



HVO Fuel: A Sustainable and High-Performance Alternative

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Executive Summary

Hydrotreated Vegetable Oil (HVO) fuel is a renewable diesel alternative that addresses the environmental and operational challenges posed by conventional fossil fuels. With the UK government phasing out the use of red diesel and promoting cleaner fuel options to meet net-zero targets, HVO offers a compelling solution. Derived from sustainable sources, HVO significantly reduces greenhouse gas emissions while maintaining high performance and compatibility with existing diesel engines. This white paper explores the benefits, challenges, and responsible sourcing considerations for HVO fuel.

Introduction

Context and Background

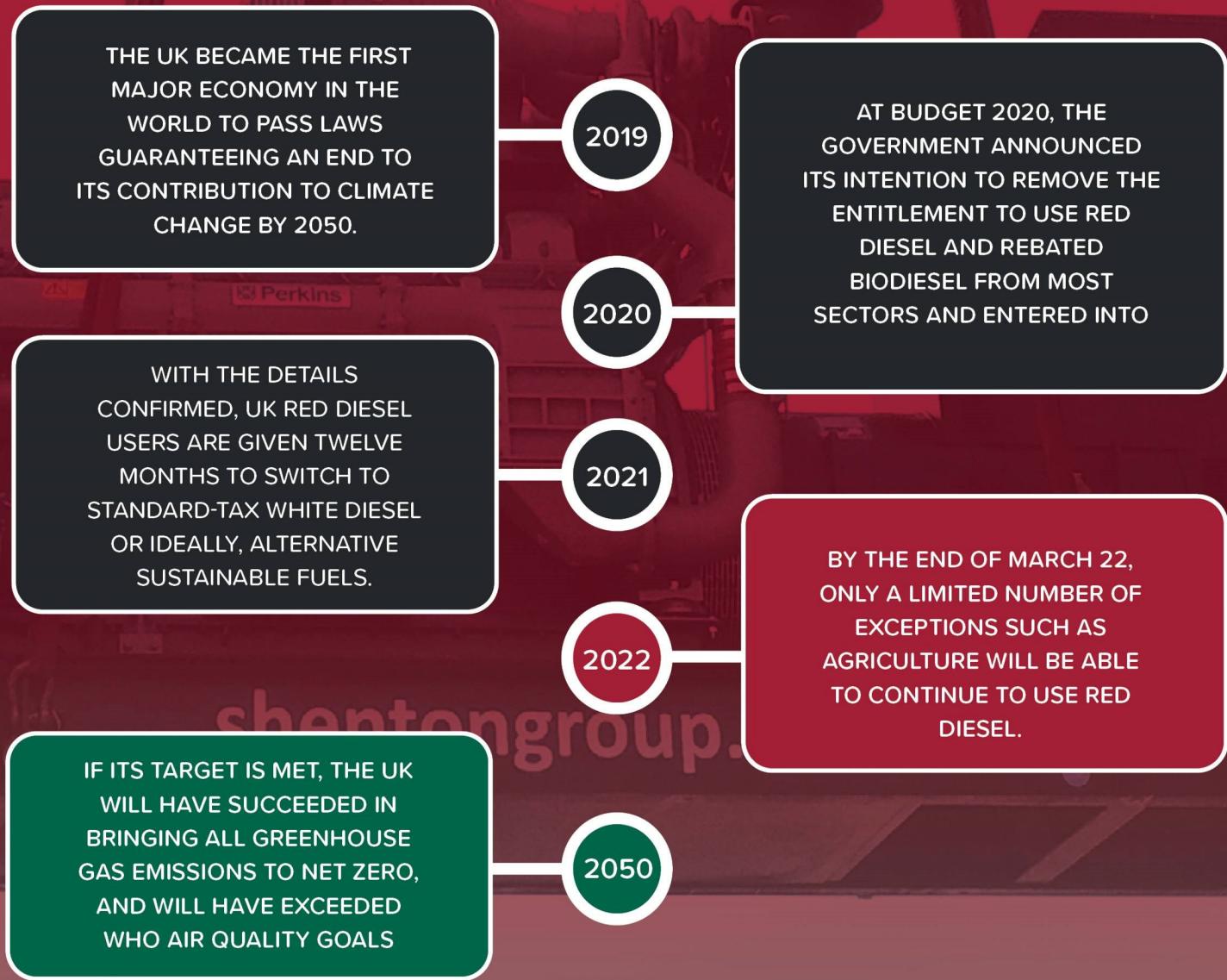
The urgent need to transition from fossil fuels has driven the adoption of renewable energy sources. The UK government's commitment to reducing air pollution and achieving net-zero emissions by 2050 has resulted in significant legislative changes, including the elimination of red diesel tax relief for most applications as of April 2022. As businesses seek alternative fuels, HVO has emerged as a key player in reducing emissions while ensuring reliability.

Purpose of the White Paper

This document provides a comprehensive overview of HVO fuel, covering its production, sustainability impacts, responsible sourcing and guidance on navigating regulatory changes. It also offers practical advice on how to implement HVO in existing operations.

Audience

This paper is aimed at facilities managers, procurement specialists, sustainability officers, and decision-makers in sectors reliant on diesel-powered systems, such as construction, logistics, and industrial operations.



What is HVO Fuel?

Hydrotreated Vegetable Oil (HVO) is a renewable diesel fuel made from waste and residue feedstocks like vegetable oils and animal fats. It undergoes a hydrotreatment process that differentiates it from traditional biodiesel and ensures high-quality performance.

Key Features of HVO

- **FAME-Free:** Unlike biodiesel, HVO does not contain Fatty Acid Methyl Ester, reducing the risk of microbial growth, water contamination, and material degradation
- **High Cetane Number:** This results in efficient combustion and smoother engine operation
- **Paraffinic Composition:** HVO belongs to the paraffinic family of fuels, characterised by zero sulfur and aromatic content, leading to cleaner combustion.

Production Process

HVO is produced through a hydrogenation process where hydrogen removes oxygen from oils, yielding a stable and clean fuel. This ensures better cold weather performance and a long storage life of up to 10 years, compared to the shorter lifespan of traditional diesel



Why Choose HVO Fuel?

1. Environmental Benefits

- Significant Reduction in Emissions: HVO can reduce net CO2 emissions by up to 90%, with additional reductions in nitrogen oxides (NOx) by around 20% and particulate matter (PM) by approximately 80%
- Cleaner Air: Using HVO results in reduced smoke on startup, reduced particulate production, and improved air quality, which is crucial for urban environments.

2. High Performance and Reliability

- Superior Cold Weather Performance: HVO has a cold plugging point of up to -42°C, ensuring reliability in extreme temperatures
- Extended Storage Life: HVO's renewable properties and stability extend its shelf life to up to 10 years, significantly reducing the need for frequent fuel testing and maintenance compared to regular diesel.

3. Versatility and Compatibility

- Drop-In Fuel: HVO can be used as a direct replacement for diesel, with no need for engine modifications. This makes it easy to integrate into existing infrastructure.



- OEM Approvals: Many engine manufacturers have confirmed HVO compatibility, ensuring peace of mind for operators.

4. Renewable and Sustainable

- Waste-Based Feedstocks: HVO is produced from renewable and waste-derived materials, aligning with the principles of the circular economy and reducing dependency on fossil fuels.
- Compliance with EN15940: HVO meets stringent European fuel standards, making it a reliable and safe choice.

5. Reduced Maintenance Costs

- Cleaner Combustion: The absence of FAME content reduces the risk of fuel contamination and engine degradation, lowering maintenance requirements

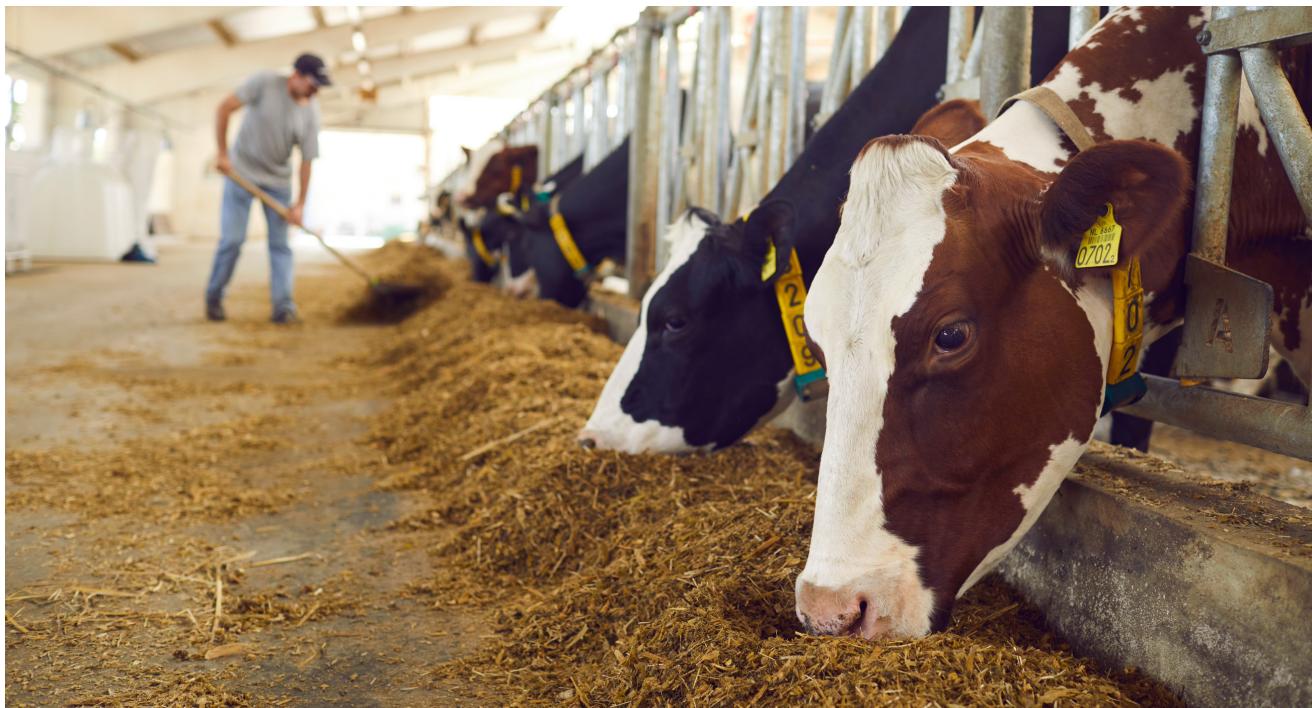
Responsible Sourcing of HVO

Sustainability Considerations

- HVO's sustainability depends on the origin of its feedstocks and the production practices. Best practices include:
- Second-Generation Biofuels: Sourcing HVO made from waste oils and fats to minimise environmental impact
- Addressing Market Displacement: Consider the risk of indirect land-use change (iLUC) when selecting feedstocks and ensure sustainable sourcing

Certifications and Due Diligence

- Renewable Fuel Declarations (RFDs): Obtain RFDs from suppliers to confirm the traceability and sustainability of the HVO
- ISCC and RFAS Certification: Verify that suppliers are certified by recognised bodies like ISCC to ensure adherence to high environmental and ethical standards
- Monitoring Supply Chains: Include HVO supply chains in risk assessments to manage potential issues such as modern slavery or unsustainable practices





Applications of HVO in Power Generation

HVO is emerging as a sustainable alternative to traditional diesel in power generation across a variety of applications. Its compatibility with existing diesel engines and reduced environmental impact make it an attractive option for businesses and industries transitioning to cleaner energy solutions.

1. Remote or Off-Grid Power Generation

HVO is particularly valuable for generating electricity in remote or off-grid locations where renewable energy sources such as solar or wind may not be feasible or reliable. Its long shelf life and stability make it an ideal solution for these challenging environments.

2. Backup Power Systems

In critical facilities like hospitals, data centres, and emergency services, HVO can be used in diesel generators to provide a dependable and environmentally friendly backup power solution. This helps reduce carbon emissions without compromising operational reliability.

3. On-Site Power for Industrial and Commercial Use

HVO is well-suited for on-site power generation in industries like manufacturing, data centres, and other commercial operations. By switching to HVO, businesses can lower their carbon footprint while maintaining compliance with strict emissions regulations, ensuring a cleaner and more sustainable energy supply.



4. Temporary Power Solutions

For temporary power needs such as events, construction sites, or installations, HVO offers a convenient and efficient option. It reduces harmful emissions while maintaining the performance and reliability required for these temporary applications.

5. Co-generation and Combined Heat and Power (CHP) Systems

HVO can enhance the sustainability of CHP systems, which produce both electricity and heat. This is particularly relevant in industrial settings or district heating systems, where efficiency and sustainability are priorities.

6. Peak Load Power Plants

HVO is an excellent option for peak load power plants, which operate during periods of high electricity demand. These plants, traditionally powered by diesel engines, can transition to HVO for cleaner operations and reduced emissions.

7. Microgrids and Hybrid Systems

In microgrids or hybrid power systems that combine renewable sources like solar and wind with diesel generators, HVO can minimise environmental impact during periods when renewable energy is insufficient. This supports a more sustainable and flexible energy solution.

8. Research and Development in Power Generation

HVO is also being studied for its potential to improve combustion processes and efficiency in power generation. Its clean-burning properties make it a promising candidate for future innovations in energy technology.

Challenges and Considerations

1. Cost Implications

- Higher Initial Costs: Although HVO is more expensive than traditional diesel, it offers long-term savings through reduced maintenance and compliance benefits

2. Availability and Supply Chain

- Regional Constraints: Availability of HVO may vary across regions, making it important to establish reliable supplier relationships
- Feedstock Volatility: The supply of waste feedstocks can fluctuate, affecting pricing and availability

3. Policy and Market Dynamics

- Government Regulations: Stay updated on policy changes, such as tax incentives and emission standards, that may impact HVO's cost-effectiveness

Conclusion

HVO fuel is a vital component in the transition to a low-carbon economy. It offers significant environmental benefits, meets regulatory requirements, and provides operational advantages. While the shift from red diesel presents challenges, HVO's superior performance and sustainability make it a compelling choice. By sourcing HVO responsibly and planning for a smooth transition, businesses can play a crucial role in reducing emissions and supporting the UK's net-zero goals.