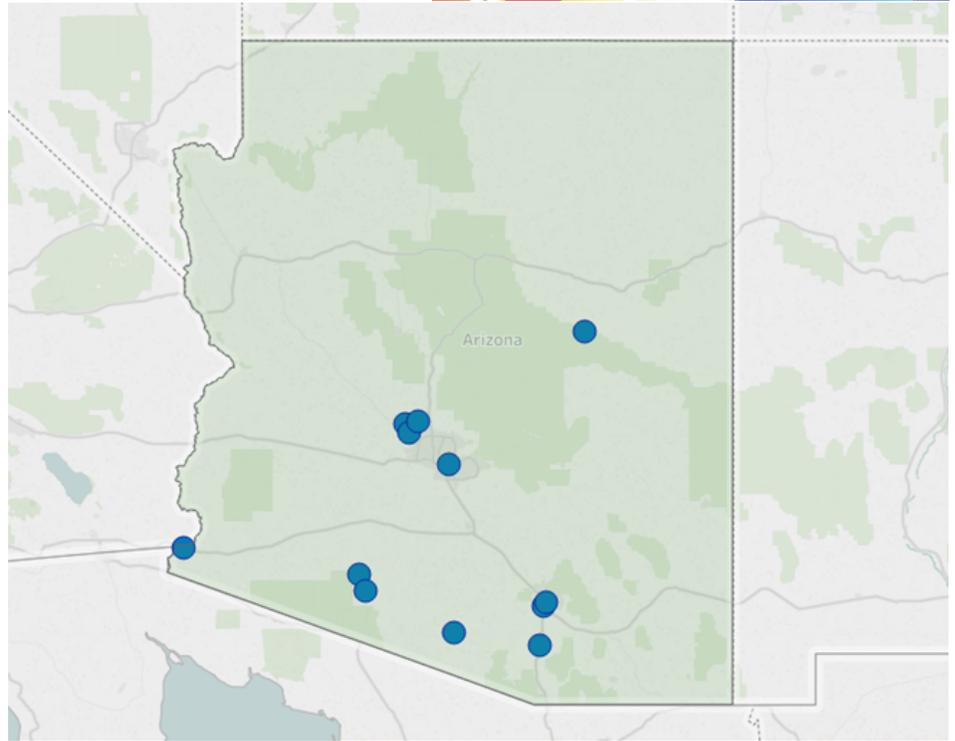


The State of CHP: Arizona



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 Arizona, with data on current installations, technical potential, and economics for CHP.



Map of current CHP installations in Arizona. Illustration from ICF.

Arizona: 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 Arizona, and can be accessed by visiting energy.gov/chp-installs.

CHP Project Profiles

The Western CHP TAP has compiled information on certain illustrative CHP projects in Arizona. You can access these by visiting the Department of Energy’s CHP Project Profiles Database at energy.gov/chp-projects.

Western CHP Technical Assistance Partnership

For assistance with questions about specific CHP opportunities in Arizona, please consult with the Western CHP TAP by visiting wchptap.org or contacting the CHP TAP director.

Arizona Existing CHP

Sector	Sites	Capacity (MW)
Industrial	2	57
Commercial/Institutional	10	26
Other	0	0
Total	12	83

Western CHP TAP Director

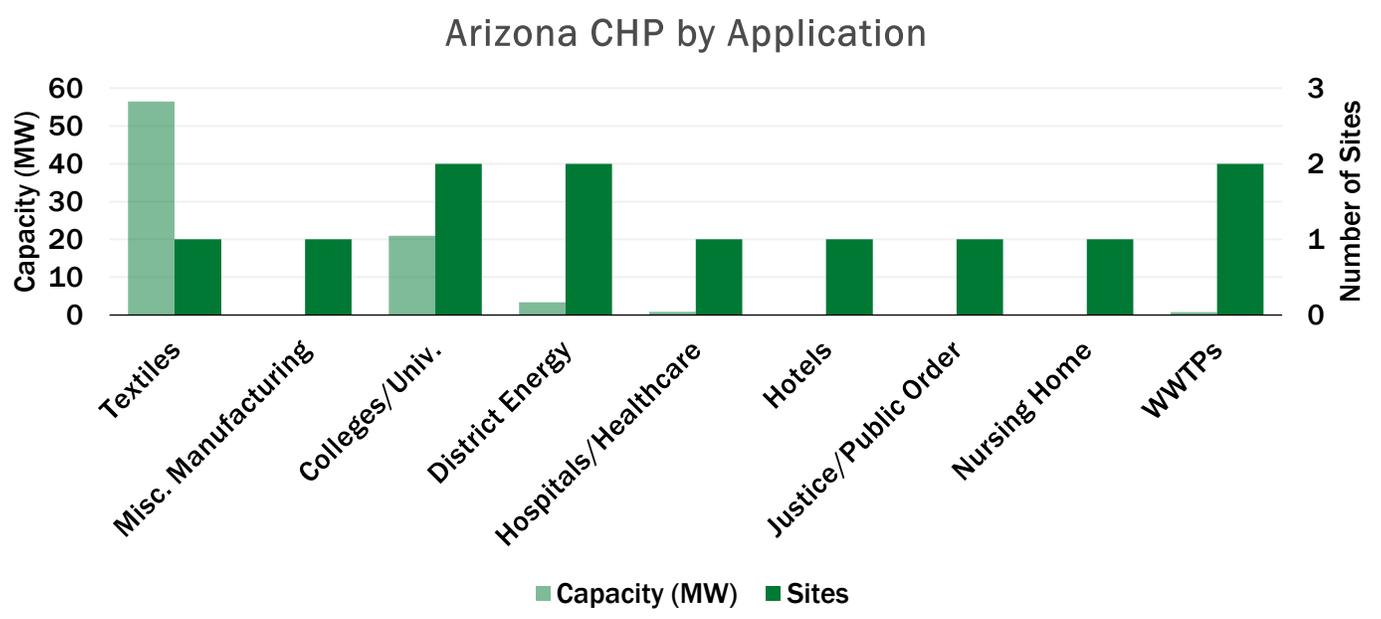
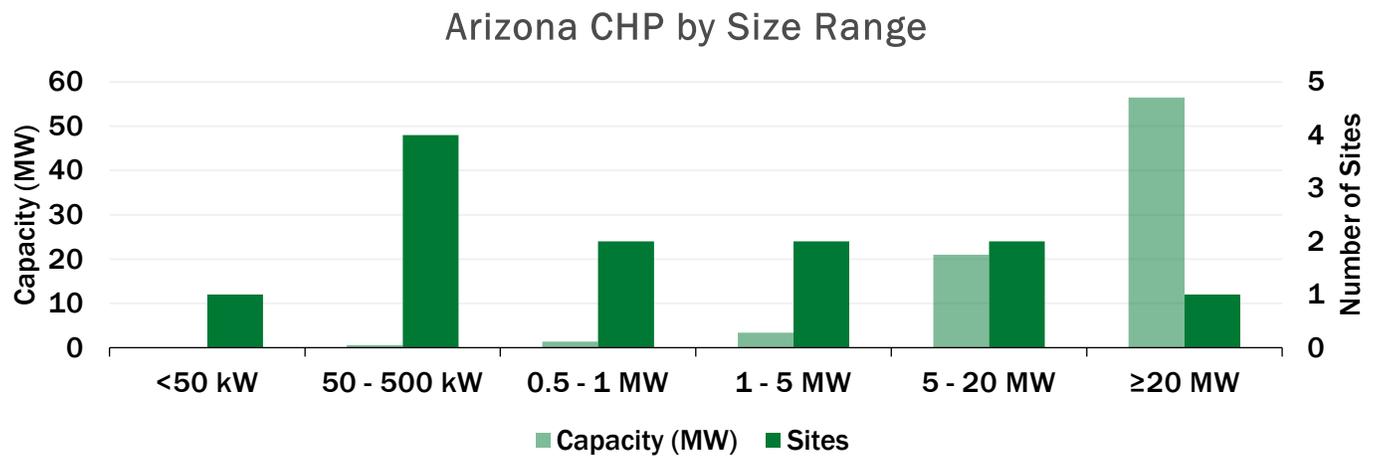
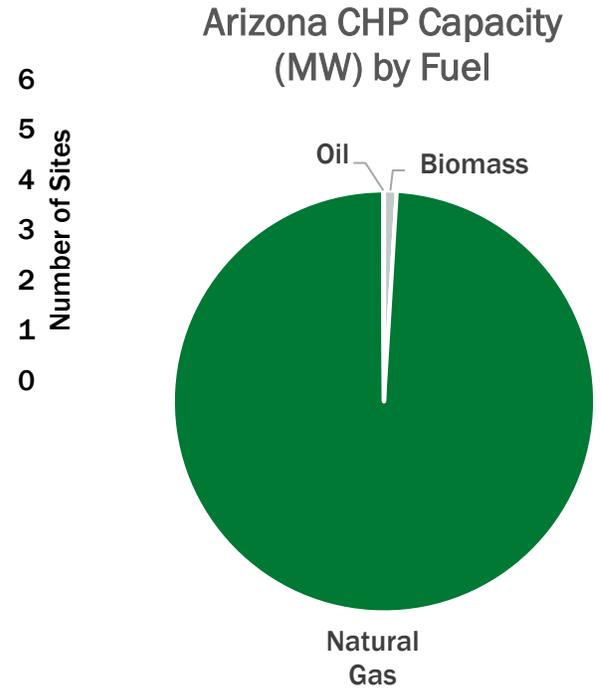
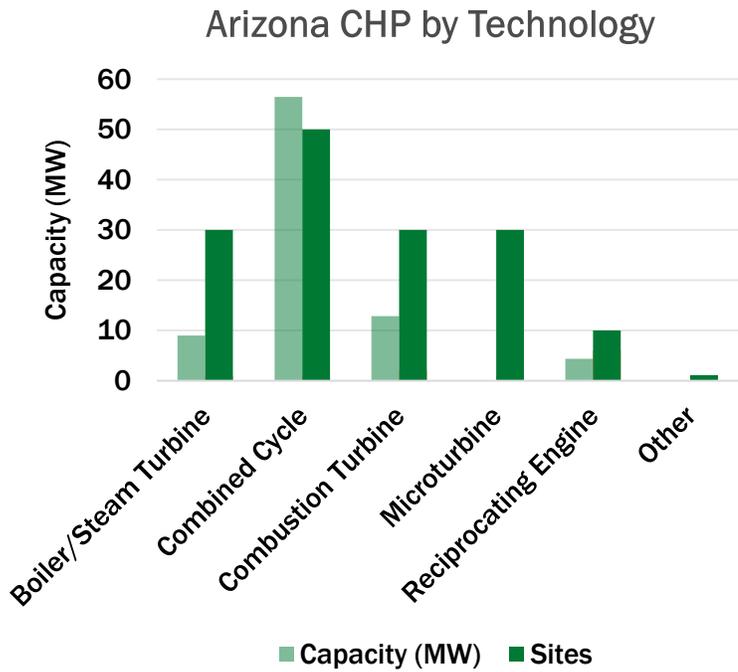
Shawn Jones

- Center for Sustainable Energy
- shawn.jones@energycenter.org
- 858-633-8739

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CHP
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PARTNERSHIPS



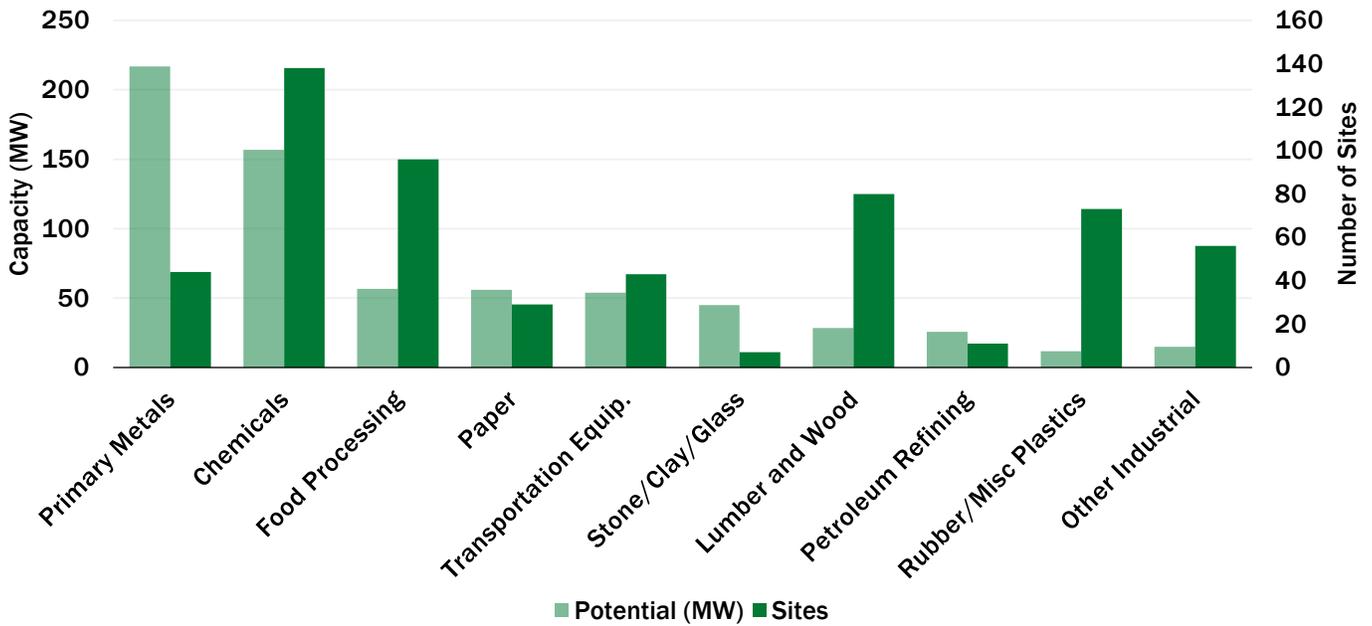
Arizona: Technical Potential for New CHP Installations

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. This report can be accessed at energy.gov/chp-potential.

Arizona CHP Technical Potential

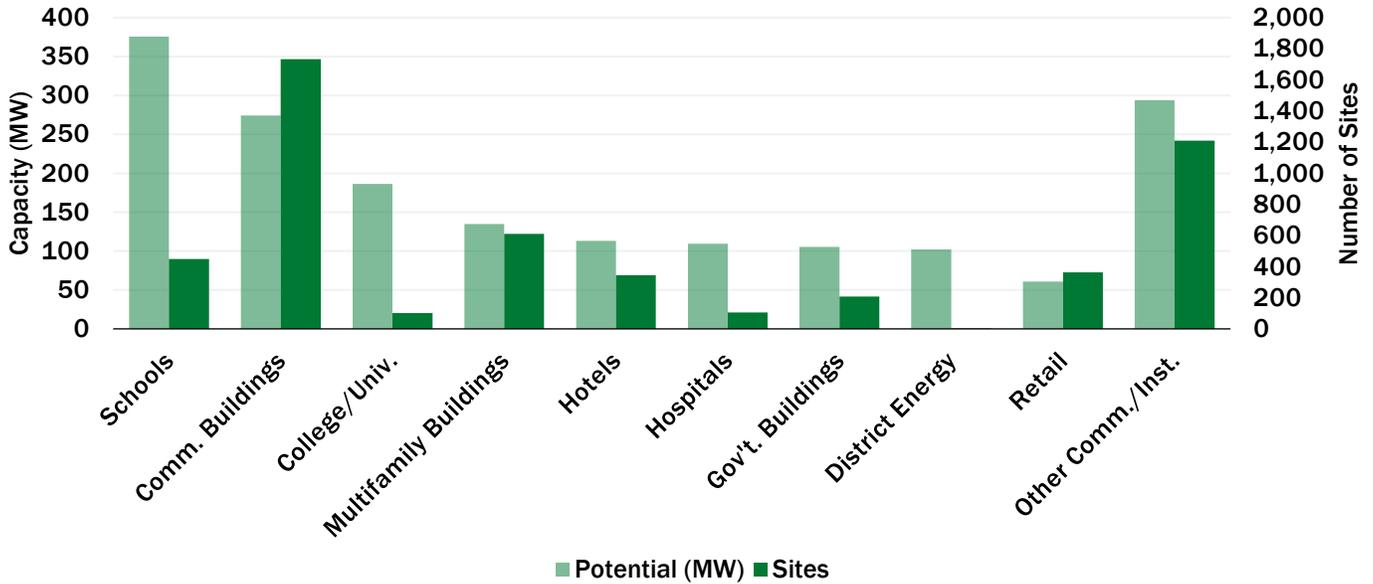
Sector	Potential Sites	Potential MW
Industrial	577	666
Commercial/Institutional	5,123	1,654
Total	5,700	2,320

Arizona Technical Potential (MW) for Industrial CHP Applications



Application	50-500 kW		0.5 - 1 MW		1 - 5 MW		5 - 20 MW		>20 MW		Total	
	Sites	MW	Sites	MW	Sites	MW	Sites	MW	Sites	MW	Total Sites	Total MW
Primary Metals	23	5	11	9	5	10	1	18	4	174	44	217
Chemicals	94	16	13	10	21	41	10	91	0	0	138	157
Food	73	15	8	6	13	24	2	11	0	0	96	57
Paper	18	5	5	4	4	13	1	10	1	24	29	56
Transportation Equip.	35	5	2	1	4	11	1	12	1	24	43	54
Other Industrial	184	27	18	13	20	45	5	40	0	0	227	126
Total	427	73	57	43	67	145	20	182	6	222	577	666

Arizona Technical Potential (MW) for Commercial/Institutional CHP Applications



Application	50-500 kW		0.5 - 1 MW		1 - 5 MW		5 - 20 MW		>20 MW		Total	
	Sites	MW	Sites	MW	Sites	MW	Sites	MW	Sites	MW	Total Sites	Total MW
Schools	92	44	239	157	117	175	0	0	0	0	448	376
Commercial Buildings	1,252	63	385	154	96	58	0	0	0	0	1,733	274
College/Univ.	61	11	8	5	24	71	8	70	1	29	102	186
Multifamily Buildings	431	32	156	78	24	24	0	0	0	0	611	135
Hotels	292	37	22	14	29	57	1	5	0	0	344	113
Other Comm./Inst.	1,705	230	84	57	86	190	8	57	2	138	1,888	672
Total	3,833	417	894	465	376	575	17	132	3	167	5,126	1,756

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://betterbuildingsinitiative.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://betterbuildingsinitiative.energy.gov/accelerators/combined-heat-and-power-resiliency>

Arizona: 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.

Arizona Natural Gas Prices

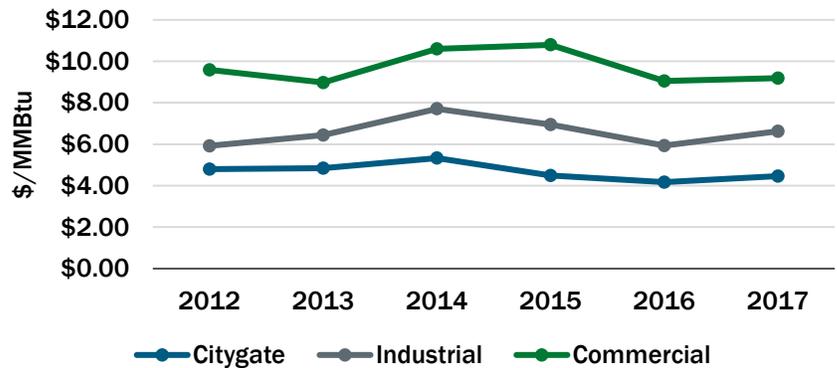
The EIA industrial natural gas price is a full tariff rate, and most large consumers are purchasing gas commodities from marketers at a lower rate.

Arizona Average Gas Prices (\$/MMBtu) - 2017

Sector	AZ Price	U.S. Price
Citygate*	4.47	4.26
Industrial	6.63	4.20
Commercial	9.19	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.

Arizona Average Natural Gas Prices



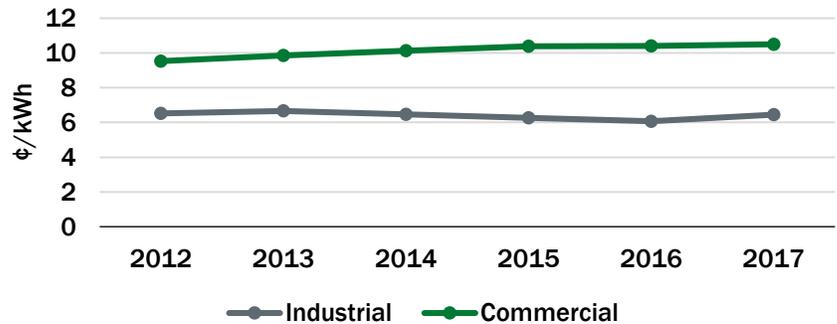
Arizona Electricity Prices

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

Arizona Average Electricity Prices (\$/kWh) - 2017

Sector	AZ Price	U.S. Price
Industrial	6.45	6.88
Commercial	10.50	10.66

Arizona Average Electricity Prices



Arizona Average Delivered Electricity Prices by Utility

Utility	Industrial Price (\$/kWh)	Commercial Price (\$/kWh)	Average Price (\$/kWh)
Navajo Tribal Utility	10.32	12.58	11.45
Graham County Elec Coop	10.76	11.76	11.26
Trico Electric Coop	7.47	13.33	10.40
Navopache Electric Coop	9.58	11.14	10.36
Sulphur Springs Valley	8.93	11.60	10.26
Tucson Electric Power	7.63	12.76	10.20
Arizona Public Service	8.36	11.36	9.86
UniSource Energy Services	7.11	9.85	8.48
Electric District Pinal County	6.35	10.27	8.31
Garkane Energy Coop	6.88	9.49	8.18
Salt River Project	6.35	9.30	7.82
Morenci Water and Electric	3.99	7.76	5.88

