

# **Vegmatics**

## **Diesel to Vegetable Oil Conversions**

Custom systems to run diesel engines on renewable fuel

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## **Services Offered Booklet**

## **A bit of the basics: What is a vegetable oil conversion, how does it work, and why should I get one?**

Simply speaking, a vegetable oil conversion is a system that allows a diesel engine to burn vegetable oil as fuel, as well as diesel fuel and biodiesel. Diesel engines are actually quite versatile machines – far more so than gasoline engines – due to the way in which they ignite fuel. Gasoline engines take in a mixture of air and fuel, compress it (often to about one-ninth of its former volume), and then ignite it with a spark. The resulting heat and pressure force the piston downward and create power. Diesels, on the other hand, initially take in only air. Then the piston compresses it to a very high ratio – generally to less than one-twentieth of its former volume – and injects fuel at high pressure into the hot, compressed air. The temperature in the cylinder at this point, often well in excess of 1500 degrees Fahrenheit, causes the fuel to self-ignite and create the pressure that pushes the piston downward.

Because diesel engines work based on compression rather than well-timed sparks, they can easily run on various liquid fuels. Early diesel engines were, in fact, designed to run on vegetable oils! Even today, “diesel fuel” can be a mixture of different hydrocarbons – the diesel fuel that goes into your vehicle in the winter is actually up to 40% kerosene. Kerosene (which is chemically similar to diesel fuel) is mixed in to lower the cloud point of diesel and keep it from solidifying in your fuel tank. Vegetable oil is yet another hydrocarbon fuel that, when used properly, can run perfectly in a diesel engine.

The vegetable oil you see in the supermarket is too thick to burn properly as is. The viscosity needs to be drastically reduced in order for it to flow through your injection pump and into your engine without causing wear or damage to internal components. There are two ways to accomplish this viscosity reduction. The first is to process the oil, through chemical reactions, into biodiesel. Biodiesel can be made at home with the proper materials, but is also now available at many gas stations and can run in unmodified engines (except for older diesels with natural rubber hoses and seals; these must be replaced with hoses and seals made from synthetic rubber or certain plastics). The other approach, which we will concern ourselves with here, is to heat the vegetable oil up enough to reduce its viscosity to that of diesel fuel.

To properly burn vegetable oil in a diesel engine, the oil must be heated to at least 160 degrees Fahrenheit. This reduces the viscosity enough that the oil can flow through the injection pump and injectors properly, and most importantly be injected with a proper spray pattern. Our conversion kits heat your oil by applying heat from engine coolant and electric heat to the oil. Your vehicle still must start on diesel fuel or biodiesel, as cold vegetable oil will not burn properly in your engine. Once the engine is warm, you can switch over to vegetable oil and run on free and renewable fuel. Don't forget to shut the vehicle down on diesel or biodiesel as well, otherwise vegetable oil will still be in your fuel lines and turning the car back on will be difficult!

Vegetable oil is a carbon-neutral fuel, since the oil comes directly from plants that absorb carbon dioxide from the air. Rather than taking stored carbon out of the earth and introducing it into the atmosphere, you are simply recirculating the carbon dioxide already in the air! Emissions from vehicles running on vegetable oil are also much cleaner than the same vehicles running on diesel fuel. Burning vegetable oil emits no sulfur oxides, the primary culprit for pollution in diesel fuel. It also burns cleaner, virtually eliminating hydrocarbon emissions. Particulate matter and carbon monoxide emissions are also significantly reduced. Nitrogen oxide emissions rise slightly, usually about ten percent, due to the greater heat generated by the vegetable oil burning.

These days, energy prices are reaching peaks unheard of just a few years ago. Yet many neighborhood restaurants are still paying money to get their used fryer oil – a perfectly good fuel for your diesel – hauled away. If you ask around, many of them are probably willing to give away their oil to you for free. After simple filtering and water removal procedures, this free oil is suitable as fuel for your converted vehicle. A properly built and installed vegetable oil conversion is an investment that pays for itself. Running your diesel car or truck on vegetable oil is truly a win-win for both the environment and your wallet. Isn't it nice when things are both ethical and economical?

## **Now, what can Vegmatics do for you?**

I first became involved in diesel-to-vegetable oil conversions in early 2006, when the technology was still in its infancy. I converted my first car – a 1982 Volkswagen that I had already set up to run on biodiesel – in June of that year. It is still my daily driver today, nearly 30,000 veggie miles later. I designed the system for my car myself, and I trust it to handle many more miles than it already has. My experience with designing and maintaining a system over time is reflected in the design and component choices of our Vegmatics conversions for reliability and longevity.

If you are interested in a conversion, I recommend that you take a look at the custom-designed systems available here at [www.vegmatics.com/system\\_selection.pdf](http://www.vegmatics.com/system_selection.pdf). That document should explain the available designs and pricing for each of them. If you have any questions about components, installation, or general vegetable oil tech, please contact us via the phone number or email address listed on the top page. Thank you.

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