

Over the last several years, interest in biodiesel has been driven by a variety of concerns including environmental quality, reducing reliance on imported oil and using renewable “home-grown” energy sources. Most efforts to date by the biodiesel industry have focused on financial incentives, supply, and production aspects, with less attention to the vehicle use and performance characteristics. While biodiesel does offer some advantages, there are many factors to be considered in making an overall assessment of the value of using biodiesel.

What is biodiesel?

Biodiesel fuels are derived from a variety of biomass sources through a chemical process called transesterification, where glycerin is separated from methyl esters derived from fat or oil. The methyl ester product is what is known as biodiesel and must meet the standards set forth by the American Society of Testing and Materials (ASTM D6751).

The most common feedstock in the U.S. for biodiesel production is soybean oil, while rapeseed oil is used more frequently in Europe. Biodiesel may be blended with petroleum-based diesel fuel at which point it is designated as BXX, where XX represents the percentage of pure biodiesel contained in the blend (e.g. B5 or B20).

What are the performance implications of using biodiesel?

Biodiesel use can reduce emissions of sulfur oxides and sulfates as well as unburned hydrocarbons, carbon monoxide, and particulate matter. While biodiesel has been shown to increase NOx emissions, recent studies indicate that emission levels may vary depending on the duty cycle of the engine, testing methods used and the particular blend. Since NOx is a precursor to ozone, use of high percentage blends of biodiesel in areas with ozone problems should be considered in relation to local air quality conditions.

Other concerns include potential oxidation, microbial growth and changes in performance characteristics in vehicles and when stored in underground tanks over an extended period of time without use. Some biodiesel blends can negatively affect cold starts, fuel flow properties and result in an initial need for greater fuel filter maintenance. Depending on the blend, fuel economy may be reduced due to biodiesel's slightly lower energy content.

What relationship is there between biodiesel, the new Ultra-low Sulfur Diesel (ULSD) fuel and 2007 and 2010 diesel engine emissions standards?

None. ULSD is 100% petroleum based, however the sulfur content has been drastically reduced from 500 to 15 parts per million (ppm). ULSD will be available at most diesel fueling stations by October 15, 2006. Use of ULSD alone will provide an approximate 10% reduction in PM emissions. Biodiesel blends for on-road use are not required to be mixed with ULSD, however light and heavy-duty vehicles manufactured after 2007 that require the use of ULSD can only use biodiesel blends if they are made with ULSD. Manufacturers are working to identify the feasibility and potential impacts of using various biodiesel blends on these next generation engines and new emissions control technology like particulate traps and catalytic converters.

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Are there biodiesel quality and performance standards in place?

There is a standard for B100 to be used as a blendstock (ASTM D6751) and for conventional diesel fuel which must be more than 99% petroleum based (ASTM D975). No standards currently exist for blended biodiesel, however the Engine Manufacturers Association has released a test specification for blended fuel with 20% biodiesel content to facilitate further testing and evaluation of B20 blends in their equipment (www.enginemanufacturers.org). The absence of ASTM standards for biodiesel blends prevents the proper testing and evaluation of their impact on engine performance, emissions and the operation of aftertreatment systems.

What is the problem with using higher biodiesel blends?

The primary concern is one of quality assurance. While many people can produce biodiesel, the production of biodiesel that meets the ASTM standard is more difficult. And even once ASTM standard biodiesel fuel is produced, it can be contaminated as it moves downstream to marketers and distributors.

As the percentage of biodiesel in the blend increases, sensitivity to the quality of the biodiesel increases proportionately. Also, storage stability and cold flow performance issues associated with biodiesel become more critical.

What about used vegetable oils from fast-food restaurants or straight vegetable oils – can those be used in diesel cars or trucks?

Use of recycled cooking oil or other animal fats that have not undergone the transesterification process are not biodiesel and are not recommended for many reasons including unknown performance and engine impacts, uncertain fuel quality, and variability in oil types and purity. While they may work in a diesel engine, the vehicle is unlikely to perform to manufacturers' specifications and may cause problems such as fuel injector plugging, cold weather freezing, and fuel pump, tank and pipeline clogging.

Can biodiesel help the United States reduce its dependence on foreign oil?

In theory the answer is yes. According to the National Biodiesel Board (NBB), current annual biodiesel production capacity is at 395 million gallons, or approximately 1% of annual on-road petroleum diesel use in the United States. At this level of production, there is not enough biodiesel to support a national B2 standard, but biodiesel production is growing exponentially and every bit helps reduce dependence on foreign oil.

What is the diesel industry doing to support greater use of biodiesel?

Most engine and vehicle manufacturers have issued statements about warranty coverage on varying blends of biodiesel, with many approving of blends up to B5. Higher percentage blends or off spec fuel could cause a variety of engine performance problems which would not be covered under manufacturers' warranties. Individual manufacturer warranty information is available at www.dieselforum.org.

Despite these potential problems, the diesel industry is proactively working to better understand the impact of biodiesel use in their products to address broader energy and air quality concerns. Many diesel engine, fuel injection, and vehicle companies are working with the NBB as part of a B20 Fleet Evaluation Team to develop a position on the use of up to a 20% biodiesel blend in diesel engine applications in the United States.

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