yokayo biofuels

"fueling R evolution"

Yokayo Biofuels is dedicated to the purpose of bringing sustainably-produced biodiesel to Northern California. The company was started in October of 2001 as a marketing and distribution business- the first of its kind in this region. In 2004, a restaurant grease collection operation was added. Finally, in the fall of 2005, Yokayo Biofuels began producing its own fuel at its plant in Ukiah.

Biodiesel is a vegetable oil-based fuel used instead of (or in conjunction with) petroleum diesel in any diesel application. Biodiesel is produced through a simple mixing procedure known as *transesterification*, which results in a reduced-viscosity oil free of the glycerol that makes vegetable oil thick and sticky. **Production of biodiesel does not require the complex, polluting processes we associate with petroleum fuel production, such as mining, refinement, and distillation.**

Once it has been produced, biodiesel gives the added benefit of far less pollution. Combustion of biodiesel emits far less greenhouse gasses and toxic pollution than its petroleum counterpart. And it smells better, too! Biodiesel users are literally able to breathe easier while operating their equipment. We should know- **at Yokayo Biofuels we run all our vehicles on 100% biodiesel.**

Biodiesel is unique among renewable energy sources in its ability to fuel existing technology and plug into the current petroleum infrastructure. **This is possible because Rudolph Diesel originally intended his engine to run on various fuel oils grown by regional farmers.** When he exhibited an early version at the World Exhibition in Paris in 1900, its source of power was peanut oil.

Although much has changed since then, diesel equipment operators currently hold the power to restore the self-sufficiency of America's fuel supply. Users of biodiesel can lessen our reliance on foreign oil while promoting peace, domestic security, and a stable economy. In addition, biodiesel is a versatile resource that can be produced from a number of different *feedstocks* (source oils), including recycled fryer oil from restaurants and even algae (which can be grown year-round in deserts). At Yokayo Biofuels, the source of your biodiesel is very important to us. **You have our commitment to providing fuel made in the most sustainable manner possible, utilizing the best available resources.**

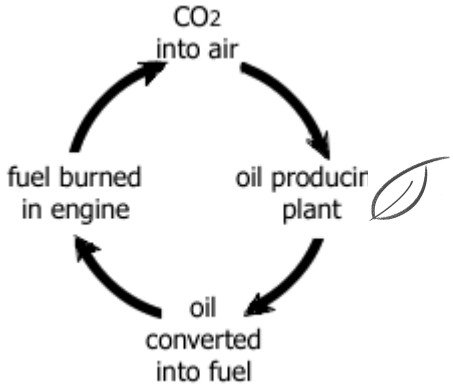
In the following pages, you will be introduced to many of the fuel's qualities as well as important facts and information about using biodiesel. We have included a glossary of terms that may not be familiar to everyone. It is important to us that people stay informed on this topic, so if there are any questions left unanswered, please give us a call at 707/ 472-0900, or you can e-mail info@ybiofuels.org. We are located at 150 Perry Street, in Ukiah, 95482. If you'd like to visit, please call for directions.

Be sure to check out www.ybiofuels.org (company website) and http://ybiofuels.livejournal.com (company blog) for more information and updates. Thank you for your interest in biodiesel.

BIODIESEL IS...

...the safest fuel to use, handle and store.

- non-toxic, non-hazardous
- biodegradable (biodegrades as fast as dextrose; 85-88% in water in 28 days)
- contact with skin, eyes, even accidental ingestion not considered dangerous
- extremely high flashpoint (over 400 degrees F)



...a healthier, cleaner-burning fuel.

- 70% less greenhouse gasses
- 55% less particulates
- 55% less hydrocarbons/VOCs
- 80-90% less mutagenicity (cancer-causing agents)
- 100% less sulfur (a major component of acid rain)
- renewable and part of an active carbon cycle, which allows for the potential of NO NET CO_2 GAIN in our atmosphere!
- can be produced from recycled and organic ingredients

...a convenient transition to make.

- can be used in any diesel application, with little or no modifications
- can be “splash-blended” with diesel in any proportion
- Yokayo Biofuels can deliver biodiesel directly to your storage tank
- becoming increasingly available at public pumps

...a reliable, proven fuel.

- has been road-tested for millions of miles
- is used by hundreds of fleets, from the US military to utilities to school busses
- lubricates the engine, retarding wear and keeping the fuel system clean
- none of the carbon build-up or deposits associated with diesel
- users report a quieter, smoother running engine with no loss in performance
- less smoke and significantly less obnoxious exhaust

...the patriotic choice, for peace.

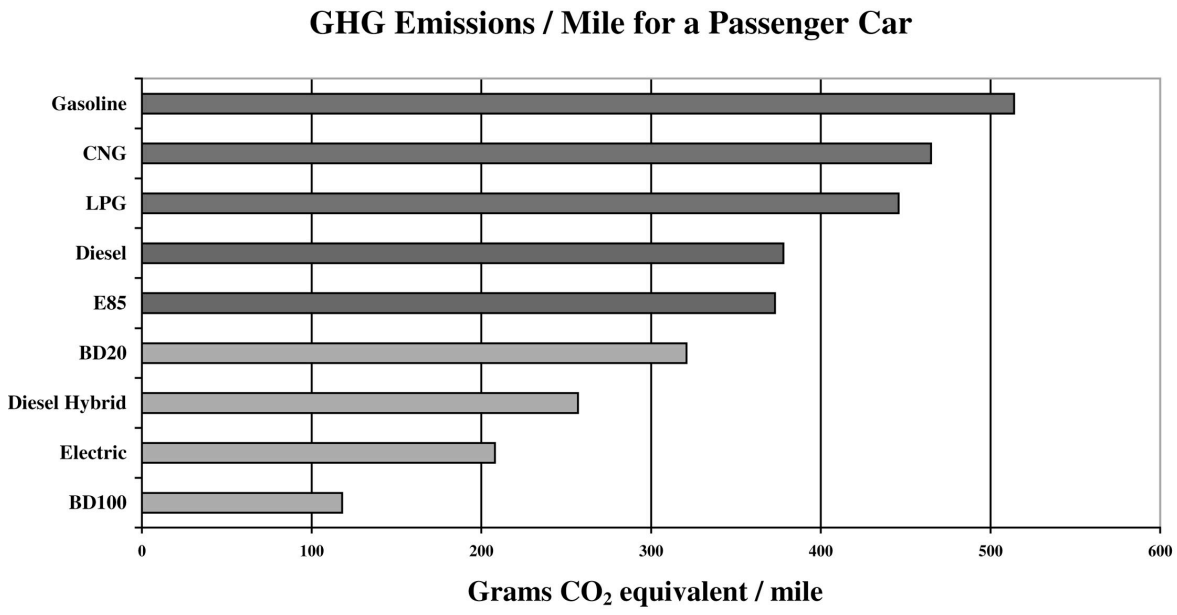
- supports America’s economy (all sources are domestic)
- eases our dependence on foreign oil, a major contributor to global warfare
- utilizes regional resources

[from **Report on Bus Alternatives**, authored by the Alternative Fuel Vehicle Program Sponsored by HGCI, UOS, Ford Motor Company, and Harvard University]

In the table below, we give the emission characteristics of various fuels as compared to diesel. The numbers in the table reflect the percent difference for a vehicle travelling for a mile on that fuel as compared to a comparable vehicle travelling for a mile on diesel. The emissions are calculated using the Argonne National Laboratory's GREET Model version 1.5a. This calculates the emissions of various gases for the entire fuel cycle. This includes the gathering of feedstock, fuel production, and tailpipe emissions. This type of complete analysis is often referred to as a well-to-wheel or fuel-cycle analysis.

While a rough comparison of fuel types can be made, it is important to realize that these numbers can vary significantly from vehicle to vehicle. Therefore, any such numbers must be treated as a rough indication of a fuel's emissions. For this reason, all numbers have been rounded to the nearest 5%. The fuels are ranked in order of most to least greenhouse gas emissions - the emissions that cause global warming. The electric category is for a battery- powered vehicle running off of the New England power grid. The hybrid is a diesel/electric hybrid.

Fuel	Greenhouse Gases	Particulates	Nitrous Oxides	Volatile Organic Compounds	Carbon Monoxide
Gasoline	+35	-70	-55	+170	+415
CNG	+20	-80	-45	-30	+190
LPG	+20	-80	-60	0	+210
Ethanol 85%	0	-75	-55	+130	+210
Diesel	0	0	0	0	0
Biodiesel 20%	-15	-20	0	-10	-15
Hybrid	-30	-20	-20	-20	-20
Electric	-45	-80	-95	-100	-100
Biodiesel 100%	-70	-55	+5	-55	-45



[from the National Renewable Energy Laboratory's **Biodiesel Handling and Use Guidelines**, available online at http://www.nrel.gov/vehiclesandfuels/npbf/feature_guidelines.html

Selected Fuel Properties for Diesel and Biodiesel Fuels

FUEL PROPERTY	**DIESEL**	**BIODIESEL**	**BIODIESEL** (EUROPEAN SPEC)
Fuel Standard	ASTM D975	ASTM D6751	EN 14214
Flash Point, °C	60-80	100-170	120 min
Kin. Viscosity, @ 40 °C	1.3-4.1	1.9-6.0	3.5-5.0
Water, ppm by wt	.05 Max	.05 max	.05 max
Sulfated Ash, mass %	.01 max	.02 max	.02 max
Sulfur, mass %	.5 max	.05 max	.01 max
Copper Strip Corrosion	No. 3 max	No. 3 max	Class 1
Cetane Number	40 min	47 min	51 min
Cloud Point, °C	n/a	report to customer	n/a
Carbon, Residue, mass %	.35	.05	.3 max
Acid Number	n/a	.80 max	.5 max
Free Glycerol, mass %	n/a	.02 max	.02 max
Total Glycerol, mass %	n/a	.24 max	.25 max

Tailpipe Emission Changes with Biodiesel

Carbon Monoxide	-43.2%
Hydrocarbons	-56.3%
Particulates	-55.4%
Nitrogen oxides	+5.8%
Air toxics	-60% to –90%
Mutagenicity	-80% to –90%
Carbon dioxide***	-78.3%

****life cycle emissions*

[Additional emission reductions , especially NOx, can be made by use of a catalytic converter.]

On **Solvency**:

"The most commonly encountered problem with solvency is biodiesel's tendency to "clean out" storage tanks, including the vehicle fuel tanks and systems. No. 2 diesel tends to form sediments that stick to and accumulate in storage systems, forming layers of sludge or slime in the fuel systems. The older the system, and the poorer the maintenance, the thicker the accumulated sediments become. Biodiesel will dissolve these sediments and carry the dissolved solids into the fuel systems of vehicles."

[*This means that first-time users of B100 will generally have to change their fuel filters once or twice, unless they've had their fuel system cleaned prior to switching to biodiesel.]*

On **Materials Compatibility**:

"Acceptable storage tank materials include aluminum, steel, fluorinated polyethylene, fluorinated polypropylene, and Teflon. Table 7 has some information on specific materials."

Table 7. Material Compatibility with Biodiesel Fuels

MATERIAL	BXX	EFFECT COMPARED TO DIESEL FUEL
Teflon	B100	Little change
Nylon 6/6	B100	Little change
Nitrile	B100	Hardness reduced 20%
	B100	Swell increased 18%
Viton A401-C	B100	Little change
Viton GFLT	B100	Little change
Fluorosilicon	B100	Little change in hardness
	B100	Swell increased 7%
Polyurethane	B100	Little change in hardness
	B100	Swell increased 6%
Polypropylene	B100	Hardness reduced 10%
	B100	Swell increased 8-15%
Polyvinyl	B100	Much Worse
Tygon	B100	Worse

[Like petroleum diesel, biodiesel will degrade rubber, but at a faster rate. Natural rubber or nitrile fuel system components include seals, gaskets, fuel return lines, and possibly adhesives. Most post -1993 engines are manufactured with biodiesel-compatible materials, designed to withstand the rigors of low-sulfur diesel fuel. Biodiesel operators of older engines should keep an eye on their fuel systems. In our experience with older diesel cars, fuel return lines are the first to degrade, and can be easily replaced. We have not experienced any other problems with degradation with our engines, nor have we heard of other users experiencing significant problems. Cheap rubber fuel hoses for dispensing fuel did swell and break down in a short time. We now use biodiesel-compatible hoses. We are willing and able to facilitate material compatibility for our customers.]

On **Warrantees**:

"Caterpillar offers a B100 warrantee on most of their newer engines that is feedstock neutral if fuels meet either ASTM D6751 or the CAT standards. Caterpillar has tested various types of biodiesel and examined the underlying chemistry of the fuels. John Deere offers B100 warrantees on some equipment."

[Additionally, New Holland has been very supportive of Biodiesel. It should be noted that in Europe, car companies offer B100 warrantees because it is a mainstream fuel in some areas, especially Germany, with major recognition coming from Volkswagen and Mercedes]

"OEMs provide a material and workmanship warranty on their products. Such warrantees do not cover damage caused by external conditions , such as fuel. Thus, if an engine using Biodiesel experiences a failure unrelated to the biodiesel use, it must be covered by the OEM's warranty. **FEDERAL LAW (MAGNUSSON-MOSS WARRANTY ACT) PROHIBITS THE VOIDING OF A WARRANTY JUST BECAUSE BIODIESEL WAS USED- IT HAS TO BE THE CAUSE OF THE FAILURE**. If an engine experiences a failure caused by biodiesel (or any other external condition, such as bad diesel fuel), it will not be covered by the OEM's warranty."

[*For these reasons, we recommend that our customers call us if they have problems with their vehicles. We can often save them the expense and headaches associated with mechanics' shops.]*

SAMPLE MATERIAL SAFETY DATA SHEET

1. **CHEMICAL PRODUCT**
General Product Name: Biodiesel
Synonyms: Methyl Soyate, Rapeseed Methyl Ester (RME), Methyl Tallowate
Product Description: Methyl esters from lipid sources
CAS Number: 67784-80-9

2. COMPOSITION/INFORMATION ON INGREDIENTS
This product contains no hazardous materials.

3. HAZARDS IDENTIFICATION
Potential Health Effects:
INHALATION:
Negligible unless heated to produce vapors. Vapors or finely misted materials may irritate the mucous membranes and cause irritation, dizziness, and nausea. Remove to fresh air.
EYE CONTACT:
May cause irritation. Irrigate eye with water for at least 15 to 20 minutes. Seek medical attention if symptoms persist.
SKIN CONTACT:
Prolonged or repeated contact is not likely to cause significant skin irritation. Material is sometimes encountered at elevated temperatures. Thermal burns are possible.
INGESTION:
No hazards anticipated from ingestion incidental to industrial exposure.

4. FIRST AID MEASURES
EYES:
Irrigate eyes with a heavy stream of water for at least 15 to 20 minutes.
SKIN:
Wash exposed areas of the body with soap and water.
INHALATION:
Remove from area of exposure, seek medical attention if symptoms persist.
INGESTION:
Give one or two glasses of water to drink. If gastro-intestinal symptoms develop, consult medical personnel. (Never give anything by mouth to an unconscious person.)

5. FIRE FIGHTING MEASURES
Flash Point (Method Used): 100.0° C min (ASTM 93)
Flammability Limits: None known
EXTINGUISHING MEDIA:
Dry chemical, foam, halon, CO2, water spray (fog). Water stream may splash the burning liquid and spread fire.
SPECIAL FIRE FIGHTING PROCEDURES:
Use water spray to cool drums exposed to fire.
UNUSUAL FIRE AND EXPLOSION HAZARDS:
Oil soaked rags can cause spontaneous combustion if not handled properly. Before disposal, wash rags with soap and water and dry in well ventilated area. Firefighters should use self-contained breathing apparatus to avoid exposure to smoke and vapor.

6. ACCIDENTAL RELEASE MEASURES SPILL CLEAN-UP PROCEDURES
Remove sources of ignition, contain spill to smallest area possible. Stop leak if possible. Pick up small spills with absorbent materials such as paper towels, “Oil Dry”, sand or dirt. Recover large spills for salvage or disposal. Wash hard surfaces with safety solvent or detergent to remove remaining oil film. Greasy nature will result in a slippery surface.

7. HANDLING AND STORAGE
Store in closed containers between 50∞F and 120∞F.
Keep away from oxidizing agents, excessive heat, and ignition sources.
Store and use in well ventilated areas.
Do not store or use near heat, spark, or flame, store out of sun.
Do not puncture, drag, or slide this container.
Drum is not a pressure vessel; never use pressure to empty.

8. EXPOSURE CONTROL /PERSONAL PROTECTION
RESPIRATORY PROTECTION:
If vapors or mists are generated, wear a NIOSH approved organic vapor/mist respirator.
PROTECTIVE CLOTHING:
Safety glasses, goggles, or face shield recommended to protect eyes from mists or splashing. PVC coated gloves recommended to prevent skin contact.
OTHER PROTECTIVE MEASURES:
Employees must practice good personal hygiene, washing exposed areas of skin several times daily and laundering contaminated clothing before re-use.

9. PHYSICAL AND CHEMICAL PROPERTIES
Boiling Point, 760 mm Hg:>200°C Volatiles, % by Volume: <2
Specific Gravity (H2O=1): 0.88 Solubility in H2O, % by Volume: insoluble
Vapor Pressure, mm Hg: <2 Evaporation Rate, Butyl Acetate=1: <1
Vapor Density, Air=1:>1
Appearance and Odor: pale yellow liquid, mild odor

10. STABILITY AND REACTIVITY
GENERAL:
This product is stable and hazardous polymerization will not occur.
INCOMPATIBLE MATERIALS AND CONDITIONS TO AVOID:
Strong oxidizing agents
HAZARDOUS DECOMPOSITION PRODUCTS:
Combustion produces carbon monoxide, carbon dioxide along with thick smoke.

11. DISPOSAL CONSIDERATIONS
WASTE DISPOSAL:
Waste may be disposed of by a licensed waste disposal company. Contaminated absorbent material may be disposed of in an approved landfill. Follow local, state and federal disposal regulations.

12. TRANSPORT INFORMATION
UN HAZARD CLASS: N/A
NMFC (National Motor Freight Classification):
PROPER SHIPPING NAME: Fatty acid ester
IDENTIFICATION NUMBER: 144920
SHIPPING CLASSIFICATION: 65

13. REGULATORY INFORMATION:
OSHA STATUS:
This product is not hazardous under the criteria of the Federal OSHA Hazard Communication Standard 29 CFR 1910.1200. However, thermal processing and decomposition fumes from this product may be hazardous as noted in Sections 2 and 3.
TSCA STATUS:
This product is listed on TSCA.
CERCLA (Comprehensive Response Compensation and Liability Act):
NOT reportable.
SARA TITLE III (Superfund Amendments and Reauthorization Act):
Section 312 Extremely Hazardous Substances:

None
Section 311/312 Hazard Categories:
Non-hazardous under Section 311/312
Section 313 Toxic Chemicals:
None
RCRA STATUS:
If discarded in its purchased form, this product would not be a hazardous waste either by listing or by characteristic. However, under RCRA, it is the responsibility of the product user to determine at the time of disposal, whether a material containing the product or derived from the product should be classified as a hazardous waste,
(40 CFR 261.20-24)
CALIFORNIA PROPOSITION 65:
The following statement is made in order to comply with the California Safe Drinking Water and Toxic Enforcement Act of 1986. This product contains no chemicals known to the state of California to cause cancer.

14. OTHER INFORMATION:
This information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any other process. Such information is to the best of the company's knowledge and believed accurate and reliable as of the date indicated. However, no representation, warranty or guarantee of any kind, express or implied, is made as to its accuracy, reliability or completeness and we assume no responsibility for any loss, damage or expense, direct or consequential, arising out of use. It is the user's responsibility to satisfy himself as to the suitableness and completeness of such information for his own particular use.

A short glossary of terms you may encounter when researching biodiesel

ASTM- The American Society for Testing and Materials is a not-for-profit organization that has created standards, referred to as ASTM specifications, for commercial biodiesel. These standards include measurable fuel qualities as well as testing methods.

Biodiesel- Also called Methyl/Ethyl Esters. A renewable fuel typically made from vegetable oil/ used fryer oil, which has had its viscosity reduced using a process called transesterification, by which the glycerin (thick component of vegetable oil) is removed. In order for transesterification to occur, the oil is mixed with methanol (or ethanol) and a catalyst. To actually qualify as "biodiesel" in the U.S., the finished product must meet the specifications of ASTM Standard D 6751.

Biofuel- Any of a number of fuels (i.e. biodiesel, ethanol, methane, biomass) produced from organic matter within an active carbon cycle, as opposed to fossil fuels, which come from long-dead material buried deep within the earth. Production and combustion of fossil fuels dump large amounts of CO_2 into the air that were not meant to be unearthed, resulting in a non-sustainable formation of the "Greenhouse Effect." Production and combustion of biofuels take and replenish CO_2 in a circular, sustainable fashion.

B100- 100% biodiesel. XX percentage of biodiesel in relation to petroleum diesel is written 'BXX.'

Cetane Number- A measure of ignition quality of diesel fuel. The higher the cetane number the easier the fuel ignites when injected into an engine. A number above 40 is considered high quality; above 50 is considered *very* high quality.

Cloud Point- The temperature at which a sample of fuel just shows a cloud or haze of crystals when it is cooled under standard conditions, as defined in ASTM D2500.

Common-Rail Diesel Engine- A diesel engine technology which uses a single, highly pressurized fuel line to deliver fuel to the fuel injector nozzles. This results in a more complete burning of the fuel mixture for added power, reduced emissions and greatly reduced diesel "clatter" noise.

Diesel no. 1 and Diesel no. 2- Diesel number one is also called kerosene, and is not generally used as fuel oil in diesel vehicles, although it can be an effecting winterizing additive. It has a lower viscosity (it is thinner) than Diesel number two. Diesel number two is typical diesel vehicle fuel. *Biodiesel replaces number two.* It is important to note that Diesel no. 1 and Diesel no. 2 correspond to heating oil no. 1 and no. 2.

Direct Injection- A diesel engine technology in which fuel is introduced directly into the combustion chamber rather than into a port leading to it. The result is more precise fuel control, which adds power and reduces emissions.

Esters- Any organic compound that is formed by combining an acid with an alcohol, and eliminating water. In the biodiesel reaction, esters are formed as a result of combining fatty acids and methanol or ethanol.

Ethanol- Ethyl alcohol, also known as 'grain alcohol.' Not commonly used in making biodiesel because of its low reactivity (higher quantity required than methanol), among other things. Usually made from corn as a by-product of the feed industry, but can be produced from numerous feedstocks. There is a lot of interest in commercial biodiesel from ethanol because it can be produced more sustainably.

Feedstock- The source of the oil used to make biodiesel, commonly denoted as '_____ methyl/ethyl esters.' Rapeseed Methyl Esters (RME), Soy Methyl Esters (SME) and Fatty Acid Methyl Esters (FAME) are all variants of biodiesel produced from different feedstocks.

Flashpoint- The lowest temperature in °C at which a liquid will produce enough vapor to ignite, if the vapor is flammable. The lower the flashpoint, the higher the risk of fire.

Fluorinated Polyethylene/ Polypropylene- Two types of plastic that have been specially modified to withstand certain chemicals, including biodiesel.

Glycerol- The "thick" component of all biodiesel feedstocks, it is separated from the esters during the biodiesel reaction process, combining together with the catalyst to form glycerin soap, the by-product of making biodiesel.

Hydrocarbons- Compounds containing various combinations of hydrogen and carbon atoms (see *VOCs*). Contribute heavily to smog.

Lubricity- the "smoothness" of a fuel, which affects wear-and-tear on the engine. The higher the lubricity, the easier a fuel can move through an engine, resulting in longer engine life.

Methanol- Methyl alcohol, also known as "wood alcohol." Commonly used in biodiesel for its relatively high reactivity. Sustainable methods of production are currently not economically viable. Usually a by-product of the natural gas industry, often used as "racing fuel."

Mutagenicity- The property of chemical or physical agents of inducing changes in genetic material that are transmitted during cell division. Fundamentally, a measure of cancer risk.

Nitrile- Also called 'Buna-N.' A low-grade rubber common in older vehicles' fuel systems that is not as ideal for use with biodiesel as higher-grade synthetics. For this reason, it is recommended that nitrile, Buna-N and other low-grade rubber fuel system components be replaced with more suitable fluoro-polymers. *See NREL material* (included in packet).

Nitrogen Oxides (NO_x)- Gaseous compounds of nitrogen and oxygen produced directly or indirectly from combustion.

NREL- The National Renewable Energy Laboratory, responsible for our government's alternative fuel research. *See www.nrel.gov*

Particulates- Very small liquid and solid particles floating in the air. A component of smog.

Pour Point- The lowest temperature at which a fuel will just flow when tested under standard conditions as defined in ASTM D97.

Silicon and Teflon- Fluoropolymers that can withstand high heat- especially useful in replacing older rubber fuel lines, along with polyurethane, fluorinated polyethylene/polypropylene, and nylon. Note that, where possible, viton is the material of choice *(see below)*.

SVO- Straight vegetable oil (not modified, not biodiesel). People use "SVO conversion kits" to modify their diesel vehicles to run on this experimental fuel.

Transesterification- The process by which the vegetable oil molecule is "cracked" and the glycerol is removed, resulting in glycerol soap by-product and methyl/ethyl esters (biodiesel).

Ultra Low Sulfur Diesel- Diesel fuel which has a sulfur content of less than 15 ppm. Beginning in 2007, all the petroleum diesel fuel in the US will be required to meet this standard. (Biodiesel has no sulfur!)

Viton- The most recommended fluoropolymer for use in older vehicles' fuel systems. It is very similar in functionality and appearance to rubber.

VOCs- Stands for Volatile Organic Compounds: carbon-containing compounds that evaporate into the air (see hydrocarbons). VOCs are a major component of air pollution, and are just starting to receive a lot of attention, as more and more products labeled 'Low VOCs' hit the market.

WVO- Waste vegetable oil (not modified, not biodiesel). *See "SVO" above.*

Yellow Grease- One of several grades of used restaurant grease that has been rendered (cooked and purified) and is typically used in animal feed. It can be used as a biodiesel feedstock, but grease that has not been rendered is often preferable.

Frequently Asked Questions:

1. So what do I need to do to convert my car to biodiesel?

Nothing. Fundamentally speaking, any vehicle (or equipment) that runs on diesel no. 2 will run on biodiesel without modification.

2. I've heard that a gradual increase in biodiesel percentage in my diesel fuel is the best way to introduce biodiesel to my vehicle- is this true?

No, although it is a popular myth. There are no scientific reasons to perform a gradual increase in biodiesel percentage.

3. So I've got it narrowed down to a gas/electric hybrid or a biodiesel vehicle--which is better?

A gas/electric hybrid is a commendable improvement over gas-only vehicles, especially when it can run in pure electric mode (a "plug-in hybrid"). However, it still relies on petroleum, and it still contributes to global warming. Biodiesel solves both those problems. Obviously, diesel hybrids are in order. Make that your mantra.

4. I read in a magazine that you can make biodiesel at home for __ cents/gallon- why in the world would I buy it instead?

Convenience, and lab-tested quality that meets the official ASTM standard and convenience. The low costs often quoted in magazine articles are not realistic- they assume free oil, cheap methanol, and no other costs. In reality, a lot of infrastructure is needed. It is definitely possible to "homebrew" high quality biodiesel- it requires knowledge of testing methods, a serious commitment of time and energy, and equipment. If you are a do-it-yourself type of person, and ready to take on a new hobby, then it's definitely worth considering. We recommend that any homebrewer occasionally send a sample of their fuel to a suitable lab for testing (we can provide contacts) to make sure the biodiesel they are brewing is "up to specs."

5. Are there special storage considerations for biodiesel?

We recommend a familiarity with petroleum diesel storage basics (since many of the same issues and potential long term problems exist) and biodiesel materials compatability. We can help answer the question "Which setup is right for me?" Give us a call.

6. What is biodiesel made from, besides vegetable oil?

The idea behind biodiesel is thinner vegetable oil. A chemical reaction called transesterification removes the glycerol component of the vegetable oil molecule (thick, moisturizing) and replaces it with methyl alcohol (methanol), thereby thinning the vegetable oil. In order to achieve this reaction, the methanol is mixed with sodium or potassium hydroxide (lye) prior to being mixed with the vegetable oil. The end result is crude biodiesel and crude glycerol. Commercial processes often involve additional ingredients, but that is the basic process.

7. Shouldn't I worry about residual methanol, lye, or glycerol?

Certainly, residual ingredients or byproducts in the fuel you run in your vehicle or equipment would be a problem. For commercial fuel, the ASTM standard does not allow for residuals to be present. For homebrewers, this is a compelling argument to "wash" (purify further) their fuel.

8. Won't biodiesel eat the rubber in my fuel system?

Biodiesel is a solvent. As such, it will dissolve rubber. High sulfur (normal) petroleum diesel does this too, but much slower. In this way, biodiesel acts similar to the Ultra Low Sulfur Diesel (ULSD) that is being phased in as the diesel standard. Diesel engines and equipment have been designed with ULSD in mind since around 1993. Rubber began to disappear from fuel systems around that time (meaning less leaks for biodiesel users). If you have an older vehicle and believe you are experiencing leaks from worn rubber, you will want to replace the components with ULSD-compatible materials.

9. I heard that I should replace my fuel filter before using biodiesel- what's the story?

The idea is on the right track, but the timing is wrong. There are some positive effects from biodiesel being a thorough solvent. Chief among them is that it keeps a fuel system clean. However, with an older vehicle (roughly 30,000+ miles of petroleum diesel usage), it will purge the system of accumulated diesel debris first. In such a case, you will experience symptoms of a clogged fuel filter (trouble starting, coughing, smoke, poor fuel economy, loss of power) at some point after switching to biodiesel. This can take weeks or months. It is best to always have an extra filter on hand. In most cases, changing the fuel filter once you experience symptoms will take care of it. In very old vehicles, a second filter change may eventually be needed. Regardless, once your vehicle's fuel system is purged of diesel debris, it will stay remarkably clean thanks to biodiesel's solvency.

10. I've read that algae can grow in biodiesel very easily- what's up with that?

The fact is that biodiesel stores similarly to petroleum diesel. If you leave lots of access to water and air, then all sorts of things can happen, including algae growth or other kinds of contamination. The bottom line is that you should know the basics of storing fuel before you do it. We can help with that.

11. When is the price going to come down?

We certainly get asked that a lot. It is possible that, as the biodiesel industry matures, several things will bring its price down: growth of the market, new government incentives, innovative technology, etc. However, it is important to understand that the price of biodiesel is an honest price- there are no hidden taxpayer fees, the way there are with petroleum diesel. In essence, petroleum diesel is costing each taxpayer well over double what you pay at the pump, with the price being even higher when this country is aggressively using the military to protect the oil supply. And we all know that the price of petroleum will keep going up.

12. Yeah, I know all about biodiesel, but I'm planning on converting my vehicle to run on straight vegetable oil (SVO) because it doesn't involve all the chemicals, is way cheaper, and burns cleaner. Shouldn't everyone convert to SVO?

In a word, no. Even though some of the first diesel engines burned unadulterated peanut oil, much has changed in engine design since then, and we now have to bring down its viscosity to use SVO. We can accomplish this by modifying the vegetable oil (turning it into biodiesel) or modifying the vehicle (via an SVO conversion kit that heats the vegetable oil to a suitable viscosity before it is combusted). Obviously, we can reach the most people with the first option. But there are other reasons not to use SVO- it still contains glycerol, which burns dirty and can leave deposits in the injection chambers. Additionally, SVO still needs to be de-watered, filtered, and heated prior to fill-up, and that requires equipment, time and energy. Further problems include a complete lack of standards and little scientific testing. First generation "dual tank" vegetable oil conversion kits have had many problems, and are definitely considered experimental. But the newer kits, led by the Elsbett kit, seem to be on the right track. However, a vehicle with the wider Elsbett injectors and hotter Elsbett glowplugs will burn biodiesel cleaner than it will burn straight vegetable oil. At Yokayo Biofuels, we believe that SVO conversions are best for vehicles traveling to places where SVO will be easier to find than diesel or biodiesel, and for old tractors, which are a relatively low-risk application.

13. What if I'm on the road and can't find biodiesel anywhere- are there problems with using diesel again?

No problem. Mix and match however you like.

14. What about the vehicle warranty?

As the industry matures, more original engine manufacturers (OEMs) are making positive statements on 100% biodiesel (b100). These include John Deere, Caterpillar, and New Holland, which all explicitly warrant the use of b100 in their engines. Other OEMS are taking a more lazy approach ("We neither support nor oppose…") and explicitly warranting blends like b20 or b5. The thing to remember is that ASTM biodiesel will not hurt any existing diesel engines (though it may at times confuse mechanics, throw off sensors, clog filters, etc.). If an OEM wants to deny a warranty based on biodiesel use, legally, they have to show that it was the biodiesel that hurt the engine. This is a compelling reason to use ASTM fuel.

15. Since you need to grow the vegetable oil, isn't there an inherent "food vs. fuel" cropland usage issue? Also, won't we run out of restaurant oil pretty quick?

The "food vs. fuel" argument would be more compelling if it weren't for the thousands of acres of fallow cropland in this country. Additionally, newer sources of oil, like algae, which can be grown in deserts off of waste carbon dioxide, have yields which far surpass traditional crops. And restaurant oil will actually last quite a while (there's 3 billion gallons produced yearly), unless everybody were to suddenly switch to biodiesel, which would certainly help speed along the aforementioned innovations.

16. Will biodiesel work in kerosene heaters?

Biodiesel is 100% compatible with diesel #2, also known as heating oil #2, or simply as 'diesel.' Kerosene, which is also known as diesel #1 and heating oil #1, is thinner than diesel #2. In general, if a heater is designed specifically for kerosene, then it can work with some kind of biodiesel blend (some experimentation required). If it is, however, designed to run on diesel #1 or #2, then it can run on b100 just fine.

17. What are some other applications for biodiesel?

We've supplied it as fuel for water heaters, boats, generators, air compressors, smudgepots, kilns, tractors, irrigation pumps, miscellaneous farm equipment, and sawmills. Additionally, we've supplied it as a concrete slipform, industrial solvent, and agricultural carrier.

18. Where can I get red-dyed biodiesel?

Unfortunately, biodiesel's varied color makes it difficult to legally dye red (in order to avoid charging taxes for off-road, non-agricultural uses). However, we do sell "off-road" biodiesel, with some reduced taxes. You can apply for the full tax reduction with a form that the Board of Equalization provides. We believe red-dyed biodiesel will be available in the future. Stay tuned for updates.

19. What kind of subsidies and incentives does the biodiesel industry receive?

To date, there is one big tax credit that is worth 50 cents a gallon to our company, provided we mix in a nominal amount of petroleum diesel. The subsidy is twice as big for biodiesel from virgin oil. To read more about tax credits, see the "Great Debate" links at our blog at ybiofuels.livejournal.com.

20. How do you plan on competing vs. big oil?

That's where you come in… (for us, this has always been a grassroots, community affair)