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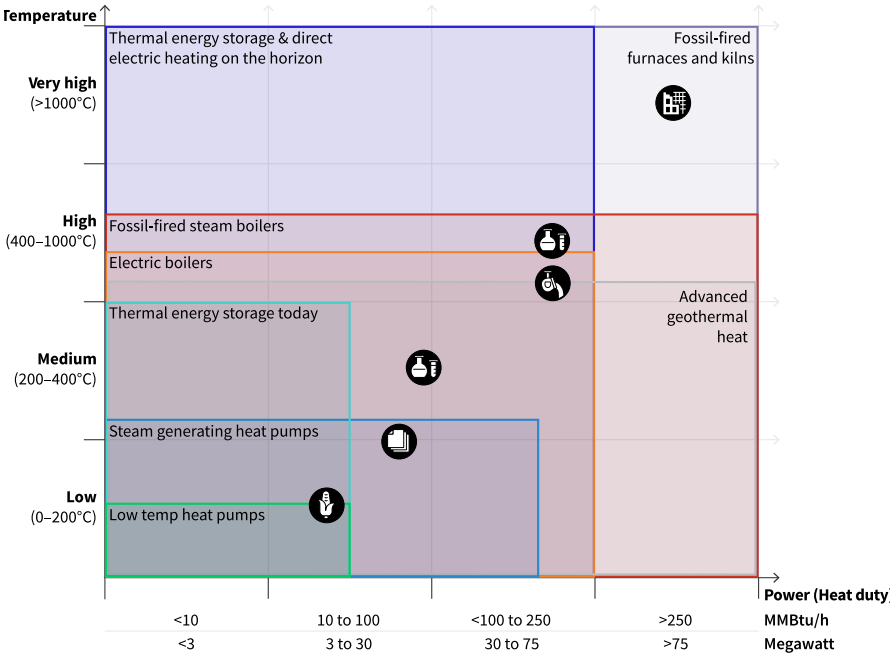
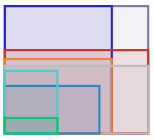
Manufacturing is a driving force of the Michigan economy: approximately 600,000 Michiganders are employed in manufacturing jobs, and the state was the seventh-largest exporter of goods in the nation in 2024. The industrial sector is also a significant source of climate pollution, comprising 13% of Michigan's total emissions.

Temperature and power capabilities of heating technologies compared with the requirements of industrial sectors

Note: This map is a simplified representation of a complex industry



Industrial heat technologies



The values represent the capability of a single unit of each technology. In practice, multiple units can be combined—for example, stacking several thermal energy storage units—to increase overall power delivery.

Key industrial subsectors

- Food & beverage
- Pulp and paper
- Chemicals
- Refining
- Iron & steel, cement

The values represent the an approximate overlay of the average energy needs for typical heating applications in key industrial subsectors.

Most subsectors require heat across multiple temperature ranges, and equipment size varies depending on the application and facility scale.

Note: Illustrative and non-exhaustive

RMI Graphic. Source: RMI analysis

To meet the climate and health targets mandated by the MI Healthy Climate Plan while maintaining Michigan's manufacturing might, the state must work to reduce emissions from its industrial sector in a way that allows businesses to stay regionally and globally competitive.

Historically deemed "hard to decarbonize," advancements in technology and global economic trends have created momentum for efficiency and electrification within the industrial sector. Many of Michigan's industrial emissions come from burning natural gas in low- and medium-temperature ranges for which low-emissions technologies like industrial heat pumps, electric boilers, and thermal energy storage have already proven viable. The actions outlined here can help Michigan policymakers ease the transition to clean manufacturing and production methods as these next-generation technologies continue down the cost curve and continue to improve in performance.

Technical solutions for clean industrial heat (<400 C)

Energy efficiency
- Heat pumps
- Combined heat and power
- Energy Management systems

Electrification
- Electric resistive heating
- Thermal energy storage

Geothermal heat

Barriers to adoption

Economic (operational)
- Gas vs. electricity costs

Economic (capital)
- Restrictions on capital for payback period
- Financial model restrictions

Technology
- Unique facility needs
- Highly integrated facilities
- High bar for proof of concept

Grid Readiness
- Scale of need

Timing + market uncertainties
- Asset lifetime
- Long planning and execution cycles
- Staff capacity constraints
- Competing capital needs

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Enabling Policies

1. Support the adoption of emissions-reducing technologies financially

- Tax credits for clean manufacturing production
- Clean heat production tax credits
- Grant programs for industrial electrification and/or efficiency projects
- Incentives for emissions-reducing equipment

2. Improve efficiency requirements

- Efficiency requirements for new-build facilities
- Renewable portfolio standards that include renewable thermal power/waste heat
- Energy efficiency standards for industrial equipment
- Binding targets for sector-wide industrial energy efficiency
- Encouraged participation efforts for certification programs and alliances
- Material efficiency standards

3. Incentivize flexible industrial electricity demand

- Alternative electricity pricing paths for industrial consumers
- Large-load electricity tariff reforms
- Utility exit fee reforms

4. Streamline permitting processes for emissions reduction projects

- Alternate approval processes for emissions reduction projects at existing sites

5. Improve emissions standards

- Clean heat emissions standards
- Local or regional cap-and-invest or carbon pricing mechanism

6. Leverage state buying power

- State “buy clean” initiatives

7. Understand the opportunity and build information bases to support modernizing industrial technology deployment

- RD&D grants or incentives
- Workforce education and training
- Technical assistance programs for facility-level technology and electricity assessments
- State-mandated facility-level assessments

Map of Michigan facilities with CO_2 emissions from low- and medium-temperature heat

RMI Graphic. Source: CAELP (HEATset)

Discover the Full Insights

For a deeper dive into the analysis and to explore comprehensive policy recommendations, please refer to the full report:

https://rmi.org/insight/michigan-clean-manufacturing-roadmap/