

WFU researchers are developing a cheaper way to make biodiesel

May 4 2009, Richard Craver

Biodiesel is not likely to replace gasoline as the main source of transportation fuel in most of our lifetimes. But researchers at Wake Forest University are convinced that they have a formula for a catalyst that could lower the cost of producing biodiesel enough so that it could provide 5 percent of the nation's needs.

"If we, as a nation, can do that, that's enough biodiesel to replace the need for oil from a country such as Iraq," said Abdessadek Lachgar, a chemistry professor at the university and one of two officials supervising the project along with Marcus Wright, a lab manager and investigator in the biodiesel work.

Biodiesel is a renewable, clean-burning fuel that also reduces tailpipe emissions. It depends primarily on feedstock crops.

One goal of the Biofuels Center of North Carolina is developing a statewide industry that would produce at least 10 percent of the liquid fuels sold in the state by 2017. According to the center's Web site, 15 companies in North Carolina are working with biofuel, including one in the Triad -- Gortman Biofuel LLC of Winston-Salem, which produces a 100 percent version of biodiesel.

Analysts say that there has been plenty of competition and methodologies for producing a lower-cost catalyst for biodiesel but little sustainable, cost-effective success.

The most commonly used raw material for biodiesel is soybean oil.

But the high cost of soybean oil has stifled major production efforts. It was at 36.7 cents a pound yesterday, but the price has been double that at times in the past two years, rising with the cost of fuel oil. At many biodiesel plants, soybean oil accounts for as much as 80 percent of the operating cost.

Wake Forest's Terrafinity project doesn't depend on soybean oil. It relies on a method that, like making sausage, may produce results but is not for the squeamish.

The Wake project uses vegetable-oil waste, animal-fat waste, recycled cooking grease and even oils extracted from municipal sewage- and water-treatment plants. Other scientists are exploring algae as a source. The researchers get some of the raw materials for free, and for now pay a nominal price for other supplies.

Every alternative-fuel option could help motorists in the long term, according to Lachgar and Gwyn Riddick, the regional director of the Piedmont Triad office of the N.C. Biotechnology Center.

"Combining all these feedstock sources to create biodiesel can ease reliance on diesel and the burdens that accompany that dependence," Lachgar said.

Lachgar said that the main challenge with using the waste from vegetable oil, animal fat and recycled cooking grease is the high presence of free fatty acids, which significantly impair biodiesel production.

That's where the Terrafinity catalyst comes into play. Researchers are developing an inexpensive method for converting the free fatty acids into biodiesel with a yield greater than 98 percent in less than 15

minutes. The catalyst can be produced for 11 cents a gram in the laboratory, although Lachgar said that the per-gram cost will be significantly reduced in a commercial setting.

The initial build-out cost for the project is about \$85,000 -- \$70,000 for a building large enough to handle production and \$15,000 for the equipment and safety features. Researchers are pursuing grants and eventually plan to pitch their technology to energy companies, such as Duke Energy Corp.

Lachgar, his team and the university have enough confidence in Terrafinity that it is being considered for a "know-how" classification, meaning they feel that it is more important to seek copyright status for the technology rather than just a patent.

About 10 percent to 20 percent of academic-licensed technologies at the university include know-how or copyrightable material, Stephen Susalka said. He is the assistant director of the Office of Technology Asset Management for Wake Forest University Health Sciences.

Lachgar said that researchers are focusing on a commercial-grade company to produce the catalyst in large quantities, as well as end-user companies that will use the [catalyst](#) for biodiesel production downstream. Marshallton Research Laboratories Inc. of King is working with researchers. Its officials deferred comment to Wake Forest.

Generating commercial revenue from university patents is big business at Wake Forest and other research-oriented universities. The tech-transfer office works with faculty members, students and staff members to identify, protect and transfer research discoveries to the commercial sector for development into new products.

In October, Wake Forest was ranked by Forbes.com as the No. 2

university in the country for return on research investment based on discoveries made by medical and technology researchers. For 2006, Wake Forest had a 41 percent return on investment, or about \$61 million on research spending of about \$146 million.

One roadblock is that there are few retail outlets for bio--diesel in North Carolina. On the Nearbio.com Web site, there are three listed in the Triad -- Gortman Biofuel at 39 Barrier Road in Lexington and Triad Biofuels at 2775 Turner Road in Lexington and 1242 Dorris Ave. in High Point.

"We sell our B100 biodiesel to everyone but don't pump it into on-road vehicles," said Derrick Gortman, the owner of Gortman Biofuel.

"It's hard for me from a cost perspective to run different blends, so I run it at 100 percent. If people want to blend it themselves to run in their vehicles, legally they can but they take on the legalities of the blending."

Gortman said he uses primarily vegetable-oil waste for his biodiesel blend, but he has experimented with other options.

"If someone can come up with a less expensive way, that would be great since it's hard for me to break even right now compared with straight diesel," he said.

Steve Troxler, the state's agriculture commissioner, said that biofuels can play an important economic-development role.

"We can stimulate our economy and boost jobs, strengthen our energy security, and help the environment by growing crops and livestock and turning some of that biomass into [biodiesel](#)," Troxler said.

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