

POWERFUL PARTNERSHIP

An alternative energy production facility planned for Acadia Parish will provide UL faculty and students with research opportunities while generating power for Louisiana utility customers.

Cleco Power LLC will build a \$1.5 million gasifier on a five-acre site in Acadia Parish Industrial Park, adjacent to interstate and rail transportation. The project is a partnership among Cleco, NorthStar Resources LLC, Acadia Parish and UL Lafayette's College of Engineering. Construction is set to begin this summer.

Dr. John Guillory, associate professor and acting head of UL Lafayette's Department of Mechanical Engineering, is the lead designer of the facility. He collaborated with EDG Inc., an international engineering firm based in Louisiana.

Dr. Mark Zappi, dean of UL Lafayette's College of Engineering said the gasifier will be a training facility where students learn to make fuels.

"A gasifier can transform any combustible material," he explained. Material is burned at high temperatures with low levels of oxygen. Instead of burning completely, the raw material is converted into syngas, or synthesis gas, a mixture of hydrogen, carbon monoxide and carbon dioxide. Syngas can be processed further to generate electricity or create liquid fuels or other chemical compounds.

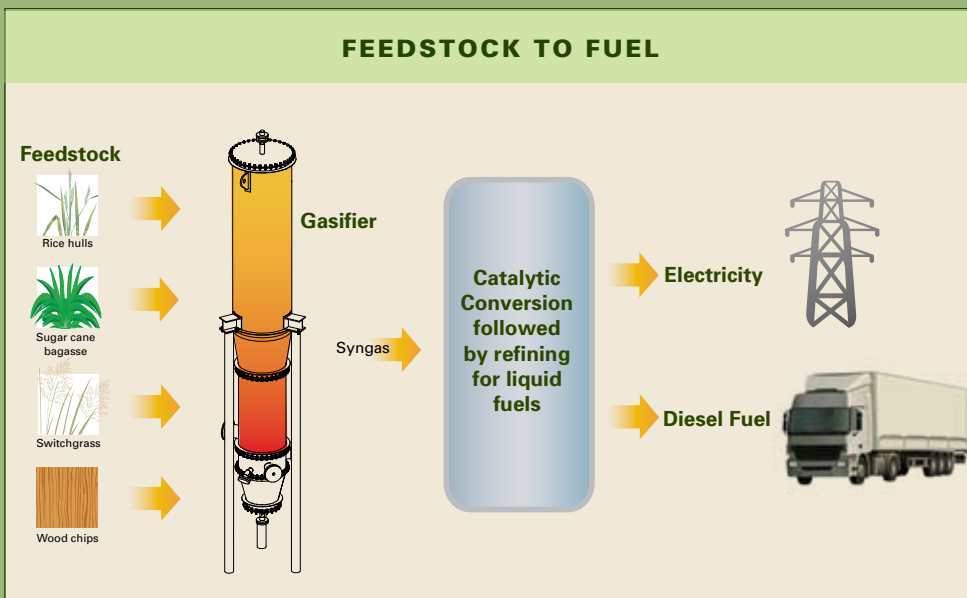
"We're essentially ripping apart complex chemicals and reducing them to their building blocks. Then we can reassemble those chemicals into compounds we want to produce," Zappi said.

Students and faculty will explore the energy potential of rice hulls, sugar cane bagasse, poultry litter and sewage sludge. Researchers are also considering cultivated energy crops, such as switchgrass, a perennial grass native to Louisiana's coastal prairie, and giant reed, a grass that produces a bamboo-like stalk. The facility is designed to process three tons of material each day.

"UL Lafayette will be one of a few institutions to have access to a large-scale facility," said Zappi. The facility will be a model for commercialization of full-scale gasifiers. "It is designed exactly as an industrial facility, with all of the safety systems and protocols in place," he said.

Ben Russo, director of market development for Cleco, said the research and development facility will help his company form long-range plans for investment in alternative energy. "We've been moving in this direction for about two years, but we still have lots of unanswered questions about what materials will work best and what the overall cost may be.

"We want to look at a wide variety of renewable energy sources. Ultimately, the research conducted by the UL Lafayette group will help us determine a cost-benefit ratio for a variety of materials. We want to know, for instance, how much energy we can produce from a ton of rice hulls or a ton of wood chips." ■



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diesel, so it doesn't present those challenges. It remains fluid in cold temperatures and can be used in existing industry infrastructure. It can be blended with diesel and produces lower emissions than traditional diesel.

"Because of the obvious advantages, energy companies are moving away from investing in biodiesel development in favor of renewable diesel," Dufreche said.

UL Lafayette scientists are addressing two primary challenges in biofuels research: developing high-yield feedstocks, or biological source material, and cost-effective extraction and refining methods. (See related article, page 27.)

THE MOST DESIRABLE FEEDSTOCKS for biodiesel contain high amounts of fat, which can be refined into fuel. Chinese tallow trees, for example, are "an almost perfect feedstock" for green diesel, Dufreche said. That's because their white, waxy seeds yield large amounts of polysaturated fat.

"To produce renewable diesel, you have to introduce high levels of hydrogen into the refining process. If you're working with a highly saturated feedstock, it's already full of hydrogen to begin with," he said.

In addition to tallow trees, the UL Lafayette research team is analyzing alligator fat as a fuel source, Dufreche said. "We can look at almost any oil as a basis for research. What we want to know is: Can we develop technology to produce that fuel in a way that is both cost efficient and environmentally responsible?"

LOUISIANA SWEET POTATOES MAY be a source of fuel, according to research under way in UL Lafayette laboratories. The work is being led by Dr. Rakesh K. Bajpai, a professor of chemical engineering. Bajpai, who came to UL Lafayette from the University of Missouri-Columbia, is an internationally known biofuels expert.

Satish Patil is a graduate student working in Bajpai's lab.