

Got Biodiesel?

What You Need to Know!

by Marshall Solomon, Marsh Marine

Much of what I do for a living involves diesel fuel. As an AlgaeX International Service Dealer, my company, Marsh Marine, specializes in cleaning diesel fuel and keeping it clean. As you might expect, I try to keep up with the latest developments in marine diesel fuel and its maintenance. With each wave of higher fuel prices I continue to hear this buzz word Biodiesel. The news media seems to delight in presenting stories about someone running their car for pennies on used Fry Daddy cooking oil or some such lame thing. Is this really so easy to do and is this the fuel that will soon power your boat? In this article I'll try to give you some understandable information and hopefully clear away the fat from the facts (I couldn't help the pun).

So what exactly is Biodiesel? Generally speaking, biodiesel is an alternative or additive to standard diesel fuel that is made from biological ingredients instead of crude oil petroleum. It is usually made from plant oils or animal fat through a series of chemical reactions. Because biodiesel essentially comes from plants and animals, these sources can be replenished through farming and recycling. Like everything in our world, it is regulated and technically defined. The ASTM International (the American Society for Testing and Materials), an organization that provides industry standards, officially defines biodiesel as:

'A fuel comprised of mono-alkyl esters of long chain fatty acids derived from vegetable oils or animal fats, designated B100, and meeting the requirements of ASTM D 6751.'

The common ingredient is fat, which is oil in semi-solid form. This is where the energy potential is stored, and it matters not where this fat comes from. Before you get the notion of being able to pour old cooking oil into your fuel tank, read carefully. The trick word here is esters. You see, before you can burn these oils and fats, they have to be chemically processed. This chemistry, called transesterification, involves first purifying the oil or fat, and then reacting it with an alcohol, usually methanol (CH₃OH) or ethanol (CH₃CH₂OH) in the presence of a catalyst such as potassium hydroxide

(KOH) or sodium hydroxide (NaOH). When this happens, the fats or oils, called triglycerides, are transformed to form esters and glycerol. The esters that remain are what we call biodiesel which has a chemical composition very similar to conventional diesel fuel. Diesel engines can run on pure, 100% biodiesel which is referred to as neat or B100. In its pure state it tends to thicken in cold temperatures, so it is usually blended with 80% low sulfur diesel fuel to make it more liquid. This blend is called B20 or BD-20.

Part of what makes biodiesel so appealing and interesting is that it can be made from numerous natural and renewable sources. Although animal fat can be used, plant oil is the largest source of biodiesel. You've probably used some of these oils in your kitchen, like soybean, peanut, rapeseed, canola, palm, cottonseed, and sunflower. In the United States, soybean oil is the

largest source of biodiesel. Alright, so now we understand what biodiesel is and how it's made. Let's move along to examine both its advantages and its detriments. I'll hit the pros in the rest of this article and next month reveal the cons... there's no free lunch, biodiesel comes with some tradeoffs. The Pros:

Average Biodiesel Emissions Compared to Conventional Diesel		
Emission Component	B100	B20
Total Unburned Hydrocarbons	-67%	-20%
Carbon Monoxide	-48%	-12%
Particulate Matter (PM)	-47%	-12%
NOx (Nitrous Oxides)	+10%	+2%
Sulfates	-100%	-20%
PAH (polycyclic aromatic hydrocarbons)	-80%	-13%

Source: National Biodiesel Board



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