



**Biodiesel Association of Canada**  
**Association canadienne de biodi sel**

# BIODIESEL BENEFITS

 2005 Biodiesel Association of Canada (613) 799-4897 • Fax: (613) 792-1399 [www.biodiesel-canada.org](http://www.biodiesel-canada.org)

## **Biodiesel Reduces Regulated Emissions**

Biodiesel reduces tailpipe particulate matter (PM), hydrocarbon (HC), and carbon monoxide (CO) emissions from most modern four stroke CI engines. In 2002, the US Environmental Protection Agency (EPA) released a comprehensive technical report of biodiesel emissions data that shows biodiesel use can reduce emissions of particulate matter by 47 percent when compared to petroleum diesel in unmodified diesel engines. The report also verified a 67 percent reduction in unburned hydrocarbons and a 48 percent reduction in carbon monoxide with pure biodiesel (B100).

While the technical report, which compiled 39 scientific biodiesel studies, is not official rulemaking, it provides a government-validated reference point for biodiesel emissions reductions data. The chart below provides the results of the EPA report for B100 and B20.

<b>Biodiesel Emissions Compared with Petroleum Diesel</b> (according to EPA biodiesel technical report)		
<b>Emission Type</b>	<b>B100</b> (100% Biodiesel)	<b>B20</b> (20% Biodiesel)
<b><u>Regulated</u></b>		
Total Unburned Hydrocarbons	-67%	-20%
Carbon Monoxide	-46%	-12%
Particulate Matter	-47%	-12%
Nox	+5%	+2%
<b><u>Non-Regulated</u></b>		
Sulfates	-100%	-20%
PAH (Polycyclic Aromatic Hydrocarbons)	-80%	-13%
NPAH (Nitrogenous PAH)	-90%	-50%
Ozonated potential of speciated HC	-50%	-10%

### <sup>1</sup> **Particulate Matter (PM)**

Breathing PM is a proven human health hazard. PM emissions testing reveal that the use of biodiesel is 47% lower than overall PM emissions from petroleum-based diesel.

### **Hydrocarbons**

Hydrocarbon emissions contribute to local smog and ozone. The total hydrocarbon emissions of biodiesel were 93% lower and speciated hydrocarbon emissions are as much as 50% lower than those of standard diesel fuel.

### **Sulfur**

Sulfur is a major component of acid rain. The exhaust emissions of sulfur oxides and sulfates are essentially eliminated with 100% biodiesel (B100).

### **Nitrogen Oxides**

NOx emissions also contribute to smog and ozone. Canada is at the forefront of NOx reduction technologies. Importantly, biodiesel reacts differently to an open flame than it does in a compression engine, resulting in a significant reduction of NOx in boiler and home heating applications.

### **Carbon Monoxide**

Exhaust emissions of the poisonous gas carbon monoxide are 50% lower with biodiesel than the carbon monoxide emissions from standard diesel.

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Ultra Low Sulfur Diesel (ULSD) regulations phasing-in in both Canada and the US through 2006-7 will require that sulfur levels in diesel fuel be reduced from 500 parts per million (ppm) to 15 ppm, a 97 percent reduction. The petroleum industry and equipment manufacturers recognized during the rulemaking process that the refinery changes necessary to meet this requirement will also dramatically reduce lubricity of the diesel fuel. Biodiesel is uniquely positioned to address the need for a lubricity additive because in ULSD diesel because it offers superior lubricity even at low blends. For example, a one percent blend of biodiesel can improve lubricity by as much as 65 percent according to tests done by Stanadyne Automotive Corp. Biodiesel has virtually no sulfur and already meets the 2006 ULSD standards in Canada and the US.

Biodiesel also significantly reduces carbon dioxide on a lifecycle basis, which is valuable to Canadians under our Kyoto commitments and proposed national regulations surrounding carbon equivalent emissions reductions, as well as offsets credits for voluntary and mandated emissions reductions.

### **Biodiesel Displaces Petroleum Diesel**

When Biodiesel displaces petroleum, it reduces greenhouse gas (GHG) emissions such as Carbon Dioxide (CO<sub>2</sub>). When fossil fuels are burned, 100% of the CO<sub>2</sub> adds to the concentration levels in the air. Because fossil fuels are used to produce biodiesel, the recycling of CO<sub>2</sub> with biodiesel is not 100%, but substituting biodiesel for petroleum diesel can reduce life-cycle carbon emissions (LFEs) by 78% or more, depending on the feedstock used. B20 will reduce LFEs on average, by 15.66%.

### **Biodiesel has a Better Energy Balance**

The fossil fuel required to produce biodiesel is only a fraction (31%) of the energy contained in one gallon of fuel. You get 3.2 units of fuel energy from biodiesel for every unit of fossil energy used to produce the fuel. Because biodiesel is energy efficient, it can extend petroleum supplies and makes for sound domestic energy policy.

### **Biodiesel and Human Health**

Some PM and HC emissions from diesel fuel combustion are toxic, suspected to cause cancer, asthma and other life threatening illnesses. Using B100 can eliminate as much as 90% of these “air toxics.” B20 reduces air toxics by 20% to 40%.

Biodiesel is less toxic than table salt and as biodegradable as sugar. In its pure form it can be handled, stored and transported under the same guidelines as vegetable oil.

### **Biodiesel is Easy to Use**

In blends of B20 and less, biodiesel is literally a “drop-in” technology. No new equipment and no equipment modifications are necessary. B20 can be stored in diesel fuel tanks and pumped with diesel equipment. There are some caveats and precautions that should be taken to ensure a trouble free B20 experience and some mistakes to be avoided, as discussed in the [2005 Fleet Manager’s Guide](#).

### **Biodiesel Blends are Accepted by All Major Diesel Engine Manufacturers**

Most engine Original Equipment Manufacturers (OEMs) have declared a lack of harmful effects for B5 and lower blends based on a statement by the leading fuel injection equipment suppliers, as long as the biodiesel meets ASTM D6751 and/or the European Biodiesel specification. Some OEMs recognize higher blend levels.

Engine and vehicle manufacturers provide a material and workmanship warranty on their products. OEMs will not and cannot void warranties based solely on the use of biodiesel. If an engine that uses biodiesel experiences a failure unrelated to biodiesel use, it should be covered by the OEM’s warranty. Warranties are only violated if the

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biodiesel is the cause of the equipment malfunction. This is the same practice as with traditional diesel. In such a case, the fuel most likely does not meet specification and the fuel supplier will be accountable.

### **Biodiesel Blends are Compatible with Existing Infrastructure**

Biodiesel blends of B20 and less are compatible with existing fueling transportation, storage and fueling infrastructure. There are several important caveats in this regard, and more in-depth information is available in the [2005 Fleet Manager's Guide](#) or the various BAC publications listed here.

Blends of B20 or less will minimize any cleaning effect or solvency issues with accumulated sediments in tanks, although minor filter plugging may be observed during initial weeks of B20 in some cases. B20 or lower blends minimize issues for material compatibility. Experience over the last 10 years with B20 indicates compatibility with all existing elastomers in diesel fuel, even those that are sensitive to higher blends, such as nitrile rubber.

### **Biodiesel has Higher Cetane than Petroleum Diesel**

All B100 fuels meeting the ASTM D6751 standard must have a cetane number above 47, which is higher than most diesel fuel produced in North America. The Higher Cetane in biodiesel and biodiesel blends provides easier starting, quieter operation and a more complete burn that will result in lower emissions.

### **Biodiesel Prolongs Engine Life**

By 2006, all Canadian and US highway diesel will contain less than 15 ppm sulfur – ultra low sulfur diesel fuel (ULSD). In the on-road market, low-level blends of biodiesel such as 1% or 2% can improve lubricity of diesel fuels and this may be particularly important for ULSD as these fuels have poor lubricating properties. Engine Manufacturers depend on lubricity to keep moving parts, especially fuel pumps, from wearing prematurely. Even 2% biodiesel can restore adequate lubricity to dry fuels such as kerosene or Fischer-Tropsch diesel.

### **Biodiesel Attracts Tax Incentives & Funding Opportunities**

Biodiesel is exempt from the Federal Excise Tax, and from Provincial Road Tax in several jurisdictions under varying schemes. The federal government announced their production target of 500 million litres (132.1 million gallons) by 2010, exempted biodiesel from the federal CAN\$.04 road tax, committed CAN\$11.9 million to biodiesel initiatives over four years to support demonstration projects in the area of biodiesel use in various applications, blend ratios, regions, and temperatures and, in the 2005 budget, stated it will work with the provinces and territories, industry and other interested stakeholders on ways to expand the production and use of renewable transportation fuels.

### **Biodiesel is Supportive of Local Agriculture**

Biodiesel can be manufactured from a variety of feedstocks, including canola and soy. Agricultural interests across Canada are working to develop Biodiesel as a sustainable, environmentally friendly and novel product made from our vast quantities of bioresources. Plant development is underway at several locations in Saskatchewan, and elsewhere in the country.

### **Biodiesel Reduces Non-Regulated Tailpipe Emissions**

One of the first benefits people notice when using biodiesel or biodiesel blends is the smell. Using biodiesel can make diesel exhaust smell better; more like cooking odors. Visible tailpipe is reduced by 35% with a B20 blend.

### **Biodiesel is Biodegradable and Non-Hazardous**

In its pure form (B100), biodiesel does not attract application of Canadian or US hazardous materials legislation – it is completely biodegradable and, believe it or not, non-flammable (ie. the flashpoint for biodiesel is more than 200 degrees F). This allows for creative, flexible and convenient transportation, storage and integration of Biodiesel (B100) into existing fueling infrastructure to achieve the desired blend at any point in the fueling value chain.

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### **Biodiesel is Tried, Tested and True**

Biodiesel has undergone rigorous testing including emissions, health effects and road-worthiness. As a result of these tests, biodiesel is a registered fuel with Environmental Protection Agency (EPA), meets clean diesel standards established by the California Air Resources Board (CARB) and is an alternative fuel recognized by the U.S. Department of Energy (DOE) and the Department of Transportation (USDOT). In Canada the CGSB has adopted the ASTM as the minimum acceptable specification for B100 biodiesel blend stock. In 2004, approximately 3.5 million litres (~ 875,000 gallons) of biodiesel was used in Canada with that number to increase in 2005.