

## WILL CHP WORK FOR ME?

If you answer “yes” to three or more of the following questions, your facility may be good candidate for CHP:

- Do you pay more than \$.10/ kWh on average for electricity (including generation, transmission and distribution)?
- Are you concerned about the impact of current or future energy costs on your business?
- Is your facility located in a deregulated electricity market?
- Are you concerned about power reliability? Is there a substantial financial impact to your business if the power goes out for 1 hour? For 5 minutes?
- Does your facility operate for more than 5000 hours/ year?
- Do you have thermal loads throughout the year (including steam, hot water, chilled water, hot air, etc.)?
- Does your facility have an existing central plant?
- Do you expect to replace, upgrade or retrofit central plant equipment within the next 3-5 years?
- Do you anticipate a facility expansion or new construction project within the next 3-5 years?
- Have you already implemented energy efficiency measures and still have high energy costs?
- Are you interested in reducing your facility's impact on the environment?

## IF YOU'RE A CANDIDATE

The Mid-Atlantic Clean Energy Application Center can help you plan, design and implement energy projects that make use of CHP and your recoverable waste heat. Reduce your energy costs, improve reliability and reduce your impact on the environment by contacting us to start an evaluation process today. Contact Director James Freihaut at (814) 863-0063 or via email at [jdf11@psu.edu](mailto:jdf11@psu.edu).

## OUR PARTNERS



**U.S. Department of Energy - Energy Efficiency and Renewable Energy Office**, Distributed Energy Program, Washington, DC 20585



**Penn State Department of Architectural Engineering**  
The Pennsylvania State University  
104 Engineering Unit A  
University Park, PA 16802



**The Navy Yard, Philadelphia**  
1413 Langley Avenue  
Philadelphia, PA 19112



**PIDC - Philadelphia Industrial Development Corporation**  
2600 Centre Square West  
1500 Market Street  
Philadelphia, PA 19102



**DVIRC**  
Delaware Valley Industrial Resource Center, 2905 Southampton Road  
Philadelphia, Pennsylvania 19154



**Ben Franklin Technology Partners**  
Building 100 Innovation Center  
4801 S. Broad Street, Suite 200  
The Navy Yard, Philadelphia, PA 19112

## FOR MORE INFORMATION

**James Freihaut, Director MACEAC - Pennsylvania**  
The Pennsylvania State University  
104 Engineering Unit A University Park, PA 16802  
(814) 863-0083 [jdf11@psu.edu](mailto:jdf11@psu.edu)

**Gearoid Foley - New Jersey**  
50 Washington Road  
Princeton Junction, NJ 08550  
609-799-2340 [gearoid@ichps.com](mailto:gearoid@ichps.com)

**Joseph Orlando - Delaware, Maryland**  
Box 1757  
Springfield, VA 22151  
703-764-3004 [jaorlando70@yahoo.com](mailto:jaorlando70@yahoo.com)

**Richard Sweetser - Virginia, West Virginia, D.C.**  
12020 Meadowville Court  
Herndon, VA 20170  
703-707-0293 [rsweetser@exergypartners.com](mailto:rsweetser@exergypartners.com)

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## DEPARTMENT OF ENERGY Mid-Atlantic Clean Energy Application Center

# Clean Energy Combined Heat & Power Waste Heat Recovery District Energy

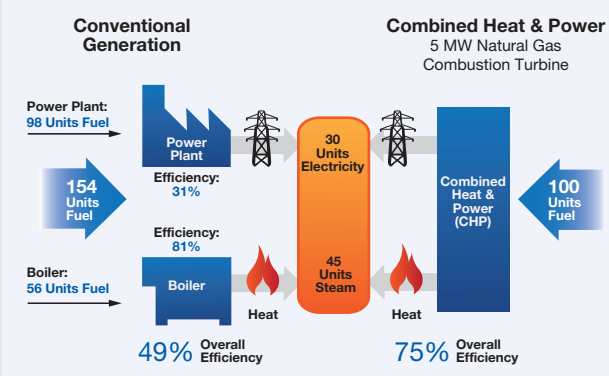
## How You Can Save Energy, Money and the Environment

[MACEAC.PSU.EDU](http://MACEAC.PSU.EDU)

## WHAT IS COMBINED HEAT & POWER?

Integrated systems for cooling, heating and power (CHP) – which also are known as cogeneration, trigeneration, energy recycling, cooling, heating and power, or total energy systems – provide a mixture of energy services to a single facility or to a group of buildings. Electricity to such buildings is provided by on-site or near-site power generators using one or more of the many options: internal combustion (IC) engines, combustion turbines, microturbines, steam turbines or fuel cells. In CHP systems, heat that otherwise would be wasted is “recycled” and used for cooling, heating, or dehumidifying.

### CHP versus Separate Heat and Electric Power Production



Note: Assumes national averages for grid electricity and incorporates electricity transmission losses.

## HOW WE CAN HELP

MACEAC focuses on providing information to all who are interested in CHP, district energy or waste heat recovery. This information includes:

- Technology and application descriptions
- Screening tools
- Case studies
- State CHP baseline information
- Project development guidebooks
- Lists of local resources

In addition, MACEAC provides technical assistance to individuals involved in developing CHP projects and to state agencies involved in promoting or establishing rules affecting CHP.

## WHAT ARE THE BENEFITS OF COMBINED HEAT & POWER?

There are four main benefits for adopting combined heat & power. These benefits include:

### #1 REDUCED ENERGY COSTS

Building owners can reduce their energy costs by deploying CHP systems because compared to conventional systems these systems provide increased energy efficiency, reduced demand charge and reduced peak electric energy costs.

### #2 REDUCED LIFE-CYCLE COSTS

Even though the initial cost of CHP systems for buildings is higher than purchasing all electric power needs and using conventional chillers and boilers for cooling, humidity control and heating needs, the life-cycle cost of the CHP systems is often lower because of the energy cost savings over its useful life of more than 20 years.

### #3 ATTRACTIVE RETURN ON INVESTMENT

As discussed above, on an overall basis, CHP systems can reduce energy costs for buildings. If the incremental installed cost of CHP systems over conventional systems is treated as an investment, and the annual savings in its energy costs are treated as the return on that investment, the return can be very attractive.

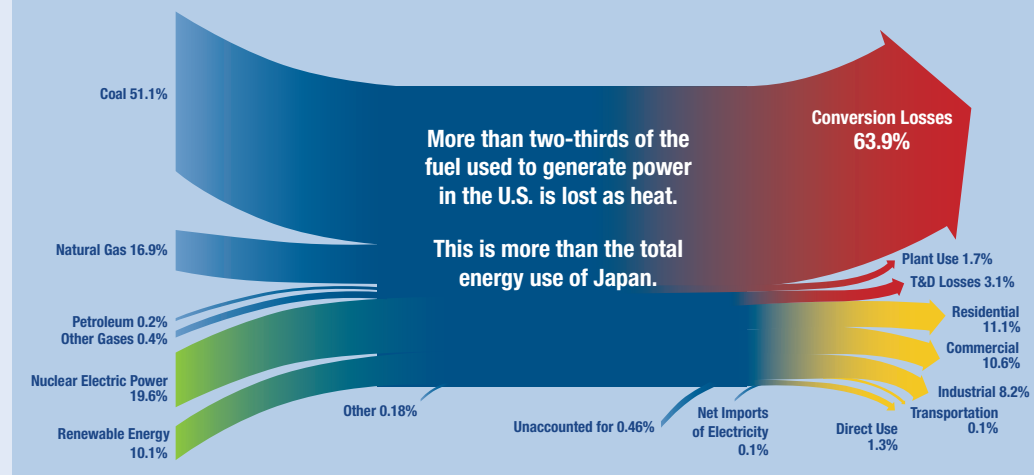
### #4 IMPROVED POWER RELIABILITY

Since CHP systems generate power on-site or near-site, these systems improve power reliability by either reducing or eliminating a building's dependence on the electric power grid, and by providing an additional power option to the building. Also, because CHP systems are located at or near buildings, power outages experienced because of losing a distribution line are improbable.

## WHY CHANGE? TRADITIONAL POWER IS VERY INEFFICIENT

The great majority of US electricity generation does not make use of the waste heat. As a result, the average efficiency of utility generation has remained at roughly 34 percent since the 1960s. The energy lost in the United States from wasted heat in the power generation sector is greater than the total energy use of Japan. CHP captures this wasted energy.

### Traditional Power Results in Massive Heat Loss



Source: Source: DOE Energy Information Administration Annual Energy Review 2007

CHP is a realistic, near-term option for energy efficiency improvements and significant CO<sub>2</sub> reductions that simultaneously spurs business investment and job creation.