



The Myth of Using Straight Vegetable Oil as a Diesel Fuel

Biodiesel, a renewable fuel produced from animal fats or vegetable oils, is popular among some vehicle owners seeking to reduce carbon emissions. Straight vegetable oil (SVO) and waste oils from cooking and other processes are not the same as biodiesel (or conventional diesel) and are generally not considered acceptable vehicle fuels. But SVO can be converted to biodiesel fuel for cars, trucks, buses, and heavy machinery. Here is why this conversion process is so important.



FURTHER READING

For a complete list of ASTM biodiesel requirements, see the Biodiesel Handling and Use Guide (Fifth Edition) at afdc.energy.gov/files/u/publication/biodiesel_handling_use_guide.pdf.

Biodiesel Made From SVO

Biodiesel is substantially different than SVO and results in better engine performance. The process of converting plant oils or greases to biodiesel reduces the fuel's viscosity and boiling point, making the product more like conventional diesel fuel. Biodiesel is most commonly blended with petroleum diesel fuel.

SVO Performance

Using SVO as a vehicle fuel increases the maintenance costs and reduces the lifespan of diesel engines. The reason is that carbon deposits build up inside the engine, typically over the long term, and SVO accumulates in the engine lubricant.

These buildups occur because SVO has high viscosity (thickness, or measure of a fuel's resistance to flow) and a high boiling point relative to those of diesel fuel.

High fuel viscosity can cause premature wear of the fuel pumps and injectors. It can also dramatically alter the fuel spray coming out of the injectors by increasing droplet size, decreasing spray angle, and increasing spray penetration. These effects can make the engine's internal surfaces very wet, diluting the engine lubricant and inviting carbon buildup. The viscosity of SVO is much higher than that of diesel fuel at normal operating temperatures.

Diesel engines equipped with modern emission control systems may experience long-term effects from using SVO. Fuel buildup in the lubricant is more significant in these engines—even if that fuel is petroleum diesel—because these systems generally were not designed to accommodate SVO. Off-spec fuel, which does not meet regulatory quality requirements, or contaminated fuel can damage these engines, which is why fuel blends are available at the gas station.

Fuel Blends

All manufacturers of diesel vehicles and engines have approved the use of B5, a blend of 5% biodiesel and 95% petroleum diesel, and some approve the use of blends up to B20 (20% biodiesel and 80% petroleum diesel) or higher. Visit the National Biodiesel Board website for information on car manufacturers' approvals of biodiesel use in vehicles (biodiesel.org/using-biodiesel/oem-information).

To ensure good engine performance, biodiesel must meet quality specifications developed by ASTM International. Blends up to B5 may be found in conventional diesel fuel without additional labeling at the pump. Blends of biodiesel from B6 to B20 are required to be labeled at the pump to inform consumers of the percentage of biodiesel being sold.