

BIODIESEL: BACKGROUND AND INFORMATION

What is Biodiesel?

Biodiesel, short for “biological oil”, is one of the alternative fuels that is produced from renewable resources. Specifically, it is a mono alkyl ester produced from vegetable oil, canola oil, soybean oil or animal fats. Waste animal fats and used frying oils (known as “yellow grease”) are also potential feedstocks. Just like petroleum-derived diesel, biodiesel operates in diesel compression engines, including those used in vehicles and stationary electrical generator units. It can be used in a 100 per cent pure fuel formulation or as a blended component with petroleum derived diesel. The most common blend is called B20, which is 20 per cent biodiesel and 80 per cent petroleum diesel. Essentially, no engine modifications are required, and biodiesel maintains the payload capacity and range of petroleum-derived diesel.

Biodiesel Production Process

The most common way that biodiesel is produced is through a process known as transesterification. The reaction begins when an alcohol, such as methanol, is catalyzed, usually by sodium hydroxide (NaOH). This mixture is then added to oil that is derived from oil seeds or animal fats. The process is relatively simple and does not produce any waste products. It is important to note that this is a required process in the use of biodiesel, and raw oils should not be used as substitutes.

For a detailed explanation of the biodiesel production process please refer to:

http://www.biodiesel.org/pdf_files/fuelfactsheets/prod_quality.pdf

What are the advantages to using biodiesel?

The use of biodiesel results in substantial reductions of unburned hydrocarbons, carbon monoxide (CO) and particulate matter (PM). For example, the use of pure biodiesel (B100) can result in reductions of PM and CO by 50 per cent, and reductions of unburned hydrocarbons by 70 per cent. All of these substances have been identified by Environment Canada as harmful to human health. Also, biodiesel has no sulfur content, and is thus compatible with the next generation of diesel engine pollution reduction devices, such as particulate filters, which require ultra-low sulfur diesel fuel for effective operation. When used in diesel engines there is a slight increase in nitrogen oxides (NO_x). This increase is negligible when biodiesel is blended with petroleum diesel. This increase does not occur when biodiesel is used in furnace heaters.

Biodiesel is an easy alternative fuel to use because it can be used in most diesel equipment, in fact adding biodiesel increases the lubricity of the fuel, which can increase the life of the engine and its components.

Because biodiesel can be produced domestically from renewable sources, such as canola or other oil seed crops or crop-residue, it is virtually CO₂ neutral. Its use does not contribute to global warming.

Because biodiesel is non-toxic and readily biodegradable, accidental spills or leakage from storage tanks pose less of a risk to ground water and the environment in general when compared to petroleum derived fuels. Biodiesel is also safer to handle because it has a higher flash point, meaning that it requires a higher temperature to ignite.

For a complete overview on biodiesel please see:

http://www.climatechangecentral.com/info_centre/discussion_papers/015Biodiesel_Discussion_Paper.pdf

Tips for biodiesel use

The Engine Manufacturers Association approves of the use of the B5 blend of biodiesel. Manufacturers should be consulted if higher blends are to be used. See below for examples of successful use with higher blends of biodiesel. Pure biodiesel (B100) has been approved as an alternative fuel in the U.S., and in Canada, the government approves of any biodiesel meeting the standards of the American Society for Testing and Materials (ASTM).

Current Usage and Experience with Biodiesel

Biodiesel has been in use in the United States and Europe for several years, but is only recently gaining popularity in Canada. In 2004, approximately 3.5 million litres of biodiesel were used in Canada. The federal government has set a target of 500 million litres by 2010. Many firms in the U.S. are now producing commercial quantities of biodiesel, and in 2004, approximately 25 million gallons (94.6 million litres) of biodiesel were produced.

For more information biodiesel producers and marketers please refer to:

<http://www.biodiesel.org/buyingbiodiesel/guide/default.shtm>

Canadian examples of biodiesel use include the Toronto Hydro fleet, non-emergency vehicles in the City of Calgary's fire department, and the transit systems in Brampton, Saskatoon, Montreal and Tofino.

For more information on biodiesel in Canada please see:

<http://oee.nrcan.gc.ca/transportation/vehicle-fuels.cfm?attr=0>

Major users of biodiesel in the United States include the Federal and State governments, public transit authorities, large commercial fleet operators and underground mine operators. A few examples include the U.S. Military, which uses B20 biodiesel fuel at different stations and bases across the States, the Maysville and Blackriver mines, which use B35 biodiesel in all their underground equipment, and most Clark County School District Buses run on B20 biodiesel.

For a more complete list of current users of biodiesel, please see:

http://www.eere.energy.gov/afdc/apps/afvinfo_niche.html

In May 2001, the first publicly accessible biodiesel refueling stations in North America opened in San Francisco, California and Reno, Nevada. Both stations offer B20 and B100 (100 per cent pure biodiesel) products at their pumps. There are currently approximately 315 biodiesel refueling stations in the United States. The first public biodiesel pump, offering B20, in Canada opened in March 2004 in Unionville, Ontario; and in April 2005, a second pump was opened in Sproat Lake, B.C.

For more information on current international applications for biodiesel and other background information, please see:

<http://www.greenfuels.org/>