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Diesels Eat Their Vegetables

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By Steven Sellers

Spectators craned their necks to see the new-fangled motor and hear the cadence that would pace the Industrial Revolution. Rudolph Diesel's invention, powered by peanut oil, earned the highest award of the 1900 World's Fair of Paris and symbolized the petroleum age even though it didn't use a drop of fossil fuel. Now, mired in an oil crisis, the diesel engine has returned to its roots: vegetables.

It was France that chose peanut oil for the exhibition. The value of the sustainable fuel was clear to the government, which had tropical colonies where the nuts grew plentifully. The inventor himself speculated, with irony plain today, that the engine's vegetable fuel might be as important as the engine itself.

"The fact that fat oils from vegetable sources can be used may seem insignificant today," Diesel wrote in 1912, a year before his death, "but such oils may perhaps become in course of time of the same importance as some natural mineral oils and the tar products are now."

Diesel was right. The conversion of "biomass"—soy, hemp, corn, sugarcane, palm oil, switch grass, algae, and biodegradable waste—into biofuel is the leading edge of renewable energy research. Biodiesel, a type of biofuel, is created from vegetable oil that has been specially treated through a process called transesterification. In warm weather, it can be used unblended (called B100) and, in colder climates, mixed with regular diesel (B50, B20, B5).

Biodiesel isn't cheap—it generally costs 15 percent more than regular diesel—but it's clean, renewable, domestic, and almost pollution-free. A U.S. Department of Energy report concluded in 1998 that, compared to regular diesel, biodiesel produced 78 percent less carbon dioxide emissions, 50 percent less ozone and carbon monoxide, 47 percent less particulate emissions, 67 percent less hydrocarbons, no sulfur emissions, and substantially less cancer-causing compounds.

And burning biofuel smells pleasant. It has a french-fried aroma that may have moved the 1900 World's Fair crowd from the cotton candy stands (which debuted at the fair) to the popcorn carts. In a pinch, Diesel's engine would have run just fine on the oil used to cook the corn.

Gus Kellogg knows that aroma, and he wants more of it wafting throughout the shoreline. He's the founder of Greenleaf Biofuels in Guilford, a biodiesel distribution firm, and he plans to build a 6-million-gallon capacity plant in New Haven to manufacture biodiesel from used cooking oil.

“There’s been slow but steady growth in the industry,” says Kellogg. “We have people and businesses who call in, especially with the rise in petroleum-based diesel fuel prices, inquiring about biodiesel, thinking that it’s cheaper. Demand will increase when the price of petroleum falls.”

Interest in renewable fuels peaks in times of crisis (vegetable fuels were used in World War II) and when petroleum prices soar. According to the National Biodiesel Board, the industry’s trade association, 57 biodiesel plants were under construction nationwide in 2008 and three more were being expanded. A plant in Southington already is capable of producing 4 million gallons of biodiesel from recycled cooking oil.

“We run my wife’s VW Bug on biodiesel and in a small diesel powerboat,” says Dave Logan, a resident of Stony Creek. Logan, who writes for the energy blog www.newenergywatch.com and is a former editor for *Practical Sailor* magazine, says he uses biodiesel as a matter of principle.

“I regard alternative energy as a necessity for national security, for national economic recovery, and for the environment,” says Logan. “Biodiesel is just a small part of the picture right now, but that’s why I use it on principle. All of these alternatives need to be encouraged. I look forward to the day when we can produce biodiesel in a more energy-efficient way, and without threatening food stocks.”

Logan refers to one criticism of biodiesel and ethanol: that the crops used for their production put pressure on farmland and irrigation otherwise would for food. But, as Kellogg points out, the biodiesel industry is relatively small and, in any event, the conversion of used cooking oil applies no such pressure.

Killingworth’s Enrico Melchiorri needs no convincing that biodiesel is the way to go. He uses biodiesel to heat his home (he just installed a special bio-friendly furnace), in his pickup truck, and in his diesel-powered Smart Car.

“When I go to Starbucks, I could sell a hundred of these,” Melchiorri says of his diminutive diesel, which resembles a giant lemon slice on wheels. “I bought it from a fellow who had imported it from Canada,” he explains. “You can’t buy them in the United States yet. People ogle it more than they do the Lotus.”

With that, Melchiorri colorfully proves that biodiesel is cool by parking his eye-popping orange Lotus next to his 50-mpg lemon slice. He announces that the Smart Car is his favorite.

“I use biodiesel because it’s clean and it has no sulfur,” says Melchiorri. “I’m optimistic about its future because everywhere I go, people are excited about this car and the fact that it runs on biodiesel.”

There’s reason for his optimism. The latest research focuses on algae and some species of the plant—the most complex of which is seaweed—can produce as much as 100 times the oil yield of soy. Grown in brackish water on land unsuitable for farming, algae ponds

don't compete with food crops or limited water resources and the leftover biomass can be converted to ethanol. The first algae-to-biofuel plant opened in Texas last spring, and the operator, PetroSun Corporation, estimates it will produce 4.4 million gallons of oil and 110 million pounds of biomass annually from a series of ponds covering 1,100 acres.

Will we embrace biodiesel or step around it like Long Island Sound seaweed? It's a question like that pondered by Rudolph Diesel, who knew the importance of biofuels, but not how long the idea would lie dormant. He wasn't alone. Jules Verne predicted another of today's alternative fuel inventions—compressed air cars—in his 1863 novel, *Paris in the Twentieth Century*. The book wasn't published until 1994.

Melchiorri takes no chances in publishing his view—he says it lies in escaping the old technology we've tinkered with for decades. As he scoots away in the Smart Car, french-fried fumes in his wake, he proclaims, “It's biodiesel, it's solar, and it's wind, folks.”