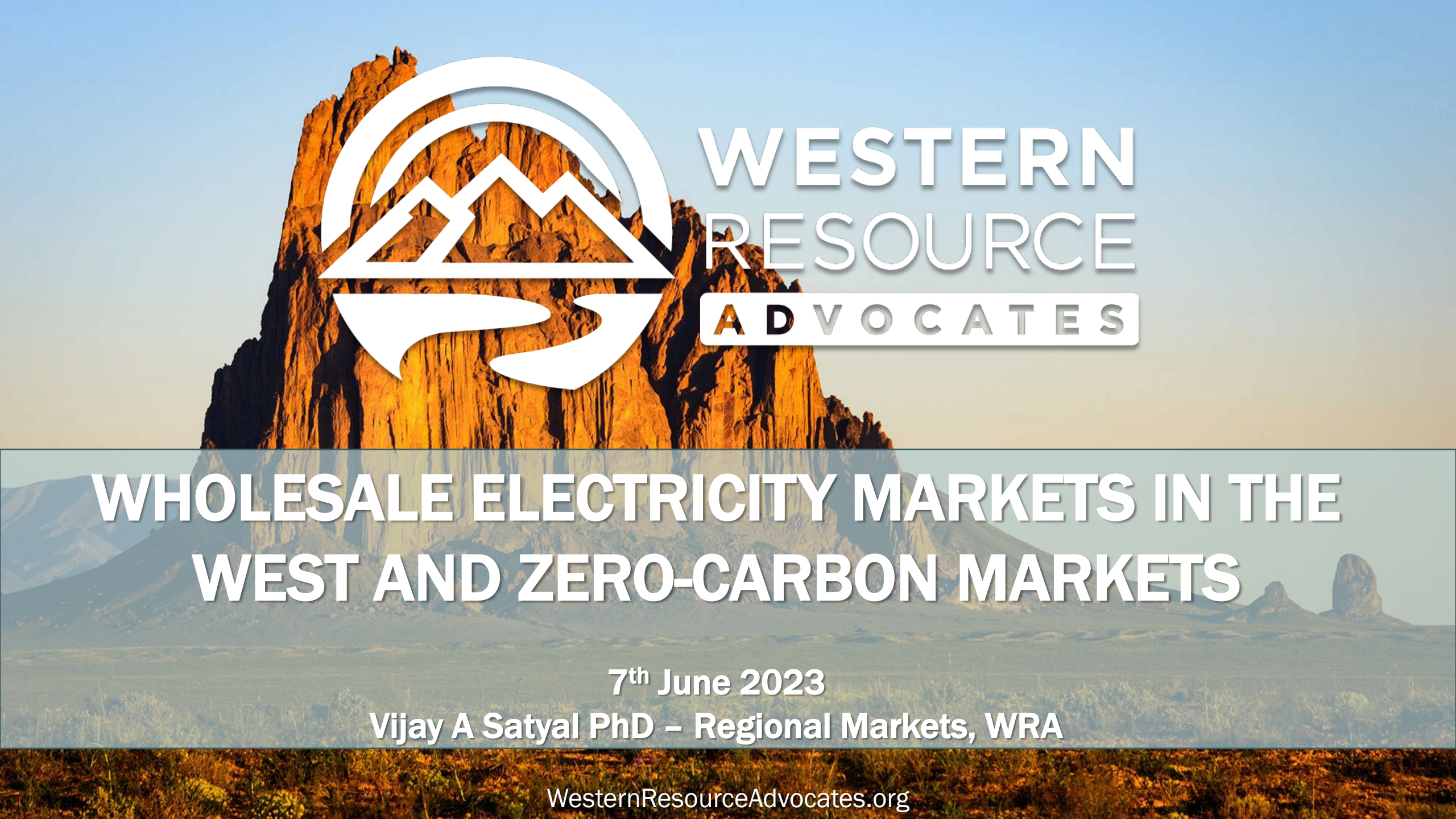
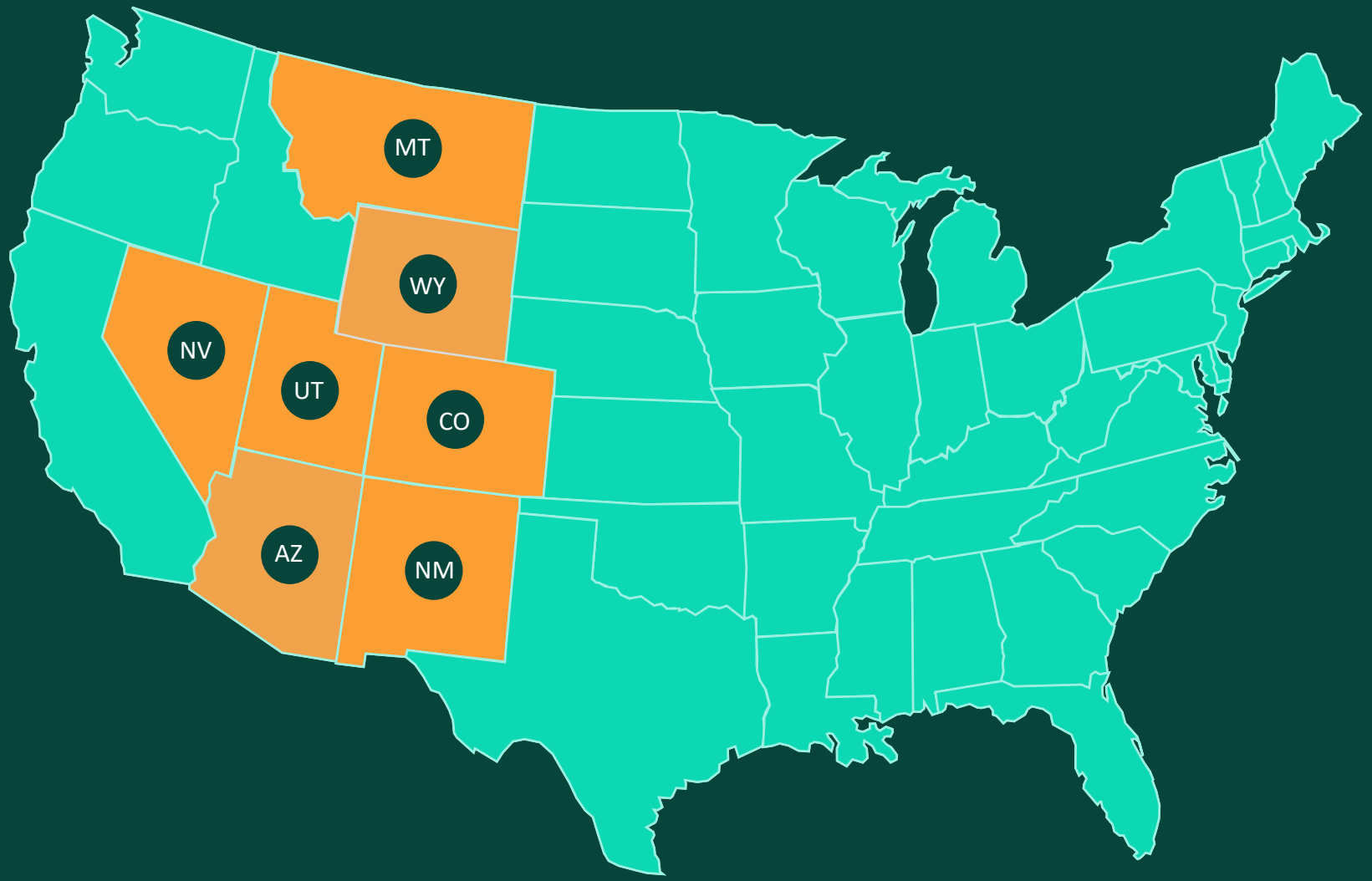


WESTERN RESOURCE ADVOCATES

WHOLESALE ELECTRICITY MARKETS IN THE WEST AND ZERO-CARBON MARKETS

7th June 2023

Vijay A Satyal PhD – Regional Markets, WRA



Where We Work

- Federal & Regional Collaboration
- State Legislatures
- State Agencies & Commissions
- Local Governments
- Electric Utilities
- Diverse Coalitions & Communities

WRA works across seven states in the **Interior West** to **protect our climate**, land, air, and water.

Regional wholesale electricity markets are an opportunity for:

1) **A broader market for clean energy development**
2) **Lower-cost and lower-emissions power**
3) **An avenue for participation in discussions about the future of grid modernization**

RTO Expansion & Value Proposition

- Public interest priorities:
  - Transparent, independent, and fair oversight / rules of the game
  - Improved GHG emissions and clean energy reporting
  - Well-functioning market
    - Cost efficiency
    - Ease of access
    - Equitable participation

Source: PGP Markets Retrospective

Progression towards centralized market

Bilateral Transactions

Energy Imbalance Markets

- Intra-hour
- Geographic diversity: integrate variable renewable resources

Day-Ahead Markets

- Planned days in advance
- Lower costs: optimization of lowest cost power benefits renewable resources

Regional Transmission Organization

- Decarbonization with reliability
- Automation, greater regional grid visibility
- More transparent decision-making

Lessons Learned from California and Texas

Extreme weather driven demand is a major concern

Moving from voluntary conservation to flexible demand as a resource

Resource counting rules must evolve to include historical performance & diversity/complementarity value

Planning, markets and programs must be big and strong enough to assure RA and have inherent customer protection

Gas-electric interface issues need urgent attention and reform

Advanced weather forecasting

Reliability & Resilience

Cooperative federalism

Engagement areas 2022-2024

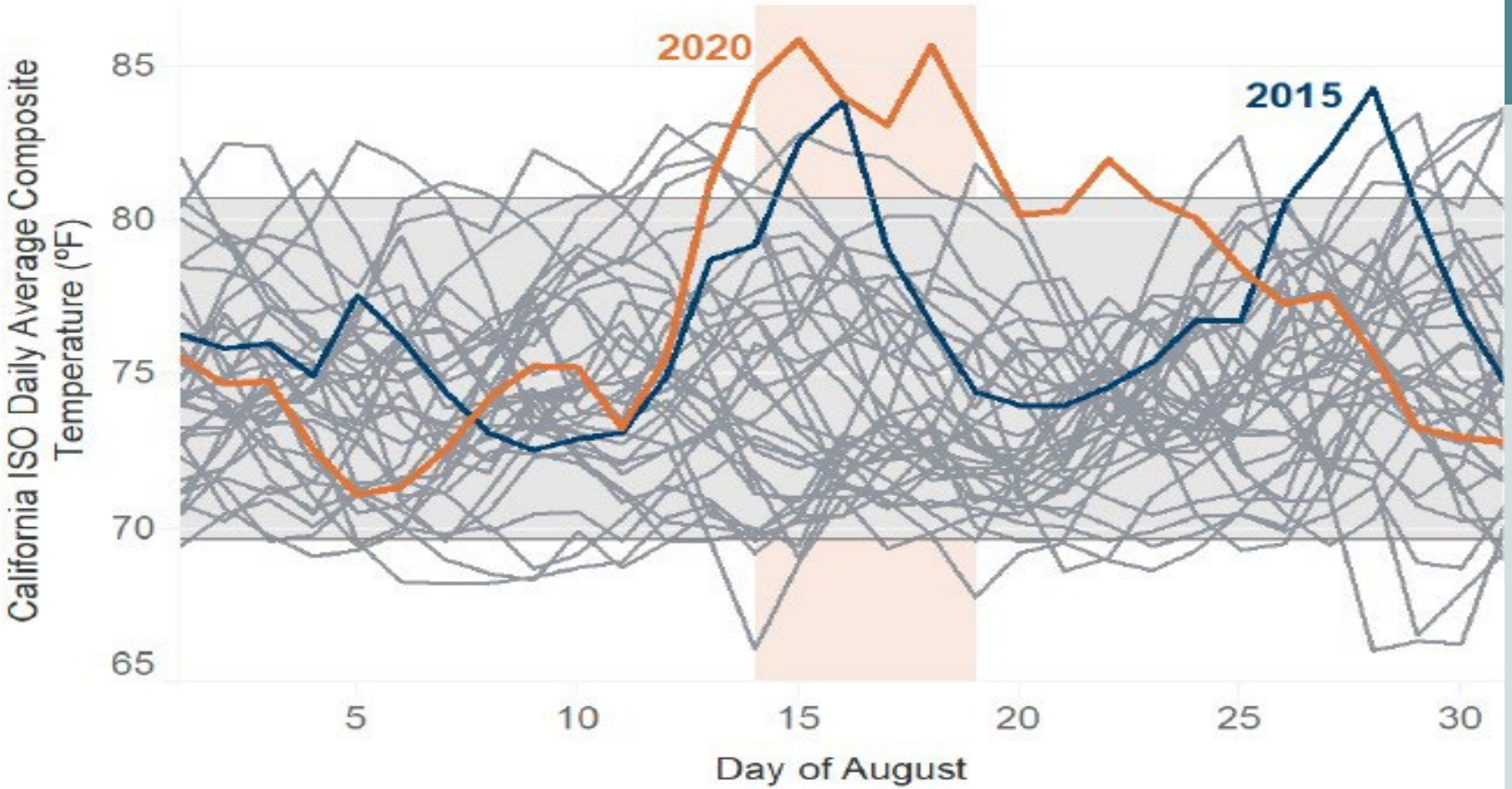
- Energy Imbalance Markets – *Track performance*
  - CAISO Western Energy Imbalance Market (WEIM)
  - SPP Western Energy Imbalance Service (WEIS)
- Day Ahead Markets in development – *Influence market design and implementation*
  - CAISO Extended Day Ahead Market (EDAM)
  - SPP Markets+
  - Split Markets/Seams – Transmission, GHG
- States level advocacy
  - Colorado rulemaking process
  - WRA states' IRPs or other infrastructure expansion approvals at commissions

August 2020 Outages: A Perfect Storm

- Underestimation of potential “seasonal” load forecasts
- Underestimation or awareness of the severity of the summer heat-waves
- Market rules for CAISO performed as expected – unintended impacts to the larger system
- Poor timing with forced outages of gas generation
- Restrictions on importation of out-of-state RE resources

https://www.youtube.com/watch?v=W9Tdw5nG4dQ

Figure ES.1: August Temperatures 1985 - 2020



(Source: CEC Weather Data/CEC Analysis)

Calling CAISO - So, what was the real problem?

- **Grid peak demands on Aug 14th and 15th: 47,000 MW and 45,000 MW respectively.**
- **Only other period of the highest temperatures prior to this: July 21-25, 2006.**
- **Resource constraints:**
  - Thermal plant retirements
  - Declining imports of power and heat wave coming in from AZ
  - Transmission constraints (COI)
  - Northwest AC Intertie – 1000 MW of derating for maintenance
  - So Cal Gas delivery restrictions: Aliso Canyon issues.

- ***Good news:***
  - **NW hydro delivered over 3050 MW in the heavy hours.**
  - Voluntary conservation: over 4,000 MW by 6 pm. Reduced "Forecasted demand" by more than 6,000 MW
  - **50 % of total peak demand between 6-8 pm was met with "economic" demand response**

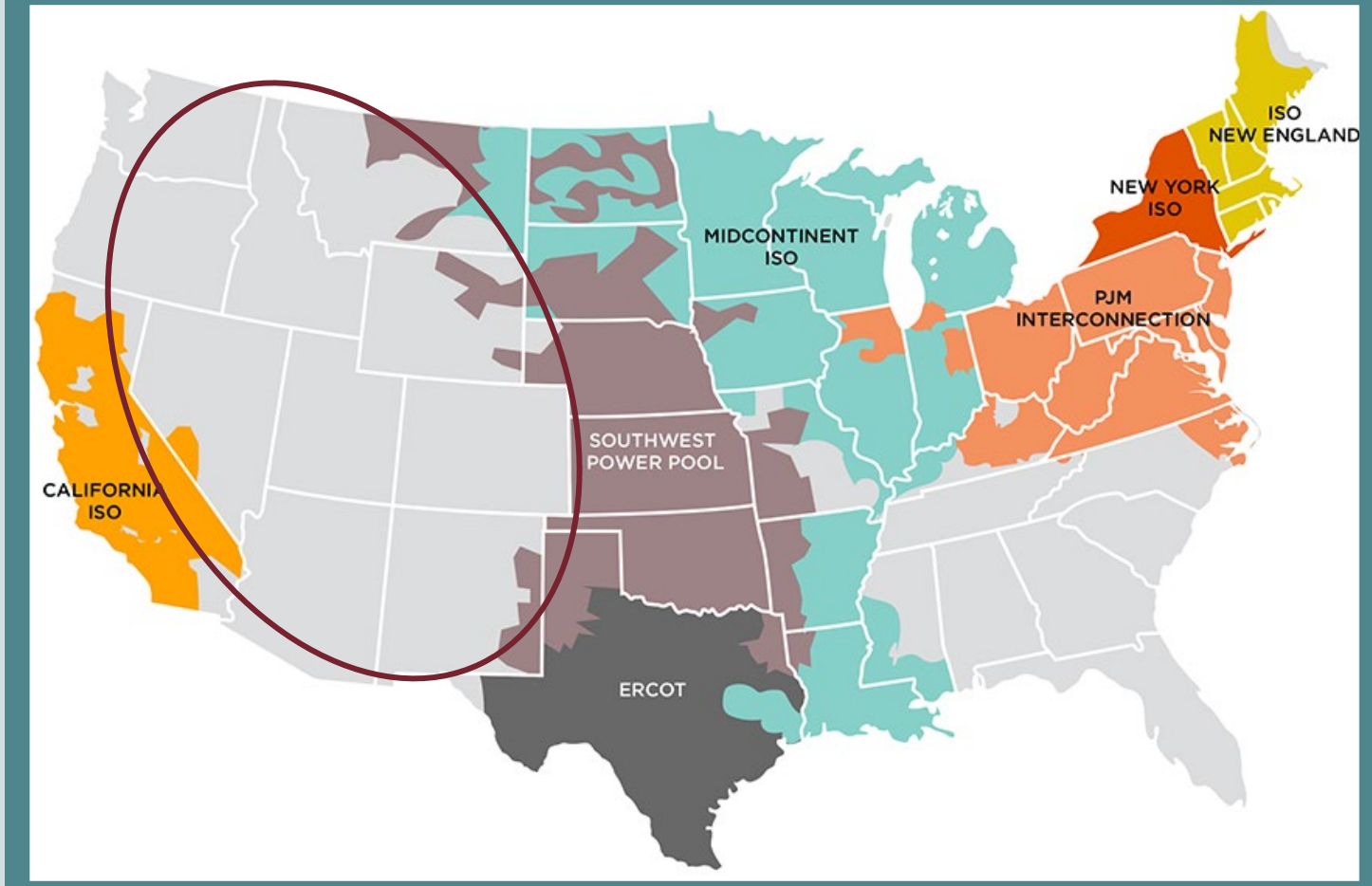
- Dependability of rich hydro power resources of PNW
  - **As of 2020 – 26.8% of total net generation was Hydro resources**
  - Extreme weather events are here to stay – Can we be assured of this consistently?

- **Flexibility of leveraging hydro resources with bilateral long-term contracted arrangements**
  - Current market design rules may/may not be able to fully extract the value of hydro resources.
  - Legacy contracts prevent full depth and breadth of resource use for pricing

- **Measurement of GHG emission reduction benefits with hydro power resources**
  - Few states have GHG emission requirements entwined with use of “renewable energy credits” that can make measurement of clean energy benefits/zero carbon impact of hydro complicated.

Benefits of a Centralized Grid

- Centralized energy markets (aka RTOs or ISOs) cover the U.S. and Canada
- Consolidated planning and efficiency in dispatch
- Market operator as “traffic controller”
- Automation, regional awareness of grid conditions, incentivizes clean energy access



Source: Sustainable FERC

Thank You!

EMAIL: Vijay.Satyal@WesternResources.org

WEBSITE: WESTERNRESOURCEADVOCATES.ORG

2023 GHG & Organized Markets Priorities

- Develop technical specifications for good reporting in a West-wide platform for market operators (day-ahead service), clean energy buyers, and state agencies.
- Recruiting partners for this effort – CEBA, other allies
- Propose a formal WREGIS or "WREGIS-like" exploration of a one-stop, West-wide, (all-generation) emissions tracking platform housed under WECC or neutral 3rd party entity.