# Hydrotreated Vegetable Oil (HVO) fuel - briefing

## What is it?

- HVO fuel (Hydrotreated Vegetable Oil) is a fossil free, renewable and sustainable fuel produced by hydrotreatment of vegetable oils and/or animal fats.

- The result is a chemical structure almost identical to regular diesel and can therefore can fully replace fossil diesel.

- It can offer a 90% reduction in carbon dioxide emissions compared with regular diesel.

- HVO biofuel meets EN 15940 standards and Fuel Quality Directive 2009/30/EC Annex 2, which allow it to be used in diesel engines.

## How does it work?

- HVO is a form of renewable diesel that has been produced from renewable and sustainably sourced vegetable fats and oils. Unlike regular biodiesel, hydrogen is used as a catalyst in the creation process instead of methanol. This makes it a more clean-burning, environmentally-friendly renewable diesel alternative, without the short shelf life of regular biodiesel

- The fuel is created by collecting cooking oil waste and putting it through a hydrogenation and isomerisation process which removes impurities. The process breaks down existing molecules and builds them up again, leaving a final product with consistent carbon chains but without the impurities that are common in traditional diesel and biodiesel.

- The hydrogenation process means that all of the oxygen is removed from the oils and this makes it much more likely to last longer in the tank than biodiesel.

- It can be used as a drop-in alternative to regular diesel with no modifications or changes necessary to the existing fleet

## What are the benefits?

- Reduction in greenhouse gas/CO2 emissions by up to 90%
- Reduction in NOx emissions by up to 27%
- Reduction in particulate matter emissions by up to 30%
- Reduction in carbon monoxide emissions by up to 24%
- Can offer a fast and simple step towards “net zero” carbon with no CAPEX requirement
- Renewable energy source produced from sustainable renewable waste feedstocks from waste cooking oil and residues.
- Direct drop-in functionality for an existing RCV fleet to use, with no need for adaptations, making it a complete replacement for diesel.
- Does not compromise fuel infrastructure, engines, or exhaust.
- Stored in the same bulk tank and used in exactly the same way as regular diesel fuel; it is a more stable fuel than ordinary diesel, with a low water content.

- Up to 10-year shelf life compared to around 1 year for regular diesel.
- Reuse of used cooking oil promotes sustainable resource management, rather than disposing of cooking oil waste in landfill or as hazardous waste.
- Contributes towards the government's waste strategy pledge to eliminate food waste to landfill by 2030
- For every 1,000 litres of diesel burned, you will produce 3.6 tonnes CO2;
  for every 1,000 litres of HVO burned, you will produce 0.195 tonnes CO2.

## What are the costs?

- Among the fuel's drawbacks is the price, it is around 10% to 15% more expensive than mineral diesel. That cost will not be recouped through fuel savings since efficiency is only marginally better than diesel.
- The benefits, therefore, are entirely emissions-based by reduction of fleet carbon emissions.
- Indications from the fuel supply industry suggest the cost of HVO will reduce over time until it reaches parity with conventional diesel. This is mainly due to the importance that the UK Government is applying to low carbon fuels and the renewable fuel obligation buy out price.

- In summary, this is high cost but high carbon impact saving.

## Other considerations:

- There are still concerns over the performance of refuse collection fleet vehicles that run on HVO, specifically whether they can achieve the required power output, compaction rates, and payload without increasing fuel consumption.

- Question marks remain over the guarantees of ecological sustainability of HVO sources, and the availability of a sustainable HVO supply in the long-term.

- Whilst HVO provides excellent technical properties, it can have a major drawback in that the oil of choice for HVO is typically Palm Oil. Procurement can however be specified for supplies without any Palm Oil. The EU Renewable Energy Directive (RED ii) aims to ban all palm oil in biofuels in stages by 2030. As a result, manufacturers are ramping up their non-palm oil sources. This gives confidence in the security of supply of HVO without Palm Oil content going forward.

- There is near limitless quantities of the base feedstock i.e. the used cooking oil, however it has been the processing plants that are needed to convert it to HVO that has limited production. To cope with this and satisfy the large European Market, traditional oil refineries have been converted to HVO production and this has led to the increase of more than 40% capacity in the last five years. This situation will continue to satisfy the ongoing demand.

- In the event of any disruption to supply of HVO the vehicles would revert to using fossil diesel so there is no risk to operational services.

## Is HVO being used successfully elsewhere?

A growing number of UK operators are trialling HVO and are adopting it for at least some of their vehicles.

**Bournemouth, Christchurch and Poole Council's** are trialling the use HVO in two of its refuse vehicles. It will explore the environmental benefits and operational impact of this alternative fuel within a large municipal fleet and consider if HVO can be the benchmark for transition to a cleaner, greener fleet.
The trial which will last one year, is expected to deliver a carbon dioxide saving of around 40 metric tonnes per vehicle, (equivalent to 11 hot air balloons of carbon dioxide) and will open up the potential for the fuel to be used within the remainder of the fleet, increasing the environmental benefit and savings across the council.

The **London Borough of Hackney** operates 90 trucks, including skip wagons and hook loaders as well as RCVs, and plans to run them all on HVO. Evidence from independent trials conducted at the Millbrook Proving Ground in Bedfordshire confirmed that the fuel's CO2 benefits are even better than those claimed by the supplier Neste, with a saving of up to 94% on a stop-start test designed to simulate a Euro VI RCV's urban duty cycle.
A subsequent trial of an RCV on a mixture of urban and rural routes involving operators such as Veolia and Biffa saw a similar level of CO2 saving. Substantial cuts in NOx emissions were achieved in both cases.

In January, **Babergh and Mid Suffolk district councils** approved the switch of its fleet to HVO fuel. The move will mean the councils' fleet emissions will reduce by up to 90%, with fleet emissions representing a quarter of the total CO2 emissions for the councils, marking a significant step towards their goal of becoming carbon neutral by 2030. The switch to HVO fuels will require some initial funds of £150,000 for storage tanks, with a further annual sum of between £56,000 and £97,000 each needed over the next three years for the fuel. But the councils said the new fuel will reduce maintenance costs and extend the life of the vehicles