



CHP
TECHNICAL ASSISTANCE
PARTNERSHIPS

Harbec Plastics

750 kW CHP System



Harbec Plastics in Ontario, NY

Quick Facts

LOCATION: Ontario, NY
GENERATING CAPACITY: 750kW
EQUIPMENT: 25 30 kW Capstone MicroTurbines
FUEL: Natural Gas
CHP TOTAL EFFICIENCY: 70 %
YEARLY ENERGY SAVINGS: 36% net cost reduction
PAYBACK: Two and a half years
INSTALLATION DATE: Summer 2001
WINTER HEAT RECOVERY APPLICATION: Radiant floor and circulated air heating
SUMMER HEAT RECOVERY APPLICATION: Absorption chiller air conditioning and desiccant drying

Project Overview

Harbec Plastics, founded by Bob Bechtold in 1977, is a custom-injection molder that services customers from a wide range of industries including original equipment manufacturers in the automotive, medical, office products and sporting goods sectors.

Faced with rising energy costs in the 1990s and frequent energy problems like power outages and surges, which had cost the company over fifteen thousand dollars in damaged equipment in one month alone, Bechtold had to make a choice: run more efficiently or pack up and leave New York like many of his industrial neighbors. He chose to stay and in doing so he found a way to thrive. He hired Bruce Keeley of Energy Concepts Engineering and went to work re-vamping his entire facility.

The company began by addressing low-hanging fruit like replacing lights, purchasing more efficient motors, soft starts and inverter drives. Next they replaced their hydraulic injection-molding machines with all electric ones that not only used less energy but also eliminated excess heat, moisture and noise from the factory floor.

But Harbec still had to address its core problem of replacing unreliable and expensive grid power with a reliable, high-quality and low emission source. Harbec decided to install a hybrid wind/CHP system in order to satisfy their main objectives of obtaining a primary source of power for the plant that had extremely low emissions, was energy efficient and economically feasible. For backup purposes, they kept their grid hookup.

Harbec uses natural gas to run twenty-five microturbines, which produce electricity for its manufacturing processes. The exhaust heat from the microturbines is harnessed to heat exchangers that transfer the heat to water. The hot water is then used to heat the facility through radiant floor heating and a forced air system during the winter. In the summer, the hot water is directed through an absorption chiller, which cools water for air conditioning. Their CHP system produces less than 10% of the CO₂ of traditional sources of energy like coal and oil for the same amount of energy. The heating and cooling are bi-products of this process – bringing efficiency levels up to around 70%.

Energy Overview

Harbec's system is a hybrid consisting of a 250 kW wind turbine and twenty-five 30 kW microturbines for a total of 750 kW of generating capacity. The microturbines run on natural gas and are dispatched in 30 kW increments. If a load increase of 30 kW is needed for more than 15 minutes they can turn on a new unit. If a decrement is expected, they shut one off. The microturbines can be dispatched within three to five minutes.



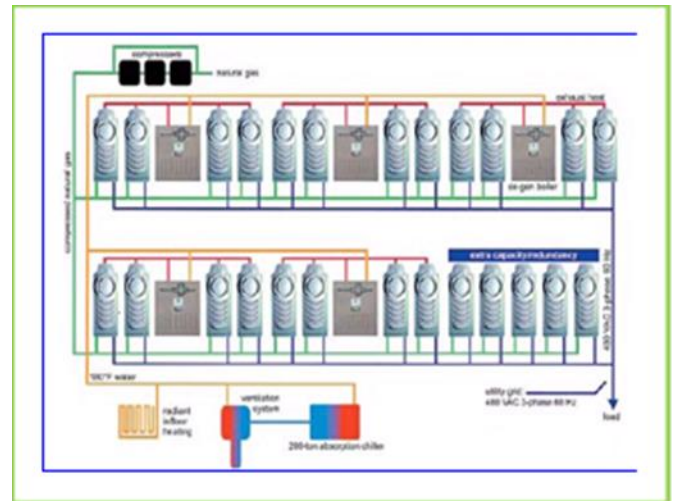
Harbec operates their facility five days a week with three shifts per day and a half day on Saturday for a total of five-and-a-half days a week or approximately 5,000 hours a year. On weekdays their load can range from 80 kW to 450 kW. On the weekends their load ranges from 75 kW to 80 kW. The parasitic load is around 70 kW to 75 kW, which is enough to meet the minimum thermal requirements of the facility – making the system a very nice fit.

Beyond the minimum requirement, Harbec tries to maximize as much power as possible from wind. However, since New York does not authorize net metering for industrial users, on a windy weekend day, they can export as much as 250 kW of free power to the grid.

Challenges

Harbec encountered an issue shortly after the installation of the system. Originally the microturbines ran together in sets of four. Structured that way, every time Harbec wanted to reduce the power in their facility they had to reduce the output of four turbines together or face severe overheating. Harbec solved this problem so that now each turbine can run independently of the others.

In addition, the original heat exchangers did not work as expected and ran at around 65% of their rated capacity. With a grant from NYSERDA, Harbec substituted the original heat exchangers with their own design. The new heat exchangers run at 110% of rated capacity and Harbec now has excess cooling capacity. More recently, with increasing gas prices, Harbec has altered its CHP operation to emphasize thermal needs over electric production.



Benefits

- Improved power quality
- No more intermittent power outages capable of ruining production materials.
- Free heating and air conditioning
- Predictable future energy costs
- Microturbines are very low maintenance – only Harbec's existing service technicians are needed for the plant.
- Over 1,800 tons CO₂ reduced annually
- 50% reduction in NO_x emissions

For More Information

U.S. DOE NEW YORK-NEW JERSEY CHP TECHNICAL ASSISTANCE PARTNERSHIP (CHP TAP)

www.nynjchptap.org

Date produced or updated: August 2016