# COGENERATION: AN EFFICIENT ENERGY SYSTEM

**by**
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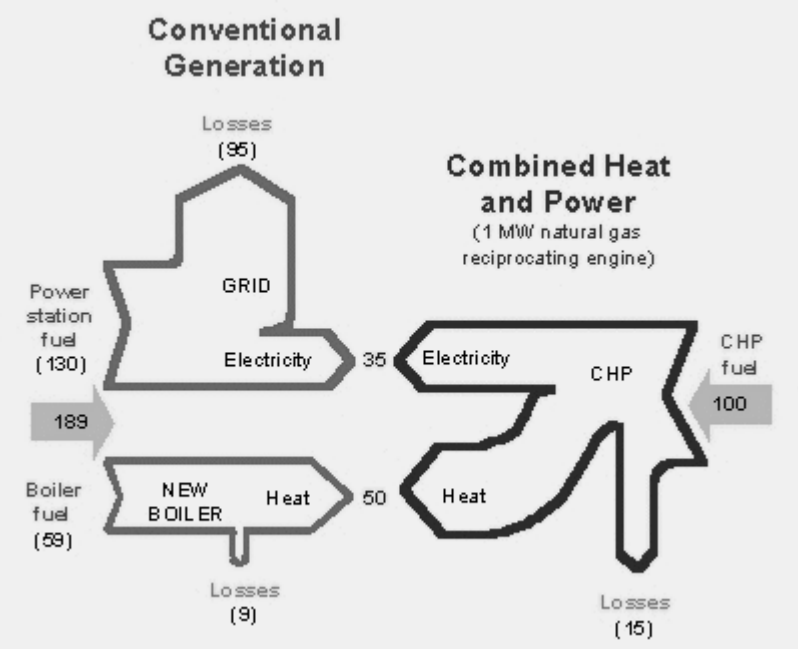
Cogeneration, or combined heat and power (CHP), is a type of distributed generation that uses the waste heat produced in electricity generation. The heat or steam produced is used for industrial processes or heating/cooling applications. CHP is an integrated energy system that is modified to fit the needs of the end user. Cogeneration, unlike some of the other distributed generation technologies, is not experimental. Cogeneration in the form of turbines, micro-turbines, reciprocating engines, and steam-turbine systems has operated successfully for decades. Combined heat and power can lower energy costs and increase electric reliability. Some CHP systems are connected to the utility's power grid and others are used only for internal use and are stand alone systems.

Comparison of Conventional Generation and Combined Heat and Power




SOURCE: http://www.uschpa.org/files/public/CHP%20Basics.pdf

The American view of electricity reliability has been shaped by recent events. Since September 11, 2001, securing the electric power infrastructure against terrorism has become a focus. Then, on August 14, 2003, a massive outage occurred and portions of the Midwest and Northeast United States and Ontario, Canada lost power. The blackout brought attention to the country's ageing transmission grid. On August 29, 2005 Hurricane Katrina struck Louisiana and impacted many utilities and caused major damage to both the generating plants and the transmission infrastructure. Most recently, on September 1, 2008, Hurricane Gustav made landfall near Cocodrie, Louisiana and continued northwest through the State. Gustav affected all major cities in Louisiana with the exception of Lake Charles. About 829,000 customers were without power immediately after Hurricane Gustav struck. The hurricane damaged the major transmission lines running between Baton Rouge and New Orleans. Seven days after the hurricane struck Louisiana, about 40 percent of Baton Rouge was still affected by widespread power blackouts. When the power went out, basic services for health, communications, finance, cooling and water supply were no longer available.

Distributed generation, which locates the power source close to the load served, is now being looked at as a hedge against power outages caused by problems on the transmission grid. Traditional users of distributed generation were operations which required absolute reliability of service. Today's dependency on electricity for our "way of life" broadens the scope of distributed generation. Cogeneration becomes more attractive.

The ideal co-generation application uses the same ratio of electricity and heat all the time. Many plants only 'co-gen' the amount of electricity they can use the heat from in their process and buy the rest. Quite often they can not start the plant with their own power, but they provide a very stable base load for the utility as they generate most of the varying load for the process. Other plants require much more heat than electricity. If the local laws permit they can generate extra power and sell it into the grid.

In Louisiana, cogeneration has been largely confined to industrial users who needed process heat. Any time fuel is converted to electricity extra heat will be left to dispose of. The new reality created by recent hurricane opens the door for more applications of cogeneration at the agricultural, industrial and commercial customer levels. CHP systems may just be the mechanism to allow continued safe operations when the utility is out of service at hospitals, nursing homes, multifamily housing, perhaps even some food storage or preparation businesses. All projects have to be justified technically and financially, but in some applications reliability, which was an elusive quality in the past, may have become a quantifiable service.

CHP can provide clean power and improved comfort from a single reliable source of both power and heat for buildings. Systems can provide winter space heating and utilize proven absorption chiller technology for summer cooling, while reducing overall electrical consumption and reducing NOx (nitrogen oxide (air quality)) emissions. The overall efficiency of CHP can easily be related to the reduction of total energy use and can be correlated to reduced operating costs for the building owner. Using energy more efficiently always has a positive effect on the air and water. The figure above compares the typical fuel input needed to produce 35 units of electricity and 50 units of heat using conventional separate heat and power. For typical electric and thermal efficiencies, CHP is nearly twice as efficient.

There are, however, some barriers to cogeneration. Grid interconnection issues, permitting regulations and lack of tax benefits have historically hindered cogeneration projects. The American Recovery and Reinvestment Act of 2009 (ARRA) provides rebates to businesses instead of tax credits for energy property placed in service during 2009 or 2010, including for combined heat and power systems. Time will tell if this inducement can tip the scale in favor of cogeneration.

The U.S. Department of Energy (DOE) has established and funded regional centers to encourage adoption of Combined Heat and Power. Louisiana is affiliated with the Gulf Coast CHP Application Center (http://www.gulfcoastchp.org/) located in Houston. Over 214 CHP installations are operating in Texas, Louisiana, and Oklahoma providing over 23 GW (gigawatts) of electrical capacity. The center's purpose is to help companies evaluate whether CHP would enhance operations.

More information about Combined Heat and Power can be found on the DOE Energy Efficiency and Renewable energy website (http://www1.eere.energy.gov/industry/distributedenergy/) and on the EPA Combined Heat and Power Partnership website (http://www.epa.gov/chp).