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# Use of HVO (Hydrotreated Vegetable Oil) in Transport

To: Transport Managers UK wide

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## 1 Executive summary

HVO (Hydrotreated Vegetable Oil) fuel is a renewable diesel fuel derived from various feedstocks, including vegetable oils, animal fats, and waste oils. It is produced through a hydrotreating process, which involves the removal of impurities and saturation of unsaturated compounds in the feedstock.

## 2 Production

The hydrotreating process typically involves the following steps:

1. **Hydrogenation:** The feedstock, which can be vegetable oils, animal fats, or recycled cooking oils, undergoes a hydrogenation process. This involves reacting the feedstock with hydrogen in the presence of a catalyst.

2. **Hydrotreatment:** The hydrogenation process removes impurities such as sulphur, nitrogen, and oxygen, as well as saturates double bonds in the hydrocarbon chains of the feedstock. This results in a cleaner and more stable fuel.

The resulting HVO fuel is a high-quality, low-emission diesel alternative that can be used in existing diesel engines without modification. It has several environmental benefits, including reduced greenhouse gas emissions and lower levels of pollutants compared to traditional fossil diesel.
HVO is considered a drop-in biofuel, meaning it can be used as a direct substitute for conventional diesel fuel without requiring changes to the existing infrastructure or engines. This makes it a more easily adoptable option for reducing the carbon footprint in the transportation sector.

## 3 Potential Drawbacks

While HVO fuel offers several environmental benefits and is considered a cleaner alternative to traditional diesel fuel, there can be some challenges and concerns associated with its production and use:

1. **Feedstock Availability and Sustainability:** The production of HVO fuel relies on the availability of feedstocks such as vegetable oils, animal fats, or waste oils. If not sourced sustainably, there could be concerns about deforestation, land use change, and competition with food production.

2. **Land Use Impact:** Large-scale production of feedstocks for HVO fuel could potentially lead to land use changes, impacting ecosystems and biodiversity. It is crucial to ensure that the production of feedstocks for HVO is done in an environmentally sustainable manner.

3. **Energy Intensity of Production:** The hydrotreating process used to produce HVO fuel can be energy-intensive. The overall environmental benefits of HVO depend on factors such as the energy source used in the production process.

4. **Competition with Food Production:** The use of edible oils for HVO production may raise concerns about competition with food production. It is important to strike a balance and prioritize the use of non-edible feedstocks, waste oils, or by-products to avoid negatively impacting food supplies.

5. **Cost:** HVO fuel can be more expensive to produce than conventional diesel, which can affect its competitiveness in the market. The economic viability of HVO may depend on factors such as feedstock prices, production scale, and government incentives.

6. **Infrastructure Compatibility:** While HVO is a drop-in biofuel, meaning it can be used in existing diesel engines without modification, there may still be considerations related to storage, distribution, and compatibility with certain materials in existing infrastructure.

Despite these challenges, ongoing research and development in the field of biofuels aim to address these concerns and improve the overall sustainability and cost-effectiveness of HVO and other renewable fuels. As with any alternative fuel, a comprehensive assessment of the entire life cycle, from production to use, is crucial to understanding its environmental impact.

## 4 HVO in Net-Zero

HVO can play a role in achieving net-zero emissions goals due to its renewable nature and potential for reducing greenhouse gas emissions in the transportation sector. Here are some ways in which HVO contributes to net-zero initiatives:

1. **Carbon Neutrality:** HVO is considered a carbon-neutral fuel because the carbon dioxide (CO2) released during combustion is roughly equal to the CO2 absorbed by the plants or organisms that originally produced the feedstocks. This closed carbon cycle makes HVO a potential tool in efforts to achieve carbon neutrality.

2. **Reduced Greenhouse Gas Emissions:** Compared to traditional fossil diesel, HVO typically results in lower greenhouse gas emissions, including carbon dioxide and other pollutants. The hydrotreating process used to produce HVO removes impurities and saturates unsaturated compounds, resulting in a cleaner-burning fuel.

3. **Use in Existing Infrastructure:** HVO is a drop-in biofuel, meaning it can be used in existing diesel engines and infrastructure without modification. This characteristic makes it a practical option for reducing the carbon footprint in transportation without requiring extensive changes to vehicles or refueling infrastructure.

4. **Transition Fuel:** HVO can serve as a transitional fuel as the transportation sector moves toward more sustainable and electrified solutions. It provides an immediate option for reducing emissions in diesel-powered vehicles while longer-term solutions are developed and implemented.

5. **Integration with Sustainable Practices:** The sustainability of HVO depends on the feedstock used for its production. To maximize its environmental benefits, it is important to source feedstocks sustainably, such as using waste oils or by-products from other industries, and avoid contributing to deforestation or other negative land-use changes.

It's important to note that achieving net-zero emissions requires a holistic approach that involves not only the use of low-carbon and renewable fuels but also improvements in energy efficiency, increased use of renewable energy sources, and potential shifts to alternative technologies, such as electric vehicles. Additionally, the overall impact of HVO on net-zero goals depends on factors such as feedstock selection, production methods, and supply chain considerations. As technologies and sustainability practices evolve, HVO may continue to be an important component of the broader strategy to reduce carbon emissions.

## 5 Current Usage

The motor industry has stated HVO is one of the cleanest burning fuels available today and can help to reduce vehicle emissions as follows:
•Reduce up to 90% in net carbon dioxide (CO2)
•Reduce up to 30% in net particulate matter (PM)
•Reduce up to 27% in net nitrogen oxide (NOx)
•Reduce up to 24% in net carbon monoxide (CO)

## 6 APSE comment

HVO should therefore only be regarded as a transitional fuel until alternatively powered vehicles become widely available and affordable. The fuel currently costs around £1.94 a litre for road users compared to around £1.51 (December 2023) for standard white diesel so carries a premium when budgets are under intense pressure.

There was an undoubted environmental impact from palm oil production, as demand increased, including clearing of tropical rain forests to plant more palm crops. Without international agreements, there remains a significant danger of similar demand for HVO creating a financial incentive to take a similar course. Councils can demand 'sustainable product only' within their procurement regime, but that will not negate the additional demand created for HVO generally.

APSE member councils should also consider assurances from vehicle manufacturers that the use of HVO in vehicles will not create any warranty implications on their purchased or leased fleet.

In conclusion, HVO should **not** be a substantial part of a long-term net-zero strategy and used widely

throughout the fleet. It may be a reasonable option for the last few legacy diesel powered vehicles in the fleet in say 5 year's time.

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