The State of CHP: Minnesota

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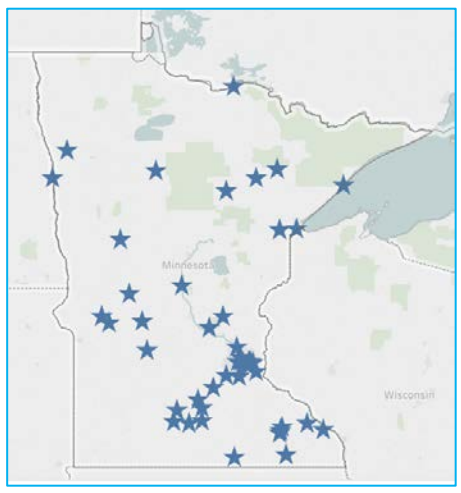
Minnesota Installed Base of CHP

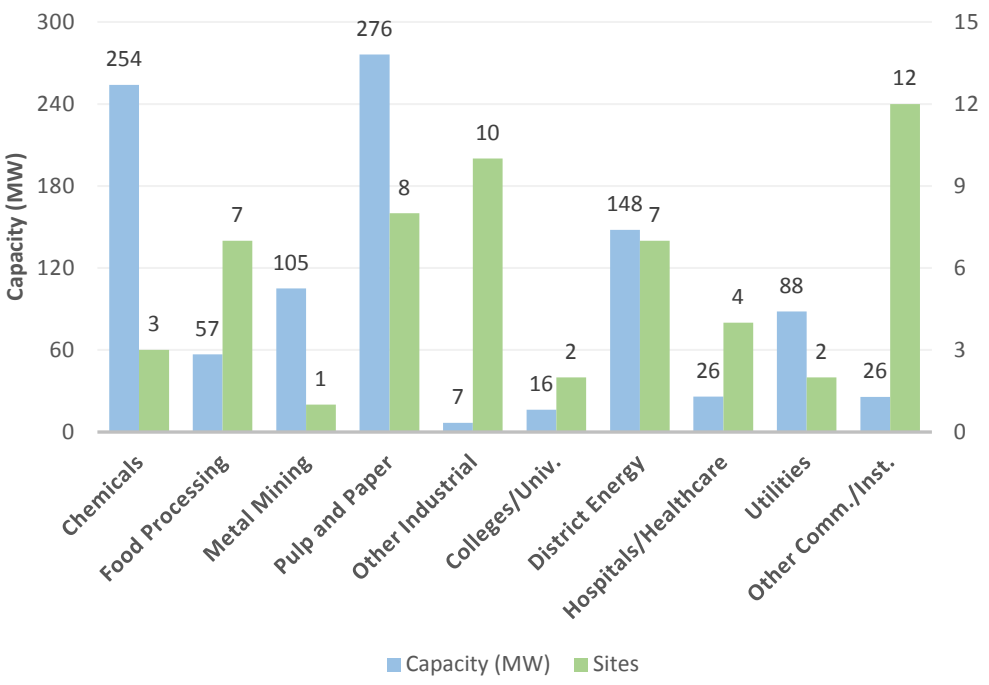
U.S. DOE Combined Heat and Power Installation Database

Sector	*Installations*	*Capacity (MW)*
Industrial	20	589
Commercial/Institutional	27	304
Other	9	111
Total	**56**	**1,003**

The Midwest CHP Technical Assistance Partnership has compiled information on certain illustrative CHP projects in Minnesota. You can access these by visiting the Department of Energy's CHP Project Profiles Database.

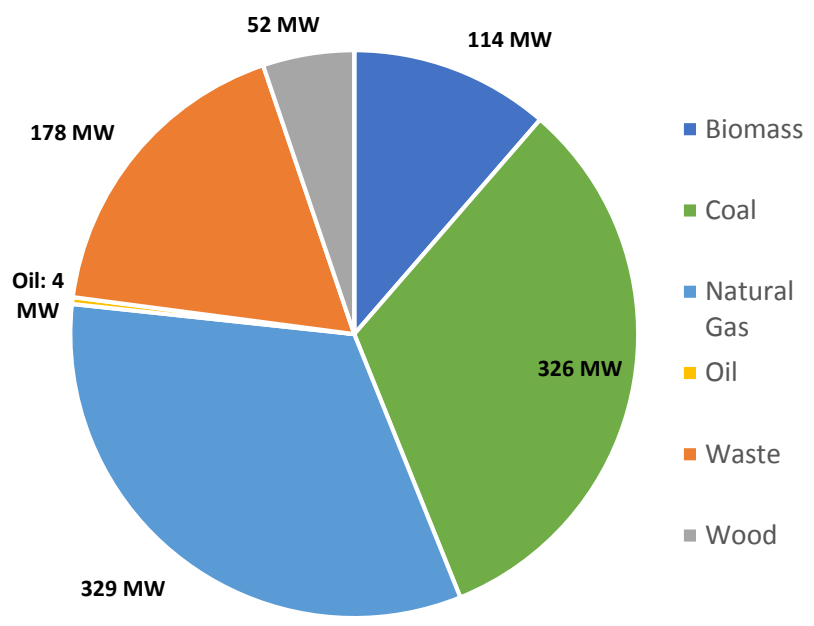


Minnesota CHP by Application



Source: DOE CHP Installation Database (U.S. installations as of Dec. 31, 2016)

Minnesota CHP Capacity (MW) by Fuel Type

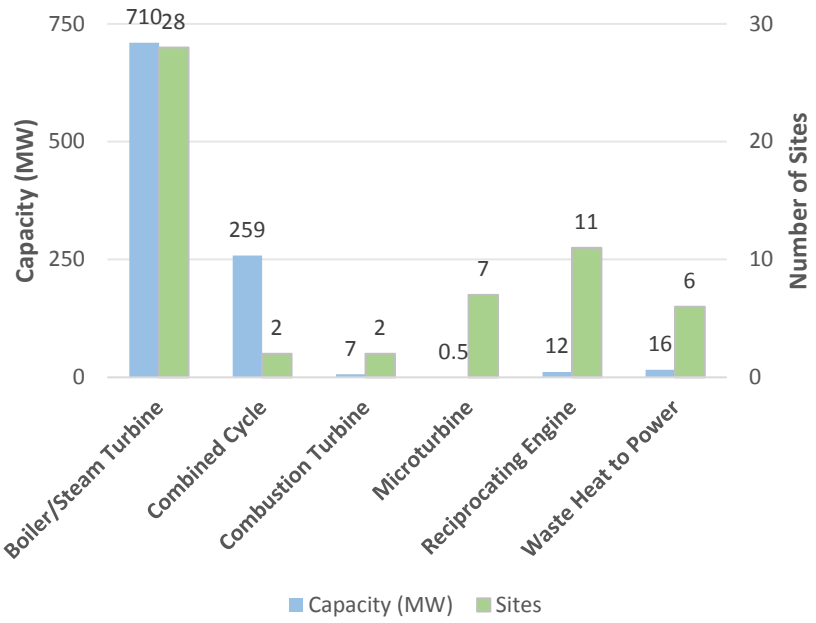


Source: DOE CHP Installation Database (U.S. installations as of Dec. 31, 2016)

Minnesota CHP by Size Range

Source: DOE CHP Installation Database (U.S. installations as of Dec. 31, 2016)

Minnesota CHP by Technology



Source: DOE CHP Installation Database (U.S. installations as of Dec. 31, 2016)

Combined Heat and Power (CHP) – sometimes 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.

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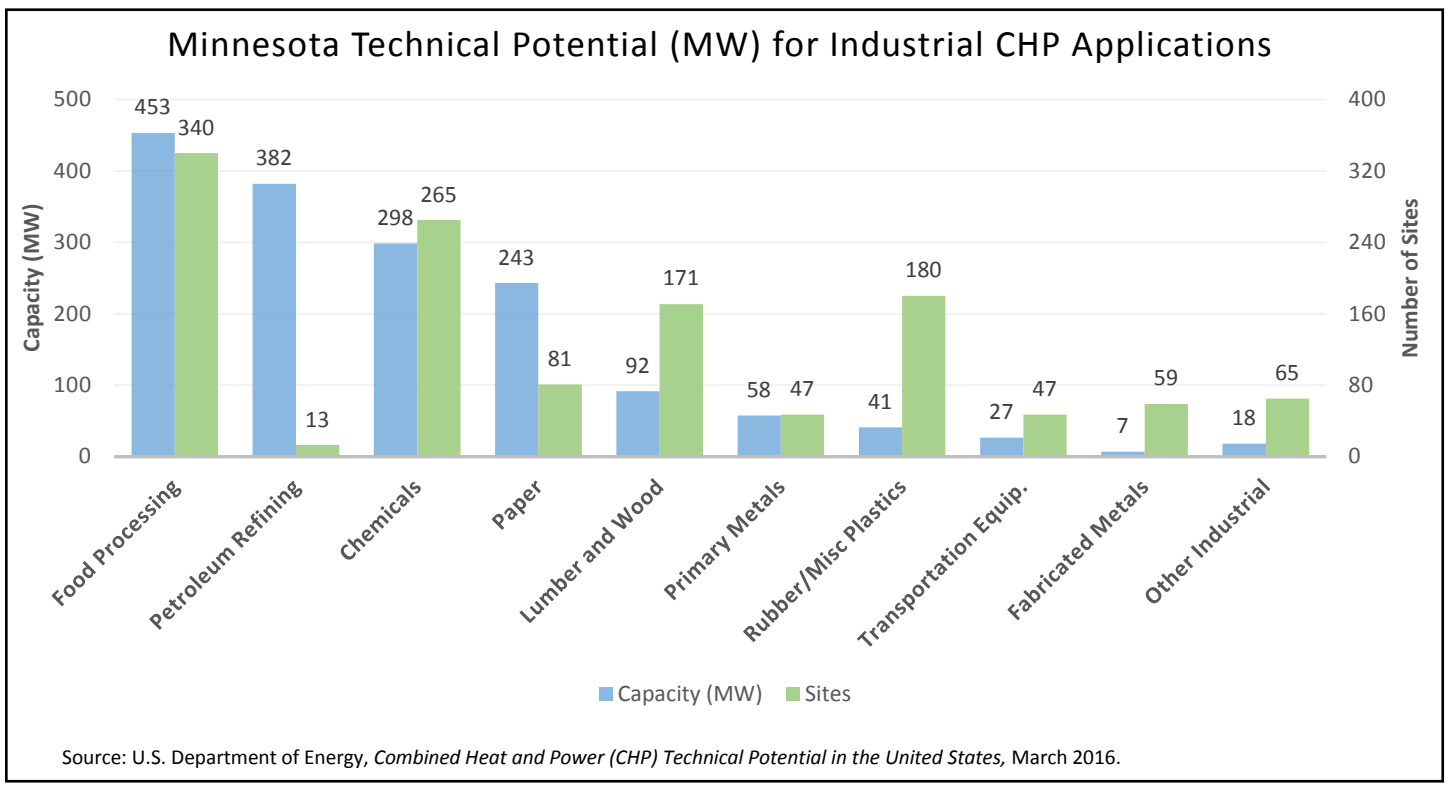
Minnesota Technical Potential for New CHP Installations

U.S. DOE Analysis: Combined Heat and Power (CHP) Technical Potential in the United States

Sector	*Potential Sites*	*Potential Capacity (MW)*
Industrial	1,268	1,619
Commercial/Institutional	5,058	2,691
Total	**6,326**	**4,310**

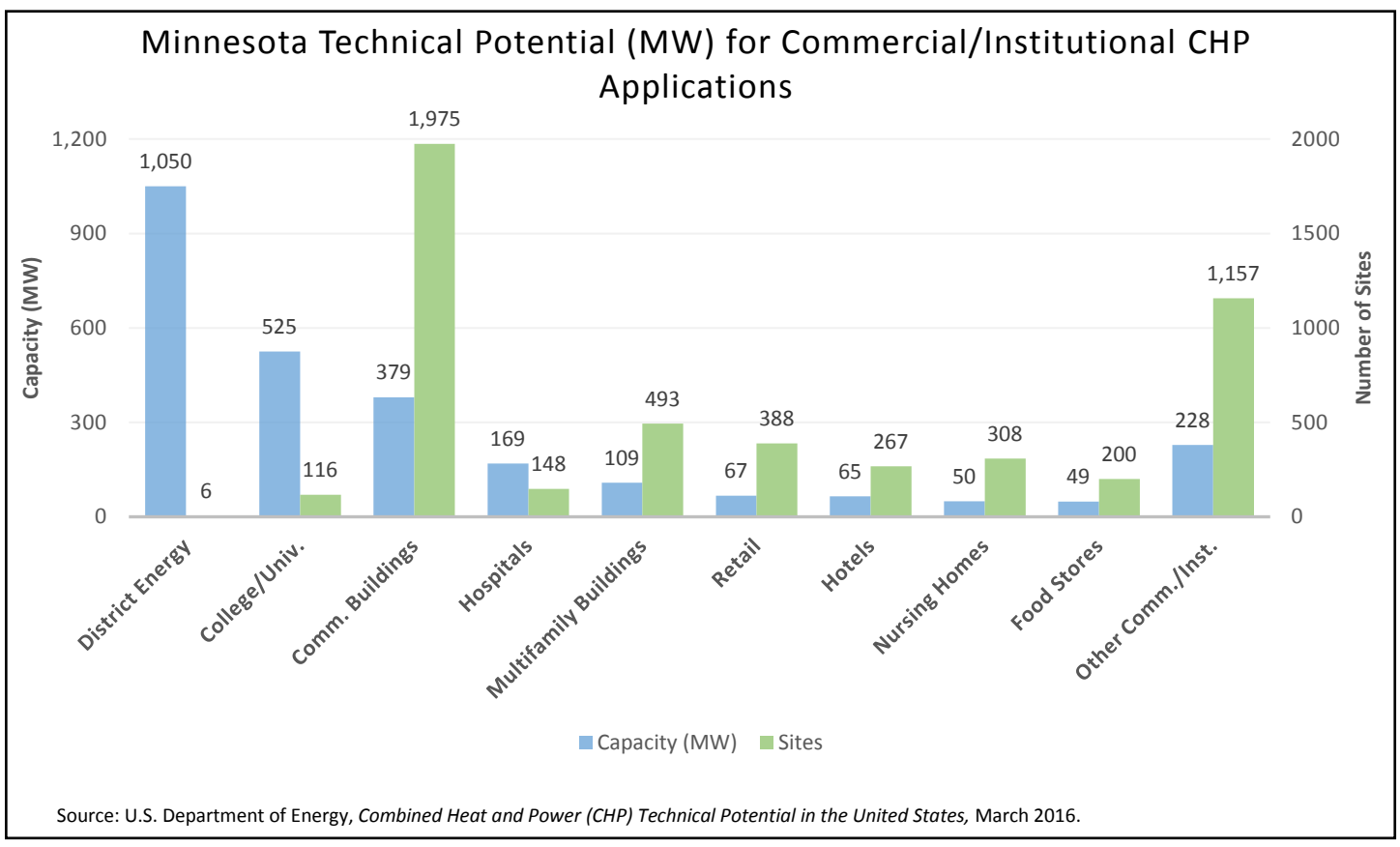


Source: U.S. Department of Energy, *Combined Heat and Power (CHP) Technical Potential in the United States,* March 2016.

Technical Potential by CHP Size Range for Top Five Industrial Sectors

	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**
Food Processing	214	44	39	30	66	127	19	174	2	79	340	453
Petroleum Refining	0	0	5	3	1	4	2	17	5	358	13	382
Chemicals	165	28	24	18	60	137	16	116	0	0	265	298
Paper	44	13	13	8	16	37	4	49	4	135	81	243
Lumber and Wood	137	23	17	12	12	17	5	39	0	0	171	92
Other Industrial	344	52	31	21	19	38	4	39	0	0	398	150
Total	904	159	129	93	174	360	50	435	11	571	1,268	1,619

Source: U.S. Department of Energy, *Combined Heat and Power (CHP) Technical Potential in the United States,* March 2016.



Source: U.S. Department of Energy, *Combined Heat and Power (CHP) Technical Potential in the United States,* March 2016.

Technical Potential by CHP Size Range for Top Five Commercial/Institutional Sectors

	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**
College/Univ.	56	10	11	7	31	68	13	128	5	312	116	525
Commercial Buildings	1,264	63	553	221	158	95	0	0	0	0	1,975	379
Hospitals	82	17	36	24	28	56	1	6	1	67	148	169
Multifamily Buildings	348	26	126	63	20	20	0	0	0	0	493	109
Retail	373	56	12	8	3	4	0	0	0	0	388	67
Other Comm./Inst.	1,811	230	71	48	46	73	4	41	6	1,050	1,938	1,441
Total	3,934	402	809	371	286	315	18	175	12	1,428	5,058	2,691

Source: U.S. Department of Energy, *Combined Heat and Power (CHP) Technical Potential in the United States,* March 2016.

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Minnesota 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.

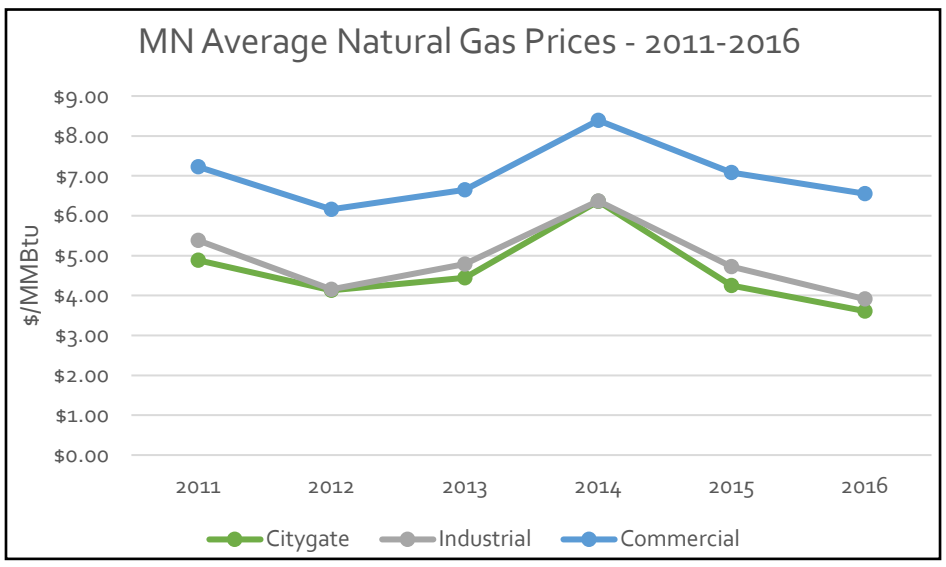
Minnesota Natural Gas Prices

Minnesota Average Gas Prices - 2016

Sector	*MN Price ($/MMBtu)*	*U.S. Price ($/MMBtu)*
Citygate*	3.61	3.75
Industrial	3.91	3.39
Commercial	6.55	7.22

Source: U.S. Energy Information Administration, "Natural Gas Prices", https://www.eia.gov/dnav/ng/ng_pri_sum_dcu_SMN_a.htm

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.



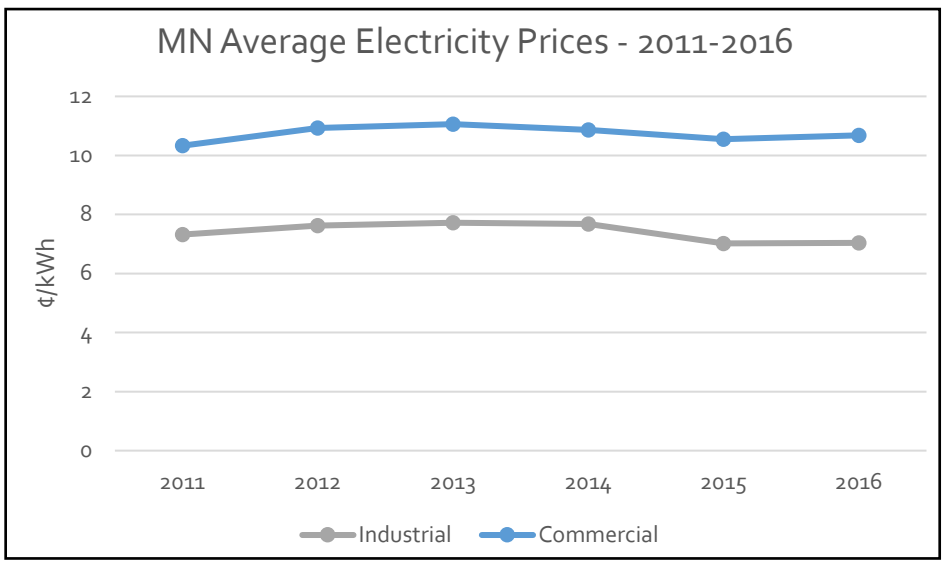
Minnesota Electricity Prices

Minnesota Average Electricity Prices - 2016

Sector	*MN Price (¢/kWh)*	*U.S. Price (¢/kWh)*
Industrial	7.04	6.75
Commercial	10.68	10.37

Source: U.S. Energy Information Administration, "Electricity Data Browser", https://www.eia.gov/electricity/data.cfm

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

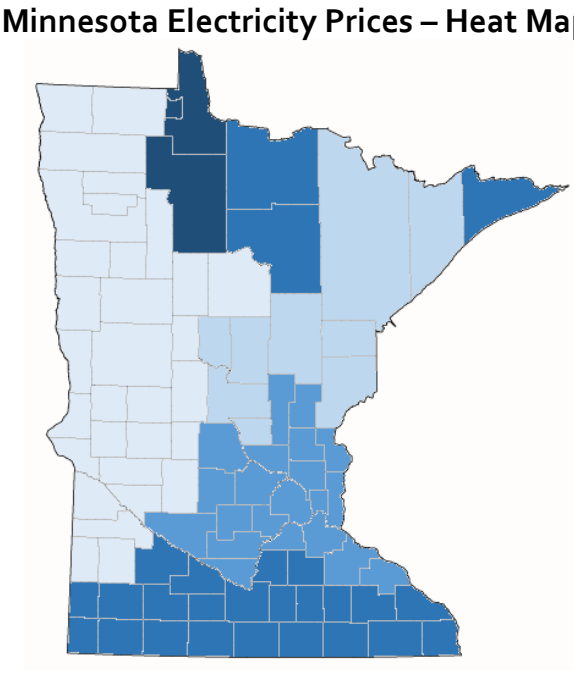


Minnesota Average Delivered Electricity Prices by Utility

Utility	*Industrial Price (¢/kWh)*	*Commercial Price (¢/kWh)*	*Average Price** (¢/kWh)*
Beltrami Electric Coop	12.00	10.85	11.42
North Star Elec Coop	-	11.39	11.39
Itasca-Mantrap Coop	8.83	12.33	10.58
Arrowhead Electric Coop	-	10.34	10.34
Southwest MN Elec Coops	8.45	11.57	10.06
Xcel Energy	-	9.46	9.46
Minnesota Power	-	7.86	7.86
Otter Tail Power	5.66	8.00	6.83

Source: U.S. Energy Information Administration, "Annual retail price of electricity by utility", https://www.eia.gov/electricity/data.cfm

Minnesota Electricity Prices – Heat Map



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

**Average of commercial and industrial electricity prices as reported by EIA.

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Installed CHP | CHP Technical Potential | CHP Economics | CHP Partners

Department of Energy CHP Partnerships

Midwest CHP Technical Assistance Partnership

U.S. Department of Energy
CHP Technical Assistance Partnerships
MIDWEST

Midwest CHP TAP Director: Cliff Haefke
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CHP for Resiliency Accelerator

The U.S. DOE is collaborating with a group of cities, states, and utilities who are actively pursuing CHP as a consideration in resiliency planning for critical infrastructure in their jurisdictions. This has included defining resiliency, identifying critical infrastructure, and assessing CHP opportunities. This process is being documented in a Resiliency Planning Tool. For more information: CHP for Resiliency Accelerator Website.

- Currently, there are no CHP for Resiliency Accelerator partners in Minnesota.

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