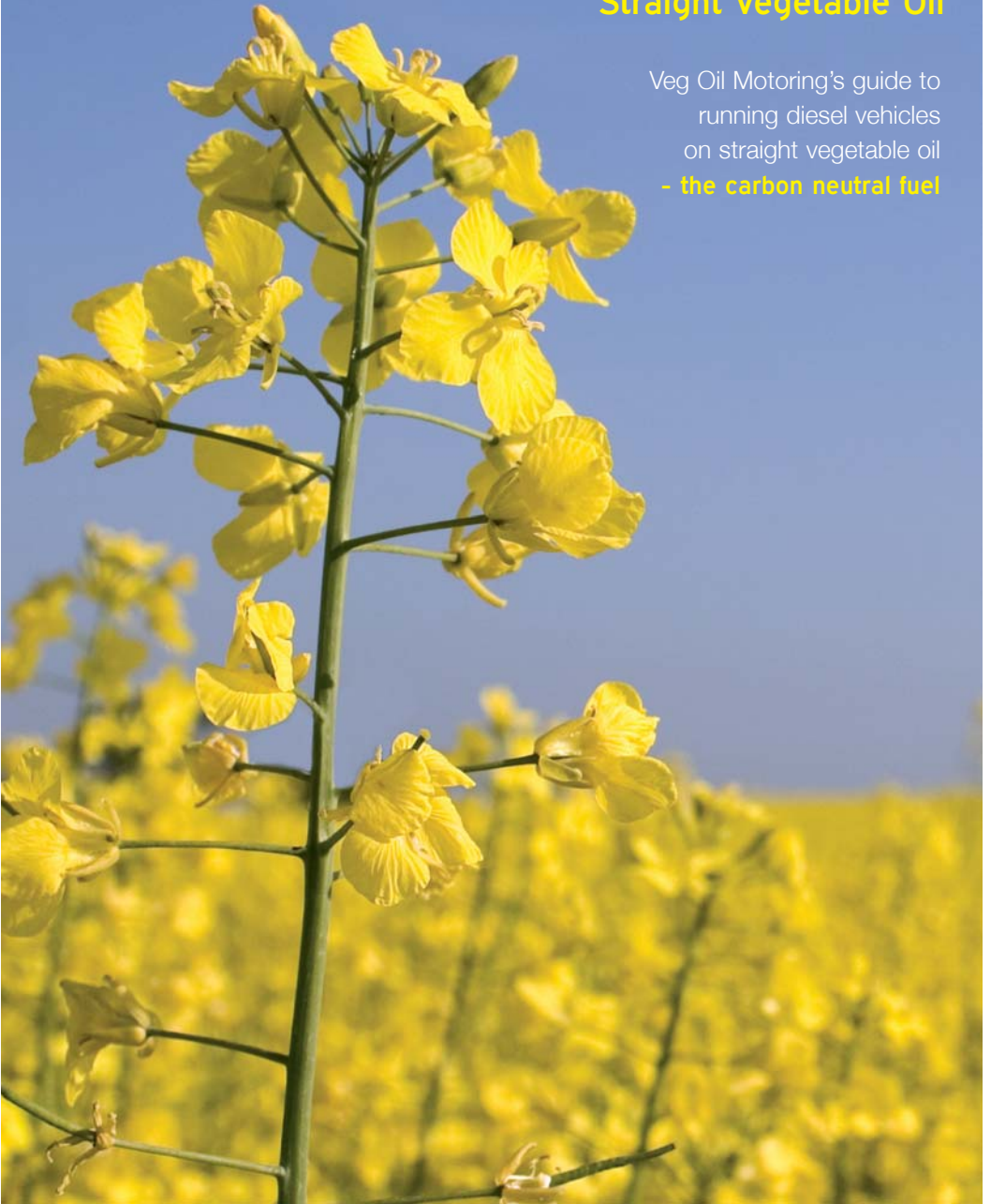


SVO

Straight Vegetable Oil

Veg Oil Motoring's guide to
running diesel vehicles
on straight vegetable oil
- **the carbon neutral fuel**





Introduction & background

This leaflet is an introduction to running diesel vehicles on straight vegetable oil (SVO) and aims to answer the main questions of those considering having their vehicles converted to run on this fuel.

Background

The idea of using vegetable oil as a diesel engine fuel has been around for a long time and dates back to the beginning of last century when the diesel engine was invented. Only four years after **Dr Rudolf Diesel** produced his first functional prototype, diesel engines were being successfully run on straight vegetable oil (**SVO**). Dr Rudolf Diesel was a considerable advocate of using SVO in his engines, but his aspirations were largely forgotten until the rocketing fuel prices of the 1970s and the early 80s, when a German company started testing SVO in its revolutionary new diesel engine. Now, over 25 years later, the same company, Elsbett GmbH, is producing reliable conversion kits which allow a huge range of diesel vehicles to run on SVO.



Why vegetable oil?

Reason 1:

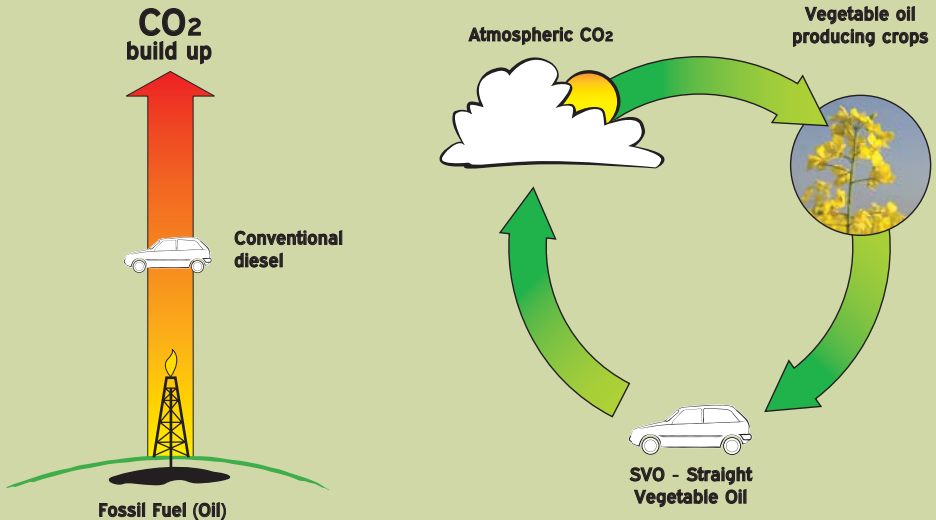
SVO is the only readily available fuel for common vehicles with virtually zero net CO₂ emissions. Like fossil fuels, SVO still gives out CO₂ emissions when burnt in an engine. However unlike fossil fuels these emissions essentially replace the CO₂ taken out of the atmosphere by the plants that initially formed the oil, with the help of sunlight. Because of this SVO is referred to as a carbon neutral fuel. For someone regularly using a diesel vehicle, switching to SVO is probably the largest single step they could make in reducing their contribution to global warming.

Reason 2:

As SVO is essentially captured sunlight energy it is a **renewable fuel** which is not going to run out while the sun still shines. Fossil fuels alternatively cannot be regenerated (unless provided with time frames of many millions of years) and are thus in a state of lessening supply. Limited supplies means that the price of fossil fuels could soon rise to levels which are truly crippling to motorists.

Why vegetable oil?

CO₂ emissions from conventional diesel and SVO



Reason 3:

SVO comes from domestic crops, reducing the need for foreign oil while boosting the **local economy** and supporting the **agricultural community**. SVO unlike Middle Eastern oil is not a source of global tension and conflict and so it is a fuel where a war is not required to ensure supply.

How to switch to SVO

To make a diesel vehicle run reliably on SVO it is necessary to fit a conversion kit to the vehicle. The kit in simple terms heats the SVO and thins it down to the same thickness/viscosity as diesel. This allows it to pass through the fuel delivery system in the same way as diesel and burn cleanly in the engine. Conversion kits which enable vehicles to run solely on SVO, known as '**one tank**' kits, have been developed over the last 25 years by the German company **Elsbett**. Driving vehicles fitted with these kits is essentially no different compared to regular, day to day driving on diesel, with the exception of what you put in the fuel tank.

Vehicle suitability

Not all diesel vehicles are suitable to convert to SVO. Diesel vehicles fitted with most types of rotary pump produced by **Lucas, CAV, Delphi, Stanadyne** and **Rotodiesel** are not recommended for conversion by Elsbett. In addition, many direct injection diesel vehicles cannot generally be converted with '**one tank**' kits as they require start up on diesel. Conversions involving '**two tank**' kits are required for these vehicles. To find a comprehensive list of the vehicles that can and cannot be converted it is best to visit the following database on the Elsbett website: **www.elsbett.de/forms/ekit**.

Finally diesel vehicles being considered for conversion should be in good condition as converted vehicles running on SVO can show engine faults that were not previously noticeable.

Legality and fuel

At the time of writing this leaflet, it is the position of the UK Government that if vegetable oil is used as a vehicle fuel then duty needs to be paid on every litre to Her Majesty's Revenue and Customs (HMRC). SVO is eligible for the reduced biodiesel fuel duty rate, which is set at 20p less than the standard fossil fuel duty rate (at the time of writing this standard rate is 48.35p/l making the duty rate on SVO: 28.35p/l).

Over the last few years, a lot of confusion has existed over the eligibility of SVO for the reduced duty rate with differing advice being provided by the HMRC in different areas of the UK. Fortunately this matter has been settled following the 2006 HMRC review on the issue. The review concluded essentially that the precedent set by Veg Oil Motoring, whereby it has claimed the lower biodiesel fuel duty rate on SVO since 2003, is correct.





Frequently asked questions

In the future SVO maybe free from fuel duty for users that do not consume more than 2500 litres per year; this possibility is currently being reviewed by the HMRC.

It is currently possible to buy duty paid SVO in West Wales from either **Veg Oil Motoring** or **Community Biofuels**. These organizations deliver fuel if purchased in bulk.

It is also possible to register to pay duty on SVO yourself. This can be done by contacting the HMRC National Advice Service on the following number: **08450 109000**.

The SVO used to fuel converted vehicles should be of a quality that meets the German industry vegetable oil standard DIN 51605. Rape seed oil which is generally sold as the cheapest oil in supermarkets meets this standard. The refined used cooking oil produced by **Veg Oil Motoring** only partially meets this standard and therefore its use is only advised for converted indirect diesel engines.

Can diesel be used in converted vehicles if SVO is unavailable?

Yes, these conversions enable the vehicle to run on multifuels which includes SVO or diesel or any mixture of the two fuels.

Will I have to inform my insurance company?

Yes, it is necessary to inform your insurance company, however most insurance companies will simply amend the vehicle policy without any additional premium. Insurance companies that have given cover to converted vehicles without any complications include: Frissel/Liverpool and Victoria, Norwich Union, Cornhill and NFU.

Will the conversion affect the servicing of the vehicle?

This depends on whether the engine of the vehicle is of direct or indirect injection design. With converted indirect injection vehicles there is no change to the usual servicing routine however it is a good precautionary move to have the components of the kit checked periodically to ensure that they are fully functional. Converted direct injection vehicles generally require a different service regime with regard to the engine's lubricant. A plant oil based lubricant is used instead of the mineral lubricant and this needs to be changed at shorter intervals.



Frequently Asked Questions

How does SVO compare with biodiesel?

SVO and biodiesel are quite different fuels however they are often confused as biodiesel is produced from SVO. Biodiesel is made when vegetable oil molecules are split four ways by a chemical reaction called transesterification. Since biodiesel is produced from SVO it also has low net CO₂ emissions. However, since the transesterification reaction requires energy and some of the chemicals needed to carry out the reaction generally come from fossil fuels this means that biodiesel has higher net CO₂ emissions than SVO. In short, SVO is the better of the two fuels for reducing CO₂ emissions.

How many hectares would be required to grow the fuel for one car, and is there enough land available in the world to grow our fuel?

A hectare of oil seed rape can produce roughly a 1000 litres of oil which if used through a reasonably economic converted diesel car can provide 10,000 miles worth of motoring; a distance many drivers cover in a year. It is extremely unlikely that all the world's vehicles currently running on fossil fuels could instead be powered by vegetable oil. Like other renewables SVO is only part of the solution to meeting our energy requirements sustainably and needs to be combined with attempts to reduce current unsustainable levels of energy consumption.

How is the performance and fuel efficiency of the engine affected?

Research has backed up anecdotal evidence that vegetable oil gives a slightly better power performance than diesel in engines compared before and after conversion. Studies on fuel efficiency give conflicting results with some studies showing higher miles per gallon (MPG) on SVO as compared to diesel and others showing less. Anecdotal experience has been that MPG on SVO is approximately the same as that on diesel.

What are emissions like with SVO?

Converted vehicles running on SVO generally pass the MOT emissions test normally. The emissions of SVO are considered comparable to diesel with the exception that the CO₂ produced from SVO is carbon neutral.

Are all forms of SVO equal?

SVO fuel sourced from used cooking oil can be considered to have virtually zero net emissions as it is captured from the waste stream and requires minimal reprocessing. SVO from virgin rapeseed oil is estimated to be between 56% to 85% carbon neutral, with the lower percentage being related to SVO production methods using mineral fertilizers and energy intensive methods of oil extraction.

Frequently Asked Questions



Is it possible just to blend vegetable oil with diesel and use this in an unconverted engine?

There is probably a blend of SVO and diesel that will function in diesel engines without causing long term damage. However it is difficult to say whether this is a 20% or a 2% blend of SVO to diesel, as few reliable trials have been completed. Veg Oil Motoring cannot recommend a blend, and vehicle owners trying this method of using SVO do so at their own risk. It is important to be aware that this approach is more likely to cause problems with direct injection engines and engines with the unsuitable pumps mentioned above.

How does a conversion affect the warranty of the vehicle?

Manufacturer's warranties are usually invalidated for vehicles that are converted to run on SVO. An exception to this is Caterpillar (South Africa) who provide full warranty on some of their vehicles to run with-out modification on pure sunflower oil. It is therefore best to convert vehicles outside of warranty.

How much does a conversion cost?

An Elsbett "one tank" conversion, including the price of the kit and its installation, generally costs around £1250. However, since kits are vehicle specific and can vary in price this figure can go up to around £1400 for non heavy goods vehicles.

What is the pay back period for the kit?

This depends on a range of factors and so has to be individually calculated for each vehicle using the following simple formula:

$$\text{payback mileage} = \frac{\text{cost of conversion}}{\left(\frac{\text{difference in fuel price per litre between SVO and diesel}}{\text{vehicle economy (miles per litre)}} \right)}$$

How do converted vehicles perform in cold weather?

As vegetable oil becomes thicker at lower temperatures Elsbett recommend blending winter diesel and vegetable oil at temperatures approaching -10°C to allow for normal operation. If the temperature is likely to go down to -15°C then the SVO should be completely switched to winter diesel.

How long does it take to convert a vehicle?

With certain types of vehicles it is necessary to have the fuel injectors for the vehicle machined in the Elsbett workshops in Germany. The conversion period required for these vehicles has to take into account the time needed to send the injectors to Germany and for them to be returned. This period usually takes as little as seven days however vehicle owners should be prepared that period could take longer. If injector work can be done in the UK then the conversion period is up to 5 days.

About veg oil motoring

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Veg Oil Motoring is a company in North Pembrokeshire which has pioneered the use of SVO in UK vehicles. Veg Oil Motoring installs kits, markets SVO fuel and runs residential courses on SVO technology at the Centre for Alternative Technology (www.cat.org.uk). It is also a service partner of Elsbett GmbH, marketing their kits at the German retail price in the UK and providing locally based support on the kits that it distributes.

For further information contact:



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Motoring**



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