Great Falls Energy Market Assessment

Transmission

October 2024

About RMI

RMI is an independent, nonprofit organization of experts accelerating the clean energy transition. Driven by deep analytics, we aim to transform the energy system to support prosperous and healthy communities for all.

Meet the RMI Team

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Agenda

- **Project Overview & Key Takeaways**
- **Transmission Deep Dive**
  - Montana's transmission system background
  - Power sector growth opportunities
  - Industry sector growth opportunities
  - Transmission solution pathways

Project Overview & Goals

WHAT

Energy Market Assessment

Transmission

Buildings

Hydrogen & eFuels

Industry

WHO

RMI, GFDA, + 30 local stakeholders

Government

Innovators

Financial Institutions

Data Analysts

Education & Capacity Building

Local Businesses

WHY

Enhance Regional Competitiveness

- To **determine market demand** for increased renewable energy production
- To **understand energy service business needs** including energy efficiency retrofits, wind and solar
- Providing basis for GFDA to **develop a strategy** to implement over the next 3-5 years to attract investment in our trade area.

Project Key Takeaways

Competitiveness

The Great Falls trade area, and Montana at large, has historically benefitted from **fossil fuels**. And is **generally underprepared** to capitalize on the transition to clean energy.

The region's existing natural resource and economic assets point towards **wind, eFuels, and green buildings as competitive opportunities** going forward.

Constraints

Lack of **transmission** and unstable **electricity prices.**

Slow population growth, **limited workforce availability and retention**, and lack of community buy-in.

Minimal access to **cheap, clean power.**

Lack of related existing industries.

Coordination

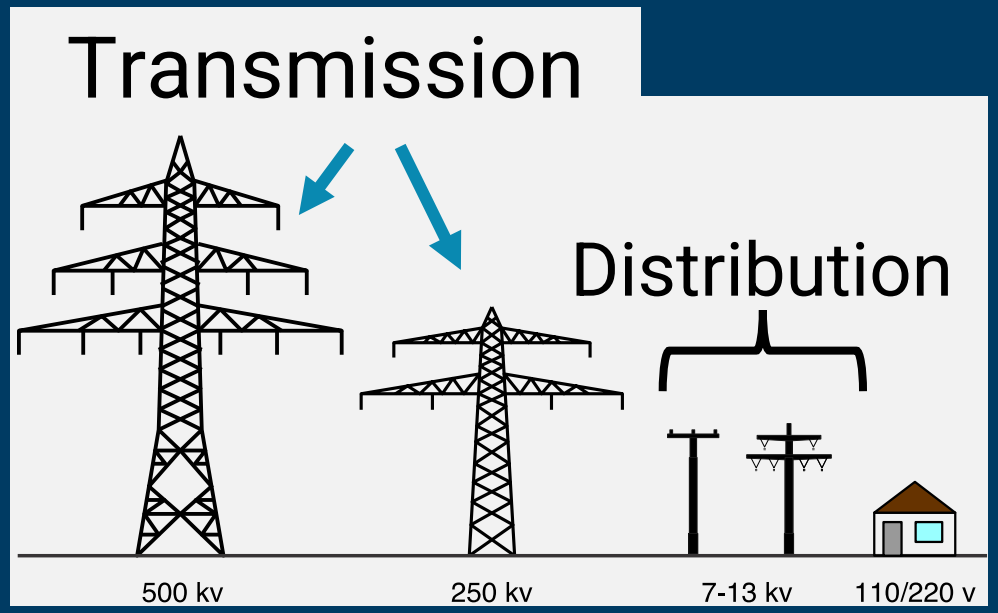
Transmission: Increased capacity will lead to economic development opportunities.

Hydrogen & eFuels: Great Falls already has a foothold in the SAF market; it's time to build out the local supply chain.

Buildings: Need to connect homeowners and developers to federal funding and close information gaps and capacity constraints.

Transmission Overview

More and more – leaders & the press realize that expanded transmission is the key to the grid



"Transmission" is the very high voltage power lines that carry power long distances.

WyoFile
People, places & policy

Gov. Gordon, Biden officials hail clean energy project as essential

Federal and state officials say the TransWest Express transmission project is a vital step to addressing a climate crisis.

BILLINGS GAZETTE

Montana needs more power transmission lines, analysts say

The Economist

The most important climate agency you've never heard of

An inept Congress puts America's Federal Energy Regulatory Commission in the spotlight

MONTANA MTFP FREE PRESS

Where electricity transmission and the energy transition meet

Transmission is essential to grow industry.

“Available transmission capacity is zero, on a long-term basis it’s all committed.”

– Utility Representative

“Interconnection upgrade costs are huge barriers to large scale wind.”

– Public Service Commission

“Great Falls is an island.”

– Energy Consultant

“Opportunities for growth have been constrained because of infrastructure.”

– Energy Consultant

The case for transmission is strong!
But challenges stand in the way of build-out.

OPPORTUNITIES

- New or upgraded transmission lines nearly always pay for themselves
- Transmission improves reliability and hedges against costly fuel spikes or extreme weather events
- Jobs & economic development
- Transmission enables new energy and industrial infrastructure
- Transmission can enable increased competition for energy supply
- Non-partisan

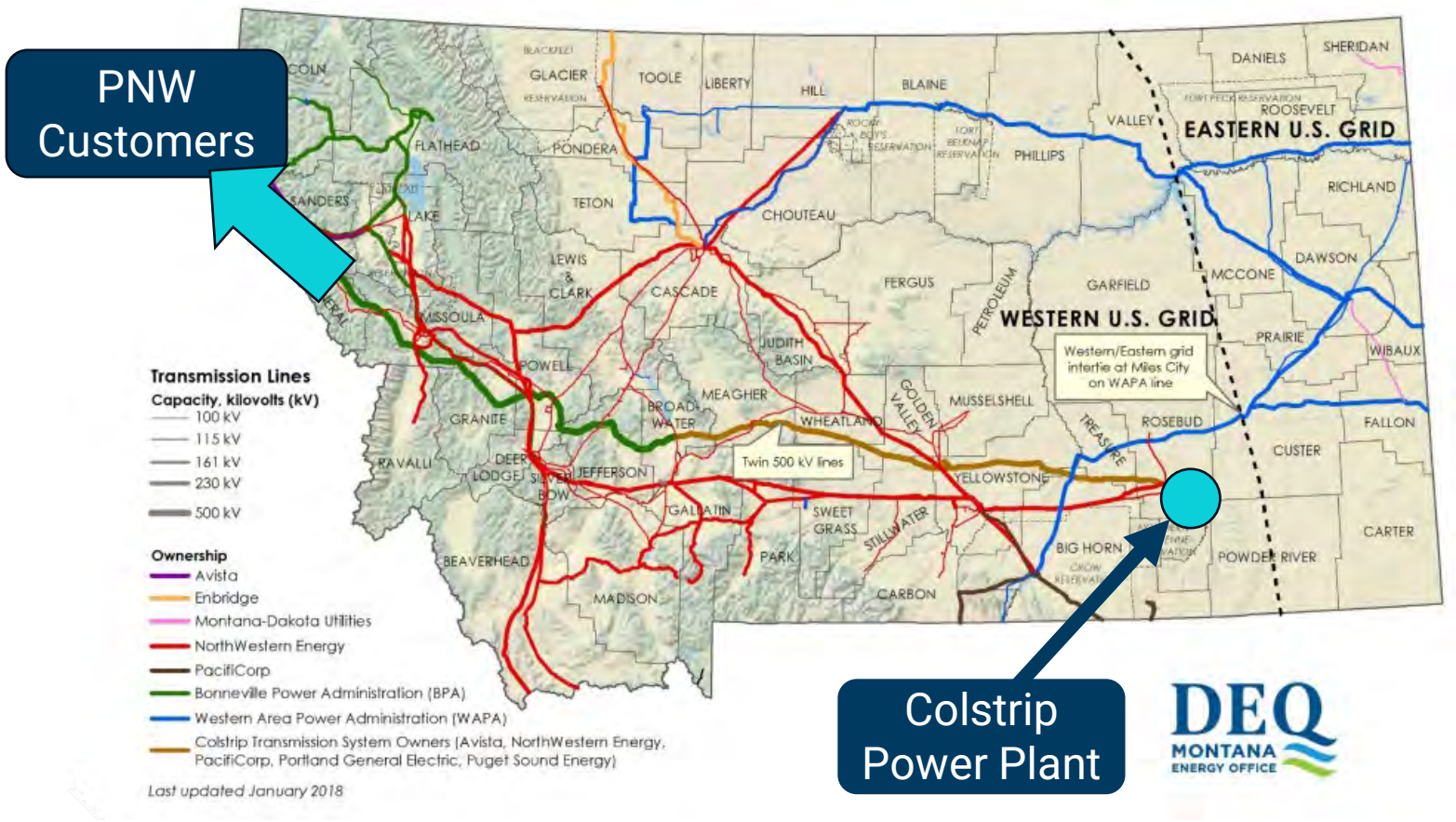
CHALLENGES

- **Transmission takes too long to plan, permit, & build. Often 15+ years.**
  - Best time to plan: 15 years ago
  - Second-best time: today
- **It's "Nobody's job" to plan inter-state transmission.**
- **States often disagree about how to split transmission's cost.**
- **Industrial users in Montana are required to go to an increasingly tight open market for energy.**

Transmission System in Montana and Great Falls

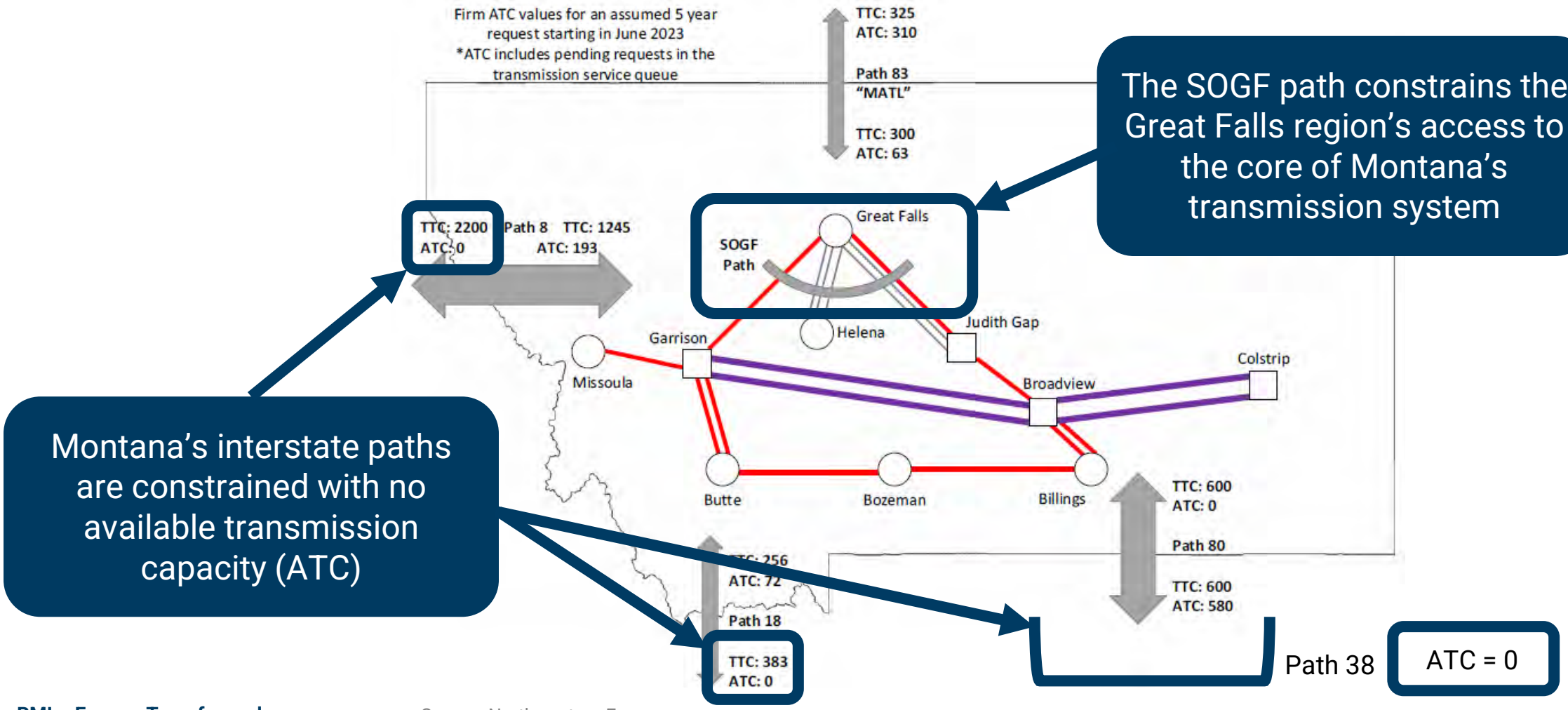
Montana's transmission system was built around Colstrip and in-state customers

- **Montana's transmission system was built to serve in-state customers and historic Colstrip coal plant customers in the Pacific Northwest.**
- **Primarily built throughout the 1960s, 70s, and 80s.**
- **Limited expansion in the past 30 years.**



Source: Montana Department of Environmental Quality

Montana's transmission system is becoming increasingly constrained



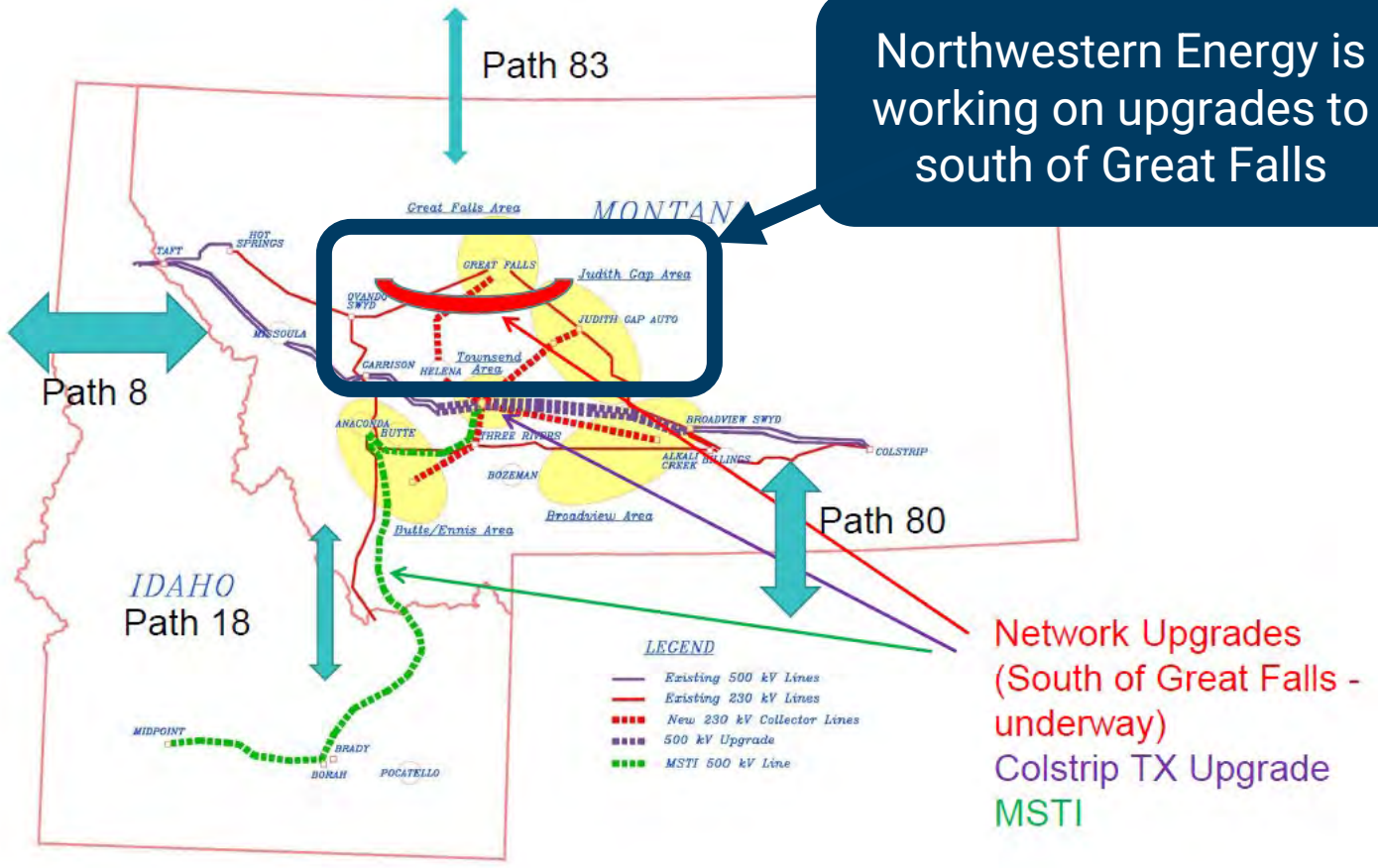
The SOGF path constrains the Great Falls region's access to the core of Montana's transmission system

Montana's interstate paths are constrained with no available transmission capacity (ATC)

Source: Northwestern Energy

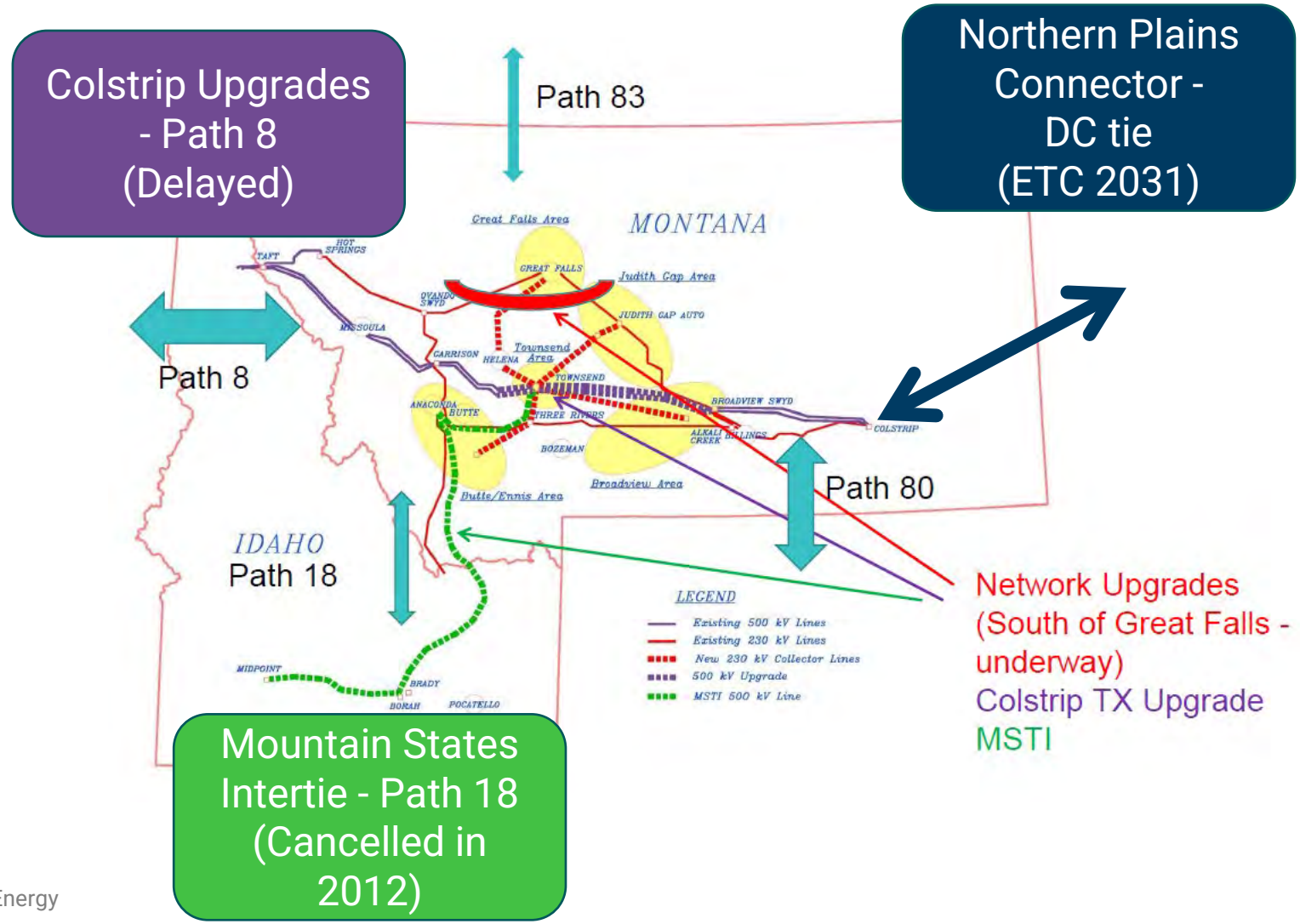
Northwestern Energy is upgrading the south of Great Falls constraint

- **This will open the Great Falls region to the core of Montana's transmission system.**
- **It will put Great Falls at par with other regions of Montana.**



Montana is not proactively planning to relieve inter-state constraints

- **In the past few decades, two large utility projects have lingered with delays, and one was eventual cancelled.**
- **Transmission lines typically take 7-20+ years to plan, permit, and construct.**
- **The Northern Plains connector is a promising advancement. (More on the next slide)**



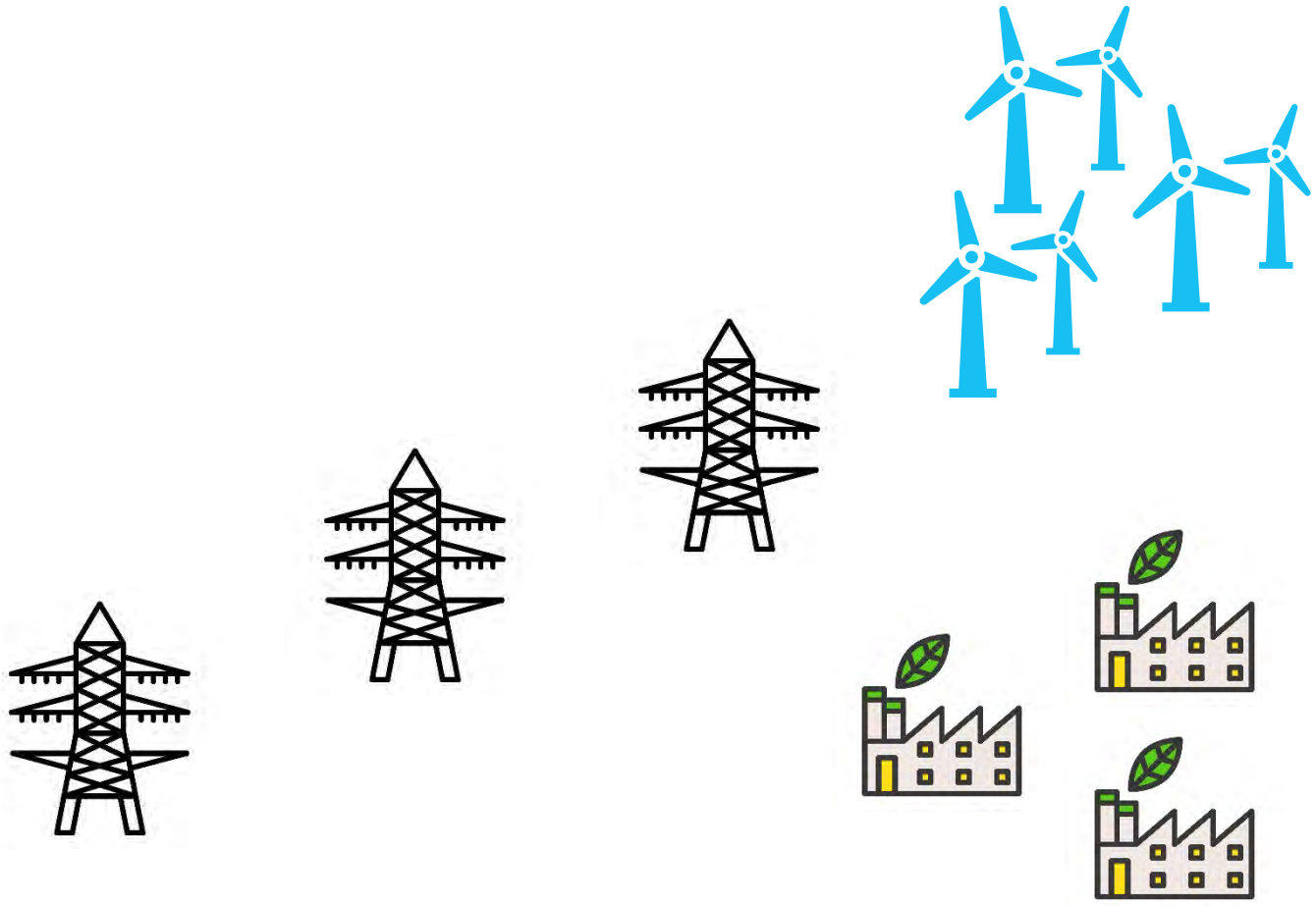
Source: Northwestern Energy

Montana's transmission system had little change in 30+ years.

Today's MT grid is weakly connected to our neighbors	• Montana has little to no available capacity between itself and its neighbors
Great Falls region has limited access to the core of the system	• The south of Great Falls upgrade will enable the region to be at par with other regions of Montana.
Northern Plains Connector is a promising development	• The Northern Plains connector is a promising development to expand Montana's access to outside markets.

Transmission enables enormous opportunities in Great Falls trade area

Transmission expansion is the keystone to economic development in the Great Falls region



Transmission can enable power sector investments in the Great Falls trade area.

Transmission can enable industrial growth in the Great Falls trade area.

Considerations for Possible Avenues of Change

Working with BHE Montana, Northwestern Energy, and WAPA to unlock marginal gains on the existing system.

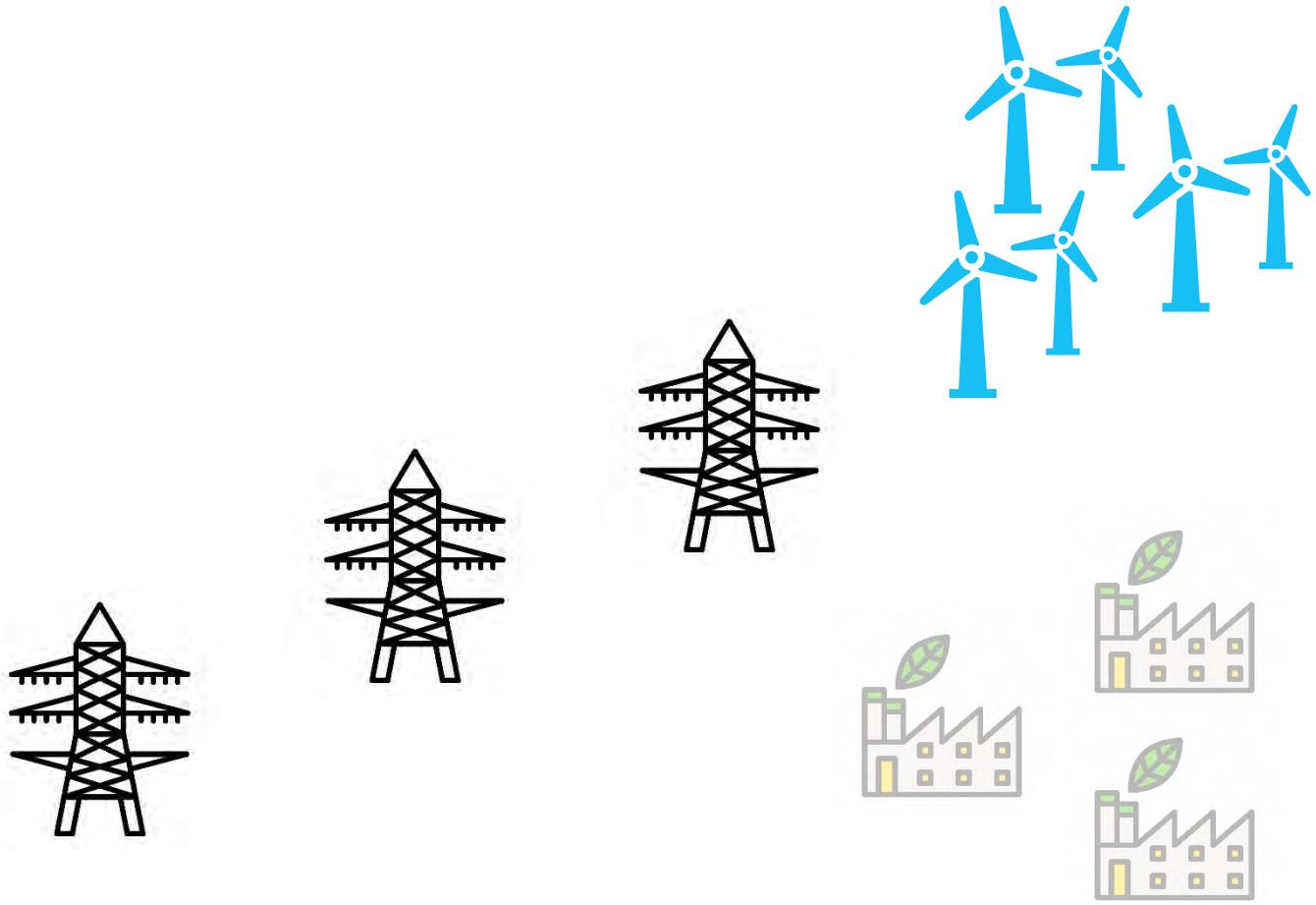
Unlocking short-term fix

Work alongside a coalition of transmission advocates (e.g. large loads, clean energy developers, etc.) throughout the state.

Building a long-term change

Transmission can support power sector development in the Great Falls trade area

Transmission expansion can enable power sector investments in the Great Falls region

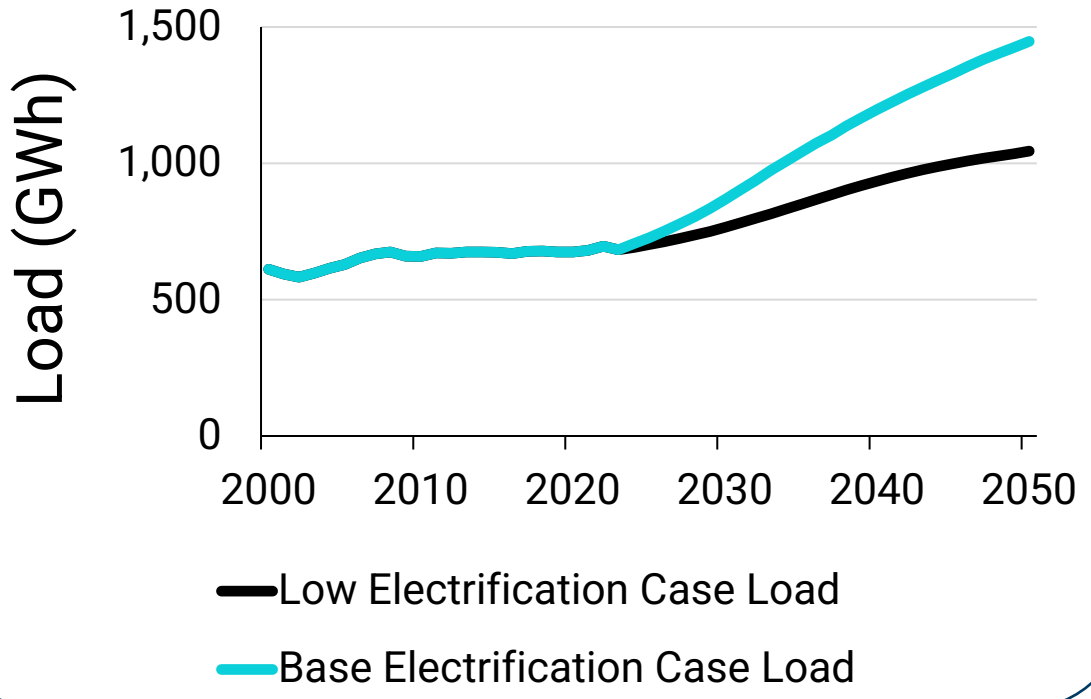


Transmission can enable power sector investments in the Great Falls region.

Transmission can enable industrial growth in the Great Falls region.

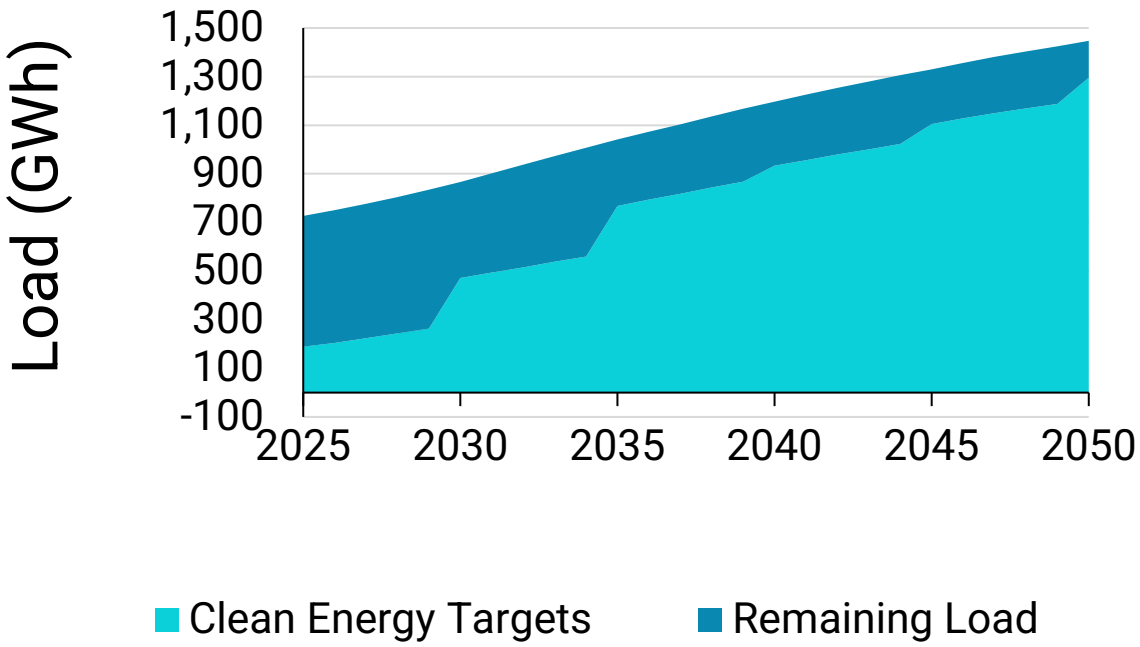
Load growth and public policy goals are driving a renewed need for new electric generation in the West

The West is on the cusp of supercharged electricity demand



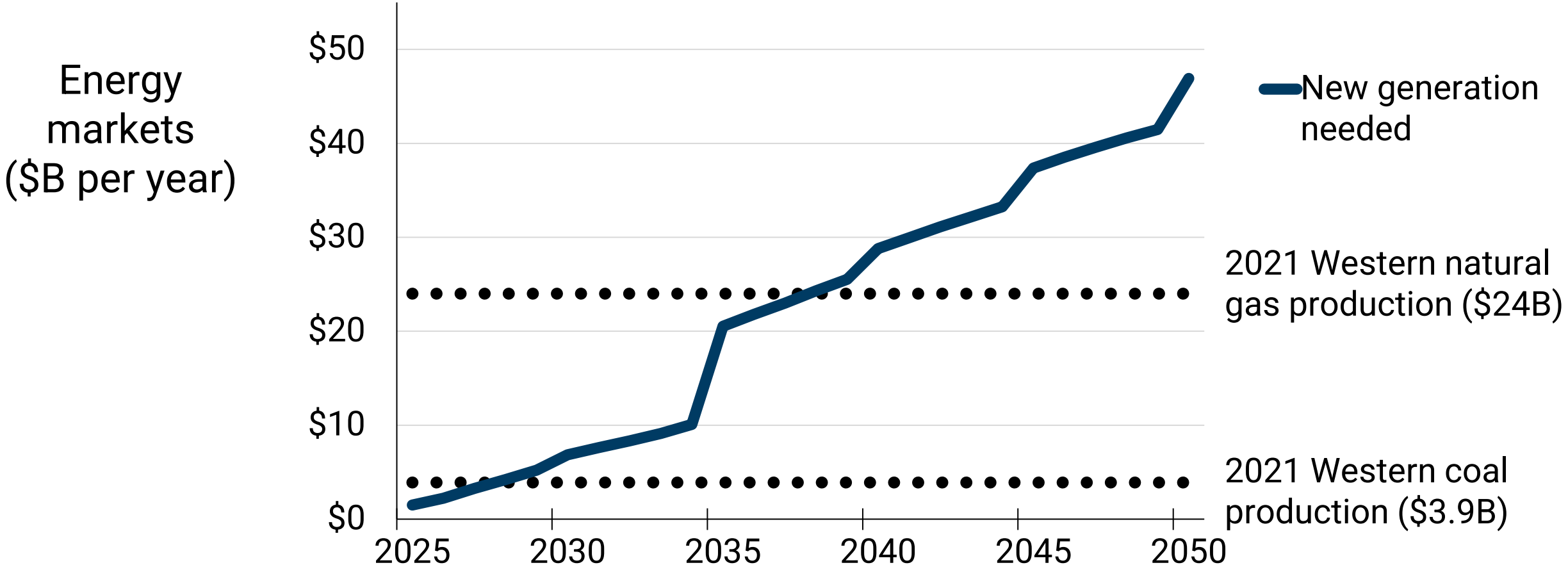
RMI Graphic. Source: RMI analysis, Energy Innovations, and the US EIA.

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



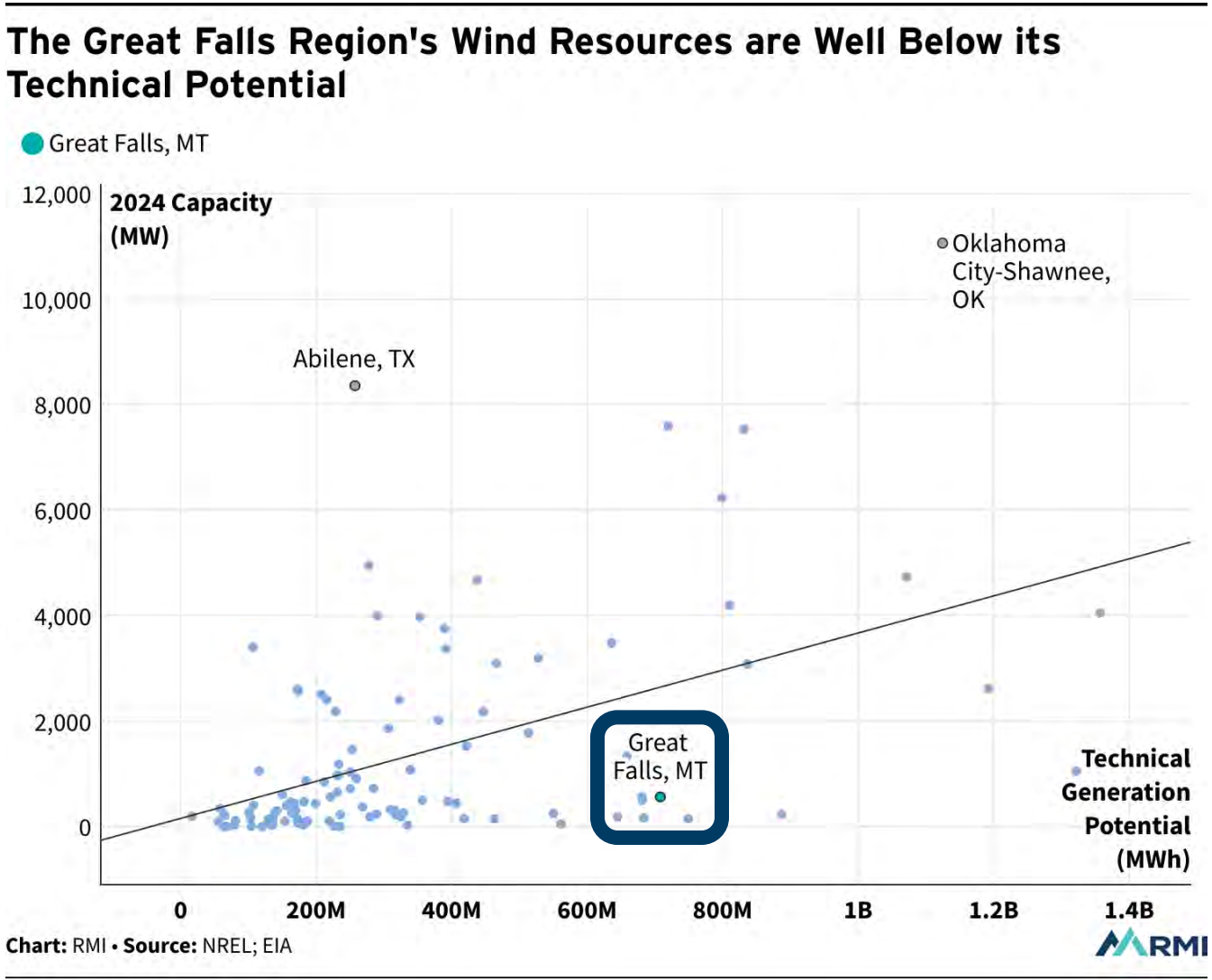
RMI Graphic. Source: RMI analysis, Lawrence Berkeley National Laboratory, and Energy Innovation

The Great Falls region has excellent potential to capitalize on this demand

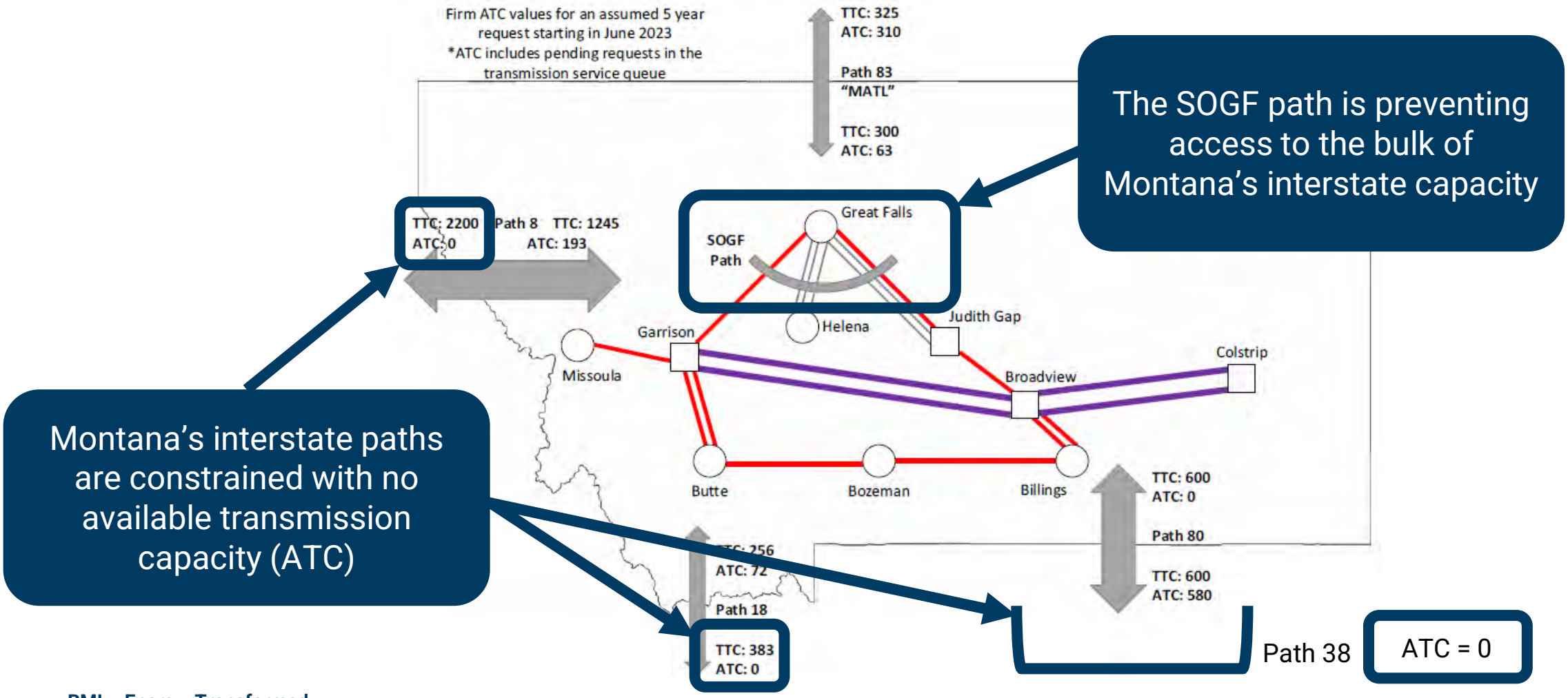
Great Falls wind is highly valuable to the Western grid

- Abundant, over a large geography
- High-capacity factor
- Exceptionally diverse compared to solar in the desert southwest and wind in other states.

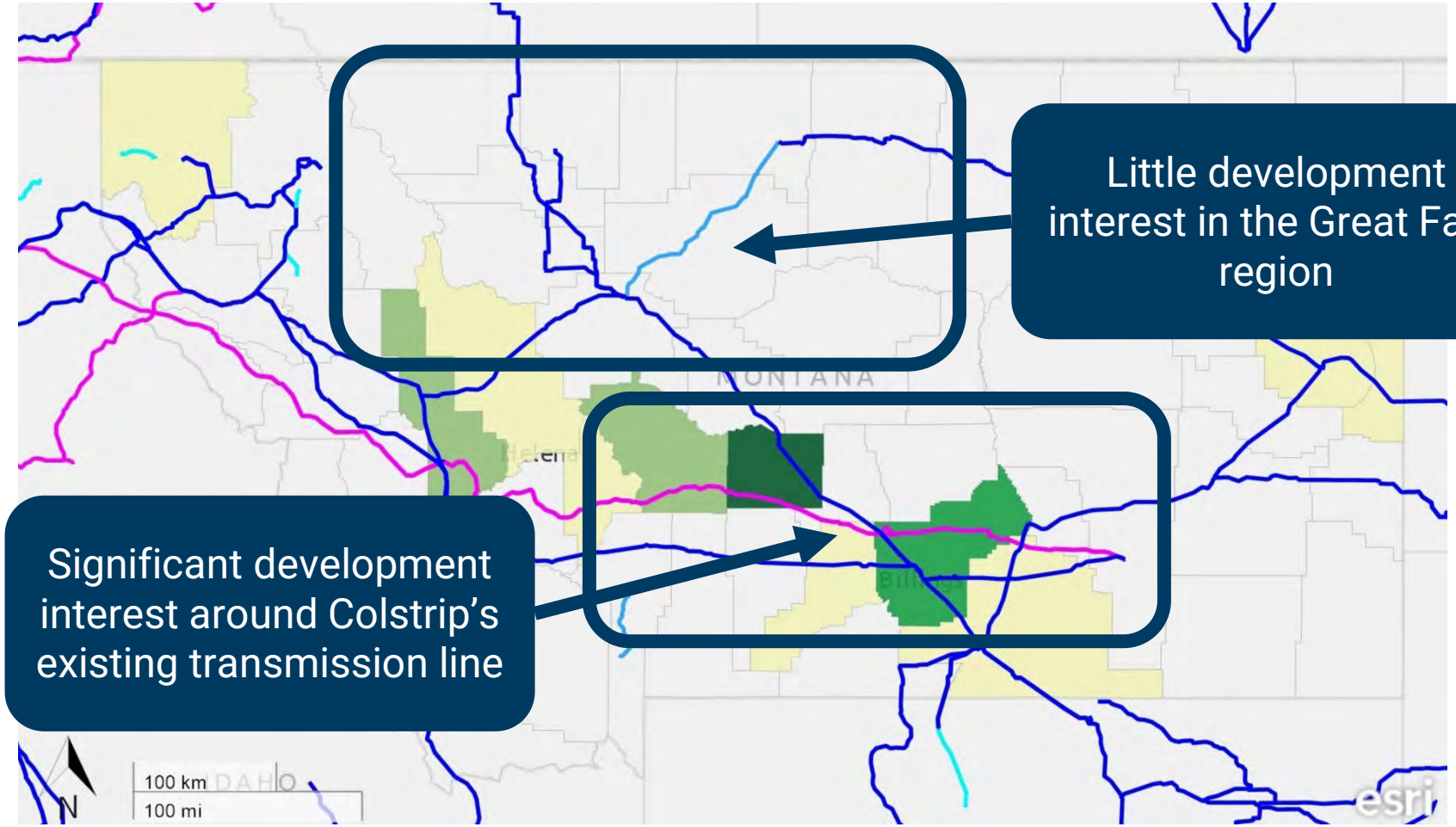
When the sun goes down in the West, it's usually still windy in Montana.



The Great Falls region is unable to access these markets due to transmission constraints



Today's intra-state transmission constraints are limiting development in the Great Falls region

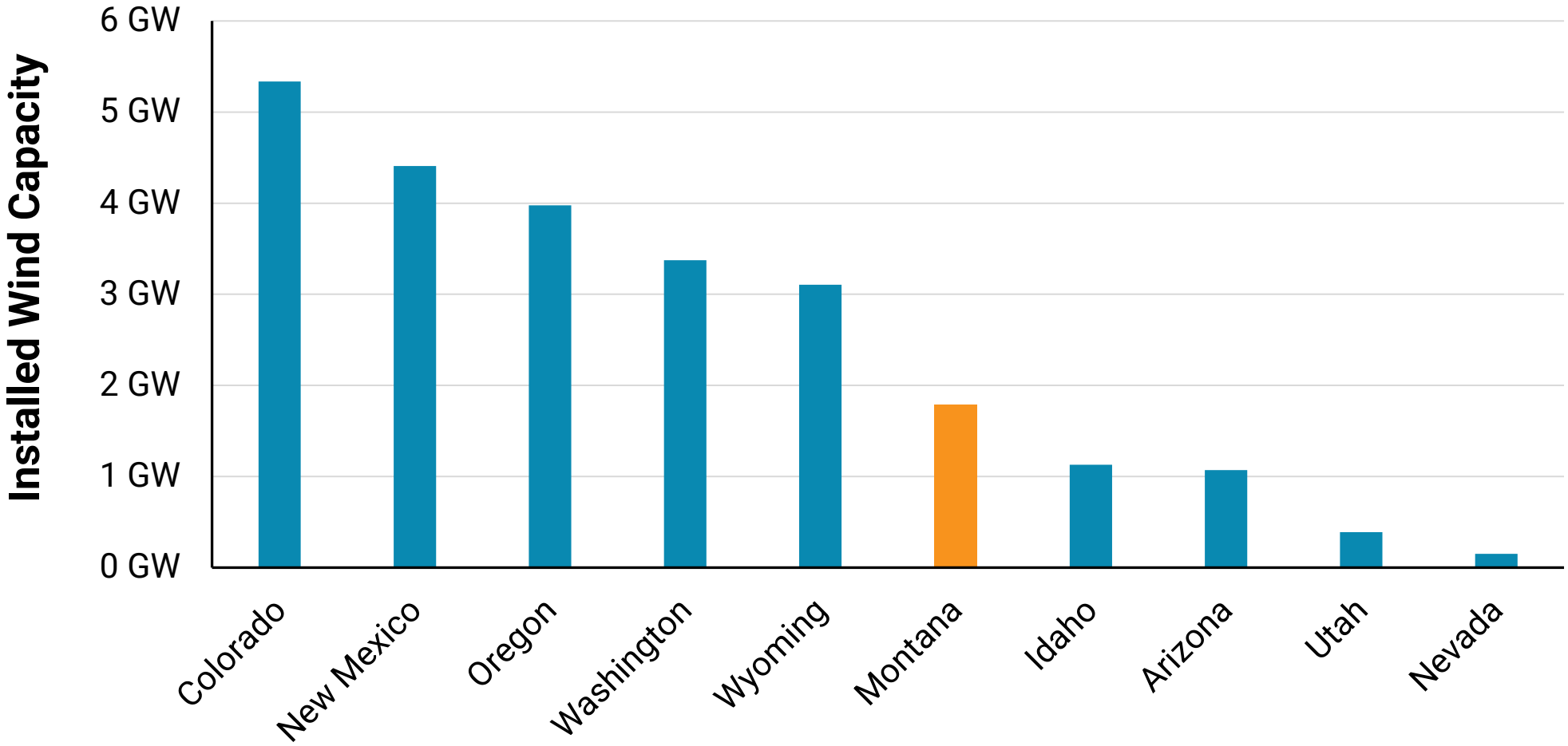


Proposed projects in the interconnection queue

- > 5 GW
- 2 to 5 GW
- 1 to 2 GW
- 0.1 to 1 GW
- < 0.1 GW

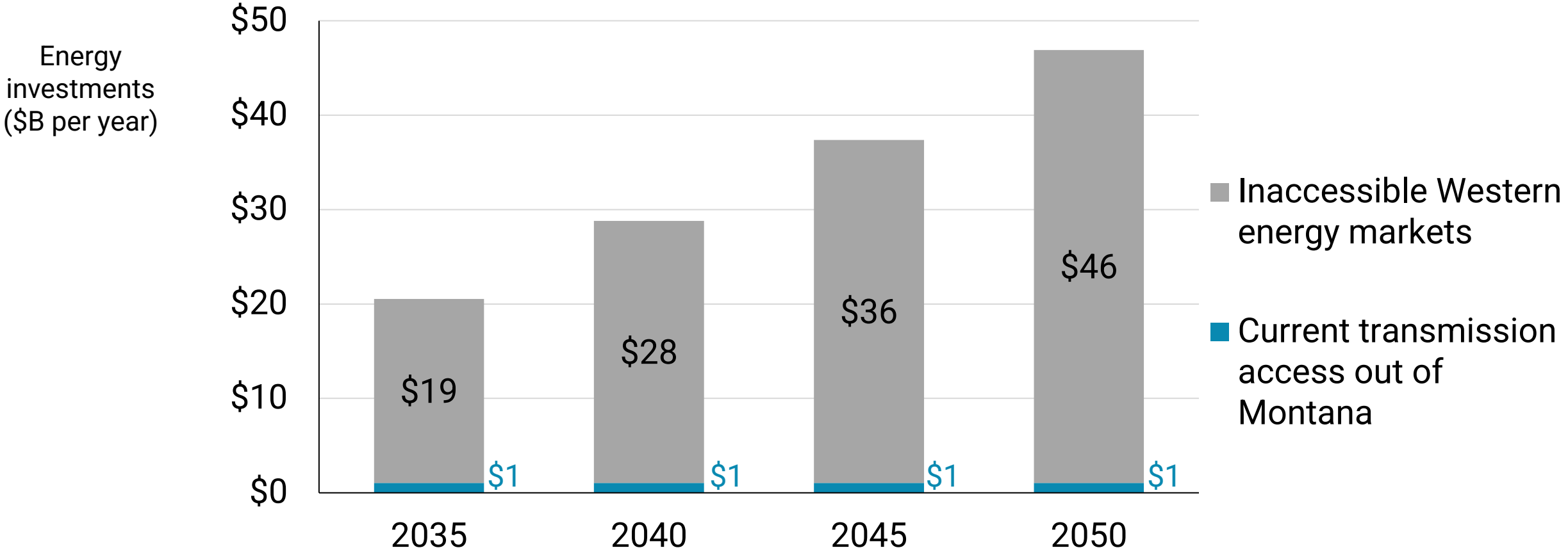
RMI Graphic. Source: S&P Global and Lawerence Berkley National Lab.

Today's inter-state transmission constraints mean the state is falling behind its peers



RMI Graphic. Source: EIA.

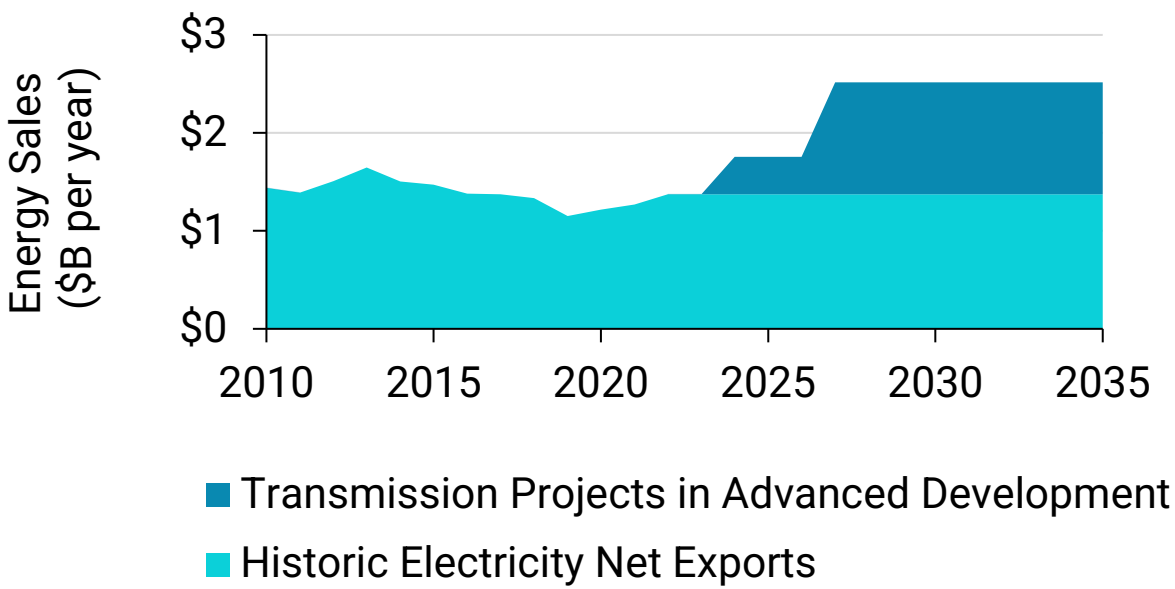
Without transmission upgrades, Montana will have access to only 2% of this new opportunity



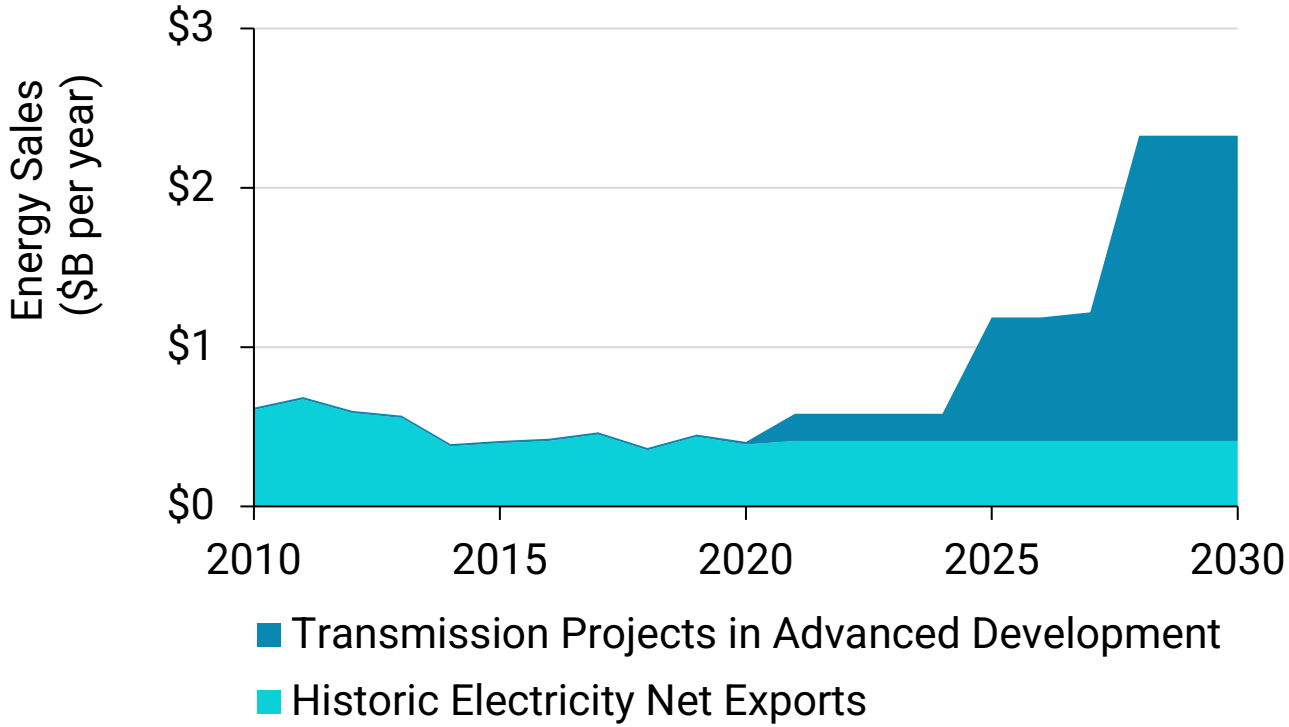
RMI Graphic. Source: RMI analysis, Lawrence Berkeley National Laboratory, and Energy Innovation

Unlike Montana, Wyoming and New Mexico are enabling their states' future energy economy

Wyoming is doubling export capacity



New Mexico is tripling export capacity



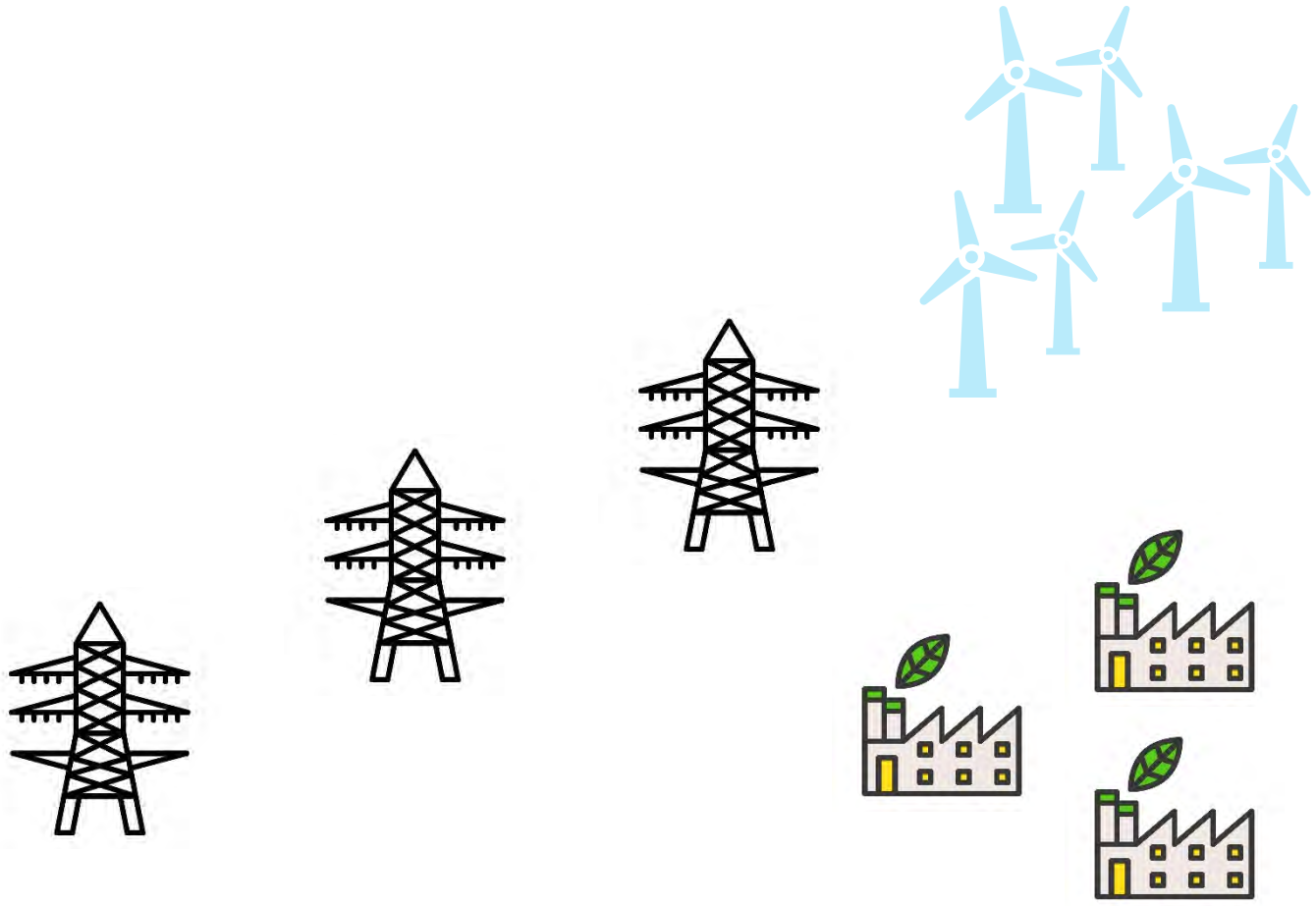
RMI Graphic. Source: RMI analysis, NM RETA, and US EIA.

Transmission can enable new energy investments in the Great Falls region

The West needs more power	• Opportunity for $47+ billion in new power generation investments between today and 2050.
Great Falls region has limited access to this market	• There is no available transmission capacity to Montana's neighbors limiting growth in the region's energy sector.
Other states are making significant progress	• Wyoming and New Mexico have attracted significant investment in new generation enabled by transmission.

Transmission can support industrial growth in the Great Falls trade area

Transmission expansion can enable power sector investments in the Great Falls region

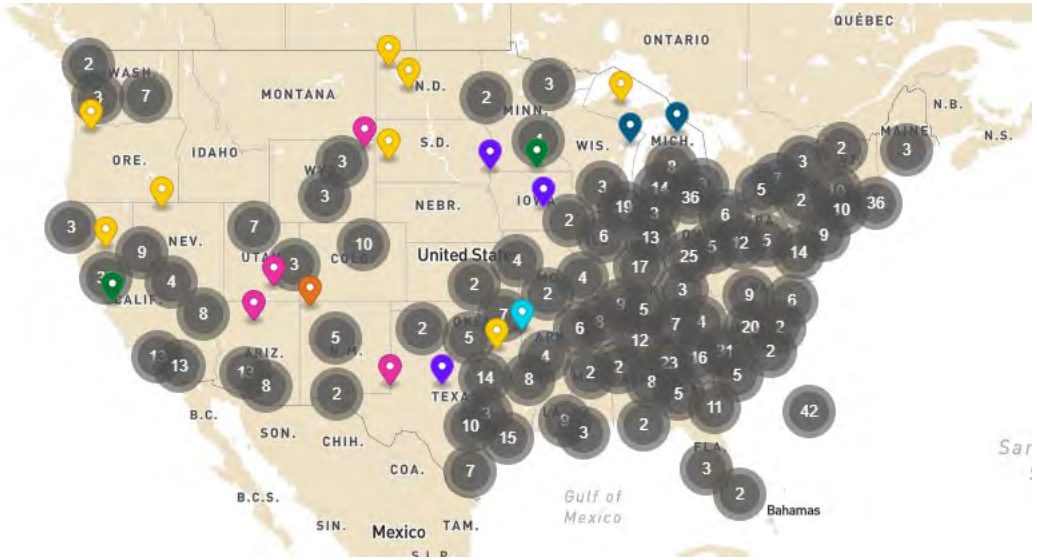


Transmission can enable power sector investments in the Great Falls region.

Transmission can enable industrial growth in the Great Falls region.

Manufacturing growth is booming across the U.S.

New IRA and IIJA Manufacturing Investments announced as of July 2024



Washington State Standard

Demand for electricity in Northwest projected to grow 30% in decade, triple previous estimates

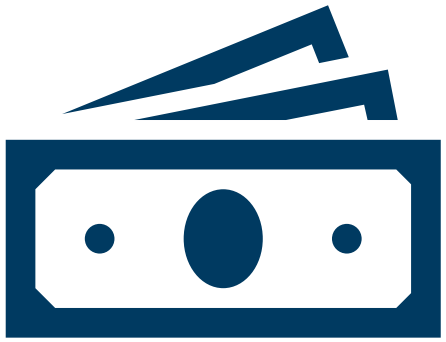
GridStrategies

The Era of Flat Power Demand is Over

KTVB7

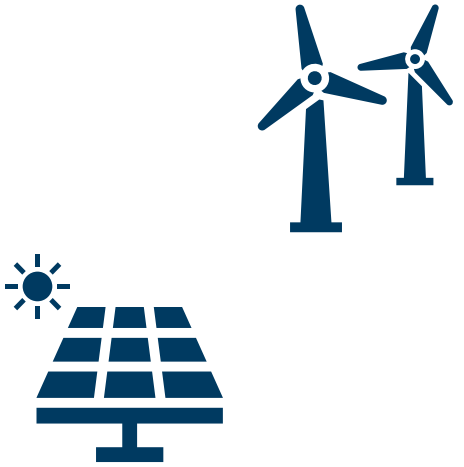
Micron's $15 billion Boise expansion helping make Idaho a leader in technology

Industrial users are looking for affordable, reliable, and clean electricity



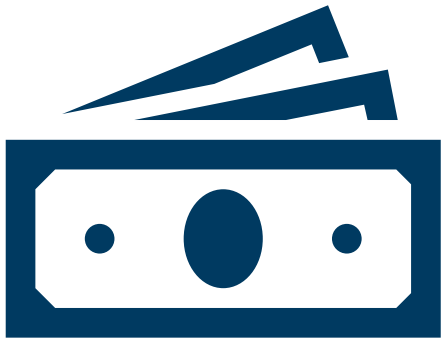
Affordable

Reliable



Clean

Industrial users foremost want affordable electricity



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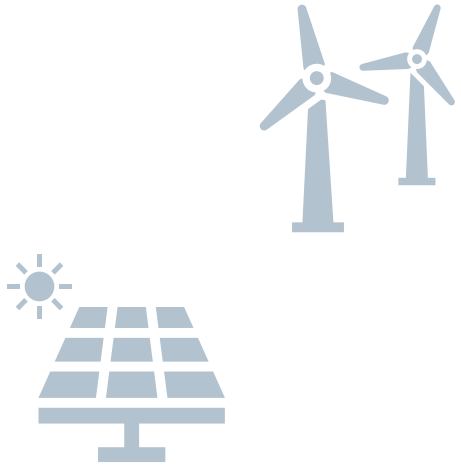
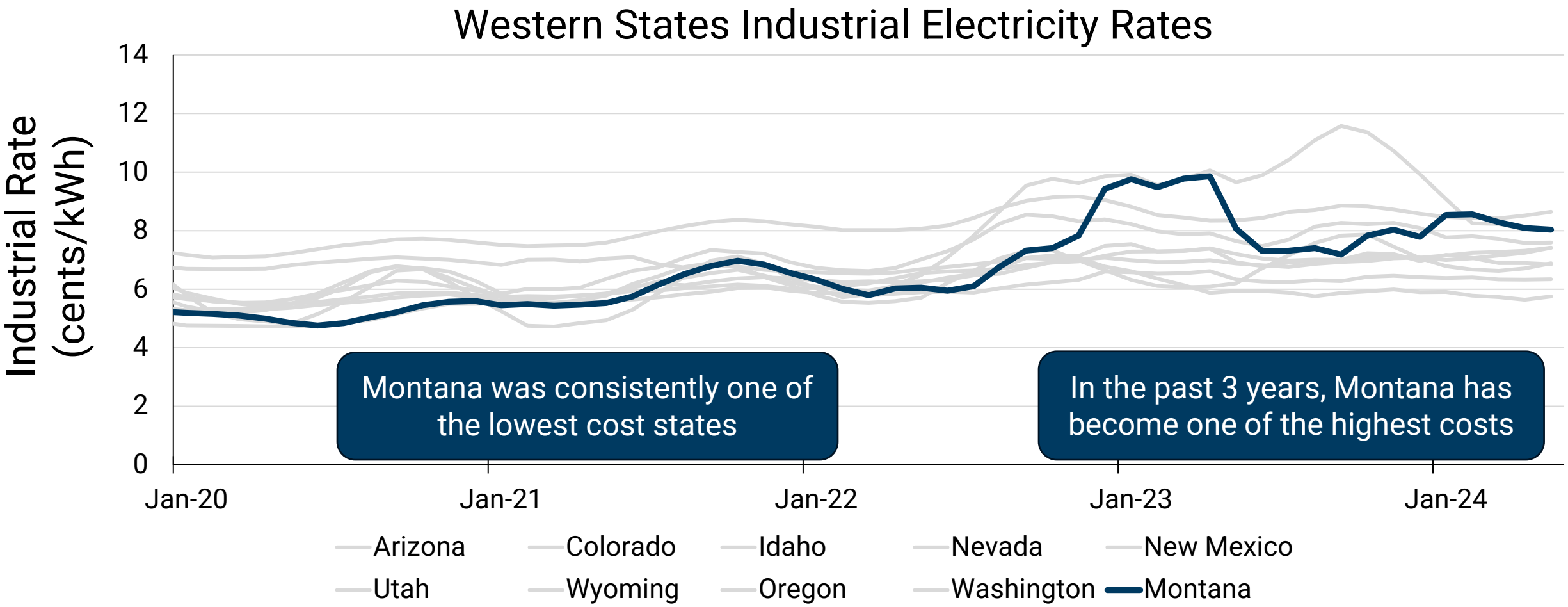


Clean

Montana is experiencing increasing electricity costs for large industrial users



Source: EIA

Transmission enables competition and supply to enter the market, driving down energy costs

"We did everything in our power to return profitability to the polysilicon business in Butte, however forecasts for sustained high electricity costs that are outside of our control necessitated this decision [to shutter the polysilicon business]"

REC Silicon CEO Kurt Levens
February 7, 2024

We are looking at doubling our energy costs with a very limited number of possible suppliers once our contracts are up.

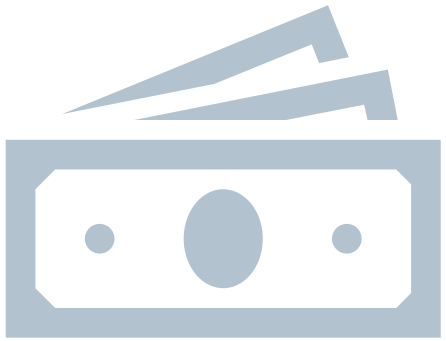
Montana Resources
February 22, 2024

"We would like to receive a larger response to our choice electric supply RFPs and are especially interested in receiving those responses from renewable sources. We believe additional transmission resources would improve the number of potential suppliers, as well as improve our potential for acquiring a renewable power supply."

Sibanye Stillwater VP Heather McDowell
April 30, 2024

RENEWABLE NORTHWEST

It is equally important for that electricity to be reliable



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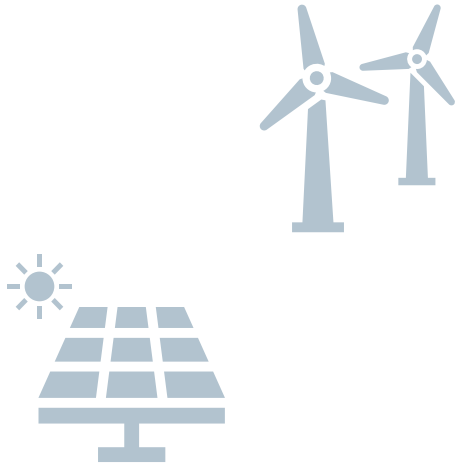
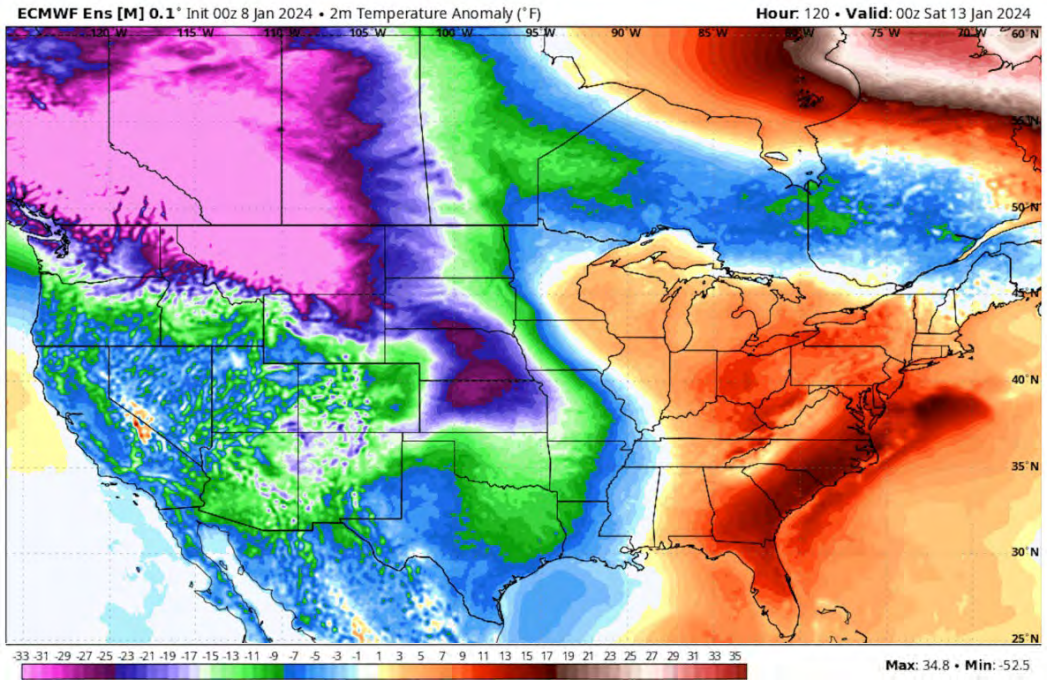


Clean

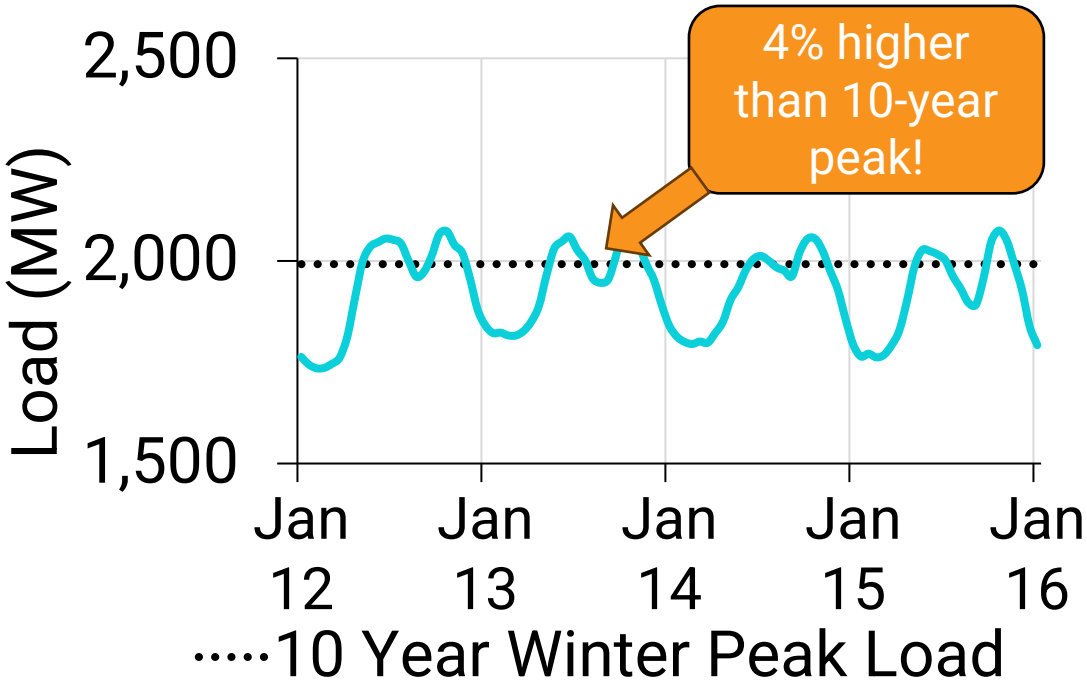
In January 2024, the Northwest region experienced an extreme cold event

Montana's temperatures were 30 degrees below normal



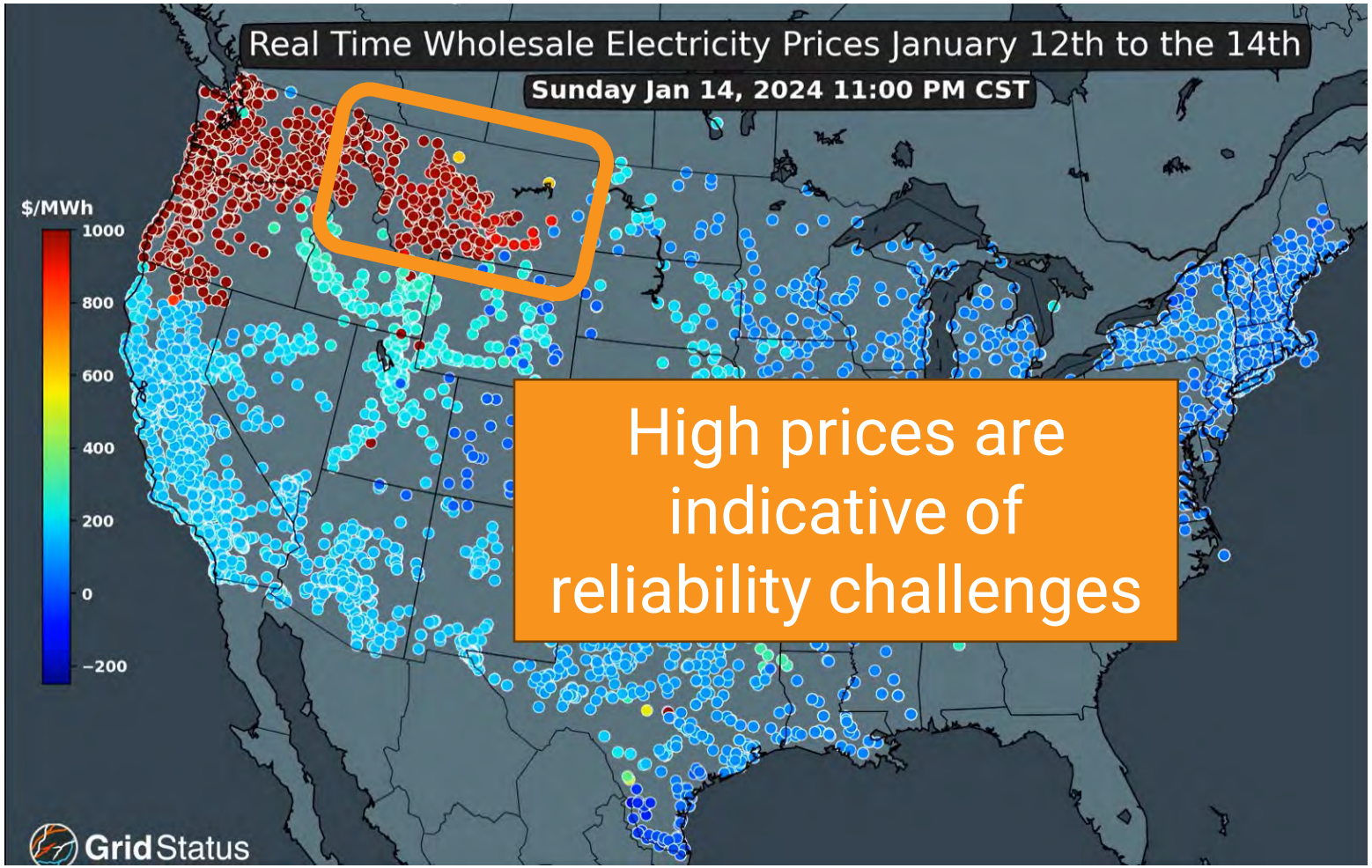
Source: weatherbell.com.

Montana's grid strained under extreme load

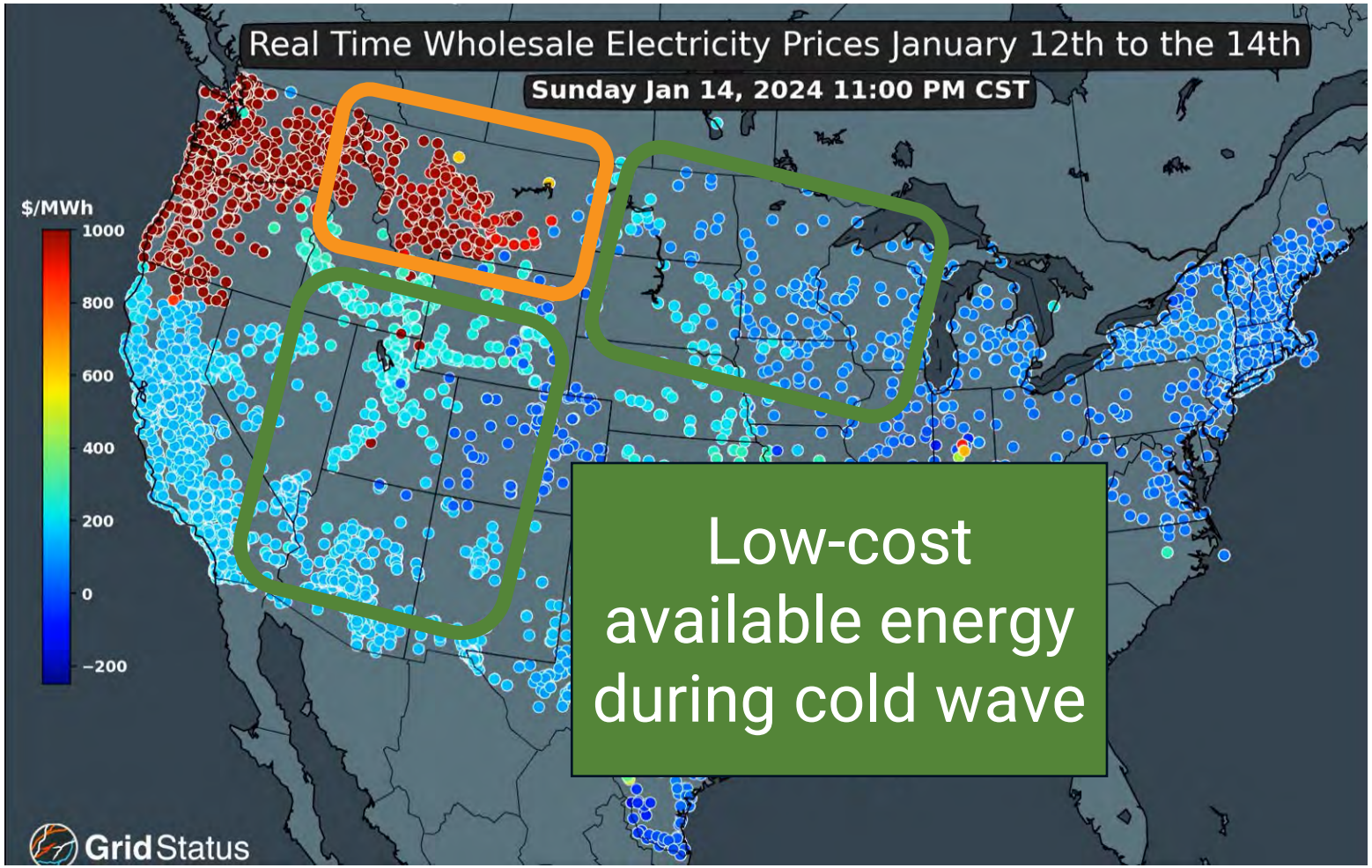


Source: US EIA.

Montana's grid was on the edge of reliable service, skyrocketing prices



Other regions to the south and east did not experience extreme grid conditions



Existing transmission was critical to keeping the lights on in the Pacific Northwest

"Temperatures and loads were at or near historic peaks, balancing authorities were managing through energy emergencies in real time and there was ***a significant amount of support required from BAs outside of the Northwest Region****..."*

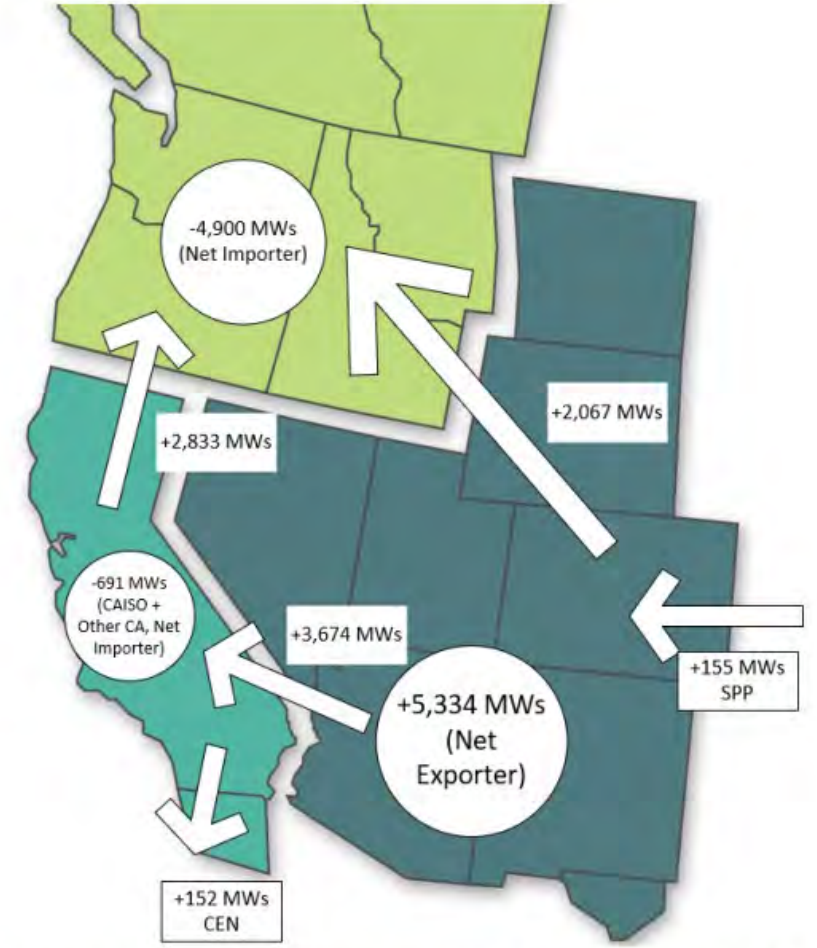
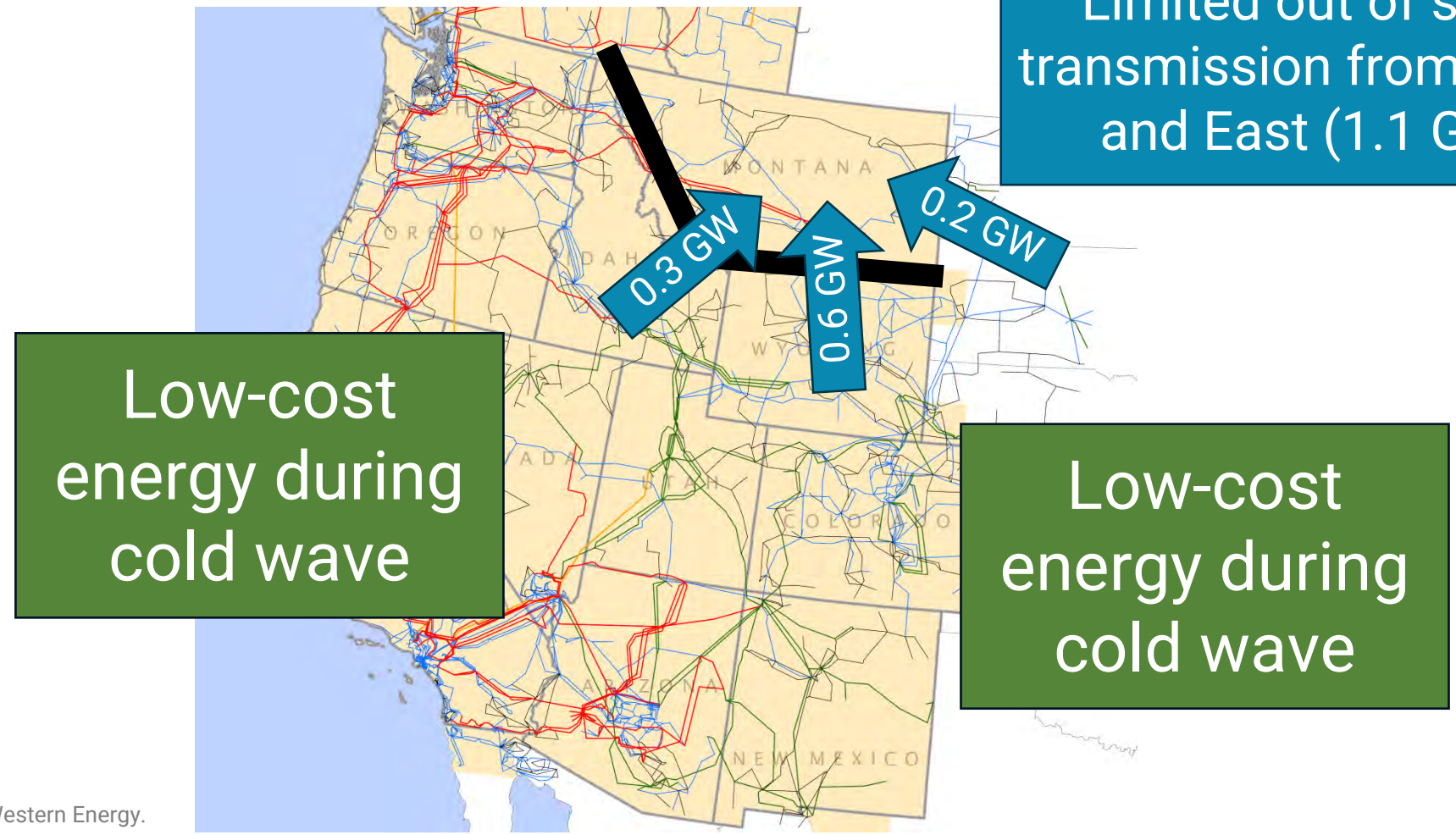


Figure 1 - Average net regional imports into the Northwest during January 12 through January 16, 2024.

Source: Western Power Pool

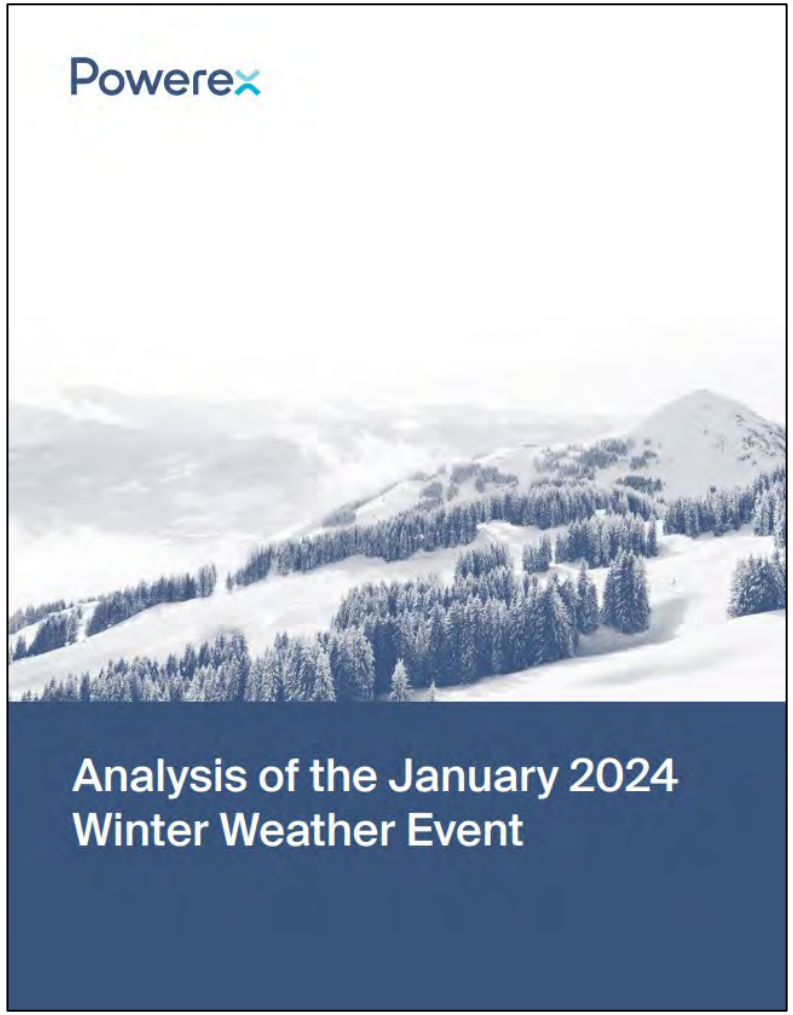
Montana could not access low-cost energy that was available from its neighbors



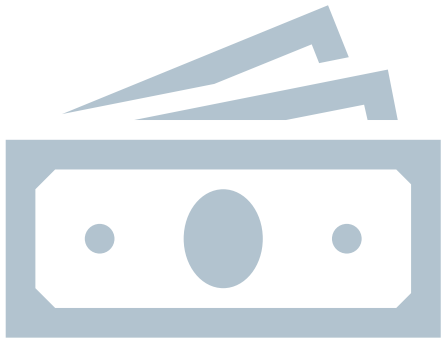
RMI Graphic. Source: WECC and NorthWestern Energy.

Expanded transmission to the desert southwest region would have brought millions in benefits and reduced reliability risk

"…an additional 2,000 MW of direct transfer capability between these regions could have provided ***up to $140 million in additional economic benefit in just five days****, while* ***greatly reducing the reliability risk*** *for the U.S. Northwest region."*



Certain industrial users are looking for clean power



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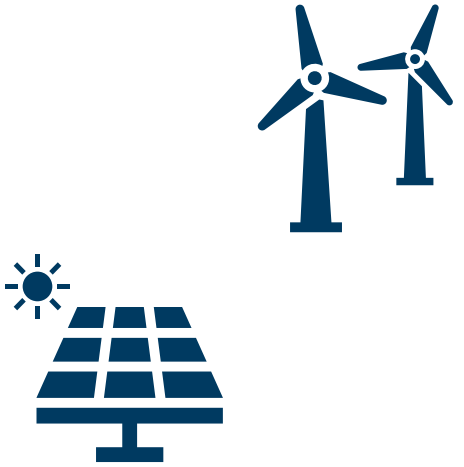


Clean

Transmission enables industry to access clean power to meet the corporate goals

Transmission
+ Clean Generation
Industrial Growth

Micron Technology, Inc., one of the world's largest semiconductor companies and the only U.S.-based manufacturer of memory, will today celebrate the start of construction on the nation's first new memory manufacturing fab in 20 years…Through the lifespan of the project, Micron will directly infuse $15.3 billion into the Idaho economy and directly spend $13.0 billion with Idaho businesses. The project will create over 17,000 new Idaho jobs, including 2,000 Micron direct jobs…[Micron is] aiming to achieve 100% water reuse, recycling and restoration, as well as use 100% renewable electricity at the new facility.

Micron Technology, Inc.
October 3, 2023

The Idaho PUC last week approved an energy service agreement that will allow Idaho Power to provide electric service to a large new data center…the center will use between 10-20MW of power..[the data center] plans to support all of its operations through the addition of renewable resources, which would in turn be connected to Idaho Power's system.

Daily Energy Insider
May 16, 2023

The East Smoky Panel Mine, which was just approved, is actually the second mine approved for J.R. Simplot this year. The Dairy Syncline Mine Project was approved in April. That mine will be the next "generation" of phosphate mining for Simplot in southeastern Idaho. The project is expected to support more than 400 mining and service jobs over the next 30 years. In addition, the mine is expected to contribute to the region's economy via taxes and royalties, purchases, and sustaining support and service jobs that provide $25 million in direct earnings.

National Mining Association
January 14, 2021

RENEWABLE NORTHWEST

Transmission can enable industrial growth in Great Falls

Industrial users are looking for **affordable** electricity	• Industrial rates are rising in Montana, pushing industry out. • Transmission can enable competition
Industrial users are looking for **reliable** electricity	• Transmission enabled a grid bigger than the weather ensuring reliable service during the most severe weather events.
Industrial users are looking for **clean** electricity	• Transmission enables access to clean energy. Other states have been able to meet new load needs with new clean generation.

Transmission solution pathways

It takes a village to build a transmission line

Key players and organizations in Montana

- Northwestern Energy and other utilities and developers.
- Commission
- State energy office
- Power plant developers
- Local permitting and siting stakeholders including communities and tribes
- Public interest organizations

Key players and organizations in the Western U.S.

- Western Transmission Expansion Coalition – WestTEC (West-wide transmission planning)
- Committee on Regional Electric Power Cooperation Transmission Coalition – CREPC TC (Commissioners and state energy office staff)
- Northern Grid (Pacific Northwest transmission planning organization)

Considerations for Possible Avenues of Change

Working with Berkshire Hathaway Energy Montana, Northwestern Energy, and Western Area Power Administration to unlock marginal gains on the existing system.

Work alongside a coalition of transmission advocates (e.g. large loads, clean energy developers, etc.) throughout the state.

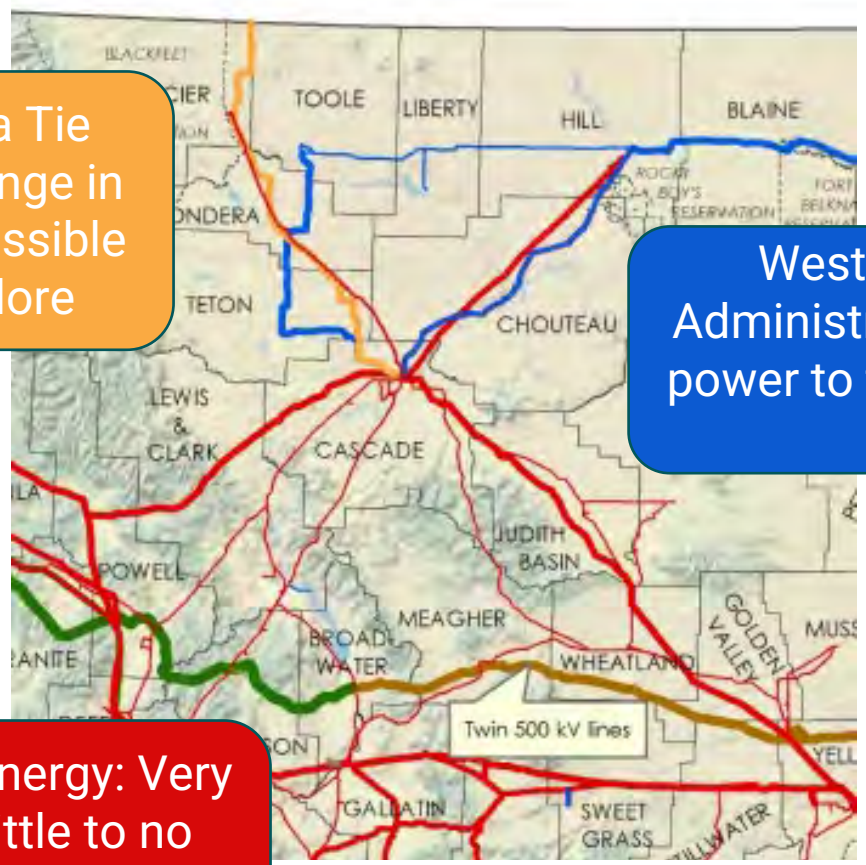
Unlocking short-term fixes

Building a long-term change

Pathway 1: Short-term fixes

Unlock additional transmission capacity on existing lines

Montana Alberta Tie Line (MATL): Change in ownership and possible avenues to explore



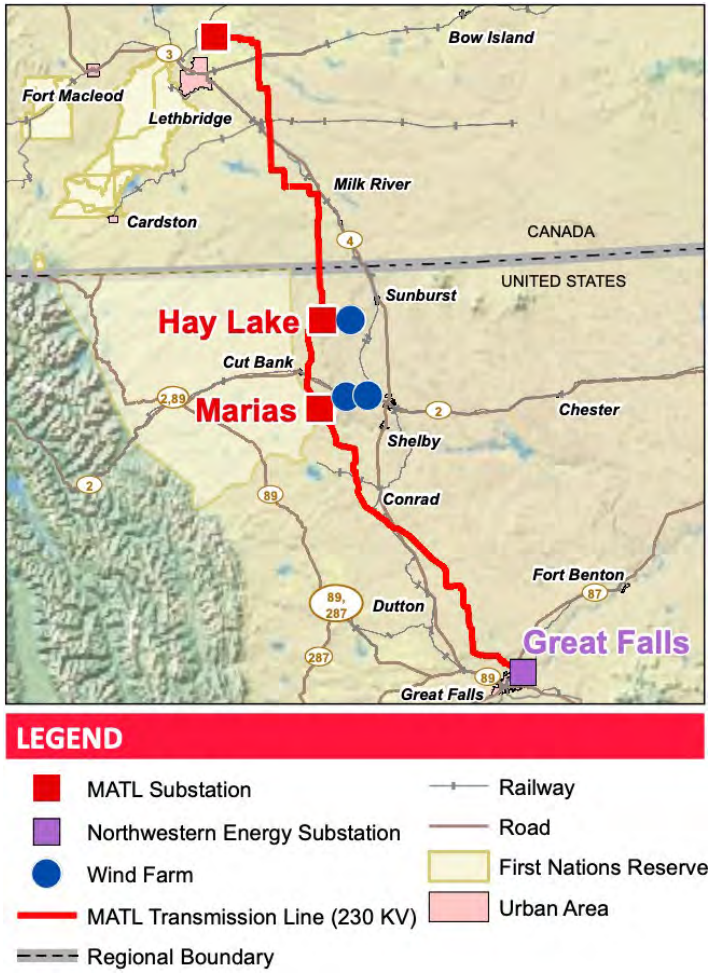
Western Area Power Administration: Constrained, power to the east. Difficult to access.

Northwestern Energy: Very constrained, little to no available transmission or generation

Pathway 1: Short-term fixes

Working with MATL to access transmission and power

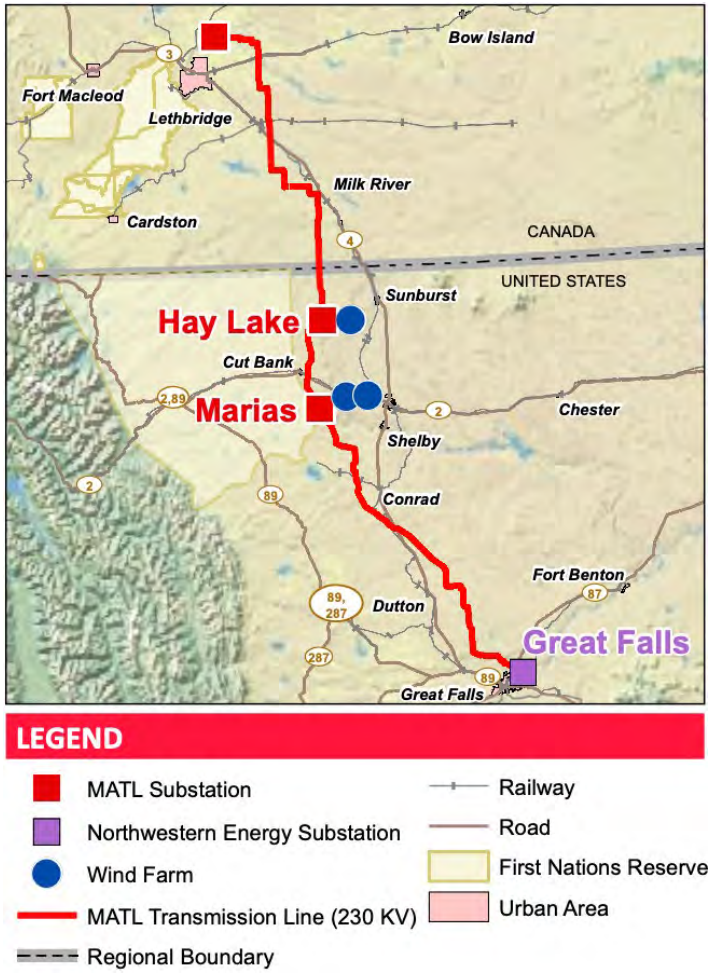
- The transmission rights across MATL are changing ownership to Berkshire Hathaway Energy Montana.
- BHE Montana will have access to 50 MW into Great Falls by Jan 1, 2025, and 300 MW by May 2026.
- New load will need to connect into the Hay Lake or Marias substations to avoid Northwestern transmission constraints at Great Falls substation.



Pathway 1: Short-term fixes

Working with MATL to build industrial hubs

- **GFDA can pursue to next steps:**
  - Steer potential industrial customers to the two MATL's substations on the northern part of their system.
  - Partner with MATL to consider the development of an additional MATL substation near the city of Great Falls. This likely has economic, regulatory, and technical hurdles.



Pathway 1: Short-term fixes

Supporting the development of industrial hubs is working

- **NV Energy is working in two areas of Nevada to support new industrial load.**
  - In the Reno area, NV Energy is supporting the development of 6.2 GW (3 times Montana's peak load) of new load in the Reno-Sparks industrial zone.
  - There is another 9 GWs of proposed load for a total of 15 GWs.

Tahoe Reno Industrial Center in Reno, NV

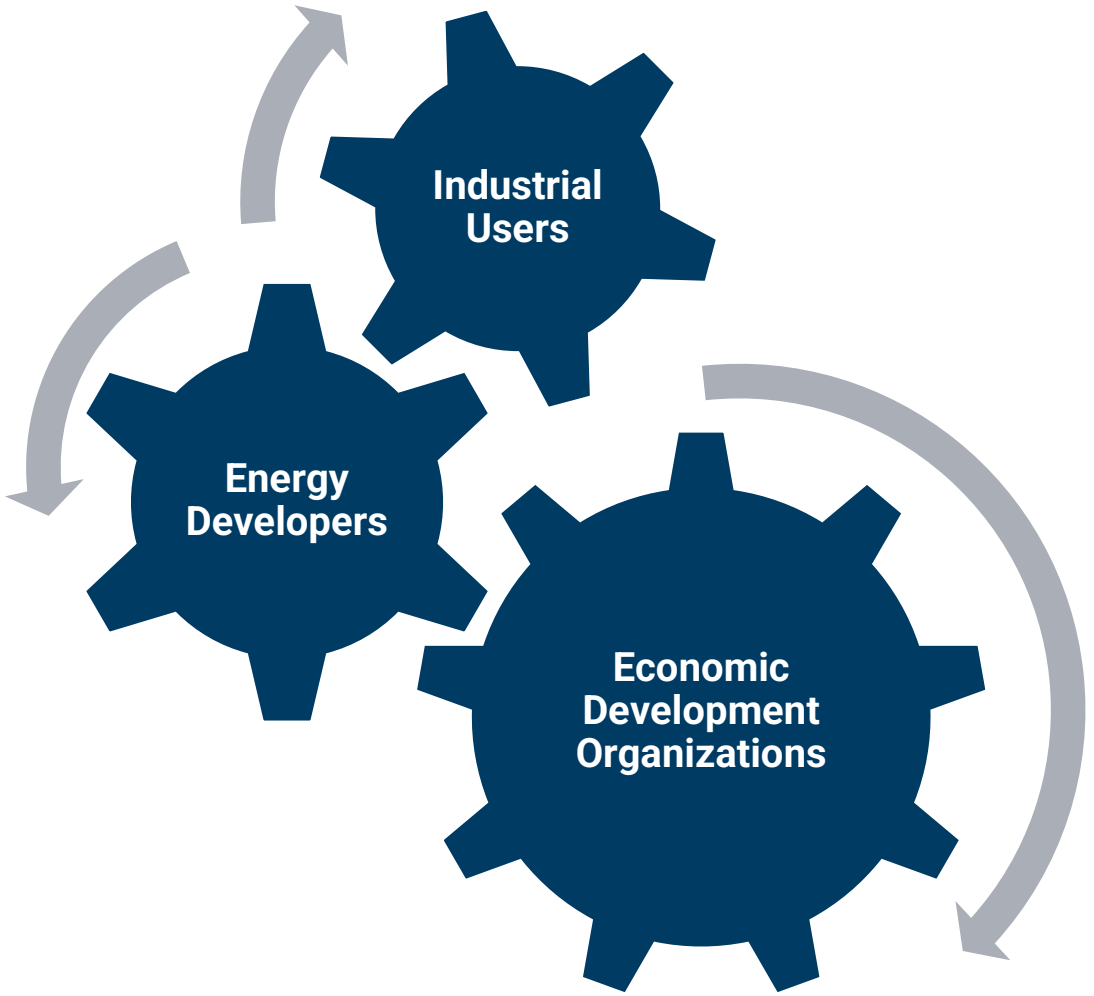
Pathway 2: Long-term fixes

Work alongside a coalition of transmission advocates throughout the state

Earlier this year, existing industrial users formed a coalition to address the need for transmission and lower electricity rates.

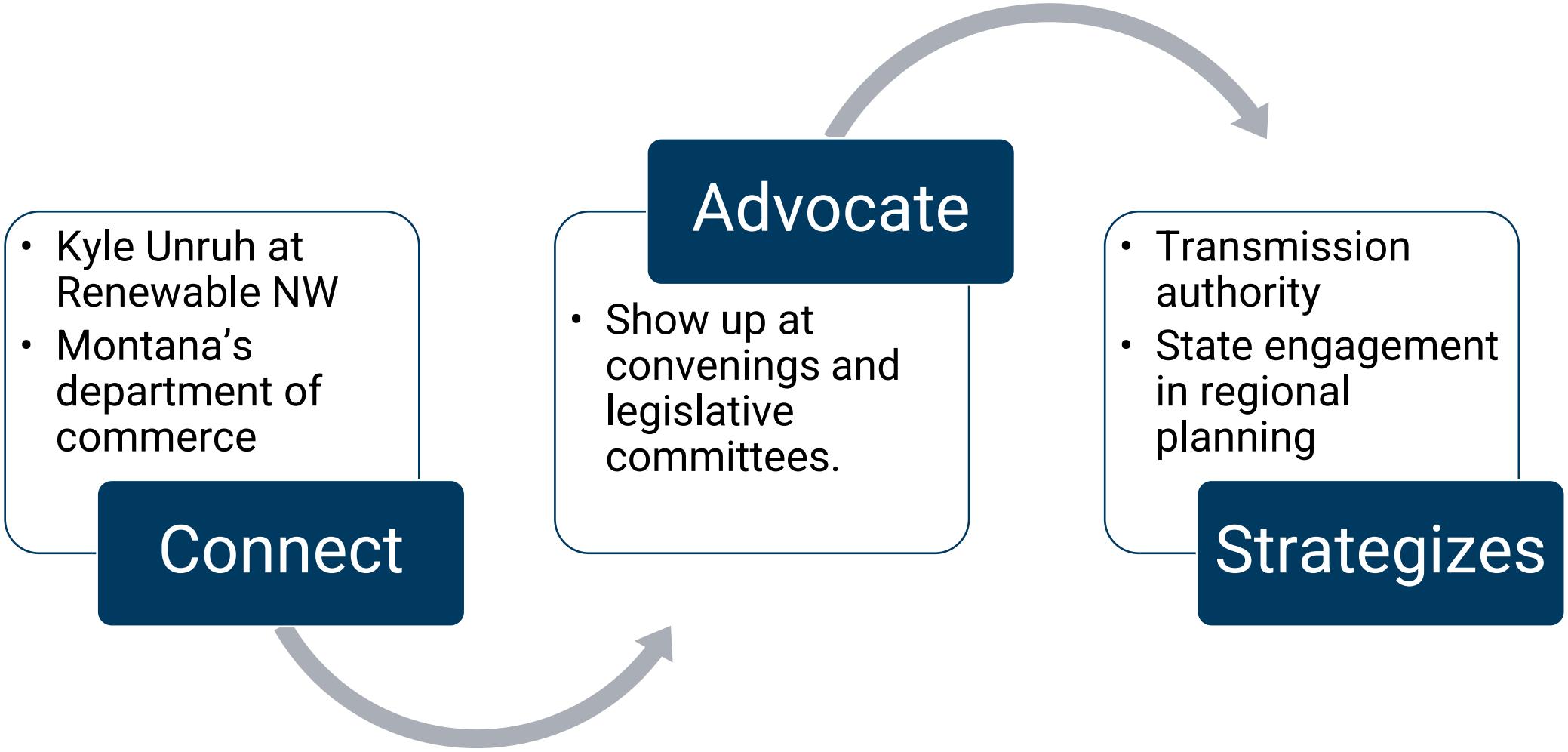
In June 2024, the energy bureau hosted a convening of industrial users.

In July 2024, the coalition spoke to the ETIC committee in Helena, MT about the need for transmission.



Pathway 2: Long-term fixes

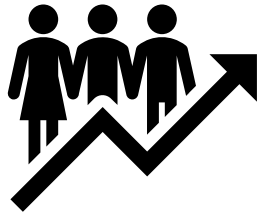
How can GFDA fit into a coalition?

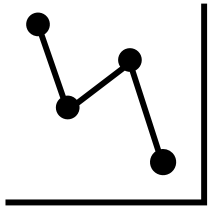


Pathway 2: Long-term fixes

What does GFDA bring to this coalition?

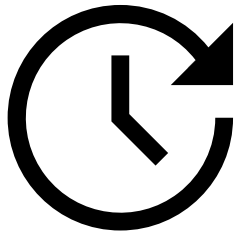
New and Different Voice
No EDO is currently engaged on transmission infrastructure and your voice would be powerful in decision makers venues.





Data and examples
“We've had X company come to us that we haven’t been able to accommodate because of electric infrastructure limitations”

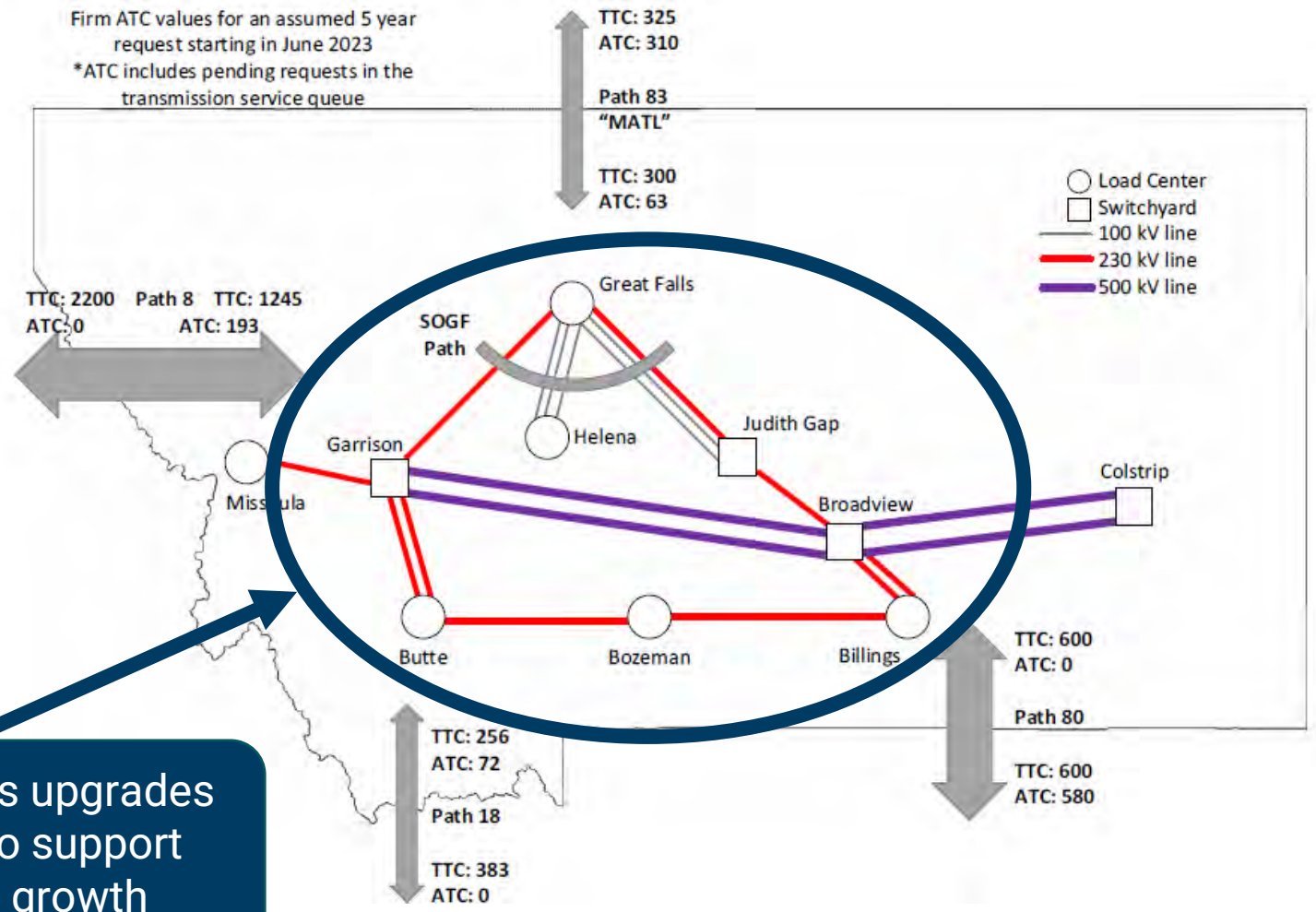
Pathway Forward
“We have these X industrial sites ready to be developed, if only we had electric infrastructure.”



Pathway 2: Long-term fixes

How will GFDA benefit from a state-wide coalition?

- **Montana needs both intra and inter state transmission upgrades to support growth in the Great Falls region.**
- **A rising tide lifts all boats in the transmission space.**
  - You can't upgrade just the Great Falls region without upgrading the entire system.



Montana needs upgrades everywhere to support Great Falls' growth

Great falls can unlock industry and energy growth with new transmission

Working with Berkshire Hathaway Energy Montana, Northwestern Energy, and Western Area Power Administration to unlock marginal gains on the existing system.

Unlocking short-term fixes

Work alongside a coalition of transmission advocates (e.g. large loads, clean energy developers, etc.) throughout the state.

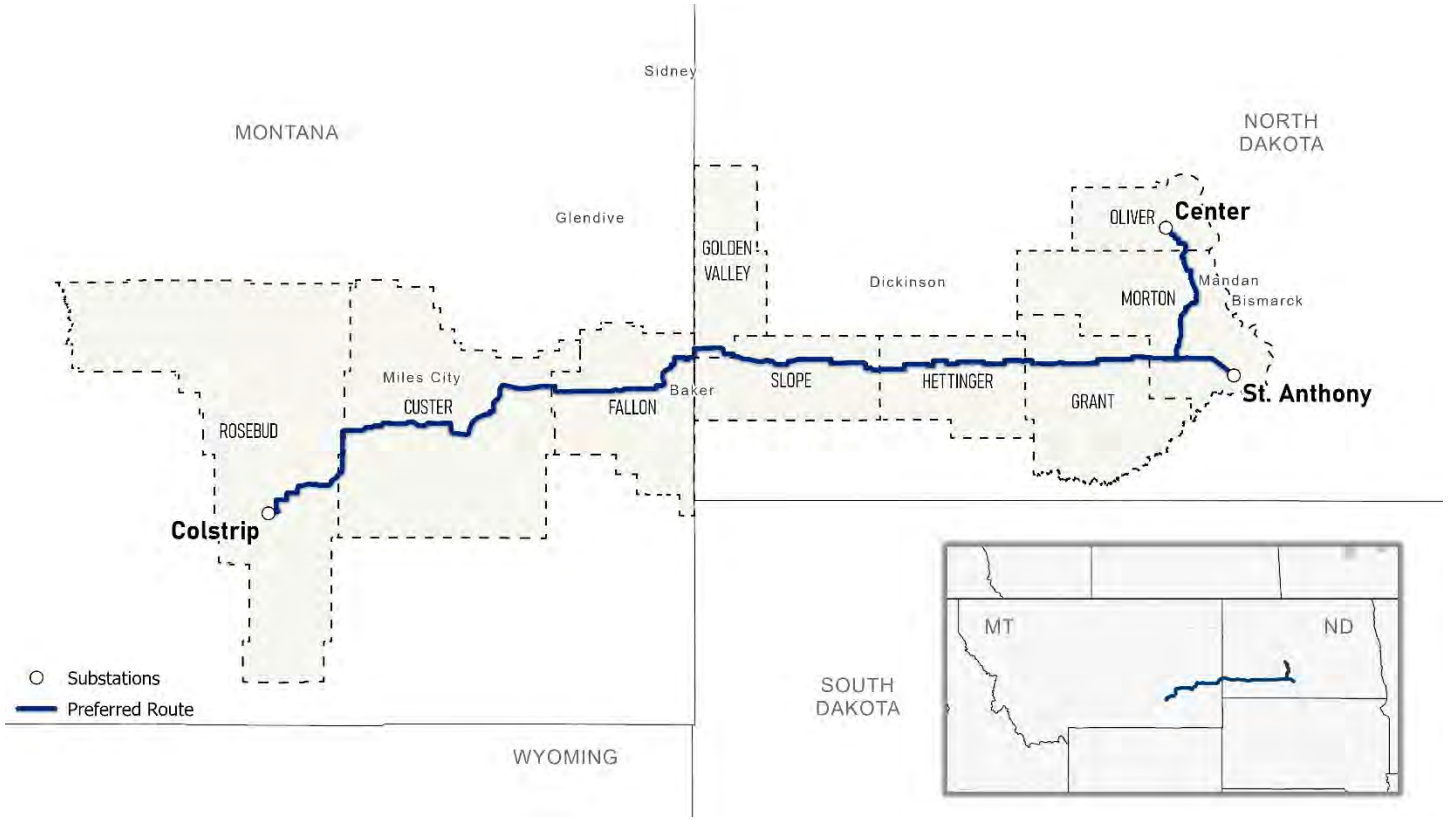
Building a long-term change

Thank you!

Appendix

Northern Plains Connector will be a first of its kind high voltage cross seam transmission line

- Being developed by Grid United (not a utility).
- It will cross the interconnect seam between the Eastern half and the Western half of the US.
- Expected to be complete in 2031 with the support of Montana's department of commerce, large utilities, and the U.S. department of energy.
- Enable additional growth in Wind generation and transmission capacity throughout Montana.



Source: Northwestern Energy