



BIODIESEL

FACT SHEET: USING BIODIESEL FUEL IN ALAMEDA COUNTY

FOCUS: USE IN HEAVY-DUTY VEHICLES

*"Our engines have done great and we are very interested in biodiesel as a long term fuel option."
Ben Horenstein, East Bay Municipal Utility District (EBMUD), Manager of Environmental Services.*

What is biodiesel?

Biodiesel is a clean burning alternative fuel produced from domestic, renewable resources such as vegetable oil or animal fat. Biodiesel contains no petroleum, but it can be blended at any percentage with petroleum diesel to create a biodiesel blend. Biodiesel can be used in compression-ignition (diesel) engines with little or no modifications. Biodiesel is simple to use, biodegradable, nontoxic, and essentially free of sulfur and aromatics.

Biodiesel is the 100% pure, unblended, biodiesel fuel. It is referred to as B100 or "neat" biodiesel.

How is biodiesel used?

Biodiesel can be used as a pure fuel or blended with petroleum in any percentage. B20 (a blend of 20% by volume biodiesel with 80% by volume petroleum diesel) has demonstrated significant environmental benefits with a minimum increase in fleet operations costs.

Is it approved for use in the U.S.?

Biodiesel is registered as a fuel and fuel additive with the U.S. Environmental Protection Agency (EPA) and meets clean diesel standards established by the California Air Resources Board (CARB). Neat (100%) biodiesel has been designated as an alternative fuel by the Department of Energy (DOE) and the U.S. Department of Transportation (DOT).

Is biodiesel the same thing as raw vegetable oil?

No. Fuel-grade biodiesel must be produced to strict industry specifications (ASTM D6751) in order to insure proper performance. Biodiesel that meets ASTM D6751 and is legally registered with the Environmental Protection Agency (EPA) is a legal motor fuel for sale and distribution. Raw vegetable oil cannot meet biodiesel fuel specifications, it is not registered with the EPA, and it is not a legal motor fuel.

Can I use biodiesel in my existing diesel engine?

Yes. Biodiesel can be operated in any diesel engine – in buses, fire trucks, and street sweepers, for example - with little or no modification to the engine or the fuel system. Ensure that only fuel meeting the biodiesel specification is used. Biodiesel has a solvent effect that may release deposits accumulated on tank walls and pipes from previous diesel fuel storage. Initially, the release of deposits may clog filters and precautions should be taken.

Why should I use biodiesel?

Biodiesel is better for the environment and human health because it is made from renewable resources and has lower emissions compared to petroleum diesel (see www.biodiesel.org/pdf_files/fuelfactsheets/emissions.pdf). Exhaust from petroleum diesel is associated with a host of health concerns including cancer, asthma and allergies. Biodiesel emissions have been found to reduce 75% to 85% of some potential cancer causing compounds.

- **Biodiesel offers similar power to diesel fuel**

Operationally, biodiesel blends perform very similar to low sulfur diesel in terms of power, torque, and fuel without major modification of engines or fuel systems.

One major advantage of biodiesel is the fact that it can be used in existing engines and fuel injection equipment with little impact to operating performance. Biodiesel has a higher cetane number (measurement of ignition quality of diesel fuel) than most U.S. diesel fuel. In more than 50 million on-road miles and numerous marine and off-road applications, biodiesel shows similar fuel consumption, horsepower, torque, and haulage rates as conventional diesel fuel.

- **Biodiesel improves lubricity**

All diesel fuel injection equipment has some reliance on diesel fuel as a lubricant. The lubricating properties of diesel fuel are important, especially for rotary and distributor type fuel injection pumps. In these pumps, moving parts are lubricated by the fuel itself as it moves through the pump—not by the engine oil. Low lubricity fuel may cause high wear and scarring and high lubricity fuel may provide reduced wear and longer component life.

Lubricity results of biodiesel and petroleum diesel using industry test methods indicate that there is a marked improvement in lubricity when biodiesel is added to conventional diesel fuel. Even biodiesel levels as low as one percent can provide up to a 65% increase in lubricity in distillate fuels.

Biodiesel in cold weather

Temperatures below 10° F are rare in the Bay Area, but such cold weather can cloud and even gel any diesel fuel, including biodiesel.

Users of a 20% biodiesel blend with #2 diesel will usually experience an increase of the cold flow properties (cold filter plugging point, cloud point, pour point) at approximately 2° F to 10° F. Precautions employed for petroleum diesel are needed for fueling with 20% blends. Neat (100 %) biodiesel will gel faster than petroleum diesel in cold weather operations. Solutions for winter operability with neat biodiesel are much the same as that for low-sulfur #2 diesel (i.e., blending with #1 diesel, utilization of fuel heaters, and storage of the vehicle in or near a building). These same solutions work well with biodiesel blends, as does the use of cold flow improvement additives.

Where do I get biodiesel?

Biodiesel is available nationwide. It can be purchased directly from biodiesel producers and marketers, petroleum distributors, or at public pumps throughout the nation. For more information, visit www.biodiesel.org/buyingbiodiesel/guide.

To find fueling stations in your locale, go to www.eere.energy.gov/afdc/stations/find_station.php for the **Alternative Fueling Station Locator** of the U.S. Department of Energy (DOE) Energy Efficiency and Renewable Energy. Enter your fuel type, location and search radius to find refueling stations across the country.

Listed below are the fueling stations located within a 50 miles radius of Oakland, CA as of August 2008. Use the contact information to double-check fuel type and availability.

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| BioFuel Oasis 510-665-5509 2465 - 4th St. Berkeley | Golden Gate Biodiesel 925-228-2223 3575 Pacheco Blvd. Martinez | Rotten Robbie 650-965-2609 310 No. Whisman Rd. Mountain View | Valley Oil 650-967-2253 785 Yuba Dr. Mountain View |
| Royal Petroleum 707-763-1279 2645 Petaluma Blvd. So. Petaluma | People's Fuel 415-250-9114 1745 Folsom St. San Francisco | Rotten Robbie 408-259-5535 1304 Piedmont Rd. San Jose | Western States Oil 408-292-1041 1790 S. 10th St. San Jose |

Defining and Specifying Biodiesel

For entities seeking to adopt a definition of biodiesel for purposes such as federal or state statute, state or national divisions of weights and measures, or for any other purpose, the official definition consistent with other federal and state laws and Original Equipment Manufacturer (OEM) guidelines is as follows:

Biodiesel is defined as mono-alkyl esters of long chain fatty acids derived from vegetable oils or animal fats which conform to ASTM D6751 specifications for use in diesel engines. Biodiesel refers to the pure fuel before blending with diesel fuel. Biodiesel blends are denoted as, "BXX" with "XX" representing the percentage of biodiesel contained in the blend (i.e.: B20 is 20% biodiesel, 80% petroleum diesel).

Who's using biodiesel in the Bay Area?

Success Stories

- In 2001 **Norcal Waste Systems**, headquartered in San Francisco, built the first liquefied natural gas (LNG) fueling station in the Bay Area. They use LNG, a cryogenic fuel, in five collection trucks and in eight transfer trucks. In March 2007, the remainder of their truck fleet, 335 collection trucks and 37 transfer trucks, switched to biodiesel.

The biodiesel is B20, a blended fuel including 20% biodiesel made from vegetable oil and 80% low-sulfur diesel. By switching to LNG and B20 biodiesel, they will reduce greenhouse gas emissions by 5,400 tons (10.7 million pounds) a year, a 21% decrease.

- Following suit, the **City and County of San Francisco** announced in November 2007 that 100% of the City's approximately 1,500 diesel vehicles have been converted to run on biodiesel, a month earlier than the goal set in 2006. The City's diesel fleet includes MUNI buses, several fire engines, ambulances and street sweepers, among other vehicles. The conversion from traditional diesel fuel to biodiesel is made using B20, a mix of 20% biofuel and 80% petroleum diesel fuel. The switch translates to displacing approximately 1.2 million gallons of diesel fuel each year.

San Francisco's progress on biodiesel conversion puts the City on track to meet its commitments under the Local Climate Action Plan, which calls for reducing greenhouse gas emissions to 20% below 1990 levels by 2012.

- **East Bay Municipal Utility District (EBMUD)** scientists and engineers have been working to create and test biodiesel fuel made from the dirty kitchen grease that would otherwise be flushed down local restaurant sewer lines causing blockages and potential overflows. In August 2007, they finished a pilot program that produced 50 to 100 gallons a month, and are in the process of determining how biodiesel could be produced on a large scale.

"We've run four diesel trucks on it with 100% biodiesel and different blends, and we've had a lot of success," said Ben Horenstein, manager of environmental services. Over the next year, EBMUD will be looking at several alternatives for waste cooking oil and grease as well as options for large scale biofuel production.

Blue Sky Biofuels is one of only two commercial-scale manufacturers of biodiesel in the Bay Area (the other is LC Biofuels in Richmond). The company collects spent vegetable oil and grease from area restaurants, hauling it to the company's East Oakland plant where it is transformed into biodiesel (see www.blueskybio-fuels.com).

Early Lessons

In 2003, the **City of Berkeley** converted its fleet to biodiesel. The result was the loss of two diesel engines due to a bad batch of 100% biodiesel. Berkeley's experiment with biodiesel in city vehicles was a lesson in the importance of the need for quality fuel. In 2007, the City reintroduced biofuels, this time mixing 80% petroleum diesel with 20% biodiesel. The City's agreement with the fuel provider held the company responsible for vehicle-engine damage.

In March of 2008, the City awarded a ten-year contract to supply biodiesel fuel for city vehicles. They currently use B20, a blend of 20% biodiesel and 80% petroleum diesel fuel, with the option to increase the percentage of biodiesel until B100 is reached. The contractor must meet the standards of the National Biodiesel Accreditation Program (see www.bq-9000.org).

New Developments

- To further reduce greenhouse gas emissions and the state's dependence on fossil fuels, the **California Department of Transportation (Caltrans)** conducted a \$100,000 six-month pilot project to determine the feasibility of using B20 biodiesel fuel, derived mainly from recycled cooking oil in Southern California.

About 20 Caltrans vehicles (trucks and construction equipment) in Indio ran on B20 biodiesel. The project concluded in July 2007 and the results are being analyzed by the University of California, Riverside. In the meantime, Caltrans is continuing to use B20 biodiesel fuel and is expanding use to other maintenance stations in the area.

Biodiesel is seen as a viable option for Caltrans because the infrastructure is already in place, with about 230 diesel fuel sites statewide that would need only minor, relatively inexpensive, modifications.

- The **Joint BioEnergy Institute (JBEI)** is headquartered in Emeryville and serves as one of three new U.S. Department of Energy (DOE) Bioenergy Research Centers. JBEI's primary scientific mission is to advance the development of the next generation of biofuels – liquid fuels derived from the solar energy stored in plant biomass that can replace gasoline.

TIPS FOR USING BIODIESEL FUEL

- Ensure the biodiesel meets the ASTM specification for pure biodiesel (ASTM D6751) before blending with petroleum diesel.**
- Check fuel filters on the vehicles and in the delivery system frequently upon initial biodiesel use, and change them as necessary.**
- Be aware of biodiesel's cold weather properties and take precautions as with #2 petroleum diesel use in very cold weather.**
- Be aware of biodiesel's compatibility with engine components.**
- Wipe painted surfaces immediately when using biodiesel.**
- Properly store biodiesel and safely dispose of biodiesel blend soaked rags to avoid spontaneous combustion.**
- Use stored biodiesel within six months.**

Source: The National Biodiesel Board (NBB). NBB is available to answer additional questions regarding the transition to biodiesel fuel use. NBB: (800) 841-5849, info@nbb.org, or www.biodiesel.org.

StopWaste.Org is the Alameda County Waste Management Authority and Recycling Board operating as one public agency.

www.StopWaste.Org, 877-STOPWASTE (786-7927)

This Fact Sheet was adapted with permission from
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