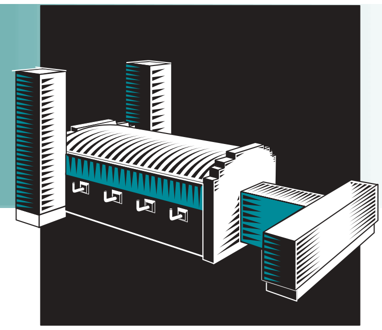
COMBINED HEAT & POWER

Cost Reduction Strategies



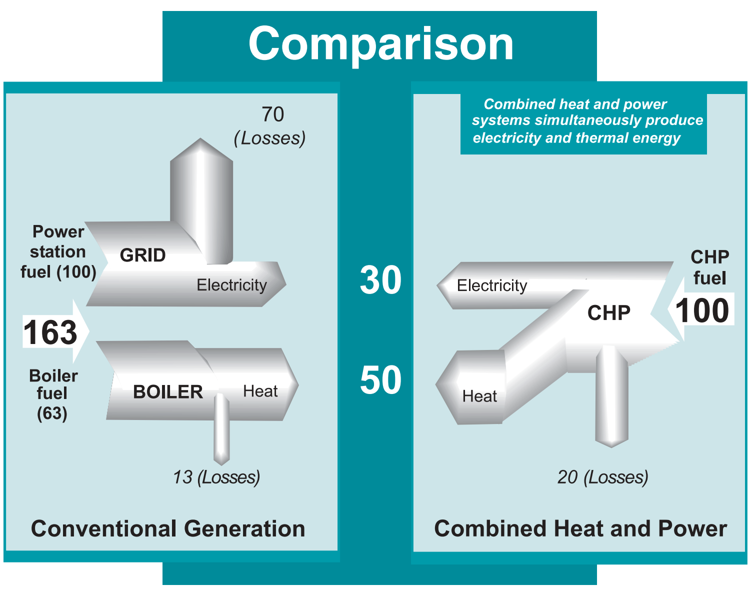
More Efficient Production of Energy

Did you know...
U.S industry currently used 47 gigawatts of CHP-generated power, saving $4.5 billion a year in energy costs?

The U.S. glass industry's annual electricity bill is close to $700 million. Rising electricity prices, disruptions in supply, or power quality issues can have significant impacts on industry operations and profits. In many cases, cost savings can be achieved by employing Combined Heat and Power (CHP) systems to generate electricity on-site while simultaneously producing process heat or other useful output. High-temperature waste heat can also be used to generate power from CHP. On-site generation power through CHP can provide glass plants the following benefits:

- Reduced energy costs
- Increased reliability of power supply
- Enhanced power quality
- Increased flexibility
- Security against rising power costs

Combined Heat and Power reduces energy costs by using energy resources more efficiently. In conventional conversion of fuel to electricity, over two-thirds of the energy input is lost in friction released to the environment and not used for productive purposes. CHP makes greater use of the fuel inputs by producing multiple products-electricity and usable thermal energy. As shown in the figure below, conventional central station power generation and stand-alone process boilers have a combined efficiency of less than 50%, while CHP efficiencies can approach 80 to 85%. Less energy use also means lower emissions. CHP is considered by many to be a key pollution prevention practice.



CHP is not a new technology, especially in large industrial facilities. The technologies employed include combustion turbines or smaller reciprocating engines using natural gas or process off gases and waste heat recovery boilers producing steam and power with the exhaust heat from process operations. Recent advances in CHP technologies are steadily reducing the capital costs increasing the efficiencies, and improving the economics of CHP systems.

Evaluate and take action

Whether CHP makes economic and strategic sense is a function of the size and timing of power and process heat needs, the price and interruptability of utility-supplied electricity, the cost and availability of either purchased fuels or waste fuel, and the type and cost of equipment best suited for a particular installation.

Developing CHP capability takes considerable time, effort, and investment, so it's best to approach the task in a series of steps:

Step 1

Walk-Through Analysis

A simple screening analysis will help to determine whether a detailed analysis is appropriate:

- Are waste heat and electrical loads sufficient to support CHP? (Average electrical loads should be at least 250 kW; average thermal loads, at least 1,000 lbs/hr steam and 700,000 Btu/hr hot water.)
- Are waste heat and electrical loads coincident over a minimum period of operating hours (>2,000 hrs)?
- Can the facility infrastructure support CHP? (Is there enough space? Are there zoning or environmental limitations? Is fuel available?)
- Do the prevailing fuel and electricity prices support CHP? (What are average retail electricity and fuel costs at the plant?)
- **A useful payback monograph is available at www.ornl.gov/cgi-bin/cgiwrap?user=chpcaic&script=CHP_payback.cgi**

Step 2

Feasibility Analysis

If the walk-through is positive, the next step is a screening analysis that considers more specific details, including the following:

- Detailed electric tariffs (retail service rates, partial service rates, demand charges, stand-by/back-up rates, transmission and distribution tariffs)
- Fuel availability and price (short-term, long-term, spot)
- Capital budget
- Operating modes (baseload, thermal following, electric following)
- Interconnection requirements with the grid and costs
- Environmental permitting requirements and costs

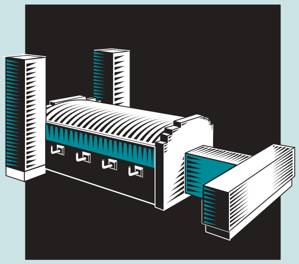
Preliminary Design

Step 3

A positive feasibility analysis should lead to a more thorough evaluation that will provide enough information to make a decision. A comprehensive energy analysis will consider the following factors:

- Analysis of hourly energy requirements and costs
- System part load performance
- System design and preliminary costs
- Return on investment/payback analysis
- Analysis of exisiting CHP systems in primarily European glass plants

If the preliminary design evaluation is favorable, specifications for bids would then be prepared for detailed project design and development



Other Resources

OIT Clearinghouse
800-862-2086

www.oit.doe.gov/bestpractices

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