Great Falls Energy Market Assessment

Energy Landscape Summary, Demand Forecast, and Capacity Analysis

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

Aaron Brickman
Principal

Eva Rosenbloom
Manager

Lachlan Carey
Manager

Madeline Weir
Senior Associate

Contributing Subject Matter Experts

Tyler Farrell
Senior Associate
Transmission

Corey Stewart
Senior Associate
Hydrogen & eFuels

Agenda

- **Project Overview & Key Takeaways**
- **Energy Landscape Deep Dive**
  - Energy Transition and the Inflation Reduction Act
  - Great Falls and Montana Energy Transition
  - Regional Capacity Analysis

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.

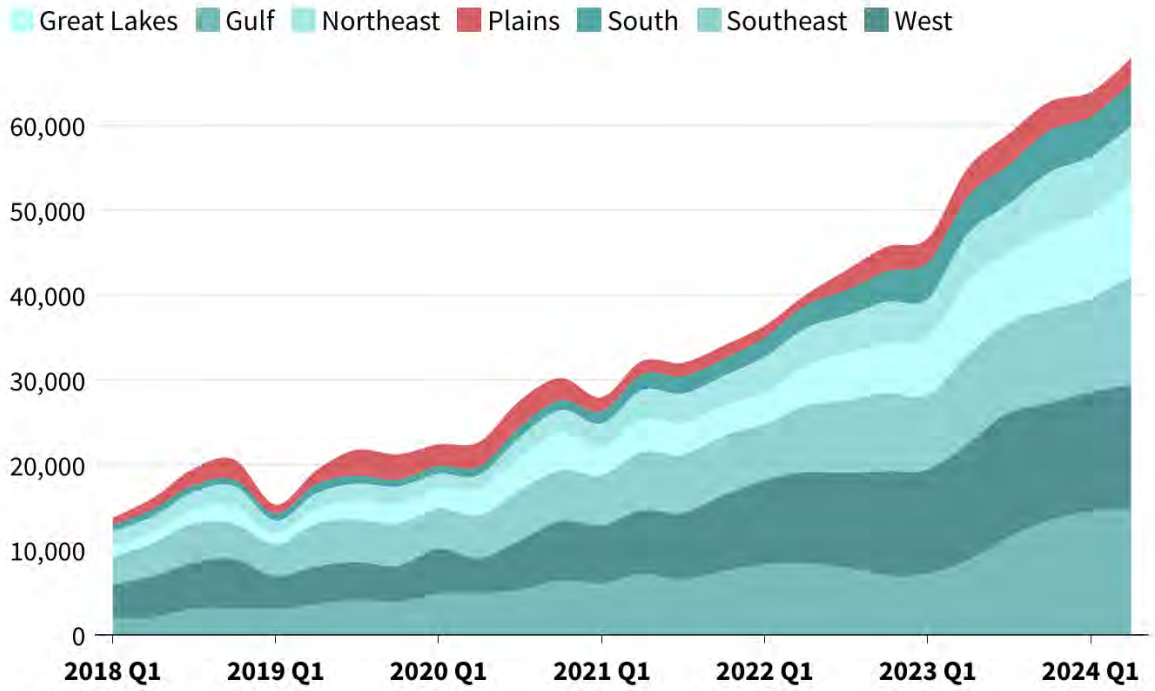
Energy Transition and IRA Overview

The clean energy economy is booming

Nationally, clean energy investment has grown almost 5 times since 2018, with battery and solar manufacturing leading the way since mid-2022.

Clean energy investment in the U.S. is almost 5x that of 2018

In the Plains, investment has more than doubled since the passage of the IRA in 2022, totaling about $2.9 billion USD.



Investment in Millions USD.

Chart: RMI Graphic • **Source:** Clean investment Monitor • Created with Datawrapper

Hydrogen, SAF and battery manufacturing have been big winners since the passage of the Inflation Reduction Act (IRA)

Growth in cumulative investment since 2018, indexed to Q2-2022. (2022-Q2=100)

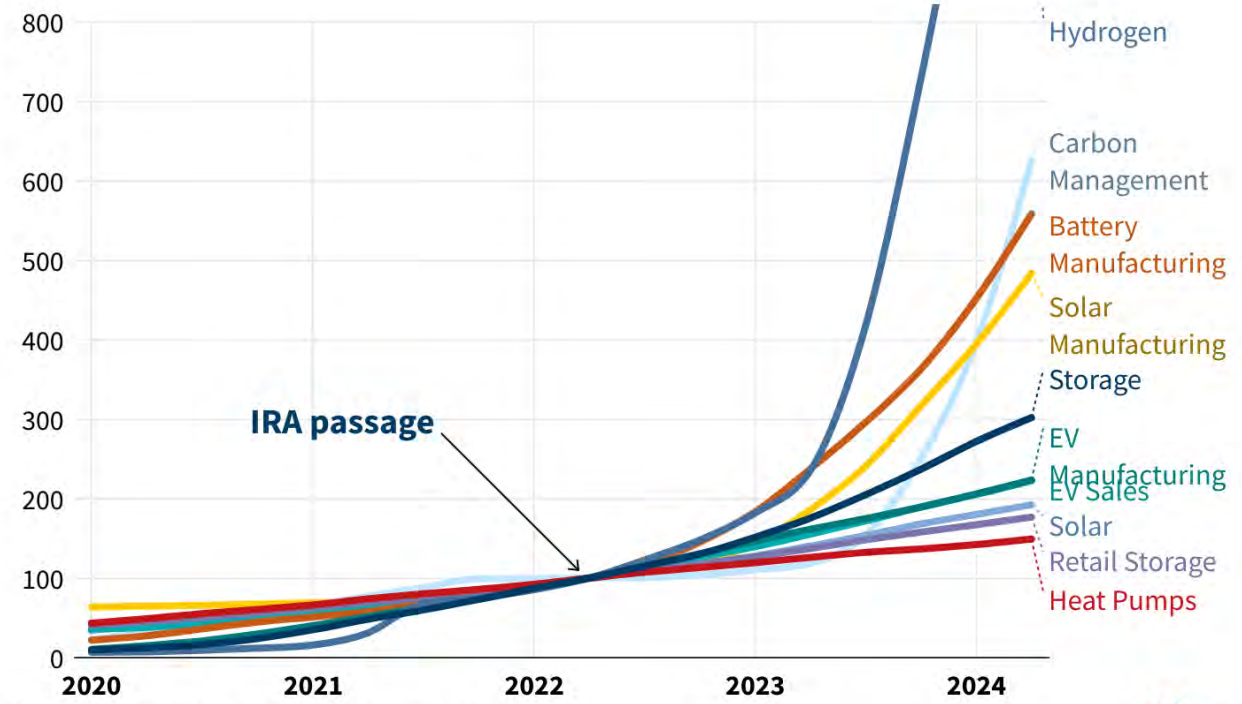


Chart: RMI Graphic • **Source:** Clean Investment Monitor

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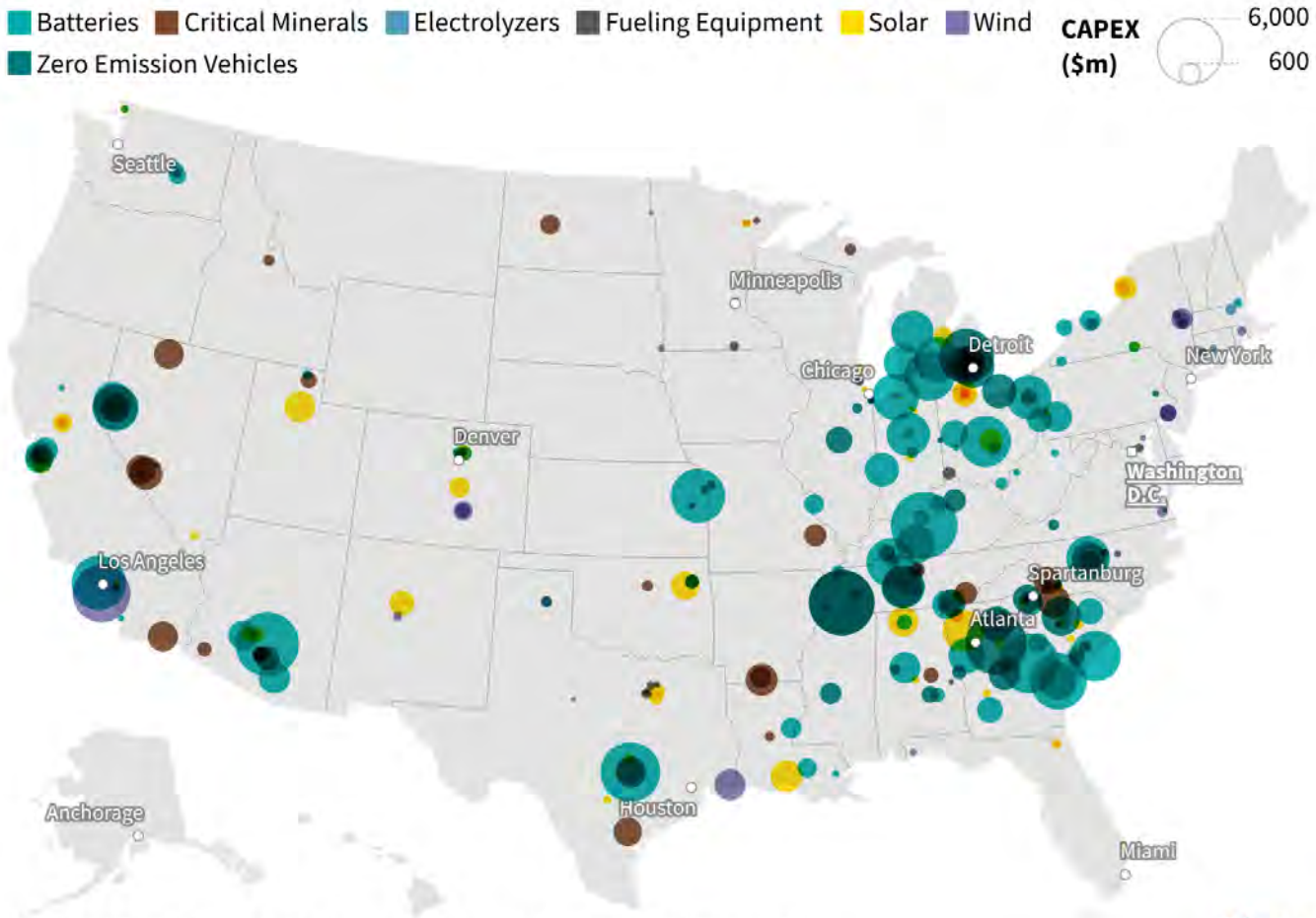
Clean energy manufacturing has been the big winner

However, these projects have been concentrated in the Midwest and Southeast.

Clean Energy Manufacturing Projects Since 2018

Nearly $200 billion in clean energy manufacturing projects have been announced, are under construction, or already operating since 2018.



Map: RMI Graphic • **Source:** Clean Investment Monitor • Created with Datawrapper

Georgia, Tennessee, and Michigan have led states in clean energy manufacturing projects

South Carolina has seen over $10bn in clean energy manufacturing project announcements since 2018

State	Total CAPEX ($b)	Share (%)
GA	27.2	13.9
TN	24.7	12.6
MI	22.3	11.4
CA	14.6	7.5
NV	12.6	6.4
OH	11.7	6.0
SC	10.7	5.5
AZ	10.3	5.2
TX	10.1	5.2
KY	9.9	5.1
IN	7.3	3.7
NC	7.2	3.7

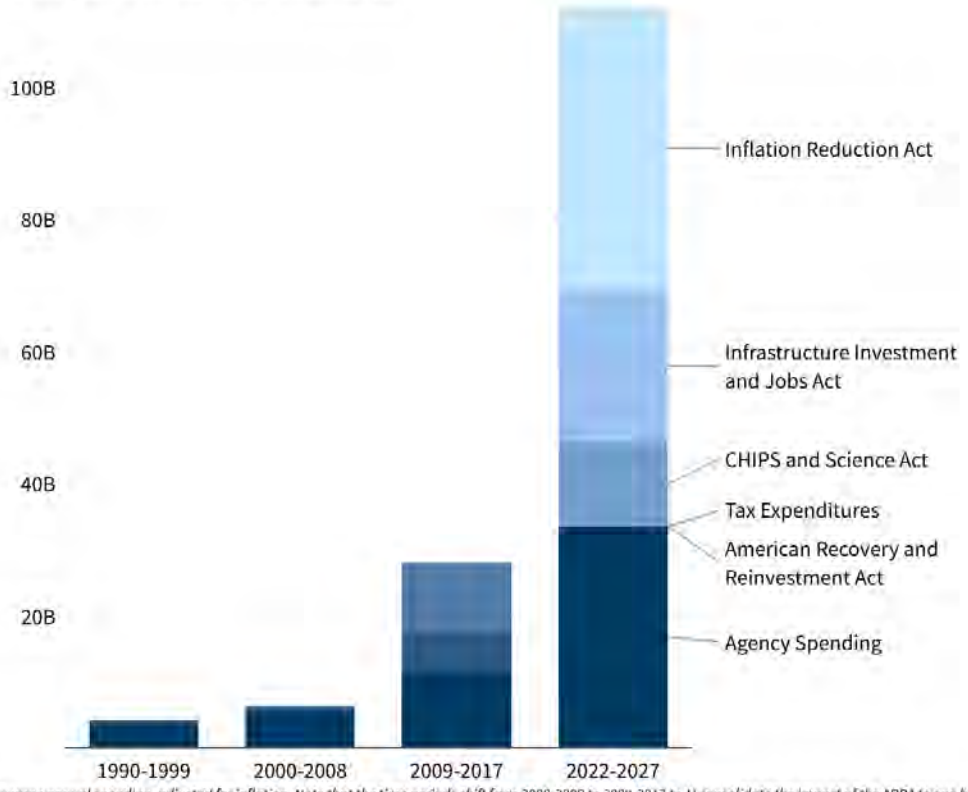
Table: RMI Graphic • **Source:** Clean investment Monitor • Created with Datawrapper

IRA+IIJA+CHIPS = A Big Deal

The US has the most ambitious suite of clean energy policies anywhere, presenting unprecedented opportunities for states and localities across the country.

Federal Spending on Climate Will Exceed $100b Annually

Spending will more than triple historic levels.



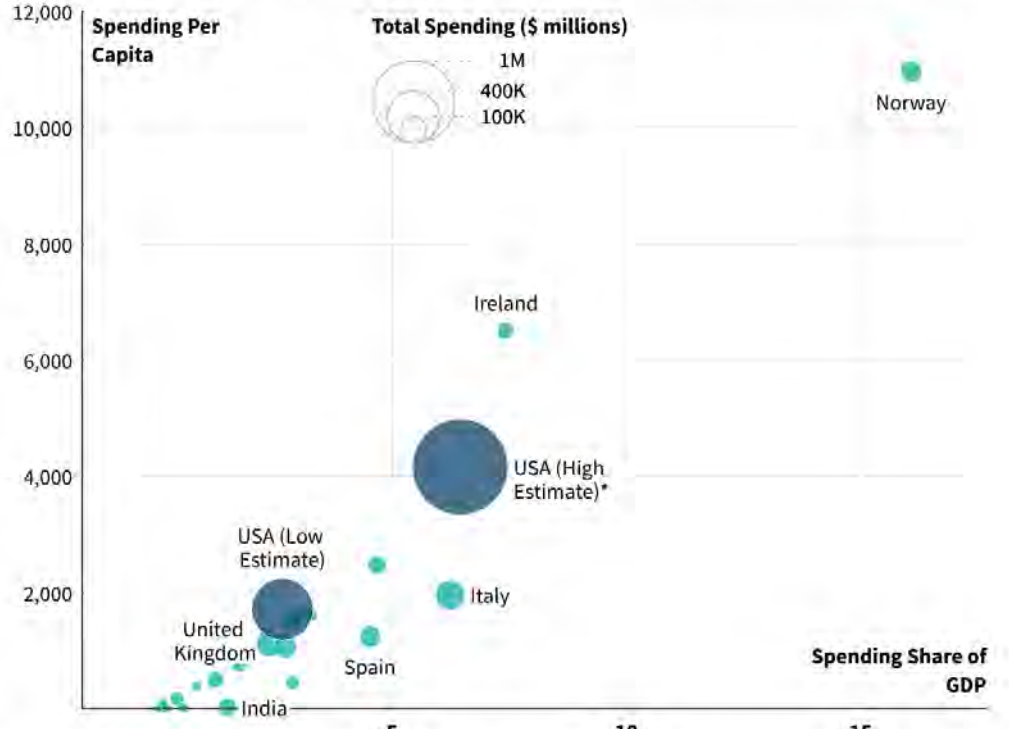
Average annual spending, adjusted for inflation. Note that the time periods shift from 2000-2008 to 2009-2017 to 1) consolidate the impact of the ARRA to one bar, and 2) address missing data between 2018-2021. Values are based on RMI estimates using agency spending data from the GAO, tax expenditure data from the JCT, and internal analysis on 2021-2022 legislation.

Source: RMI • Created with Datawrapper

RMI

Clean Energy Spending Among Developed Countries since 2020

Even using the CBO's conservative estimates, the US has dedicated the most spending towards clean energy policies since Covid-19 and is among the largest relative to population and GDP. This grows significantly when accounting for uncapped tax credits.



*Spending figures are for clean energy investment support only and exclude energy affordability measures. *Uses the Goldman Sachs $1.2 trillion estimate of overall IRA incentives, rather than the official CBO $369 billion estimate.*

Chart: RMI Graphic • **Source:** IEA Government Energy Spending Tracker

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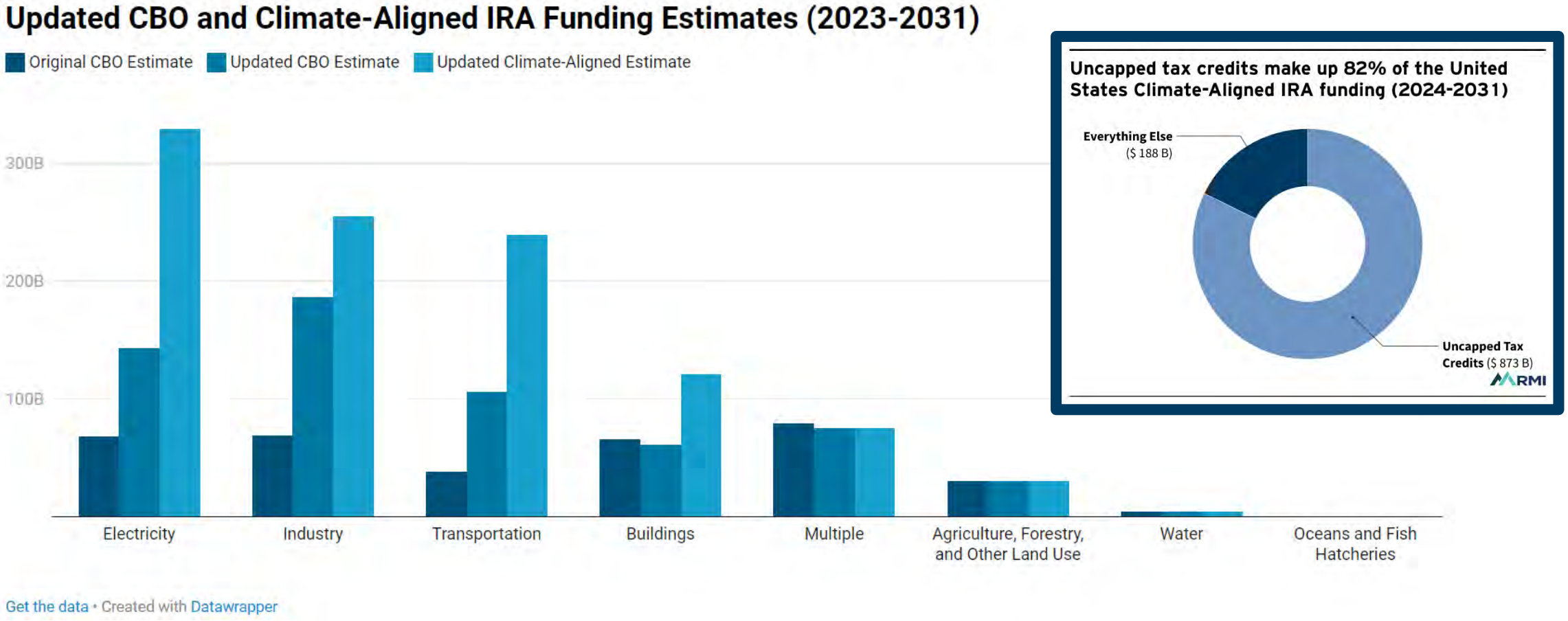
The Headline IRA Numbers Undersell its Potential

Uncapped tax credits could lead to ~$1 trillion spending bill.



Montana has already received nearly a quarter of a billion dollars in federal clean energy investments

Montana has received nearly 0.5% of its annual GDP in federal funding through the IRA

Estimated federal funding through the IRA since 2022, relative to GDP

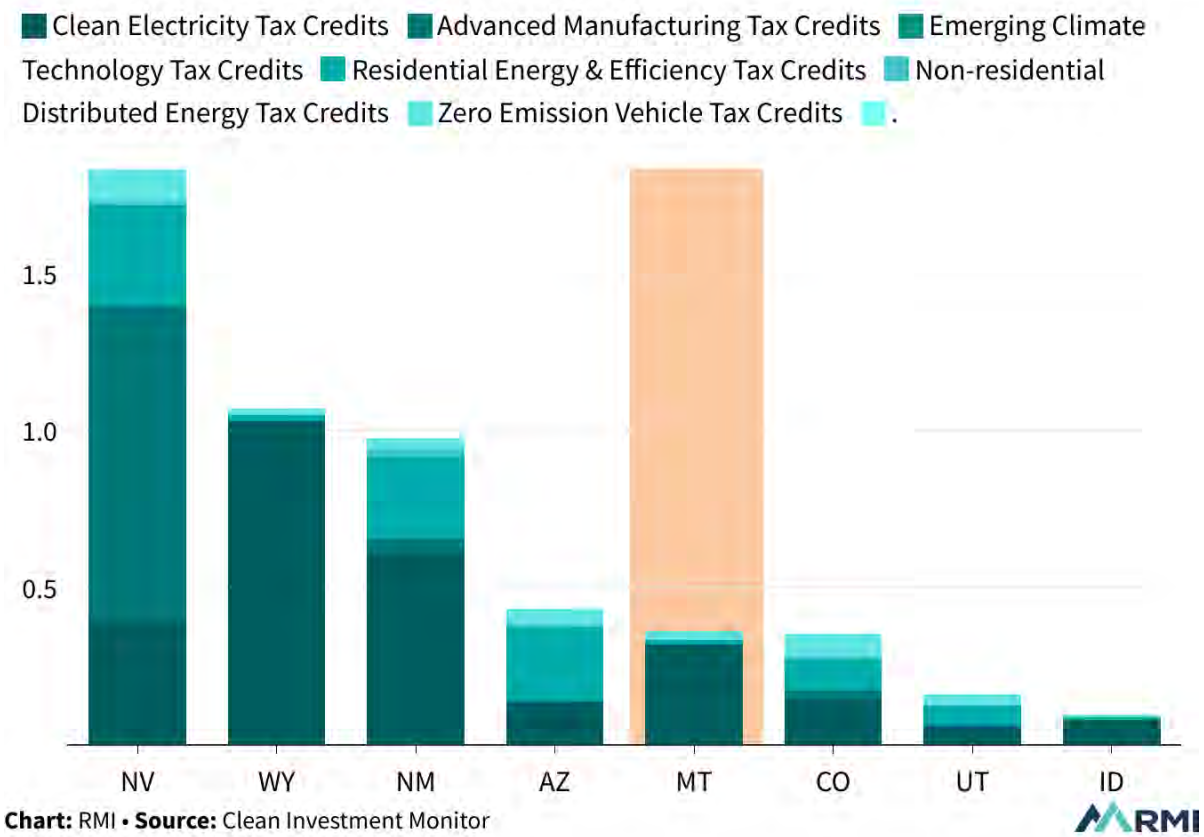


Chart: RMI • **Source:** Clean Investment Monitor

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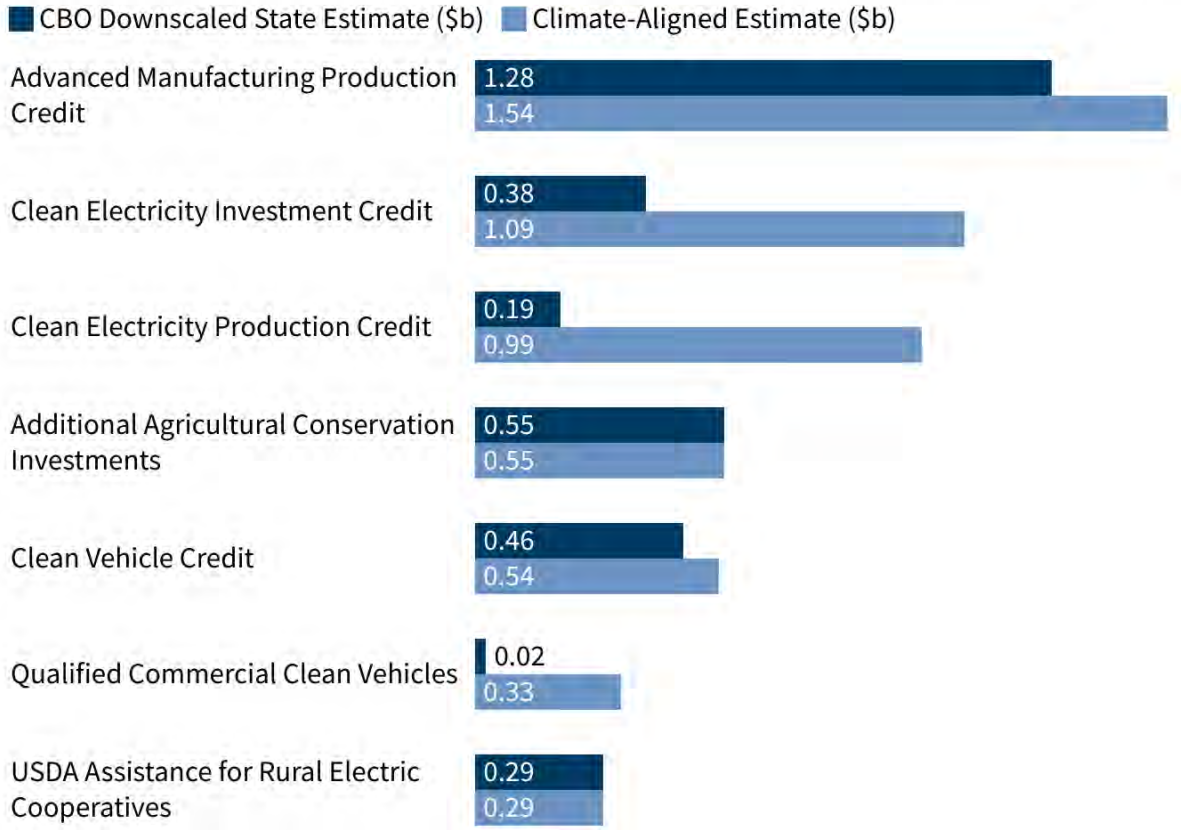
Montana Could Attract Over $7 Billion in Federal Funding by 2031

Estimates of Total Federal Funding to Montana by 2031 in a business-as-usual (CBO) scenario and a climate-aligned scenario, in billions of USD



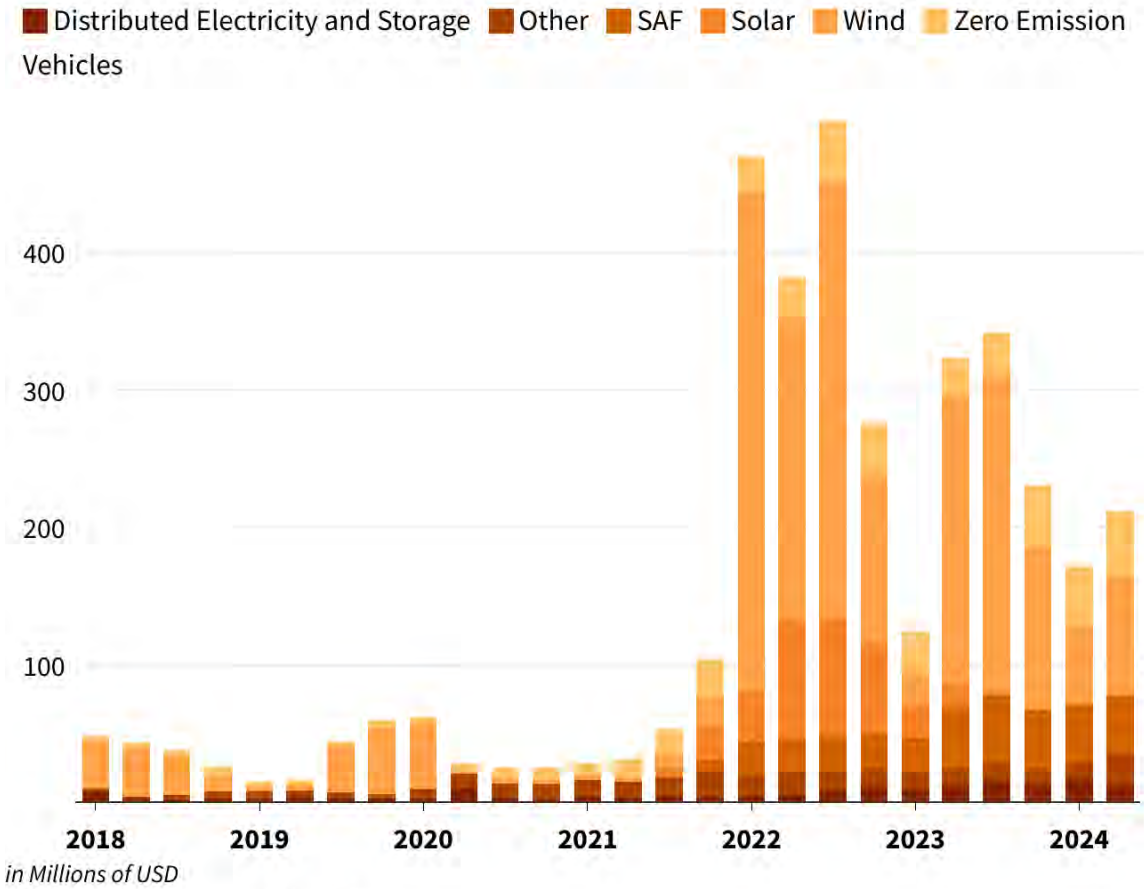
Great Falls and Montana Energy Transition

Investment in clean energy generation has been accelerating in Montana for a decade

Wind and Sustainable Aviation Fuels have been leading the way.

Clean Energy Investment, by Technology

Wind has attracted the most investment, while SAF and ZEVs have grown in recent years

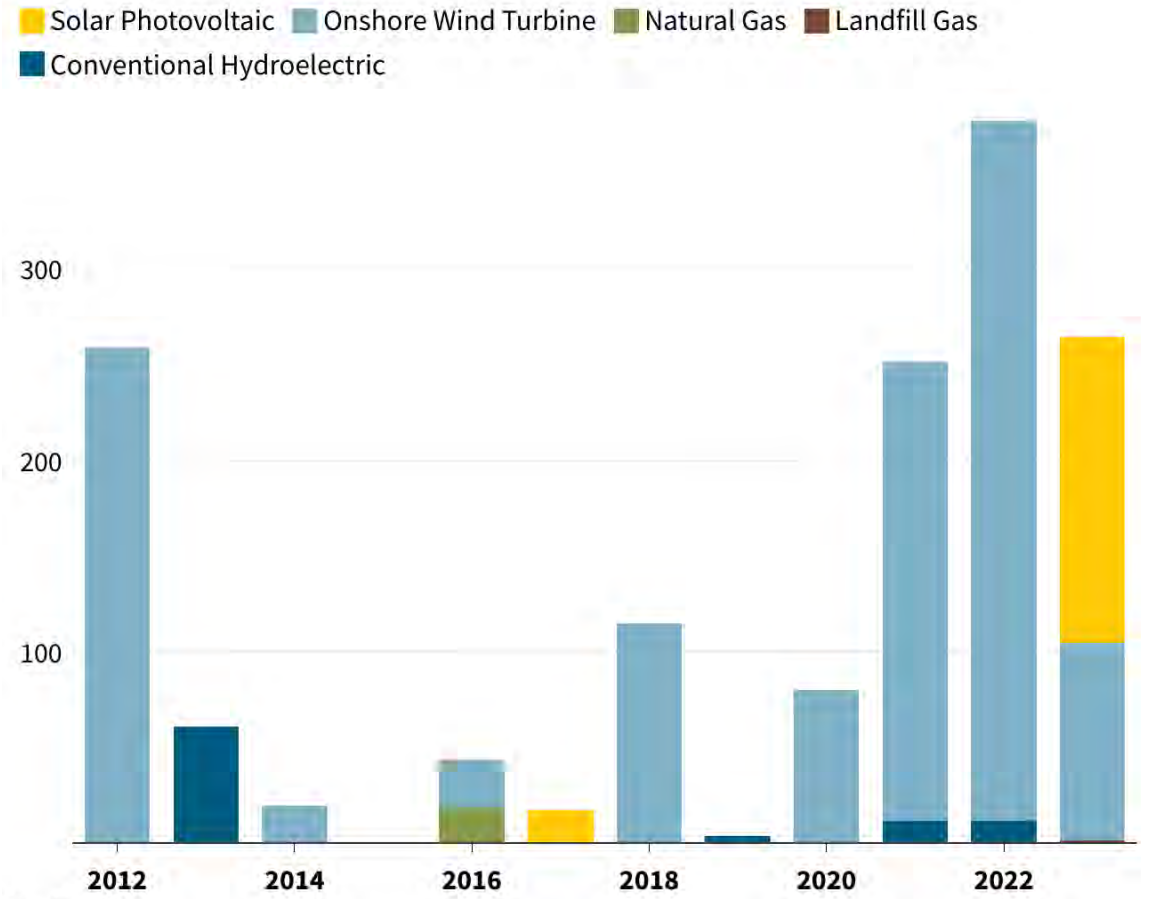


in Millions of USD

Source: Clean Investment Monitor

Generation Capacity Additions, by Technology

Nameplate Capacity (MW)



Source: EIA

Yet clean energy has grown slower in Montana than its neighbors

In terms of both investment and renewable electricity capacity, Montana lags behind states like Nevada, Wyoming, and New Mexico.

Montana has lagged behind in clean energy investment

Cumulative Clean Energy Investment per Capita since 2018, in Millions of Dollars

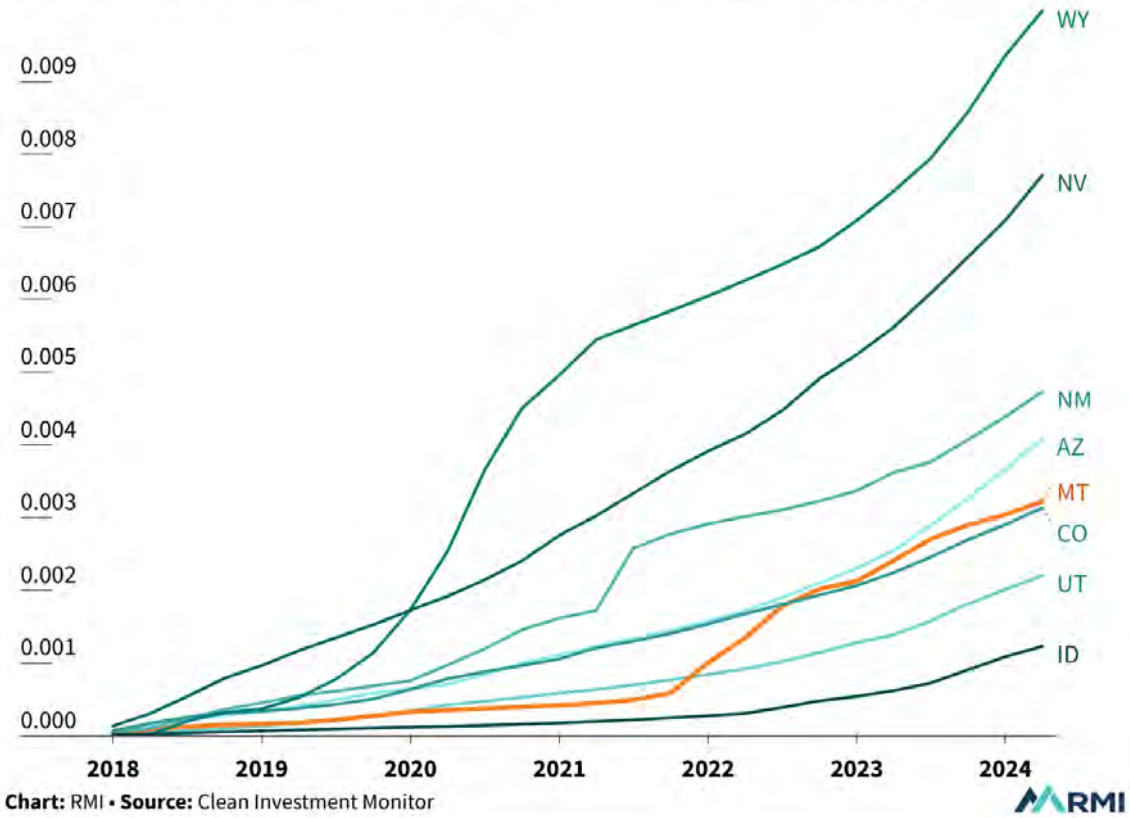


Chart: RMI • **Source:** Clean Investment Monitor

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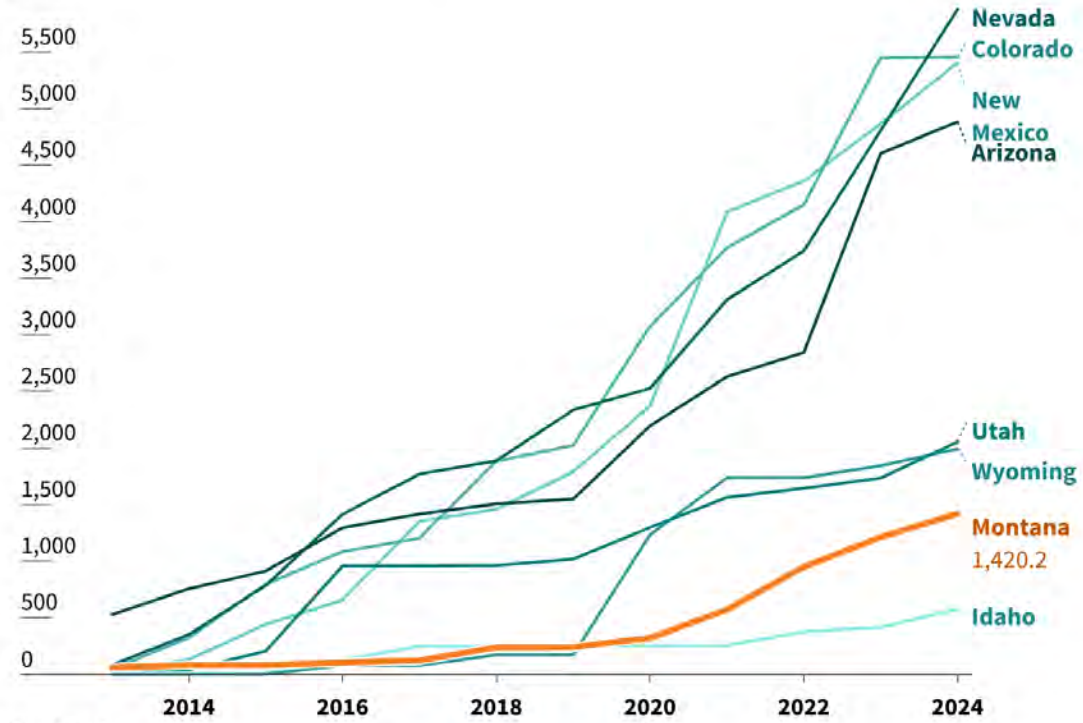
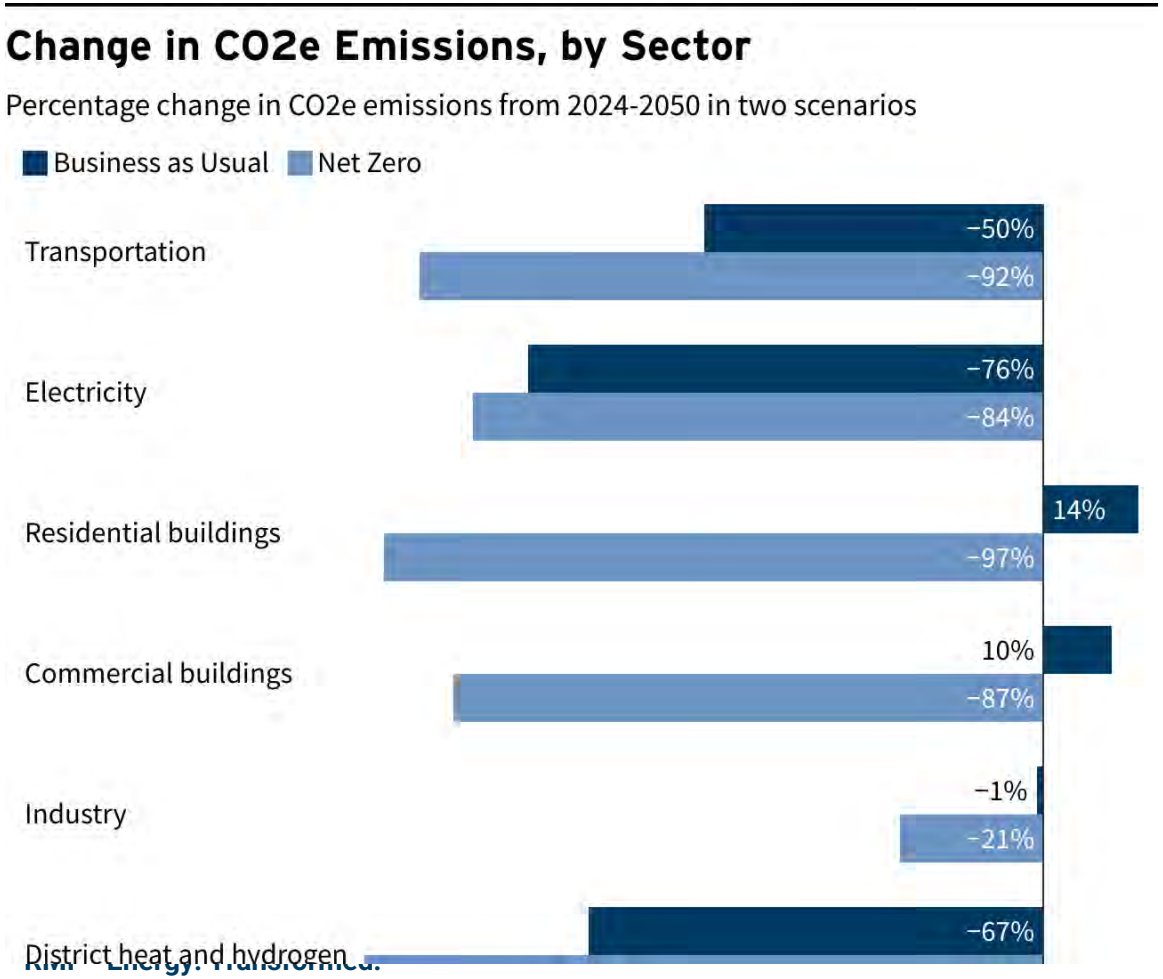
Montana has been consistently slow to add renewable energy capacity

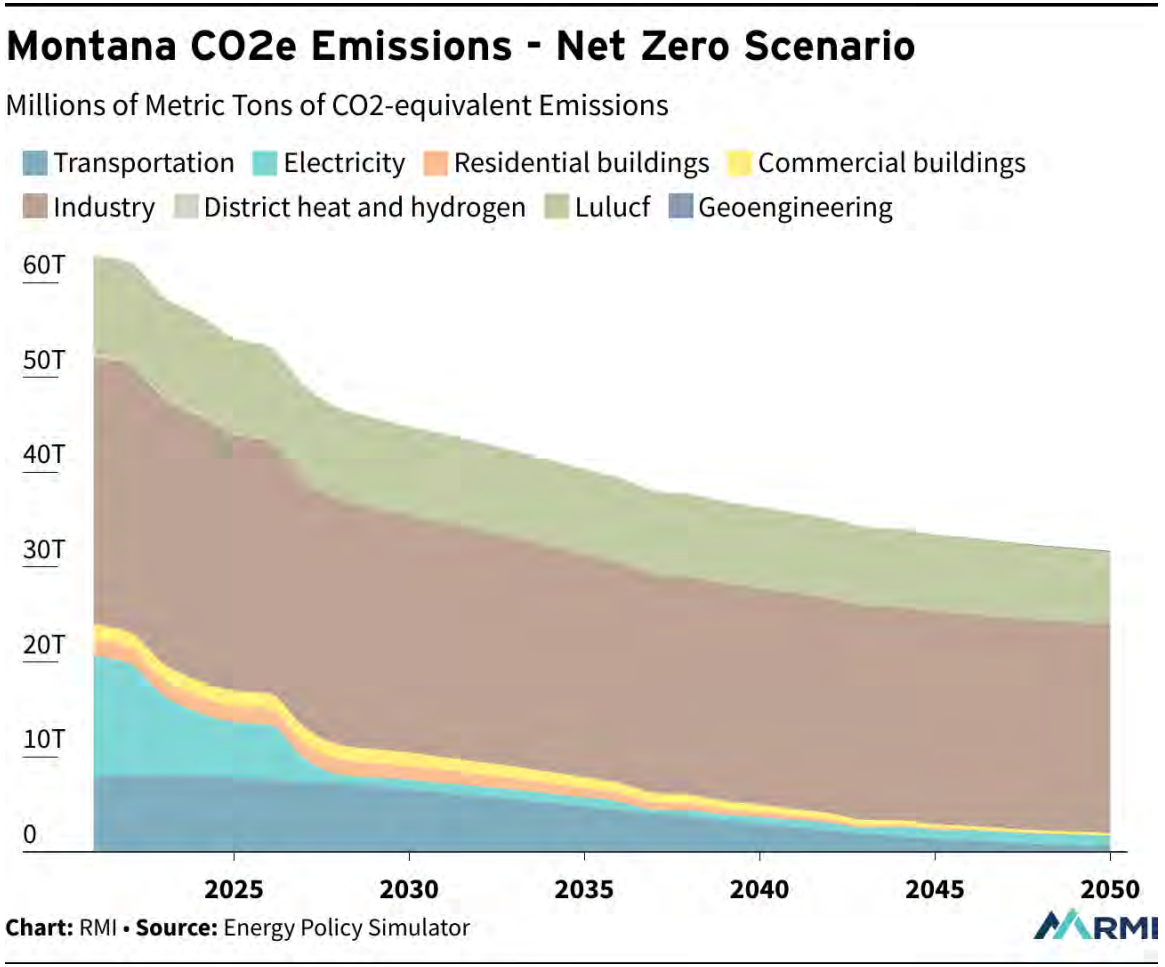
Cumulative Renewable Generation Capacity Additions since 2012, in total Nameplate Capacity (MW)



Source: EIA

Montana's emissions are set to fall over the next few years, but work remains

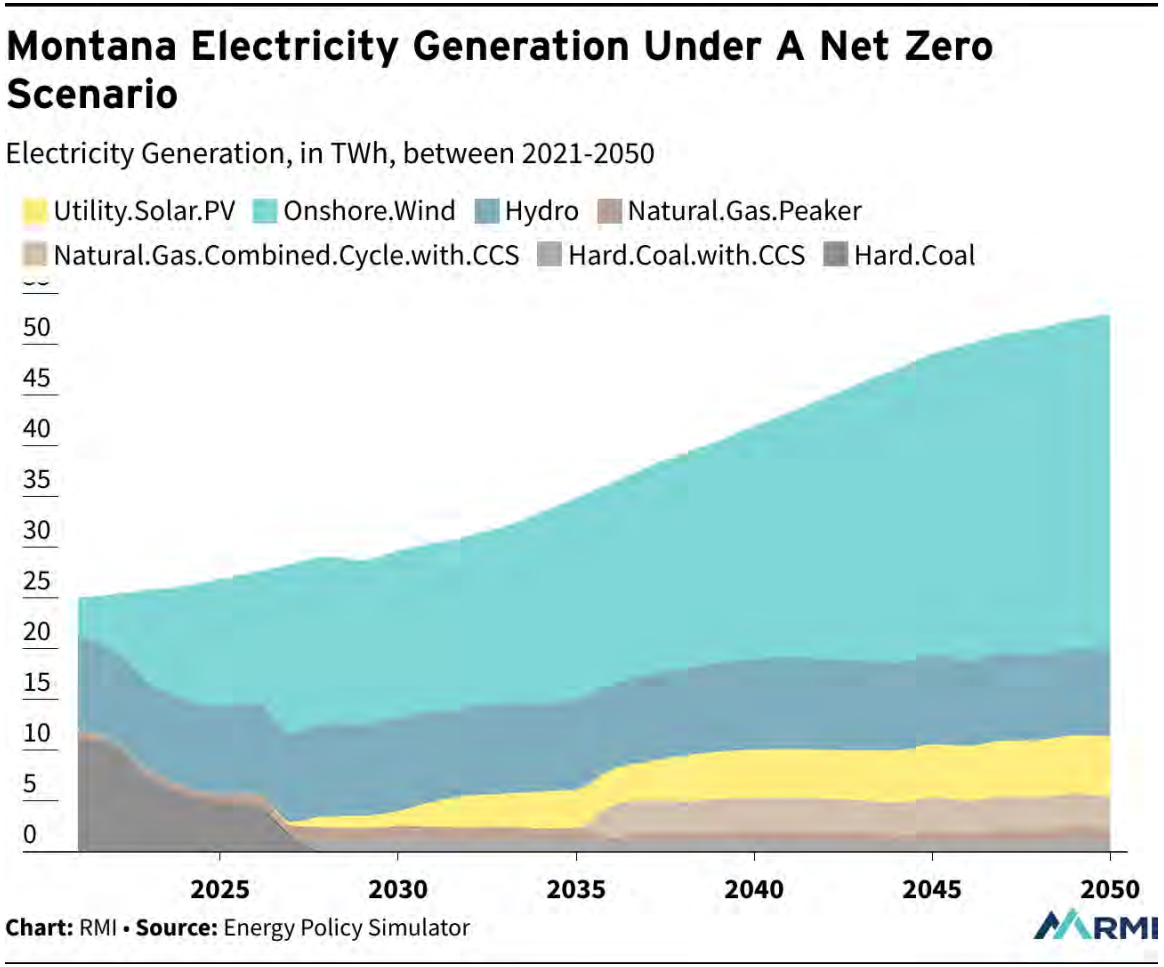




Total electricity generation grows significantly across the state, and skyrockets in a net zero scenario

Total electricity generation across the state more than doubles by 2050, sources mostly from onshore wind.

Loading visualization …



Montana uses less oil, gas, and coal, and consumes less energy for heating in a net zero scenario

Change in Primary Energy Consumption, by Type

Absolute change in energy consumption, in quads/yr, between 2024-2050 in two scenarios

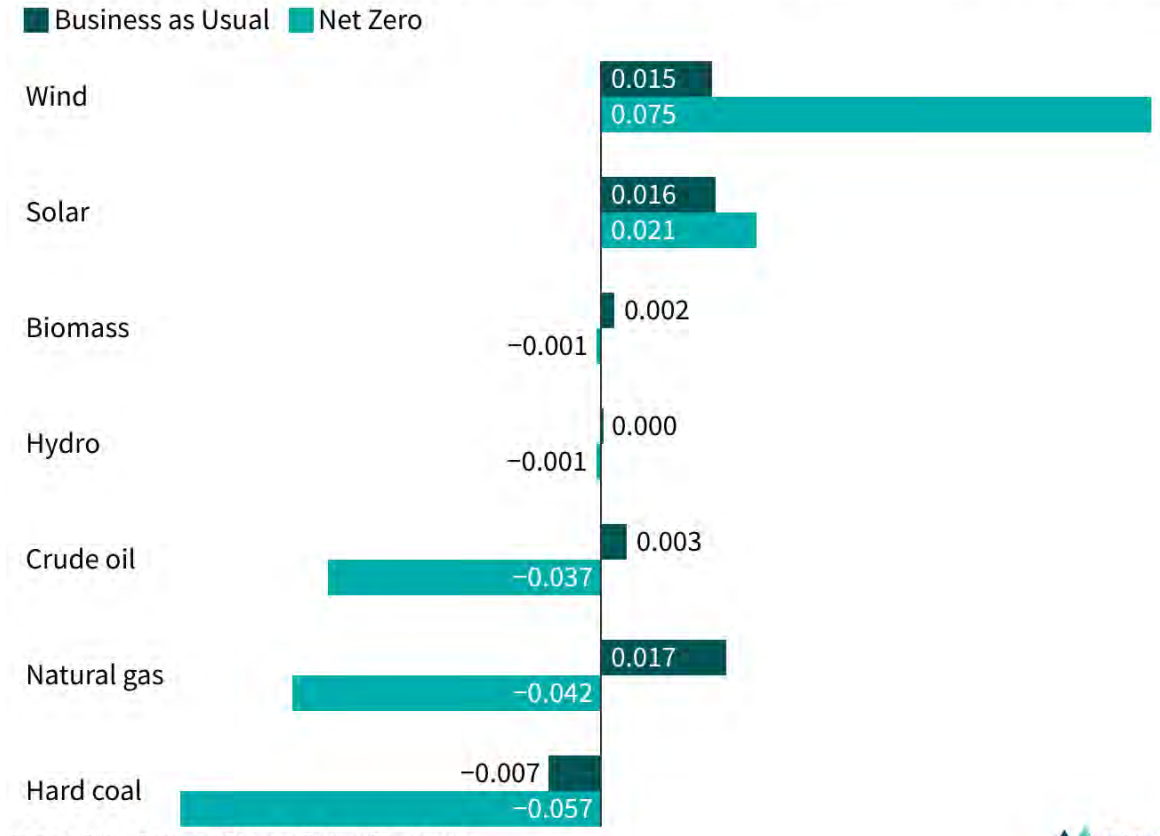


Chart: RMI • **Source:** Energy Policy Simulator

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Change in Energy Consumption, by Component

Absolute change in energy consumption, in quads/yr, between 2024-2050 in two scenarios

Chart: RMI • **Source:** Energy Policy Simulator

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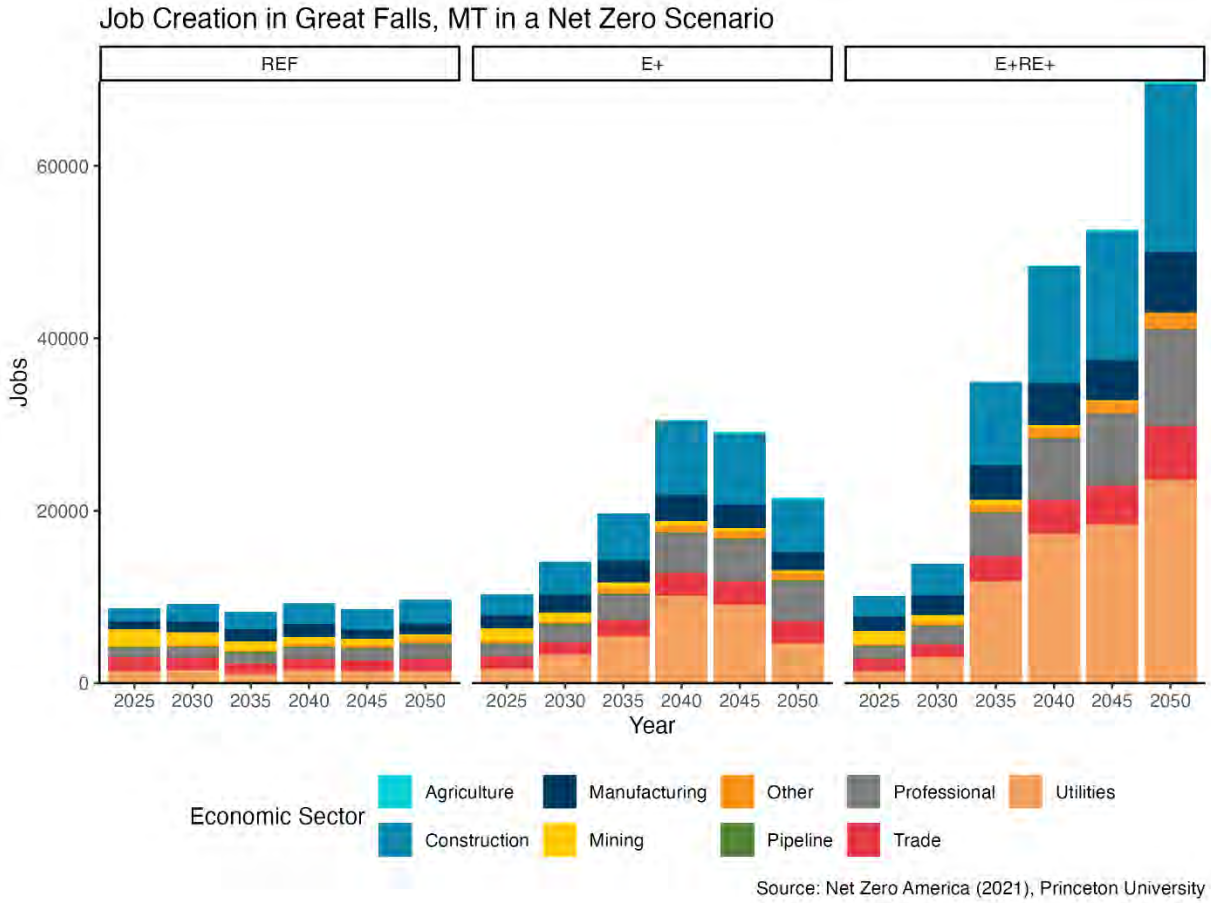
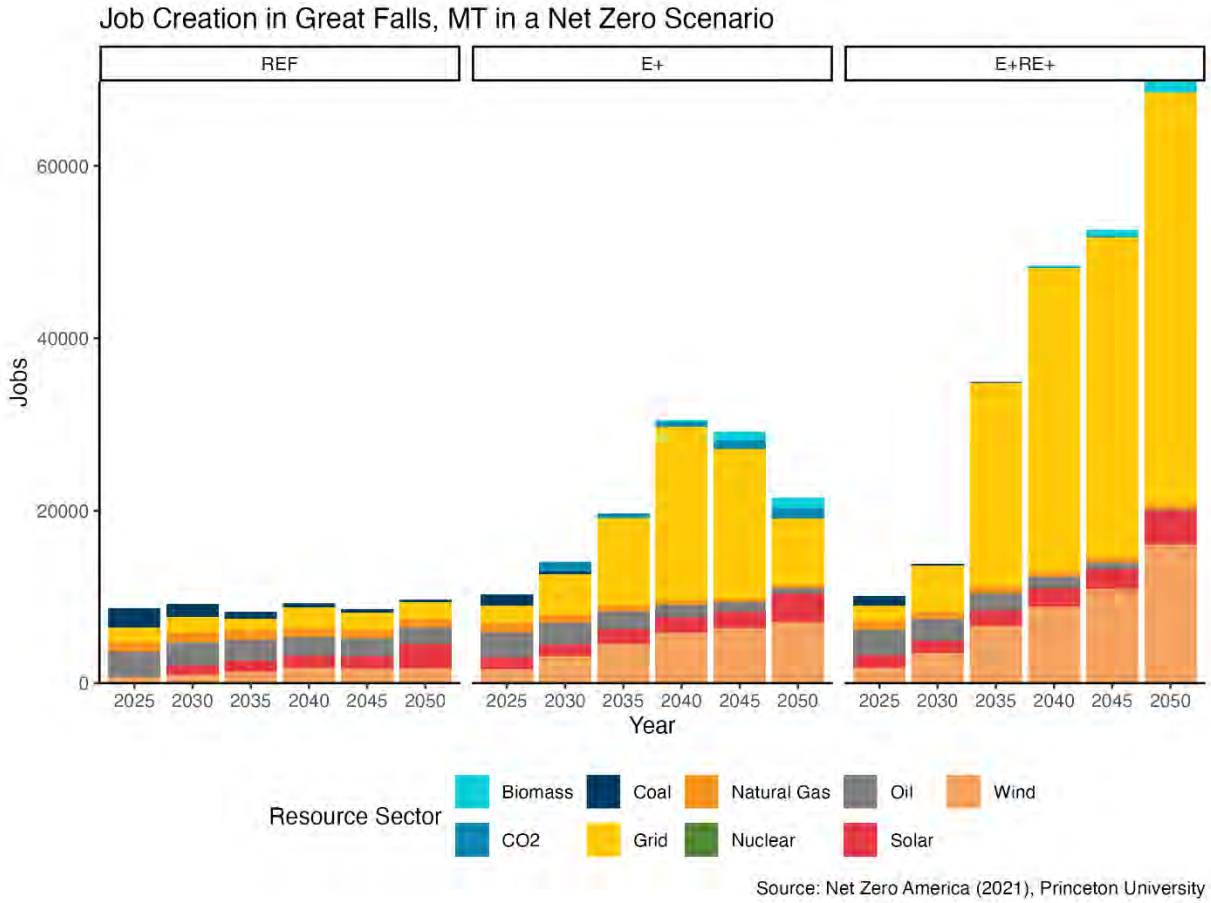
In the Great Falls Area, this could lead to significant job growth

To achieve Net Zero, there will be increased workforce demand across existing economic and resource sectors, particularly in wind energy and grid construction.



Source: Net Zero America (2021), Princeton University

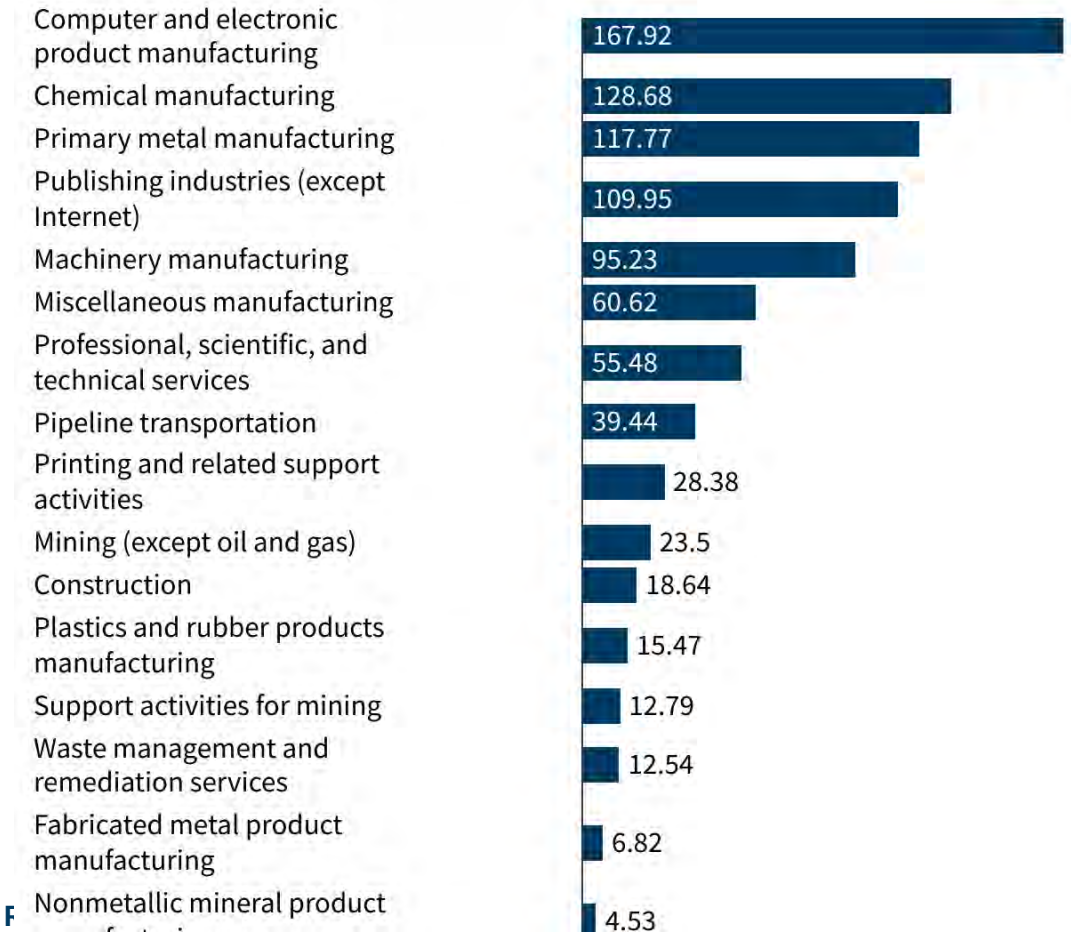


Source: Net Zero America (2021), Princeton University

Montana has seen significant growth in key energy transition-related sectors, many of which the Great Falls region specializes in

Growth in Energy Transition-Related Industries in Montana

GDP Growth 2017-22 (%)



Employment in Energy Transition-Related Sectors in Great Falls, Montana

Great Falls specializes in several industries that are important to the energy transition, such as mining, utilities, metal product manufacturing, and construciton.

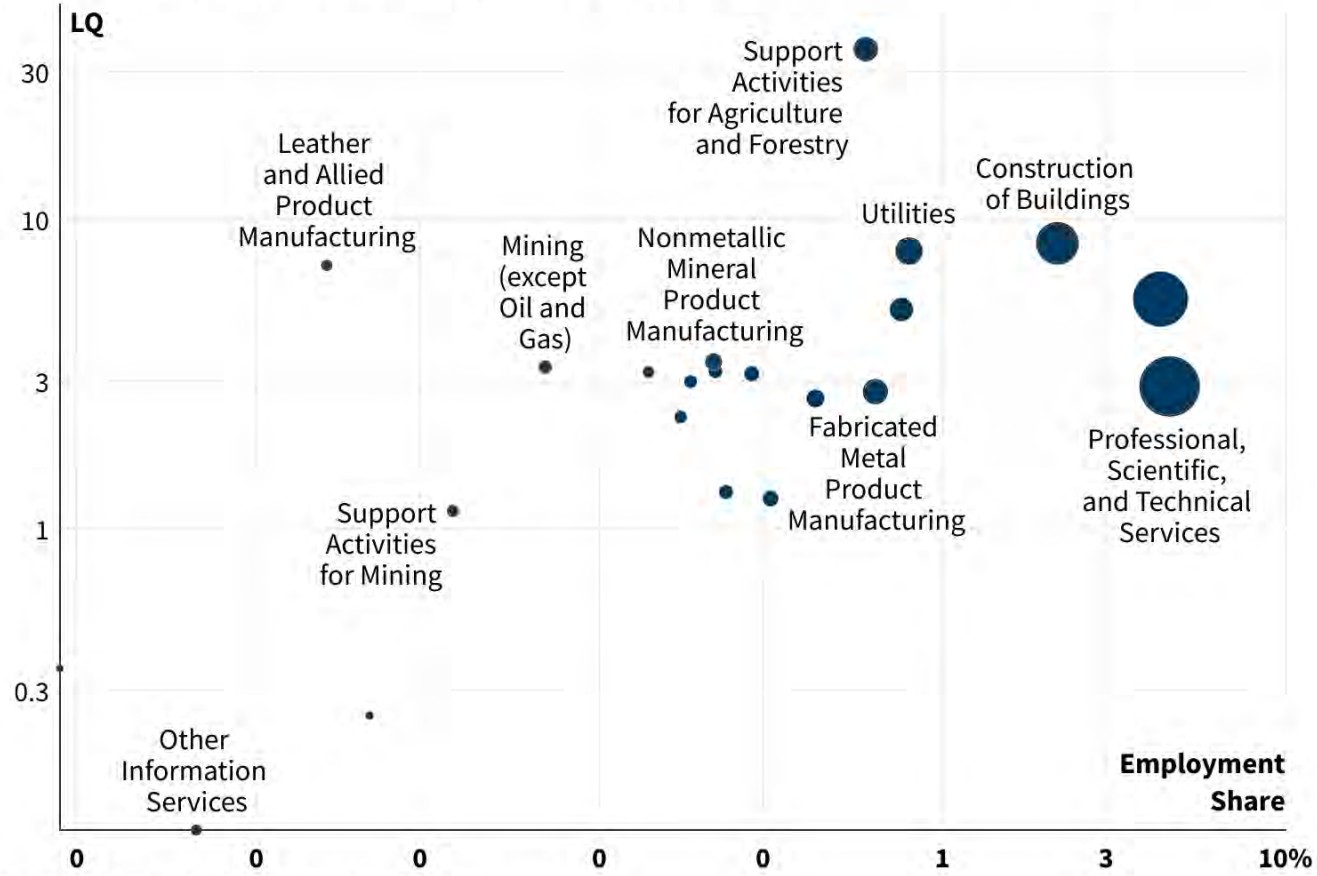


Chart: RMI • **Source:** County Business Patterns, 2022

Montana’s Clean Energy Employment

Energy Efficiency is Montana's Largest Clean Energy Employer

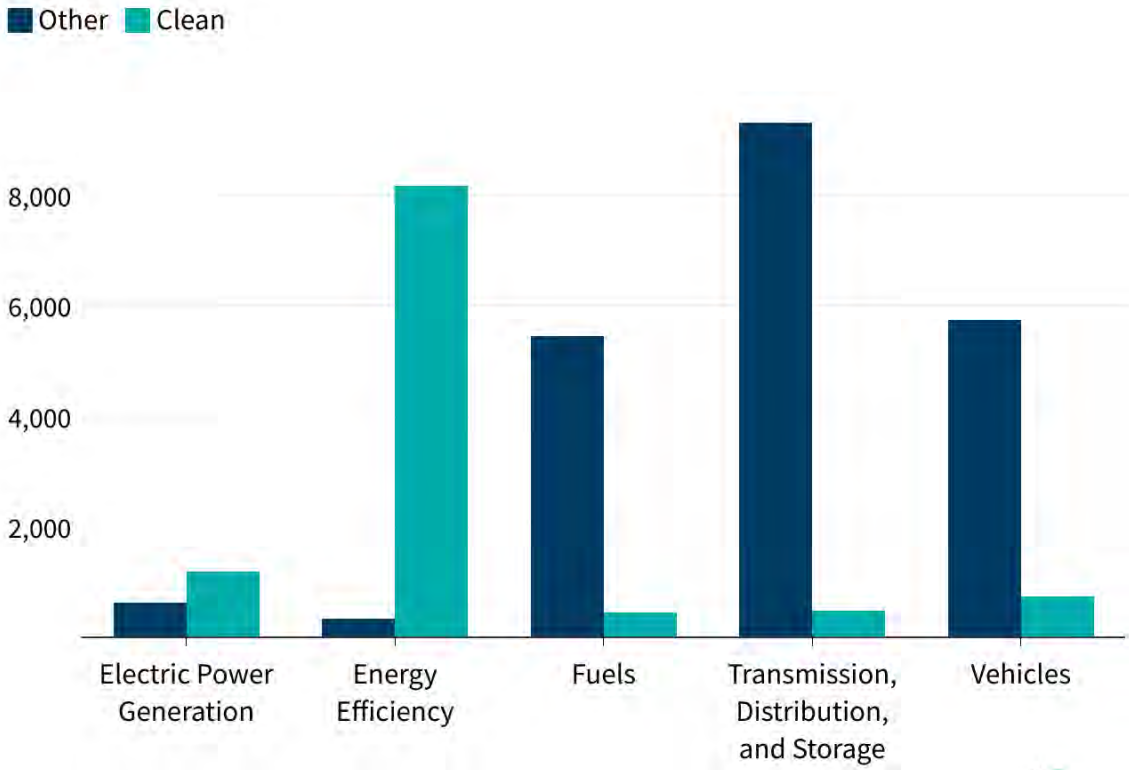


Chart: RMI • **Source:** 2024 US Energy & Employment Jobs Report, DOE

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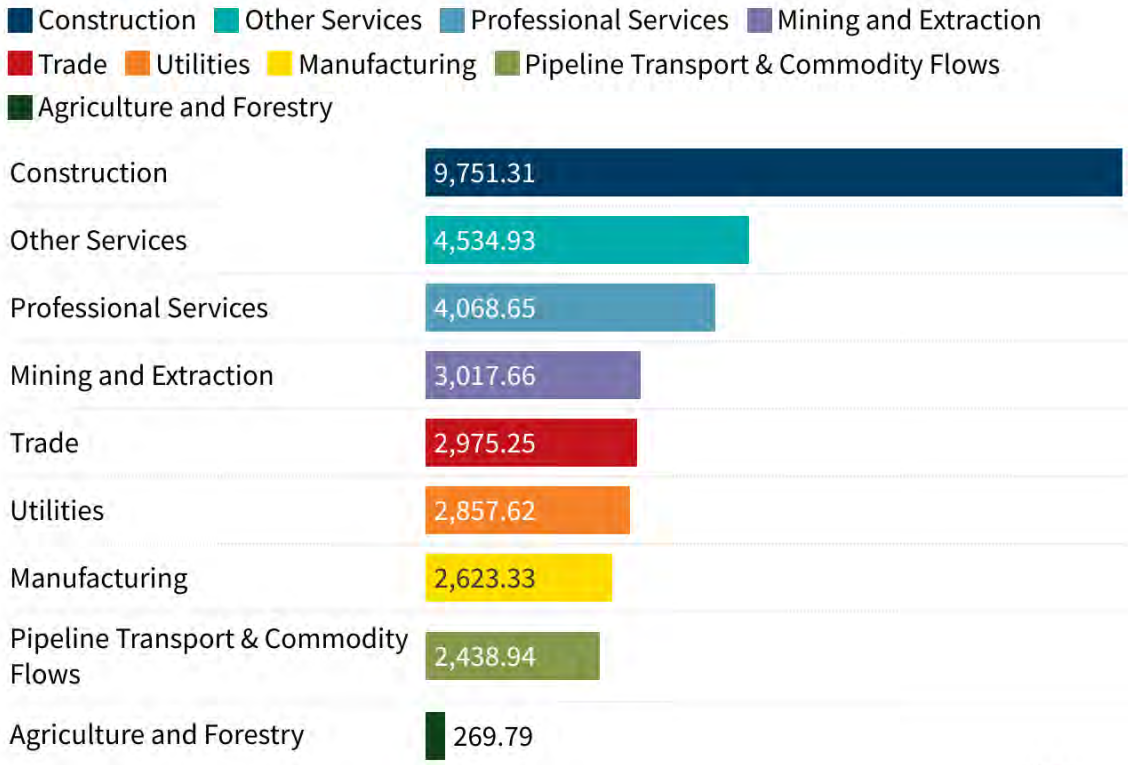
Construction is the Largest Employer in Montana's Energy Industry



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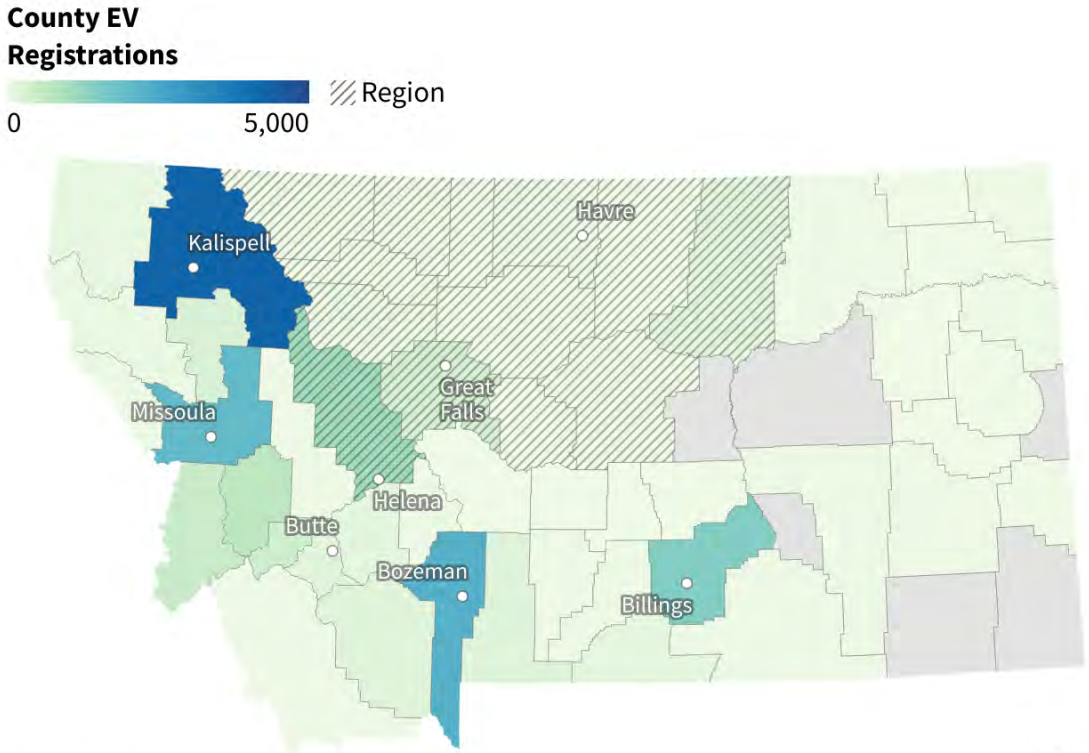
Transportation sector: EV uptake

EV uptake has been accelerating across the state and Great Falls

EV Registrations Across the State are Led by Flathead County



Map: RMI • **Source:** Montana Department of Environmental Quality

EV Registrations in the Great Falls Area

EV registrations have grown 350% over the last four years, led by Tesla sales

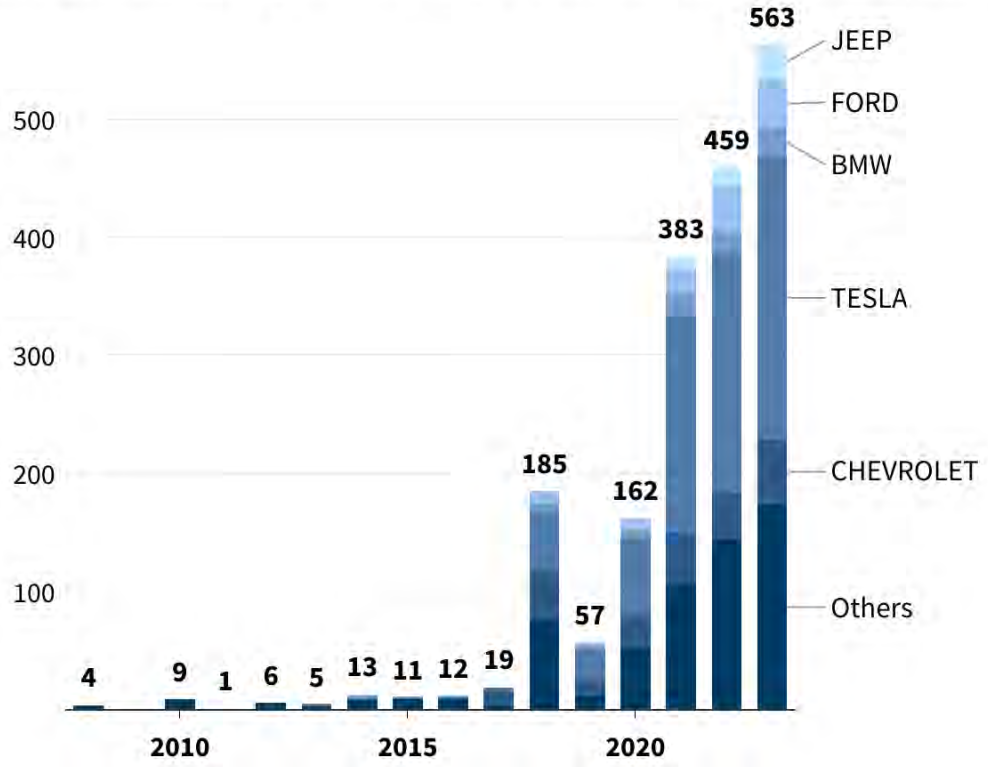
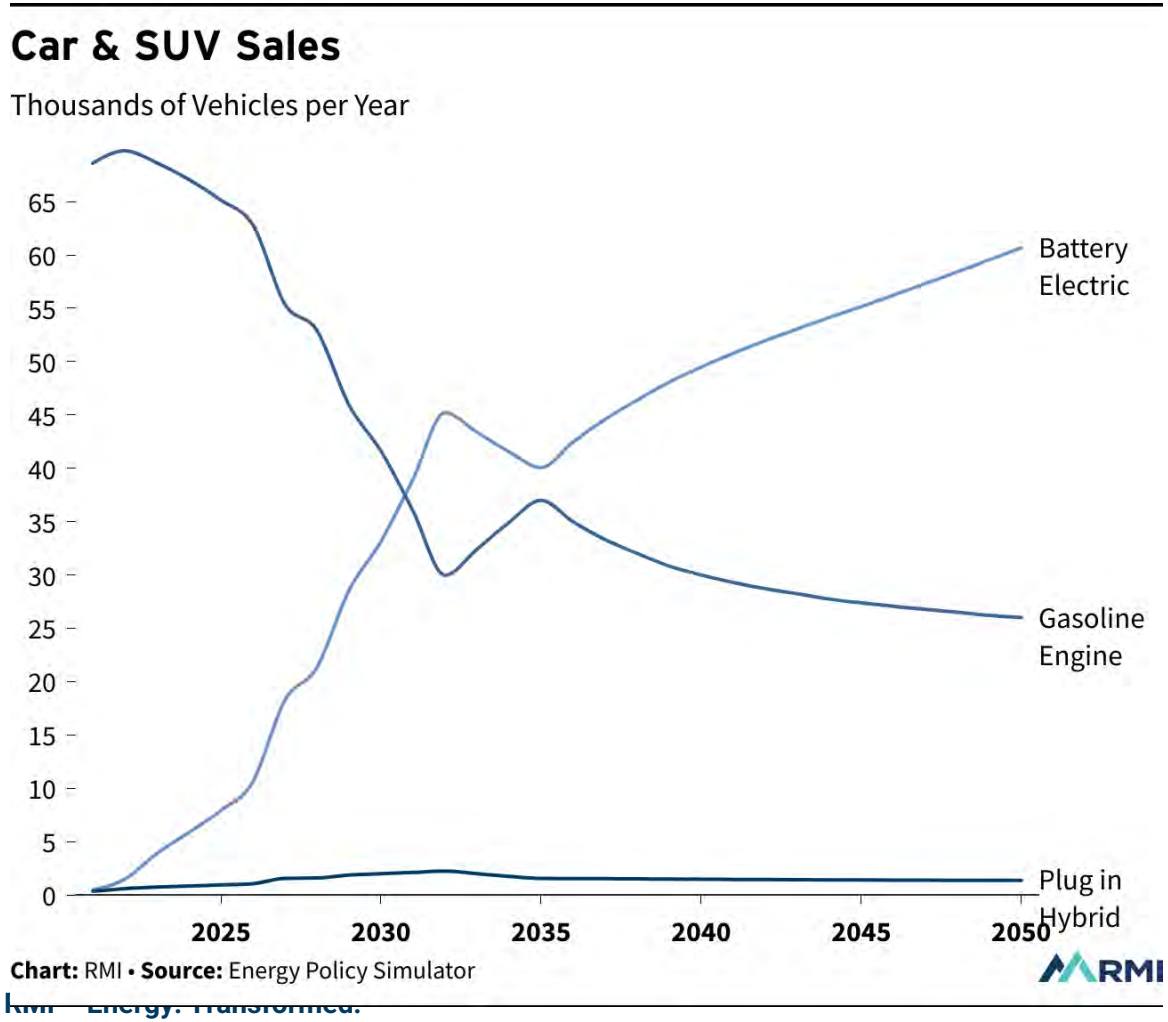
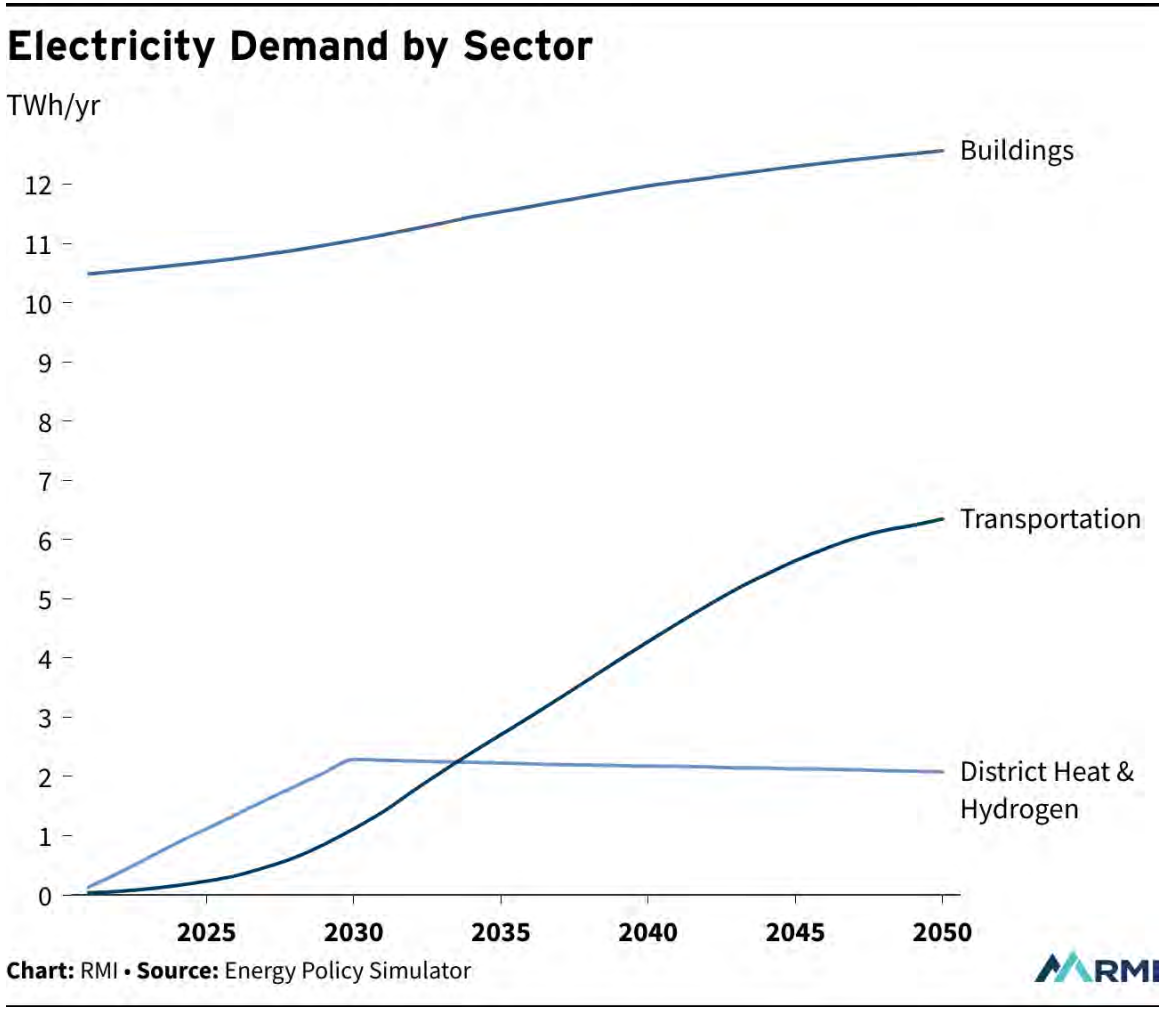


Chart: RMI • **Source:** Montana Department of Environmental Quality

Increased vehicle electrification will put further pressure on the grid





Transportation: Rail

Montana's Coal Distribution Trends; Sustaining Rail Industry through Clean Energy Industries

- **In 2022, coal comprised about 50% of Montana's rail freight by volume.**
  - 50% of Montana's coal was sent to other states via rail road (Michigan, Minnesota, and Washington.)
  - 10% of Montana's coal was exported via rail to western Canada and then to Asia.
- **Production Decline:**
  - Montana's coal production declined nearly 30% from 2018 to 2022.
  - Key reasons: Competition from natural gas and renewable energy sources, and retirements of coal-fired power plants.
- **Clean Energy Industry Related Opportunities for Rail**
  - Biofuel distribution for sustainable aviation and maritime fuel
  - Feedstock movement
  - Wind turbine components
  - PV panels
  - Raw materials and equipment for hydrogen production
  - Hydrogen transport, particularly in liquid form
  - Battery components for large-scale energy storage systems

Industry

Energy Intensity of Manufacturing Across the West

Energy costs as a share of manufacturing sales, 2021 (%)

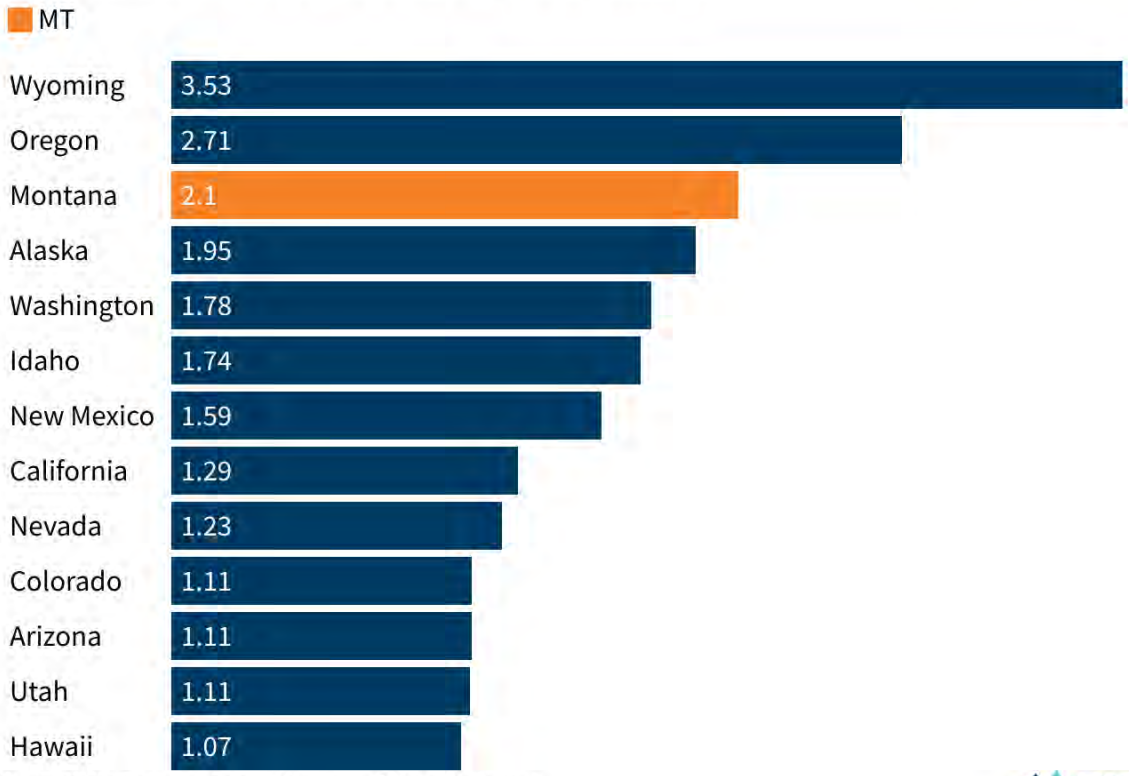
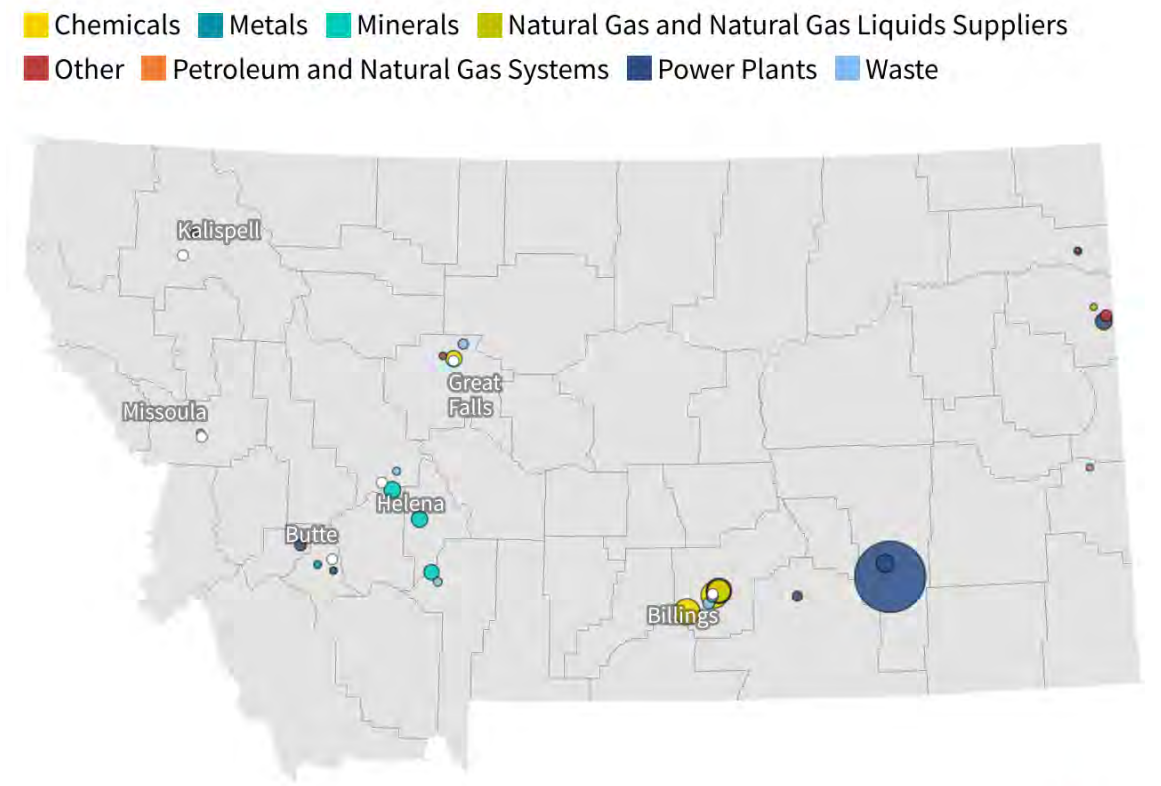


Chart: RMI • **Source:** Annual Survey of Manufacturers

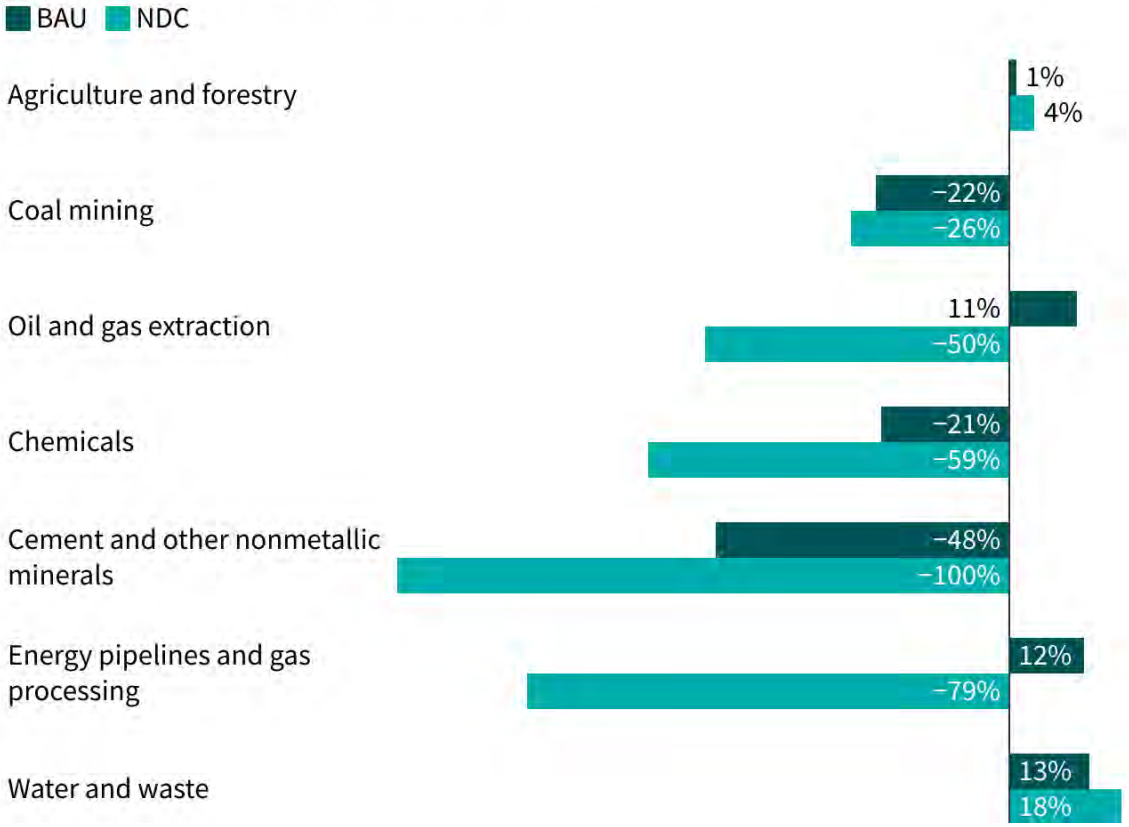
Great Falls has very few polluting industrial facilities



Map: RMI • **Source:** EPA, FLIGHT

Industrial Process Emissions will Fall with No Further Policy Changes, with the Exception of Agriculture & Forestry

Change in Montana's Process Emissions in a Business as Usual and Net Zero Scenario



Process Emissions in Montana will Continue to be Dominated by Agriculture & Forestry

Even in a Net Zero Scenario

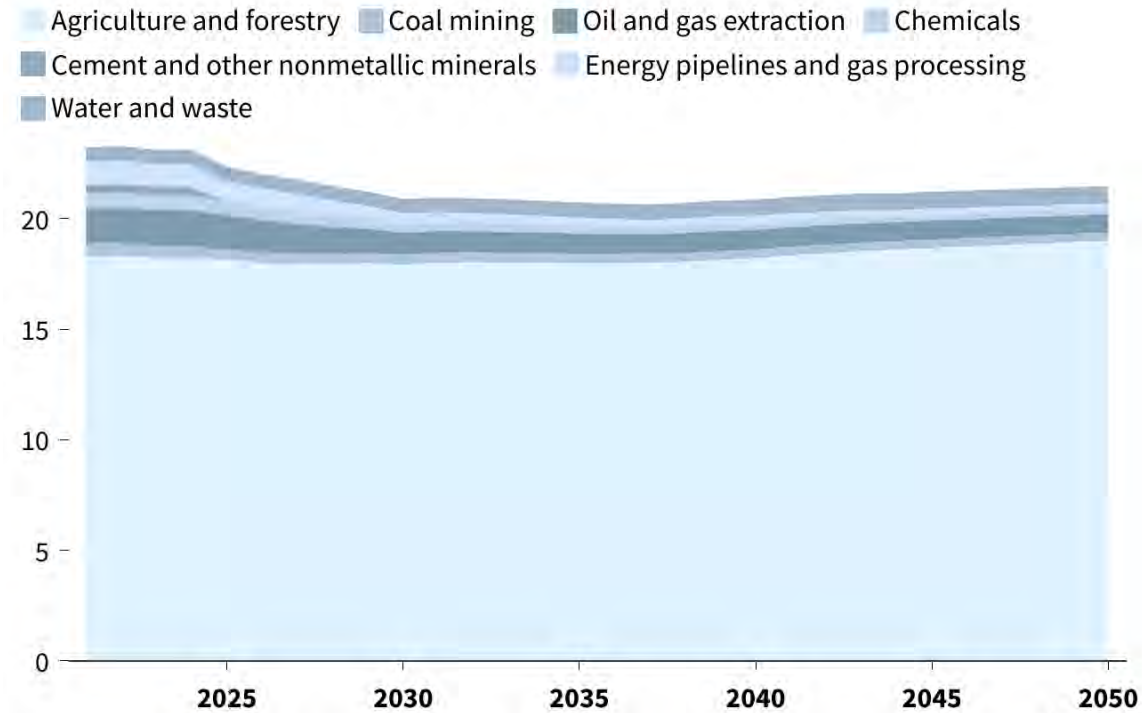


Chart: RMI • **Source:** Energy Policy Simulator

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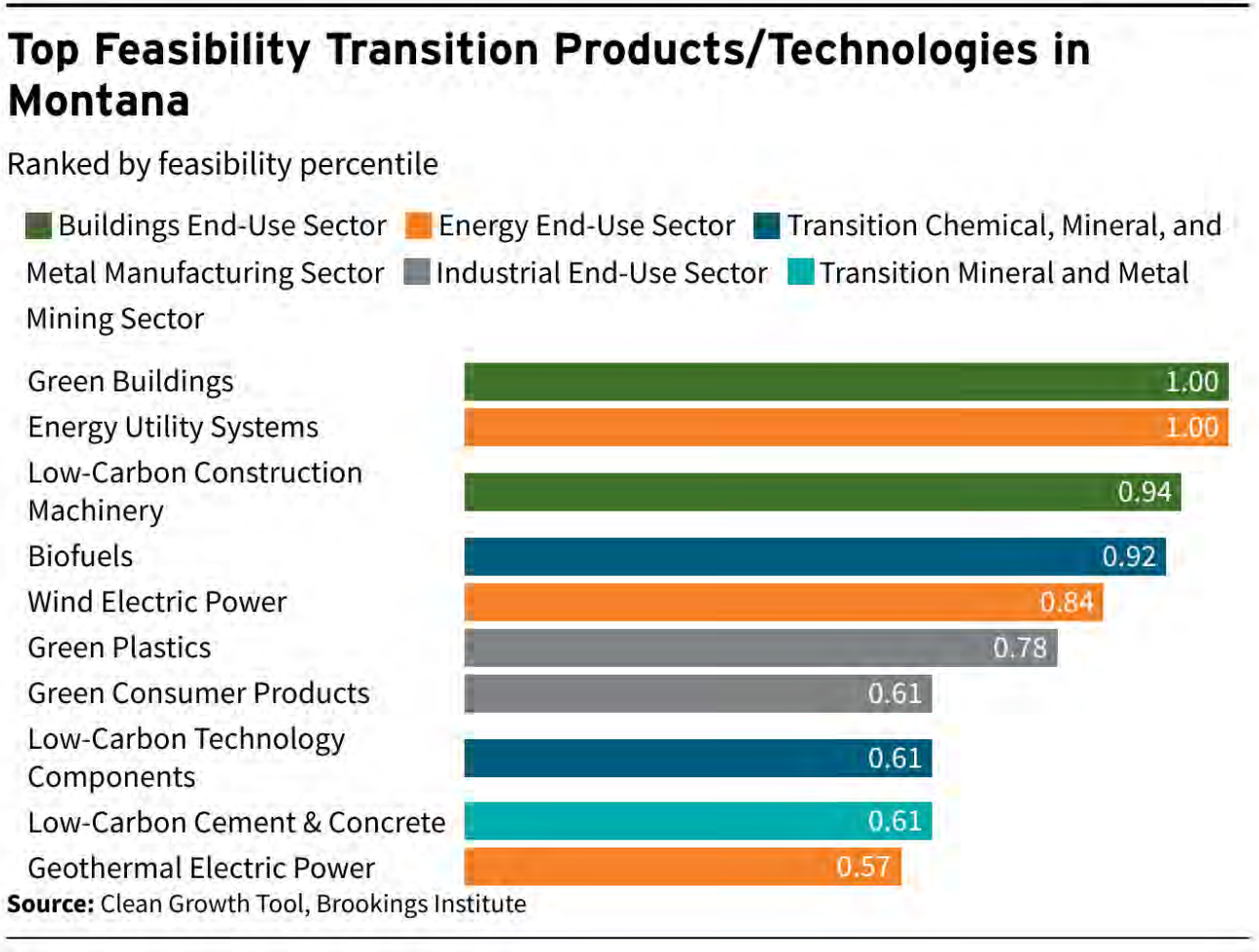
Capacity Analysis

Clean Technology Feasibility in Montana

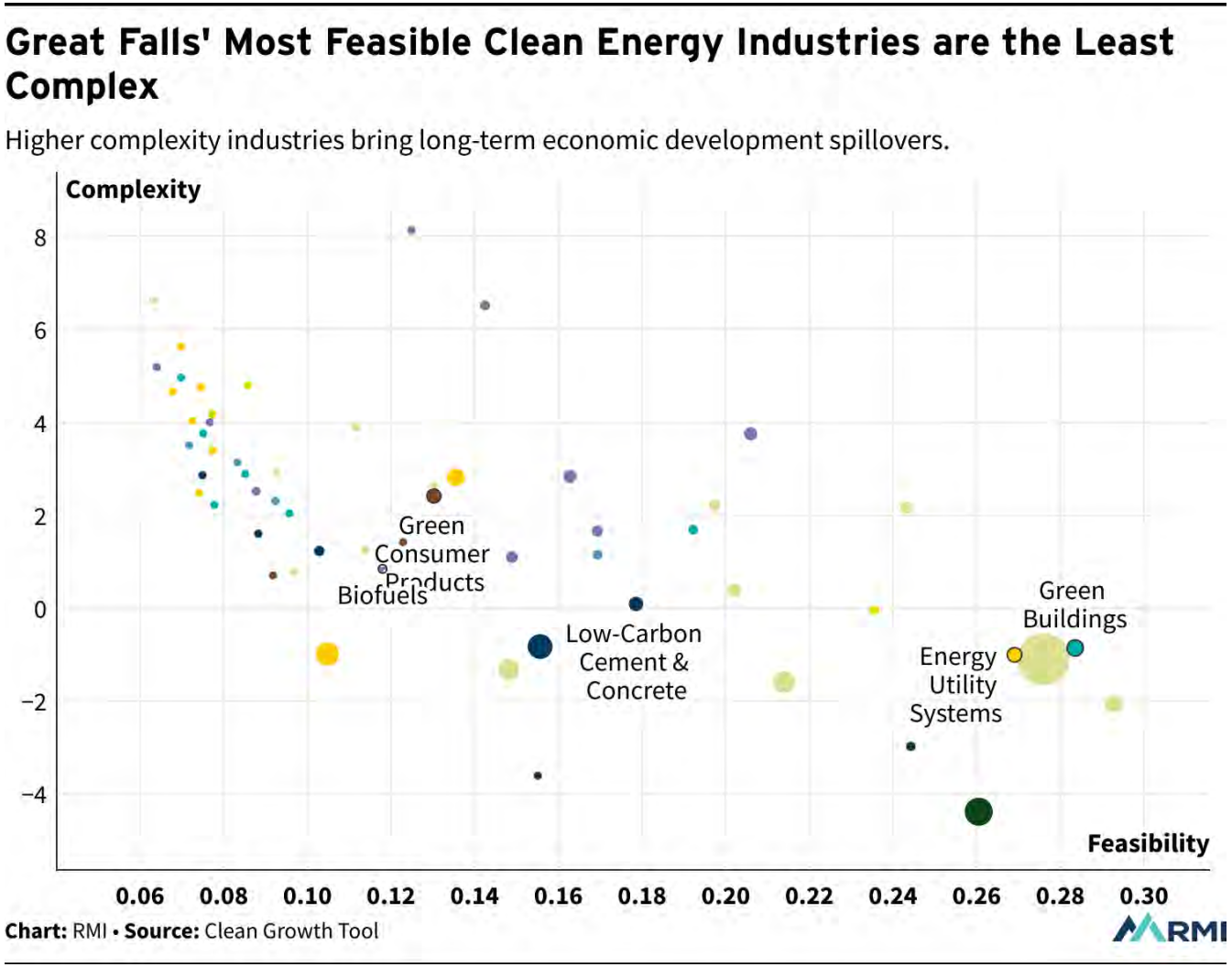
Green Buildings, Energy Utility Systems, Low-Carbon Construction Machinery, Biofuels and Wind are the most feasible

- **Feasibility:**
  - Measure of local capabilities, as a function of industry density
  - Good predictor of job creation and thriving industry
- **Complexity:**
  - Measure of industry's capability requirements
  - Indication of local specialization



Transmission, biofuels, and green buildings are growth areas in Great Falls

- **Feasible Transition Opportunities:**
  - Green buildings
  - Biofuels
  - Hydroelectric power
  - Energy utility systems
  - Low-carbon cement and concrete



NAICS 4-Digit Industry View

Top 10 Feasible Industries in Great Falls, MT for Clean Energy Employment

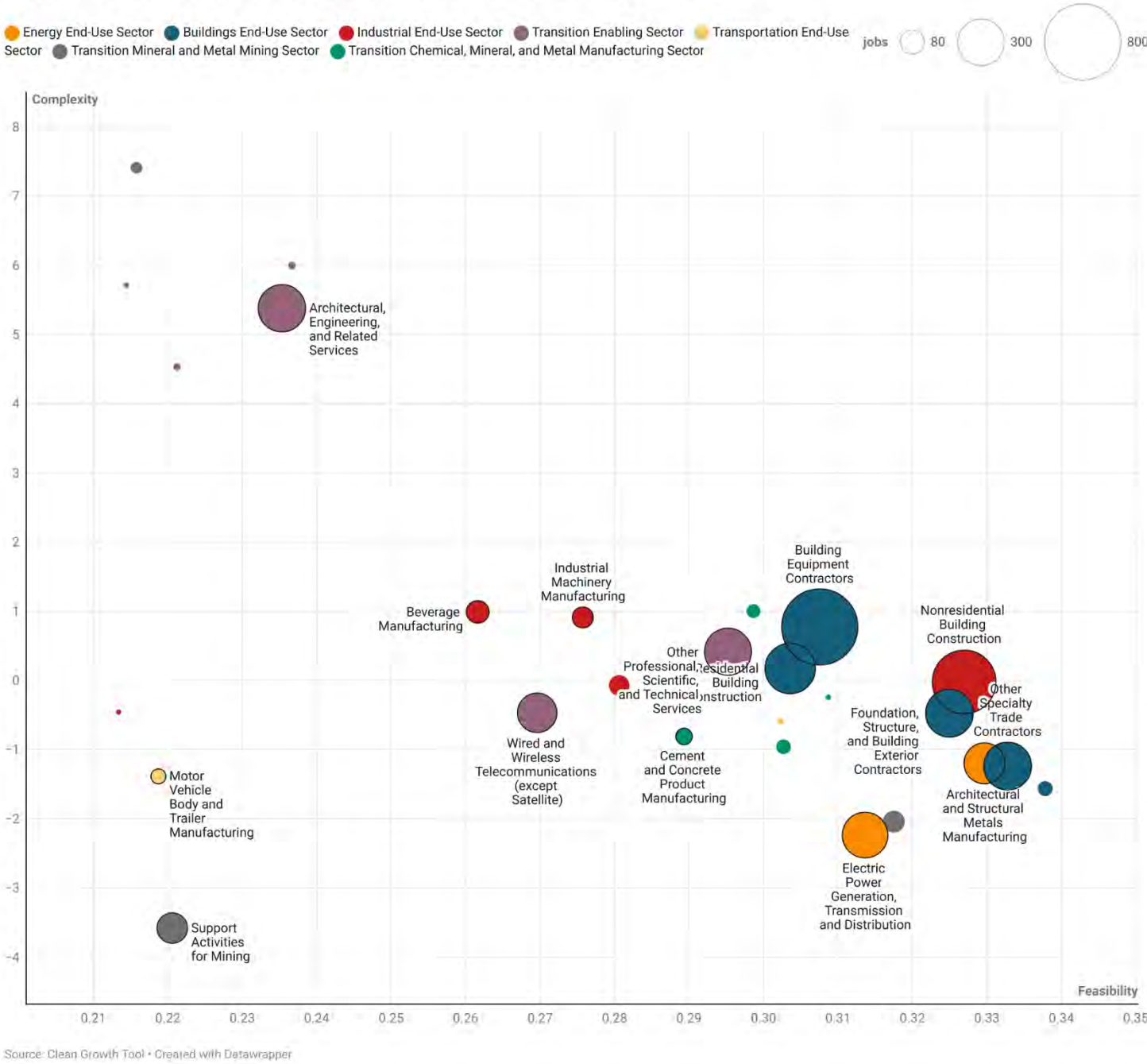
Industry	Feasibility	Complexity	Share of Good Jobs	Number of Jobs
Other Wood Product Manufacturing	0.34	−1.56	0.33	27
Other Specialty Trade Contractors	0.33	−1.24	0.37	312
Architectural and Structural Metals Manufacturing	0.33	−1.20	0.49	228
Nonresidential Building Construction	0.33	−0.02	0.37	557
Foundation, Structure, and Building Exterior Contractors	0.32	−0.47	0.37	310
Nonmetallic Mineral Mining and Quarrying	0.32	−2.04	0.60	62
Electric Power Generation, Transmission and Distribution	0.31	−2.24	0.77	285
Other Fabricated Metal Product Manufacturing	0.31	−0.24	0.47	0
Building Equipment Contractors	0.31	0.77	0.37	797
Residential Building Construction	0.30	0.17	0.37	348

Additional 10 rows not shown.

Employment figures from Occupational Employment and Wage Statistics (OEWS) data

Source: Clean Growth Tool • Created with Datawrapper

Most Feasible Industries in Great Falls, MT for Clean Energy Employment



Source: Clean Growth Tool • Created with Datawrapper

Workforce: Green Buildings

Via the Clean Growth Tool…

- **96 critical occupations**
  - 33% above national average employment (developed)
  - 66% below national average employment (underdeveloped)
- **37% good jobs**
  - Wages above median
  - Healthcare benefits

Important & Underdeveloped Occupations

Occupation	Location Quotient
Elevator and Escalator Installers and Repairers	0.083x
Millwrights	0.091x
Helpers, Construction Trades, All Other	0.13x
Solar Photovoltaic Installers	0.18x
Paving, Surfacing, and Tamping Equipment	0.19x

Important & Developed Occupations

Occupation	Location Quotient
Manufactured Building and Mobile Home Installers	16x
Helpers--Painters, Paperhangers, Plasterers, and Stucco Masons	5.7x
Helpers--Roofers	4.8x
Helpers--Brickmasons, Blockmasons, Stonemasons, and Tile and Marble	3.9x

Source: Clean Growth Tool, Brookings Institute, OEWS

Workforce: Energy Utility Systems

Via the Clean Growth Tool…

- **73 critical occupations**
  - 33% above national average employment (developed)
  - 66% below national average employment (underdeveloped)
- **37% good jobs**
  - Wages above median
  - Healthcare benefits

Important & Underdeveloped Occupations

Occupation	Location Quotient
Electrical and Electronics Drafters	0.053x
Millwrights	0.091x
Underground Mining Machine Operators, All Other	0.12x
Helpers, Construction Trades, All Other	0.13x
Occupational Health and Safety	0.15x

Important & Developed Occupations

Occupation	Location Quotient
Foresters	5.9x
Pump Operators, Except Wellhead Pumpers	3.7x
Wellhead Pumpers	3.3x
Electrical Power-Line Installers and Repairers	2.1x
Civil Engineering Technologists and Technicians	1.8x
Operating Engineers and	1.8x

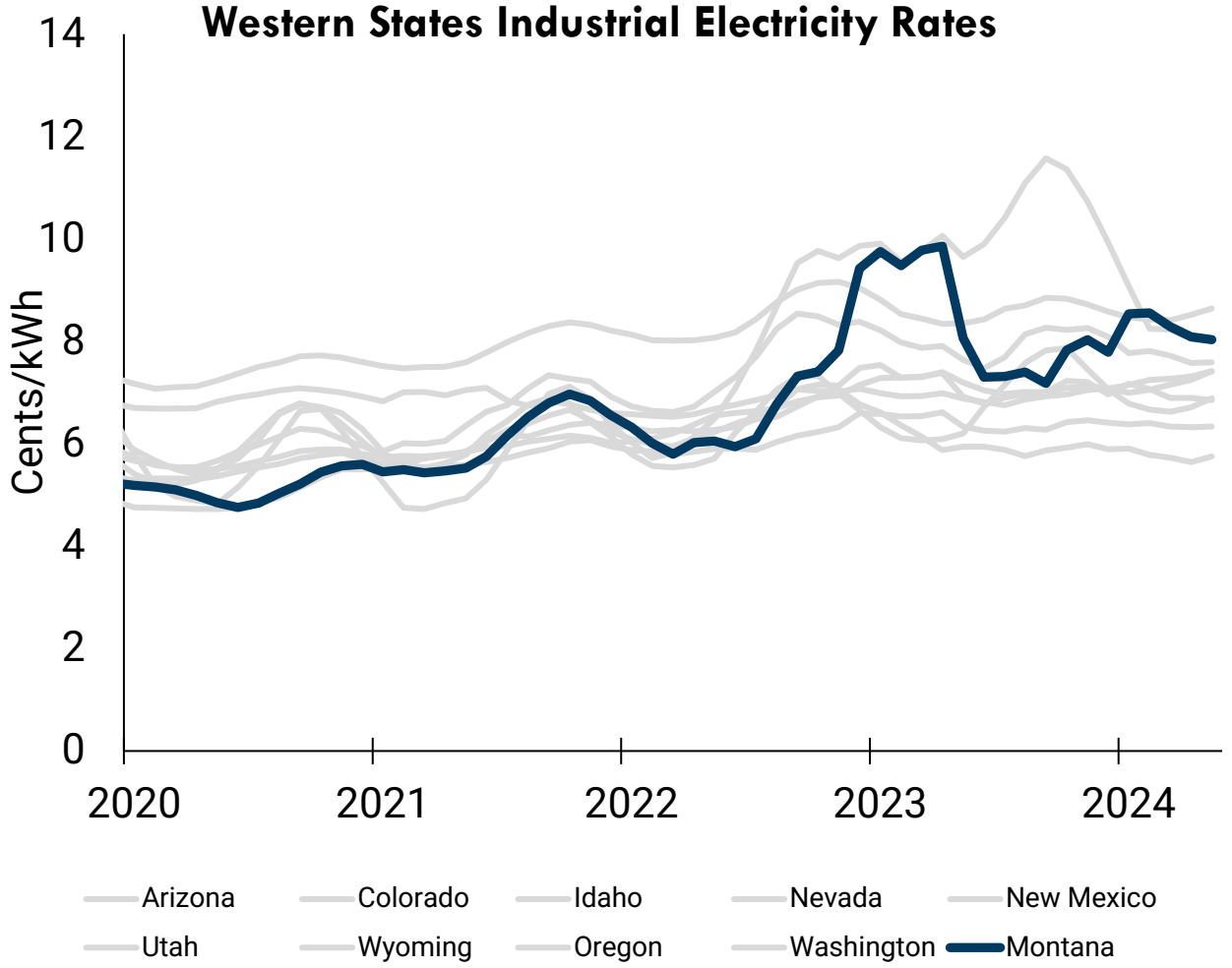
Housing & Workforce Attraction

In Great Falls trade region

- **Population Growth Trends**
  - Positive population and household growth
  - Aging population
- **Housing costs & supply growth**
  - Nearly 11% annual home price appreciation
  - Strong demand for new apartments and first-time buyer housing
  - Aging infrastructure with poor insulation (especially in single family)
- **Policy Considerations**
  - Workforce development programs for building trades
  - Incentive programs for envelope improvements and electric equipment swap outs

Electric Prices and Transmission

- **Electric Sector Growth Trends**
  - Large load growth in industrial sector
  - Significant need for clean electricity in neighboring states
- **Electric costs & supply growth**
  - Lack of new transmission & power plant capacity -> rising electricity prices
- **Institutional assets**
  - Northwestern Energy
  - Opportunity for economic development
- **Policy Considerations**
  - Long lead times for new transmission development (5-20+ years)



Policy Environment

Montana has some of the weakest climate and clean energy policies in the region

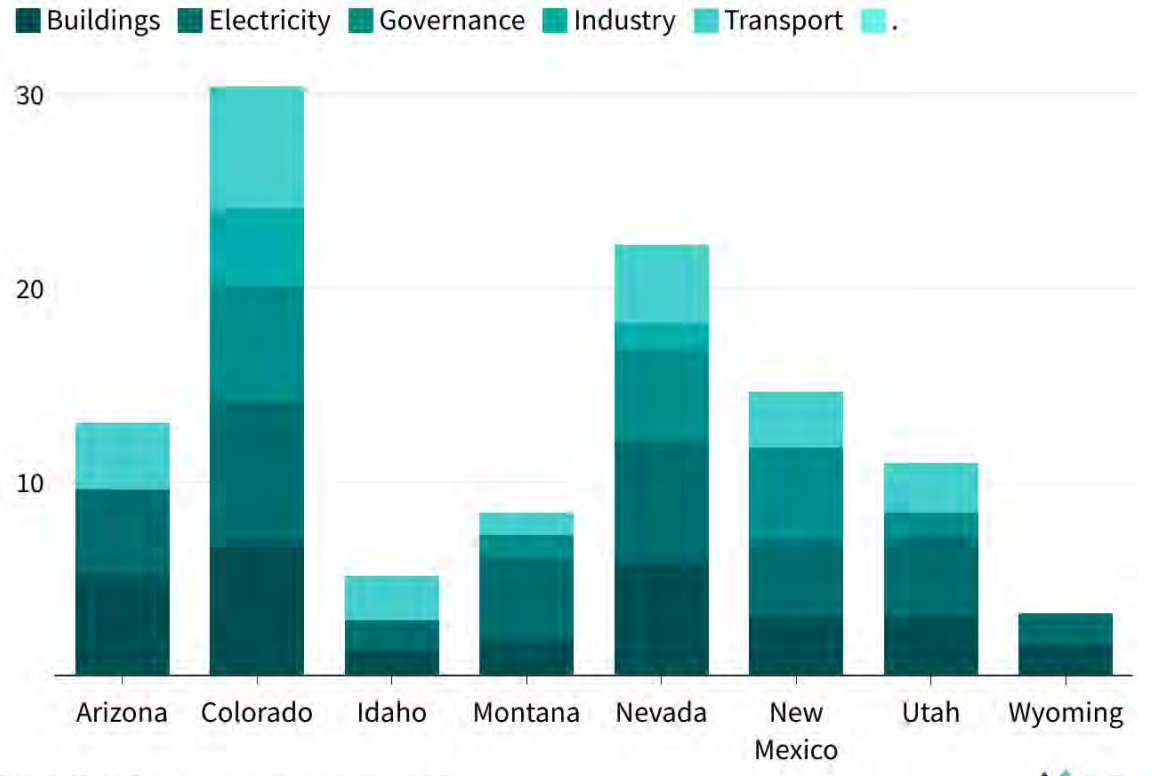


Chart: RMI • **Source:** Xchange Policy Tracker

Montana has a range of economic development and manufacturing incentives that could spur investment

Program_Name	Theme	Agency
Tax Deduction for Energy-Conserving Investments	Building	Montana Department of Revenue
Pollution Control and Carbon Capture Equipment	Carbon	Montana Department of Revenue
Small Electrical Generation Equipment Exemption	Energy	Montana Department of Revenue
Alternative Energy Revolving Loan Program	Energy	The Montana Department Environmental Quality
Commerical Property Assessed Captial Enhancement Program	Energy	Montana Facility Finance Authority
New Industrial Property Tax Exemption	Industrial	Montana Department of Revenue
New/Expanded Industry Credit	Industry	Montana Department of Revenue
Montana Wood Products Revolving Loan Program	Industry	Montana Department of Commerce
Growth Through Agriculture (GTA) Program	Industry	Montana Department of Agriculture
Montana SBIR/STTR Matching Funds Program	Innovation	Montana Department of Commerce

Thank you!