The new combined heat and power plant system at the University of Central Florida will be powered by Mitsubishi Power Systems' 18KU30GSI natural gas-powered reciprocating engine. The 18-cylinder, vee-stroke engine is rated for continuous operation at 5500 kW, 720 r/min, 60 Hz and has a 300 mm engine bore.

Thinking Outside The Grid

Combined heat and power plant to cut university's electrical expenses

With a 2009-2010 enrollment of more than 53 000, the University of Central Florida has the third highest enrollment in the United States, and with that, a bulging electric bill.

The university, which receives its power from Progress Energy, spends about US$15 million a year on its utilities, an amount it hopes to reduce in order to save money and energy, said David Norvell, the university's director of sustainability and energy management.

The university placed an order with Mitsubishi Power Systems for a combined heat and power plant system designed to lower the university's carbon footprint, produce fewer equivalent emissions and reduce the university's electrical grid consumption.

Mitsubishi Power Systems will furnish the system design, power generation, chilled water, auxiliary, electrical, plant control and pollution abatement systems as its scope of supply. The chilled water equipment features an absorption chiller that captures engine-generated heat and uses that to produce chilled water for the university's cooling system. The power plant is expected to be operational in September 2011, Norvell said.

"We expect to save millions of dollars for the university and reduce greenhouse gas emissions," Norvell said, adding that the expectation is to reduce the university's utility bill by one-third of its current cost. "Right now, the price of gas is less than electricity. That makes the project economically favorable to us."

The US$8 million project became a priority about three years after the university's president, John Hitt, signed the American College & University Presidents' Climate Commitment in 2007. The commitment is a pledge by several colleges and universities across the United States to find ways for their establishments to reduce greenhouse gases in a collective effort to prevent the effects of global warming. The future installation of Mitsubishi's combined heat and power plant system stemmed from the university's involvement in the national effort, Norvell said.

The power plant is powered by a Mitsubishi 18KU30GSI natural gas-powered reciprocating engine. The 18-cylinder, vee-stroke engine is rated for continuous operation at 5500 kW, 720 r/min, 60 Hz. The engine bore is 300 mm, said Todd Shaw, business development manager for Mitsubishi's gas engine program. The engine measures 8.2 m long, 2.9 m wide and 3.7 m in height and weighs 60 tonnes, according to Mitsubishi.

In keeping with the university's commitment to reduce greenhouse gases, the power plant also includes an emissions control system, Shaw said. The emissions control system, selected by Mitsubishi, includes a selective catalytic reduction (SCR) system for reducing nitrogen oxide and an oxidation catalyst system for removing carbon monoxide. At 100% load and 15% oxygen, the system is designed to reduce NO_x emissions to 5 ppmvd, according to the company.

The power plant will be controlled by the Mitsubishi Diamond System (DIASYS). The DIASYS control system is the same control system found in Mitsubishi's large gas turbine power plants using Netmation digital control. The engine's combustion system utilizes the Mitsubishi Real Time Intelligent Control System (M-RICS) integrated with a Solenoid Gas Admission Valve (SOGAV) fuel delivery system designed to provide a fuel-efficient operation.

The power plant, which will measure 15.2 m by 30.5 m, will be located on the southern end of the university's academic core, or the main area where most of the university's academic buildings are, Norvell said. It has a service life between 20 and 30 years, he said. The power plant will be designed to meet noise requirements of 85 dBA near field, Shaw said, adding, "This was important due to the plant's proximity to nearby academic buildings and dorms."

The plan is to break ground on the power plant in March 2011, with the equipment delivered in the May-June timeframe, he said. The university, Norvell said, still plans to use Progress Energy for some of its power supply, especially as a backup source. He doesn't foresee any additional plants in the near future.

"We want to use the power plant in sync with Progress Energy," Norvell said. "If we ever see our power drop out, they'll pick us up."

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