

Biodiesel Basics

How to Run Your Car on Used Salad Oil

by Erica Gies

For financial, political and environmental reasons—including the fact that we may soon reach the peak of oil production, after which fossil fuels will get increasingly expensive—Americans are trying out biodiesel, both in their vehicles and (mainly in the Northeast) for home heating.

Biodiesel emits 78 percent less carbon dioxide (CO₂) emissions than petroleum diesel, according to the National Biodiesel Board, but it's not necessarily squeaky green. According to Kathryn Phillips, manager of Environmental Defense's California Clean Air for Life campaign, it actually increases nitrous oxide (NO_x) emissions, which react with other chemicals to create ground-level ozone, or smog, significantly impacting lung development in children.

However, Phillips adds that the biodiesel industry is working on methods to reduce NO_x via an additive or catalyst. NO_x emissions result from the catalytic conversion process and therefore aren't a problem when biodiesel is used for home heating.

Another area of concern is that biodiesel is often made from genetically engineered (GE) soybeans, and is a product of the industrial agriculture system that results in topsoil loss and fertilizer runoff. Actress and biodiesel advocate Daryl Hannah counsels caution about the developing industry, warning, "It may encourage people to use more pesticides and GM crops. We shouldn't cut off the nose to spite the face.

Without workarounds, biodiesel faces cold-weather issues since it becomes unusably gelatinous as the temperature approaches freezing. Still, in spite of its challenges, biodiesel is a far greener alternative than petroleum, according to its advocates. "Particulate matter from diesel is a really bad pollutant and a carcinogen," says Phillips. And in spite of its long-held reputation as being a premium-cost fuel for elite environmentalists, after shortages caused by Hurricanes Katrina and Rita the price of biodiesel became quite competitive with standard fuel oil for Northeastern homeowners with oil burners.



Triple biofuels dispenser at Baca Street Biofuels Stations

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Take Action

If you want to use the alternative fuel to wean yourself off Big Oil, step one is to buy a diesel car or truck, since gasoline vehicles can't burn biodiesel. (However, Hannah points out that gasoline-powered cars can be converted to run on alcohol/ethanol. She's put the TransAm from her film Kill Bill up on blocks until she gets a chance to do the conversion.)

There are three basic fuels available to biodiesel drivers: B100 (pure, processed biodiesel from retailers), B20 (a blend of 20 percent biodiesel and 80 percent regular petroleum diesel, also available from retailers), and fryer oil ("recycled" oil from restaurants that is not sold commercially).

B100 and B20 can be put directly into any diesel engine. If drivers are unable to find biodiesel (or if it's too cold to use the higher blends), they can simply switch to standard petroleum diesel. B20, because it is mostly diesel fuel, can be used virtually year-round.

The best solution for using B100 in the winter is to use a heated filter or a tank heater, both of which plumb the coolant system to heat the fuel to 180 degrees Fahrenheit. Once the engine is warmed, it alone can keep the biodiesel at the proper viscosity. Robert Lewis, technical service specialist at fuel filtration products company Racor, says his company sells these devices for \$200 to \$400. But, he adds, "You still need a second tank with diesel fuel for the starting and shutting down sequence, because you don't want the oil to gel inside the filter when it gets cold."

Lewis says he gets the most calls from customers who want to run their vehicles on straight used vegetable oil, also known as SVO. For people willing to mix petroleum with their biodiesel, engine gizmos aren't necessary. Instead, you can mix your fuel in different concentrations throughout the year, as biodiesel advocate Charris Ford did when he lived in Telluride, Colorado. He used 50 percent petroleum diesel in the winter and 25 percent in the spring and fall, running 100 percent biodiesel only in the summer.

Blended biodiesel fuels sold commercially can be made from recycled oil, the most environmentally friendly option. Using recycled oil consumes a waste product, which boosts its carbon neutrality. But John DeCicco, a senior fellow at Environmental Defense, points out that virgin biodiesel is not necessarily "carbon neutral" as advertised. That claim comes from the fact that the plants grown to make the fuel absorb CO₂ as they grow, offsetting the exhaust produced when burned.

"Did you fertilize that plant?" asks DeCicco. "Did you till the field? Did you truck it somewhere? Where did that energy come from? There's a lot of bookkeeping that has to be done to figure out whether a specific batch of biodiesel is actually carbon neutral."

Jorah Roussopoulos, co-owner with his partner Andi Rubalcaba of the first solar-powered biodiesel pump in the country in Ben Lomond, California, understands this implicitly. It's for that reason he stocks recycled B100 at his store whenever he can get it.

Other biodiesel drivers want the freedom to drive up to a restaurant's grease pit, filter the used fryer oil, and put it directly in their tanks. Worried about the supply? There is an estimated 4.5 billion gallons of used vegetable oil generated every year, according to passionate advocate (and country singer) Willie Nelson. For that capability, you need a conversion kit. Massachusetts-based Greasecar sells one that includes a special biofuel tank, filters, heat exchangers and plumbing. A turn-key conversion costs \$1,500, but if you're mechanically inclined, you can install it yourself for \$795. Missouri-based Greasel also makes a kit.

Before you run out and buy that brand-new, diesel-powered VW Passat, you might want to consider warranty issues. Volkswagen currently only approves the use of B5, according to spokesperson Patrick Hesper. (Further, VW diesels are not currently sold in some states because they fail to comply with strict California emission regulations.) General Motors offers only one diesel vehicle in North America, the Duramax 6.6 liter V-8 turbo, and it too only approves the use of B5.

There are only 200 or so biodiesel stations in the country, according to Greg Pahl, author of *Biodiesel: Growing a New Energy Economy*. So enthusiasts in some communities are forming cooperatives to get their fixes. Still, the stuff isn't cheap, often selling for a dollar or so more than unleaded gas. Roussopoulos sells his B100 for \$3.65 a gallon, a price at which he says he's losing money. "The whole idea right now is to raise awareness," he says. "Somebody has to do it."

Heating Oil Too

Some homeowners in the Northeast are getting biodiesel blended into their home furnace mixes whether they asked for it or not. Oil companies in Connecticut, for instance, are assuring customers that this exotic new fuel won't damage their boilers. Devine Brothers, a veteran home heating specialist in Norwalk, Connecticut, has taken out billboards, trumpeting the virtues of blended biodiesel, which in a two-year test administered in the Warwick, Rhode Island school system performed better than conventional heating oil in both burner efficiency and emissions.

Customers of Santa Fuel, also Connecticut based, are getting a five percent biodiesel blend at no extra charge. "This is something we believe in as a company," says general manager Peter Russell. "It's a renewable product that is good for the environment. Five percent is not a lot, but it's a great start."

The Central Connecticut Biodiesel Consumer Cooperative, helmed by mechanical engineer Karl W. Radune, is working to convince consumers that B100 won't harm their furnaces. Some experts are concerned that B100 will erode the rubber seals in furnace pumps, but Radune says a few dollars worth of Teflon replacements will sidestep the problem.

Environmental concerns, coupled with high fuel-oil prices, are making biodiesel more popular for various uses. Biodiesel production is up markedly across the country, from 18 million gallons in 2002 to 30 million gallons in 2004, according to the National Biodiesel Board.

Soybean oil is the most popular for biodiesel, but canola works well and people are experimenting with other sources. France has distilled excess wine into fuel. A professor at the University of Illinois planted a field trial of a grass called Miscanthus that grows 14 feet tall and has been bred to be sterile, so it won't go haywire as an invasive species. Roussopoulos mentions certain algae that produce as much as 50 percent oil and can grow in brackish sewage ponds.

Many options are not yet in play that could further reduce our carbon footprint, but biodiesel pioneers aren't waiting. They're driving down that black ribbon of highway, French fry fumes floating in their wake.

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