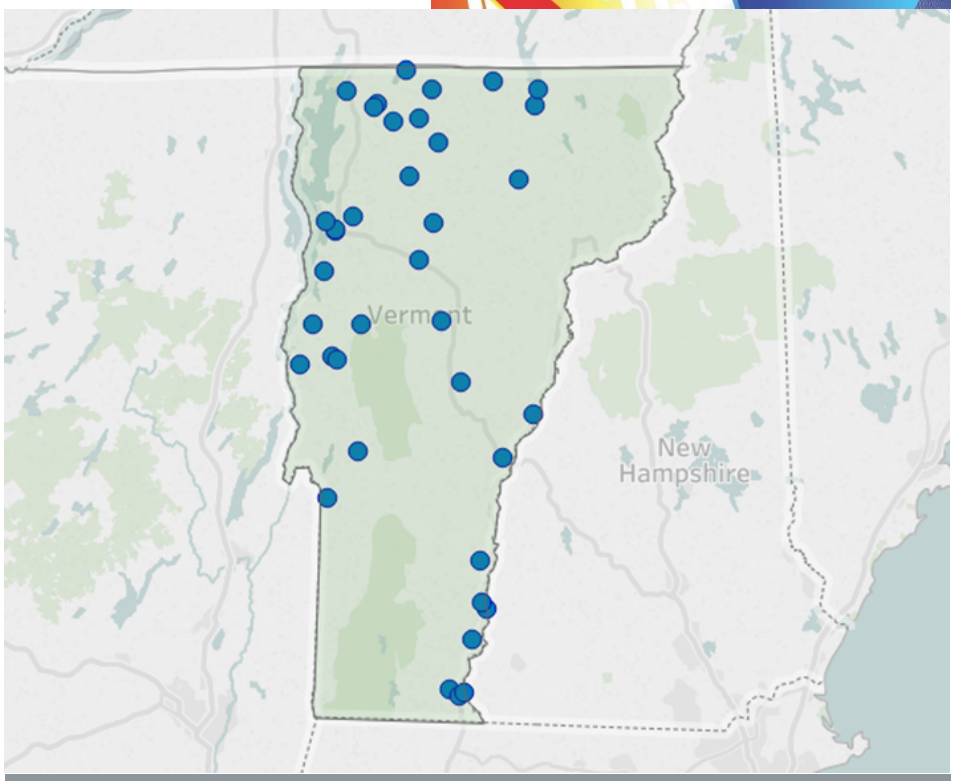
U.S. DEPARTMENT OF ENERGY

Office of ENERGY EFFICIENCY & RENEWABLE ENERGY

The State of CHP: Vermont

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



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

Vermont: 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 Vermont, and can be accessed by visiting https://doe.icfwebservices.com/chp.

CHP Project Profiles

The New England CHP TAP has compiled information on certain illustrative CHP projects in Vermont. 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.

New England CHP Technical Assistance Partnership

For assistance with questions about specific CHP opportunities in Vermont, please consult with the New England CHP TAP by visiting nechptap.org or contacting the CHP TAP director.

Vermont Existing CHP

Sector	Sites	Capacity (MW)
Industrial	6	2.4
Commercial/Institutional	14	6.2
Other	18	12.4
Total	38	21.0

New England CHP TAP Director

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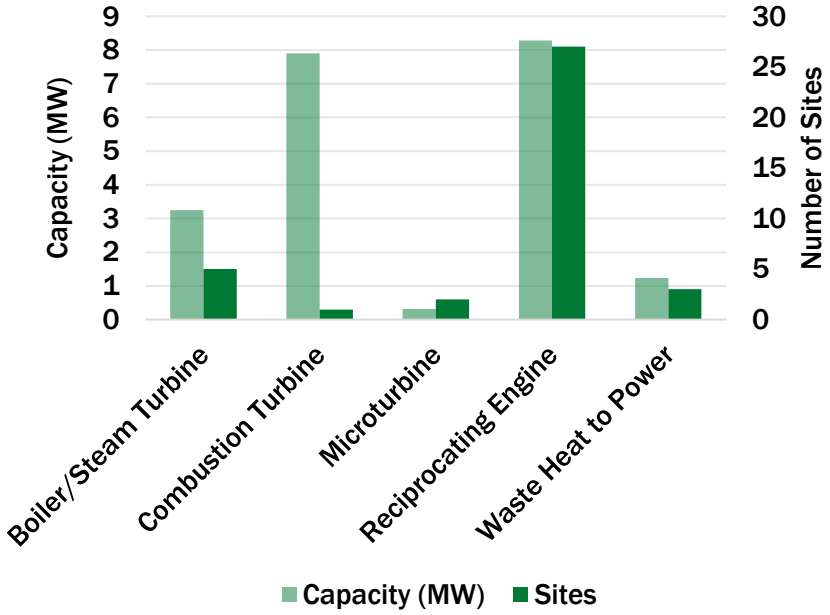
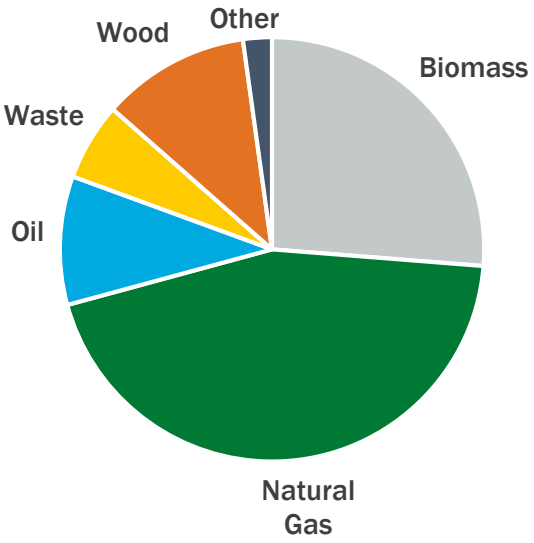
NEW ENGLAND CHP Technical Assistance Partnerships

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

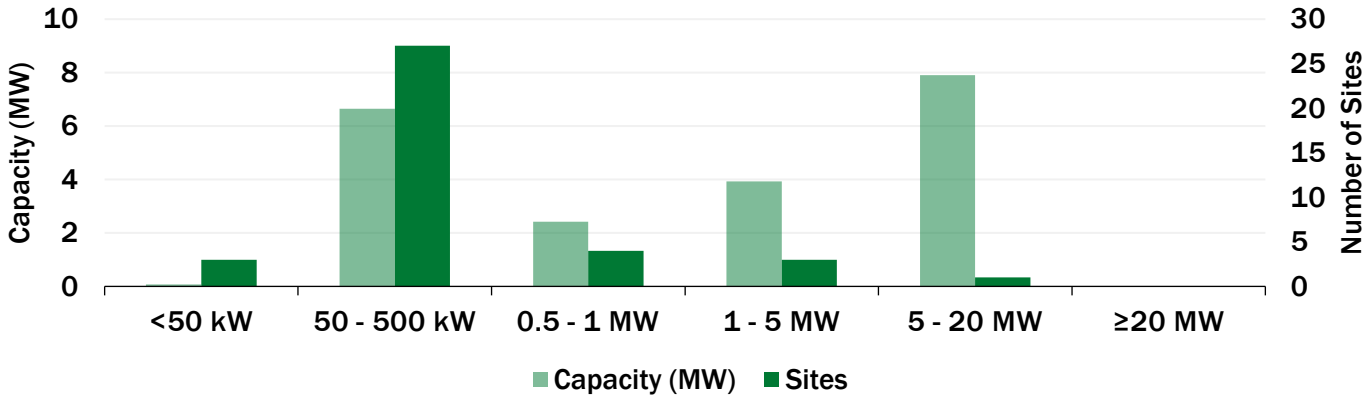
Vermont CHP by Technology



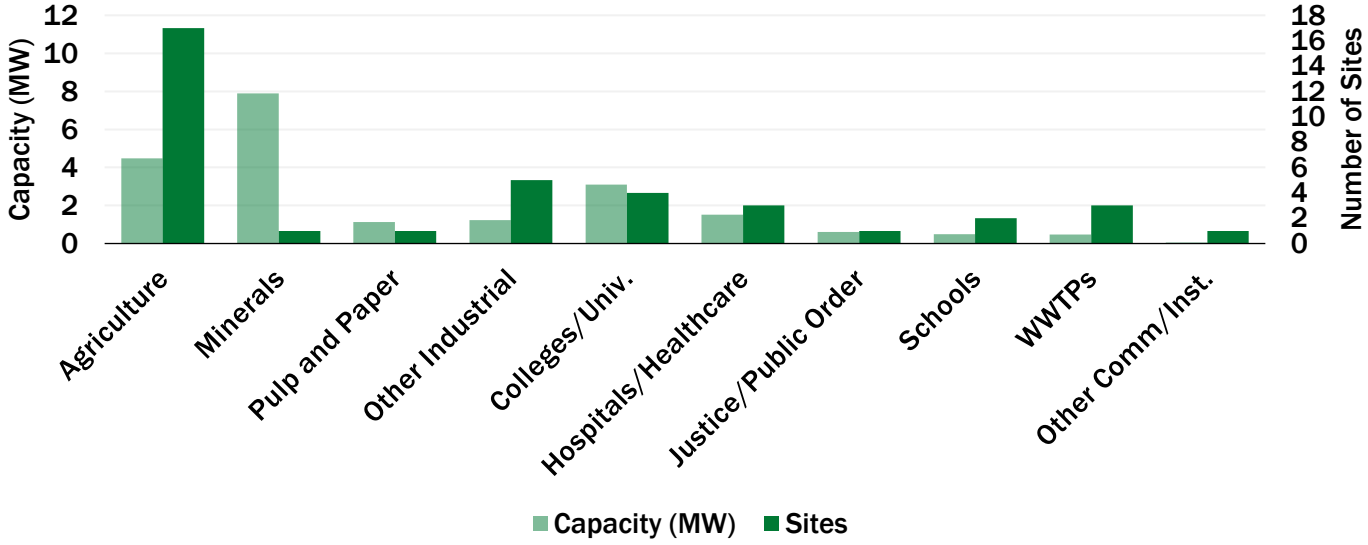
Vermont CHP Capacity (MW) by Fuel



Vermont CHP by Size Range



Vermont CHP by Application

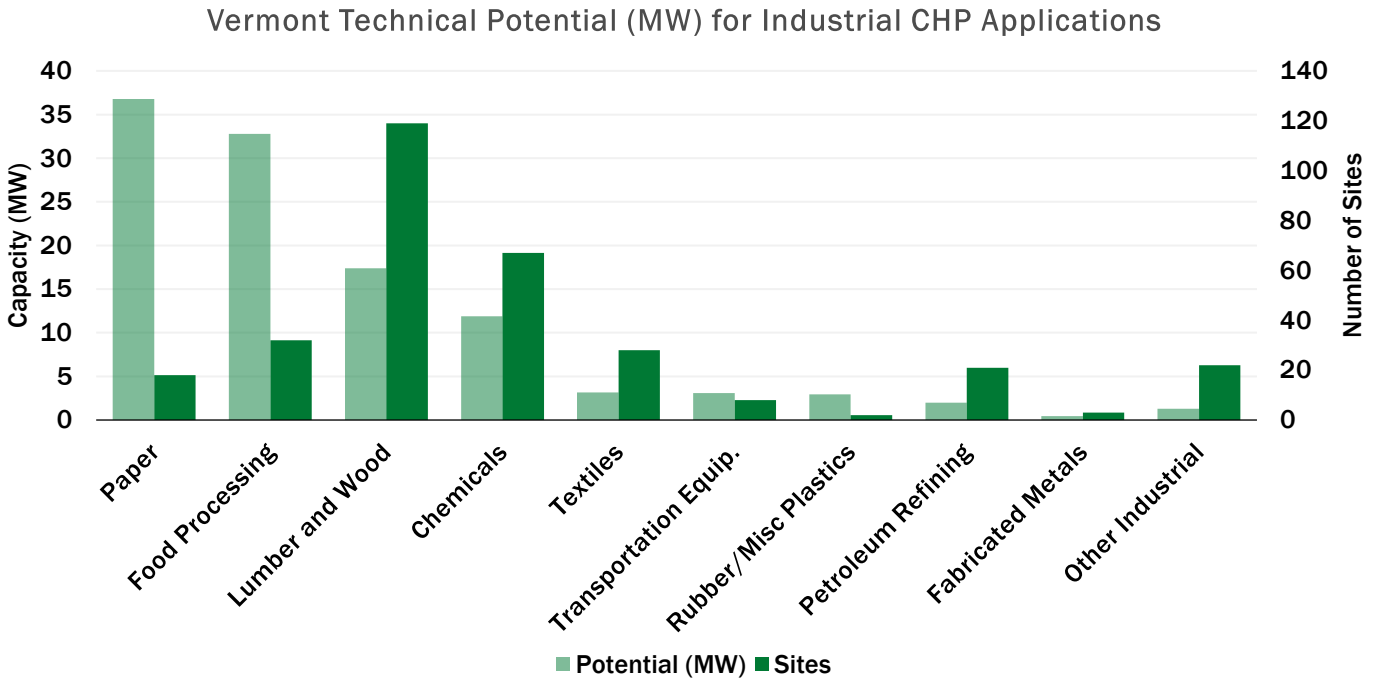


Vermont: Technical Potential for New CHP Installations

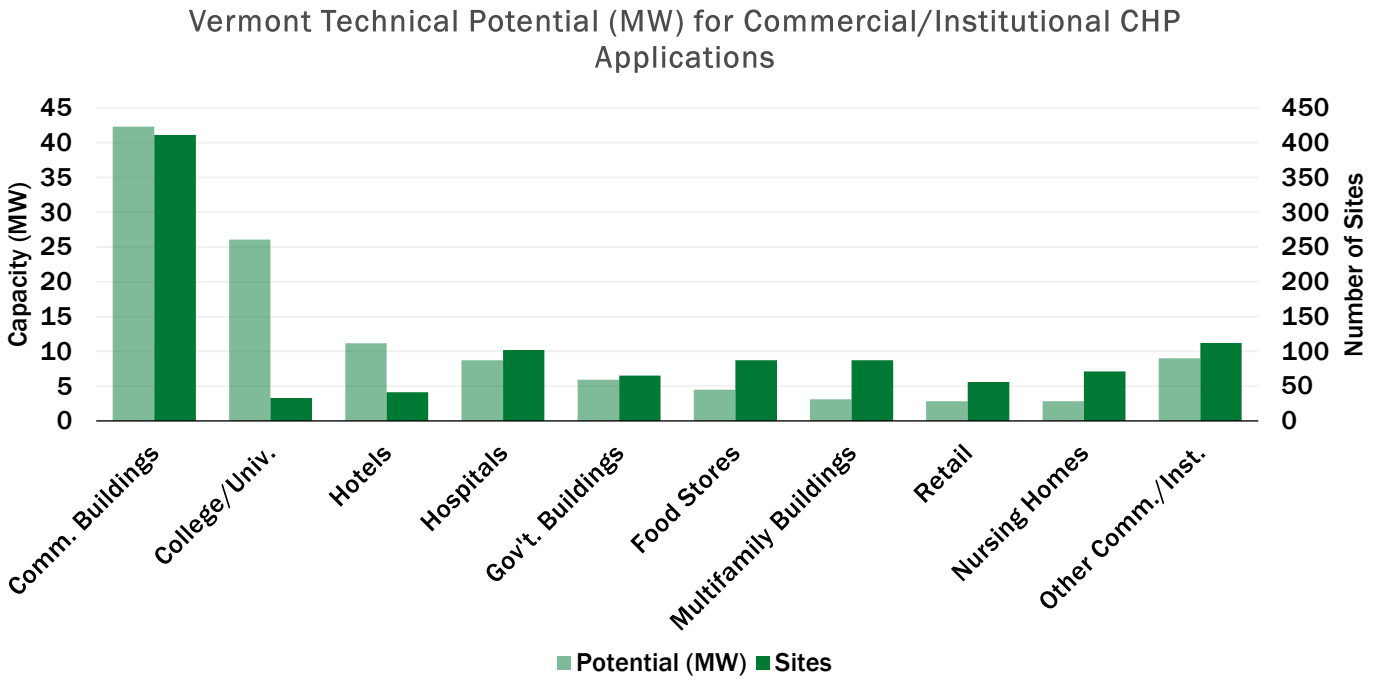
The "Combined Heat and Power (CHP) Technical Potential in the United States" market analysis report provides data on the technical potential in industrial facilities and commercial buildings for "topping cycle" CHP, waste heat to power (WHP) CHP, and district energy CHP in the U.S. Read the report **here**.

Vermont CHP Technical Potential

Sector	Potential Sites	Potential MW
Industrial	164	112
Commercial/Institutional	493	116
Total	657	228



	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
Paper	5	1	0	0	4	11	0	0	1	24	10	37
Food Processing	34	6	7	6	7	14	1	7	0	0	49	33
Lumber and Wood	33	7	4	3	4	8	0	0	0	0	41	17
Chemicals	14	2	3	2	4	7	0	0	0	0	21	12
Textiles	7	1	1	1	1	1	0	0	0	0	9	3
Other Industrial	26	3	6	4	2	2	0	0	0	0	34	10
Total	119	21	21	15	22	43	1	7	1	24	164	112



	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	114	6	57	23	23	14	0	0	0	0	194	42
College/Univ.	14	2	4	3	2	6	0	14	0	0	20	26
Hotels	70	9	4	3	0	0	0	0	0	0	74	11
Hospitals	9	2	3	2	2	5	1	0	0	0	15	9
Government Buildings	28	3	1	1	1	3	0	0	0	0	30	6
Other Comm./Inst.	154	18	6	3	1	1	0	0	0	0	160	22
Total	389	40	75	34	29	28	1	14	0	0	493	116

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

Vermont: 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.

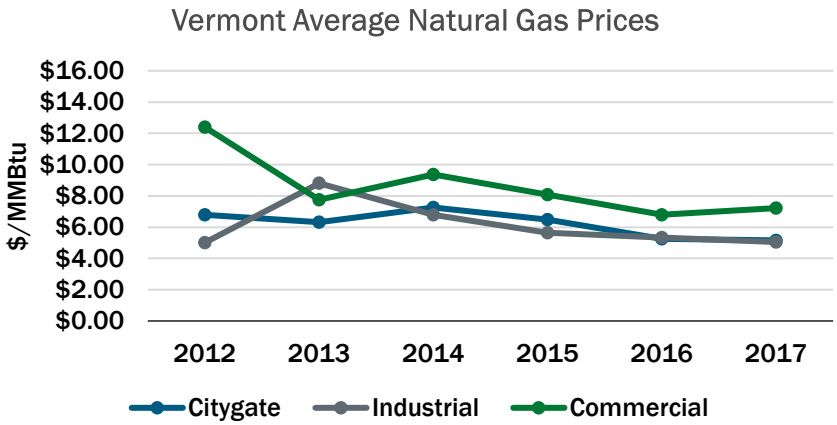
Vermont Natural Gas Prices

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.

Vermont Average Gas Prices ($/MMBtu) - 2017

Sector	VT Price	U.S. Price
Citygate*	5.16	4.26
Industrial	5.04	4.20
Commercial	7.22	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.

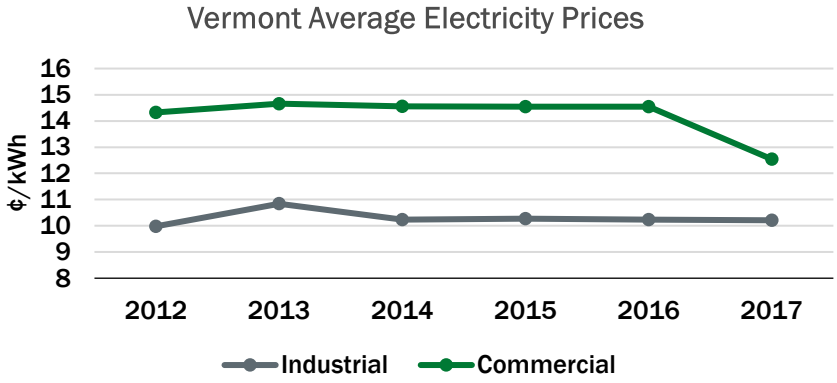


Vermont Electricity Prices

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

Vermont Average Electricity Prices (¢/kWh) - 2017

Sector	ME Price	U.S. Price
Industrial	10.21	6.88
Commercial	12.54	10.66



Vermont Average Delivered Electricity Prices by Utility

Utility	Industrial Price (¢/kWh)	Commercial Price (¢/kWh)	Average Price (¢/kWh)
Washington Electric Coop	14.56	20.55	17.56
Village of Ludlow	17.71	16.91	17.31
Village of Lyndonville	15.76	16.48	16.12
Village of Morrisville	14.53	16.20	15.36
Town of Stowe	14.69	14.08	14.38
Village of Northfield	12.76	14.85	13.81
Village of Swanton	-	13.49	13.49
Vermont Electric Cooperative	10.88	15.78	13.33
City of Burlington Electric	11.54	14.44	12.99
Green Mountain Power Corp	9.76	14.41	12.09