

COMMERCIAL + INDUSTRIAL SERVICES

bulletin

Technological advances in energy generation, distribution and delivery proceed at a remarkable pace. The options available to any commercial or industrial operation are as varied as they are numerous.

At Bay State Gas we strive to provide you the latest in technology and information on the most advanced and efficient natural gas energy solutions that are right for your business.



NATURAL GAS CHILLER SYSTEMS

Natural Gas Chiller Systems

- > Reduce energy costs
- > Eliminate electric demand charges
- > Good for the environment
- > Reliable, plentiful energy source
- > Options to suit virtually any application
- > Can utilize existing boiler system providing year-round boiler system efficiency
- > Efficient option for power generation
- > Avoid electric system upgrade charges when adding new cooling equipment

Facilities that may benefit from Natural Gas Chiller Systems include:

- > Office buildings
- > Retail stores and malls
- > Municipal facilities
- > Schools, colleges and public buildings
- > Industrial facilities with thermal loads
- > Food storage terminals
- > Ice arenas

Versatile Natural Gas Cooling Equipment Provides Significant Savings

Natural gas cooling options can help reduce energy costs in commercial and industrial process applications. New gas cooling technologies developed and produced over the last decade can lower operating costs and eliminate electric peak demand charges. Available as standard, larger packaged units or custom-designed systems, natural gas cooling and refrigeration systems require less maintenance and offer improved environmental performance.

Gas Cooling Options: Absorption, Engine-Driven and Steam Turbine

Absorption systems rely on a cycle of condensation and evaporation to produce cooling. The process is driven by a heat source – either a gas burner or recovered thermal energy – and is available in single or double-effect designs. Absorption systems are quiet and low-maintenance, making them well suited to commercial facilities. Absorption cooling operates similarly to conventional electric vapor compression chillers with some very important differences. Absorption systems use distilled water and either non-toxic lithium bromide or ammonia. Other significant differences include the use of heat, rather than a compressor, as the driving force, and lower pressure/vacuum conditions. Heat for the absorption process can be supplied directly by a

Natural Gas Chiller Systems



Several installed chillers. Photo courtesy of Tecogen, Inc.



Engine driven chiller system. Photo courtesy of Tecogen, Inc.

natural gas burner or indirectly from the recovered waste heat of a cogeneration system, hot water or steam.

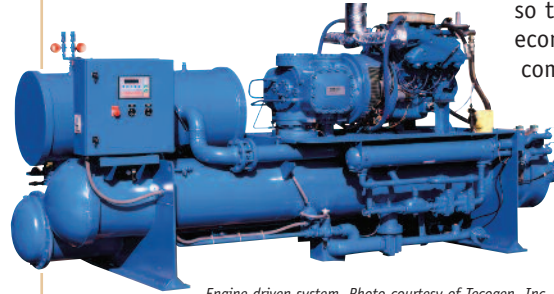
The differences between natural gas absorption cooling and traditional electric systems translate into significant benefits for facilities. These systems have no large rotating components which provides for a safer and quieter operation, higher reliability and low maintenance. Natural gas absorption systems are available as chillers or chiller/heaters which can provide chilled and hot water simultaneously.

Engine-driven cooling systems operate in a manner similar to electric cooling systems, substituting a natural gas engine for the electric motor. System efficiency is improved by optimizing the ability to use the heat recovered from the engine to produce hot water for domestic and process thermal loads. Units are available for capacities ranging from less than 25 to over 1,000 tons. Significant cost savings, coupled with superior performance, make this technology an ideal choice for commercial and process applications. Like an electric-powered system, natural gas engine-driven cooling systems use vapor compression equipment and compression cycle to cool air, water or glycol solutions. In the gas system, an engine replaces the electric motor, providing variable-speed operating capability and greater efficiency when operating at partial loads, an important feature in cooling and process applications. System efficiency is further enhanced when waste heat from the engine jacket and exhaust gas is recovered to supply thermal energy for domestic hot water, steam generation and other applications. Gas engine-driven cooling is an economical alternative to high electric costs and electric peak demand charges, providing operating cost savings that can easily offset equipment costs.

Steam-turbines can be classified as either back pressure or condensing units. The most common are condensing units which are more efficient than a back pressure configuration. In condensing turbine systems the steam enters and is fully condensed, a dedicated steam condenser and heat is rejected via a cooling tower or river water. In contrast, with the back pressure turbine design, the steam leaving the turbine enters the steam distribution system for use in a process or useful heating.

Back pressure chiller systems are less efficient but the steam leaving the turbine can be used for other useful process duties so the overall system economics can be comparable to condensing turbine designs.

Either design can be less costly to operate than electric chillers depending on the costs of



Engine driven system. Photo courtesy of Tecogen, Inc.

steam versus electrical power. Both unit designs incorporate vapor compression compressors providing excellent turndown and low temperature distribution loops.

Steam-turbine drive cooling uses medium pressure steam (usually 100 to 200 psig) to turn a compressor. The compressor provides the motive force for the traditional refrigerant vapor compression cycle. Similar to the absorption cooling process, useful cooling is generated in the evaporator. Heat is rejected in the refrigerant condenser to



Hartford YMCA chiller system. Photo courtesy of Tecogen, Inc.

cooling water. The same cooling water is then also passed to the steam condenser to absorb the heat required to condense the steam exiting the turbine. The condensed steam is returned to the steam generating source.

Steam turbine-driven chillers are applicable to large tonnage systems with an existing source of steam to meet process and space conditioning cooling requirements.



Direct fired gas chiller system. Photo courtesy of Broad USA



Steam double natural gas chiller system. Photo courtesy of Broad USA



Partners In Energy Working Together

YOUR SOURCE FOR ENERGY SOLUTIONS

If you believe natural gas chiller technology is an appropriate consideration for your operation, our **Partners In Energy** program can assist you. We offer financial incentives to help you minimize your upfront cost by sharing a portion of the cost to design, purchase and install the equipment. Simply follow the program guidelines to qualify for matching funds.*

These rebates, combined with the reduction in your overall energy expenses can provide an outstanding return on investment that will pay dividends for years to come.

*Program restrictions apply. Limited time offer.

FOR MORE INFORMATION call us toll-free

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