

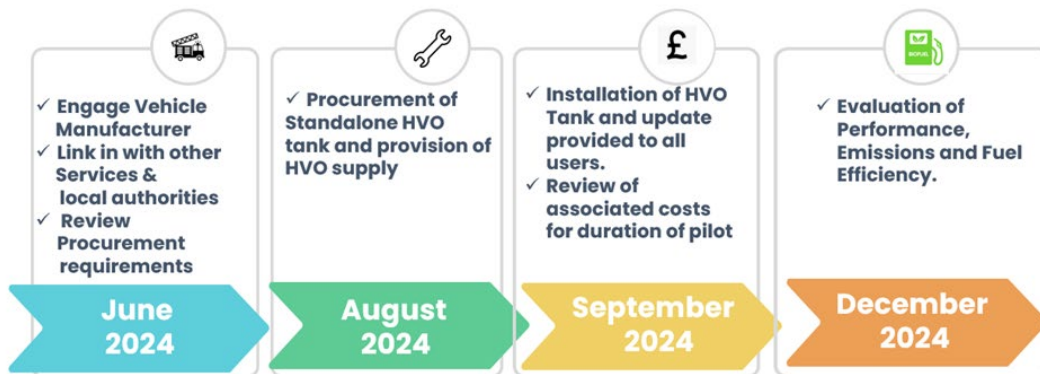


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Meeting	Services Leadership Team	Agenda no.	6o
	Strategic Board		12
Meeting Date	30 April 2024		
	13 June 2024		
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Presented By	Karl Edwards, Director of Corporate Services		
Subject	Alternative Fuels Pilot Programme		
Type of Report:	Information		
Action Point No.		For Publication	Yes

RECOMMENDATIONS

None. This report is to advise of the intended ECFRS pilot programme to evaluate the feasibility, benefits, and operational impact of using HVO (hydrotreated vegetable oil) as an alternative fuel.

BIO-FUEL PILOT TIMELINE



- **Objective:** Assess HVO performance, emissions reduction, and operational efficiency.
- **Potential Rollout:** Pending successful evaluation, consider a service-wide adoption.

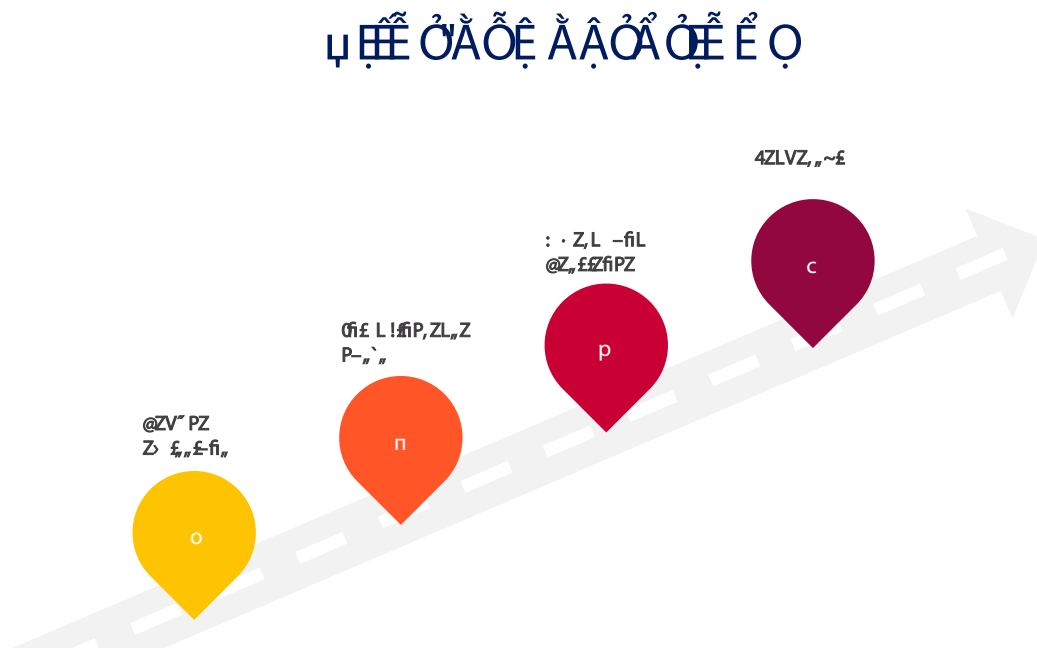
EXECUTIVE SUMMARY

As Essex County Fire and Rescue Service (ECFRS), we recognise the urgent need to address climate change and reduce our carbon footprint. Our fleet plays a significant role in our operations, and transitioning to alternative fuels is a crucial step towards achieving sustainability goals.

As detailed within the roadmap of the Cenex Zero Emission Vehicle Fleet Strategy (Appendix 1) it is highlighted that the use of HVO could be an interim solution to reduce the carbon footprint of our fleet, whilst vehicle technology evolves. It is therefore proposed to initiate a pilot programme, which will include the installation of a standalone HVO tank, to enable the Service to assess the impact that HVO has on emissions, performance, and operational efficiency.

This report has been based on collaboration with manufacturers, regional fire and rescue services, and industry research and data. Specific consideration of the fuel type means limited to no impact on retrofitting or replacing engine parts to ensure compatibility.

The pilot expectations are: -



- Reduce Emissions: Alternative fuels emit fewer greenhouse gas, contributing to cleaner air and a healthier environment.
- Increase Fuel Costs: by approximately 20%, although this is expected to be balanced against environmental gains and ECFRS would look at collaborative opportunities with other blue light services and local authorities.
- Operational Resilience: Diversifying our fuel sources enhances our resilience during supply disruptions.
- Leadership: Demonstrating our commitment to sustainability and setting an example for other organisations.

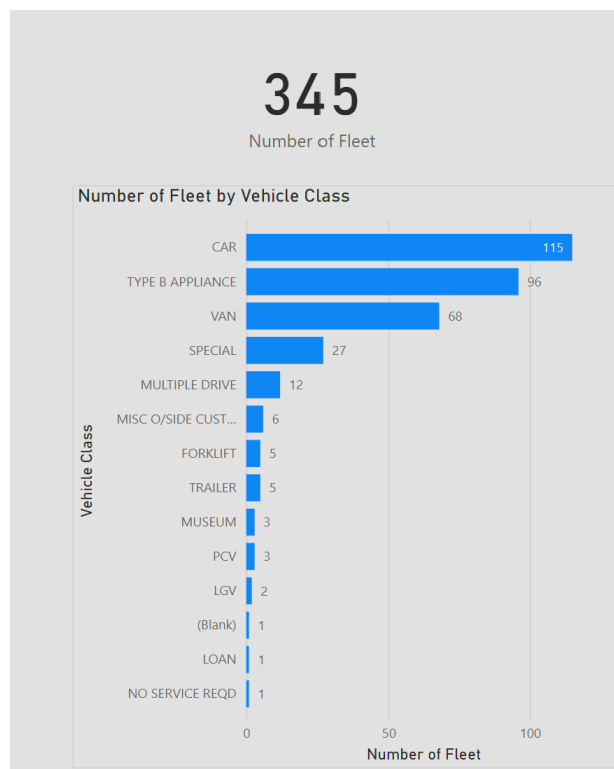
The expected outcomes are:

- Performance Evaluation, assessment of vehicle performance, range, reliability under real-world conditions
- Data Collection: data collection during the pilot will inform our decisions moving forward.
- Stakeholder Engagement: Engage with firefighters, engineers, and other staff to gather feedback and address concerns.
- Recommendations: Based on the pilot results, we will recommend scaling up alternative fuel adoption or refining our approach.

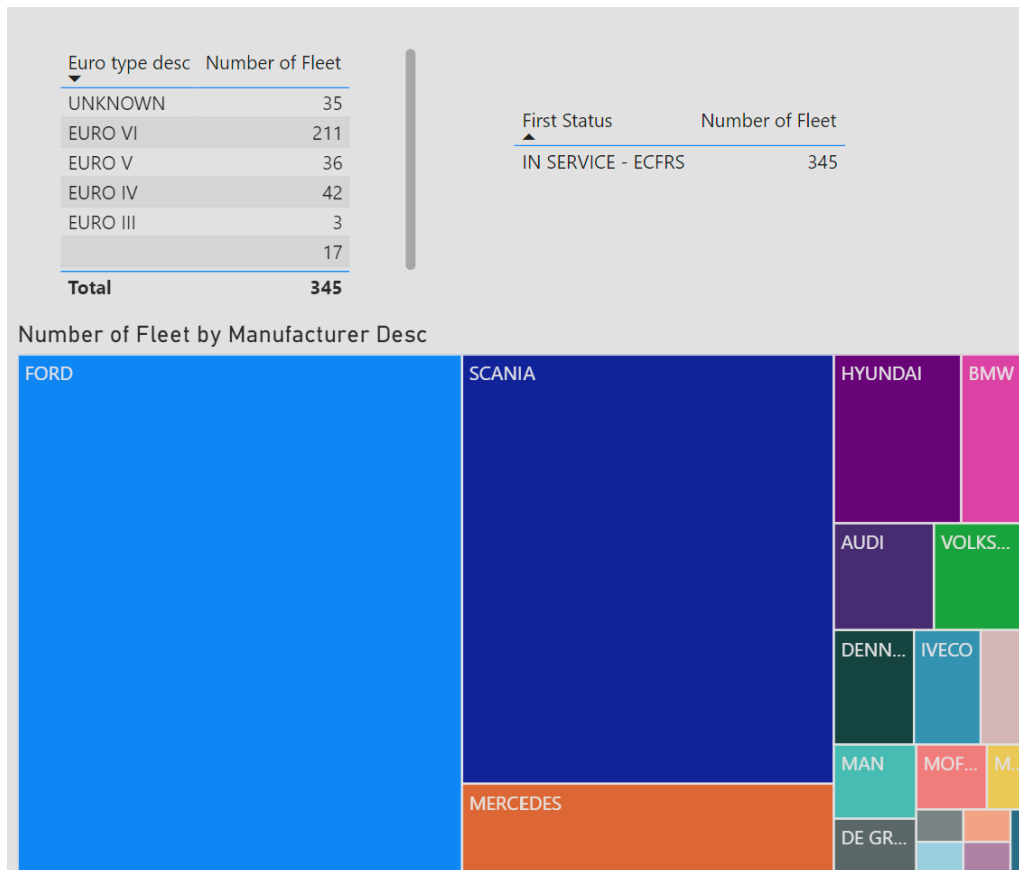
BACKGROUND

Essex County Fire and Rescue Service (ECFRS) plays a critical role in safeguarding lives and property across our region. Our fleet of mainly emergency response vehicles are currently powered by diesel fuel, which is essential for our operations, using a total of 410,606 litres of diesel in fiscal year 2022-23 equating to 1035 carbon tonnes.

ECFRS has 345 vehicles within its fleet with the following breakdown of vehicle type:



Of the 345 vehicles the following diagram shows Euro Category types and vehicles by manufacturer:



However, we recognise the need and requirement to transition toward more sustainable and environmentally friendly alternative vehicle fuel types. As detailed in the PFCC Environment Strategy, the Service is obliged to meet net zero greenhouse gas emissions by 2050.

The Cenex Zero Emission Vehicle Fleet Strategy sets out a roadmap to enable ECFRS to transition to zero emission vehicle technologies where suitable vehicles are available. One of the key elements from this is that ECFRS could use HVO within our fleet to provide an interim solution to reduce greenhouse emissions, whilst technology evolves to meet the Service’s vehicle operational requirements.

The Service has progressed with electricity as an alternative fuel source with 16 of our building assets having at least 1 electric vehicle charging point for use by fleet vehicle users. This capital infrastructure investment enhances the feasibility of using electric vehicles for fleet operations. This also prepares the Service to meet the UK Government’s plans for all new cars, vans, and heavy goods vehicles up to 26 tonnes to be zero emission vehicles from 2035 and sets a positive example for other organisations to follow.

The rationale for this project considers the following:

1. Environmental Imperative: Climate change poses a significant threat, and as responsible stewards, we must reduce our carbon footprint. Transitioning to HVO aligns with our sustainability goals.
2. Legislative Mandates: National and international regulations are increasingly stringent regarding emissions. By potentially adopting HVO, we demonstrate compliance and leadership within the Fire Sector.
3. Health and Air Quality: Diesel emissions contribute to air pollution and health risks. HVO offers cleaner combustion and reduced particulate matter.

OPTIONS AND ANALYSIS

Hydrotreated Vegetable Oil (HVO) is a renewable, synthetic diesel substitute. It is produced from vegetable oils, animal fats, or waste cooking oil through a hydrogenation process. HVO is chemically like diesel but has superior environmental characteristics:

- Zero Fossil Carbon: HVO is carbon-neutral, as it recycles existing carbon from organic sources.
- Lower Emissions: Reduced NOx, particulate matter, and sulphur emissions.
- Compatibility: Can be used in existing diesel engines without modification.

The following research shows the comparison between Diesel and Hydrotreated Vegetable Oil (HVO) fuel; in this research it is important to recognise several factors including fuel efficiency (miles per gallon) and environmental impact.

	Diesel Fuel	HVO Fuel
Fuel Efficiency	<ul style="list-style-type: none"> • Diesel, derived from petroleum, has been a staple for transportation and machinery. • MPG varies based on vehicle type, load, and driving conditions. • On average, diesel-powered vehicles achieve around 7.6 mpg for articulated lorries (weighing over 33 tons) and 9.1 mpg for rigid lorries in the UK. 	<ul style="list-style-type: none"> • HVO, a paraffinic diesel, is produced from renewable waste (verified vegetable oils and fats). • It has similar chemical and physical properties to standard diesel but with a lower carbon-to-hydrogen ratio. • HVO's uniform hydrocarbon molecules allow it to burn more cleanly. • While specific mpg figures for HVO vary, it offers better performance during cold weather. • HVO can contribute to improved engine efficiency and cleanliness.
Environmental Factors – CO2	<ul style="list-style-type: none"> • Fossil-derived diesel emits significant CO2 due to its high density and impurities. 	<ul style="list-style-type: none"> • Fossil-free HVO produces up to 90% lower CO2 emissions. Its clean combustion contributes to reduced greenhouse gas impact
Cost	<ul style="list-style-type: none"> • Cost per litre - £1.2153 	<ul style="list-style-type: none"> • Cost per litre - £1.45 • HVO currently costs slightly more than regular diesel but is expected to decrease as it becomes more widely available. • Long-term savings should be considered due to reduced fuel-related carbon emissions.

It should be noted that the cost per litre for both diesel and HVO were obtained at the time of compiling the information for this report. The HVO cost per litre has been based on our annual diesel consumption for fiscal year 2022-23 and therefore is likely to increase. Transport fuel prices change on a weekly basis and are subject to a small load premium and this is also likely for HVO.

GTL (gas to liquid) fuel has also been considered as an alternative fuel source. This technology converts natural gas into a high – quality liquid fuel which can be used as a direct replacement to diesel with no modifications required to vehicles. This has however been disregarded since GTL fuel does not lower life – cycle greenhouse gas carbon emissions as does HVO.

Proposed Pilot Program

Fleet Services are:

- Currently identifying a suitable location for the installation of a standalone HVO tank which has a high diesel usage. This will therefore provide extensive evaluation of vehicle type and performance.
- Formal engagement with ECFRS from fleet vehicle manufactures to use HVO in their vehicles is currently being obtained.
- Investigating procurement options for the supply of HVO and standalone HVO tank. It is understood that the incumbent framework provider for our diesel supply can be used to run a further competition for the supply of HVO. However, it should be noted that not all suppliers can provide this fuel type and may not be able to deliver smaller delivery requests that are currently met by our existing diesel supplier.

Monitoring and Evaluation:

Collect data on vehicle performance, emissions, and fuel efficiency. Engage with firefighters and mechanics to gather feedback. Assess any operational challenges.

Expected Benefits:

1. Emissions Reduction: HVO significantly lowers greenhouse gas emissions, contributing to our net-zero target.
2. Cost Savings: HVO prices are competitive, and potential maintenance savings may offset initial costs.
3. Operational Resilience: Diversifying fuel sources enhances our readiness during supply disruptions.
4. Public Perception: Demonstrating our commitment to sustainability enhances provides assurance to our communities about ECFRS commitment to reducing our Carbon Footprint.

The transition to HVO represents a strategic move toward a greener fleet. By piloting this alternative fuel, we position ourselves as leaders in sustainable emergency services. Let us work together to protect both our community and the environment.

RISKS AND MITIGATIONS

Ref	Risk	Mitigation
1	Environmental Impact: While HVO is often marketed as an environmentally friendly alternative to traditional fuels, there are concerns about its actual environmental impact. For instance, HVO has often been produced from palm oil, extracted from deforested rainforest plantations and transported halfway around the world. This could lead to significant embedded emissions in production and transportation.	Pilot, Review and Evaluation
2	Sustainability: There are concerns about the sustainability of the feedstocks used to produce HVO1. Only 8% of all verified renewable fuel supplied to the UK is produced from UK origin feedstocks. There are also concerns about the supply chain for waste oil and how long before it runs dry.	Pilot, Review and Evaluation
3	Vehicle operation: it is understood that HVO can be used as a direct replacement to diesel. Operation of the vehicle needs to be examined.	Pilot, Review and Evaluation

LINKS TO FIRE AND RESCUE PLAN

- ✓ Prevention, Protection & Response
- ✓ Improve Safety on our Roads.
- ✓ Help the Vulnerable Stay Safe
- ✓ Create a Positive Culture in the Workplace
- ✓ Be Transparent, open, and accessible.
- ✓ Collaborate with our Partners.
- ✓ Make the best use of resources.

FINANCIAL IMPLICATIONS

HVO fuel is on average 20% more expensive than diesel and if the Service were to transition to HVO fuel a 20% uplift in the current transport fuel budget, named petrol and diesel, would need to be required.

Financial year	Budget
2023-24	£500,000
2023-24 (final year spend)	£632,626
2024-25	£495,000

Based on the current spend for fiscal year 2023-24, an additional £127k would be required if the Service were to transition to HVO fuel at all sites where fuel tanks are located across the estate portfolio. Whilst there is an increased costs the pilot will assess all benefits to determine whether the cost increase would be mitigated in other ways.

LEGAL IMPLICATIONS

1. **Regulatory Compliance:** The use of HVO fuels must comply with the regulations set by the local and national authorities. In the UK, for example, the Renewable Transport Fuel Obligation (RTFO) administers the use of renewable fuels.
2. **Sustainability Certification:** It's important to ensure that the HVO fuel is sourced sustainably. Certifications like the International Sustainability Carbon Certification (ISCC) and the Renewable Fuels Assurance Scheme (RFAS) can provide assurance of the fuel's sustainability.
3. **Environmental Legislation:** As countries aim to reduce their greenhouse gas emissions, legislation is being introduced to encourage the use of alternative fuels like HVO.
4. **Health and Safety Regulations:** The use of HVO fuels in emergency services equipment, like fire trucks or ambulances, must comply with health and safety regulations. This includes ensuring the fuel is stored and handled safely.
5. **Contractual Obligations:** to be explore by procurement.

STAFFING IMPLICATIONS

Training: Staff training on the handling, storage, and use of HVO fuel. This could include understanding the differences between HVO and traditional fuels, how to safely store HVO, and what to do in case of a spill.

Equipment Maintenance: HVO fuel has clean-burning properties and produces significantly less particulate matter, which can help improve engine cleanliness and promote the longevity of engine oils. This could potentially reduce the time and resources spent on vehicle maintenance.

Sustainability Initiatives: Staff may need to be involved in sustainability initiatives related to the use of HVO fuel. This could include tracking and reporting on emissions reductions, participating in sustainability certifications like the Renewable Fuels Assurance Scheme (RFAS), and communicating with stakeholders about the organisation's sustainability efforts.

Regulatory Compliance: Ensure compliance with environmental legislation and regulations related to the use of alternative fuels.

Supply Chain Management: May need to manage a new supply chain for HVO fuel, including sourcing from suppliers that provide sustainably produced HVO.

EQUALITY AND DIVERSITY IMPLICATIONS

The actions being taken will not have a disproportionate impact on individuals with protected characteristics (as defined within the Equality Act 2010), when compared to all other individuals and will not disadvantage people with protected characteristics.

Race	n	Religion or belief	n
Sex	n	Gender reassignment	n
Age	n	Pregnancy & maternity	n
Disability	n	Marriage and Civil Partnership	n
Sexual orientation	n		

The Core Code of Ethics Fire Standard has been fully considered and incorporated into the proposals outlined in this paper.

HEALTH AND SAFETY IMPLICATIONS

HVO is non-toxic and biodegradable. In the event of a leak or spillage, the environmental impact will be considerably less detrimental than with diesel or kerosene. This could potentially reduce health and safety risks for staff.

CONSULTATION AND ENGAGEMENT

A survey has been carried out on participants of the National Transport Officer Group which asked if other Services are using or proposing to trial and use biodiesels in the future. Of the 8 Fire & Rescue Service's that responded the following have confirmed use of alternative fuels. North Wales F&R currently use HVO. Hertfordshire F&R currently use GTL but are looking at HVO due to the additional Co2 reduction. In addition, three F&R Services are investigating their options with biodiesels and 3 are not looking into this at this time.

FUTURE PLANS

Transitioning our diesel fuelled fleet to HVO will provide an interim solution to reduce ECFRS's carbon footprint. Conducting this pilot study allows the Service to assess the feasibility and performance of HVO within our fleet prior to requesting a budget uplift in September 2024; and taking a strategic decision to transition our bunkered fuel tanks to HVO and align with our sustainability goals.

LIST OF BACKGROUND PAPERS AND APPENDICES

Genex Zero Emission Vehicle Fleet Strategy