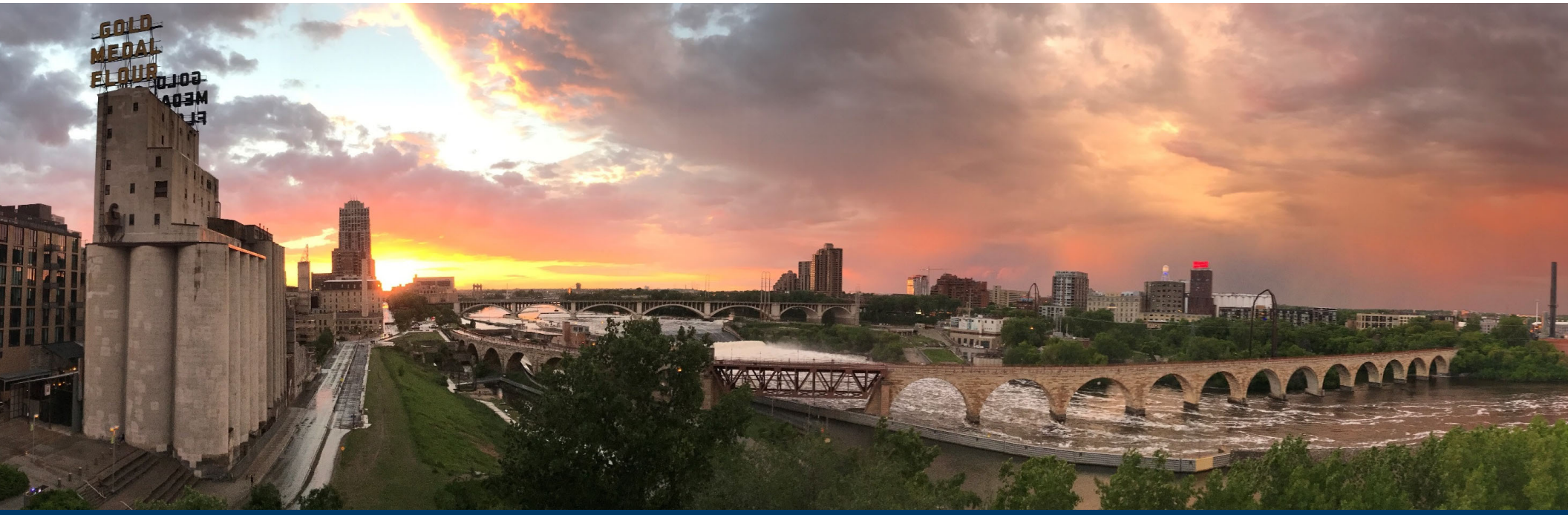


Minnesota Energy Overview

Jessica Burdette| Manager, Energy Regulation & Planning

Minnesota Department of Commerce

MN Department of Commerce: Divisions

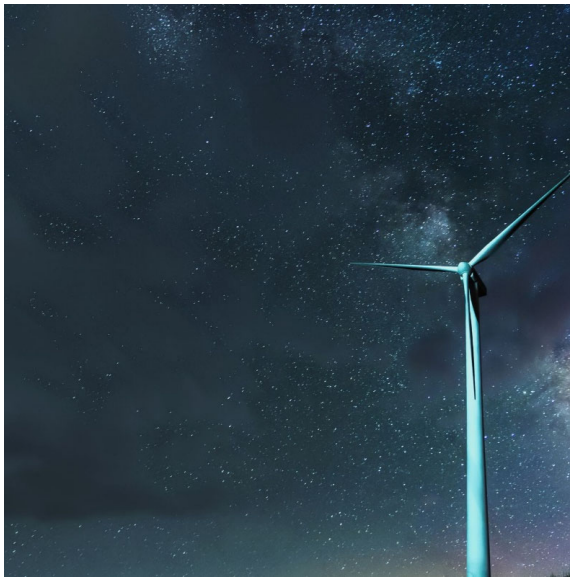
Minnesota Energy Regulation & Planning

Rates & Financial Analysis

Energy Planning

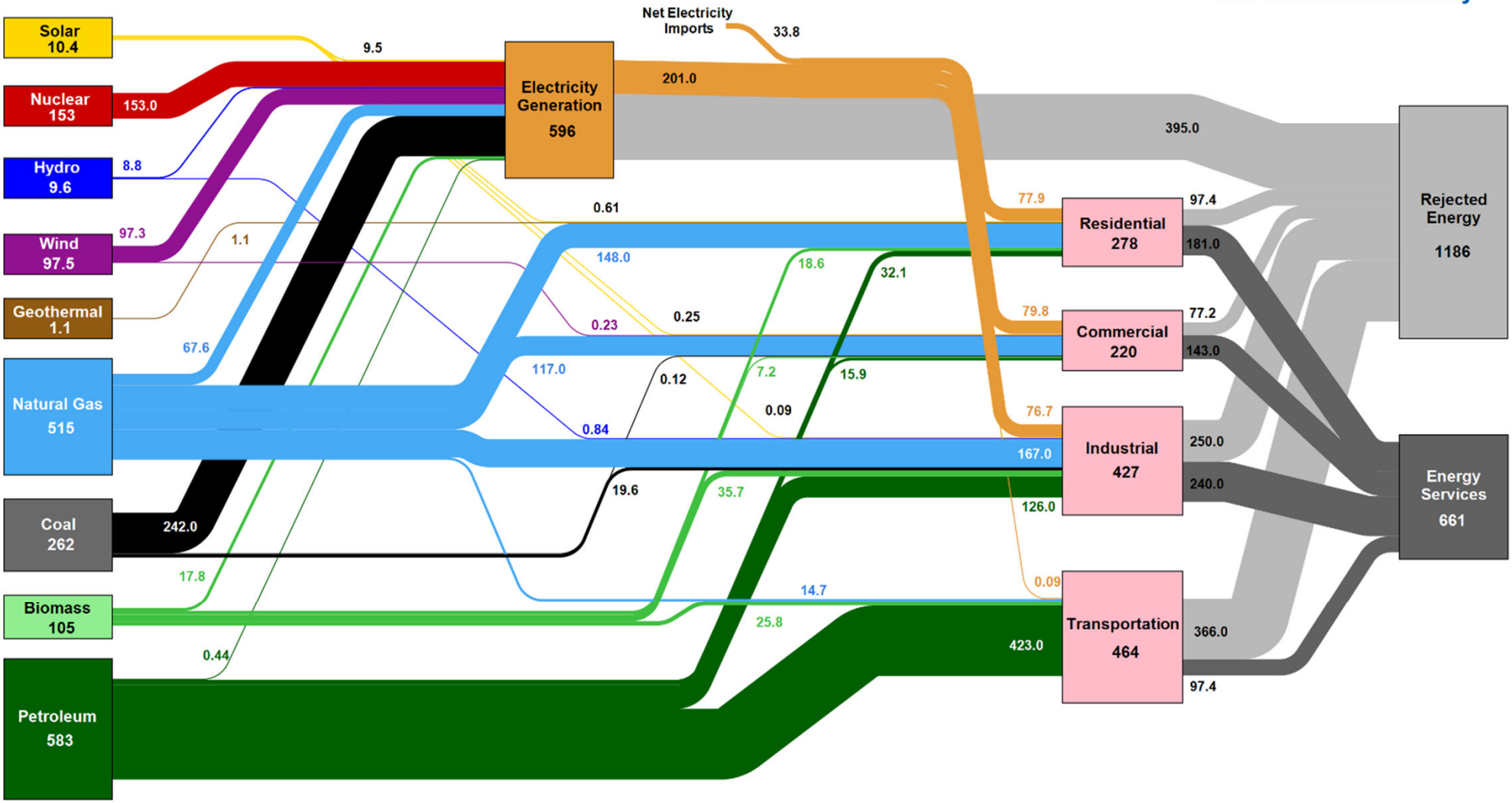
Conservation & Optimization

Where does our energy come from?



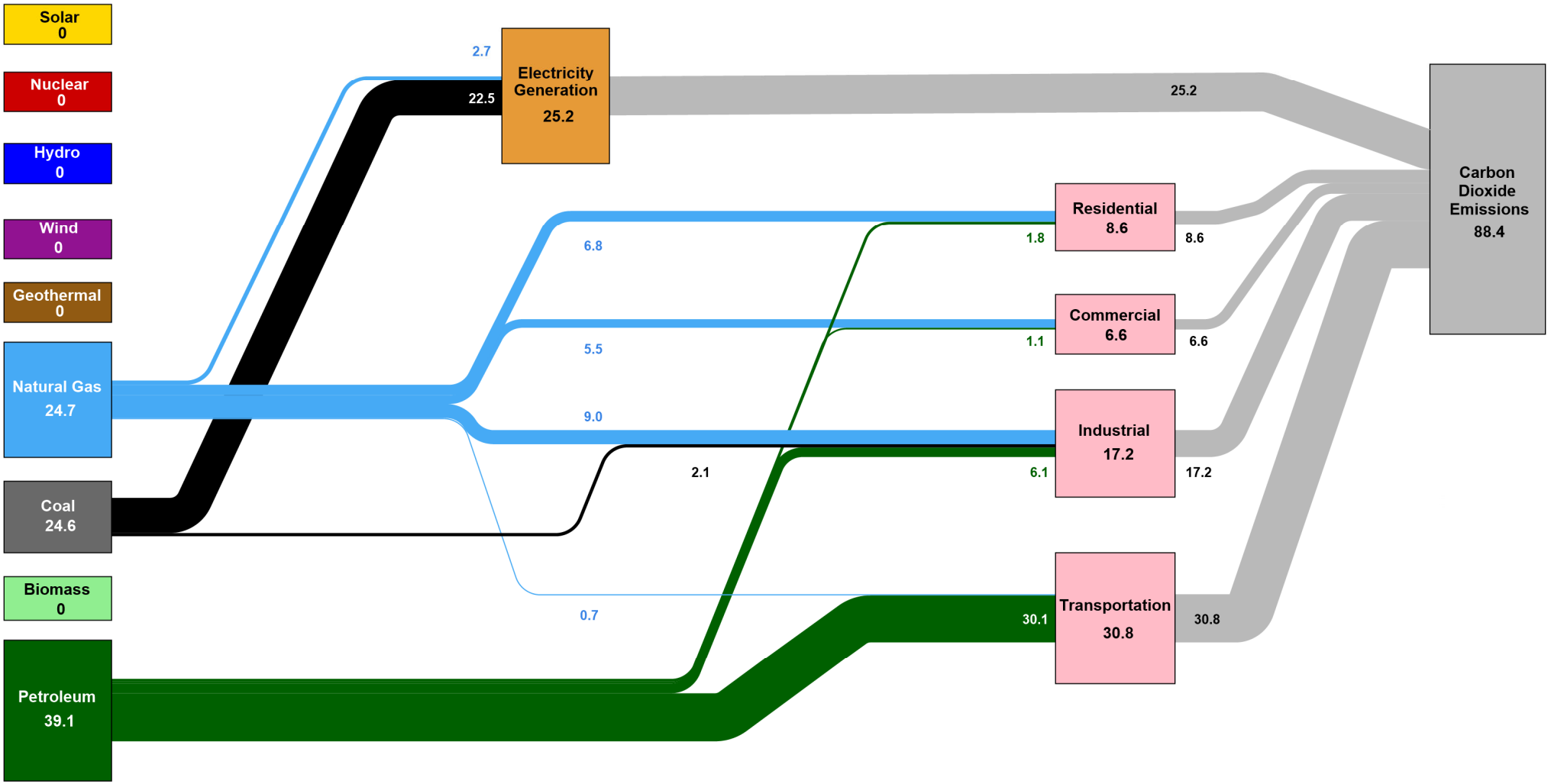
Estimated Minnesota Energy Consumption in 2018: 1,847 Trillion BTU

Lawrence Livermore National Laboratory

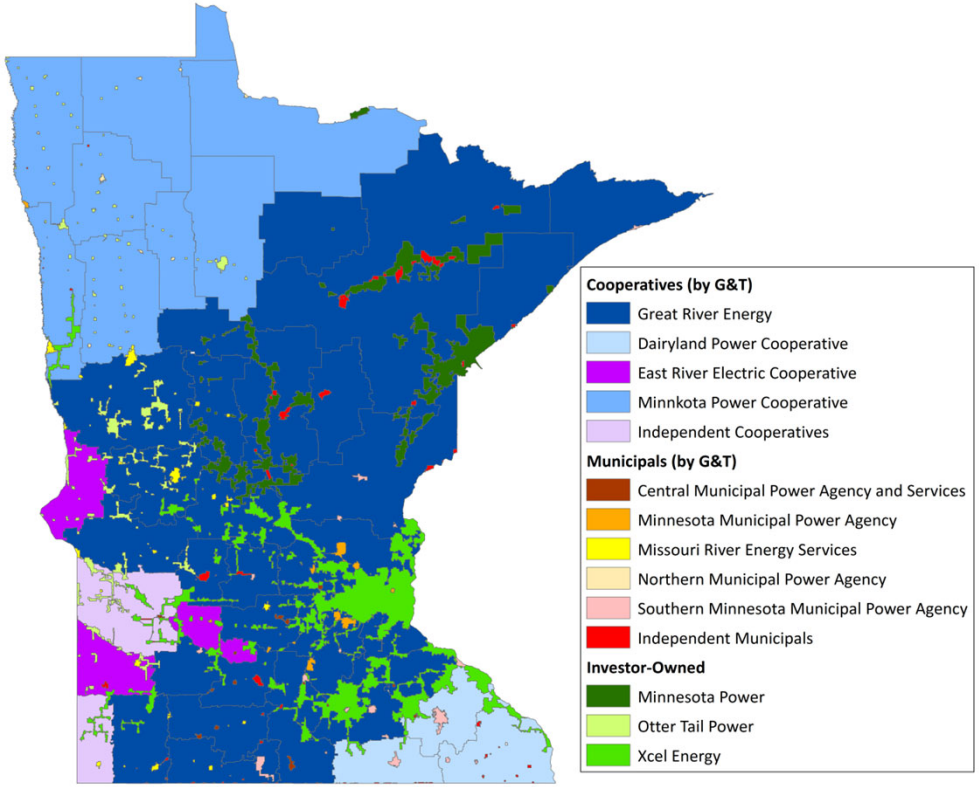


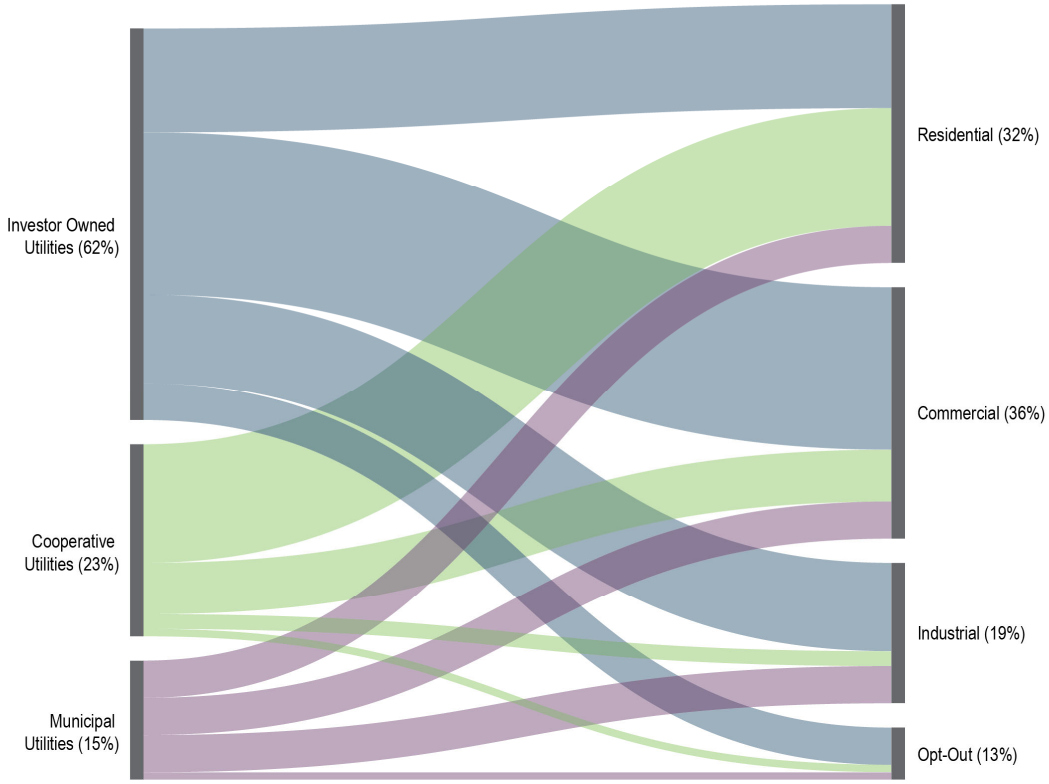
Estimated Minnesota Carbon Dioxide Emissions in 2017: 88.4 Million Metric Tons

Lawrence Livermore National Laboratory

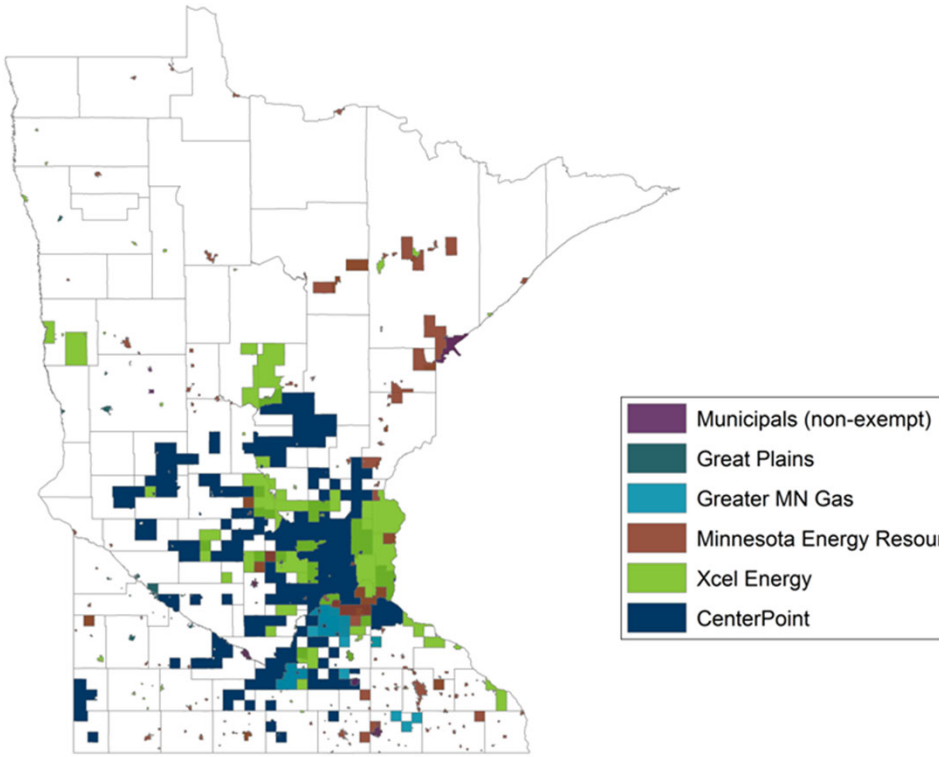


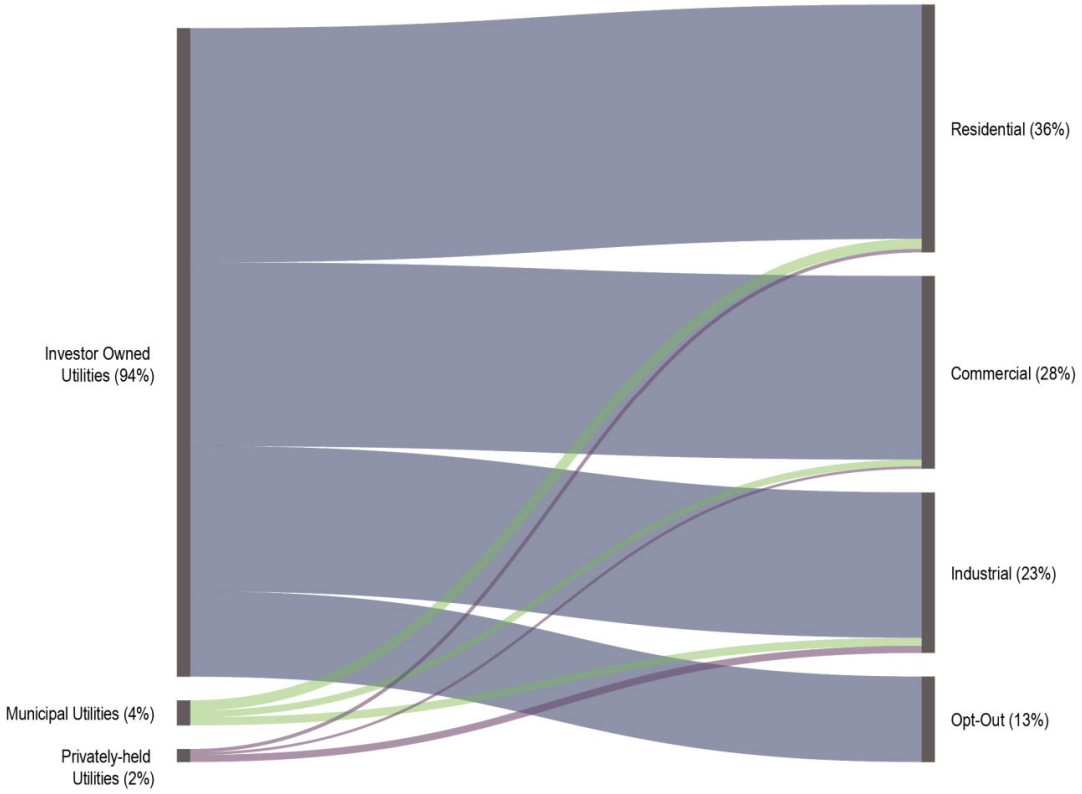
Electric Utilities and Customer Loads in Minnesota

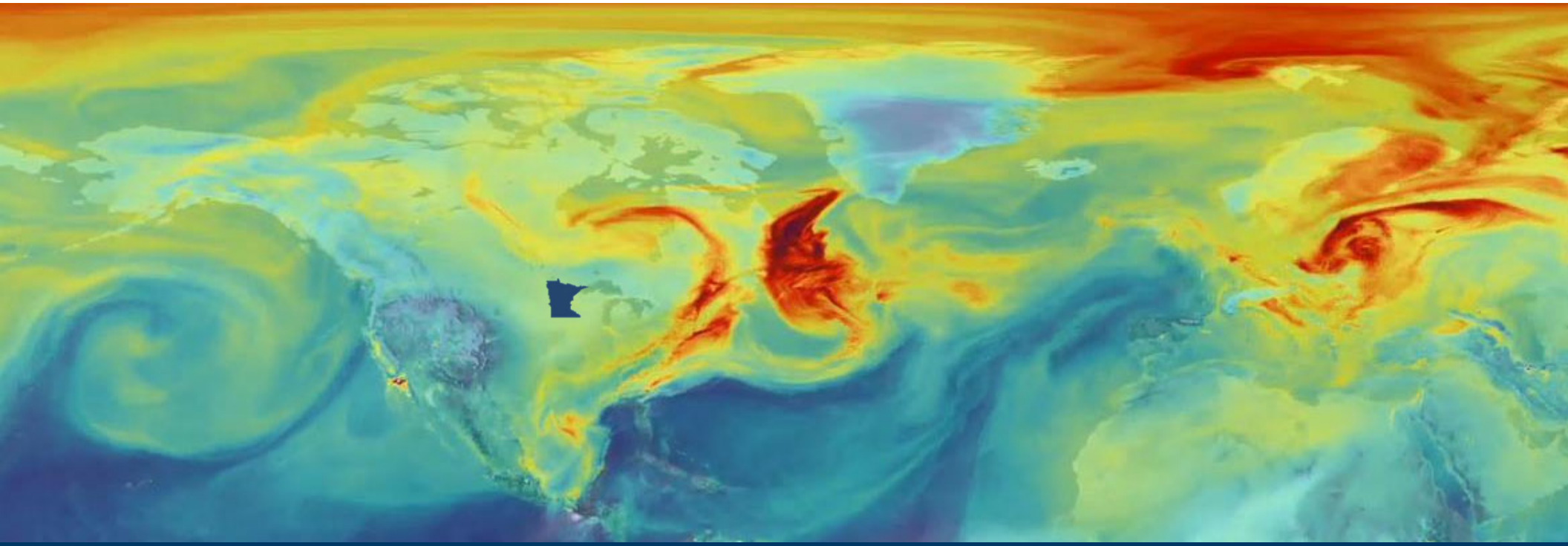




Natural Gas Utilities and Customer Loads in Minnesota





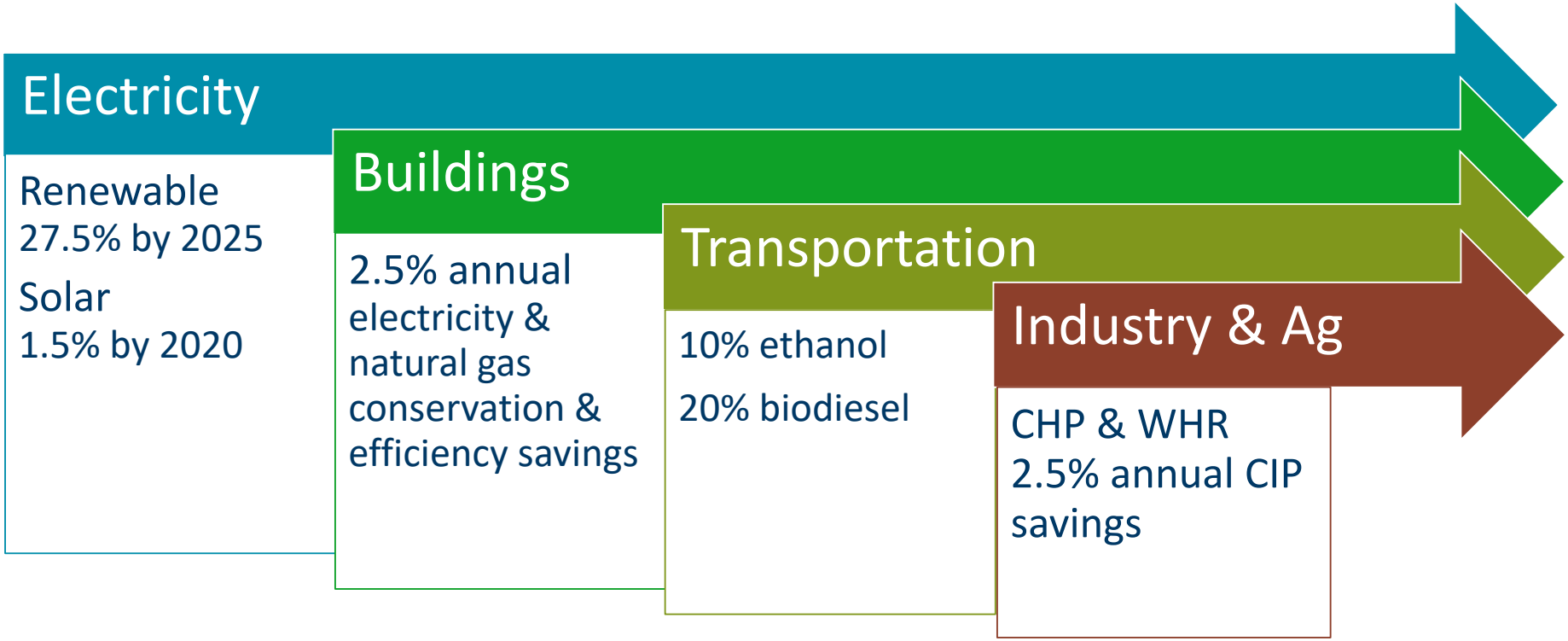


Minnesota's Energy & Climate Goals

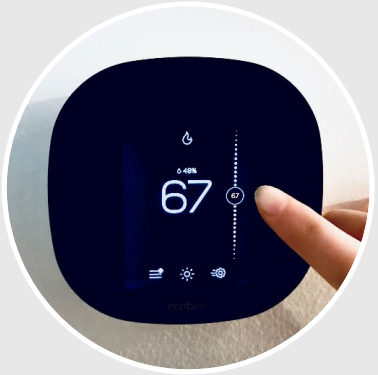
Energy & Climate Goals

- 1980 Conservation Improvement Program
- 1981 Net Energy Metering
- 1994 Xcel Renewable Mandate (425MW wind, 110MW biomass by 2002)
- 2001 Renewable Energy Objective (10% RE x 2015)
- 2002 Metropolitan Emissions Reduction Project (Coal retirements)
- 2007 Next Generation Energy Act (27.5% RE x 2025 + 1.5% EE/yr)
- 2013 Solar Energy Jobs Act (28.5% RE x 2025)
- 2021 Energy Conservation & Optimization; Natural Gas Innovation Act

Current Policy Objectives



Impact of Policy Efforts to Date



Energy Efficiency

Saved Minnesotans over **$6** Billion

Coal Generation in MN

Reduced from **over 60%** to **under 25%**

Electric Sector CO_2 Emissions

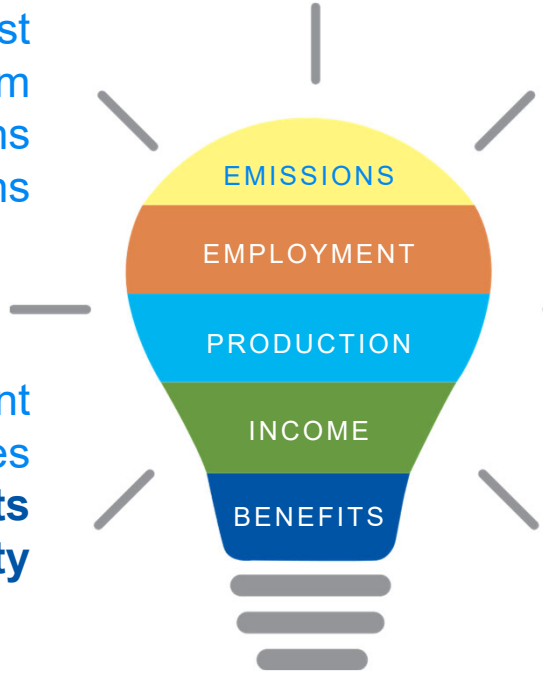
Reduced by **29%** from 2005 baseline

Renewable Energy

Developed nearly **6,000** MW's of Wind & Solar

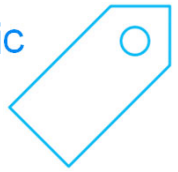
Economic Benefits of Energy Efficiency
Conservation Improvement Program (CIP) investments 2013-2018

$146 Million Boost to GDP from Emissions Reductions



48,000 Local Jobs Added

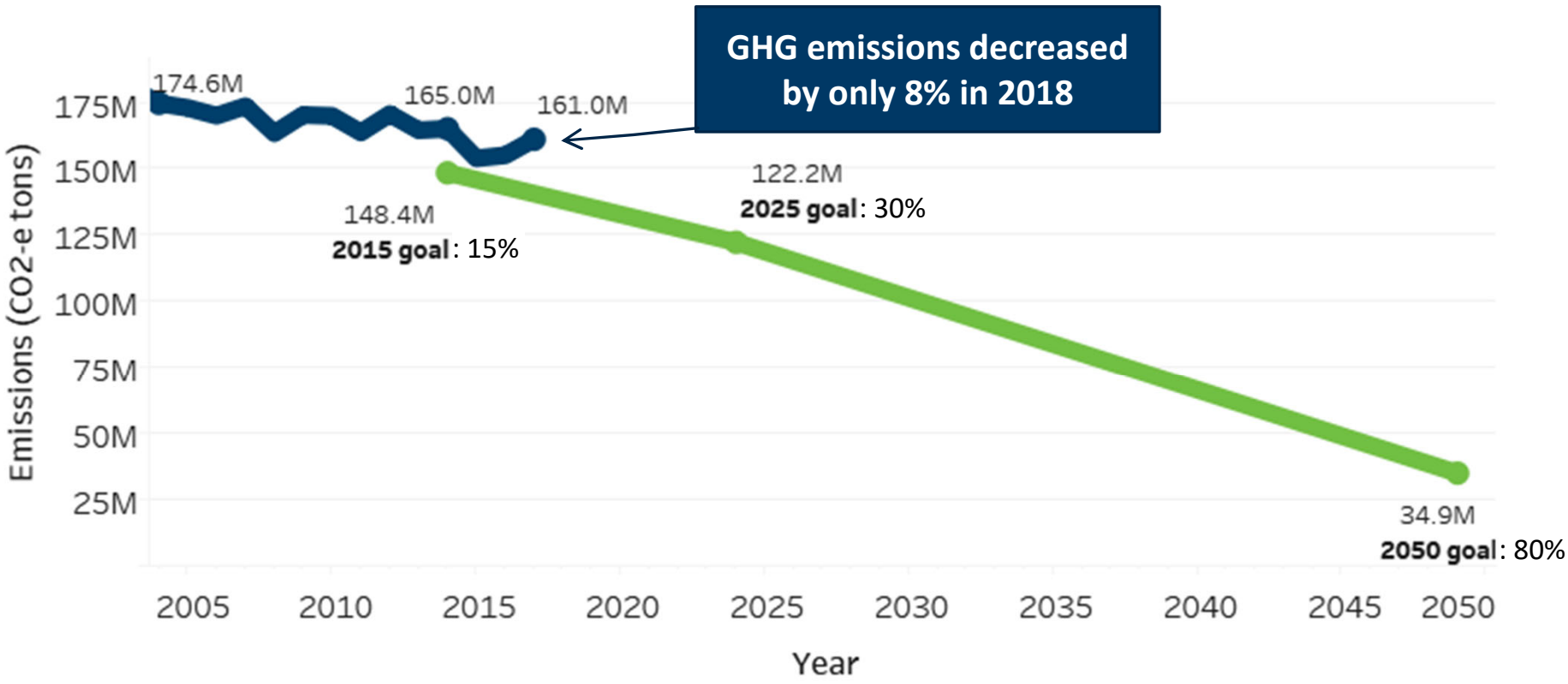
$11 Billion in New Economic Activity



Each Dollar Spent on CIP Generates **$3.75 in Benefits to Society**

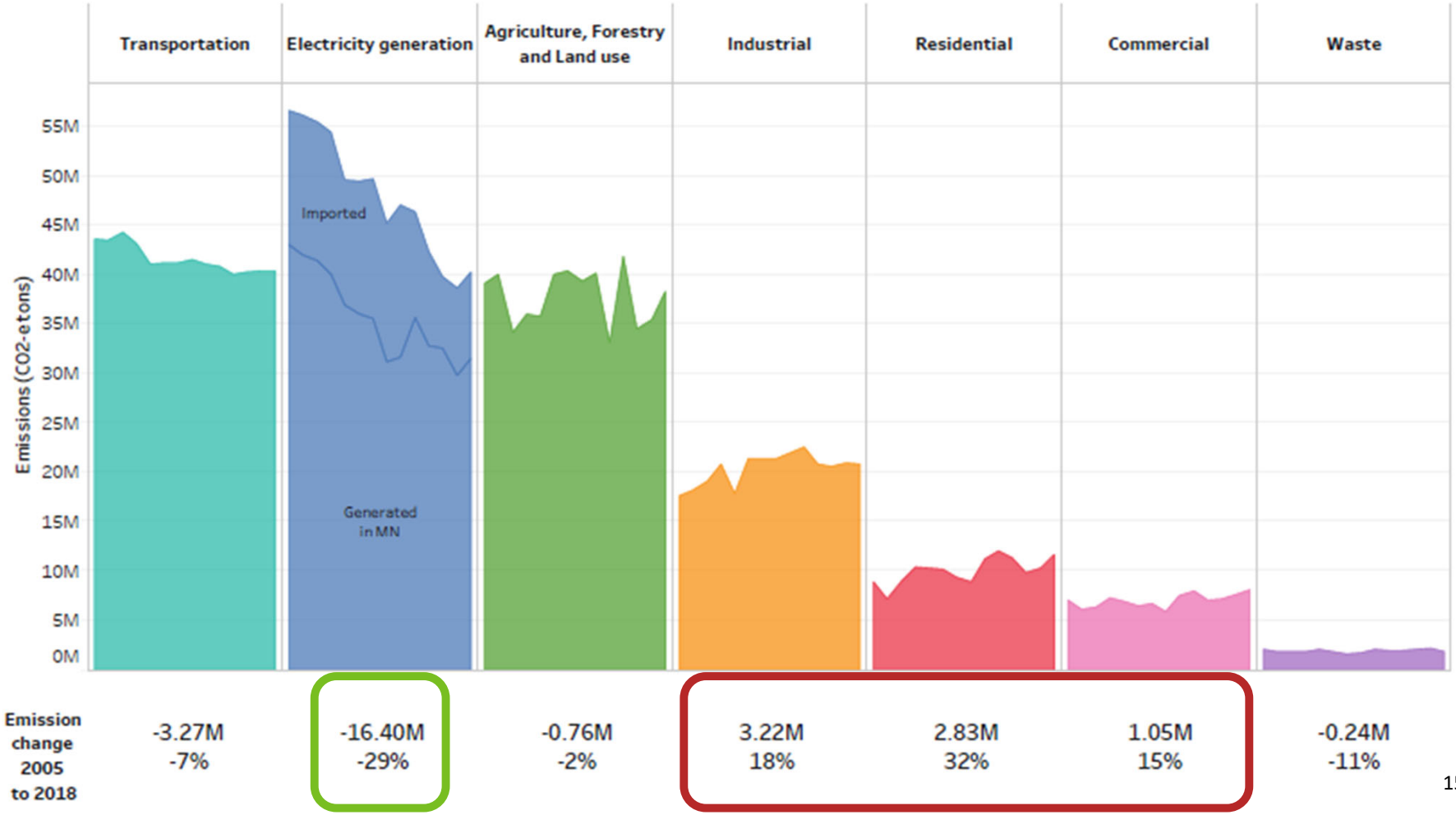
Extra $900 in the Wallet of Each Minnesotan

Minnesota is not on track to meet its GHG goals



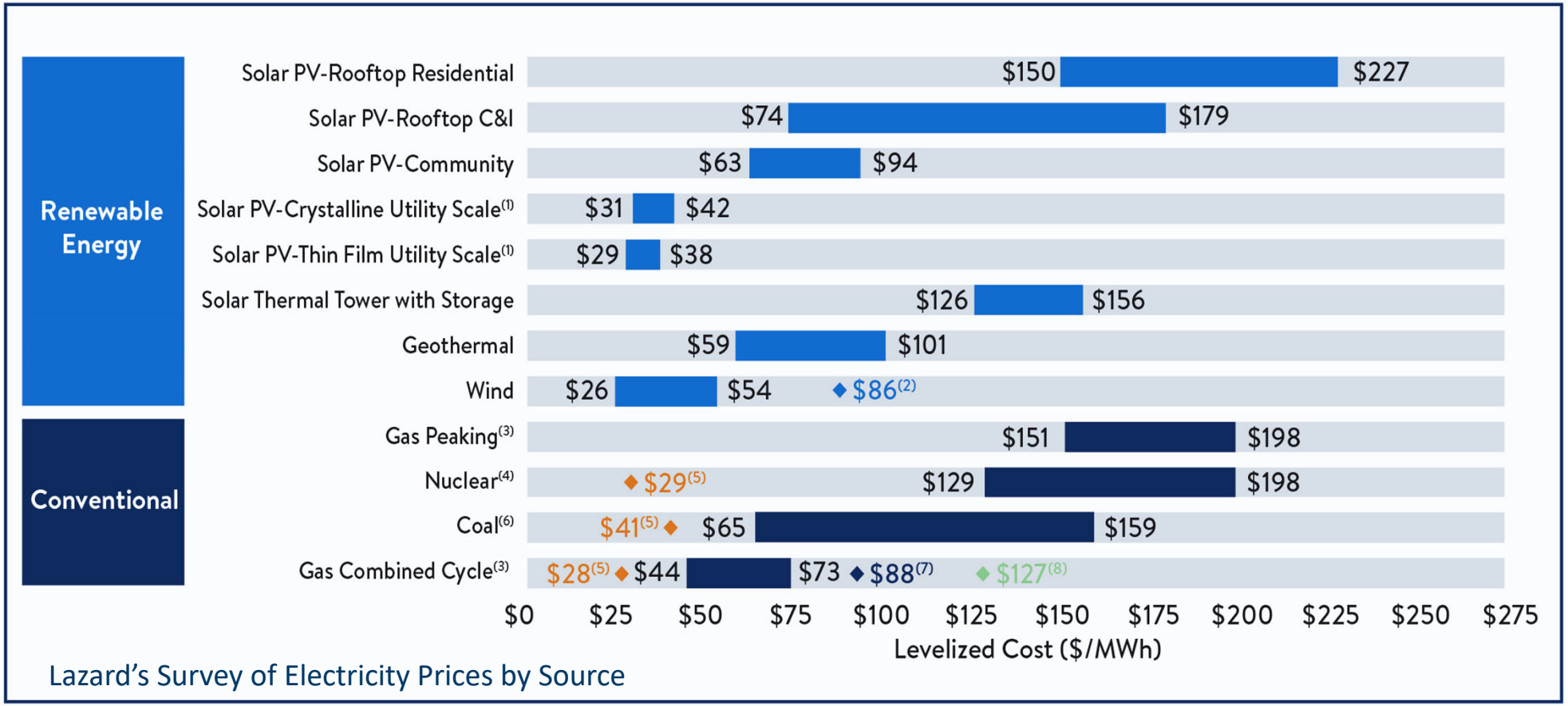
Minnesota's actual GHG emissions, compared to the Next Generation Energy Act goals

Greenhouse gas emissions by sector



Power Sector Transformation

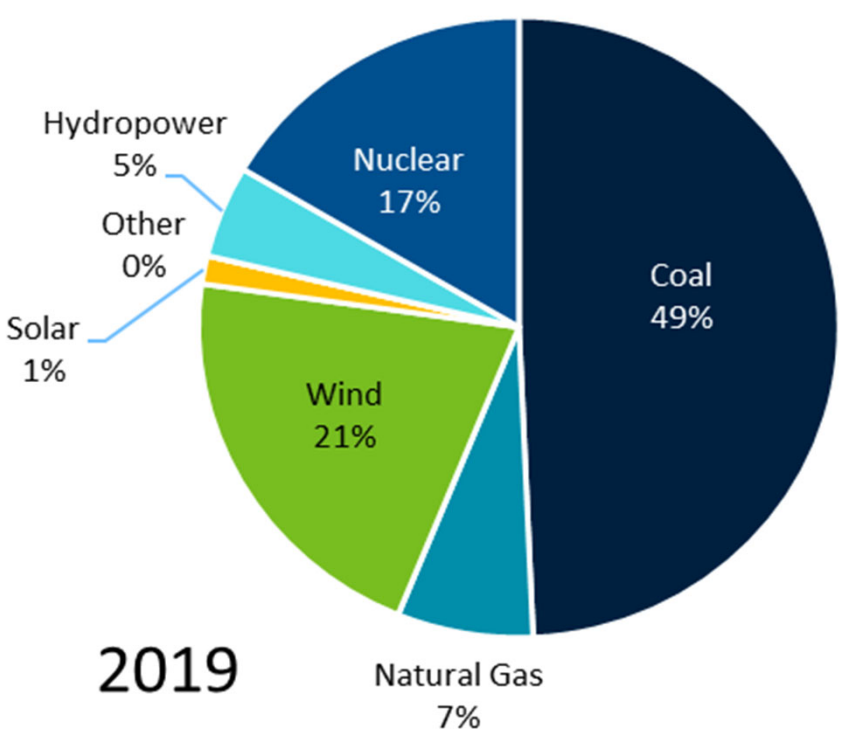
Levelized Cost of Energy Comparison

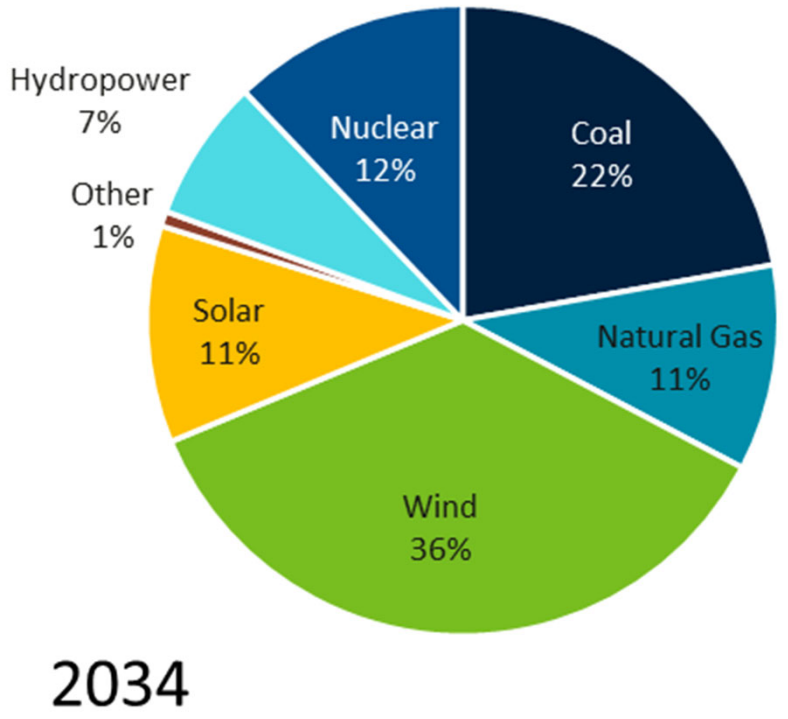


Lazard's Survey of Electricity Prices by Source

Upper Midwest Electricity in Transition

*Current Plans: 2019 – 2034**



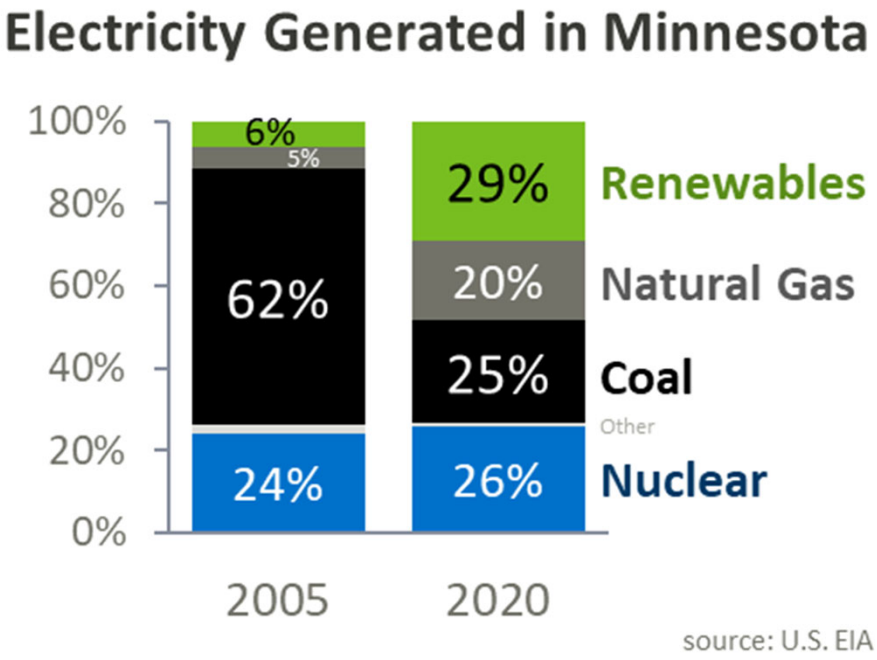


*** Per Xcel, GRE, Mn Power, and OTP Resource Plans**

Minnesota's Generation Mix Over Time

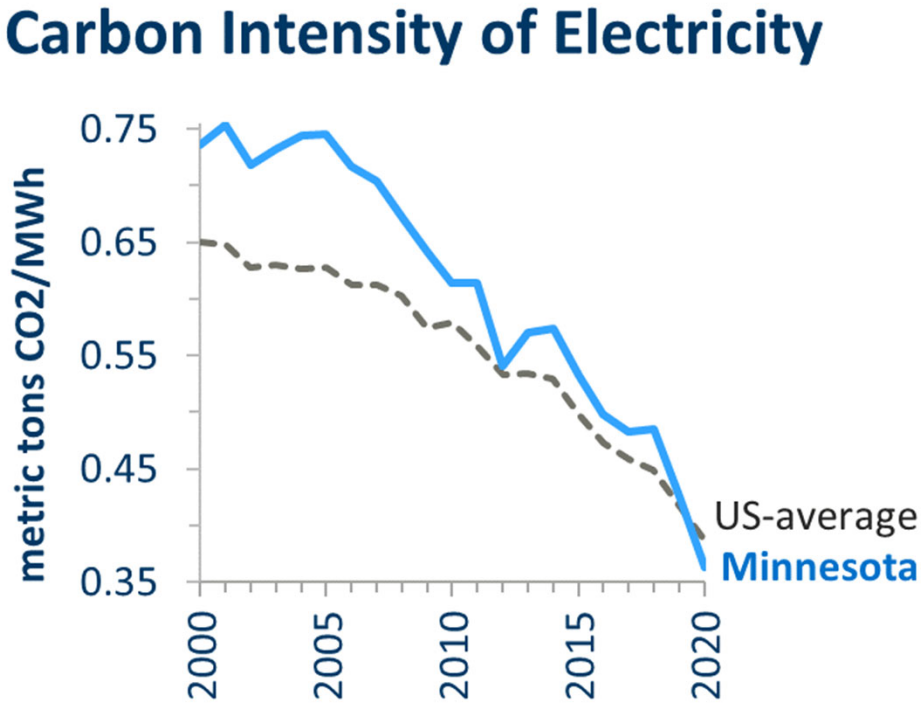
Between 2005 and 2020:

- Renewable electricity increased from 6% to 29%
- Coal power dropped from 62% to 25%



Generation Mix Over Time

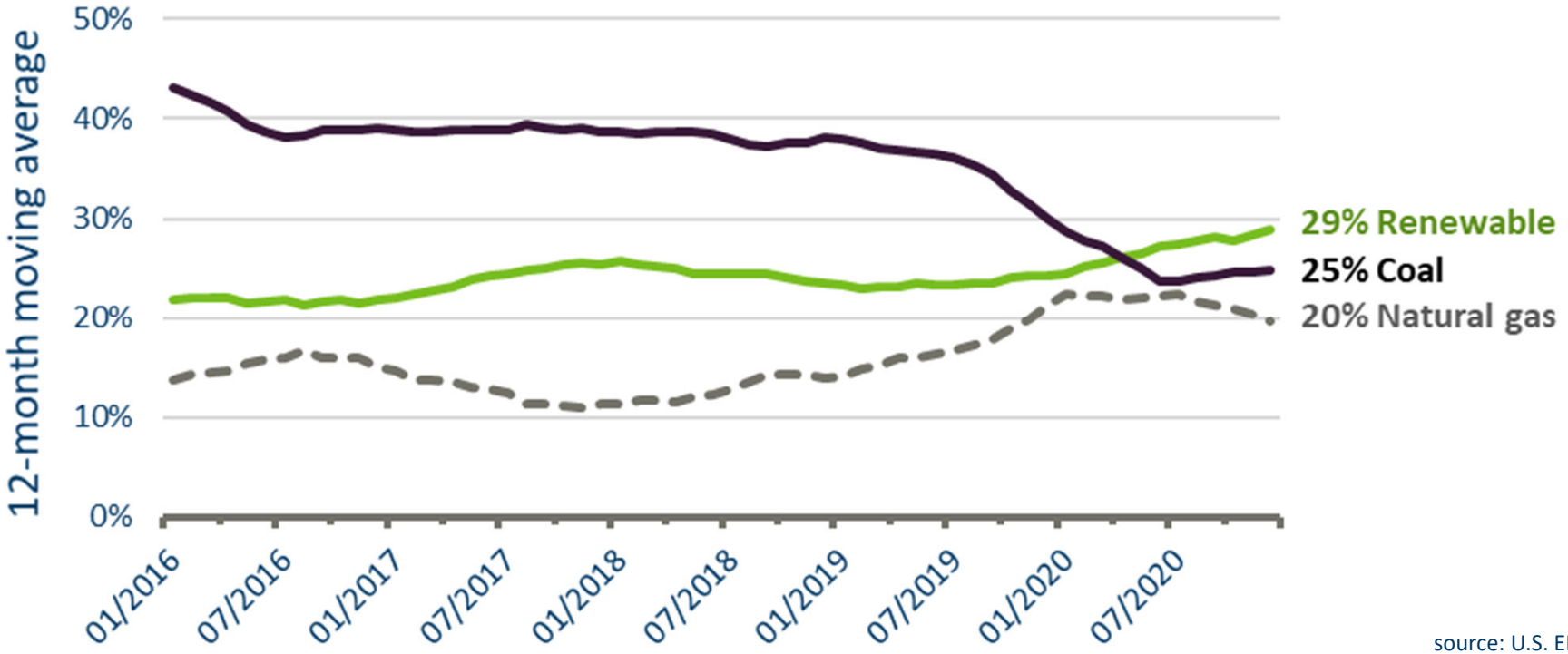
- State policies and market forces have resulted in a rapid decarbonization of Minnesota's power sector.
- Minnesota's carbon intensity dropped below the national average in 2020



Source: U.S.EIA data

Electric System in Transition

2016-2020 Monthly Electricity Generation in Minnesota



source: U.S. EIA

Remaining Electric Utility Owned Coal-Fired Generation

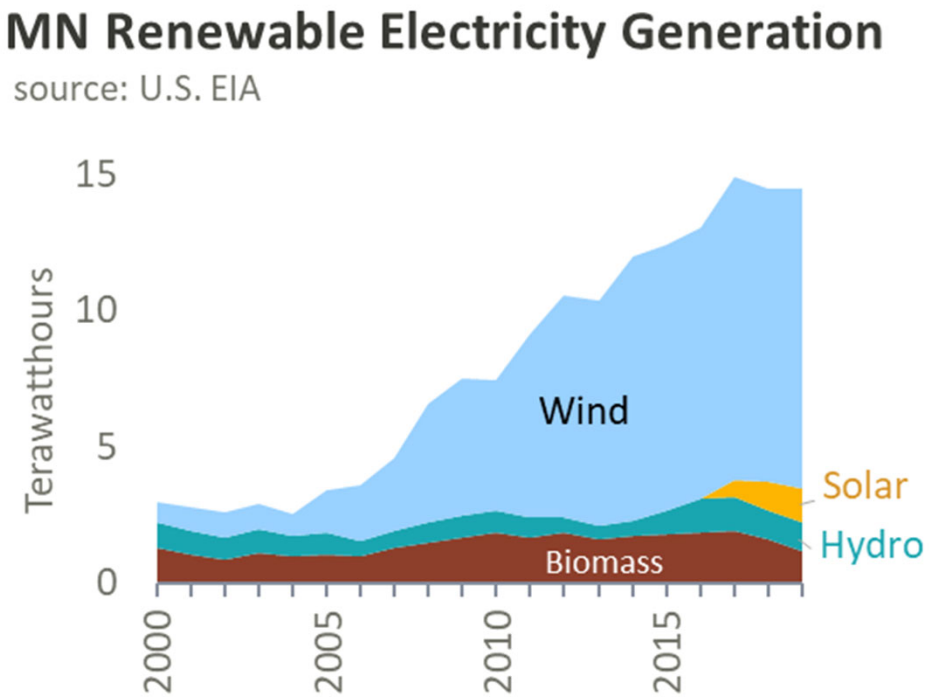
Facility	Size (nameplate capacity, MW; rounded)	Status
Hibbing Public Utilities Commission		
Hibbing 3	10	Standby/backup: available for service but not normally used
Hibbing 5	20	Standby/backup: available for service but not normally used
Hibbing 6	6	Standby/backup: available for service but not normally used
Minnesota Power		
Boswell unit 3	365	Operating
Boswell unit 4	558	Operating
Taconite Harbor Energy Center unit 1	75	Standby/backup: available for service but not normally used
Taconite Harbor Energy Center unit 2	75	Standby/backup: available for service but not normally used
Otter Tail Power Company		
Hoot Lake 2	54	Operating, full retirement by 2021
Hoot Lake 3	75	Operating, full retirement by 2020
Xcel Energy		
Sherburne County 1	680	Operating, full retirement by 2026
Sherburne County 2	682	Operating, full retirement by 2023
Sherburne County 3	876	Operating, proposed retirement by 2030
Allen S King	511	Operating, proposed retirement by 2028

- Most of the emissions reductions in the electric power sector have come from utilities retiring coal-fired electricity generating facilities.
- Recent and upcoming decisions by the MN Public Utilities Commission are expected to further reduce GHG emissions.
- Additionally, some utilities are beginning to seasonally dispatch existing coal-fired generating units ensuring economic operations with the potential for lower emissions.

Minnesota's electricity market is transforming

In 2020, Wind generated 22% of MN's electricity

Solar is at 3%, small but growing fast.



Changing the way we use the grid

- **Grid Modernization**
- **Interconnection**
- **Data Access**
- **Electrification**

Electric Vehicles in Minnesota

- 18,000+ Plug in Electric Vehicles in Minnesota
- 7 million+ total registered vehicles in MN
- Of 265,000 new vehicle registrations in 2018, over 4,000 were EVs or PHEVs

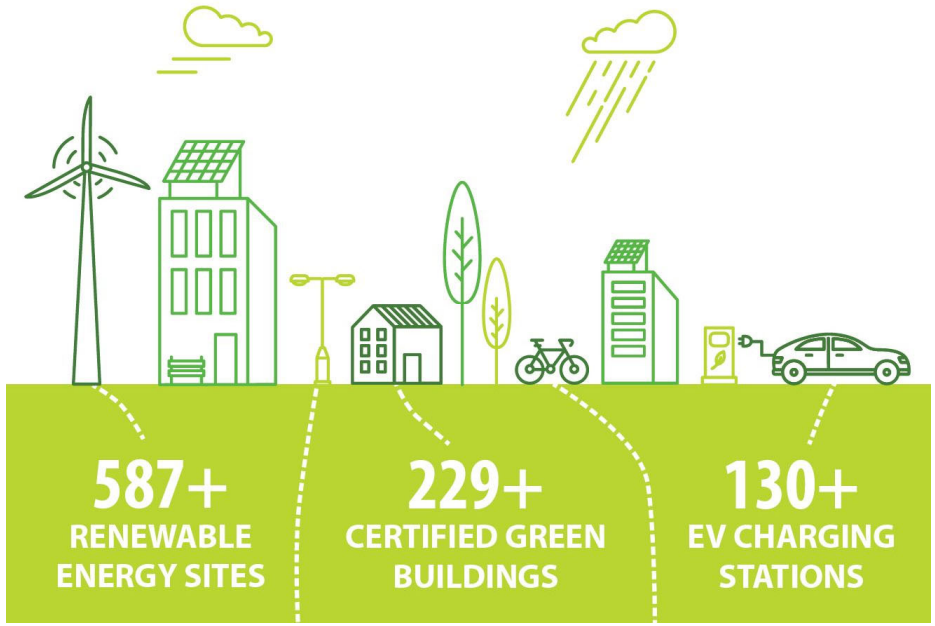
Energy Sector – Current Commitments

- **Xcel Energy:**
  - retire all coal for 80% carbon reduction by 2030
  - 100% carbon-free electricity by 2050
  - Net zero emissions natural gas by 2050
- **Great River Energy**: 95% carbon free by 2023
- **Minnesota Power:** 70% renewable by 2030, coal-free by 2035 & 100% carbon-free by 2050
- **SMMPA:** 80% carbon free in 2030
- **OTP**: 30% renewable energy & 40% carbon reduction by 2022

GreenStep Cities

By the numbers:

- 141 participants
- Covers 49% of Minnesota's population
- 35% are small cities (5,000 people or fewer)
- Achieves more than $8 million savings per year on energy costs



Climate and Energy Goals

City	Climate Goals	Renewable Goals
Grand Marais	**Climate Action Plan (2019):** Carbon Neutral by 2040	**Achieve energy resilience** **100% renewable** for city operations
Northfield	**Climate Action Plan (2019):** Carbon free by 2040	**10% in-boundary** renewable electricity **(20 MW)** **Carbon-free electricity** by 2030
Rochester	**Energy Action Plan (2017):** Supports state goal to reduce GHG emissions 80% by 2050	Mayoral proclamation: **100% renewable** electricity by 2031
St. Louis Park	**Climate Action Plan (2018):** Carbon neutral, community-wide by 2040	**100% renewable** electricity by 2030 **10% in-boundary (37 MW)** City ops currently at 100% renewable
St. Paul	**Climate Action and Resilience Plan (2019 draft):** Reduce emissions 50% by 2030, carbon neutral by 2050, community-wide	**10% in-boundary** renewable electricity **(200 MW)**
Minneapolis	**Climate Action Plan (2013):** 80% reduction in emissions from 2005 by 2050, community-wide	**100% renewable** electricity by 2030 community-wide **100% renewable** electricity for city ops by 2022

Source: Great Plains Institute

Economy-Wide Strategies to Reduce Carbon Emissions

- Electricity/Power Sector – Walz/Flanagan 100% Path to Clean Energy
- Buildings – Building Performance Standards and Retrofitting
- Commercial/Industrial process – Waste energy capture (Infancy)
- Transportation – Decarbonization through Electrification and Biofuels
- Agriculture – Biofuels, Effectively lower-carbon fuel standards

Leverage success in the power sector to decarbonize other sectors

The Commission's Regulatory Process

Resource Planning

- Alternatives
- Forecast
- DSM
- Existing Generation
- Planning Model
- Size, Type, & Timing Approved

Resource Acquisition

- Forecast Update
- Alternatives
- Environment & Socioeconomics
- Facility Approved

Facility Siting & Routing

- Public Participation
- Alternative Sites
- Environmental Review
- Siting/Routing Approved & Constructed

Facility Operation

- MISO Member Load
- MISO Member Generators
- MISO Market Design
- Actual MW & MWh
- MISO Member Load Mgmt

Cost Recovery

- Finance Adjustments
- Design Rates
- Forecast Adjustments
- Rate Increase Approved
- Assign Costs

Thank you!

Jessica Burdette

Minnesota Department of Commerce, Division of Energy Resource

Energy Regulation & Planning, Manager

Jessica.burdette@state.mn.us