



## Biofuels

The last decade has seen a tremendous growth in the use of biofuels to replace petroleum-based transportation fuels. Ethanol production has grown from 0.2 billion gallons in 1980 to over 2.1 billion gallons in 2002. Rural economies not only benefit from growing the raw materials for biofuels, but can also benefit by being involved in the production of biofuels. Minnesota ethanol plants, most owned by farmers, produce over 400 million gallons of ethanol a year, nearly 20 percent of current U.S. production.<sup>1</sup>

**What is ethanol?** Also referred to as ethyl alcohol, grain alcohol, or ETOH, ethanol is a clear liquid with an agreeable odor. Ethanol is made by fermenting and distilling simple sugars. Today, ethanol is produced from crops such as corn, grain sorghum, wheat, sugar, and other agricultural feedstocks. Most ethanol produced in the U.S. is derived from corn—latest figures indicate that 10% of the U.S. corn crop is dedicated to ethanol production. In Brazil, the world's top producer of ethanol, sugar is the primary feedstock. Since it is produced from crops or plants that harness the power of the sun, ethanol is a renewable fuel.

**What do E85 and E10 mean?** E85 is a mixture of 85 percent ethanol and 15 percent gasoline, E85 is a leading alternative fuel used in the U.S. Over 3.5 million autos run on E85 fuel, and it can be purchased at approximately 200 refueling sites in the U.S., nearly 100 of them in Minnesota. When E85 is not available, these "flexible" fuel vehicles can operate on any blend of ethanol or straight unleaded gasoline.

The most common form of ethanol, E10 contains 10 percent ethanol and 90 percent gasoline. Nearly 3 billion gallons of ethanol is consumed each year in the U.S., the vast majority of which is E10. All automobile manufacturers in the U.S. approve the use of E10.

**What is ethanol's impact on air quality?** Using ethanol-blended fuel has a positive impact on air quality. Ethanol is an oxygenate, 6% oxygen by volume. The oxygen helps the fuel burn more cleanly and more completely, a cleaner fuel for cleaner air. Many areas of the country have used ethanol in order to meet EPA clean air standards with great results. Ethanol reduces

<sup>1</sup> Pawlisch, Melissa, Carl Nelson, Lola Schoenrich. 2003. *Designing A Clean Energy Future: A Resource Manual*. P. 53. Retrieved on February 10<sup>th</sup>, 2005, from: [www.cleanenergyresourceteams.org](http://www.cleanenergyresourceteams.org).

emissions of carbon monoxide, volatile organic compounds, and other toxic air emissions. In every area of the country that has used ethanol-blended fuel, air quality has improved. <sup>2</sup>

**What is biodiesel?** Biodiesel is the name of a clean burning alternative fuel, produced from domestic, renewable resources. Biodiesel contains no petroleum, but it can be blended at any level with petroleum diesel to create a biodiesel blend. It can be used in compression-ignition (diesel) engines with little or no modifications. Biodiesel is simple to use, biodegradable, nontoxic, and essentially free of sulfur and aromatics.

**How much biodiesel has been sold in the US?** The National Biodiesel Board has released the following sales volume estimates for the US:

2003 -- an estimated 25 million gallons  
2002 -- 15 million gallons  
2001 -- 5 million gallons  
2000 -- 2 million gallons  
1999 -- 500,000 gallons

**How do biodiesel emissions compare to petroleum diesel?** Biodiesel is the only alternative fuel to have fully completed the health effects testing requirements of the Clean Air Act. The use of biodiesel in a conventional diesel engine results in substantial reduction of unburned hydrocarbons, carbon monoxide, and particulate matter compared to emissions from diesel fuel. In addition, the exhaust emissions of sulfur oxides and sulfates (major components of acid rain) from biodiesel are essentially eliminated compared to diesel. Of the major exhaust pollutants, both unburned hydrocarbons and nitrogen oxides are ozone or smog forming precursors. The use of biodiesel results in a substantial reduction of unburned hydrocarbons. Emissions of nitrogen oxides are either slightly reduced or slightly increased depending on the duty cycle of the engine and testing methods used. Based on engine testing, using the most stringent emissions testing protocols required by EPA for certification of fuels or fuel additives in the US, the overall ozone forming potential of the speciated hydrocarbon emissions from biodiesel was nearly 50 percent less than that measured for diesel fuel.<sup>3</sup>

***Links:***

American Coalition for Ethanol: <http://www.ethanol.org/>.

National Ethanol Vehicle Coalition: <http://www.e85fuel.com/>.

Ethanol Producers and Consumers: <http://www.ethanolmt.org/>.

National Biodiesel Board: <http://www.biodiesel.org/>.

U.S. Department of Energy: <http://www.eere.energy.gov/afdc/>.

Minnesota Pollution Control Agency:

<http://www.pca.state.mn.us/publications/mnenvironment/winter2005/mythfact.html>.

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<sup>2</sup> Ethanol information was taken from the American Coalition for Ethanol website. Retrieved on February 10<sup>th</sup>, 2005, from: <http://www.ethanol.org/index.htm>.

<sup>3</sup> All questions and answers listed come from the National Biodiesel Board's Frequently Asked Questions link. Retrieved on February 10<sup>th</sup>, 2005, from: <http://www.biodiesel.org/resources/faqs/default.shtm>.

