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GHG Project Case Study

Combined Heat and Power: Reliability, Efficiency, and GHG Reductions at Bristol-Myers Squibb Company

Bristol-Myers Squibb Company operates a 1 million square-foot pharmaceutical research and development facility in Wallingford, Connecticut. The site covers 180 acres and houses a state-of-the-art research laboratory. It is staffed by more than 1,400 employees working to discover cures for diseases such as cancer and HIV. The site requires a significant amount of energy, both electricity and steam, and consumes more than 48,000 megawatt-hours of power and 280 million pounds of steam annually.

Pharmaceutical research facilities can require power 24 hours a day, 365 days a year, because many research studies are in a continuous state of operation. As a result, research facilities require a constant, regulated environment, including controls on temperature, humidity, and non-recirculated ventilation. Utility interruptions could be detrimental to the operations, so highly reliable utility services—electricity, steam, and chilled water—are vital.

To optimize reliability, efficiency, economics, and environmental performance, Bristol-Myers Squibb Company constructed a combined heat and power (CHP) plant at its Wallingford site. An engineering analysis determined that a 4.8-megawatt-hour combustion turbine and heat recovery system (waste heat boiler) would meet the company's various requirements. In addition to the financial advantages, the CHP plant relieved a shortfall in backup steam-generating capacity. It also provided a large standby generator that could be used if the public utility was unable to provide electrical power. The turbine uses clean-burning natural gas for fuel, and it has a duel-fuel capability that allows for burning oil as a backup. The unit is also very efficient and can handle the site's peak steam load, thereby eliminating the need for an additional boiler.

The installation of the CHP system provided flexibility that allowed the utility plant staff to redesign the sequence of equipment operation and supply of utility services, thus achieving optimal efficiency. During the winter months, all the waste heat from the gas turbine is recovered to make steam to heat the complex. This has resulted in large reductions in the amount of fuel used in the on-site boilers. During the spring and fall months, the facility is often able to meet its total steam and chilled water requirements by solely using the CHP steam to simultaneously meet process and chiller plant loads. This results in several months of "run time" during which no boilers are needed to support steam demands.

The CHP investment has delivered environmental benefits as well. Producing electric power "inside the fence" is more efficient than electricity supplied through the power grid, and there are minimal transmission line losses. The efficiency of the Wallingford system is approximately 72 percent. In comparison, the efficiency of the entire U.S. electric power system is estimated at 32 percent (EIA 2003a). Considering the amount of electric and steam energy that Bristol-Myers Squibb Company draws from its CHP plant and comparing this with the alternative (buying power from the New England power pool and generating steam through a typical boiler), the CHP project has

reduced GHG emissions by 20 percent, or roughly 6,600 tonnes per year. These reductions are helping Bristol-Myers Squibb Company meet its corporate goals of reducing GHG emissions and energy use.

In addition, when Bristol-Myers Squibb Company installed the CHP unit, it realized that advancements in gas turbine technology would allow for reductions in emissions of nitrogen oxides (NO_x), an air pollutant that leads to several environmental and health problems. The facility voluntarily upgraded the combustor section of the turbine to cutting-edge technology, which lowered NO_x from a high of 21 parts per million (ppm) to 14 ppm, a 33 percent decrease in emissions.