



## **GOOD NEWS FOR THE ENVIRONMENT & HEALTH, *Right Now!!!***

A number of recent studies and reports are focusing new light on the growing environmental and health benefits of using biodiesel. This includes, among others, emissions improvements, positive energy balance and life cycle benefits.

### **It's More Than Just the Popcorn Smell!**

The Environmental Protection Agency (EPA) has released a technical analysis of biodiesel emissions data entitled *A Comprehensive Analysis of Biodiesel Impacts on Exhaust Emissions* [EPA420-P-02-001, October 2002, [link to study here](#)]. EPA analyzed 80 prominent biodiesel emissions studies, including research performed by the U.S. Department of Energy, the U.S. Department of Agriculture, Lovelace Respiratory Research Institute and Southwest Research Institute.

The report shows the following results when neat biodiesel (B100) and 20 percent biodiesel (B20) are used to power unmodified engines, when compared to petroleum diesel:

<b><u>Pollutant</u></b>	<b><u>B100</u></b>	<b><u>B20</u></b>
Total Unburned Hydrocarbons	-67%	-20%
Carbon Monoxide	-47%	-12%
Particulate Matter	-48%	-12%
NOx	+10%	+2%

The EPA study shows more reductions per gallon of biodiesel burned when biodiesel is used at levels around 20% biodiesel (B20), making B20 or lower blends optimal for overall emissions benefits for air sheds who want to reduce particulate matter, carbon monoxide, and ozone related unburned hydrocarbons emissions.

### **Biodiesel's Future: An Implementing Technology for 90% NOx Reductions**

While biodiesel in unmodified diesel engines does not affect NOx or can show a slight increase in NOx, biodiesel is an extremely high lubricity, high cetane, virtually zero sulfur fuel. Biodiesel can be used in low levels (i.e. B2) to provide the needed lubricity for S15 diesel fuel (so called Ultra Low Sulfur Diesel Fuel, where sulfur is less than 15 ppm), or it can be used as a pure fuel in these new technologies.

Biodiesel serves as an implementing fuel technology for these new diesel engines and after-treatment technologies which go into effect in Model Year 2007. Compared to today's engines, these new diesel engine and after-treatment systems will provide:

- Over 90% reduction in NOx emissions
- Over 90% reduction in particulate emissions

### **Reducing NOx Through Use as a Home Heating Fuel and Additives**

The NOx options don't stop with new technology. Biodiesel has been tested in home heating (i.e. boiler applications) and the open flame technology used in these applications allows a B20 blend to reduce NOx by approximately 20%. This break-through research is just now hitting the market, and is likely to change the thinking about biodiesel and NOx for home heating and industrial boilers! In addition, several tests conducted by private companies and the National Renewable Energy Laboratory have indicated NOx reductions of up to 5% with B20 blends. Contact the NBB for the latest information.

### **Biodiesel Reduces Other Air Toxics and Cancer Compounds**

*Biodiesel reduces the health risks associated with petroleum diesel.* Biodiesel emissions show decreased levels of PAH and nitrated PAH compounds, which have been identified as potential cancer causing compounds. In the recent testing with B100, PAH compounds were reduced by 75 to 85 percent, with the exception of benzo(a)anthracene, which was reduced by roughly 50 percent. Targeted nPAH compounds were also reduced dramatically with biodiesel fuel, with 2-nitrofluorene and 1-nitropyrene reduced by 90 percent, and the rest of the nPAH compounds reduced to only trace levels.

### **Biodiesel Has Positive Energy Balance, Reduces Life Cycle CO2 Emissions a Whopping 78%**

Biodiesel is produced by a reaction of a natural oil, like soybean oil, with a simple alcohol like methanol or ethanol. Since growing plants to produce the oil takes up carbon dioxide, biodiesel has a closed carbon cycle, dramatically reducing CO2. In addition, biodiesel is produced only from the oil contained in the plant seed, like soybeans, and oil is Mother Nature's way of storing energy so it is already intrinsically high in energy content. This is much different than other fuels which may use the entire plant or seed for production. Starting with a high-energy density oil made from soybeans, a [DOE/USDA analysis found:](#)

- A 78% life cycle decrease in CO2 emissions when compared to petroleum diesel fuel.
- A 3.24 to 1 positive life cycle energy balance, beginning with bare ground and counting all inputs for growing, harvesting, processing and transportation.

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