



SRP Integrated System Plan
Technical Working Session:
Regional Market Developments

March 31, 2023

Welcome

Bobby Olsen

Senior Director, Corporate Planning, Environmental Services & Innovation (SRP)

Welcome SRP Board and Council Observers



John Hoopes
SRP Association Vice
President



Chris Dobson
SRP District Vice President



Anda McAfee
SRP Board Member



Jack White
SRP Board Member



Larry Rovey
SRP Board Member



Krista O'Brien
SRP Board Member



Suzanne Naylor
SRP Council Member



Rocky Shelton
SRP Council Member

Safety & Sustainability Minute

Meeting Objectives:

- Understand key values and limitations of greater regional market interaction
- Discuss key considerations for SRP's participation in new regional market initiatives
- Discuss how greater market interaction should be captured in long-term planning processes and identify potential enhancements needed for future Integrated System Plans (ISPs)

Agenda

Time		Topics	Presenter
9:00-9:05	5 min	Welcome and Meeting Overview	Bobby Olsen (SRP)
9:05-9:20	15 min	SRP's Participation in Markets: Today and in the Future	Josh Robertson (SRP)
9:20-10:10	50 min	Presentations from panelists (10 min each)	Panelists
		(1) Research/Academia Perspective	David Hurlbut (NREL)
		(2) Regional Market Initiatives Perspective	Sarah Edmonds (Western Power Pool/ Western Resource Adequacy Program [WRAP])
		(3) Environmental Perspective	Kelsie Gomanie (NRDC)
		(4) Government Perspective	Tony Clark (Wilkinson Barker Knauer LLP /Federal Energy Regulatory Commission [FERC])
		(5) Utility Perspective	Colton Kennedy (Omaha Public Power District)
10:10-10:20	10 min	Coffee Break	
10:20-11:20	60 min	Facilitated panel discussion and Q&A with participants	Panelists & SRP participants Arne Olson (E3) as moderator
11:20-11:30	10 min	Wrap up and closing remarks	Angie Bond-Simpson (SRP)

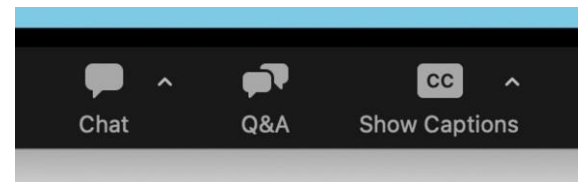
How to Ask for Technical Help in the Technical Working Session



Having technical issues during the meeting?

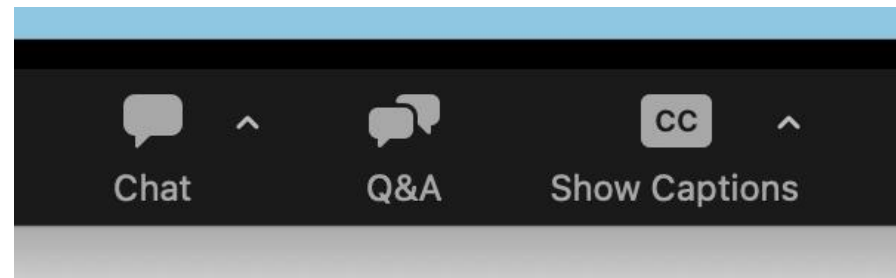
Send a message using the chat.

You can also enable captioning.



How to Ask a Question in the Webinar

Please submit questions for the panelists using the Q&A box.



SRP's Participation in Markets: Today and in the Future

Josh Robertson

Director, Energy Market Strategy (SRP)

Value Proposition of Markets

Leveraging load and resource diversity over a larger footprint through expanded markets can deliver benefits to customers, such as reduced costs and enhanced reliability.

Each new market opportunity must be evaluated.



Expanded Western Markets



Potential Benefits

- Renewable integration
- Economic optimization
- Transmission planning
- Resource adequacy

Potential Risks

- Governance
- Cost allocation
- Evolution of market rules
- Resource adequacy



SRP's Current Participation in Markets

Bilateral Markets

Traditional wholesale market by phone or exchange platform

California Independent System Operator (CAISO) Intertie Bidding

Hourly bidding into CAISO wholesale energy market

Western Energy Imbalance Markets (WEIM)

Real-time and five- and fifteen-minute markets

SRP's WEIM participation began in April 2020.

SRP Priorities for New Market or Regional Transmission Organization (RTO) Participation

Customer Benefits	Governance	Transmission Cost Allocation	Generation Resource Sufficiency
<ul style="list-style-type: none">• Net benefits• Load and resource diversity• Maintain or enhance reliability• Path to RTO	<ul style="list-style-type: none">• Independence / transparency• Public Power representation• Local resource decision making• Utility input on grid operations	<ul style="list-style-type: none">• New project cost allocated based on needs and measurable benefits• Transmission costs recovered via “license plate” charge	<ul style="list-style-type: none">• Maintain vertically integrated utility structure• Self scheduling of generation• Resource Adequacy Construct

New Regional Market Developments

Real-Time and Day-Ahead Markets



CAISO's Extended Day Ahead Market (EDAM)

Expanding day-ahead market coordination and unit commitment across the West



SPP's Markets+

Real-time and day-ahead market provided by Southwest Power Pool (SPP)

Regional Reliability Planning Program



WPP's Western Resource Adequacy Program (WRAP)

Regional reliability and resource adequacy program in the West with 20 committed utilities, including SRP

Panelist Introductions



Arne Olson- Moderator

Senior Partner
Energy + Environmental Economics

External Panelists

Research/Academia



David Hurlbut

Senior Analyst

**National Renewable
Energy Laboratory
(NREL)**

Regional Market Initiatives



Sarah Edmonds

**President and CEO,
Northwest Power Pool
Corporation**

**Western Resource
Adequacy Program
(WRAP)**

Environmental



Kelsie Gomanie

**Advocate, Climate &
Clean Energy Program**

**Natural Resources
Defense Council
(NRDC)**

Government



Tony Clark

**Senior Advisor,
Wilkinson|Barker|
Knauer|LLP**

**Former Commissioner
Federal Energy
Regulatory Commission
(FERC)**

Utility



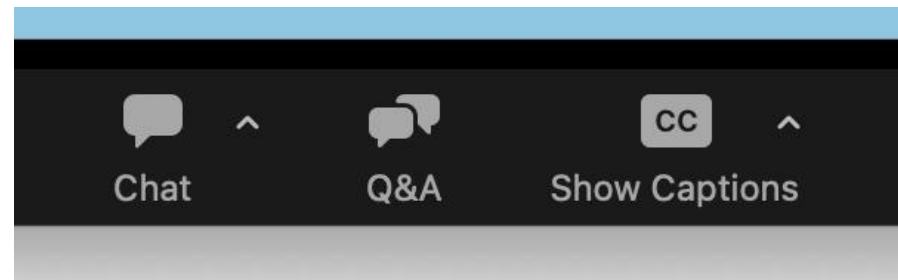
Colton Kennedy

**Director, Energy
Portfolio Planning**

**Omaha Public Power
District**

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Research/ Academia Perspective

Research/Academia



David Hurlbut

Senior Analyst

National Renewable
Energy Laboratory
(NREL)

Regional Electricity Markets: Why Do It, What to Expect

David J. Hurlbut, Senior Analyst
SRP Technical Working Session on Integrated
System Planning
March 31, 2023

Why Interest in Markets is Growing in the West



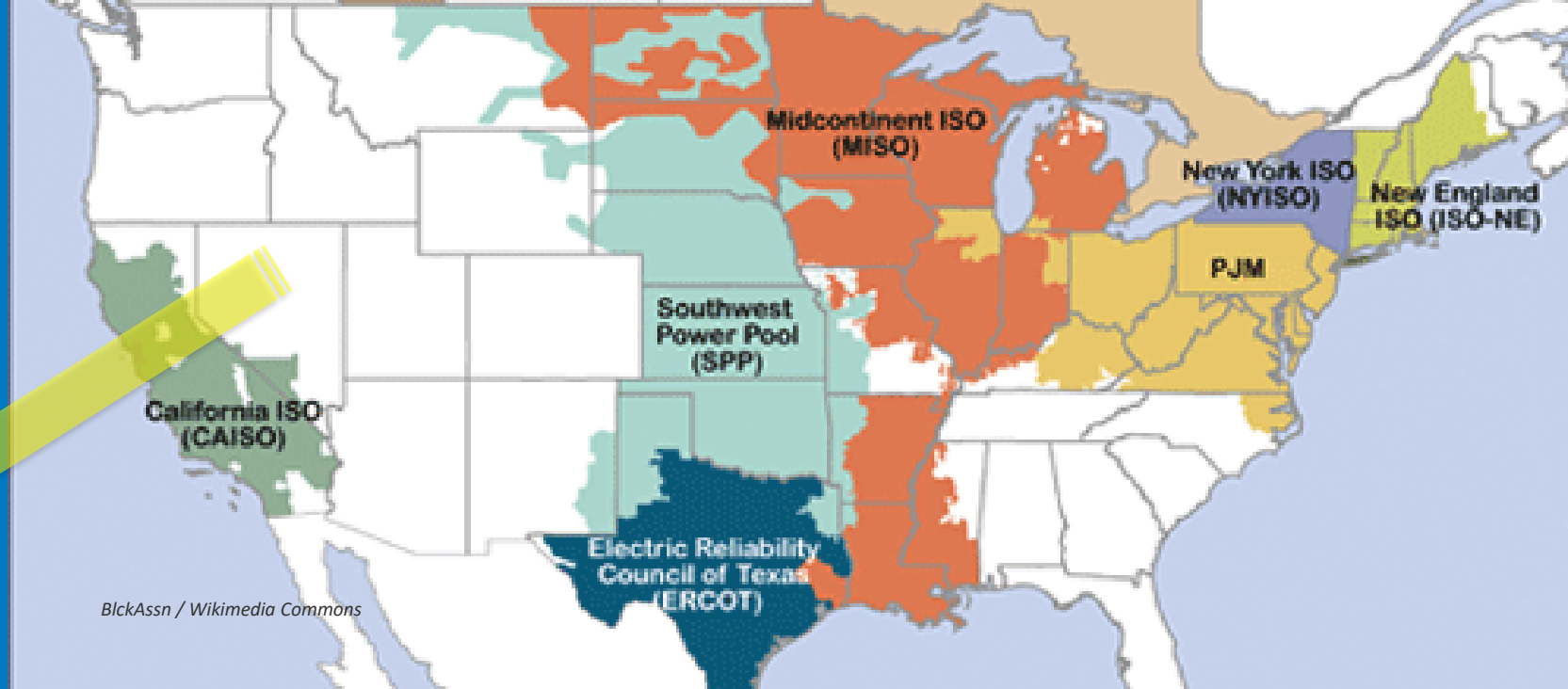
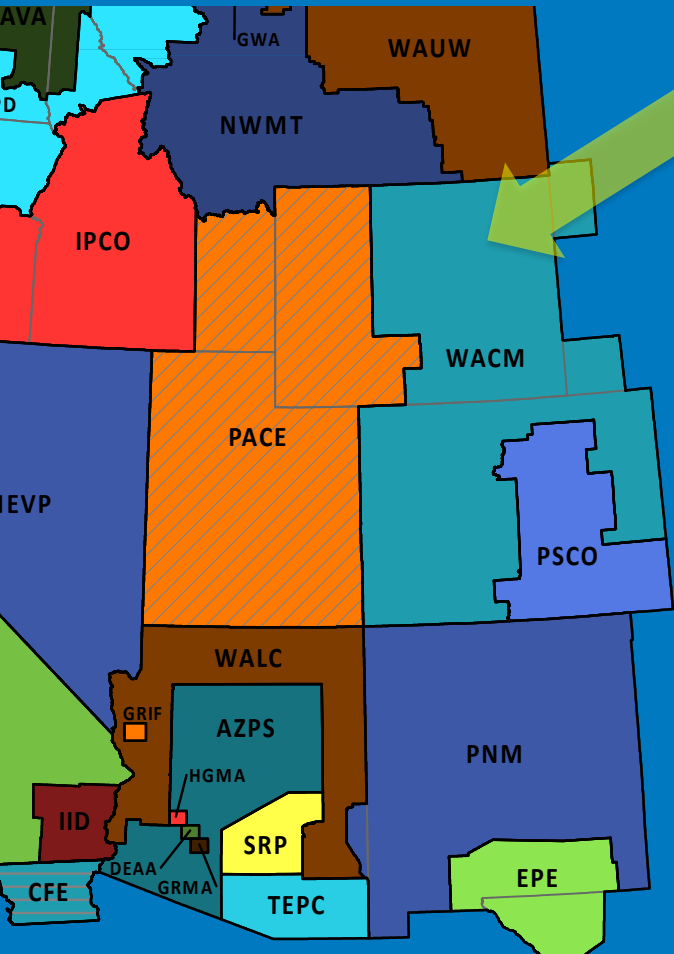
The electric sector is changing fundamentally

Many of yesterday's tools don't fit today's challenges

No going back

- Well-tempered markets can reduce a utility's cost of doing business
 - New technologies do more
 - Customers are demanding more
- In a regional market, a utility isn't limited to its own resources for solving every problem
 - A healthy market can reduce the number of new plants that customers have to pay for
 - More options for maintaining reliability
- Many utilities have clean energy or decarbonization goals, but they also have an obligation to customers to do so cost effectively
 - Regional markets help integrate wind and solar reliably and cost effectively

Learning from Experience in Other U.S. Markets



U.S. has seven organized wholesale markets with more than two decades of experience; each market consolidates all aspects of wholesale operations for the entire region



In contrast, WECC is many separate balancing authorities; load is smaller and resources are more scattered than in organized markets

How Regional Markets Work

- Markets can broadly encompass all aspects of grid operations, or they can narrowly target specific functions
 - Regional transmission organization (RTO) consolidates all wholesale operations
 - Energy markets, reserve sharing plans leave other operational, planning functions unchanged
 - **Regional cooperation is possible without an RTO**
- No requirement for universal participation
 - Every utility makes its own opt-in/opt-out decision
 - **Caution: Universal participation is often a simplifying assumption in wide-area modeling, which can skew estimated benefits higher**
- Markets are evolutionary
 - What participants learn from initial engagement informs what they do next

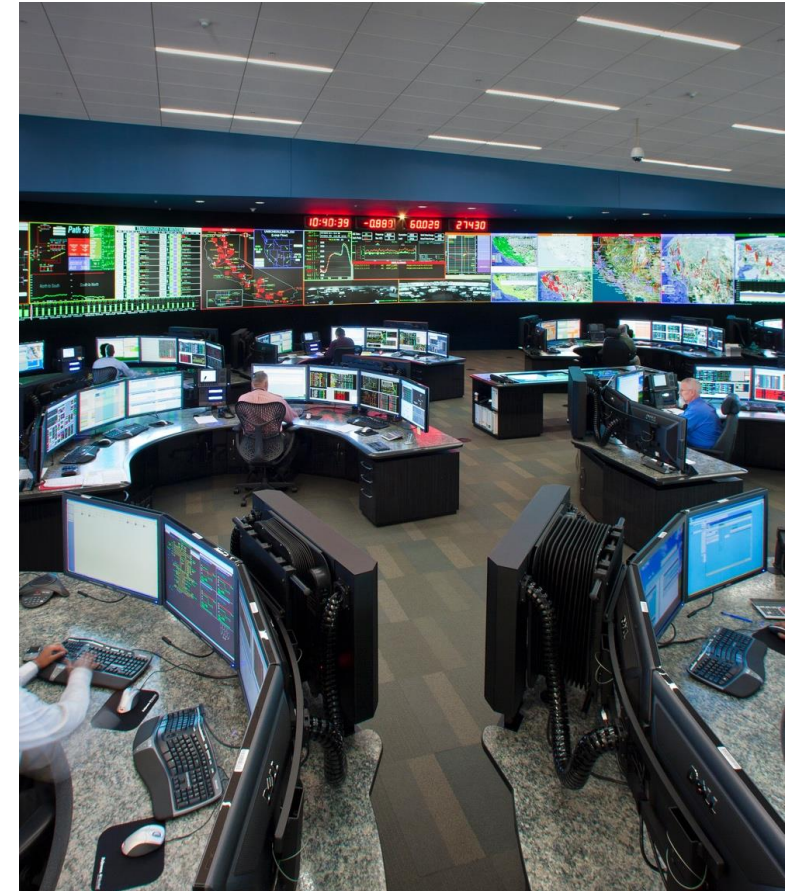
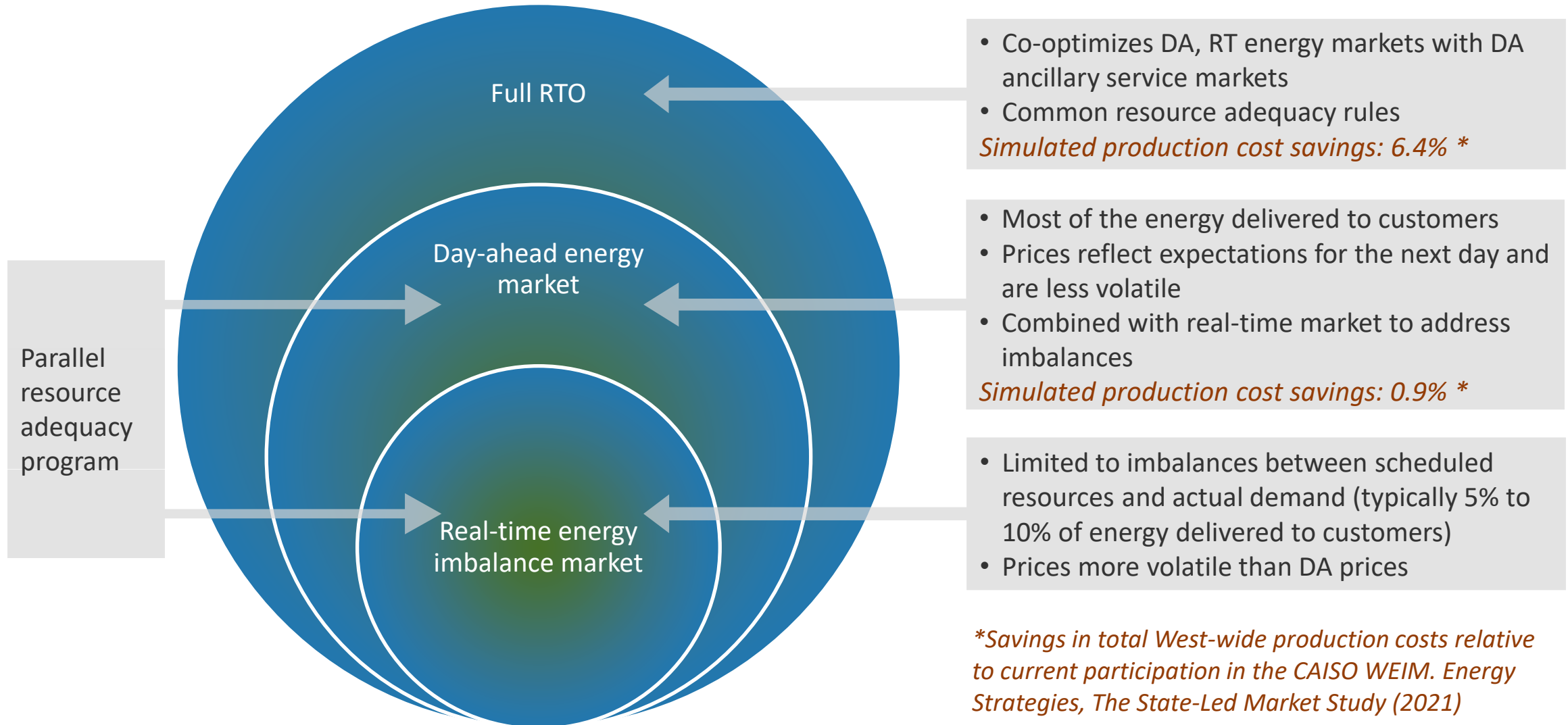


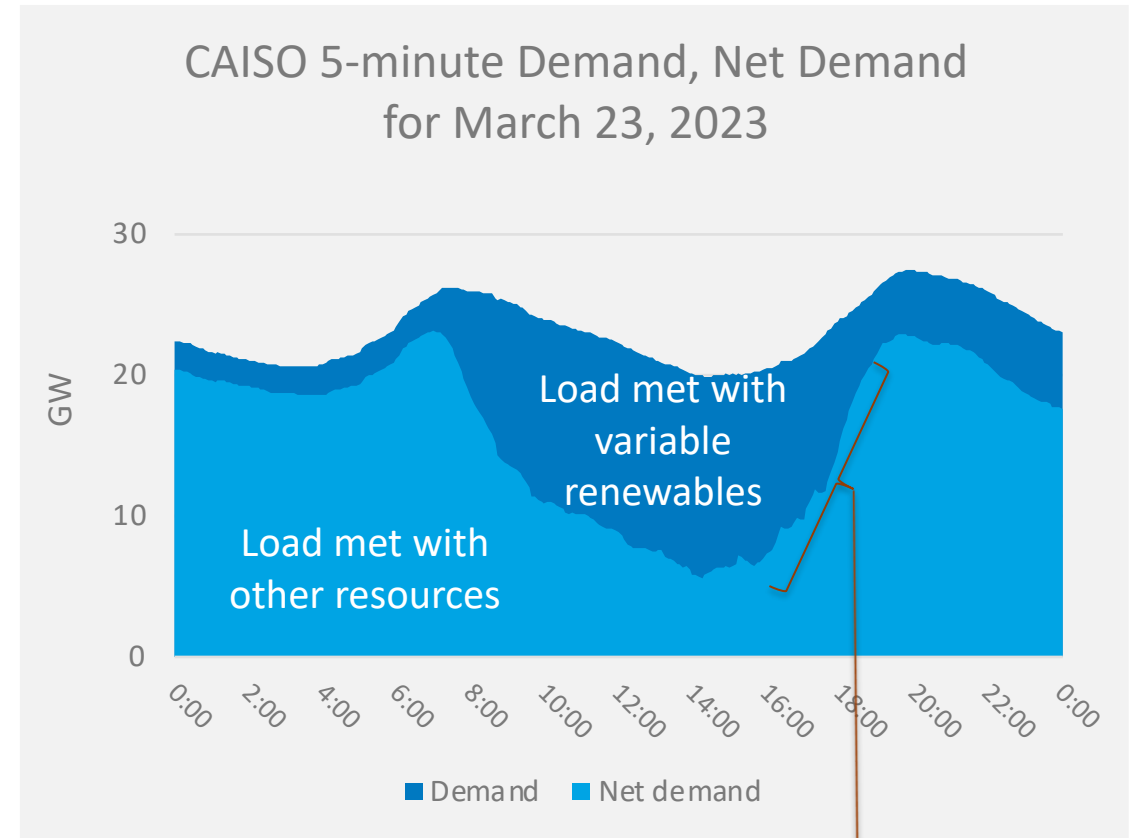
Photo by CAISO

Benefit Opportunities Increase as Markets Do More



Hourly, Sub-Hourly Energy Markets

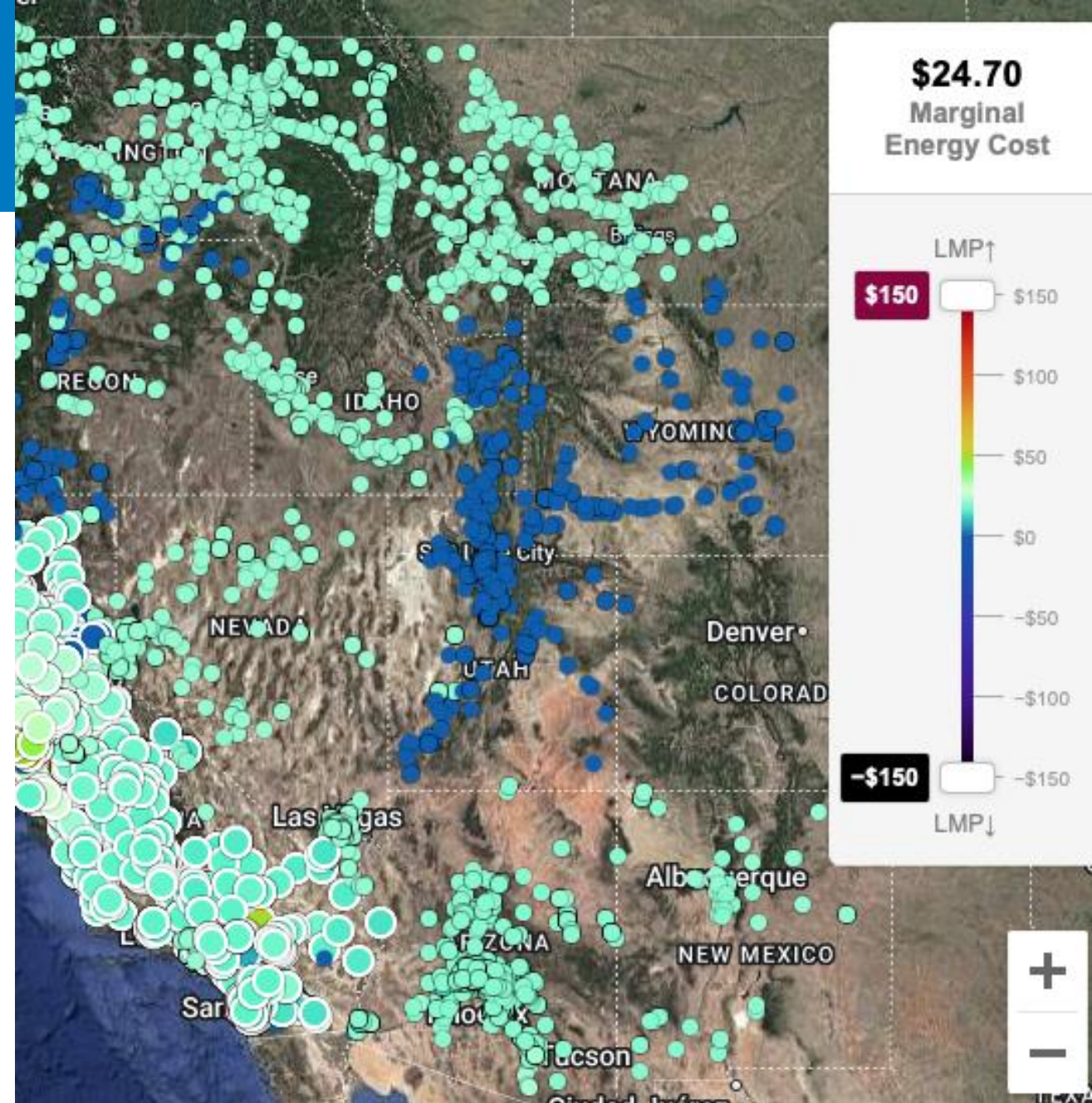
- West's resource mix is changing in a way that makes time-sensitive energy pricing more valuable
 - Coal is decreasing
 - Renewables and natural gas are increasing
- Wind, solar, and customer demand vary sub-hourly
 - Net demand: Demand minus wind and solar output
- Flexible resources (natural gas, storage) take on more value as wind, solar increase and net demand variations become common
 - Regional market provides a deeper pool for finding least-cost resources
- Power systems dominated by inflexible coal did not benefit from fast markets and sub-hourly pricing



Real-time requirement from flexible resources:
14.6 GW of up ramp for 3 hours

Price Transparency

- Prices are set by security-constrained economic dispatch
 - Selects the lowest-cost set of resources to meet demand, subject to transmission constraints
 - Each grid node has its own locational marginal price (LMP) that captures instantaneous marginal energy cost and the effect of transmission constraints, losses
 - DA markets every hour, RT markets every 5 minutes; outcomes reported publicly
- Bilateral energy contracts still exist, but they contain provisions for handling the differences between LMPs and the terms of the contract
 - As old contracts are replaced by new ones, contract prices should converge with market expectations for LMPs



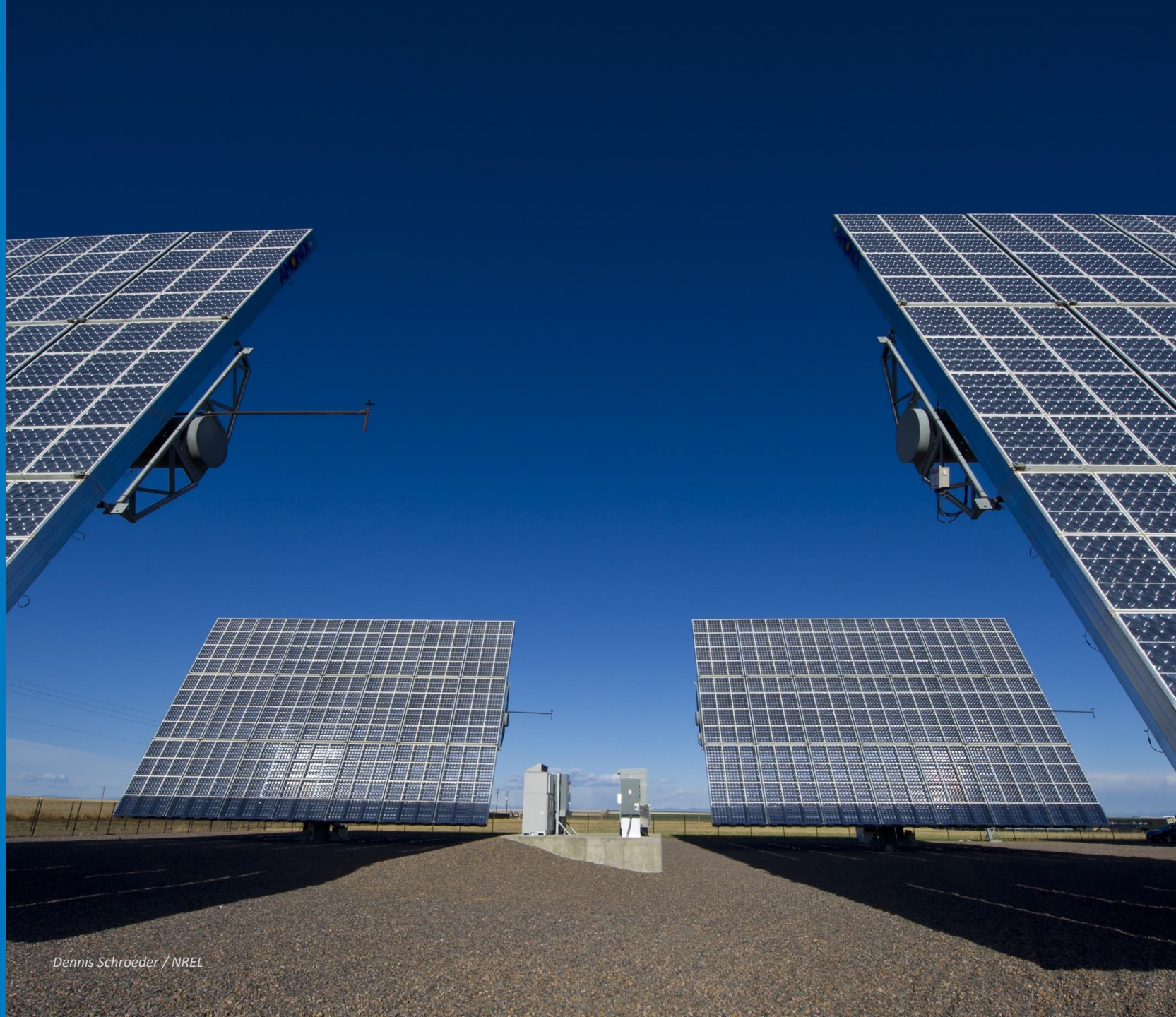
Planning: Economies of Scale Are Different

- Studies and experience show that geographic diversity increases wind, solar value
 - Variations at one site tend to offset variations at another, resulting in less net variability to manage with flexible resources
 - Thermal technologies are the opposite; economies of scale come from building large central-station plants
- Increases the importance of regional transmission planning
 - New lines should reach wind and solar zones in the West with high capacity factors (examples: SunZia, TransWest Express)
 - Goal: A few high capacity lines to deliver the most clean energy with the least capital investment and the least impact on land



Closing thought

The power sector is changing in ways that make regional coordination and regional markets more beneficial to customers than ever before. But some of the fundamentals are different, and they demand different ways of thinking.





Thank you

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Additional slides

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Market Competition

- Competition is a critical factor affecting the ability of a regional market to produce benefits
 - *Wholesale competition is why RTOs were created*
 - Market-based prices can be just and reasonable as long as no one can exercise market power (control prices, prevent competitors from entering the market)
 - Monitoring, market power mitigation
- Production cost modeling assumes perfect competition, even though it is never perfect even in fully restructured markets
 - Modeling usually assumes
 - all resources are always available to the market
 - all resources are always priced at their marginal cost of operation

Caveats for Electricity Market Modeling

- Grid resilience is not captured well in traditional modeling
 - Disruptions caused by extreme weather events, cyberattack
 - Mass forced outages of resources that were expected to be available
 - Reserve sharing arrangements provide additional measure of resilience
 - Benefits might be limited if the arrangements are based on existing transmission and do not include cooperative transmission planning
- Resource adequacy
 - Consensus has been growing for a while that resource availability during the year's peak load hour is not a sufficient measure of resource adequacy
 - New approaches test loss of load probabilities at all times of the year, especially during extended periods of high ramping requirements
 - Current research is examining transmission's resource adequacy value

Caveats for Electricity Market Modeling

- Power system modeling focuses on benefits, primarily reductions in system-wide generator costs, capacity value savings, reduced cost of operating reserves, reductions in unserved load
 - Many of the risks are not quantified or set aside as qualifications to the results
 - Loss of local control over operating the power system
 - Jurisdictional issues
 - Allocating the cost of new transmission among participants in the market who would benefit from the new line
 - IT, staff training costs incurred by utility, market participants to engage in the new market

Regional Markets Initiatives Perspective

Regional Market Initiatives



Sarah Edmonds

**President and CEO,
Northwest Power Pool
Corporation**

**Western Resource
Adequacy Program
(WRAP)**



WESTERN RESOURCE ADEQUACY PROGRAM AND OTHER REGIONAL GRID INITIATIVES

Sarah Edmonds, WPP President

March 31, 2023

WRAP VALUE PROPOSITION

- » ***Reliability first-*** Implementing a west-wide resource adequacy (RA) program must be the priority for the region
 - Work on WRAP interoperability with markets is important and ongoing
- » ***Diversity is key-*** WRAP benefits hinge on diversity of resources, loads, and transmission across a broad footprint
- » ***Leadership opportunity is nigh-*** WRAP commitments send strong signal that the West can work together to tackle RA

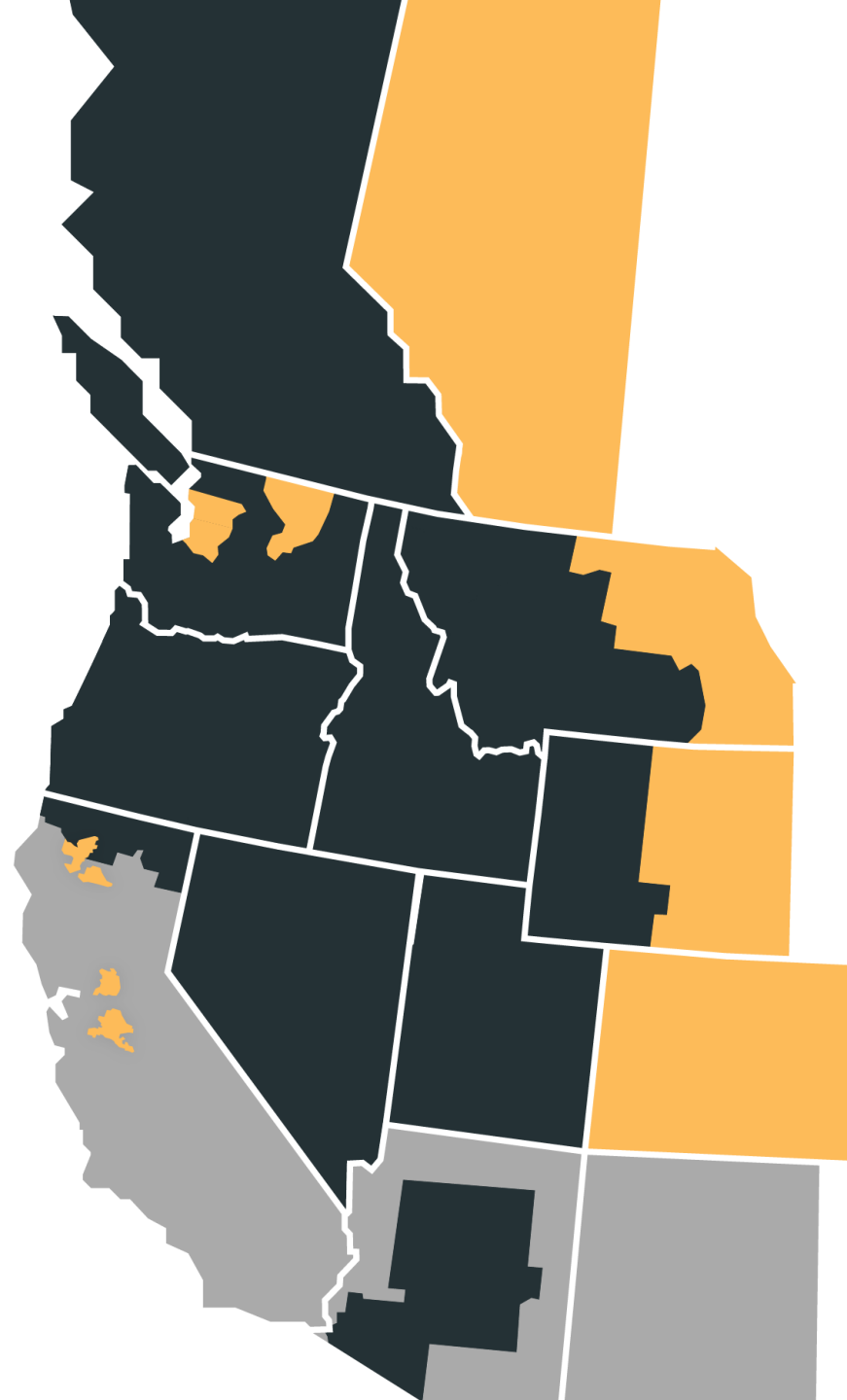
SOLVING A PROBLEM

- » Resource Adequacy is currently conducted on utility-by-utility basis
 - No standardized method for measuring reliability risk or capacity contribution of resources
 - Utilities often must make broad assumptions about regional capacity availability that may not be accurate
- » Implements a **binding forward showing** framework that requires entities to demonstrate they have secured their share of the regional capacity need for the upcoming season
- » Implements a **binding operational program** that obligates members with calculated surplus to assist participants with a calculated deficit on the hours of highest need
- » Leverages the binding nature of the operational program, together with modeled supply and load diversity, to **safely lower the requirements** in the forward showing and help **inform resource selection** for the region, **driving investment savings** for members and their end use customers

CURRENT PARTICIPANTS (19)*

Arizona Public Service
Avista
Bonneville Power Administration
Calpine
Chelan PUD
Clatskanie PUD
Eugene Water & Electric Board
Grant PUD
Idaho Power
NorthWestern Energy
NV Energy
PacifiCorp
Portland General Electric
Powerex
Puget Sound Energy
Salt River Project
Shell Energy
Tacoma Power
The Energy Authority

**anticipating 2 more*



WRAP LOADS

Winter Peak

56,800 MW
44% of WECC

Summer Peak

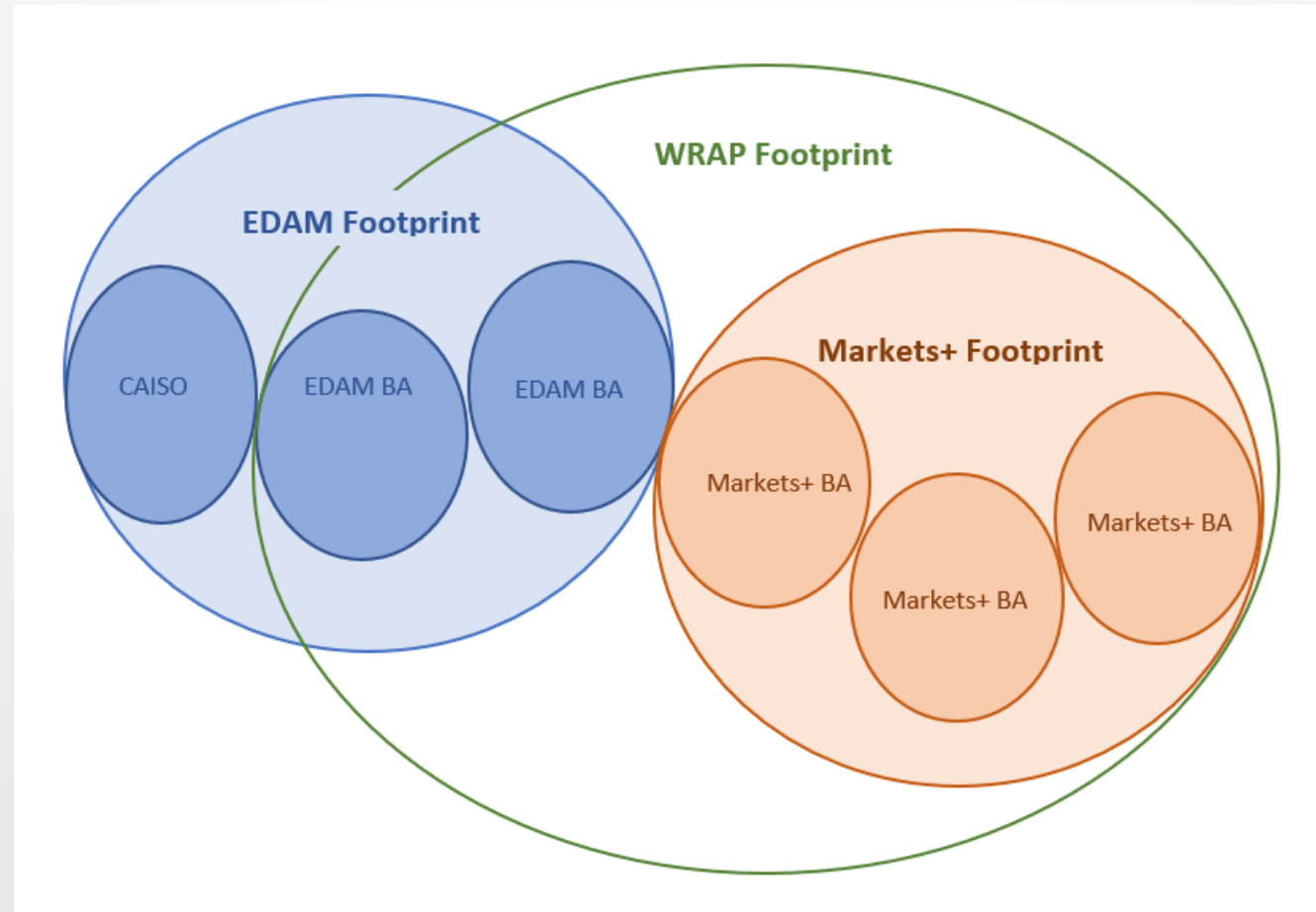
65,200 MW
40% of WECC

ADDITIONAL
WPP FOOTPRINT

NON-WPP FOOTPRINT

CURRENT WRAP
FOOTPRINT

CONCEPTUAL WRAP + MULTIPLE MARKETS FOOTPRINT



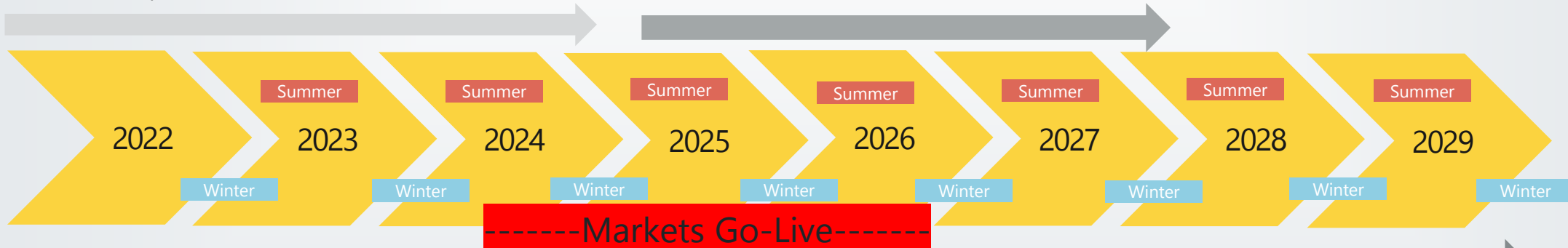
TRANSITION TIMELINE

Non-Binding Forward Showing

Winter 22-23, Summer 23, Winter 23-24, Summer 24, Winter 24-25

Transition Seasons (Ops and FS)

Summer 25, Winter 25-26, Summer 26, Winter 26-27, Summer 27, Winter 27-28



Non-Binding Operations Program

Summer 23 (trial – will include testing scenarios), Winter 23-24, Summer 24, Winter 24-25

Binding Program Without Transition Provisions

Summer 28 and all seasons following

Environmental Perspective

Environmental



Kelsie Gomanie

**Advocate, Climate &
Clean Energy Program**

**Natural Resources
Defense Council
(NRDC)**

REGIONAL MARKETS: ENVIRONMENTAL BENEFITS



KELSIE GOMANIE | MARCH 31, 2023

**SALT RIVER PROJECT ISP TECHNICAL WORKING SESSION:
REGIONAL MARKET DEVELOPMENTS**

About NRDC and Sustainable FERC



NRDC works to safeguard the earth—its people, its plants and animals, and the natural systems on which all life depends.

We combine the power of more than 3 million members and online activists with the expertise of some 700 scientists, lawyers, and policy advocates across the globe to ensure the rights of all people to the air, the water, and the wild.

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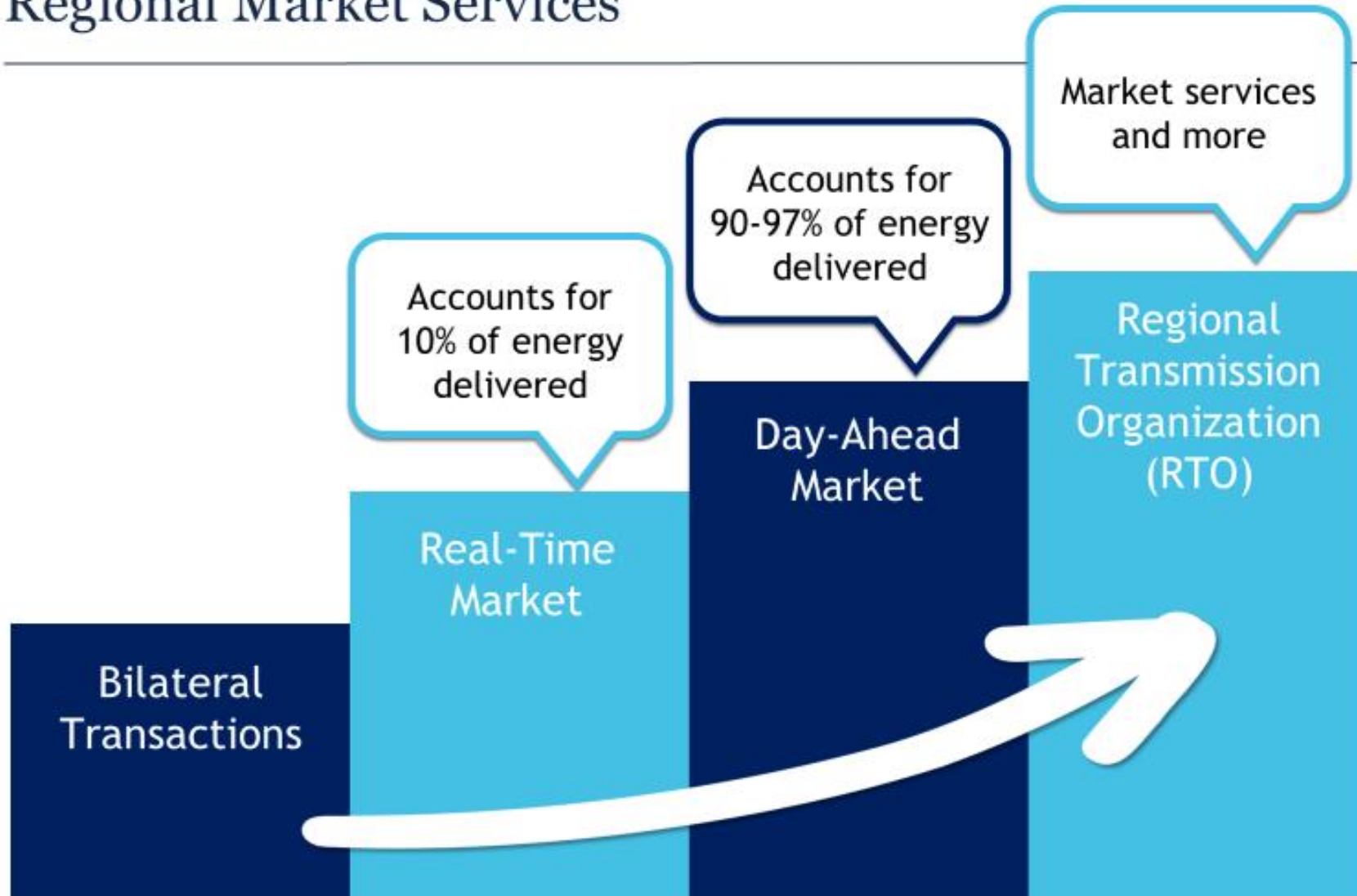
The Sustainable FERC Project is a partnership of state, regional and national environmental and other public interest organizations working to expand the deployment of clean energy resources into America's electricity transmission grid and to reduce and eventually eliminate carbon pollution from the U.S. power sector.

sustainableferc.org

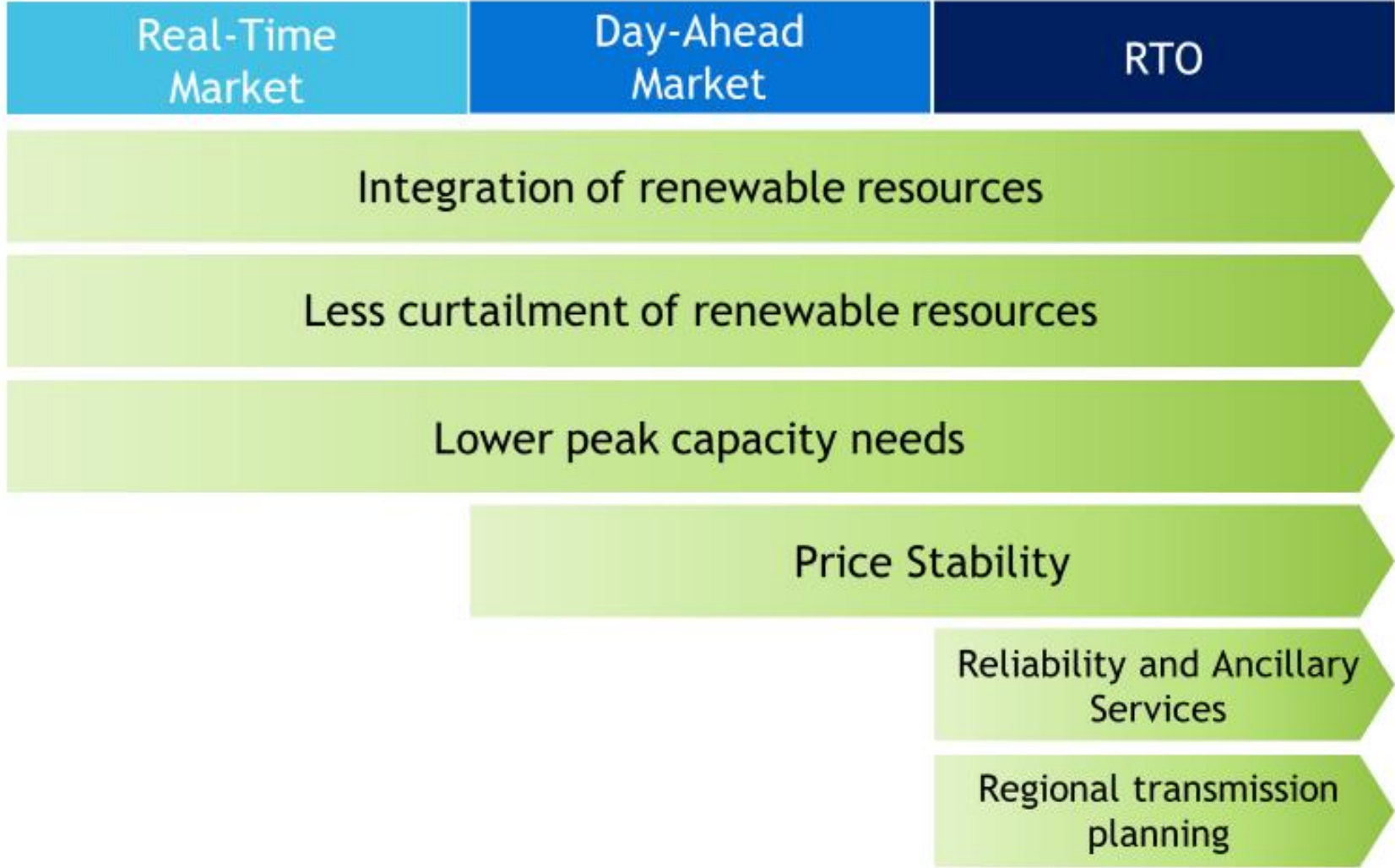
Regional Market Benefits

Goals for the West	Decarbonization	Reliability	Affordability
Regional Market Benefits	Integration of renewables Enable demand response technologies Less curtailment of renewables	Geographic and resource diversity Regional transmission planning Fewer disruptions from severe weather and other emergencies	Access to lowest cost generation Efficient transmission use Lower peak capacity needs

Regional Market Services



Regional Market Benefits



Summary

- Enhanced regional coordination is needed to ensure sustainability of the future western grid and meet climate goals
- Regional markets offer benefits to the western region that contribute to decarbonization, affordability, and reliability
- A west-wide RTO offers the most regional coordination, market benefits, and other services including centralized transmission planning
- One market offers more benefits than splitting the region

THANK YOU

kgomanie@nrdc.org



Government Perspective

Government



Tony Clark

Senior Advisor,
Wilkinson| Barker|
Knauer| LLP

Former Commissioner
Federal Energy
Regulatory Commission
(FERC)

Regionalization in Wholesale Electricity Markets

Tony Clark

Sr. Advisor, WBK Law

SRP ISP Technical Working Session: Regional Market Developments

March 31, 2023

WILKINSON) BARKER) KNAUER) LLP

Regionalization in Wholesale Markets

- Chasing Scale (size and geography)
- What were RTO's originally designed to do?
- Different Approaches for Different Companies/States/Regions
 - East Coast
 - Midwest
 - Southeast
 - West
 - Texas

Challenges in the Wholesale Markets

- Bilateral Market Regions seek to increase scale and planning
- RTO regions also struggle to adjust to the energy transition
 - In joining RTOs, states/utilities tacitly agreed to allow RTO-formed prices to make determinations about investments.
 - But the trends in RTOs are simultaneously doing several things :
 - Increasing penetration of resources that are price agnostic
 - Increasing financial pressure on dispatchable resources still needed for reliability
 - States/utilities won't abide by RTO results that don't give them the generation they want or need
 - States enact policies that directly fight the RTO market construct

Recommendations for Decision Makers

- Avoid falling into the “One Best Way” trap
- Governance discussions are key – especially in the West
- Understand the perspectives and self-interest of each stakeholder in the policy ecosystem
- Examine “third ways” that might achieve shared goals: Models to bring the most scale, best reliability and the biggest customer savings, with the least bureaucracy and loss of local control
- Be engaged. Be thoughtful. Be Nimble.

Further Reading

- Clark, Tony; Duane, Vincent, [“Stretched to the Breaking Point: RTOs and the Clean Energy Transition”](#)
 - Clark, Tony; Duane, Vincent, [“Who Owns the RTO?”](#)
 - Clark, Tony; Duane, Vincent, [“Rethinking and Restyling an Old Idea: A New Model of Transco to Plan and Operate a Changing Grid”](#)
-
- Tony Clark
 - tclark@wbklaw.com

Utility Perspective

Utility



Colton Kennedy

**Director, Energy
Portfolio Planning**

**Omaha Public Power
District**



Portfolio Planning within an Integrated Market

SRP Technical Working Session on Integrated System Planning

Colton Kennedy, PE – Director, Energy Portfolio Planning

March 31, 2023



Omaha Public Power District
Vertically Integrated Utility
Southwest Power Pool Member
Approx. 2,500MW Peak
Approx. 380,000 Customers

Today's Resource Mix:

1,330 MW	Coal
972 MW	Wind
866 MW	Gas
167 MW	Demand Response
123 MW	Oil
79 MW	Hydro (WAPA)
6 MW	Landfill Gas
5 MW	Solar
1 MW	Battery Energy Storage

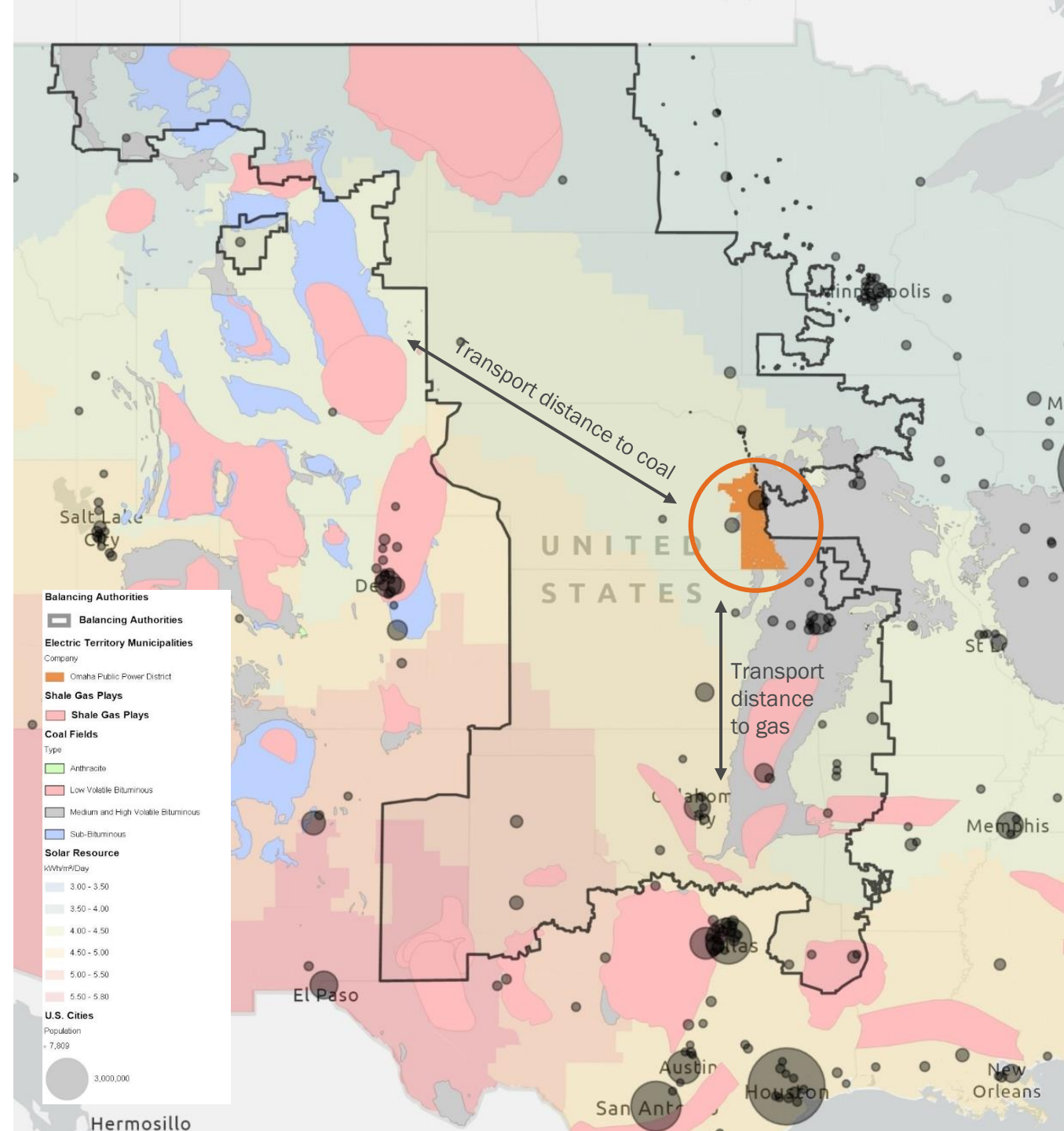
OPPD has a strategic directive to achieve **Net Zero Carbon by 2050.**



Many more renewable resources, energy storage, and continued investment in flexible firm resources.

Regional Economic Efficiencies

- Market participants have unique advantages, not only due to access to resources, but also in their financial structure
- An integrated market supports maximization of the unique productive capabilities of participants, creating economic efficiency and savings
- Historically, a significant source of efficiency was derived from marginal production cost savings through availability and transport of fuel stocks.
- However, as zero marginal cost renewables saturate markets and energy prices collapse, value will transition from the energy market to other market products such as ancillary services and availability.



Advantages



Challenges

- Economic efficiencies due to reductions in net production costs
 - Increased asset utilization
 - Reductions in marginal production costs
- More efficient access to renewable resources located in prime locations
 - Reduced system capital expenditures to provide a given level of renewable energy
 - Greater participation of non-utility renewable resources with transparent pricing and direct access to wholesale markets
- Efficient market signal to support energy arbitrage as energy storage is increasingly deployed
- Reduced financial impact of generator outages due to availability of market power purchases
 - No scrambling to fill energy positions, the market automatically drives incentive to produce.
- External market signals drive generator production, creating volumetric uncertainty
 - Budget uncertainty
 - Emissions uncertainty
 - Fuel procurement uncertainty
- Price signals may drive inefficient asset utilization if not properly accounted for in offers
- Energy prices alone will not incent and support appropriate levels of essential reliability services
- Regional changes in resource mix will have a more direct impact on the value of resources, often negatively for variable energy resources with increasing saturation
- Elective externalities such as the cost of carbon may not be admissible into a multi-jurisdictional market
- Markets may create the incentive to move away from maintaining local system resource adequacy and create increased inter-dependency across systems.

Summary

- Traditional savings achieved through energy markets is diminishing as systems are increasingly saturated with renewable resources
- Value migration is likely to occur from traditional energy markets to other market products that are reflective of essential reliability services and resource adequacy
- While there are definite advantages to participation in an integrated market, this comes with challenges and limitations which need to be fully understood in the context of an evolving system.

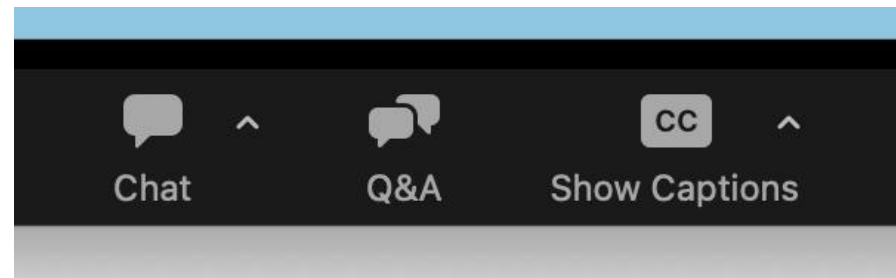
Thank You
cmkennedy@oppd.com

Coffee Break

Facilitated Discussion with Q&A from Participants

How to Ask a Question in the Webinar

Please submit questions for the panelists using the Q&A box.



thank you!