RADISSON SANTA MARIA

PROJECT SUMMARY

The Radisson Hotel of Santa Maria is a 185 room hotel located adjacent to the Santa Maria Airport about 50 miles north of Santa Barbara, California. The hotel has an 80-seat gourmet restaurant/lounge and amenities including conference and meeting rooms, exercise area, outdoor pool and spa. The hotel has provided lodging, dining, professional and business services to the Santa Maria and Vandenberg communities for over 27 years. With the high costs of energy and operations and the need to comply with strict environmental standards and regulations of the South Coast Air Quality Management District, the hotel was a strong candidate for clean, efficient on-site energy generation.

With the support of hotel partner Hardy Hearn, a advocate of energy conservation and distributed power generation, the hotel management team worked with PowerHouse Energy (PHE) to reduce the hotel's cost of electricity, hot water and space heating. Two of Capstone Turbine's C60-ICHP (Integrated Combined Heat and Power) systems were placed into operation in October 2003, becoming the very first of this new integrated CHP product to go online (a 3-unit array of C60-ICHPs at the Irvine, California, Atrium Hotel – featured in the Nov/Dec 2003 issue of *Distributed Energy* magazine – went online shortly thereafter).

PERFORMANCE SUMMARY

On examination of the hotel requirements and the benefits of a distributed generation energy system, the owner/management team approved a PHE-recommended installation of two Capstone MicroTurbine C60-ICHP systems. Capstone's integration of a heat recovery unit and controls provides the hotel with a superior combined heat and power platform while reducing installation time, footprint and impact in the mechanical area. During the winter months, the microturbine array provides a majority of the hotel's hot water, while the boilers remain in a reserve capacity. The system is expected to provide all the domestic water heating needs during the summer months. Above 80ºF, the turbines begin to derate, as all mass-flow devices do. In the extremes of summer temperatures, the microturbine's electrical output can reduce by 10%, yet, any decrease in electrical output in hot weather will result in an increase in thermal output. The microturbines return to peak electrical output during the cooler temperatures that predominate at this facility located just a few miles west of the Pacific coast.

The operating reliability of the ICHP system, including start up and commissioning, has been >99.5%.

INSTALLATION EXPERIENCE

The microturbines each produce 60 kW of electrical energy and 115 kW of thermal energy. A Copeland natural gas compressor boosts inlet gas pressure to the requisite 75 psig. The project is installed in an easily viewable area adjacent to a mechanical area, and is connected to a 200-amp electrical sub-panel and extended gas service. Since the Capstone systems are precertified to the stringent California Air Resources Board 2003 DG emissions and the systems are also precertified to California's statewide Rule 21 interconnection requirements, the installation and startup were quick, easy and had no impact on hotel operations.

Capstone ICHP MicroTurbines were installed in parallel with the hotel's existing PG&E electrical utility connection. The MicroTurbines are run continuously to offset the hotel's average demand of 160 kW; nearly 800,000 Btu/hr of heat is obtained from the compact, top-mounted heat recovery units. The existing domestic, laundry and kitchen hot water loops were reconfigured to circulate 140º F water through a common 500- gallon storage tank to minimize the runtime of the existing hot water boilers. To reduce space heating costs, its existing heat pump/cooling tower closed-loop system was tied into a portion of the microturbine thermal circulation through a plate-and-frame heat exchanger. The captured heat creates a 40º F temperature rise in the water flowing at 80 gpm though the C60-ICHPs, offsetting the hotel's thermal demands.

TAKE AWAY PROJECT FACTS

- Two Capstone C60-ICHP MicroTurbine systems
- Total electrical output: 0-120 kWe at sea level and <80º F
- Total thermal output: 0-230 kWth (784,000 Btu/hr) at full load
- Total fuel efficiency: >82% LHV
- Total thermal recovery capacity: 40ºF rise at 80 gpm (140ºF outlet)
- Total hours of operation: Nearly 2,000 to date.
- Total project cost: $185,000 inclusive of self-generation rebate
- Emissions:
  - 0.15 lb/MWh* NO_x
  - 0.10 lb/MWh* CO
  - 0.0018 lb/MWh* THC
  - 0.0016 lb/MWh* CH_4
  - 0.02 lb/MWh SO_2
  - 560 lb/MWh CO_2
- Estimated saving: >$66,000/yr: 32% IRR or 2.8 year simple payback
- Availability: >99.5%

* Per independent US EPA test of a Capstone C60:
www.epa.gov/etv/pdfs/vrvs/03_vr_capstone60.pdf

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