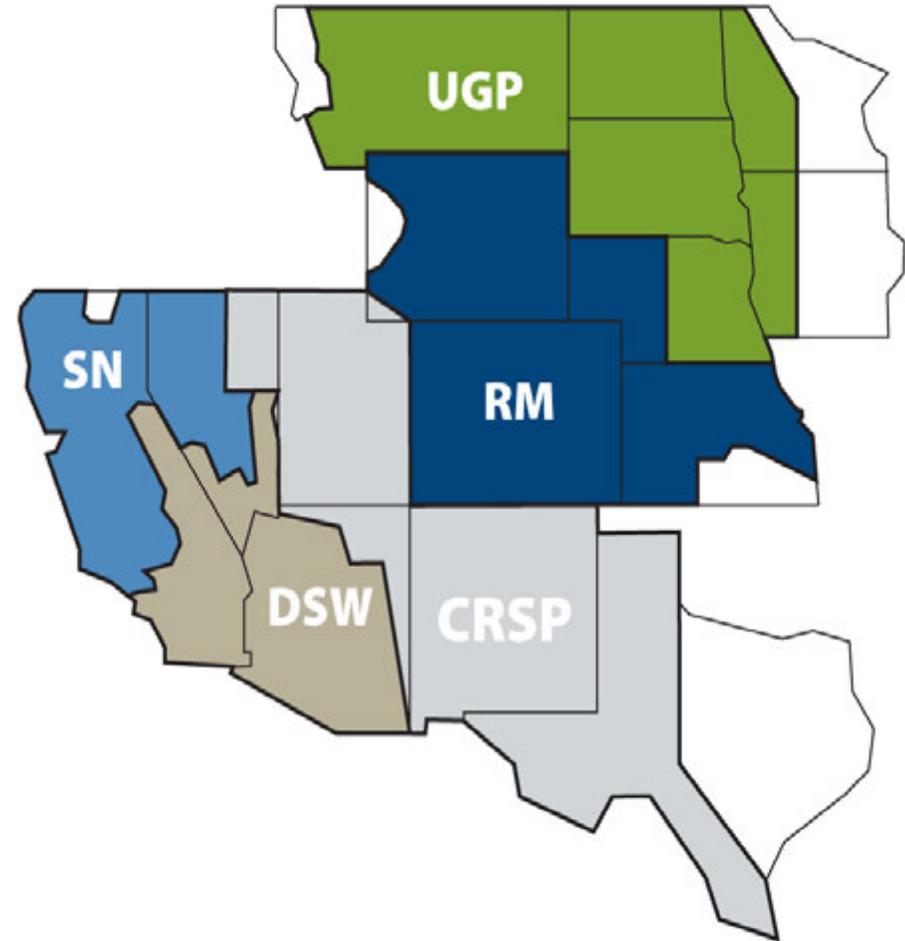
- The industry is undergoing a dramatic shift from large coal generators to natural gas generators and renewable resources including wind and solar.
 - The high voltage transmission system was built around coal generators. Switching to a larger number of smaller generators changes transmission operations.
 - Electricity markets in most of the West are currently hourly. Wind and solar behave much differently than traditional generators within an hour, so markets need to change too.
- In response, centralized electricity markets are developing rapidly in the West.
 - Centralized markets with large footprints offer significant reliability benefits in a world with significant renewable (but variable) generators.
 - WAPA buys and sells significant amounts of wholesale electricity. Reductions in bilateral trading partners are a significant risk.

Other initiatives in the West

- CAISO Extended Day-Ahead Market (EDAM)
 - Initiative to add a day-ahead market to the EIM.
 - WAPA participating in the stakeholder process.
 - On hold pending further progress on 2021 Summer readiness.
- SPP WEIS Participants exploring SPP RTO expansion in West
 - Includes Several SPP WEIS members including WAPA-Rocky Mountain Region and WAPA Upper Great Plains West.
 - Would add day ahead market to existing real time market.

WAPA's position

- Each region is unique.
- Multiple market constructs are “on the table” and are actively being evaluated or implemented.
- WAPA is committed to staying strategic, proactive and in alignment with our mission.



GC Emergency Exception Criteria Outlook

- CAISO 2021 Summer Readiness/Resource Adequacy
 - Multiple initiatives to address generation shortages in the CAISO.
 - These activities are a priority for the CAISO.
- CRSP committed to respond to any of the 37 Balancing authorities if energy shortage emergency occurs
 - Northwest utilities also working on resource adequacy to address future shortages.
 - There is currently no expectation of emergency energy requests beyond the CAISO.

Future Hydrological Impacts

Year	Release in MAF*	Purchase Power Costs (estimated)	EOY Basin Fund Balance (estimated)
FY2021	8.23	\$52.3 M	\$102.5 M
FY2022	7.48	\$52.9 M	\$60.1 M
FY2023	7.48	\$41.3 M	\$41.7 M

*Most probable release based on January 2021 24-month study

- This table shows the effect of having a lower release and higher purchase power costs to the Basin Fund Balance

Notes:

- The FY2021 Basin Fund beginning balance was: \$116.8M
- The estimated Basin Fund Balance at the end of FY21 (and subsequent years), is contingent on WAPA receiving a \$20.7M credit from Reclamation for historical miscellaneous revenue