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CHP: a game-changer

Capstone's microturbines deliver low-cost energy resiliency by increasing the reliability of supply.

By Drew Robb

A Canadian high-rise condominium complex in Scarborough, Ontario, struggled with electricity and gas bills that accounted for nearly 60% of operating expenses. Faced with rising expenses and an additional budget pinch that included a 28% increase in facility maintenance fees, the complex's owners needed to take urgent steps to bring down costs.

Energy consumption reduction measures included suite metering and automation, switching to LED lighting in common areas and implementing more energy-efficiency equipment. But the biggest gains came via the installation of an on-site combined heat and power (CHP) system to replace utility-provided electricity. This not only lowered energy costs, but it also improved resiliency by increasing the reliability of supply.

Two C65 microturbines from Capstone Green Energy Corp. sit at the heart of the CHP system. As well as electricity, the waste heat from the microturbine exhaust is fed to a 100-ton absorption chiller to improve the efficiency of building heating and cooling systems.

"CHP has been a game-changer in our drive to control energy costs," said Zahir Antia, secretary of the condominium owners' association. "We are very satisfied with our decision to choose Capstone microturbines, as we have minimal maintenance requirements and no complaints of noise or vibration from our residents."

PHOTO COURTESY OF CAPSTONE GREEN ENERGY CORP.

Earlier this year, Capstone Green Energy Corp.'s C65 microturbine was recertified by the California Air Resources Board (CARB) as a distributed generation resource exempt from CARB's emission standards. The C65 was first certified in 2007 and has maintained its CARB certification and compliance with the board's testing standards for the last 15 years.

PHASED INSTALLATION

The CHP system evolved over several phases. The original equipment replaced an old boiler with one Capstone C65 CHP microturbine unit. It generated electricity for over half of the electricity needs of the common areas. During the generation process, the waste heat provided the building and its residents with both hot water year-round and heat during the cold months of the year.

Building on the success of the CHP system, the owners recognized the potential for even greater energy savings and efficiency. That led to a more ambitious trigeneration system. They added a second Capstone C65 CHP unit and followed that with a 100-ton direct exhaust absorption chiller capable of producing 81 tons of refrigeration from the combined exhaust of the two C65 microturbines. The result is a combined cooling, heat and power solution that provides nearly all of the electricity for the common areas and is able to utilize all heat produced year-round. By eliminating an old, inefficient electric chiller and replacing it with a natural gas-based absorption chiller, energy costs were further reduced.

Due to a compact design, the installation fits into the existing penthouse boiler room without the need for changes to the mechanical equipment layout or other structural modifications.

RESULTS

The reduction in energy costs for the complex has been dramatic. The facility saves approximately $90,000 per year from the nearly 75% average CHP system efficiency. The two Capstone C65 CHP microturbines fueled by natural gas provide the condo complex with reliable power, delivering 99% uptime with only 1% downtime only, due to scheduled maintenance requirements. Combined, the two C65 systems have operated problem-free for more than 40,000 hours and have generated more than 2,200 megawatt hours during that time.

As energy costs continue to rise in the region, the annual electricity and gas budget for the building has decreased to $210,000, less than half of its previous amount. As a result, energy costs fell to 21% of the complex's overall operating expenses. Combined with $250,000 in government incentives, the ongoing savings have yielded an attractive return on investment.

According to the owners, grid electricity usage dropped by 94%. As well as greatly lowered costs, those reductions translate into a lower carbon footprint and reduced emissions, which is important to both owners and tenants.

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