DE Packaged System Evaluated by Supermarket

System Cuts Energy Use and Costs for A&P

Background

A new A&P Food Market in Mt. Kisco, New York, is enjoying annual energy cost savings of nearly $130,000 with the installation of an integrated microturbine power system developed by DOE's Distributed Energy Program and UTC Power, a United Technologies company. The PureComfort™ system, which provides cooling, heating and power solutions, was installed in 2005 in the 57,000-square-foot facility. The New York supermarket was the first U.S. customer to take delivery of the new system.

The PureComfort system is designed to reduce dependence on the electrical grid; provide cooling for refrigeration systems and space heating or cooling; improve fuel utilization; and reduce emissions associated with power generation, all significant concerns under current economic and environmental conditions. The design can achieve an overall energy utilization level of approximately 80%—more than twice the typical efficiency level of a central power plant.

Technology

The PureComfort system consists of four natural-gas-powered 60-kW microturbines integrated with a Carrier double-effect absorption chiller/heater. The system was developed by United Technologies Corporation (UTC) through cost-shared research with DOE/ORNL.

Energy end use	*Annual baseline energy saved (%)*	*Annual cost savings ($)*
Grid electricity	54	44,000
Refrigeration compression	10	10,000
Space cooling compression	70	45,000
Desiccant refrigeration	50	9,000
Space heating	75	21,000
TOTAL		129,000

The key to outstanding system performance is integration. In the PureComfort system, a pre-engineered assembly carries the microturbines and chiller along with gas compressors, a cooling tower, and a chilled-water pumping system. Heat from the microturbines is not wasted but is used to directly power the high-efficiency double-effect absorption chiller. Energy in the turbine exhaust is directly transferred to the chiller working fluid, a more efficient process that also eliminates the need for a heat recovery unit. The double-effect absorption chiller/heater can cool or heat from the same unit while generating no additional emissions.

Benefits

PureComfort 240M systems provide power generation independent of the electrical grid, which is especially important for businesses that carry large inventories of refrigerated goods. Extended power disruptions caused by events such as blackouts and hurricanes leave tons of spoiled food in refrigerated cases in food stores. Producing power on site is more efficient and avoids the losses that occur during transmission. These factors are especially important considering recent increases in power demands and costs and the large cooling energy requirements of food stores, with their rows of freezers and cold cases.

The systems are also environmentally friendly. PureComfort 240M systems produce 40% less CO_2 and 85% less NO_X per megawatt-hour than conventional fossil fuel utility generation. The chiller uses no ozone-depleting fluorocarbons, and the units are quieter than competing technologies.

Shorter and Less Expensive Installation

Pre-packaged systems can reduce installation time by as much as two-thirds and provide corresponding installation cost savings.

Future Work

UTC is continuing to develop more product sizes and additional features based on the PureComfort 240M system. For example, two larger versions have already been introduced: PureComfort 300M and PureComfort 360M, with five and six microturbines, respectively.

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