Masonic Homes of Elizabethtown

- Combined heat and power system
- Five 60 kW microturbines
- Three 300 hp dual-fuel water-tube boilers with low NO_X burners
- Elizabethtown, Pennsylvania

Natural Gas-Fired Microturbines Move Retirement Facility from Coal Era to Cogeneration

The Masonic Homes of Elizabethtown has leaped from the coal era to the energy wave of the future – microturbine-based cogeneration.

The sprawling complex in Pennsylvania's Lancaster County is a continuing care retirement community, children's home and community service organization serving more than 1,400 residents, cared for by 1,200 staff. Open since 1910, Masonic Homes obtained its heat from a coal-fired, high-pressure steam plant that burned approximately 5,000 tons of coal annually. That plant's three coal-powered boilers also produced steam for laundry and other purposes.

To get away from the emissions-creating, inefficient coal-fired steam system and take advantage of Pennsylvania's deregulation of electric utilities, the Masonic Homes' board of directors agreed to install a natural gas-fired distributed energy generation system that would not only supply existing heat and steam needs, but also create electric power.

"It was an opportunity to get out of the business of burning coal for our hot water heating systems," says Jeff Gromis, Facilities Engineer at Masonic Homes. "The co-gen portion of this, which provides electricity and reheats our return loop water, provided enough justification to get away from coal and the emissions issues that go with it."

New high-tech plant

The new co-generation plant consists of five 60 kW Capstone microturbines that produce 300 kW of electricity. They run parallel to the local power grid to provide supplementary power to the entire facility. In case of a power outage, they can back up the three new Bryan low-NO_X emission boilers, which operate on natural gas but can also run on

No. 2 fuel oil. For additional fuel efficiency and even fewer NO_X emissions, heat generated by the microturbines is used to preheat water for the boilers.

Another reason for choosing the Capstone units was their ability to be installed outdoors.

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Study projects savings

McClure, the design-build contractor for the cogeneration project, undertook a life-cycle analysis projecting it would save more than $13 million in energy costs for Masonic Homes over 30 years.

"They made the decision based on return on investment," says Dan Kerr, Director of Design-Build Services at McClure. "We've proven that the pro forma calculations were correct on return on investment."

The Masonic Homes has realized other savings in addition to energy costs.

"We have made some substantial cuts in staffing (in the plant) from two men per shift 24/7 to a single person 40-hours per week," Gromis says. "It has also enabled us to be more environmentally conscious by burning gas instead of coal."

Importance of self-reliance

Being self-reliant energy-wise is important at the Masonic Homes, according to Todd Christ of UGI, the local natural gas utility. UGI extended an existing natural gas service line to the cogeneration plant and added capacity in order to provide the steady pressure required by microturbines.

"The Masonic Homes complex was very independent," Christ says. "They had their own orchards, their own butchers, their own farming. They still want to be pretty independent." That focus on self-reliance includes being able to generate electricity on-site.

"Masonic Homes is a leading-edge thinker," agrees Kerr. "They can envision their campus' being totally self-reliant. It was fulfilling to work with a customer that understood value and that was willing to embrace a new technology."

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