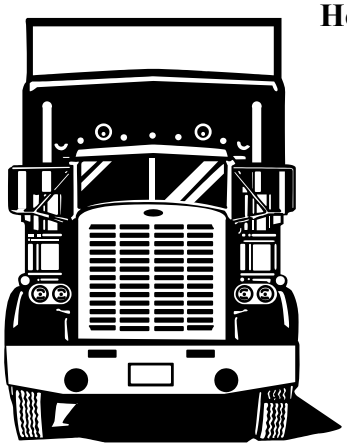
Biodiesel

What is biodiesel?

Biodiesel is an alternative fuel produced from vegetable oils and/or animal fats. Biodiesel is made up of ethyl esters, which are separated from glycerin through a process called transesterification. Biodiesel can be used in diesel engines with little or no modifications. It can be used alone, or blended with petroleum-derived diesel[1].



How does biodiesel compare to petroleum diesel?

- Biodiesel provides 118,000 BTUs to diesel's 130,500 BTUs per equivalent weight, meaning biodiesel is about 90% as efficient. This means horsepower and torque are changed very little, and gas mileage remains nearly the same.
- Biodiesel increases lubrication over petroleum diesel, reducing wear, increasing engine life, and cleaning injectors and fuel pumps and lines.
- B20, a diesel fuel blend including 20% biodiesel, reduces particulate discharge by 14%, total hydrocarbon emission by 13%, and carbon monoxide emission by 7%.
- B100 (100% biodiesel) is nearly completely free of sulfurs and benzene, a carcinogen[1].

So it burns cleaner. Are there other reasons biodiesel is good for the environment?

- Biodiesel is made from materials that are already part of the carbon cycle. In contrast, petroleum diesel releases carbon that has been locked underground for millions of years. Thus, biodiesel does not contribute to new CO_2 emissions.
- Biodiesel does not release harmful vapors at regular temperatures.
- Biodiesel is less toxic per unit weight than table salt, and is as biodegradable as sugar[1,2].

What are the disadvantages of biodiesel?

- High percentage blends of biodiesel (>B20) may thicken at higher temperatures than petroleum diesel, necessitating the use of fuel line and tank heaters. However, Central Valley (Spokane) school buses have run with B20 at –23° F with no problems.
- Rubber or nitrile seals in older (pre-1993) fuel pumps may deteriorate more rapidly when used with higher percentage blends of biodiesel, but can be replaced with newer seals.
- B100 (pure biodiesel) generally costs between $1.50 and $2.00 per gallon, with fuel taxes increasing the actual cost by 50 cents or more. B20 (20% biodiesel) costs about 15 to 20 cents per gallon more than pure petroleum diesel.
- When higher percentage biodiesel is initially used in an engine that has previously been used with petroleum diesel, it may break up deposits left by the previous fuel, clogging fuel filters.

Why isn't there biogasoline?

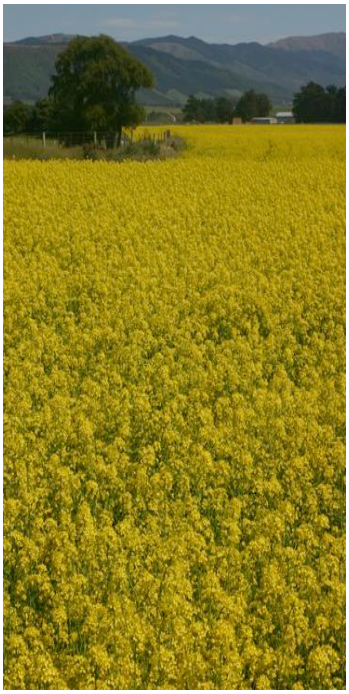
- There is! Biogasoline can be made from the same oils as biodiesel. However, the process is much more involved because the oil molecules actually have to be broken to make lighter biogasoline. This makes biogasoline many times more expensive than biodiesel to manufacture from plant and animal oils[3].

What is the connection between the Palouse and biodiesel?

- The University of Idaho has taken a leadership role in the development of biodiesel technologies. The University of Idaho used to make biodiesel for use at Yellowstone National Park, although the park has now gone to a commercial vendor.
- Many of the oilseeds that can be used to provide the raw material for biodiesel can be grown on the Palouse. Soybeans, sunflowers, and rapeseed are the most typical sources. Rapeseed has the highest yield, and also grows quite well on the Palouse[1].

You have me interested now. Where can I get biodiesel, and how much does it cost?

- Unfortunately, biodiesel is substantially more expensive than petroleum diesel. This is largely because of the raw material costs – vegetable oil typically costs $1.50 to $3.00 per gallon, while at the time this fact sheet was composed, crude oil was selling for $0.71 per gallon.
- There are currently three retail filling stations in Idaho, with one each in Boise, Shoshone, and Twin Falls. There are also several retail filling stations in Washington, with the nearest in Spokane.
- Nonetheless, there may be other sources for biodiesel – it may be purchased from distributors or through private co-ops.
- In late January 2004, B20 was selling for $1.90/gallon, and B100 for $2.85/gallon at the Acme Fuel station on Lilly Road in Olympia, WA. Petroleum diesel was retailing for $1.63/gallon.



The oilfields of tomorrow could look very different from those of today.

Want to learn more?

Attend a Biodiesel Evening Forum April 7 at the Palouse Discovery Science Center from 7:00 to 9:00 p.m.
Contact PCEI for more information – (208) 882-1444 or visit http://www.pcei.org/education/adult.htm

References:

[1] "Biodiesel Basics". Available at http://biodiesel.org.
[2] Spokane County Conservation District. Available at http://www.sccd.org/biofuel.
[3] United Nations Industrial Development Organization. 2003. Final report: expert group meeting on cleaner technology for green chemistry and promotion of other related projects. Proceedings: Trieste, Italy. May 26-27, 2003.
[4] University of Idaho Biodiesel Page. Available at http://www.uidaho.edu/bae/biodiesel