

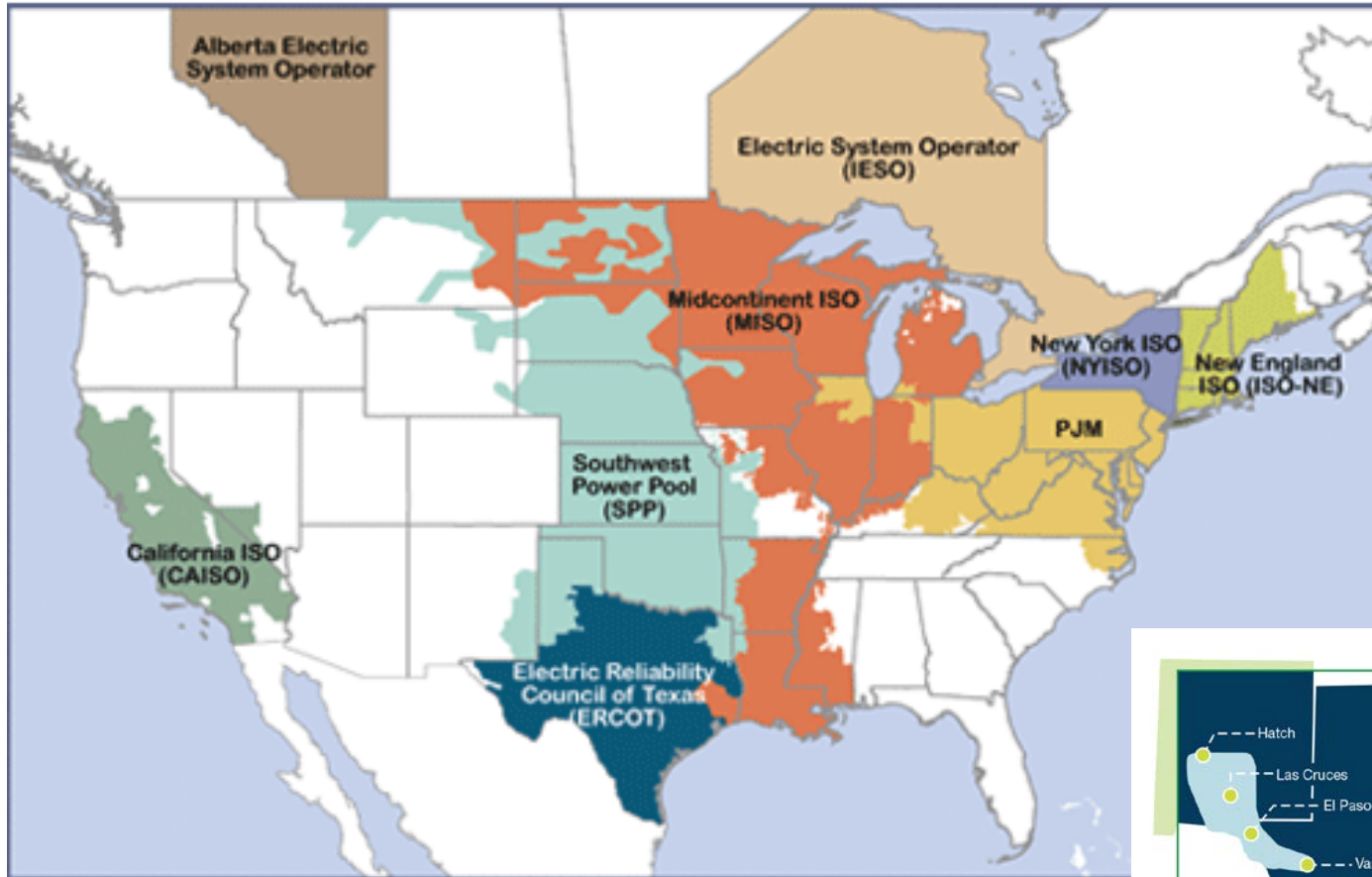
REGIONAL TRANSMISSION
ORGANIZATIONS / INDEPENDENT
SYSTEM OPERATORS
AND THE
ENERGY IMBALANCE MARKET:
AN OVERVIEW OF THE PICTURE IN THE
WEST

MEGAN O'REILLY
COALITION FOR CLEAN AFFORDABLE ENERGY
EPE IRP STAKEHOLDER MEETING, LAS CRUCES
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PRESENTATION OVERVIEW

1. Overview of the current situation in the West
2. Background on Regional Transmission Organizations and Independent System Operators
3. Summary of activity in the West to create new regional markets
4. Introduction to the Energy Imbalance Market

RTOs and ISOs IN THE UNITED STATES AND CANADA



- Current Regional Transmission Organizations (RTOs) and Independent System Operators (ISOs)
- California Independent System Operator (CAISO) is the only ISO in the West (although that may change)

WHAT ARE REGIONAL TRANSMISSION ORGANIZATIONS AND INDEPENDENT SYSTEM OPERATORS?

Regional Transmission Organizations (RTOs) and Independent System Operators (ISOs):

- Organizations that serve as regional managers for wholesale electricity operations
- They are independent, membership-based, non-profit organizations that ensure reliability and optimize supply and demand bids for wholesale electric power.
- RTOs and ISOs manage the majority (60%) of power supplied to load-serving entities in the United States, with the remainder operated by individual utilities or utility holding companies.

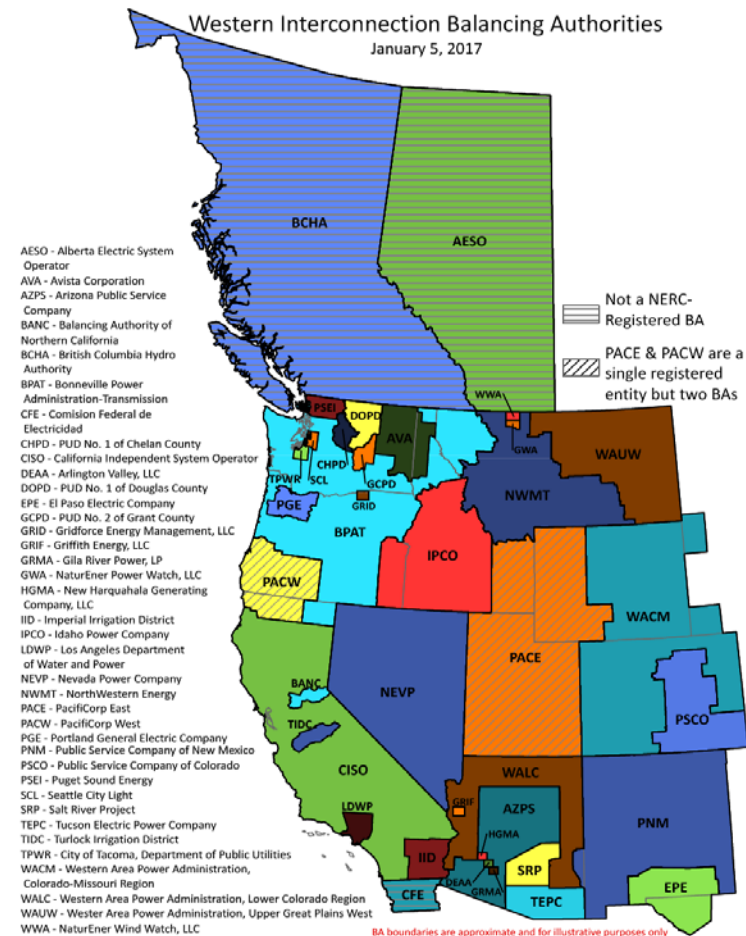
WHAT DO RTOs AND ISOs DO?

ISOs and RTOs provide numerous services to their members:

- They manage power flows on high voltage transmission systems across multiple utility areas;
- They efficiently dispatch electricity generating units within their footprint to meet customer demand, ensuring lowest cost resources are deployed first;
- They provide a platform for wholesale energy market transactions – including day-ahead and real-time markets – facilitating competition among generators;
- They perform long-term planning to ensure that adequate electricity generation capacity is available to meet peak demand and emergency conditions across the footprint.

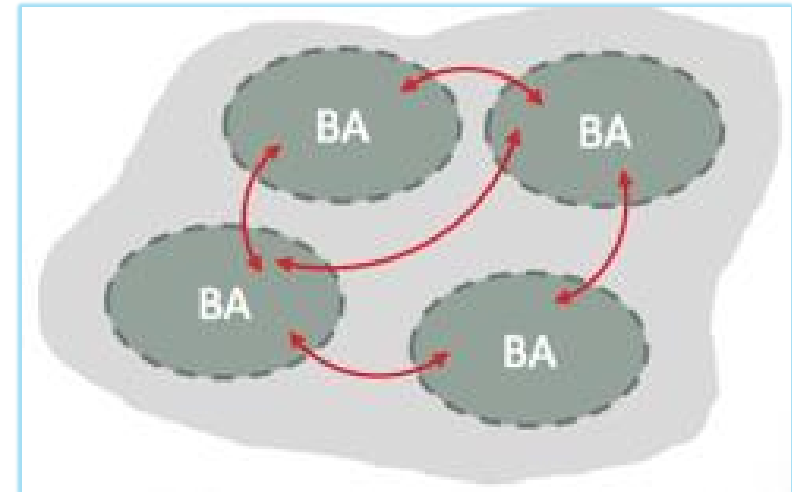
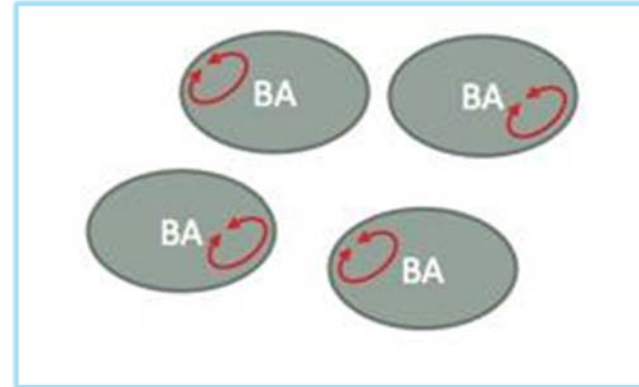
WHAT ABOUT THE REST OF THE WEST THAT DOES NOT HAVE A RTO OR ISO?

- In the West, there are 38 balancing authorities and each one is responsible for ensuring that the amount of electricity delivered to the grid is equal to the demand for electricity consumption at every moment.
- When not part of an ISO or RTO, individual utilities must manage:
 - the balancing of their own resources;
 - transmission line capacity; and
 - variable consumer demand.



BALANCING AREAS WITHIN OR OUTSIDE OF A RTO/ISO

- Outside of an RTO/ISO, each Balancing Area Authority must constantly balance demand using their own generation resources or two-party contracts.
- When a utility joins an ISO or RTO, the system operator coordinates the dispatch of resources in a regional, organized electricity market.
- The RTO or ISO selects the least cost resources for deployment among participating balancing authorities.



BENEFITS OF A RTO OR ISO

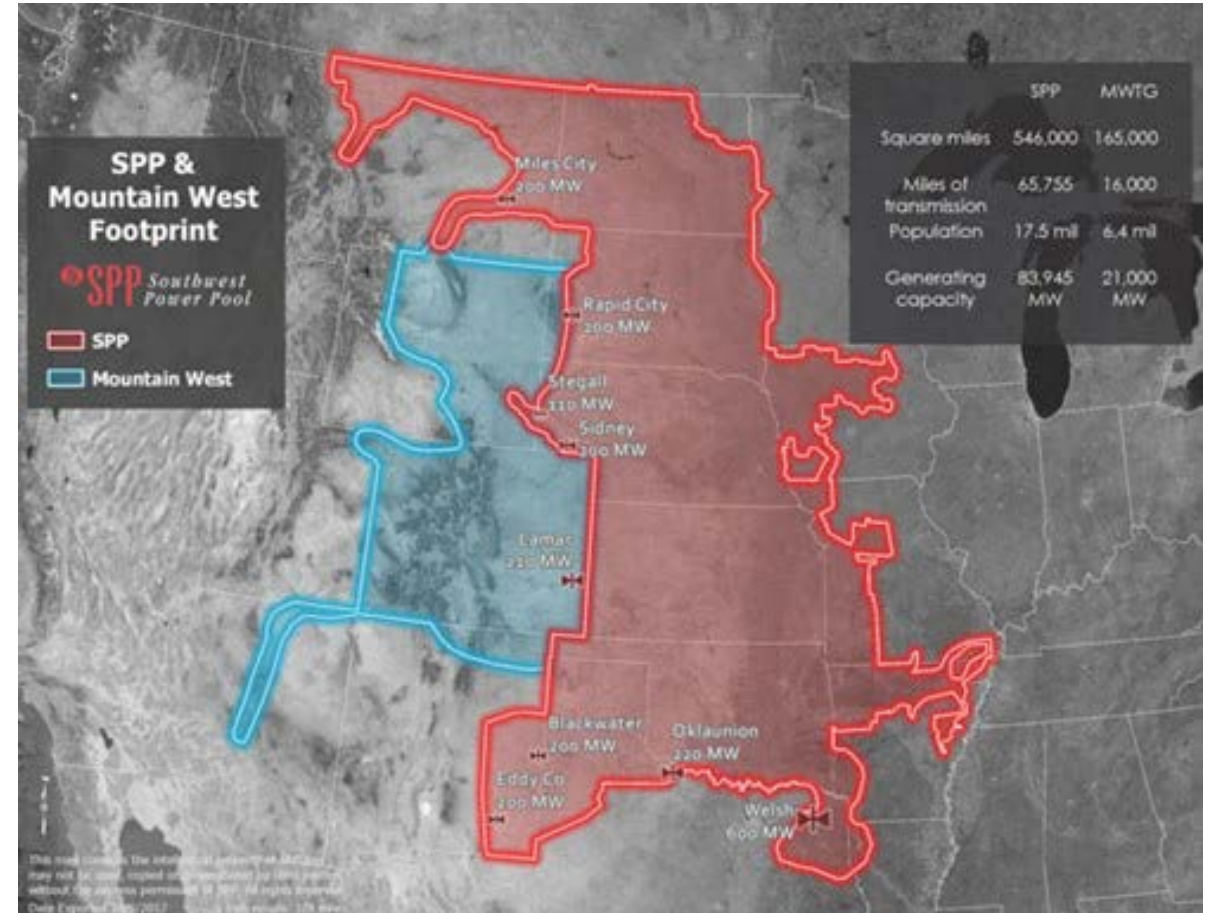
- **More economic dispatch of resources.**
 - Lower cost resources are dispatched first, including renewable resources.
 - Sharing generation and transmission resources across balancing areas allows for more efficient and cost-effective utilization of grid resources; an RTO or ISO may be able to take advantage of low demand in one geographical area with excess generation resources by sending that power to an area having high demand at that time.
- **Improved Reliability**
 - With a more interconnected system and more real-time information about electric generation sources and conditions on the transmission system, the system's reliability is improved.
- **Smoothing of variable resources**
 - The system is able to integrate higher penetrations of low-cost renewable energy as geographic and weather diversity smooths variability of renewable energy resources.
- **Reduced Need for Reserves**
 - Because utilities can share reserve capacity needed as backup for plant outages or other electrical disturbances, each utility can carry fewer expensive reserves.

BUT YOU SAID THERE IS ONLY ONE ISO IN THE WEST AND IT'S IN CALIFORNIA!

- This is still true, but this situation is unlikely to last for long
- Numerous options to develop regional markets in the West are being discussed:
 - Southwest Power Pool (SPP)/ Mountain West Transmission Group (MWTG)
 - PJM/Peak Reliability Proposal
 - CAISO → Full Western RTO
 - CAISO → Opening up day-ahead markets
 - CAISO / Western Energy Imbalance Market

SOUTHWEST POWER POOL (SPP)/ MOUNTAIN WEST TRANSMISSION GROUP (MWTG)

- SPP, which currently operates in all or part of 14 states, including a small part of New Mexico, may expand westward to include the Mountain West Transmission Group
- MWTG is “an informal collaboration of electricity service providers” “formed in early 2013 to evaluate an array of options ranging from a common transmission tariff to regional transmission organization (RTO) membership.”
- These negotiations as well as required regulatory approval process are ongoing.



PJM / PEAK RELIABILITY PROPOSAL FOR A REGIONAL MARKET

- Another possibility for regional market development emerged recently when Peak Reliability, the Reliability Coordinator for the majority of the Western Interconnection, and PJM Connex, a subsidiary of PJM Interconnection, announced an agreement to explore reliability services and markets in the West.
- Peak and PJM Connex seek to combine Peak's west-wide system model with PJM's market expertise.
- The two entities will explore potential reliability services, market design, governance, product suites, rules, technology, and organization
- Results of their exploration should be available in March 2018.

CAISO EXPANSION

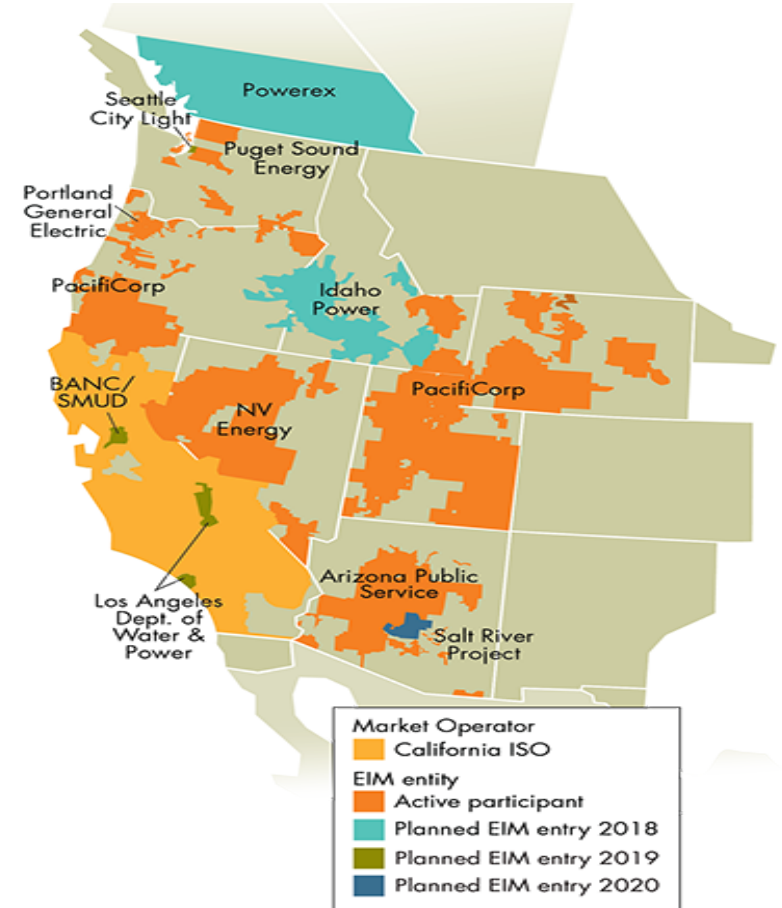
- CAISO has been exploring the possibility of expanding into a regional ISO for some time, with significant stakeholder input put into the development of a regional market
- Those efforts have been stymied by the failure of the California Legislature to pass legislation expanding governance to other states, a critical step to the expansion of the ISO
- Continuing efforts to pass legislation in 2018 to allow for a regional ISO

CAISO MARKET ENHANCEMENTS

- Short of a full regional ISO, CAISO has already developed the Western Energy Imbalance Market (EIM) (more on that in a minute!)
- In addition, CAISO recently announced that it is considering enhancements to the Western EIM, which would allow EIM participants access to additional market products and services on a voluntary basis
- Day ahead unit commitment and scheduling across a larger footprint would improve market efficiency and more effectively integrate renewable resources
- EIM participants would retain balancing area and planning functions, and states would retain control over integrated resource planning, resource adequacy procurement decisions, and transmission planning and investment.
- Implementation of these enhancements anticipated to begin in 2018, with day-ahead market enhancements extended to EIM participants in early 2020.

WESTERN ENERGY IMBALANCE MARKET

- The California ISO has opened its real-time, energy imbalance market to utilities throughout the West, creating the Western EIM.
- PNM studying entry into the Western EIM, and PRC docket
- Some of the Benefits of the EIM:
 - Improved balance of supply and demand at lower cost
 - Facilitates greater integration of renewable resource through the aggregation of flexible resources from neighboring states
 - Allows utilities to capture the associated diversity benefits from expanded geographic footprint and expanded potential use for those resources- for example, New Mexico could take advantage of inexpensive California solar during its peak, and benefit from opportunities to sell New Mexico's resources to other members at their peak hours



WESTERN ENERGY IMBALANCE MARKET

- As utilities consider full market options, entry into the EIM is a no-regrets option:
 - The pay-back period for costs to upgrade software and make other changes to integrate into the market is rapid, with costs typically paid back in less than two years.
 - internal company investments needed to participate in the EIM are necessary building blocks for the company to participate in any of the full market operations
 - Participation in the EIM is voluntary, and utilities retain operational control over its assets and systems.
 - The EIM has no exit fees, so utilities retain flexibility to pursue a different course of action after conclusion of a full inquiry into other market options

QUESTIONS?

MEGAN O'REILLY

ATTORNEY

COALITION FOR CLEAN AFFORDABLE ENERGY

575.779.7836

oreilly.ccae@gmail.com

ccaenm.org