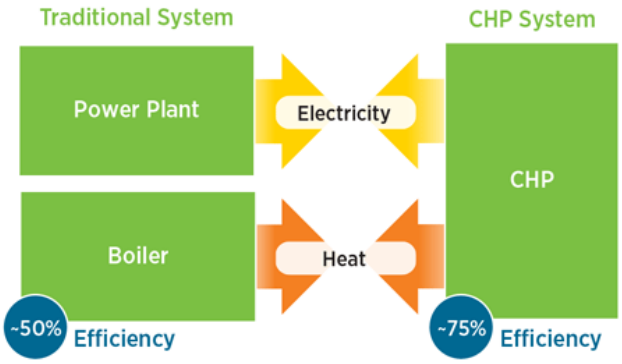
Combined Heat and Power

A Combined Heat and Power (CHP) installation produces heat and power from a single fuel source. A CHP system is on-site electricity generation that captures the heat that would otherwise be wasted to provide useful thermal energy—such as steam or hot water—that can be used for space heating, cooling, domestic hot water and industrial processes.

A traditional system uses a power plant to create electricity and a boiler to generate heat. CHP can achieve efficiencies of over 80 percent, compared to 50 percent for conventional technologies providing separate services (i.e., grid-supplied electricity and an on-site boiler). Source: U.S. Department of Energy, CHP Basics



Operators

CHP has been employed for many years, mostly in industrial, large commercial, and institutional applications. CHP may not be widely recognized outside industrial, commercial, institutional, and utility circles, but it has quietly been providing highly efficient electricity and process heat to some of the most vital industries, largest employers, urban centers, and campuses in the United States.[1] CHP is used in over 4,400 facilities nationwide, including:[2]

- Commercial buildings – *office buildings, hotels, health clubs, nursing homes*
- Residential – *condominiums, co-ops, apartments, planned communities*
- Institutions – *colleges and universities, hospitals, prisons, military bases*
- Municipal – *district energy systems, wastewater treatment facilities, K-12 schools*
- Manufacturers – *chemical, refining, ethanol, pulp and paper, food processing, glass*

CHP in Utah

There are 22 CHP installations in Utah, which produce 288.6 MW. The Department of Energy (DOE) provides a table of information on Utah's CHP systems categorized by city, application class, prime mover, and fuel type. Market use and installation fuel type totals are below.

COMMERCIAL MARKET
15 INSTALLATIONS
138.6 MW

INDUSTRIAL MARKET
5 INSTALLATIONS
134.9 MW

OTHER
2 INSTALLATIONS
15.2 MW

Biomass		Coal		Natural Gas		Oil		Waste		Wood		Total	
Sites	7	Sites	1	Sites	9	Sites	1	Sites	3	Sites	1	Sites	22
MW	15.9	MW	58.0	MW	173.8	MW	3.0	MW	33.7	MW	4.3	MW	288.6

[1] U.S. Department of Energy, Combined Heat and Power Basics
[2] U.S. Environmental Protection Agency, Combined Heat and Power Partnership

CHP Nationwide

There are 4,395 CHP systems in the United States, which produce 82,597.5 MW. Market use and installation fuel type totals are below.

COMMERCIAL MARKET
2,599 INSTALLATIONS
11,801.9 MW

INDUSTRIAL MARKET
1,199 INSTALLATIONS
66,369.2 MW

OTHER
597 INSTALLATIONS
4,426.4 MW

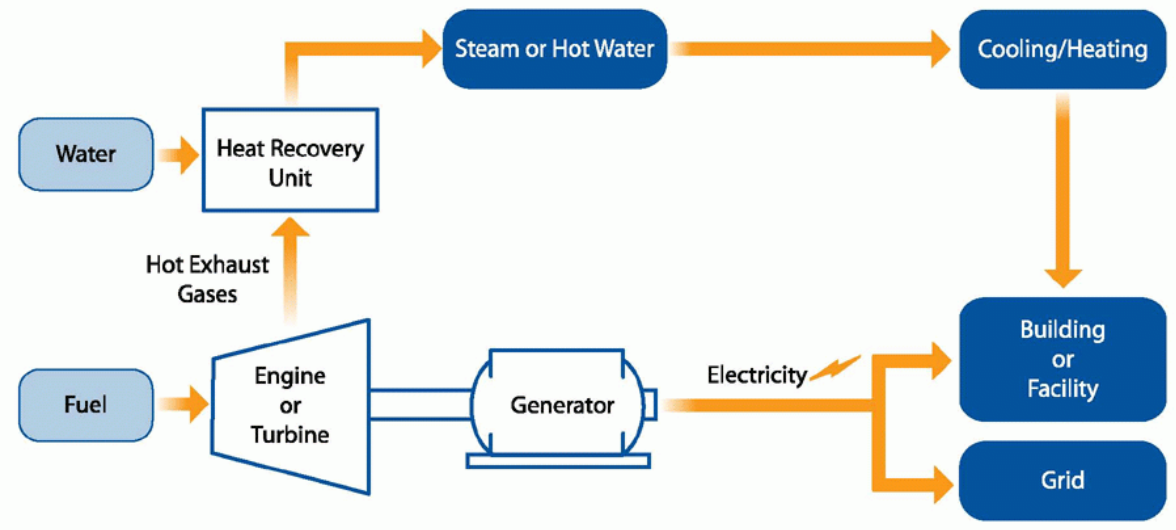
Biomass		Coal		Natural Gas		Oil	
Sites	628	Sites	171	Sites	2,913	Sites	251
MW	2,504.7	MW	10,677.2	MW	58,029.6	MW	1,235.5
Waste		**Wood**		**Other**		**Total**	
Sites	263	Sites	121	Sites	48	Sites	4,395
MW	8,132.0	MW	1,747.1	MW	271.3	MW	82,597.5

The DOE's CHP Installation Database contains a comprehensive listing of CHP installations throughout the country, from large industrial systems that are hundreds of megawatts in size to small commercial microturbine and fuel cell systems that are tens of kilowatts. The database tables are the most comprehensive source of information on CHP installations in the United States. The tables show each state's existing CHP systems with information about the site name, location, capacity, application, operating year, prime mover, and fuel type.

CHP Configurations

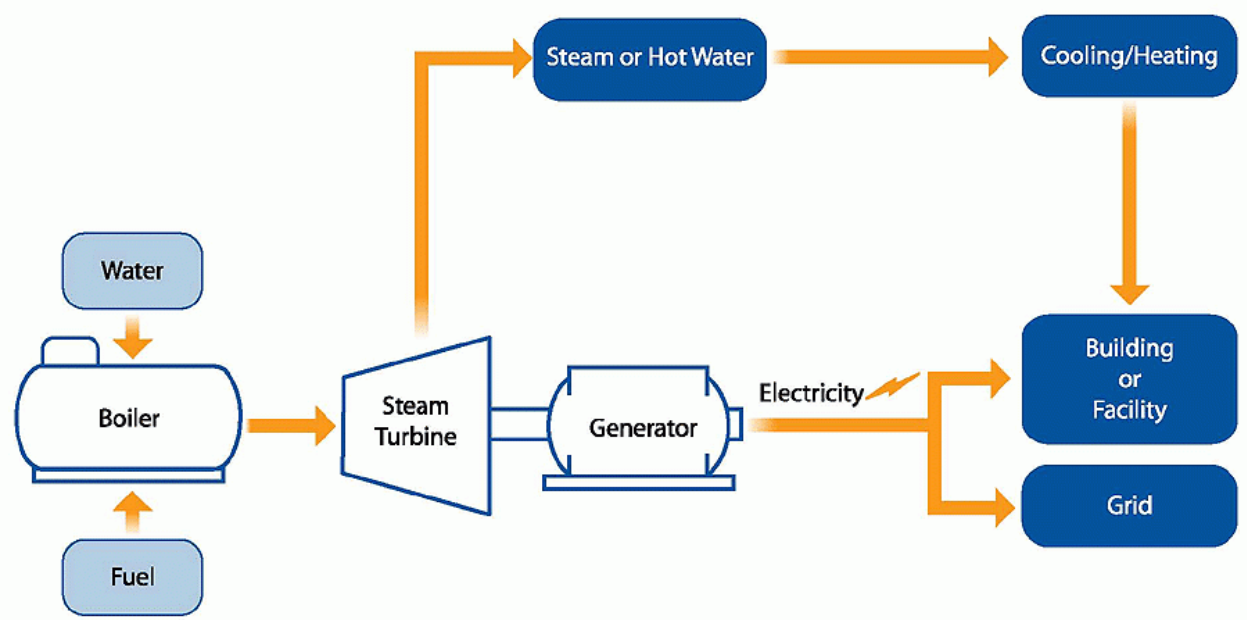
The two most common CHP system configurations are **(1)** Combustion turbine, or reciprocating engine, with heat recovery unit; and **(2)** Steam boiler with steam turbine.

Combustion turbine or reciprocating engine CHP systems burn fuel (natural gas, oil, or biogas) to turn generators to produce electricity and use heat recovery devices to capture the heat from the turbine or engine. This heat is converted into useful thermal energy, usually in the form of steam or hot water.[3]



[3] U.S. Environmental Protection Agency, Combined Heat and Power Partnership

With *steam turbines*, the process begins by producing steam in a boiler. The steam is then used to turn a turbine to run a generator to produce electricity. The steam leaving the turbine can be used to produce useful thermal energy. These systems can use a variety of fuels, such as natural gas, oil, biomass, and coal.[4]



State Policies

1) Utah's renewable portfolio goal, though voluntary, includes electric generation facilities that produce electricity from CHP and WHP projects. The goal requires investor-owned, municipal, and cooperative utilities to use eligible resources to account for 20 percent of their 2025 adjusted retail electric sales.[5]

2) In 2010, the Utah Public Service Commission adopted rules for interconnection. These standards contain provisions for interconnection of systems up to 20 MW. The law explicitly includes facilities that utilize waste heat capture or recovery. Utah's net metering law requires the state's one investor-owned utility and most electric cooperatives to offer net metering to customers who generate power using clean energy, including via CHP systems that are renewably fueled.[6]

3) The state's 2014 alternative energy development incentive provides up to a 75 percent state tax credit for alternative energy projects located in a designated alternative energy development zone. CHP is a qualifying technology.[7]

[4] U.S. Environmental Protection Agency, Combined Heat and Power Partnership
[5] The Pew Charitable Trusts: Industrial Efficiency in the States
[6] The Pew Charitable Trusts: Industrial Efficiency in the States
[7] The Pew Charitable Trusts: Industrial Efficiency in the States