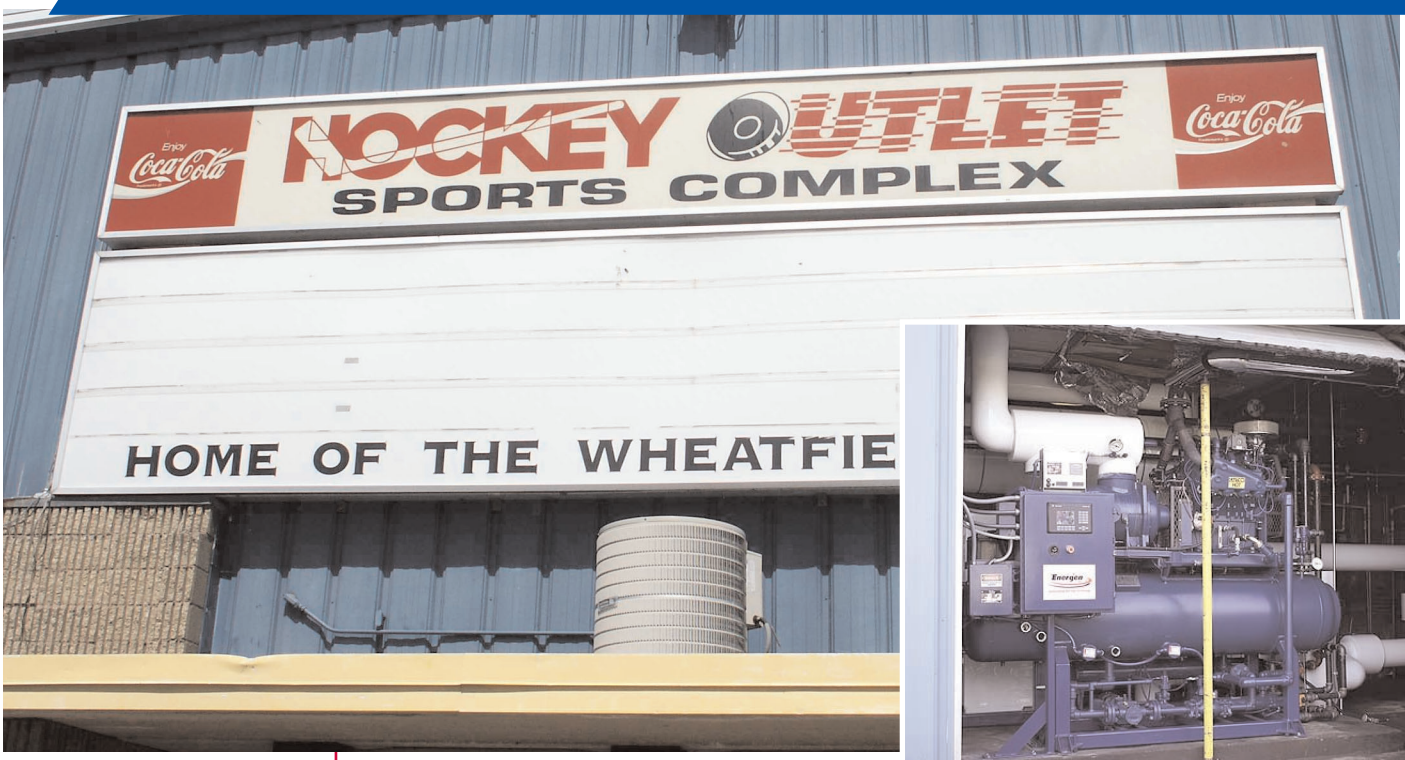
Hockey Outlet



- Natural gas engine-driven ice-making system
- Engine heat recovery
- Desiccant dehumidification
- Wheatfield, New York

Natural Gas Engine-Driven Refrigeration Provides Better Ice, Hot Water and Moisture Control of Busy Ice Arena

Hockey Outlet, an ice arena near Buffalo, New York, offers its patrons a superior skating experience, thanks to a new engine-driven refrigeration system that runs on natural gas.

Formerly the practice home to the Buffalo Sabres hockey team, Hockey Outlet is a year-round, full-service ice arena with two ice surfaces, a pro shop and a snack bar. It offers hockey and figure skating programs and recreational skating.

The new refrigeration system and its accessories are saving rink owner Tim Igo close to 500,000 kilowatt-hours of electricity annually.

How the refrigeration and heat recovery processes work

A new 8.1-liter Energen natural gas-fired engine generates 130 tons of ammonia refrigeration at 13°F for the ice rinks. Thermal energy recovered from the engine produces hot water for regenerating a Munters IceAire desiccant dehumidification system to remove excess humidity, a common problem in skating facilities.

"We take the heat that normally would be wasted from the (engine) jacket water and also part of the exhaust heat, and put it to work," says Joseph Merckel, President of Energen, Inc. Energen provided overall concept and design to this turn-key project, designed and manufactured the refrigeration system, and helped to finance it through an energy service contract.

Heated water from the refrigeration process is pumped through a hot water coil to regenerate the desiccant in the dehumidification system, and then flows to a hot water tank for

use in showers and restrooms. In addition, the Zamboni machine uses 100 gallons of this hot water each time it resurfaces an ice rink.

Natural gas engine-driven refrigeration lowers energy costs

The new refrigeration system and its auxiliary equipment save rink owner Tim Igo close to 500,000 kilowatt-hours of electricity annually. They also reduce monthly electric demand by as much as 90kW, according to Howard Kielar, Energen Vice President. "A large percentage of the cost of operating the facility is energy," he explains. "Unlike electric power costs, natural gas doesn't have a demand component in price, so the owner isn't paying heavily to meet short periods of high load – like morning pull-down, for example. The economics worked out so that it was less expensive to run on natural gas than on electricity.

"And thanks to firing the dehumidifier with waste heat, any increase in the cost of natural gas also increases the value of the recovered energy," Kielar adds. "This helps provide some future economic stability in the face of our changing energy markets."

Including heat recovery, the new refrigeration system saved $2,000 to $3,000 monthly during its first year, Kielar says.

"It's not only reduced his energy costs, but it has improved the air quality in the rink by reducing humidity," says David Burke, General Energy Consultant at National Fuel Gas Company, the local natural gas supplier. National Fuel provided some funding to the project to demonstrate gas engine-driven chilling technology.

"Their (electric) equipment was near the end of its expected life cycle. It (the new natural gas refrigeration system) was a more cost-favorable alternative to electric chillers," Burke adds.

The new system automatically maintains a selected cooling brine temperature, and the engine driving the refrigeration has a variable-speed drive to adjust to the load. With the old electric system, compressors were turned on and off manually

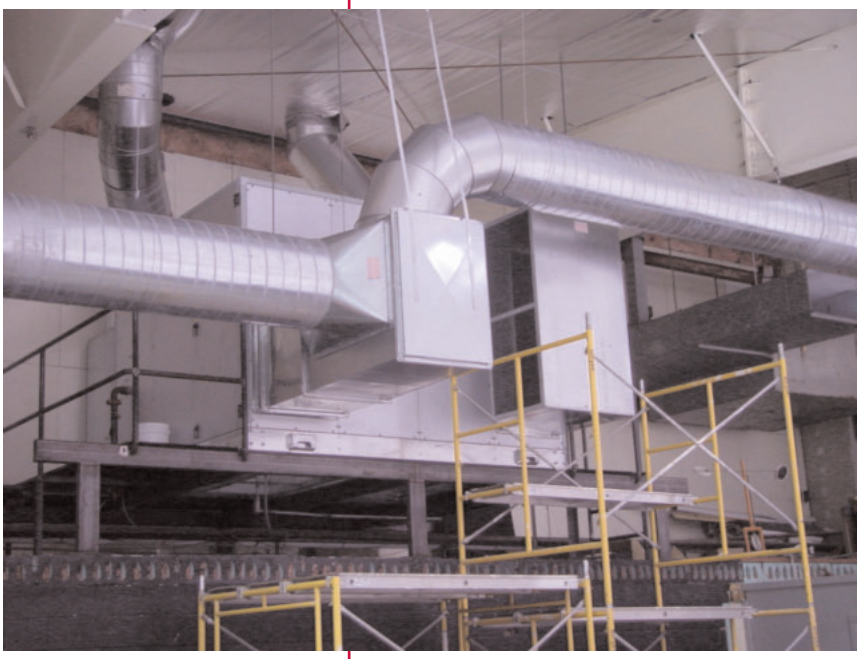
"We're definitely seeing a return on our money, in terms of energy savings," says Igo, adding that he sees additional savings in the form of reduced building maintenance costs because the dehumidification system keeps the 35-year-old facility dry.

"We haven't had to put a dime in repairs into stuff because of water damage," he says. Prior to installing the dehumidification system, moisture caused paint to blister and peel off the rink's interior walls. In addition to lowering maintenance costs, the drier indoor air also creates a better skating experience, he adds.

Humidity control improves skating

"With it being drier, when the ice is resurfaced, it sets up better and you don't get any air pockets," Igo says. "You get a much better surface."

As moisture condenses on a typical rink, the ice softens and forms puddles until the refrigeration system can freeze the condensation, explains Jacqueline McIlrath, Marketing



Coordinator for Munters Commercial Dehumidification. The ice becomes frosty and fog forms, leading to safety problems. Excess moisture condensing on the roof causes dripping on spectators, damage to the ice, and deterioration of the building structure.

In a rink using dehumidification, the ice stays hard, the structure maintains its integrity, and the refrigeration system can operate at maximum efficiency, saving energy and expensive system capacity.

Energen, Inc.
19 Ransier Drive
West Seneca, NY 14228

Munters Commercial Dehumidification
16900 Jordan Road
Selma, TX 78154

National Fuel Gas Co.
6363 Main Street
Williamsville, NY 14221

Energy Solutions Center Inc.
400 N. Capital Street, NW
4th Floor
Washington, DC 20001