



Combined Heat and Power: Combining Energy Reliability and Efficiency with Pollution Reduction

What Is Combined Heat and Power?

Combined heat and power (CHP) systems (also known as cogeneration) generate electricity and useful thermal energy in a single, integrated system (see figure at right). This contrasts with the common practice of separate heat and power (SHP) where electricity is generated at a central power plant, while on-site heating and cooling equipment is used to meet non-electric energy requirements. The thermal energy recovered in a CHP system is used for heating or cooling in industry or buildings. Because CHP captures the heat that would otherwise be rejected in traditional generation of electric power, the total efficiency of these integrated systems is much greater than from typical separate systems.

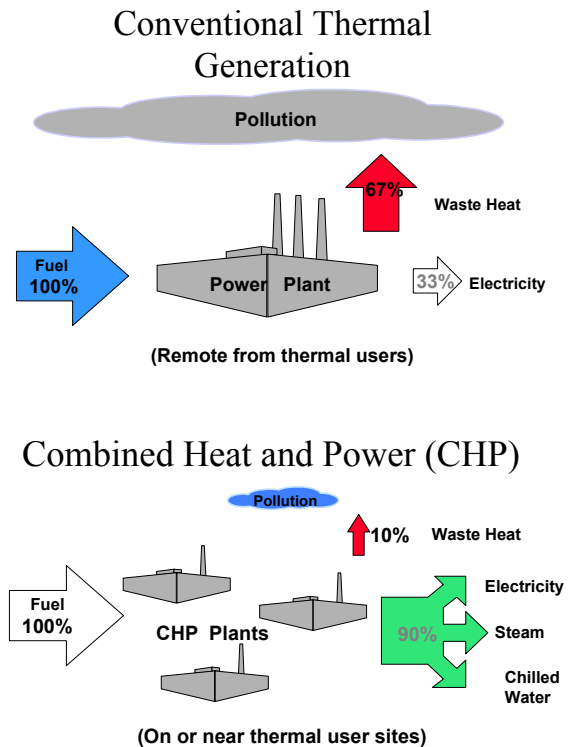
CHP in America

Currently, approximately 56,000 megawatts (MW) of CHP electric generation (7 percent of U.S. electricity generation capacity) is in operation in the United States, up from less than 10,000 MW in 1980. CHP is widely used in the chemical, petroleum refining, and paper industries. In recent years, smaller CHP systems have begun to make inroads in the food, pharmaceutical, and light manufacturing industries, as well as in commercial buildings and on university campuses.

CHP Potential

There are cost-effective opportunities for CHP capacity to grow several-fold in the United States.

- In Denmark and the Netherlands, more than 40 percent of electricity is obtained from CHP systems. In the United Kingdom, CHP's share of electric power production has doubled in the past decade, with additional growth targeted by the government.
- The CHP industry, U.S. Department of Energy (DOE), and Environmental Protection Agency (EPA) set an ambitious but achievable goal to double U.S. CHP capacity between 1999 and 2010 by adding approximately 50,000 MW of new capacity. If this goal is achieved, CHP would represent about 14 percent of U.S. 2010 electric generating capacity.
- CHP potential exists in three important market segments: industry, buildings, and district energy systems such as universities, government complexes, and central business districts in many cities. Federal facilities have a potential approaching 5 GW.



Regulatory and Market Barriers to CHP

Although technologies used in CHP systems have improved in recent years and CHP has become cost-effective in many applications, significant hurdles exist that limit widespread uses of CHP. The effect of these hurdles is to constrain use of CHP systems, meaning that less-efficient separate systems continue to predominate. The main hurdles to CHP are:

- No national standards exist for the interconnection of distributed generation technologies such as CHP to the electric utility grid, and as a result some utilities impose onerous and costly studies, and require the installation of unnecessarily expensive equipment to discourage CHP.
- Many utilities currently charge discriminatory backup rates and prohibitive “exit fees” to customers that build CHP facilities.
- Depreciation schedules for CHP investments vary from 5 to 39 years depending on system ownership, and frequently don’t reflect the true economic lives of the equipment.
- Current air quality regulations do not recognize the overall energy efficiency of CHP or credit the emissions avoided from displaced grid electricity generation.
- Many facility managers are unaware of technology developments that have expanded the potential for cost-effective CHP.

Recommended Next Steps

- Congress should direct the Federal Energy Regulatory Commission (FERC) to promulgate national distribution and transmission interconnection standards for and encourage appropriate regulatory authorities to use this standard. Congress should also establish a right for the purchase of backup and supplemental power service for CHP facilities at fair and reasonable terms.
- Congress should direct the Internal Revenue Service (IRS) to set a depreciation schedule of seven-years for industrial and utility facilities and ten-years on Building CHP (BCHP) assets, which reflects the true technical and economic life of most systems.
- Congress should enact tax credits to a ten percent investment tax credit (ITC) for new thermal energy distribution systems at district energy CHP facilities.
- Congress should fund DOE to support R&D to improve efficiency and environmental performance of CHP technologies, especially for smaller systems, and to improve their integration into industrial and building systems.
- Congress should fund DOE and EPA to support educational and technical assistance efforts by state and regional initiatives to identify and implement CHP at appropriate sites.
- States should implement interconnect and access rules favorable to CHP, including an exemption from exist fees, facilitate siting and permitting, cost-share CHP feasibility studies, and review state facilities for CHP opportunities.
- EPA should shift to output-based emissions standards, which regulate emissions based on the power and heat produced and thereby implicitly credit efficiency. EPA should also educate and assist states regarding implementing this environmental permitting approach.