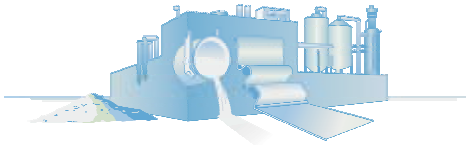
Improve Overall Plant Efficiency and Fuel Use

Combined Heat and Power (CHP) Tool Identifies Energy Savings in Gas Turbine-Driven CHP Systems



- *What opportunities for CHP applications exist in your plant?*
- *What is the optimal CHP system size needed to supply your process heating needs?*
- *What payback can you expect from investing in a CHP system for your plant?*

The Combined Heat and Power (CHP) Tool developed by the U.S. Department of Energy is available at no charge to help you answer these questions. The CHP tool is a software tool that evaluates the feasibility of using gas turbines to generate power and the turbine exhaust gasses to supply heat to industrial heating systems. The tool also provides the estimated energy savings, system cost, payback period, and what-if analysis for various utility costs.

The tool helps the user select the appropriate turbine size to supply the required heat for the selected heating process. It is assumed that the turbine exhaust gases can be used to supply all or part of the heat required for the process. The tool can be used to size or select design parameters for a new system or to modify a system in use. Results of the analysis include the estimated payback period for the application based on the fuel and electricity rates; costs of the turbine, engineering, installation; and annual maintenance costs of the system. The results can be used to determine whether it is worthwhile to carry out further engineering studies for the project. The tool includes necessary performance data and default cost information for commonly used and available commercial gas turbines. If necessary, the user can change the default cost values to meet the requirements for specific applications. The tool also allows the user to modify performance data for a selected turbine or to add data for turbines not included in the database.

Figure 1: Sample CHP tool user screen showing the tool's main menu and available options.

The CHP tool identifies opportunities for application of CHP systems to supply heat to a heating process and determines optimal equipment size, implementation costs, and the payback period for investing in CHP technologies.

To download the CHP Tool and other free software tools or participate in an on-line tool forum, visit us at:

www.eere.energy.gov/industry/bestpractices/software.html

Tool Description

This tool offers CHP application analysis for three commonly used heating systems: (1) Fluid Heating in Fired Heat Exchangers where exhaust gases form a gas turbine can be used to supply heat for indirect heating of liquids or gases in heat exchangers; (2) Exhaust Gas Heat Recovery in Heaters - Direct heating applications where the turbine exhaust gases are mixed or injected in a furnace, oven, heater, dryer or heat recovery steam generators (HRSG), or boilers to supply all or part of the heat requirements; and (3) Duct Burner Systems - Use of the turbine exhaust gases for combustion of fuels such as natural gas, light oil, by-product gases in a furnace, heater, boiler, etc., where a "duct-burner" is used to consume residual oxygen from the turbine exhaust gases for fuel combustion.

The CHP Tool produces summary reports with clear and detailed information on the results of the analyses. Outputs of the tool include:

- Current energy input data for the furnace/boiler
- Performance data for the selected turbine
- Energy use data for the CHP system
- Cost details for the CHP system application
- Payback period based on the cost data provided for the fuel, electricity and the equipment used in the CHP system

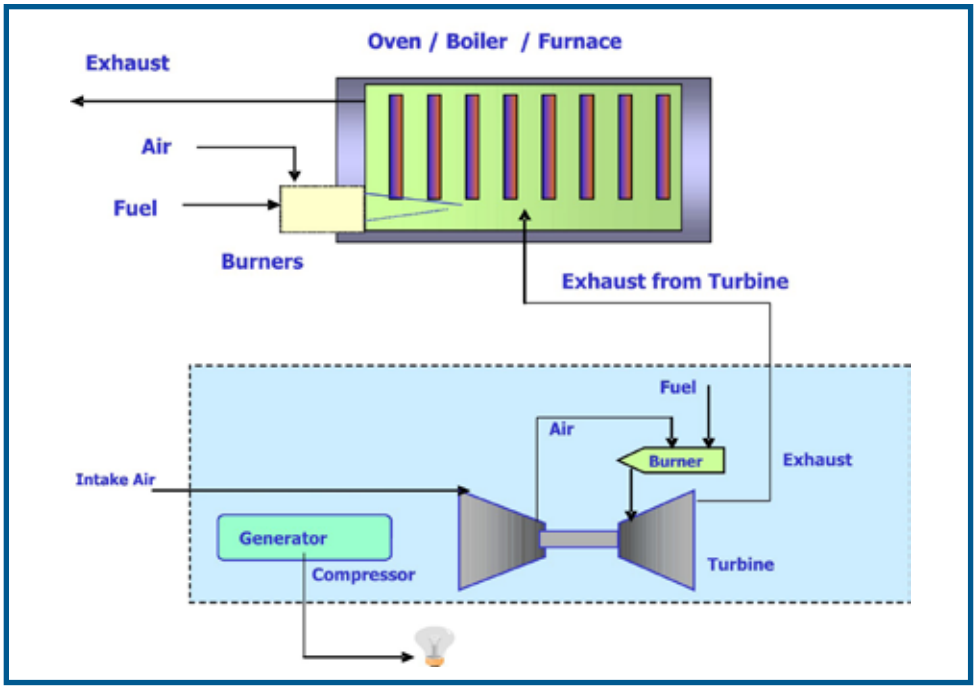


Figure 2: Example application of CHP – exhaust gases from a gas turbine can be used to heat liquid or gas fluids in a heat exchanger.

The Combined Heat and Power (CHP) Tool for Industrial Heating Systems was developed by Oak Ridge National laboratory and E3M, Inc. for the U.S. Department of Energy's Distributed Energy and Industrial Technologies Programs.

A Strong Energy Portfolio for a Strong America

Energy efficiency and clean, renewable energy will mean a stronger economy, a cleaner environment, and greater energy independence for America. Working with a wide array of state, community, industry, and university partners, the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy invests in a diverse portfolio of energy technologies.

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Bringing you a prosperous future where energy is clean, abundant, reliable, and affordable

October 2005