



## COMBINED HEAT AND POWER (CHP)



**COMBINED HEAT & POWER (CHP)**, also known as cogeneration, is:

**The concurrent production** of electricity or mechanical power and useful thermal energy (heating and/or cooling) from a single source of energy.

**A type of distributed generation**, which, unlike central station generation, is located at or near the point of consumption.

**A suite of technologies** that can use a variety of fuels to generate electricity or power at the point of use, allowing the heat that would normally be lost in the power generation process to be recovered to provide needed heating and/or cooling.

CHP technology can be deployed quickly, cost-effectively, and with few geographic limitations. CHP can use a variety of fuels, both fossil- and renewable-based. It 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. It is reasonable to expect CHP applications to operate at 65-75% efficiency, a large improvement over the national average of about 50% for these services when separately provided.



CHP applications can operate at about 75% efficiency, a significant improvement over the national average of about 50% for these services when provided separately.



## ABOUT CHP

### WHAT IS COMBINED HEAT AND POWER?

Combined heat and power (CHP) – sometimes referred to as cogeneration – provides a cost-effective, near-term opportunity to improve our nation's energy, environmental, and economic future. CHP is an efficient and clean approach to generating on-site electric power and useful thermal energy from a single fuel source. While CHP may not be widely recognized outside industrial, commercial, institutional, and utility circles, it provides highly efficient electricity and process heat to some of the most vital industries and largest employers, urban centers, and campuses in the United States. CHP applications can operate at 65-75% efficiency, a significant improvement over the national average of 50% for these services when provided separately.

### BENEFITS OF CHP

CHP technologies hold enormous potential to improve the nation's energy security and resilience and help us meet our environmental goals. CHP positively impacts the health of local economies and supports national policy goals in a number of ways. Specifically, CHP can:

- **Improve energy efficiency** by capturing heat that is typically wasted
- **Advance our environmental goals** by reducing emissions of harmful pollutants
- **Diversify energy supply** by enabling further integration of domestically-produced and renewable fuels
- **Increase the resilience of our energy infrastructure** by limiting congestion and offsetting transmission losses
- **Enhance our energy security** by reducing our national energy requirements and helping businesses weather energy price volatility and supply disruptions
- **Improve business competitiveness** by increasing energy efficiency and managing costs

## FREQUENTLY ASKED QUESTIONS

### **IS THERE ANY POTENTIAL, AND ARE THERE REAL OPPORTUNITIES IN MY MARKET?**

CHP solutions provide efficient, reliable, and more affordable power for businesses and institutions. CHP is now installed at more than 4,400 commercial, industrial, and institutional facilities across the nation, improving energy efficiency, ensuring environmental quality, promoting economic growth, and fostering a more robust and resilient energy infrastructure. CHP systems today represent over 81 gigawatts (GW) – or almost 8% – of the nation’s total electricity capacity. 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 CHP, and district energy CHP in the United States.

### **IS CHP A GOOD FIT FOR MY FACILITY?**

The CHP Deployment Program provides stakeholders with the resources necessary to identify CHP market opportunities and support the implementation of CHP systems. DOE’s [CHP Technical Assistance Partnerships \(CHP TAPs\)](#) are available to answer your CHP questions. A new [CHP TAPs fact sheet](#) provides an overview of the CHP TAPs and highlights CHP success stories at Better Plants Partner sites.

### **WHERE HAS CHP BEEN INSTALLED?**

The [U.S. Department of Energy database of CHP installations](#) provides information about CHP systems currently operating in the United States including locations, organizations served, and facility characteristics. More than 200 [CHP Project Profiles](#) compiled by the CHP TAPs can be searched by state, CHP TAP, market sector, North American Industry Classification System (NAICS) code, system size, technology/prime mover, fuel, thermal energy use, and year installed.

### **HOW CAN I LEARN ABOUT CHP TECHNOLOGIES AND APPLICATIONS?**

[Technology fact sheets](#) explain the fundamentals and characteristics of CHP, including the following common CHP technologies and applications: fuel cells, gas turbines, microturbines, reciprocating engines, steam turbines, absorption chillers, microgrids, district energy, and thermal energy storage.

# Coldwater Board of Public Utilities Cogeneration Plant for Greenhouse Facility, Michigan USA

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**Coldwater Board of Public Utilities is a member of Michigan South Central Power Agency (MSCPA). MSCPA selected Clarke Energy to replace outdated diesel units with Jenbacher gas engines to help meet energy capacity needs for the city of Coldwater, Michigan. The project is co-located with a 100-acre greenhouse facility that has the capability to use the engine heat and CO<sub>2</sub> for greenhouse fertilization.**

The operation mode of the plant is called upon when the utility market pricing deems it viable to generate their own electricity. The combined heat and power (CHP) plant utilized three Jenbacher JMS624 generator sets to provide 13MW of electricity, enough to power the equivalent of 13,000 American homes. For maximum efficiency, the plant is engineered and designed to use captured heat and CO<sub>2</sub>, which has been implemented at other greenhouses across the globe.

“We are excited to begin construction on this new facility to help power the City of Coldwater and support our mission of providing cost-effective and reliable electric service to our customers. I look forward to this new natural gas-fueled plant to start operating next year as we diversify our energy generation portfolio and provide a unique opportunity to support Michigan’s growth in greenhouse agriculture.”

#### **Paul Beckhusen – Director Coldwater Board of Public Utilities**

Michigan’s agricultural sector contributes \$91.4 billion to the state economy, and more than 923,000 people are employed in the industry. To help maintain the agricultural industry’s success year-round, the new plant was commissioned before the fall season’s colder weather set in and when traditional vegetable growing becomes nearly impossible.





## ABOUT LATTICE ENERGY SOLUTIONS

Lattice Energy Solutions is an integrated energy, engineering, and operations company and steadily growing. We serve public and private clients locally and nationwide. From our energy roots to the range of consulting, engineering, and operational expertise we provide today, we work for a diverse clientele—including municipalities, the energy industry, agriculture, food and beverage, manufacturing, colleges and universities, and the real estate community. Talented people are at the heart of our firm. Our company was founded in 2013 on a simple business concept: provide an enjoyable place to work with opportunity, integrity, and commitment, and we will attract talented people. It happened. At the heart of our company are people, who are experts in their fields and passionate about what they do, showing a level of commitment and integrity that drive results for our clients. You experience this power every day in our actions, our solutions, and our promises kept.

### Energy & Power Engineering

LES enables businesses to gain a competitive advantage by efficiently delivering power from clean alternative sources to energy users. Our engineering and operational staff provides the personal service of a small company backed by the depth of capabilities of a national, full-service network of companies. We have the agility to keep projects moving forward and create value by minimizing risk and completing projects on time with exceptional quality.



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Michael's leadership across multiple platforms, includes extensive experience in Clean Energy, Commercial and Industrial Real Estate, and Agriculture. Michael has led multiple projects in nationwide expansion which includes scaling vertical supply chains. Our goal is to reduce your company's energy footprint while enhancing energy performance, sustainability, and profitability.