

Biodiesel: An Overview

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So What's Biodiesel?

- In the USA, Biodiesel is an alternative fuel produced from domestic plant oils, animal fats, and new sources such as algae.
- Biodiesel goes through “esterification” to convert these oils into biodiesel
- Bio contains no petroleum, but can be blended with diesel and can be used in diesel engines with little or no modifications.
- There are industry specifications (ASTM D6751) that ensure quality.
- EPA considers it a legal motor fuel for sale and distribution

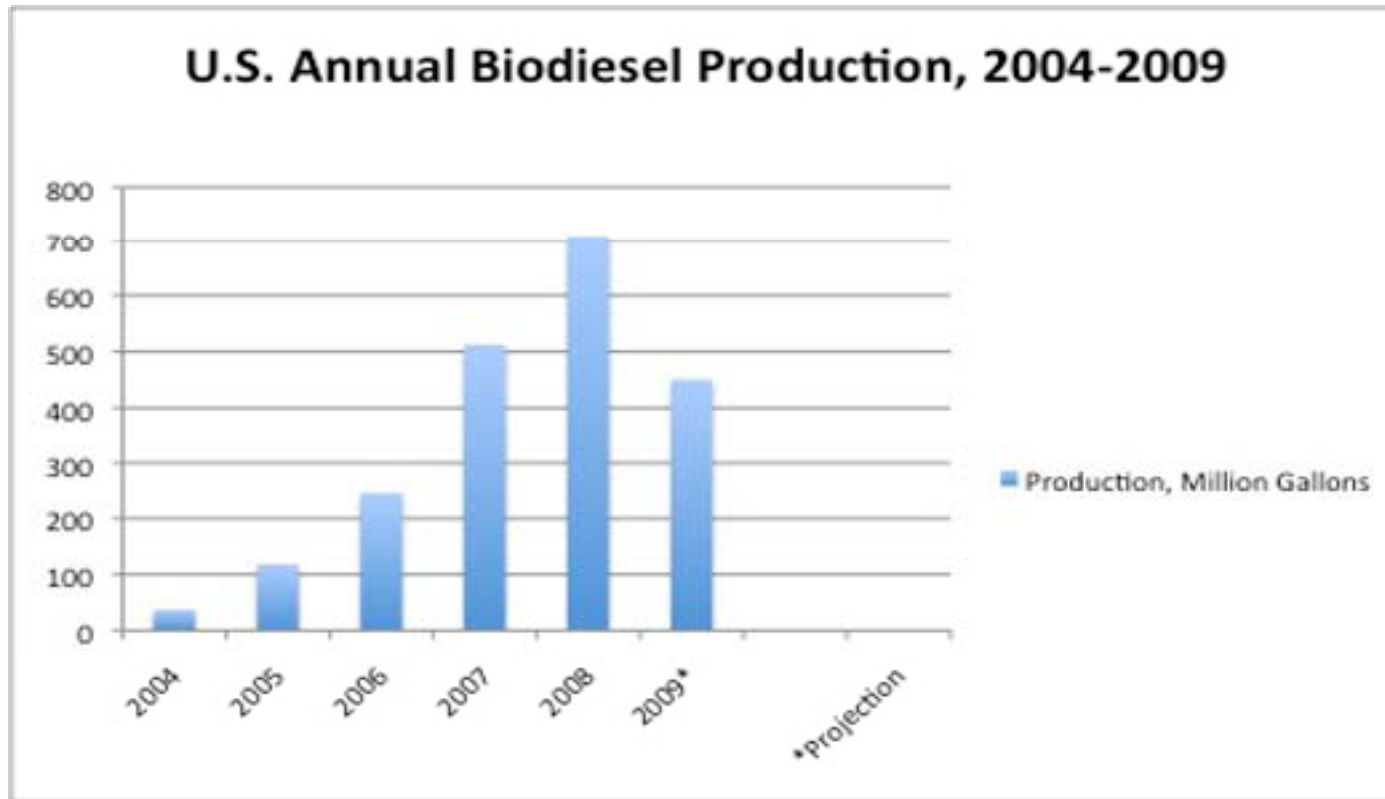
Biodiesel Sources

- Most biodiesel in the USA comes from soybean oil.
- Biodiesel DOES NOT come from corn. Ethanol is not used.
- Soybean oil is the only part of the soy crop that is used in biodiesel
- 14% of domestic soybean oil stocks are used for biodiesel

*Source: Soybean Oil Consumption 2007/2008, United Soybean Board Market View Database (2009). Available at:
<http://usb.adayana.com:8080/usb/jsp/login.jsp>.*

- EPA does not consider vegetable oil or used cooking oil that has not been processed into esters as biodiesel.

Source: EPA Office of Transportation and Air Quality , EPA-420-F-09-064 ,October 2009



Source: World Ethanol and Biofuels Report, vol. 7, no. 14

2009 production is decreased due in part to diesel prices that are lower than current cost of biodiesel production, reducing incentives

Biodiesel Blends

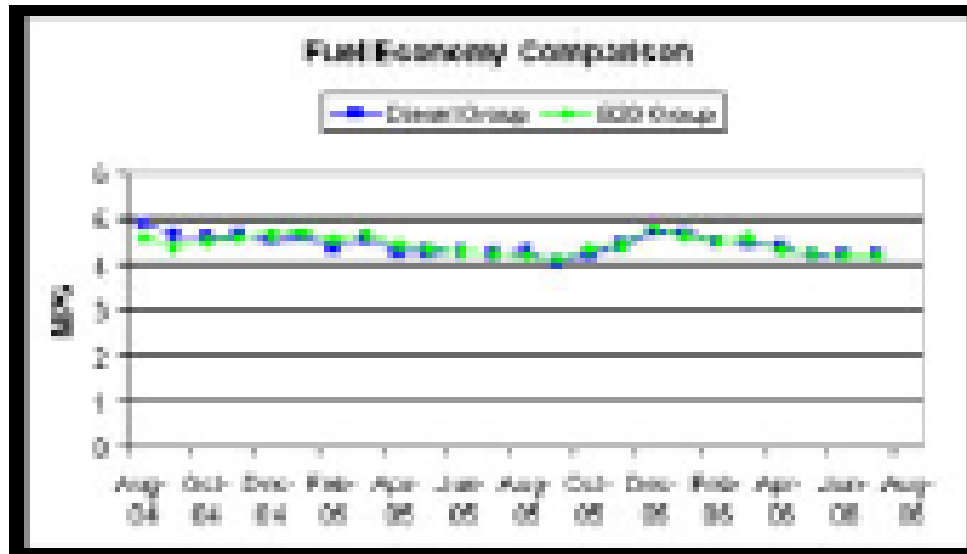
- Commercially available blends include B5, B10, B11, B20.
- The “B” number indicates the percentage of bio product that is blended with diesel fuel.
- Many truck manufacturers will allow use up to B20 without any warranty issues.
- The most common blend in IL is B11.

Biodiesel Availability

- Bio is widely available across the USA
- 15 available retail locations in Chicago metro area
- Local fleet fuel providers include Bell Fuels and Al Warren Fuels

Vehicle Performance

Fuel Economy is roughly the same as conventional diesel.



Source: National Renewable Energy Laboratory, US Dept of Energy - NREL/PR-540-41830 March 2007

Vehicle Performance

- Similar Horsepower
- Similar Torque
- Superior Lubricity
- Highest BTU content of any alternative fuel
- Keep an eye out:

Biodiesel has a solvent effect that may release deposits accumulated on tank walls and pipes from previous diesel fuel storage. This affect is much more dramatic with B100 than with biodiesel blends like B20. The release of deposits may clog filters upon the initial use of B20 and should be closely monitored when switching to B20. Always ensure that only fuel meeting the biodiesel specification (D 6751) is used.

Misperceptions

- **“It doesn’t perform well in cold weather”** Not true in blends up to B20. Our experience with B11 has been problem-free here in Chicago.
- **“Bio is incompatible with 2010+ diesel technology”** Slightly higher oil dilution levels remain in uncritical range and there were no negative impacts on emissions, performance or parts wear. *Source: National Biodiesel Board “Biodiesel Myths Busted”*
- **“Bio use will void my warranty”** Most major heavy truck OEM’s have statements specifically allowing biodiesel blends. Some allow up to B20, some only up to B5. Check with your OEM.

AVERAGE BIODIESEL EMISSIONS COMPARED TO CONVENTIONAL DIESEL, ACCORDING TO EPA

Emission Type B20

Regulated

Total Unburned Hydrocarbons (smog and ozone)	-20%
Carbon Monoxide (poisonous gas)	-12%
Particulate Matter (health hazard, asthma?)	-12%
Nox (Respiratory, Asthma)	+2% to -2%

Non-Regulated

Sulfates (acid rain)	-20%*
PAH (Polycyclic Aromatic Hydrocarbons -potential cancer causing)**	-13%
nPAH (nitrated PAH's – potential cancer causing)**	-50%***
Ozone potential of speciated HC	-10%

* Estimated from B100 result

** Average reduction across all compounds measured

*** 2-nitroflourine results were within test method variability

Source http://www.biodiesel.org/pdf_files/fuelfactsheets/emissions.pdf

Benefits of Biodiesel Use

- EPA says B20 reduces greenhouse gases by 10% versus straight D2 diesel. Source: <http://www.epa.gov/otaq/renewablefuels/420f09064.htm>
- Lower reliance on foreign & domestic oil. Myriad national security and environmental positives.
- Soy biodiesel's energy balance shows soy biodiesel produces 4.5 units of energy for every 1 unit needed Source:
- Surplus stocks of US fats and oils sufficient to meet near and medium term biodiesel target volumes.

Worldwide Drawbacks of Bio Use

- All change has unforeseen consequences
- Some areas that are of concern are:

Diversion of land use from food to fuel stocks – what implications does this have on world hunger?

Food price increases – what causes them and does bio have an impact?

Deforestation – forests can absorb more CO₂ than the deforested land can return in biofuel carbon savings.

All are very serious questions that need answers and solutions

Our View

Transport is a necessary component of human activity. How do we do it better with less environmental damage?

1. We use bio because it reduces greenhouse gases and reduces US reliance on foreign oil. It's not perfect but it's a start.
2. Increased usage can signal that biodiesel has a market and more supply could come as result. Demand-driven.
3. Land diversion/deforestation can be properly managed in the US through various means. We can behave responsibly with tax incentives, standards and certifications in US production.
4. A price on carbon can make bio cost-effective for producers and buyers, innovation can result in alternative fuels and better, more efficient vehicle technologies. We see what happens when diesel costs are lower than cost of production of alternative fuels like biodiesel. Production plummets and we miss opportunity to do better.

Resources

- <http://www.biodiesel.org/resources/fuelfactsheets/> great gateway
- <http://www.epa.gov/otaq/renewablefuels/420r10006.pdf> most recent EPA lifecycle analysis of bio and ethanol
- <http://www.pewclimate.org/technology/factsheet/biodiesel#23> Pew center report and position on biodiesel
- http://www.edf.org/documents/10881_EDF_report_TheGoodHaul.pdf Environmental Defense Fund report on good freight transport practices
- <http://www.epa.gov/otaq/fuels/renewablefuels/index.htm> EPA gateway to renewables

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