

Yarmarka Shopping Center

It was easy for officials of the Yarmarka Shopping Center in Ukhta, Russia, to choose the new mall's energy source. They could pay outrageous utility bills or install an onsite Capstone Microturbine power plant in a combined heat and power (CHP) application and pay less than half the expected utility costs. Microturbines were the clear choice.

An added bonus: the Capstone system would allow for a gradual increase in power output as the new mall expanded and energy demands grew, thus reducing future capital investments.

Today, three Capstone C65 microturbines sit quietly under the shopping mall's office building. Seven additional C65s and one C1000 are housed in a specially-designed building alongside the mall. Together, the 11 natural gas-fueled microturbines run around the clock, providing all power and heat to the 30,000-square-meter (322,917-square-foot) shopping mall and accompanying warehouse. Not a single kilowatt (kW) of utility power is used to support the large five-level shopping center.

"The combination of technical and environmental characteristics offered by Capstone microturbines made them the indisputable leader



At a glance

Location

City of Ukhta, Republic of Komi, Russia

Commissioned

Stage 1 – 3 C65s – March 2008

Stage 2 – 7 C65s – February 2011

Stage 3 – 1 C1000 – April 2011

Fuel

Natural gas

Technologies

- A Capstone C1000 Power Package.
- Ten C65 microturbines.
- Eleven UT-65 heat recovery units manufactured by Uhta Experimental Mechanical Plant in Russia.

Results

- The shopping center's power costs are less than half of utility costs.
- The CHP system generates nearly 1,700kW of high-quality electricity for the shopping center.
- The 11 microturbines are the mall's prime power source; no utility power is used.
- 2,330kW of thermal power generated by the 11 microturbines heats the shopping center and the domestic water supply.
- The CHP system achieves nearly 90% efficiency.
- The return on investment of the Stage 1 installation was just 2.5 years.

when we made our decision,” said Alexander Yasyulya, Chief Engineer of the facility. “We analyzed existing products in the distributed generation market and chose Capstone microturbines for several reasons.”

He continued, “In addition to allowing us to reduce our initial and long-term capital costs, Capstone microturbines offer a variety of excellent operational features,” added Yasyulya. “They do not demand much maintenance or require personnel onsite available 24/7, plus they are highly automated, and have remote control capabilities. Capstone microturbines do not need oil and coolants for operation, and consequently we eliminated the need to replenish oil and dispose of such engine wastes.”

Total power output of the CHP system, which was installed in three stages from 2008–2011, is nearly 1,700kW, while thermal output reaches 2,330kW. Heat recovery modules capture exhaust heat from the microturbines to heat the building and domestic water.

Total efficiency of the CHP system can reach 90 percent, which meets strict government guidelines that require power efficiency of all heat-generating facilities to remain above 70 percent.

The microturbines’ low emissions, absence of vibration, and minimal noise allowed the power system to be installed next to the busy mall.

Because each C1000 is comprised of five 200kW microturbines, the power system features internal redundancy that allows separate C200s to be placed out of service for routine maintenance without shutting down the entire microturbine power station. This

“Capstone microturbines do not demand much maintenance or require personnel onsite available 24/7.”

*— Alexander Yasyulya, Chief Engineer,
Yarmarka Shopping Center*

dexterity ensures round-the-clock, highly reliable power.

Payback on the first three C65 microturbines installed in 2008 was just 2.5 years. Expected payback of the C1000 and seven additional C65 microturbines is five years thanks to a promised reduction of energy costs when compared to utility power. The highly reliable microturbines save maintenance and labor costs since operational staff are not needed around the clock.

This energy independence allows the mall – an economic focal point in Ukhta – to focus on supporting the economy of the growing city. ■

