

Cogeneration plant proves value to LSU after hurricanes Success could serve as model for communities, institutions throughout state

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In the aftermath of Hurricane Katrina, when power was lost throughout much of Baton Rouge, the campus of LSU was largely unfazed, thanks to continued power supplied by the new LSU Cogeneration Plant. The plant exemplifies the goals of an initiative called the Clean Power and Energy Research Consortium, or CPERC, which was established under the Governor's Energy Initiative in 2002 to help address critical scientific issues in power and energy generation.

According to CPERC Chairman and LSU Board of Supervisors member Charles Cusimano, the advantages of the Cogeneration Plant are that "it produces energy on site and the excess energy produced by its gas turbine is used to meet heating and air-conditioning needs." In addition, it doesn't utilize extensive transmission lines that can be downed by hurricanes, storm surges or trees falling on the lines. As a result, "both efficiency and reliability are improved, leading to reduced downtime due to power outages."

Cusimano explained that, in a hurricane-prone state such as Louisiana, extensive utilization of cogeneration for local energy needs may help avoid power disruption that normally occur during hurricanes. This is because, with cogeneration, transmission lines are local and are kept short, and the potential of lines breaking is minimized. In the case of LSU's Cogeneration Plant, the distribution system is underground and therefore not subject to wind damage.

"Given the frequency of hurricanes recently experienced by Louisiana, more thought needs to be given to the energy infrastructure of the state and how it should be set up," said Cusimano.

The Cogeneration Plant at LSU is a combined heat and power energy-services project developed for LSU by Bernhard Mechanical Contractors Inc. and designed by Shaw Stone & Webster Engineering of Baton Rouge. The new facility incorporates energy efficiencies, provides environmental advantages and even includes a 40-seat classroom facility for use by engineering students.

At the core of the new energy plant is a turbine engine fueled by natural gas. The gas turbine drives an electric generator and the waste heat from the turbine is recovered in the form of steam, thus "cogenerating" both electricity and steam in a combined heat-and-power process. The gas-turbine generator runs 24 hours a day and can produce up to 20 megawatts of electricity and 150,000 pounds per hour of steam matching the base electrical and maximum steam load of the LSU campus. The new plant is capable of providing a substantial portion of the cooling and all of the heating requirements necessary for LSU's academic departments, research facilities, campus housing and sporting events.

The captured steam produced by the new cogeneration facility can be used directly by the university's heating system or as the energy source to produce an additional 6,000 tons of air conditioning for the campus, depending on weather conditions. The ability to capture waste heat while producing electricity is an environmental boon, and improvements to the campus's 13.8 kilovolt electrical distribution system was an added benefit of the project.

According to Cusimano, "When Hurricane Katrina hit New Orleans, the administrative offices of both University of New Orleans and LSU Medical School relocated to the LSU. The Lod Cook Conference Center and Hotel provided housing to many of the LSU people displaced from New Orleans."

"The LSU campus never lost power because the cogeneration plant was on site and not dependent on the transmission grid," he added. "We were able to work on LSU business right through the hurricane and this brought home to me how important cogeneration is in a hurricane-prone state like Louisiana. CPERC can provide the needed leadership for effective utilization of cogeneration in Louisiana and for technology improvements to cogeneration systems."

CPERC is a synergistic effort that brings together the Turbine Innovation and Energy Research Center, or TIER, at LSU; the Energy Conservation and Conversion Center at the University of New Orleans; the Bio-Energy Laboratory at Nicholls State University; the Advanced Materials Research Laboratory at Southern University; and the Entergy Energy Institute at Tulane University. CPERC's mission is to lead technological developments in the area of energy generation that will reduce energy costs, improve reliability and minimize environmental impact.

The Cogeneration Plant provides opportunities for CPERC researchers to examine current technology and to improve these technologies for future systems. The TIER Center at LSU is partnering with GE Power Systems and the Department of Energy in a unique relationship aimed at developing the next generation gas turbines with improved efficiency and reduced losses. According to TIER Center Director and LSU Professor Sumanta Acharya, "Such a broad-based partnership blends fundamental research with the development of improved energy generation technology leading to reduced fuel utilization."

This research is being conducted, in part, under the auspices of the TIER Center, which is spearheading research in several areas including: improving performance and reliability of gas turbines leading to reduced fuel utilization; use of synthetic gas from coal or biomass and Liquefied Natural Gas for energy generation; reducing emissions from power plants; and development of fuel cell technology for energy and power.

The LSU Cogeneration Plant project is an example of how CPERC is partnering with industry and government. The Cogeneration Plant is located in the historic Audubon Sugar Building. Auxiliary equipment is located inside and adjacent to the existing Central Power Plant Building.

For additional technical information, contact Acharya at acharya@me.LSU.edu or 225-578-5809. For more information on the potential benefits of cogeneration, visit http://www.epa.gov/combdhpp/what_is_chp.htm.

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