Bob Bechtold with 30-kW Capstone Microturbines

Businesses Find Energy and Pollution Solutions

By Bailey G. Foster

For the past decade, Bob Bechtold, President and CEO of Harbec Plastics, Inc. in Ontario, NY, has been researching and developing a plan that would help his company become more efficient and more ecologically correct. One part of the solution his company has adopted is called cogeneration, a highly efficient means of generating heat and electric power simultaneously from the same energy source. In other words, the exhaust heat from generating electricity replaces fossil fuel (oil, coal, or natural gas) combustion. This is heat that would normally be discharged into lakes and rivers or the atmosphere in the current process of traditional utility power generation.

Also referred to as combined heat and power (CHP), Cogen offers the potential to reach efficiencies that triple, or even quadruple, conventional power generation. Although it has been a possibility for nearly a century, in the mid-1980's relatively low natural gas prices made it a widely attractive alternative for new power generation.

Cogeneration is a highly efficient means of generating heat and electric power from the same energy source.

To understand cogeneration, it is necessary to know that most conventional power generation is based on burning a fuel to produce steam. It is the pressure of the steam that actually turns the turbines and generates power, in an inherently inefficient process. Cogeneration, in contrast, makes use of the excess heat, usually in the form of relatively low-temperature steam exhausted from the power generation turbines. Such steam is suitable for a wide range of heating applications and effectively displaces the combustion of carbon-based fuels, with all their negative environmental implications. The heat potential can also be used to air condition with the help of absorptive chiller technology.

The environmental implications of cogeneration stem not just from its inherent efficiency, but also from its decentralized character. Because it is impractical to transport heat over any distance, cogeneration equipment must be located physically close to its heat user. A number of environmentally positive consequences flow from this fact. Power tends to be generated close to the power consumer, significantly reducing transmission losses, stray current, and the need for distribution equipment.

In recent years new methods of using this Cogen/CHP potential have been developing. HARBEC Plastics' application uses Compressed Natural Gas (CNG) to run Capstone micro turbine generators, which produce electricity used to operate their molding company. The hot exhaust from these micro turbines is directed to a heat exchanger, which is able to transfer the heat to water. The hot water is then used to heat the building through radiant in-floor heating systems and through pre-existing forced air systems. During the summer, the hot water is sent to an absorptive chiller, which uses heat to create cold water for air-conditioning.

CHP represents an opportunity to make significant progress toward meeting our Kyoto commitments on greenhouse gas reductions. The local air quality improvement and opportunities for economic growth presented by CHP are equally compelling. CHP presents an opportunity to improve the "bottom line" for businesses and public organizations, while also providing a path for improving the environment. Harbec Plastics, Inc. believes the private sector should actively pursue adoption of CHP – both for "bottom-line" economic and environmental benefits.

The FLU-ACE® heat recovery system at the St. Vincent Hospital in Ottawa, Canada.

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Tom Hinke, founder, chairman, and CEO of Ottawa-based Thermal Energy International, develops product solutions that will improve and enhance the potentials of Cogen. An example of one of these products is FLU-ACE®, a process that recaptures up to 90% of the heat energy normally lost to the atmosphere through a conventional exhaust stack. Depending on how it is utilized, this recuperated waste heat can reduce the client's energy costs from 15-25% per year. While it recovers and recycles heat, FLU-ACE® also captures and eliminates many undesirable air pollutants. It captures over 90% of the soot, dust, and ash particulate; 50% of the carbon oxides; over 90% of the sulfur oxides; up to 25% of the nitrogen oxides; 99% of toxic hydrocarbons and odor-producing compounds. Another product in their line, called the THERMALONOx™, aids the FLU-ACE® in reducing nitrogen oxides by up to 80%.

Thermal Energy has proven these solutions do not have to cost so much that the consumer will be negatively impacted. "By using the savings from heat recovery, many companies will pay for these investments in as little as two to five years. After that, the savings go back to the shareholders," states Hinke.