States in Sync: The Western Win-Win Transmission Opportunity

Webinar

RMI

Tyler Farrell, Chaz Teplin, Liza Martin, and Emily Long

May 9, 2024

Housekeeping

- **There will be two 10-minute opportunities for questions**
- **For questions:**
  1. Raise hand using zoom feature and we will allow you to talk or
  2. Add your question to the Q&A and Liza Martin will voice it over

Today's Agenda

- Introduction to RMI
- States in Sync Part 1
- Questions
- States in Sync Part 2
- Questions

RMI's mission is to transform the global energy system to secure a clean, prosperous, zero-carbon future for all

Sector Focus Areas

- Carbon-Free Industry
- Carbon-Free Mobility
- Carbon-Free Buildings
- **Carbon-Free Electricity**

Market Catalysts

- Policy
- Finance
- Business Models
- Data & Transparency
- Technology
- Education & Capacity

Global Geographies

Cities

China

India

U.S.

Developing Economies

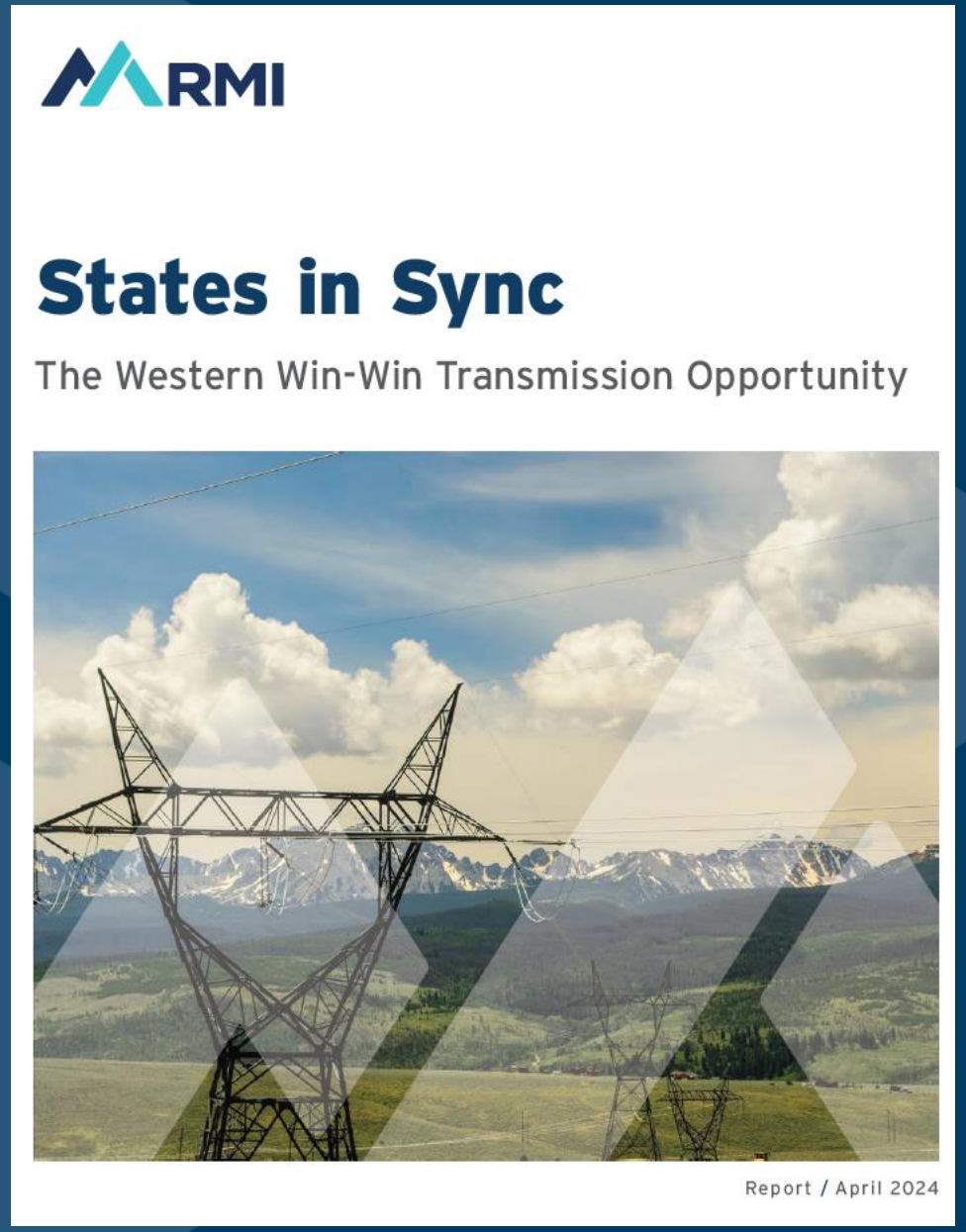
Our Clean Competitive Grids team works to ensure transmission supports the energy transition.

We actively participate in Western and PJM transmission processes

We publish insights on grid solutions: regional transmission planning, grid-enhancing technologies, federal funding opportunities, and more

We collaborate with PUCs, energy offices, legislators, and utilities

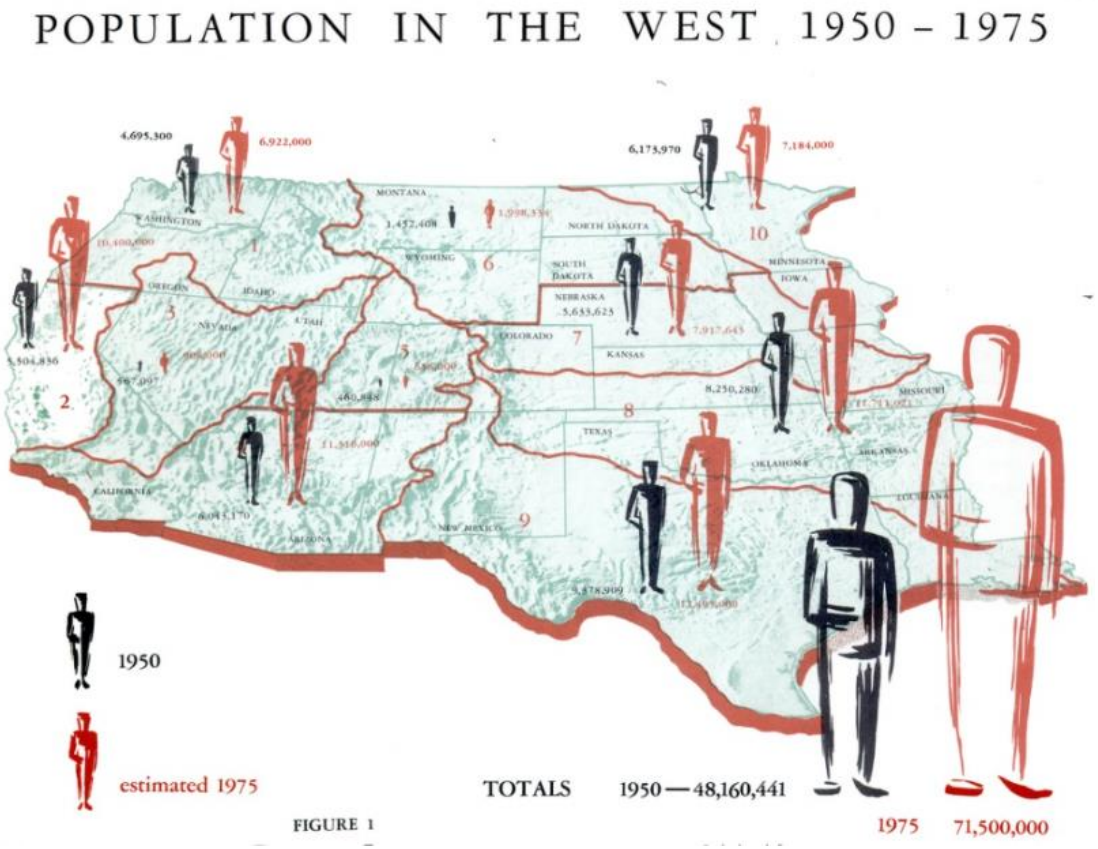
States in Sync

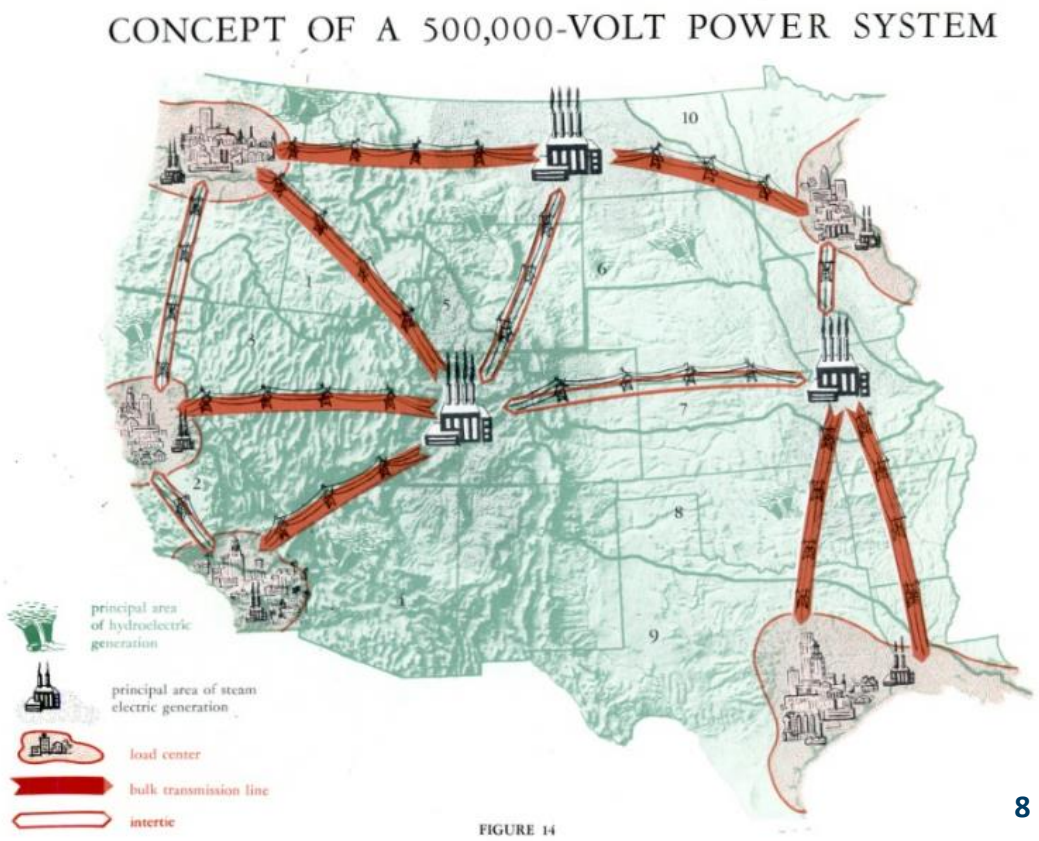


Background on Western Transmission

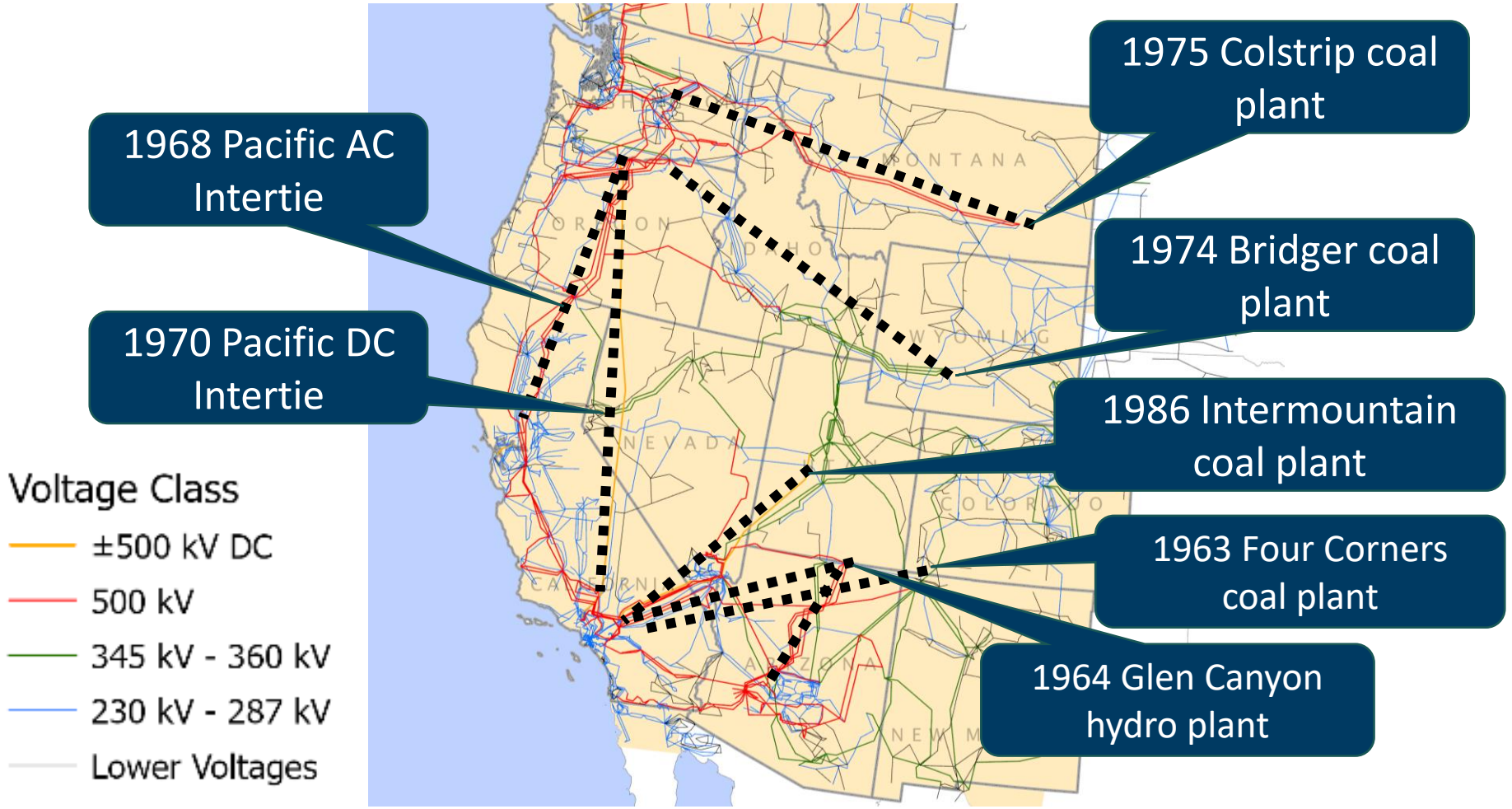
Coordinated, proactive transmission planning was essential to the West's growth (1940s-1990s)

Figures from "a study of future power transmission for the West"
US Bureau of Reclamation (1952)





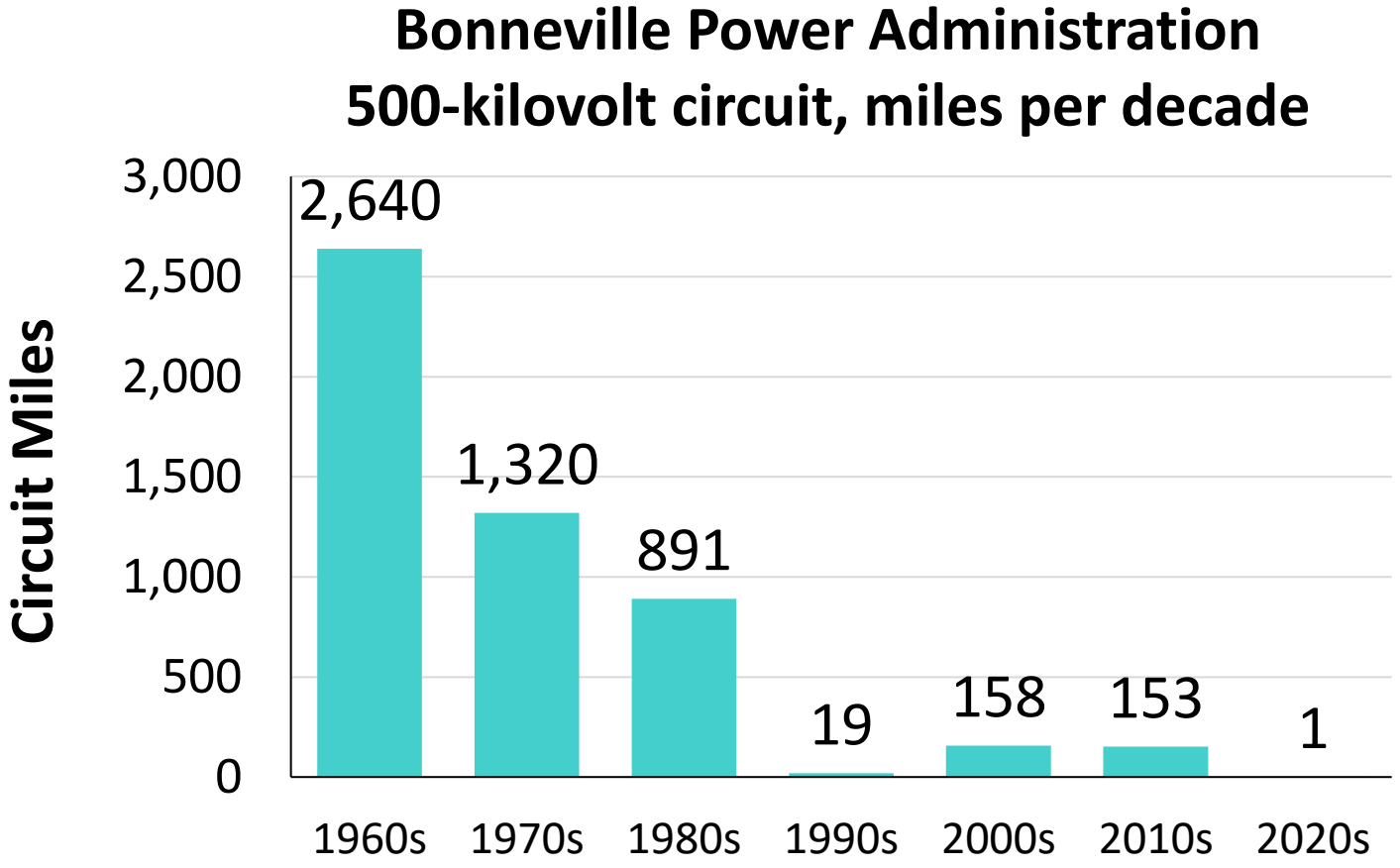
The backbone of the Western transmission was built during the 60s, 70s, and 80s



Source: Doug Larson, “Evolution of Western Interconnection”, April 2024, CREPC-WIRAB Conference and WECC.

And very little regional transmission has been planned or built since

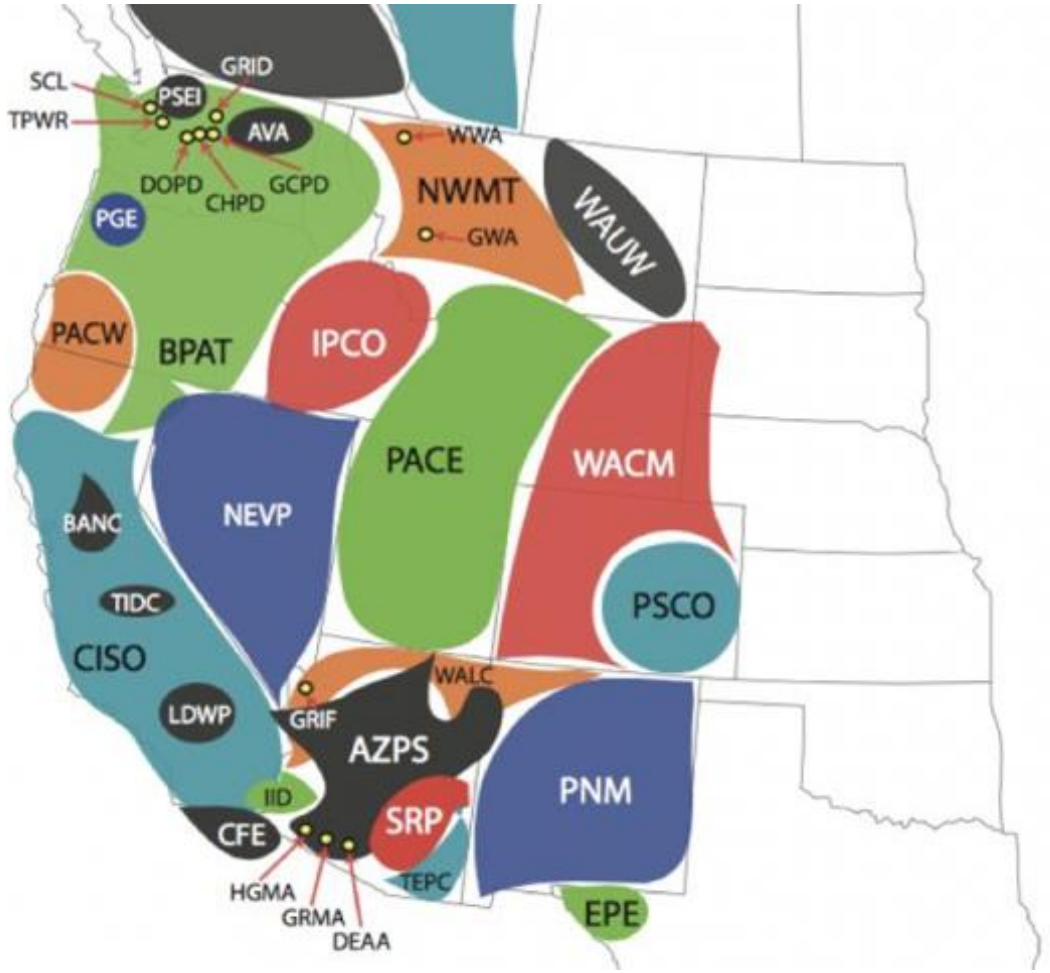
- Lack of load growth
- Lack of new resource
- Difficulties in permitting and siting
- Lack of region-wide planning



RMI Graphic. Source: Bonneville Power Administration.

The West lacks an effective centralized venue to plan transmission

- **Transmission planning is largely done by the region's 38 individual balancing authorities.**
- **Bottom-up planning fails to capture the economic value of regional coordination.**



Source: Western Electricity Coordinating Council.

Why States in Sync?

Western States can seize the multi-billion-dollar economic opportunity in West-wide proactive transmission planning

Transmission benefits from the March 2024 CREPC Transmission Collaborative meeting

- **Enhanced grid reliability and resilience**
  - Transmission helps alleviate impacts of extreme weather on demand and grid operations
  - Imports reduce loss of load probability
  - Better prepared to address ongoing load and supply changes
- **Capture advantages of regional diversity**
  - Different seasonal peaks
  - Weather/fuel availability at different times
  - Time zones impact both demand and supply
- **Reduced congestion/power costs**
- **Economic development for power exporters and importers**
- **Helps states achieve policy goals**

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We quantify the value of regional diversity across the West

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We quantify the value of regional diversity across the West

We quantify the investment opportunity for power exporters

To seize the transmission opportunity, states must support ambitious West-wide planning today

States can support and leverage ongoing efforts to plan West-wide transmission

WestTEC

POWERED BY WPP

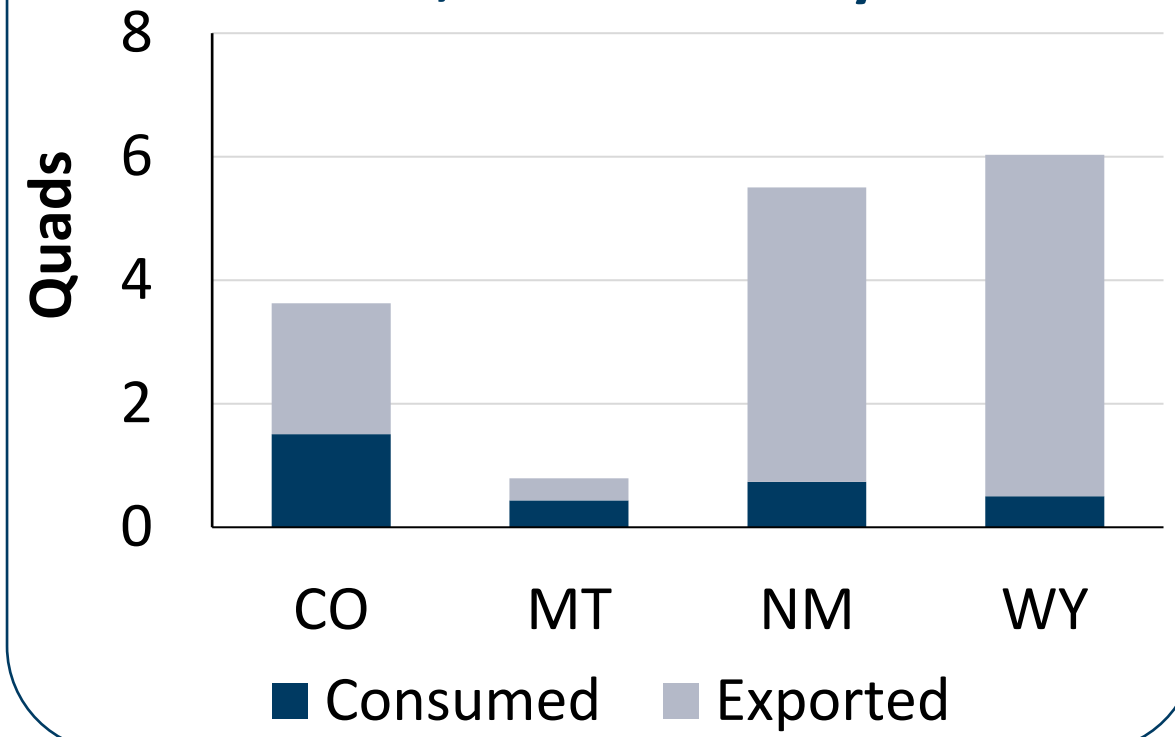
Lead the West to consensus on a fair allocation of transmission costs

Ensure that inter-state transmission is considered in in-state planning

Quantifying the investment opportunity for power exporters

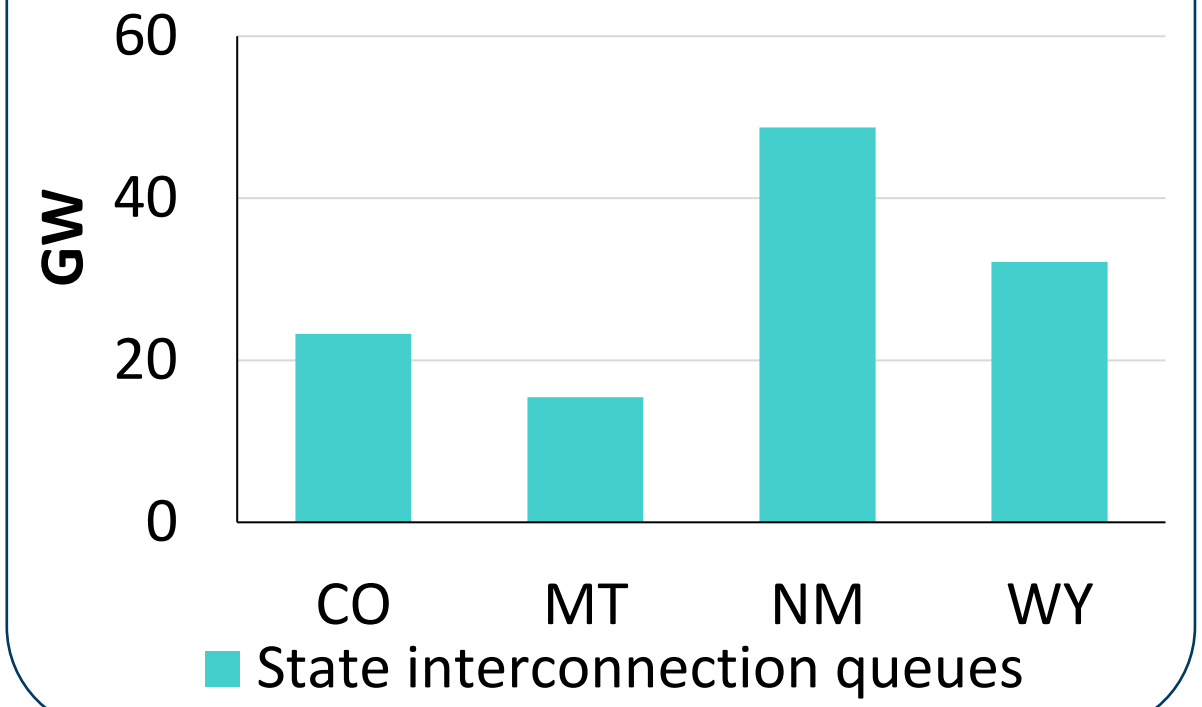
Colorado, Montana, New Mexico, and Wyoming are the leading energy export states of the West

Export significant quantities of oil, gas, coal, and electricity



RMI Graphic. Source: RMI analysis and the US EIA.

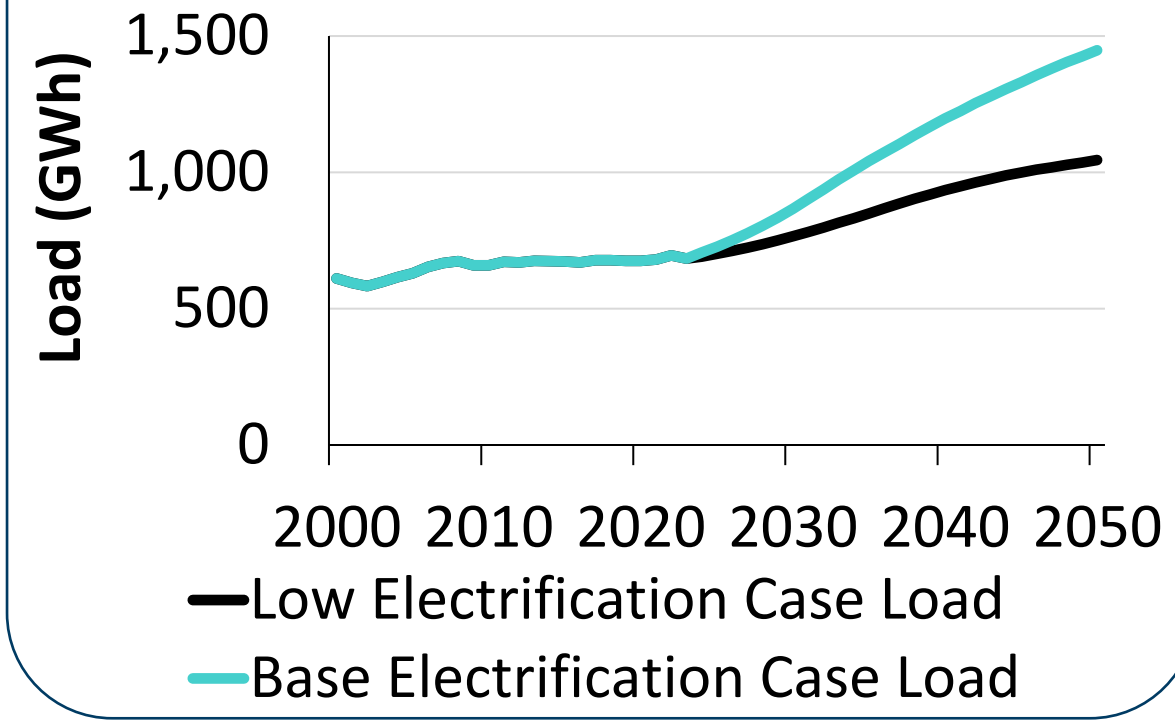
And have massive future potential for electric generation



RMI Graphic. Source: RMI analysis and the Lawrence Berkley National Laboratory.

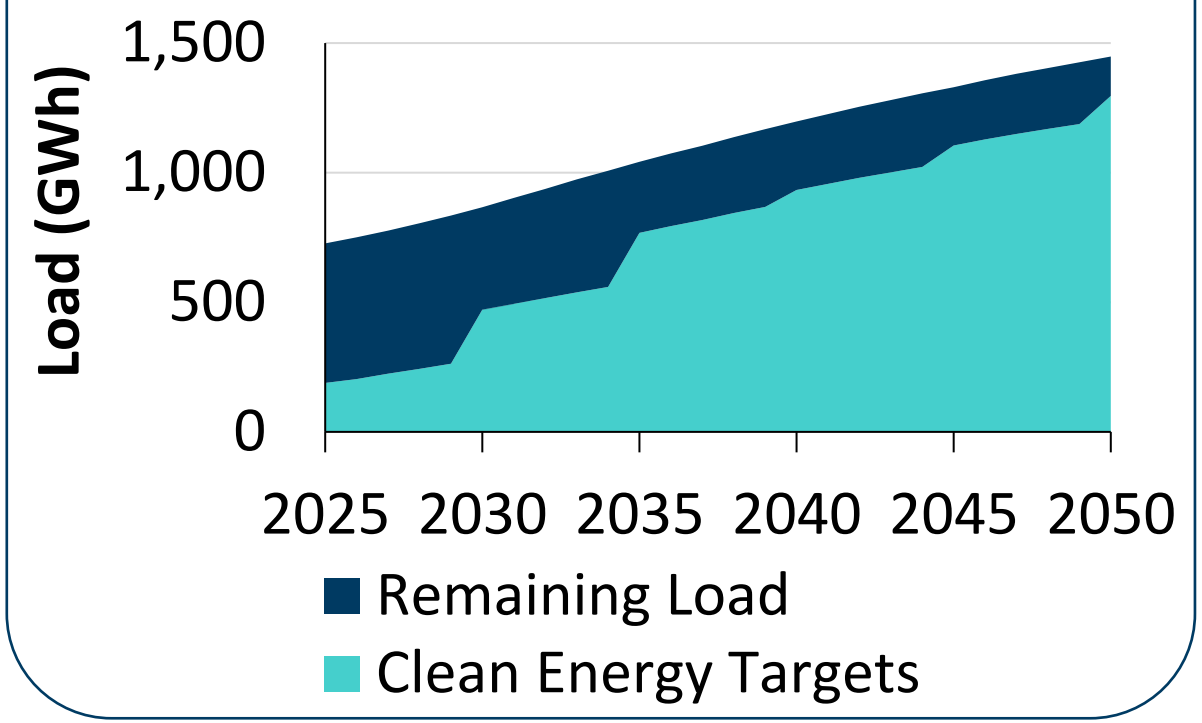
Load growth and public policy goals are driving a renewed need for new electric generation

The West is on the cusp of supercharged electricity demand



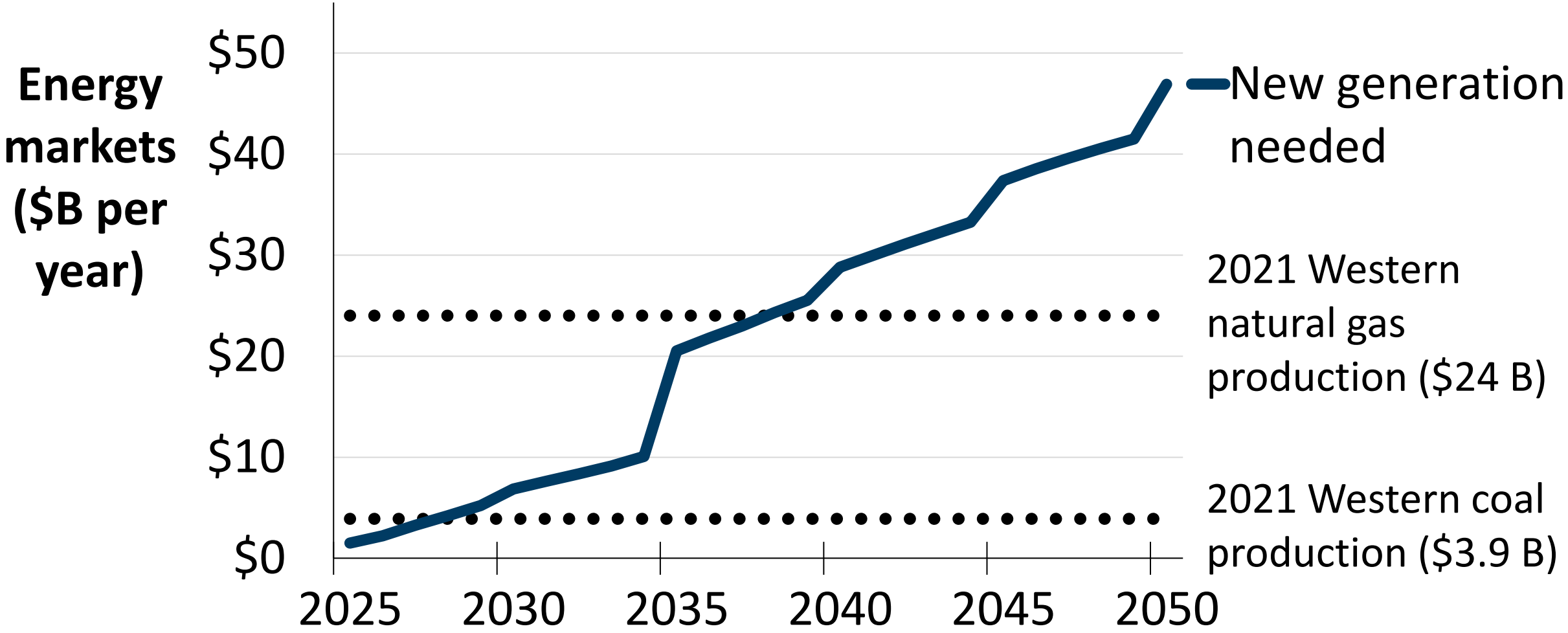
RMI Graphic. Source: RMI analysis, Energy Innovations, and the US EIA.

Clean energy targets will make up over 90% of Western demand by 2050



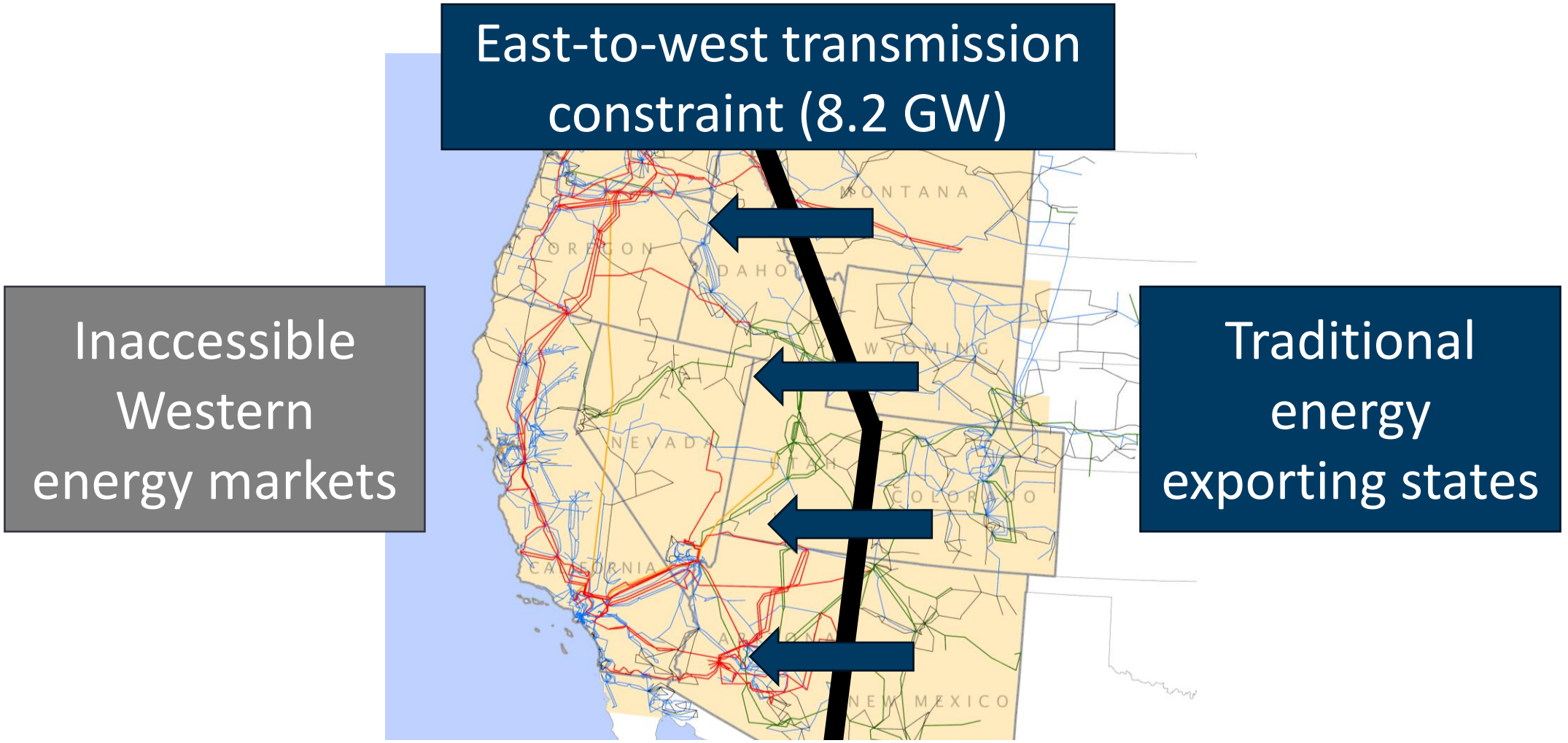
RMI Graphic. Source: RMI analysis and the Lawrence Berkley National Laboratory.

New electric power investments will grow rapidly over the coming decades



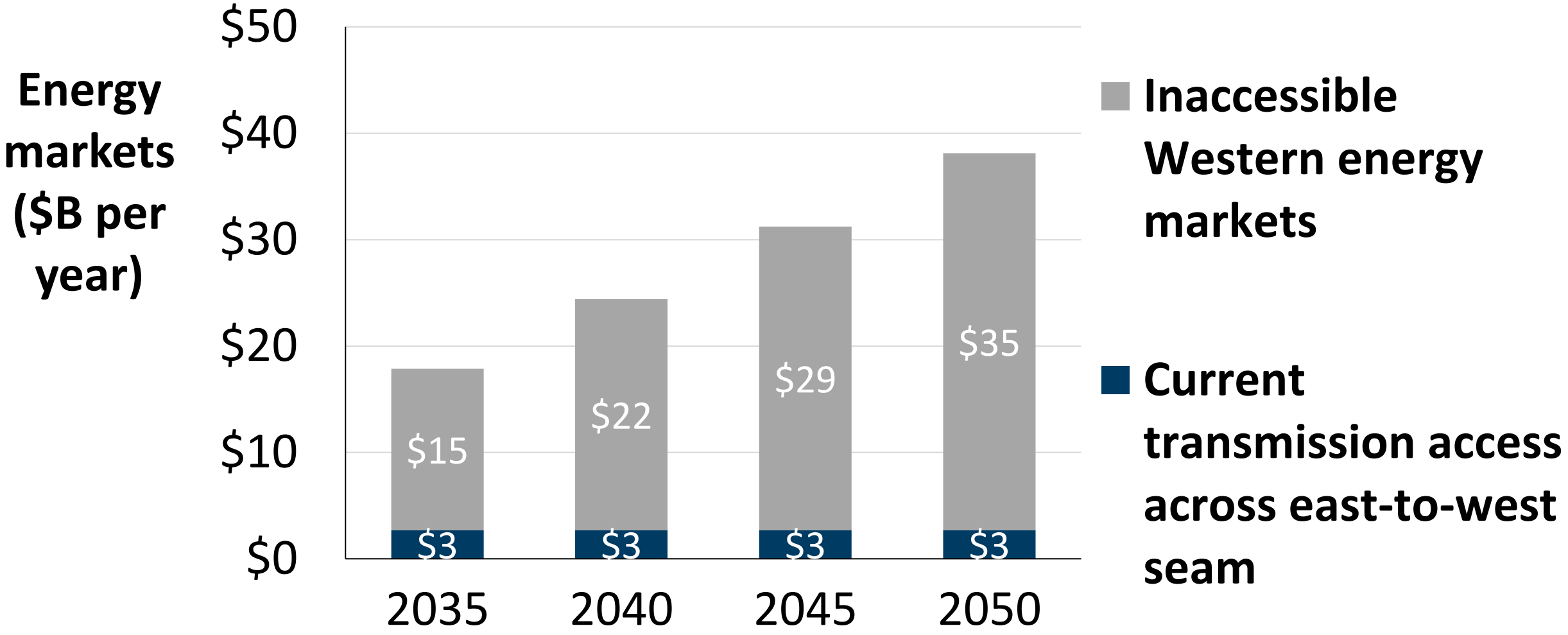
RMI Graphic. Source: RMI analysis, Lawrence Berkeley National Laboratory, and Energy Innovation

Colorado, Montana, New Mexico, and Wyoming have limited inter-state transmission capacity



RMI Graphic. Source: WECC.

Without transmission upgrades, energy export states will only have access to 7% of this new opportunity



RMI Graphic. Source: RMI analysis, Lawrence Berkeley National Laboratory, and Energy Innovation

Case Study: New Mexico

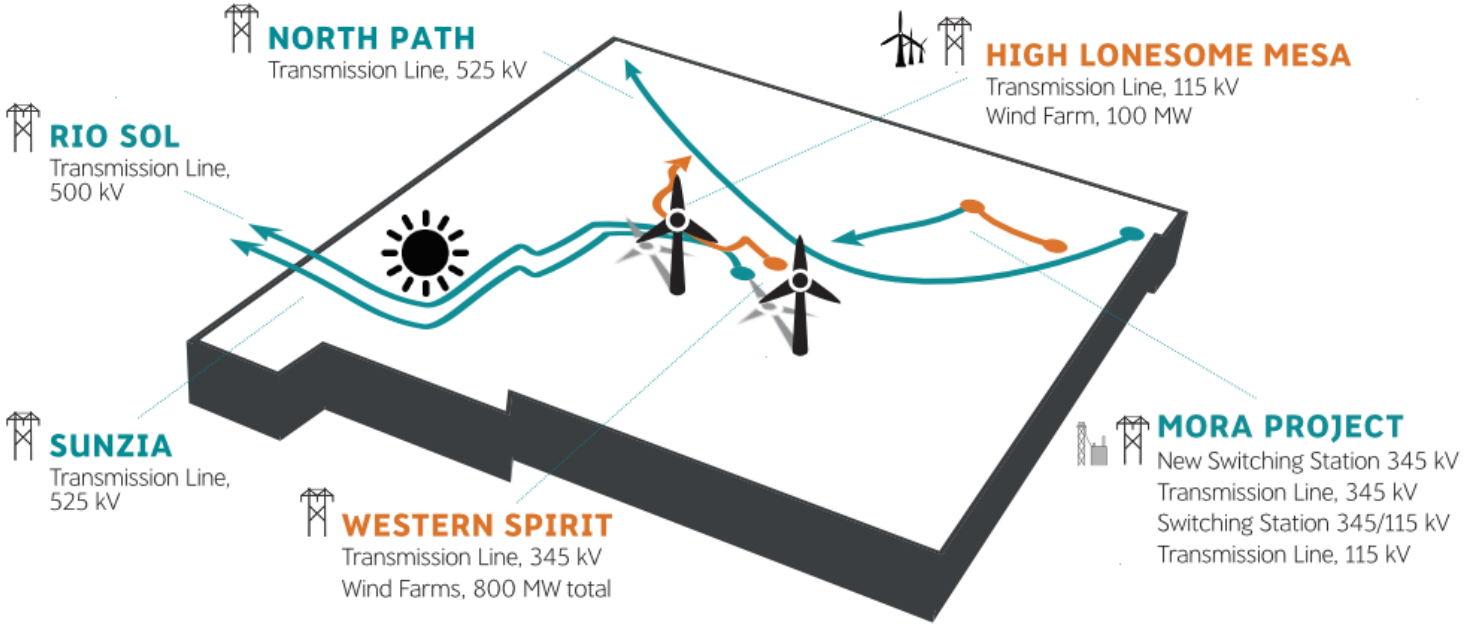
New Mexico Renewable Energy Transmission Authority (RETA) is enabling NM's future energy economy

- **NM state legislature created RETA in 2007**
- **Eases hurdles across:**
  - Paying
  - Permitting
  - Planning

New Mexico RETA Projects

Orange projects are online projects

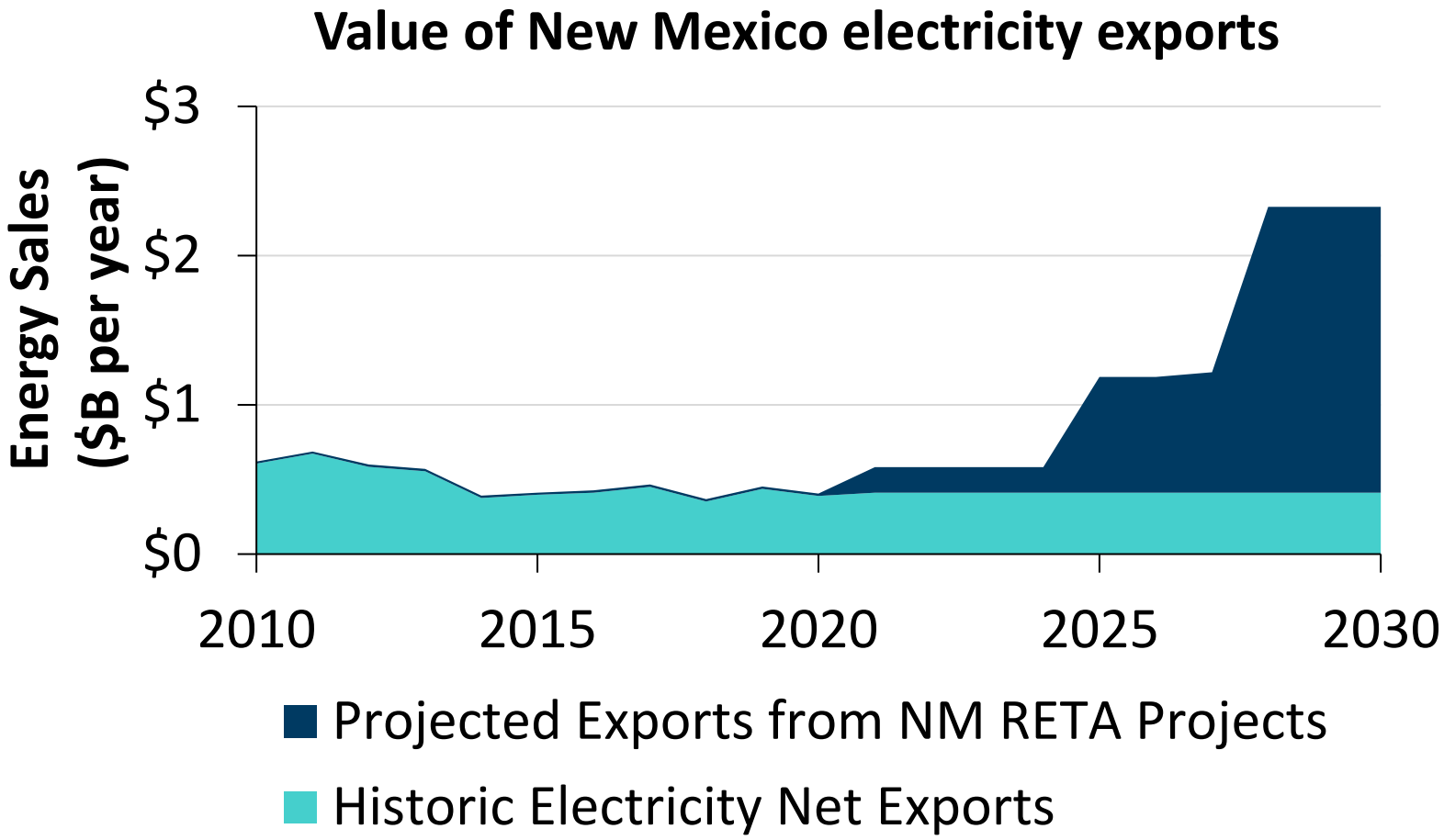
Blue projects are expected to be in service by 2028



NM RETA Graphic. Source: NM RETA.

NM RETA projects expected to quadruple the exported electricity at no cost for ratepayers

- **Opening 8.6 GW of new transmission capacity**
- **Exporting 3.4 TWh per year to new energy markets**



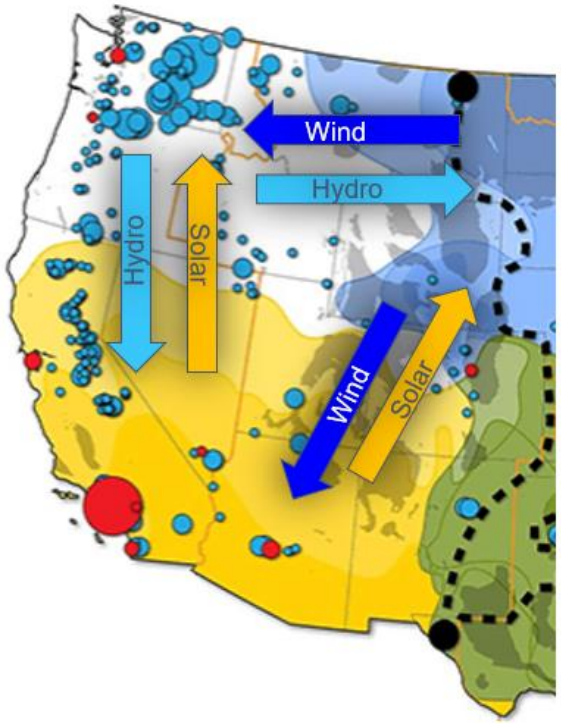
RMI Graphic. Source: RMI analysis, NM RETA, and US EIA.

Questions?

Quantifying the value of regional diversity across the West

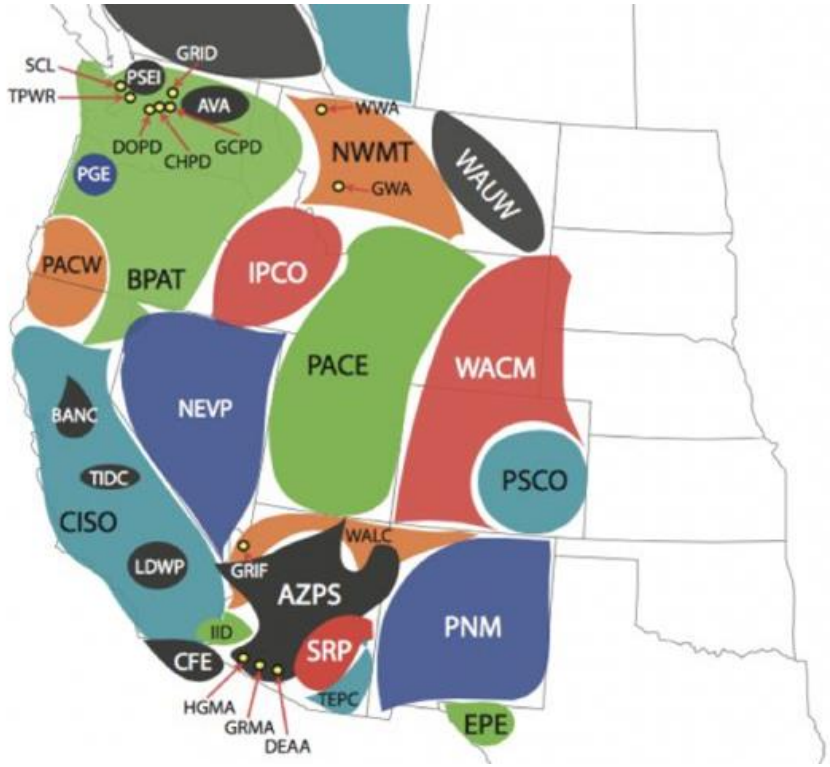
Approach: What is the value of regional planning compared to isolated planning to meet 100% clean energy goals?

How much can each state save doing this…



Source: National Renewable Energy Laboratory.

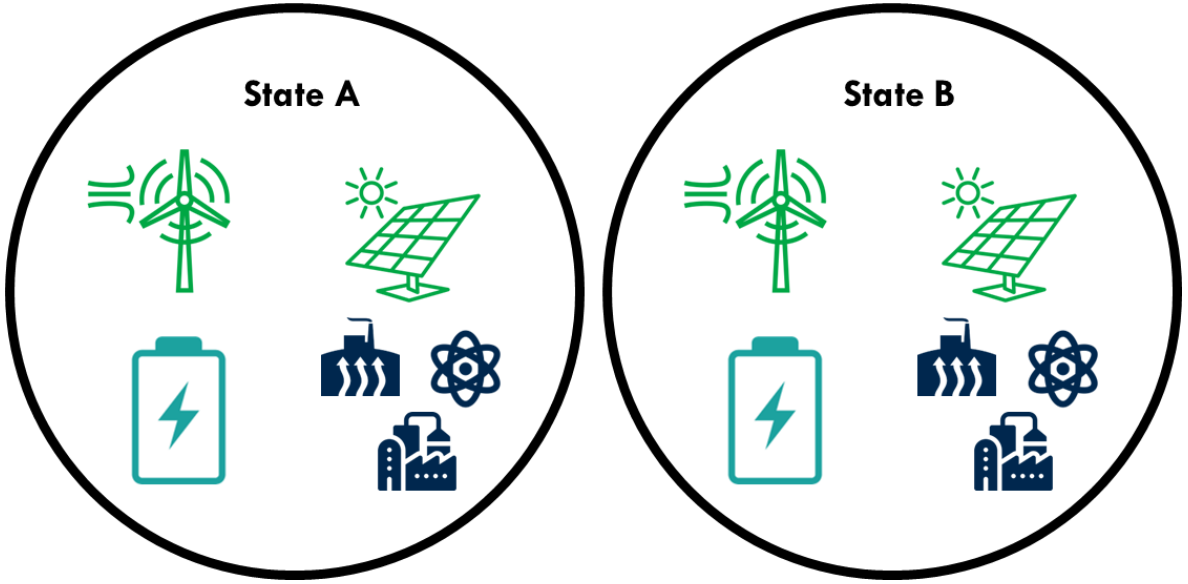
Instead of planning in isolation like this…



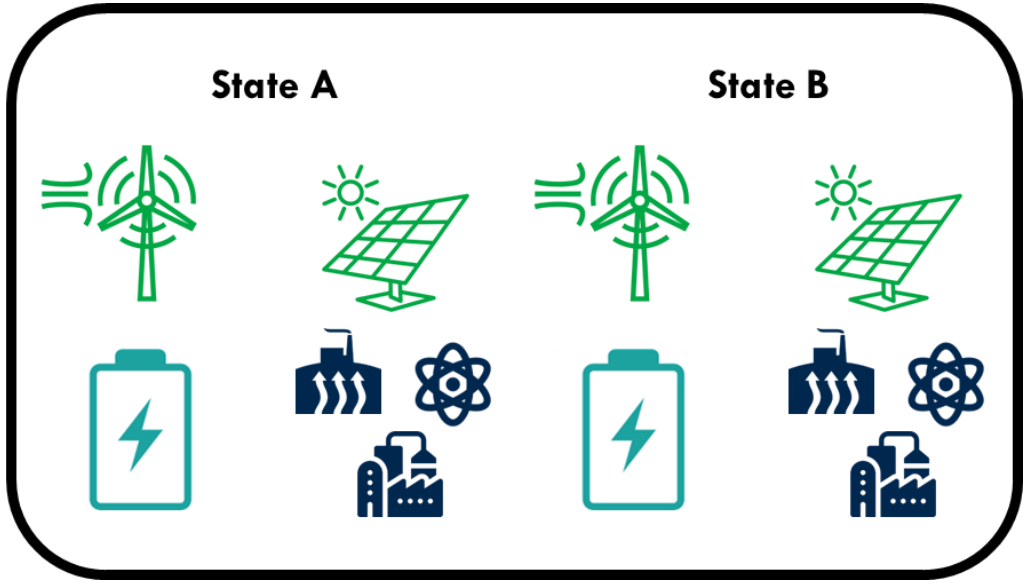
Source: Western Electricity Coordinating Council.

We quantify regional diversity by running an energy model with states in isolation and as a pair

Cost for state A and B to meet load in isolation



Cost for state A and B to meet load as a pair

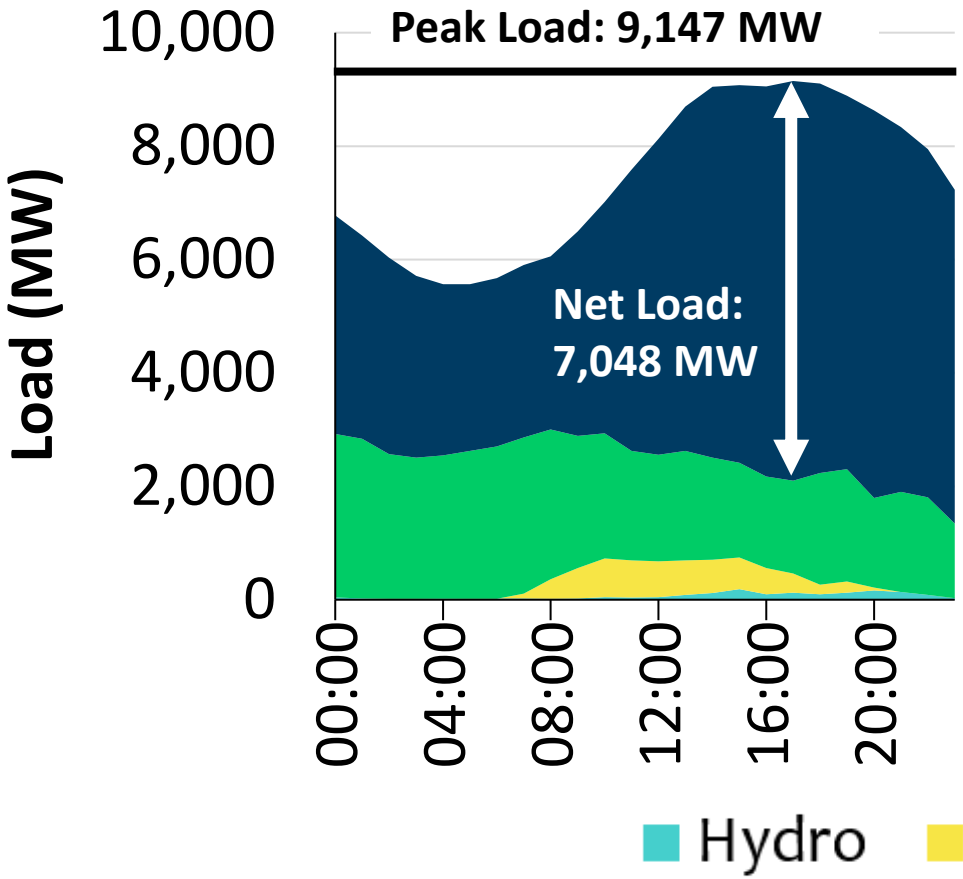


RMI Graphic. Source: RMI analysis.

Today, planners face their most challenging periods during peak load days and peak net load days

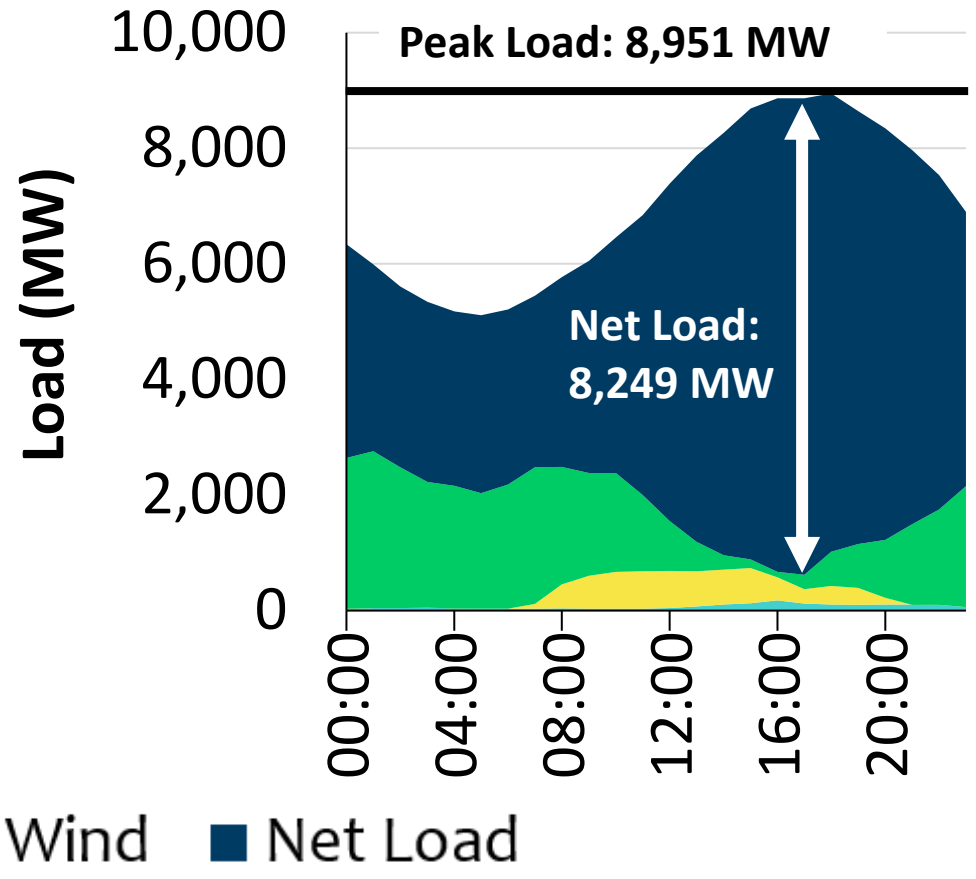
Yesterday's challenge (peak load)

Public Service Company of Colorado, July 18, 2022



Today's challenge (peak net load)

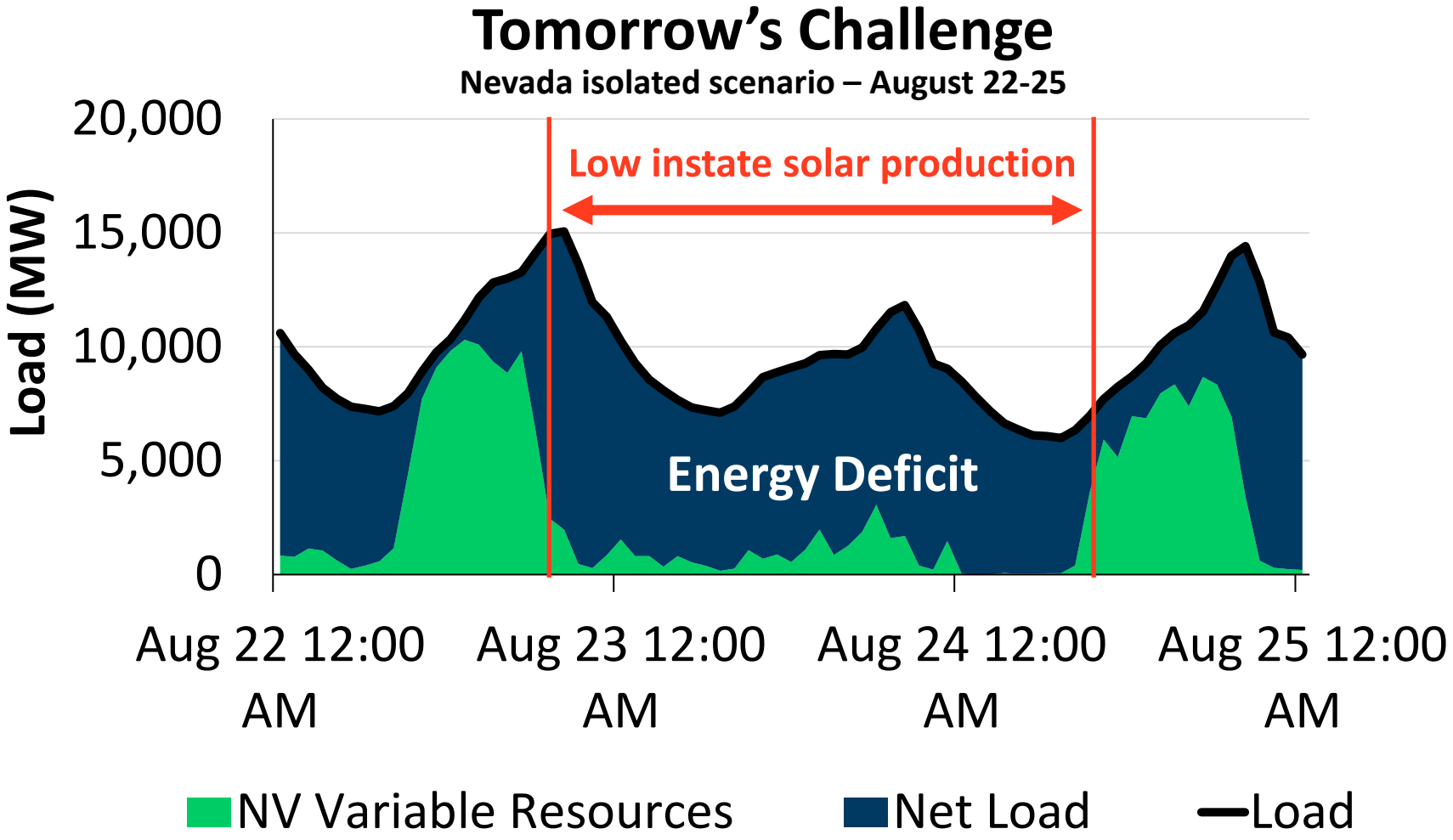
Public Service Company of Colorado, July 22, 2022



Hydro Solar Wind Net Load

Planners will encounter new challenges in the future due to periods with low wind and solar generation

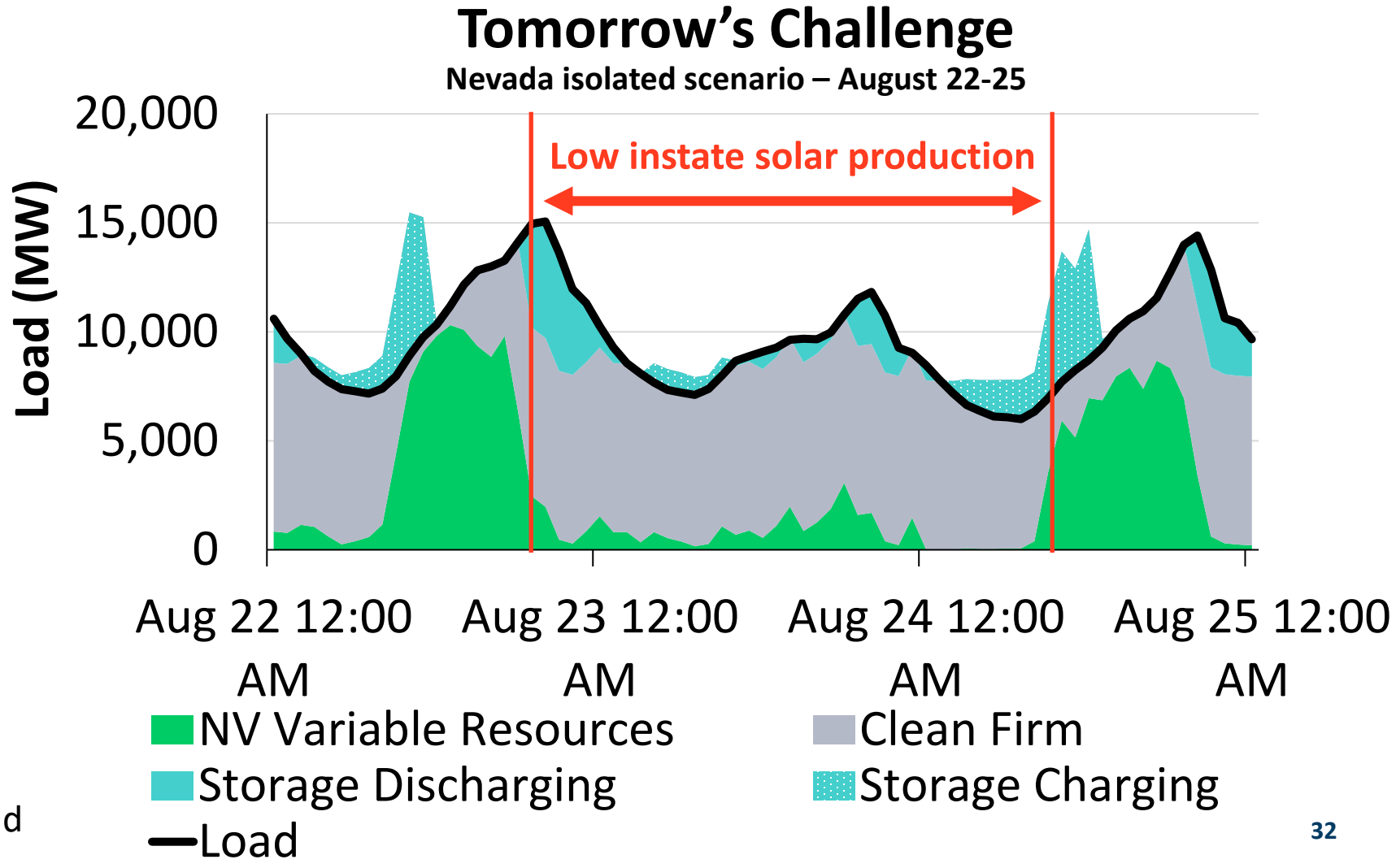
- **Additional variable resources provide little marginal value during these periods.**
- **A significant energy deficit makes it difficult to charge and discharge battery storage.**



RMI Graphic. Source: RMI analysis and NREL

New challenges cannot be reasonably addressed by only variable resources or battery storage

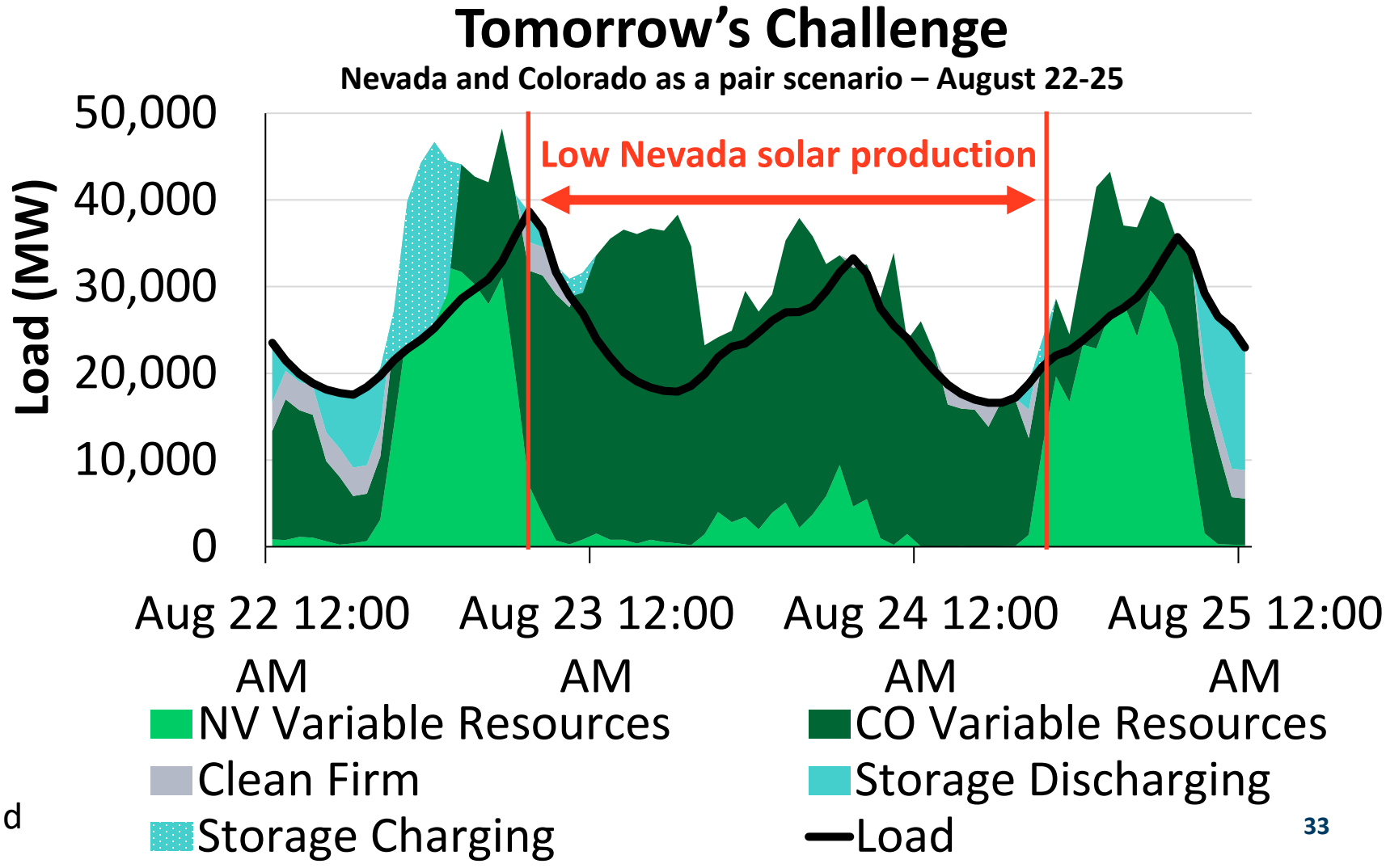
- **Our model finds an optimal need for 7.7 GW of relatively more expensive clean firm.**



RMI Graphic. Source: RMI analysis and NREL

Regional transmission harnesses diversity to reduce the need for clean firm

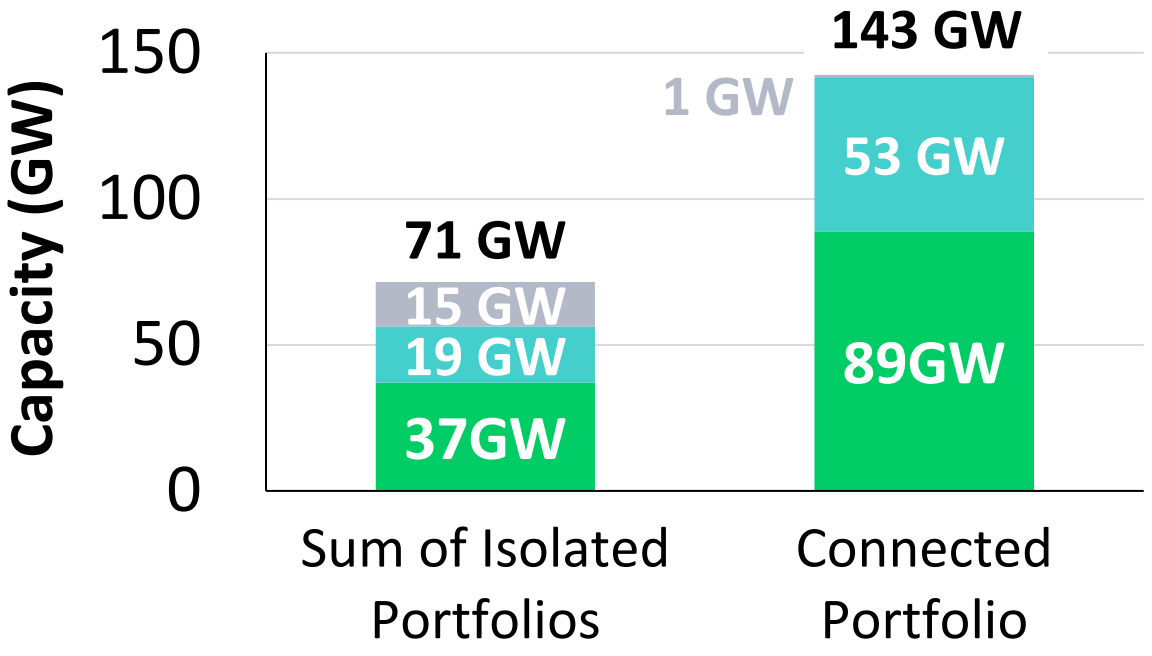
- **As a pair, variable resources are now curtailed during this same period.**
- **Overall, the system reduces its reliance on expensive clean firm.**



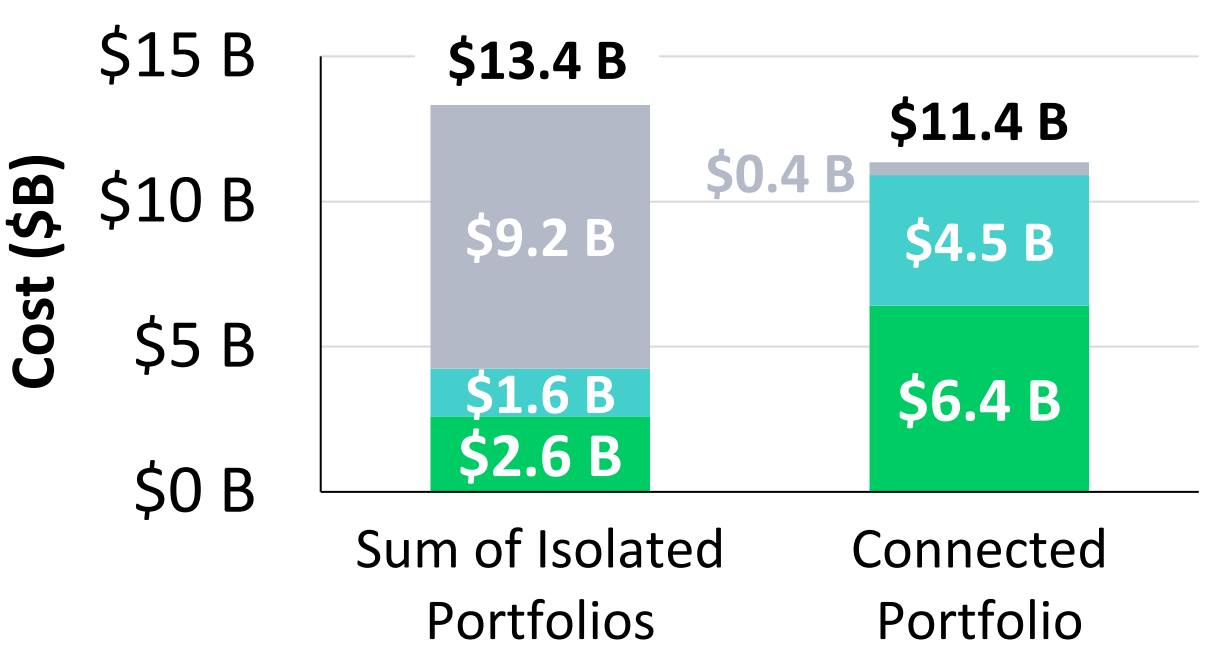
RMI Graphic. Source: RMI analysis and NREL

Cost savings are driven by a reductions in clean firm capacity

In isolation, Colorado and Nevada need 15 GW of "Clean Firm".
As a pair, they can leverage more wind, solar, and storage.

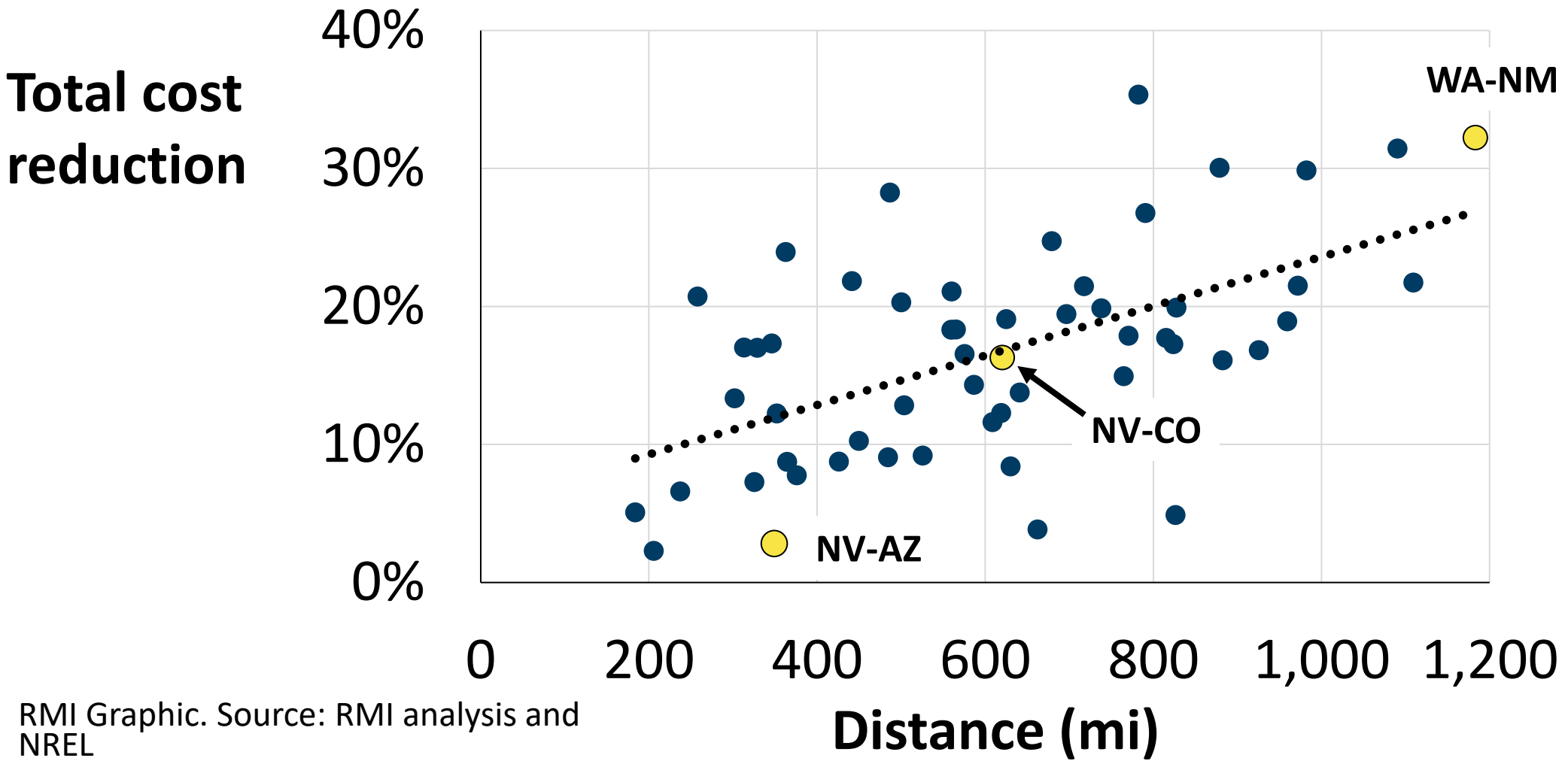


In isolation, Colorado and Nevada need to spend $9B on expensive "Clean Firm."
As a pair, they can use much lower cost wind, solar, and storage, saving ~$2 B.



Variable Resources Battery Storage Clean Firm

Finding: The most wide-reaching planning could significantly reduce the cost of meeting clean energy goals



RMI Graphic. Source: RMI analysis and NREL

How can we seize the economic opportunity in the West?

To seize the transmission opportunity, states must support ambitious West-wide planning today

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Lead the West to consensus on a fair allocation of transmission costs

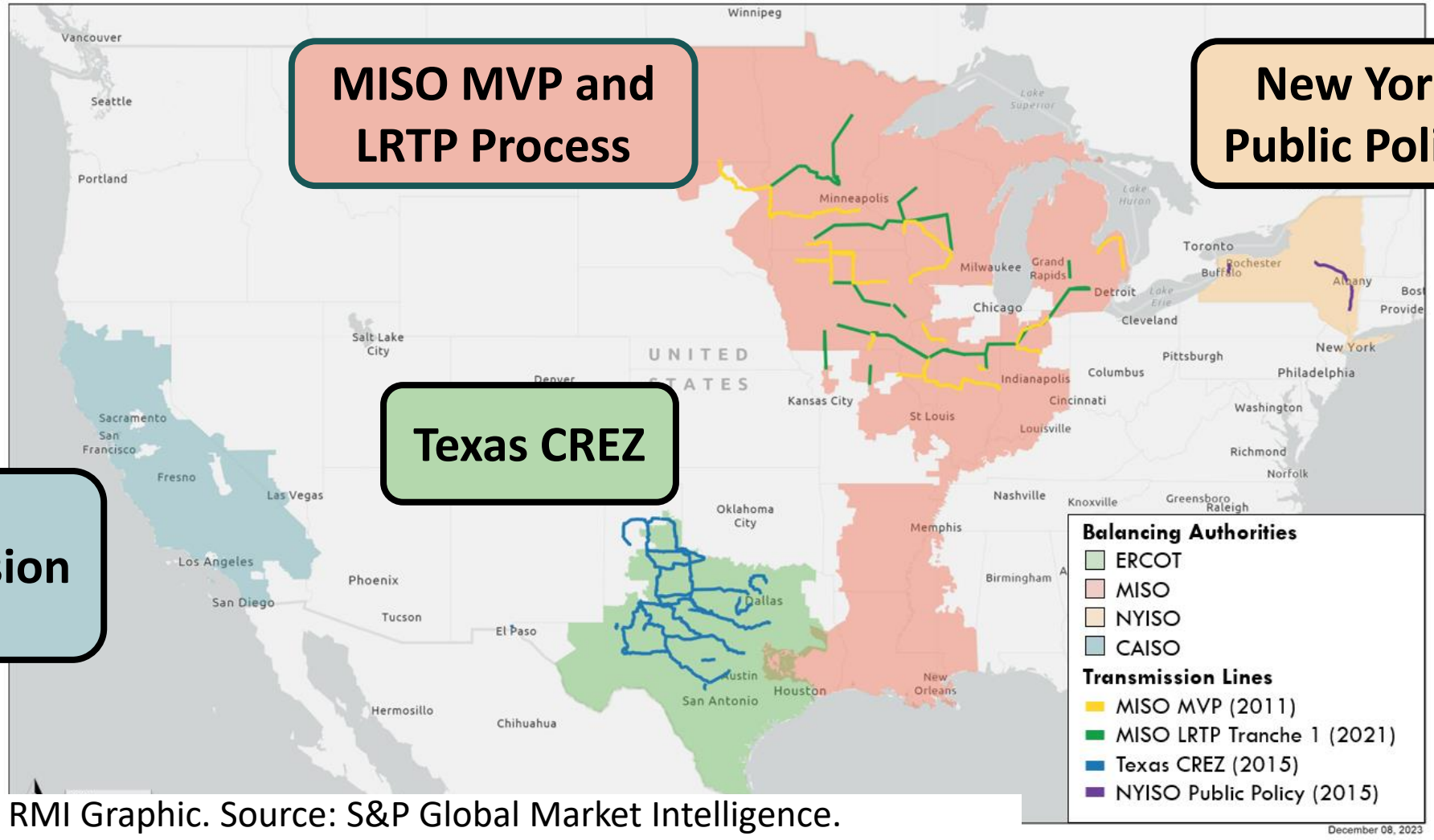
Ensure that inter-state transmission is considered in in-state planning

Questions?

RMI
ENERGY. TRANSFORMED.
Thank you
Contact: tfarrell@rmi.org

Appendix

Transmission lines get built when states give a clear political mandate in support of their need



RMI Graphic. Source: S&P Global Market Intelligence.

Transmission lines get built when states give a clear political mandate in support of their need

MISO MVP and LRTP Process

In 2007, Governors of 7 midwestern states sent a letter to MISO showing they were in unanimous agreement around the need for transmission.

New York Public Policy Process

The Climate Leadership and Community Protection Act (CLCPA) drove public policy needs for three new transmission lines. A new PUC lead effort is identifying further transmission gaps in New York.

California's CAISO Planning

California Independent System Operator (CAISO) identified 27 transmission projects (21 and 6 in 2023 and 2022, respectively) that were public policy driven to meet SB 100 goals.

Texas CREZ Process

In 2005, the Governor and legislator passed Senate Bill 20 directing the PUC to establish CREZs and the associated transmission planning.

Exhibit 17 Key technology assumptions for RMI's model

	Wind	Solar	Battery storage	Clean firm
Annual costs per MW-year	**$85,000**	**$60,000**	**$85,000**	**$600,000**
Variable costs per MWh	$0	$0	$0	$0
Generation profile	State specific	State Specific	Energy limited	Up to full capacity
Levelized cost of energy at capacity factor (%)	$21/MWh at 45%	$22/MWh at 30%	N/A	$75/MWh at 90%