



CHP
TECHNICAL ASSISTANCE
PARTNERSHIPS

Towers Two Housing Complex

Rexburg, Idaho

15-kW Packaged Micro-CHP System



Towers II housing complex, Rexburg, ID. Photo Courtesy, Blake Willis

Quick Facts

- LOCATION:** Rexburg, Idaho
- MARKET SECTOR:** Student Housing
- FACILITY SIZE:** 43 units housing 244 students
- FACILITY Total Electrical Energy Use:** 251,390 kWh/year for common area
- EQUIPMENT:** One 10 kW and one 5 kW reciprocating engine
- FUEL:** Natural gas-fired
- USE OF THERMAL ENERGY:** Hot water heating and snow melting
- CHP TOTAL EFFICIENCY:** About 85% at full-load. Meets about 47% of thermal load and 48% of common area electrical loads
- TOTAL PROJECT COST:** \$128,500
- YEARLY ENERGY SAVINGS:** \$15,870
- PAYBACK:** About 5 years with incentives and avoided equipment costs included
- CHP IN OPERATION SINCE:** August, 2016

Site Description

The Towers Two student apartment complex is located near Brigham Young University in Rexburg, Idaho. The 75,000 square foot facility provides 43 units capable of housing 244 students and one unit for a residence manager. The building also contains a game room, 24-hour gym, and assigned underground parking. The 44 rooms each contain two refrigerators and a washer/dryer, with enclosed hallways provided for security reasons.

Reasons for CHP

The Towers II building owners wanted their new student housing facility to be less expensive for students so it would be desirable in the highly competitive student rental market. The Northwest CHP TAP completed a screening technical assistance study and identified the site as a potential candidate for installation of a CHP project in large part due to the presence of coincident thermal and electrical loads that exist over most hours of the year. Based upon CHP TAP input and subsequent analyses and design development, Towers II now operates a CHP system consisting of two natural gas-fired reciprocating engine/generators; with one Yanmar unit rated at 10 kW and one at 5 kW. The reciprocating engines provide electrical energy to serve common room loads with waste heat recovered to provide thermal energy for potable water supply heating and showers plus heat for a snow melt system for their walkways. The CHP units only serves common area electrical loads that are billed through a commercial utility meter. Student electrical energy use is purchased from the local utility and is not offset by the CHP project as units are separately billed through 44 individual electrical meters.

CHP Equipment & Configuration

The two CHP units are managed by a system controller to operate in a thermal load-following mode with the 10 kW unit operating as the lead or baseload machine and the 5 kW unit serving as the lag machine. Both CHP units are capable of being modulated down to 1 kW. Thermal loads are seasonally weather dependent and additionally decline in the summer due to lower student occupancy. The CHP units could also be operated continuously at full output with electrical energy sold to the local electrical utility under a net metering arrangement.



The CHP installation at the Towers II student housing complex consists of 10 kW and 5 kW packaged natural gas-fired Yanmar reciprocating engines.

CHP Design, Installation, and Operation

The CHP project was incorporated into the design of a newly constructed building, thus avoiding some HVAC equipment costs. Two 7.5 kW Qnergy Stirling engines were originally installed but proved to be maintenance intensive and prone to requiring repair or even equipment replacement. They were subsequently removed and replaced by two Yanmar reciprocating engines that were installed under warranty. Since being installed, the Yanmar units have worked smoothly—providing about 120,000 kWh/year of electrical energy and recoverable waste heat that offsets the need to purchase about 8,970 therms of natural gas annually.

Energy Efficiency Benefits

With electrical energy delivered by Rocky Mountain Power priced at about \$0.10/kWh and natural gas provided by Inter-Mountain Gas costing about \$0.76/therm, the annual energy savings provided by the CHP project is about \$18,870. Annual maintenance costs are on the order of \$3,000 based upon \$0.025/kWh of electrical energy generation, leading to an overall operating cost reduction of \$15,870 per year.

Maintenance Requirements

Towers II maintenance staff perform some routine maintenance activities, but for the most part depend upon equipment distributor Highland West Energy to stock spare parts and provide maintenance services for the generating equipment. Towers II did purchase a ten-year “bumper-to-bumper” warranty for the CHP system.

“As a building owner, I have to be concerned about safety and lawsuits. Sidewalk snowmelt capabilities alone are enough to justify putting a CHP system in place as slip and fall hazards are reduced along with ice removal and salt application labor costs. I wish I had a CHP system at my home.”

---Blake Willis, Owner, Towers II

For More Information

U.S. DOE Northwest CHP TECHNICAL ASSISTANCE PARTNERSHIP (CHP TAP)

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