Rowan University

- **Improved reliability and increased efficiency with a cogeneration plant**
- **Reduced operating costs using a hybrid chiller plant**
- **Projected annual savings of $1 million**
- **Reduced greenhouse emissions**
- **Glassboro, New Jersey**

Energy Component of University's Master Plan Addresses Key Facility Concerns

Rowan University, a growing 10,000-student state university in southern New Jersey, was seeking a reliable and cost-effective alternative to purchasing power from the electric grid. Rising energy costs, aging equipment and an extensive expansion project led the university to develop a comprehensive Master Plan with a strong energy component to address the anticipated 50% increase in student population by 2010.

As part of this Master Plan, the administration established an Energy Review Panel comprised of faculty, staff and students to advise on significant energy issues facing the university. The plan's goals of sustainable design, energy efficiency and controlled operating costs may well become a model that others will follow.

Long recognized as an energy efficiency leader in the field of higher education, Rowan launched one of New Jersey's first cogeneration facilities in 1991, and continues to enjoy the resulting energy savings.

"Like quality programs and faculty, our facilities and infrastructure are key to creating a safe, cost-effective, educational environment for our growing student population," says John Imperatore, P.E., Director of Facilities, Resource Management at Rowan University. "By marrying high technology and compact development, we can accommodate future growth and successfully address sustainability, energy efficiency and cost control issues."

Reliability is key

One of the Energy Review Panel's recommendations from an in-depth study of the facilities and mechanical systems was to expand the existing co-generation facility from

1.7 MW to 4.7 MW. With the original natural gas-fired cogeneration plant nearing the end of its useful life cycle, university administration elected to implement this recommendation.

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A new energy complex will house a 3.5 MW and a 1.2 MW Solar turbine unit, the hybrid chilled water plant with steam-driven chillers and high efficiency steam boilers. It will eventually serve 72 buildings totaling nearly 2.5 million square feet.

University anticipates $1 million in annual savings

The new co-generation plant is expected to save the university $1 million annually when compared to the cost of purchasing all its electricity from the grid. The plant is scheduled to be fully operational in December 2007, and will supply approximately 80 percent of the electric power needed on the campus.

The key to a successful co-generation project is the effective recovery and use of waste heat normally exhausted into the air during the generating process. In this case, high-temperature flue gases are being used to produce steam for dual purposes. Primarily, the steam will drive a 2,300-ton York centrifugal chiller for chilled water application. Secondarily, the steam will be piped through the district steam loop for hot water, heating and laboratory usage.

According to Ian Spanswick, Products Manager at Johnson Controls Inc., York Products, "The York YST stream turbine chillers make the most of the available stream to produce chilled water in the most efficient and reliable way.

"The inherent variable speed technology makes the turbine drive the most efficient cooling technology for CHP as it operates throughout the cooling season and is ideally paired with gas turbine systems," Spanswick adds. "The chiller includes automatic controls to simplify the startup and operation of the complete steam turbine chiller and provides a full graphical representation of the system operation. Furthermore, both the electric chillers and steam turbine chiller are derived from the same basic design providing a familiarity to all aspects of the chilled water plant operation and maintenance."

Complementing this technology, traditional electric chillers will provide an additional 2,000 tons of chilled water capacity. This hybrid chiller plant allows Rowan to take advantage of favorable off-peak rates for both natural gas and electric energy and helps guarantee redun-

dancy to ensure continuous operation in the wake of power outages.

"Reliability is the top priority – having the ability to generate our own electric ensures that there is power and light for students, faculty and staff at all times," says Imperatore.

Significant environmental benefits

In addition to saving the university $1 million a year, the cogeneration facility will significantly benefit the environment, according to Imperatore.

By generating its own power, Rowan will enable the electric utility to reduce its greenhouse emissions by 8,000 tons of CO_2. This is the equivalent of planting nearly 1.1 million trees, or taking 1,139 cars off the road, and constitutes 30 percent of the university's greenhouse gas reduction target as a member of the New Jersey Higher Education Partnership for Sustainability.

"Rowan University has a goal to become a model that demonstrates to the students and the community and the region that economic development and environmental protection can co-exist," Imperatore explains.

With the assistance of South Jersey Gas, the local natural gas utility, Rowan will receive $1 million toward construction of the cogeneration plant through the New Jersey Clean Energy program. The payback for this project is anticipated to be eight years.

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