DIY Diesel to Vegetable Oil Conversion

Waste Vegetable Oil, Used Fryer Oil, whatever you want to call it, it's the stuff your fries and egg rolls were fried in, now it's fuel, not waste. Usually it can be found for free, but if you have to pay for it, it's usually under $1 / gallon. Compared to diesel at $5 / gallon, that's a bargain, and you get a much cleaner and healthier exhaust in the deal. Since vegetable oil has a similar btu value to diesel, mileage and power will not be significantly different.

The original diesel engine, invented by Rudolf Diesel around 1900, was first demonstrated at the World's Fair running on peanut oil. Today's engines are built too tightly (fine tolerances) to run on thick veggie oil without some modifications. The two main ways of getting veggie oil to run in a diesel are to convert the fuel to biodiesel, the subject of our DIY Biodiesel Fuel book, or to convert the diesel fuel system to run on the thicker raw oil. That is the method this book will address.

The problem is the oil is too thick to run through the fuel system. The easiest way to fix this is to heat the oil, either with electric, hot coolant, or a combination. We prefer a coolant only system for simplicity and less chance of failures.

Let's look at the existing fuel system. Starting at the back of the vehicle, we have the fuel tank, with a feed line running forward. The next item we might find is a fuel pump, then a filter, and then finally the injector pump, with a return that connects back to the tank.

<factory fuel system diagram>

We want to add heat to this system so that veggie oil gets thin enough to flow freely. Engine coolant is cold on startup, so we will startup on diesel, and shutdown on diesel, to clean any veggie out of the fuel system, to prevent cold weather clogs, and injector pump damage.

We will add a second fuel tank, a electric lift pump, a separate filter, and a pair of 3 port fuel valves, all heated with engine coolant.

<completed fuel and coolant system diagram>

Adding the fuel tank:

Depending on the vehicle, a tank can be added in the trunk, in the bed (pickup), underneath (especially if your model had a second tank option), or in the cargo space of a van or station wagon. Plastic tanks such as marine fuel tanks or metal ones can be used as the temperatures will never exceed 200F or so.

Heating the Fuel Tank:

Some folks will cut a slot and install a heat exchanger, like a under dash heater core or transmission cooler. These work well, but the "rubber" lines inside the tank need to be heat and oil resistant. Standard heater hoses will degrade in this environment. Hydraulic hoses work well. We used to use this

method, until we discovered Arctic Fox Hotfox heat exchangers. They are stainless steel, insert through a small hole easily cut with a hole saw, and keep all the connections on the exterior of the tank. They contain the fuel pickup, so the fuel is heated at pickup point, and you don't have to wait for the tank to warm up. They do not contain the return connection, so a return and vent (very important) will need to be installed. The return fuel will be hot, so locate it near the pickup. In cold climates, or where the fuel tank is in the passenger space and you have hot summers, we will wrap the tank with 2 layers of foil backed bubble wrap.

Heating the Lines:

Some folks will install a Hose-In-Hose (HIH) heated fuel line, where the fuel line runs down the center of the coolant lines. After seeing the catastrophic results of this 15 years ago, we recommend Hose-On-Hose (HOH) configurations, where the fuel and coolant lines are strapped together, then insulated with plumbers foam pipe insulation tubes. Strap the 4 hoses together with zip ties (2 coolant, 2 fuel), cover with insulation tube, and wrap with duct tape.

Lift pump:

We install a electric lift pump at the veggie tank so that the injector pump does not have to work so hard. Diesel vehicles commonly come with lift pumps already installed, some at the diesel tank, some on the injector pump. Having a bit more help on the veggie side is good insurance, and makes purging the fuel lines of air a "breeze".

Filter:

A filter is added to the veggie side, as the existing vehicle filter is dedicated to diesel. This way, if either side clogs, you can get home, or change the filter while on the road without a disabled vehicle. We use a coolant heated filter, called a TurbiFyner, that cleans the oil and heats it to engine temperatures.

Fuel valves:

Two 3 port (not a single 6 port) fuel valves are installed on both the feed and return lines of the injector pump. These valves allow us to select the veggie or diesel tank, on the feed and return line, individually. This enhances purging of the veggie from the system at shutdown, and keeps cold veggie out of the diesel tank, where it can clog lines and filters, or damage injector pumps. The best valves we have found are made by Greasecar.com.

Coolant Tee's:

The hot and cold water lines entering the engine block are cut, and a "T" is installed in each. We prefer brass for this, as not all plastic tees are up to handling the temperatures. The heater lines going back to the veggie tank connect to these "T"'s.

Electrical:

Two switches are mounted to the dash to activate the fuel valves, with separate or integrated indicator lights. Optional equipment can also be installed, like a veggie temperature gauge, filter pressure/vacuum gauge, and fuel level gauge.

<insert electrical diagram>

Parts Sources:

Collecting Vegetable oil:

Cleaning the oil before putting it in your tank: