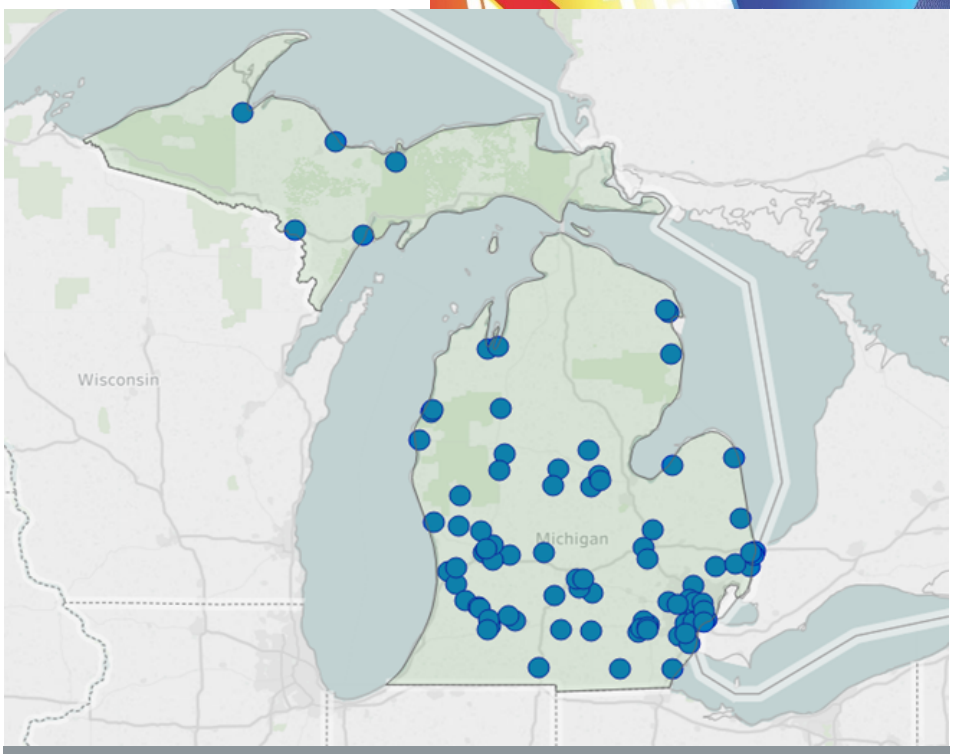
U.S. DEPARTMENT OF ENERGY

Office of ENERGY EFFICIENCY & RENEWABLE ENERGY

The State of CHP: Michigan



Map of current CHP installations in Michigan. *Illustration from ICF.*

Combined heat and power (CHP) – also referred to as cogeneration – is an efficient and clean approach to generating on-site electric power and useful thermal energy from a single fuel source. The information in this document provides a general overview of the state of CHP in Michigan, with data on current installations, technical potential, and economics for CHP.

Michigan: Installed CHP

U.S. DOE Combined Heat and Power Installation Database

The DOE CHP Installation Database is a data collection effort sponsored by the U.S. Department of Energy. The database contains a comprehensive listing of combined heat and power installations throughout the country, including those in Michigan, and can be accessed by visiting https://doe.icfwebservices.com/chp.

CHP Project Profiles

The Midwest CHP TAP has compiled information on certain illustrative CHP projects in Michigan. You can access these by visiting the Department of Energy's CHP Project Profiles Database at https://betterbuildingssolutioncenter.energy.gov/chp/chp-project-profiles-database.

Midwest CHP Technical Assistance Partnership

For assistance with questions about specific CHP opportunities in Michigan, please consult with the Midwest CHP TAP by visiting mwchptap.org or contacting the CHP TAP director.

Michigan Existing CHP

Sector	Sites	Capacity (MW)
Industrial	41	3,005
Commercial/Institutional	43	525
Other	4	2
Total	88	3,532

Midwest CHP TAP Director

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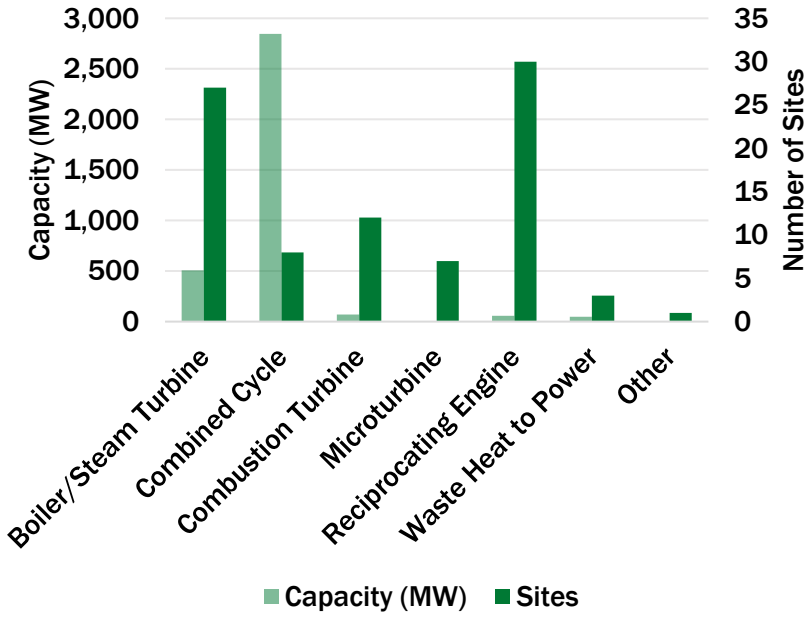
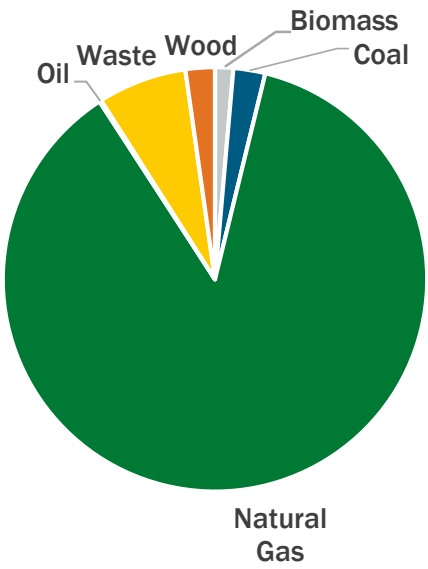
MIDWEST CHP TECHNICAL ASSISTANCE PARTNERSHIPS

DOE CHP Installation Database (U.S. installations as of Dec. 31, 2017)

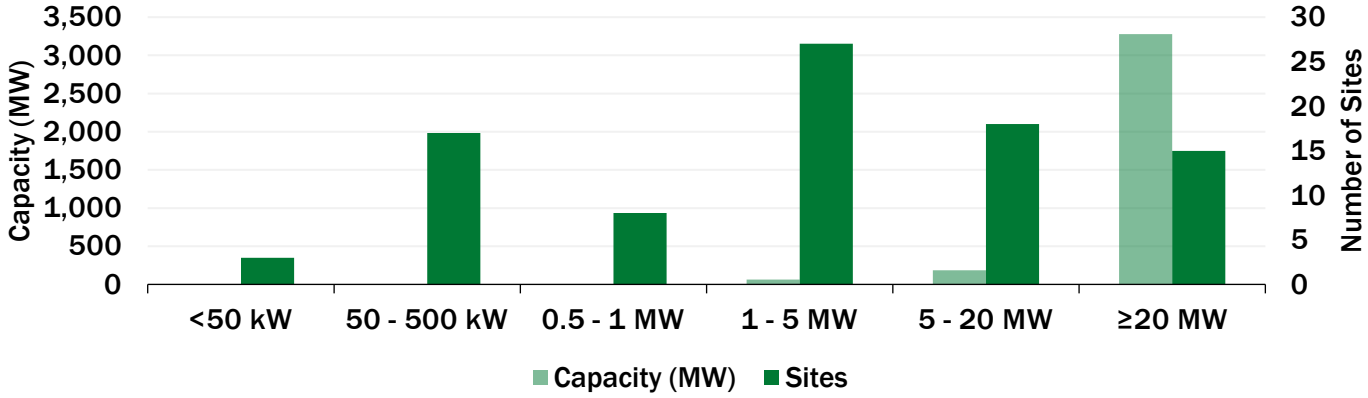
Michigan CHP by Technology



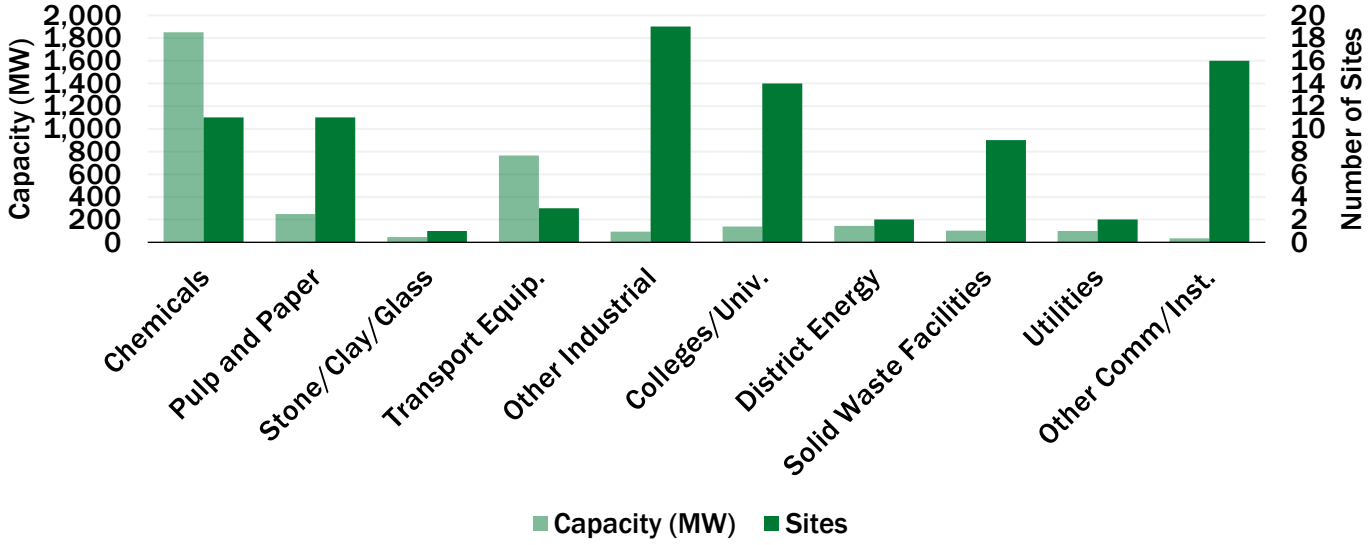
Michigan CHP Capacity (MW) by Fuel



Michigan CHP by Size Range



Michigan CHP by Application

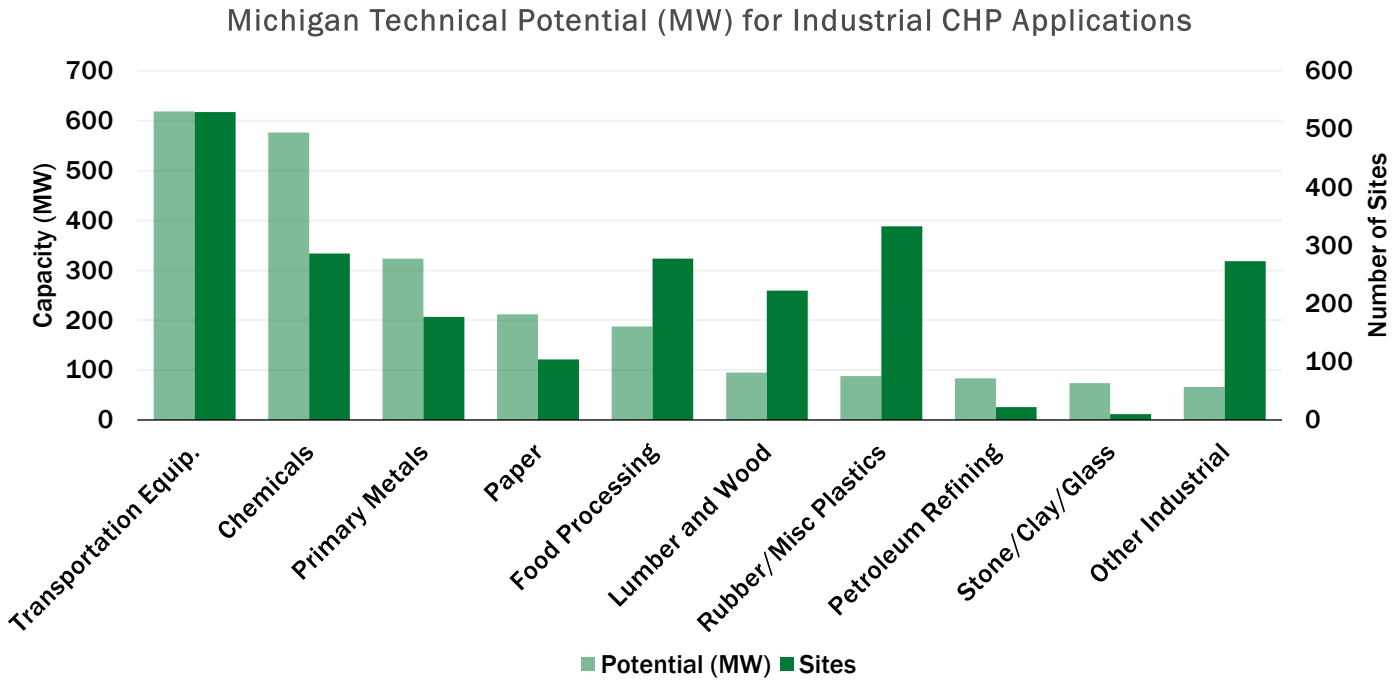


Michigan: Technical Potential for New CHP Installations

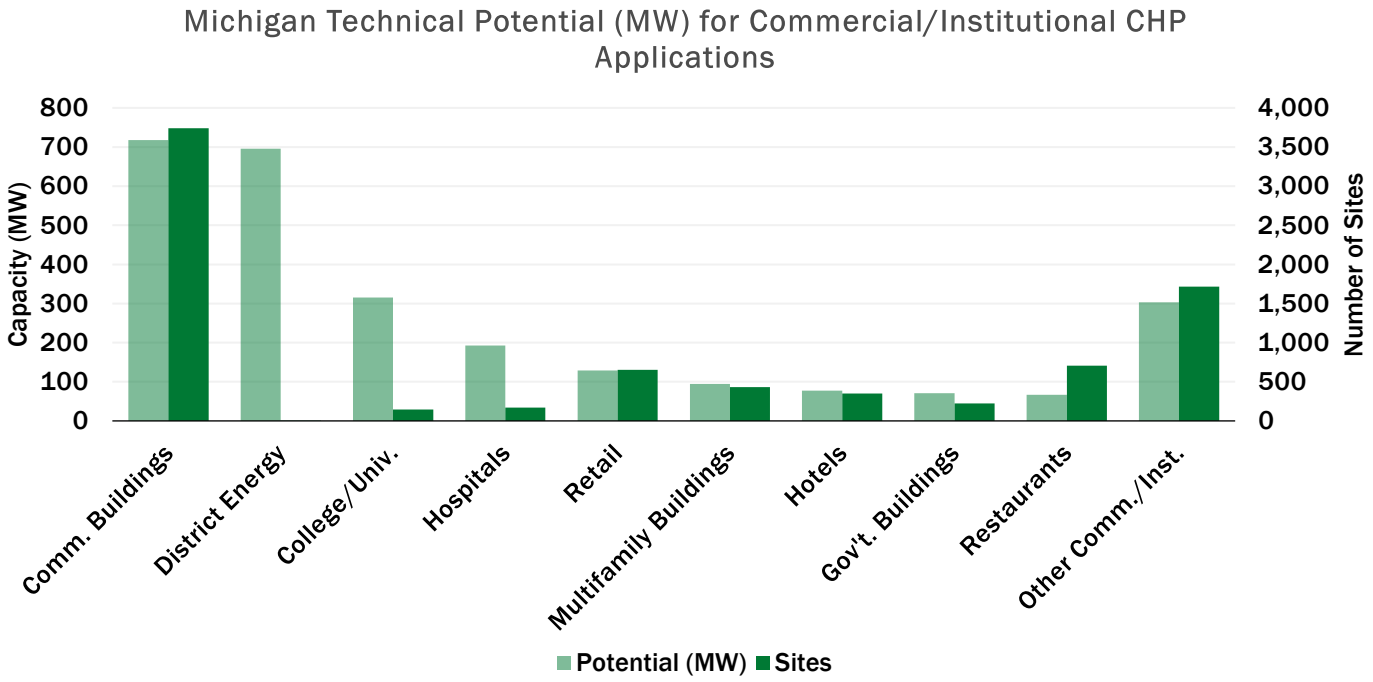
The "Combined Heat and Power (CHP) Technical Potential in the United States" market analysis report provides data on the technical potential in industrial facilities and commercial buildings for "topping cycle" CHP, waste heat to power (WHP) CHP, and district energy CHP in the U.S. Read the report **here**.

Michigan CHP Technical Potential

Sector	Potential Sites	Potential MW
Industrial	2,233	2,324
Commercial/Institutional	8,137	2,664
Total	10,370	4,987



	50-500 kW		0.5 - 1 MW		1 - 5 MW		5 - 20 MW		>20 MW		Total	
Application	Sites	MW	Sites	MW	Sites	MW	Sites	MW	Sites	MW	Total Sites	Total MW
Transportation Equip.	300	59	111	77	91	178	22	178	5	127	529	618
Chemicals	150	27	42	30	67	154	24	234	3	132	286	576
Primary Metals	104	25	31	22	29	64	10	95	3	117	177	323
Paper	64	17	12	10	23	52	2	16	3	118	104	212
Food Processing	197	37	35	26	39	75	6	49	0	0	277	188
Other Industrial	742	115	59	41	46	94	11	89	2	68	860	407
Total	1,557	279	290	206	295	616	75	661	16	562	2,233	2,324



	50-500 kW		0.5 - 1 MW		1 - 5 MW		5 - 20 MW		>20 MW		Total	
Application	Sites	MW	Sites	MW	Sites	MW	Sites	MW	Sites	MW	Total Sites	Total MW
Commercial Buildings	2,393	120	1,047	419	299	179	0	0	0	0	3,739	718
College/Univ.	82	14	11	7	34	91	17	141	2	62	146	315
Hospitals	79	20	29	19	59	127	4	27	0	0	171	193
Retail	602	90	43	25	8	14	0	0	0	0	653	129
Multifamily Buildings	303	23	110	55	17	17	0	0	0	0	430	95
Other Comm./Inst.	2,835	326	75	50	85	136	1	5	2	696	2,998	1,214
Total	6,294	593	1,315	576	502	563	22	174	4	758	8,137	2,664

Department of Energy CHP Accelerators

Packaged CHP Accelerator

Standardized packaged CHP systems can reduce risk for both CHP users and suppliers by reducing design errors, limiting uncertainty about performance, shortening project development time, and reducing overall costs. Accelerator partners will validate the installation, performance, and economic and resiliency benefits of packaged CHP systems, evaluate the integration of new technologies and packaged CHP, and identify R&D challenges. For more information, visit https://betterbuildingssolutioncenter.energy.gov/accelerators/packaged-chp

CHP for Resiliency Accelerator

The U.S. DOE collaborated with cities, states, utilities, and other stakeholders who are actively pursuing CHP as a consideration in resiliency planning for critical infrastructure in their jurisdictions. This included defining resiliency, identifying critical infrastructure, and assessing CHP opportunities. This process was documented in the DG for Resilience Planning Guide and the CHP for Resilience Screening Tool. For more information, visit https://betterbuildingssolutioncenter.energy.gov/accelerators/combined-heat-and-power-resiliency

Michigan: CHP Economics

The most important indicators for CHP economics are electricity and gas prices. For most potential CHP installations, natural gas and electricity rates for host facilities will fall within the range of average commercial and industrial prices. Lower energy prices may be possible for large CHP applications.

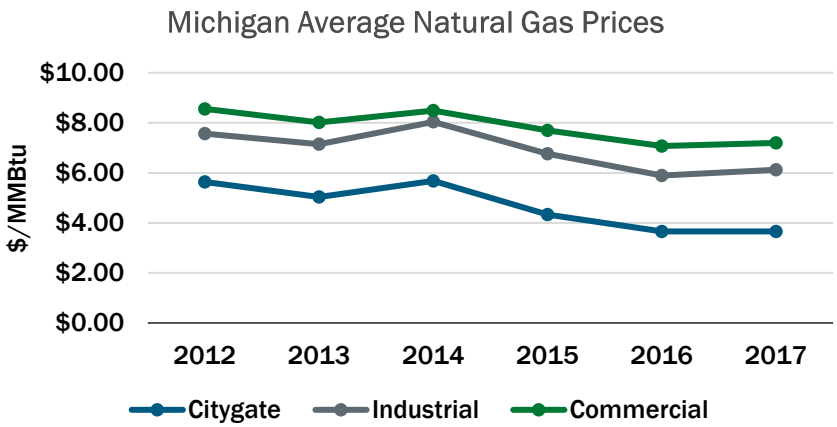
Michigan Natural Gas Prices

The EIA industrial natural gas price is a full tariff rate, and most large consumers are purchasing gas commodities from marketers at a lower rate.

Michigan Average Gas Prices ($/MMBtu) - 2017

Sector	MI Price	U.S. Price
Citygate*	3.66	4.26
Industrial	6.12	4.20
Commercial	7.20	8.08

*Citygate is a point or measuring station at which a distributing gas utility receives gas from a NG pipeline company or transmission system.

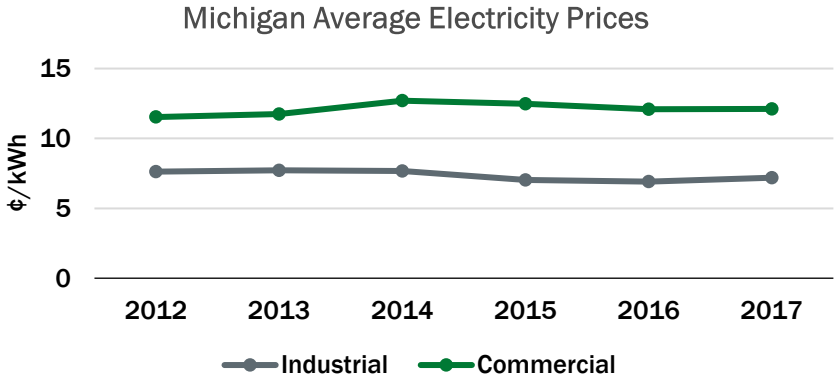


Michigan Electricity Prices

Electricity rates can vary greatly by utility and facility size range. The rates below from EIA represent general averages; individual facility rates may vary.

Michigan Average Electricity Prices (¢/kWh) - 2017

Sector	MI Price	U.S. Price
Industrial	7.19	6.88
Commercial	12.12	10.66



Michigan Average Delivered Electricity Prices by Utility

Utility	Industrial Price (¢/kWh)	Commercial Price (¢/kWh)	Average Price (¢/kWh)
Upper Peninsula Power	6.74	17.00	11.87
City of Lansing	10.62	13.04	11.83
Great Lakes Energy Coop	8.21	13.03	10.62
Consumers Energy	8.20	12.71	10.46
Upper MI Energy Resources	6.70	14.17	10.44
Cloverland Electric Coop	8.17	10.48	9.33
Alpena Power	6.18	11.91	9.05
DTE Energy	6.74	10.31	8.53
Indiana Michigan Power	6.40	8.92	7.66