CABINET

Tuesday, 07 September 2021

Subject	Fleet De-Carbonisation – An Interim Solution
Report by	Councillor James Mallinder Cabinet Member with responsibility for The Environment
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Is the report Open or Exempt?	OPEN

Wards Affected:	All Wards

Purpose and high-level overview

Purpose of Report:

In its Strategic Plan 2020/24 the Council pledged to put the environment at the heart of everything we do and to become a carbon neutral council by 2030. In so doing, it committed to making radical changes to its operational assets including its vehicle fleet.

In 2020/21 the Council's diesel fleet of some two hundred and forty-six vehicles, including its 48 heavy goods refuse lorries, accounted for approximately 44% of the Council's total carbon emissions. Encouraged by debate at the Environmental Task Group, several approaches to reducing these emissions have been investigated. Some are not yet possible as the technology is simply not sufficiently advanced. For example, electrification and hydrogen power. Others involve less developed supply chains and therefore pose a risk to service delivery and are particularly expensive to implement, for example biogas.

This report proposes the replacement of diesel, the fuel currently used by the fleet, by Hydrotreated Vegetable Oil (HVO). This change can be implemented quickly, without the need for engine modifications and therefore at a reasonable cost. It will dramatically reduce the diesel fleet's carbon emissions.

Options:

In seeking a solution to quickly decarbonise the diesel fleet the Council considered the following lower-emission alternative options to the use of fossil-fuel diesel:

- Electrification
- Biodiesel
- Biogas
- Hydrogen
- Hydrotreated vegetable oil (HVO)

Recommendations:

That Cabinet:

- Approves changing the fuel used by all the Euro 6 rated diesel-powered vehicles in the Council's vehicle fleet from diesel to certified palm oil free Hydrotreated Vegetable Oil fuel.
- Approves a procurement process in autumn 2021 for the supply of certified palm oil free Hydrotreated Vegetable Oil fuel meeting the International Sustainability and Carbon Certification.
- Approves in principle the potential additional cost of £150,000 to purchase and install HVO bulk fuel storage tanks to be funded from the capital programme.
- Requires that other than in the most exceptional circumstances any replacement or new fleet vehicles (whether leased or purchased) are Euro 6 compliant.

Corporate Impact Assessment

Governance:

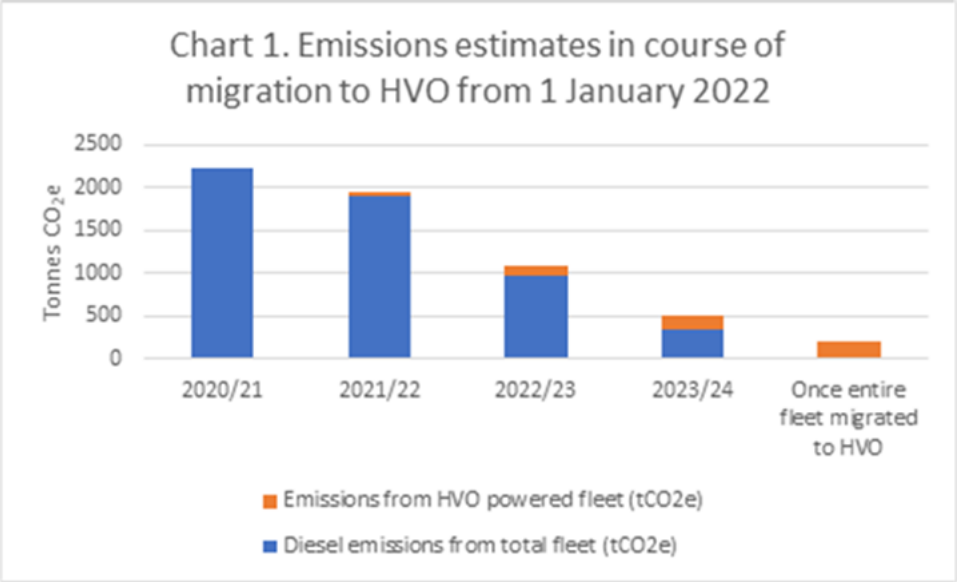
This proposal will be managed through existing governance arrangements.

ESC policies and strategies that directly apply to the proposal:

- Strategic Plan 2020-2024
- Air Quality Strategy 2021
- Medium Term Financial Strategy

Environmental:

The Council's diesel fleet, largely operated by East Suffolk Norse and the Council's Housing Department, contributed 44% of the Council's total carbon emissions in 2020/21. It is the single biggest source of corporate carbon emissions, by some margin.



Switching from fossil-fuel diesel to an alternative low carbon fuel has the potential to ultimately (once the entire fleet has been migrated) reduce annual emissions by approximately 2023tCO_2e.*

As such, the action proposed has the potential to deliver, and embed, an immediate and significant contribution to the Council's target to become carbon-neutral by 2030. The action will also contribute towards the Authority's aim of Leading by Example under the Strategic Plan theme of Caring for our Environment.

* CO2e, or carbon dioxide equivalent, is **a standard unit for measuring carbon footprints**.

Financial

Market engagement has confirmed that HVO costs some 15% to 26% more per litre than fossil-fuel diesel, so switching fuels will not produce a direct operational cost saving. Both fossil diesel and HVO are subject to regular variations in price and the cost differential is therefore not a certainty. Accordingly, and for the purposes of costing this initiative the mid-range price for this fuel, £1.20/litre, has been used.

At the point of writing this report, seventy-nine of the two hundred and forty-six diesel vehicles in the Council's fleet can run on HVO. In terms of the immediate cost, if implemented from 1 January 2022 for just those vehicles currently compatible with HVO,

there would be an additional cost of fuel for the remainder of 2021/22 of approximately £13,000.

The annual cost for running all 246 diesel vehicles on HVO would result in an additional fuel cost of approximately £174,000 per year. While this is a significant additional service cost, in terms of the carbon saving achieved, it represents the greatest carbon saving possible per £ spent and will reduce the Council's fleet carbon emissions by 90.7%, once the entire fleet is migrated to HVO.

Table 1. Cost of diesel consumed by fleet (2020/21) and projected cost of HVO by entire fleet. ** Based on figures supplied by East Suffolk Norse.

Quantity of diesel consumed (litres) (20/21)**	Average diesel price per litre (20/21)	Total cost of diesel (20/21 costs, rounded to nearest £1000)	Projected annual cost of HVO fuel at mid price point (rounded to nearest £1000)	Additional full year cost of HVO fuel
829,745	£0.99	£822,000	£996,000	£174,000

The need to install additional bulk HVO fuel storage tanks is under investigation. However, it already seems likely that it will be possible to use the existing bulk diesel storage tanks for HVO immediately. If this is possible, then the remaining older diesel vehicles that cannot be run on HVO will use fuel cards to obtain conventional diesel at local filling stations, until they are removed from the fleet.

In terms of the fleet replacement, this is currently under review. A 'route and tasking' review is planned for the refuse fleet, which may see it being reduced in size, at least temporarily until the implications of the Government's new waste strategy becomes clear. The Housing fleet is also being reviewed because of the move to a more mobile way of working and potentially a different vehicle profile being required.

Should additional separate HVO bulk storage tanks be required then two 50,000 litre storage tanks will be needed, one at each of the Ufford and Lowestoft depots.

Human Resources:

None.

ICT:

None.

Legal:

None.

Risk:

There are two significant risks:

Financial Impact

The main risk is the possible variation in the unit price of HVO (fossil diesel is also subject to constant variation in price). The risk of variation in the price of HVO can be mitigated through careful procurement and the setting up of a 3-year contract to give a longer-term cost certainty.

Security of Supply
The risk of disruption to the supply of HVO is considered low as the main HVO manufacturers are increasing their non-palm oil sources of vegetable oil, as a result of the EU Renewable Energy Directive aiming to ban all palm oil in biofuels by 2030. This risk will however be mitigated further through the completion of a firm contract for supply. Additionally, should an extreme event occur then because HVO can be used without the need for any engine adaptation the vehicles can switch back to using conventional fossil diesel until the supply of HVO resumes.

External Consultees:	Norse.

Strategic Plan Priorities

Select the priorities of the Strategic Plan which are supported by this proposal: *(Select only one primary and as many secondary as appropriate)*		**Primary priority**	**Secondary priorities**
T01	**Growing our Economy**		
P01	Build the right environment for East Suffolk	☐	☒
P02	Attract and stimulate inward investment	☐	☐
P03	Maximise and grow the unique selling points of East Suffolk	☐	☒
P04	Business partnerships	☐	☐
P05	Support and deliver infrastructure	☐	☐
T02	**Enabling our Communities**		
P06	Community Partnerships	☐	☐
P07	Taking positive action on what matters most	☐	☒
P08	Maximising health, well-being and safety in our District	☐	☒
P09	Community Pride	☐	☐
T03	**Maintaining Financial Sustainability**		
P10	Organisational design and streamlining services	☐	☐
P11	Making best use of and investing in our assets	☐	☐
P12	Being commercially astute	☐	☐
P13	Optimising our financial investments and grant opportunities	☐	☐
P14	Review service delivery with partners	☐	☒
T04	**Delivering Digital Transformation**		
P15	Digital by default	☐	☐
P16	Lean and efficient streamlined services	☐	☐
P17	Effective use of data	☐	☐
P18	Skills and training	☐	☐
P19	District-wide digital infrastructure	☐	☐
T05	**Caring for our Environment**		
P20	Lead by example	☒	☐
P21	Minimise waste, reuse materials, increase recycling	☐	☐
P22	Renewable energy	☐	☐
P23	Protection, education and influence	☐	☒

XXX	Governance		
XXX	How ESC governs itself as an authority	☐	☒

How does this proposal support the priorities selected?

This project will deliver the strategic objectives set out above by:

- Making an immediate positive impact on the Council's carbon emissions by substantially reducing the most heavily polluting area of the Council's activity.
- Making a significant advance in the Council's commitment towards its ambition of becoming a carbon neutral Council by 2030.
- Enabling the Council to demonstrate that it is leading by example by migrating two of its key front-line services to the use of a less carbon polluting fuel, whilst promoting wider environmental responsibility by ensuring that the fuel is palm oil free.

Background and Justification for Recommendation

1	Background facts
1.1	In July 2019 the Council declared its recognition of the climate emergency and committed to put the environment at the heart of everything it does. It also pledged to become a carbon neutral Council by 2030.
1.2	In 2020/21 the Council's diesel fleet of some two hundred and forty-six vehicles, including its 48 heavy goods refuse lorries, accounted for approximately 44% (2230tCO_2e) of the Council's total carbon emissions (5105.2tCO_2e). The breakdown of the emissions arising from the diesel fleet were as follows: • Refuse: 1669tCO_2e; 75% of fleet emissions • Streets: 213tCO_2e; 9% of fleet emissions • Housing: 148 tCO_2e; 7% of fleet emissions • Facilities management: 72 tCO_2e; 3% of fleet emissions • All other diesel fleet (car parks, building cleansing, environmental enforcement, facilities management, dock, workshop, and pool cars) made up the remaining 6%.
1.3	Based on information provided by East Suffolk Norse relating to the Euro ratings of, and diesel consumption by, the vehicles of the fleet, Table 2 below outlines the consumption of diesel by, and the tonnes of CO_2 equivalent emissions arising from, our diesel-powered fleet. Table 2. Diesel consumption and emissions by Euro 6 vehicles and all remaining non-Euro 6 vehicles (2020/21).

	No. of vehicles	Diesel consumed (L)	Scope 1 Emissions (tCO_2e)

Euro 6	79	471,371	1,267
Non-Euro 6	167	358,374	963
Grand total	**246**	**829,745**	**2,230**

Vehicles rated Euro 5 or under tend to be lighter vehicles that consume less diesel. Of the 48 HGVs on the fleet, 29 (60%) are Euro 6 standard, 18 are Euro 5 and only 1 is Euro 4.

The nineteen Euro 4 and Euro 5 HGVs are expected to be deleted from the fleet or replaced with Euro 6-engined vehicles within the next 9-12 months. Collectively, these nineteen vehicles accounted for 64% of all diesel consumption by non-Euro 6 vehicles in 20/21.

A proportion of the non-Euro 6 'light' fleet will also be replaced over this period and a timetable will also be produced for the replacement of the remainder.

1.4 All the additional cost and emission savings estimates in this report assume that fuel consumption rates remain at 2020/21 levels. However, in the context of the national Resource and Waste Strategy (RAWS), it can be anticipated that demands on local authority recycling and refuse collection services may change significantly in the coming years with potential implications for the size and composition of the fleet and therefore also fuel consumption.

2 Current position

2.1 The Council has considered the following lower-emission alternative options to fossil-fuel diesel to power its fleet:

- Electrification
- Biodiesel
- Biogas
- Hydrogen
- Hydrotreated vegetable oil (HVO)

The sections below summarise the positions regarding each of these sources of power in turn and their suitability for use by the Council.

2.2 **Electrification**

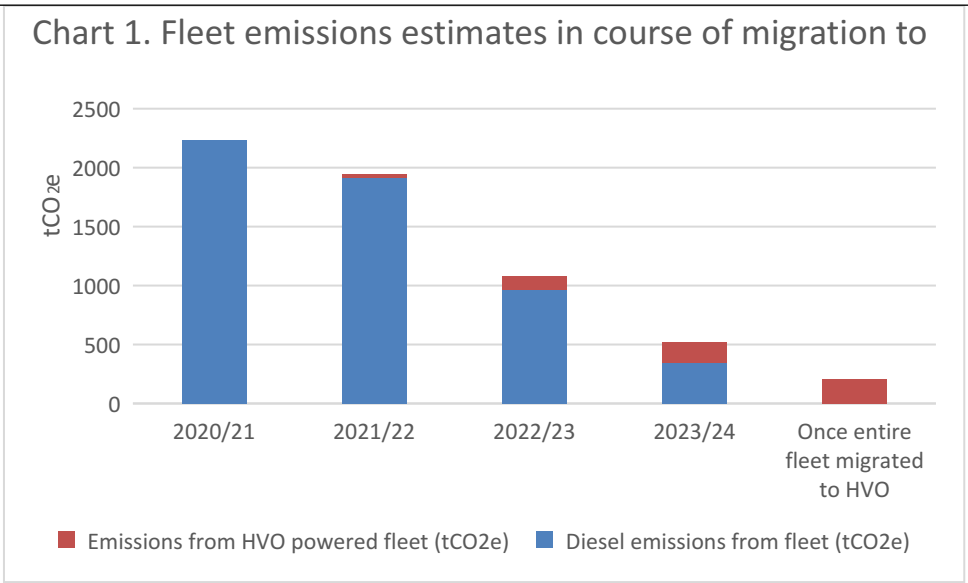
In 2020/21, East Suffolk Council purchased four electric vans and four electric cars for use in the delivery of the parking enforcement operation. As this work involves comparatively short trips and does not require the need to carry heavy goods, electrification is a suitable solution. A number of new electric charging points have been installed at the Ufford and the Lowestoft depots.

In the same year the Council also purchased an electric pool car to support business travel by its Port Health operations in Felixstowe. This is supported by the installation of charging facilities at that site. These new electric vehicles are in

	addition to the electric pool car based at East Suffolk House since 2016/17. The biggest emitter of carbon and other greenhouse gases is the refuse collection heavy goods vehicle (RCV) fleet, which is responsible for 75% of the fleet emissions. Whilst electric cars and light vans are readily available, the real challenge is the availability of electric RCVs. This technology is still in its infancy. There is one model of electric RCV commercially available, which is the eCollect manufactured by Dennis Eagle. The costs of this vehicle are 40-80% greater than the conventional diesel engine version from the same manufacturer. However, the costs of the electricity to power the vehicle are claimed to be around a third of the costs of powering the diesel-fuelled equivalent, with additional savings in the form of zero vehicle excise duty and reduced servicing costs. It should be noted that there is no guarantee that electric vehicles would continue to benefit from zero vehicle excise duty in the longer term, particularly once electric vehicles come to dominate the national fleet. There would also be additional costs in the form of suitable electric vehicle charging points and associated infrastructure at depots. There are no appropriate technical performance details of the electric Refuse Collection Vehicle offered by Dennis Eagle. There are trials occurring across the country, notably the City of London, however, these are predominantly in urban areas which do not facilitate a close comparison with the long distances that need to be travelled in a mixed urban/rural district such as East Suffolk. A trial of an electric vehicle has been requested from Dennis Eagle, which we are hoping will be provided in September this year, to enable the Council to explore the application of this technology in this district. Due to the lack of performance data for these electric RCVs, there is currently considerable doubt that this would be a viable alternative for ESC to pursue, given the critical requirement to maintain an effective and efficient refuse collection service.
2.3	**Biodiesel (FAME)** Biodiesel otherwise known as Fatty Acid Methyl Ester (FAME) is a diesel fuel replacement produced from plant/vegetable oils. Such oils cannot be blended directly with conventional diesel without further chemical treatment. The norm in the UK is to blend biofuels to a maximum of 7% of the total fuel. Plant/vegetable oils may come from a variety of sources, such as oilseed rape, soy and palm, used cooking oils (UCO) and waste oils. Depending on the provenance, the biofuel can save around 50-60% of the emissions resulting from a ULS (ultra-low sulphur) diesel fuel. However, there are other issues associated with biodiesels. • Palm oil-based fuels block the vehicle's filters. • Biodiesel can oxidise and turn rancid if left too long in a storage tank. • Biodiesels have a corrosive effect on rubber components of vehicles' engines. • Doubt remains over the traceability of the UCO sourced from outside Europe.

	• The main issue is the likelihood that biodiesel contains palm oil, even if from a waste cooking oil source. Whilst it offers a cheap and versatile feedstock the environmental and ecological impact related to its cultivation has increasingly brought its sustainability and long-term suitability into question. For the reasons above, biodiesel in this form has not been considered as a suitable alternative fuel at the current time.
2.4	**Hydrogen** There is considerable interest in the potential for hydrogen as an alternative fuel for both the Council's fleet and buildings. An increasing number of companies, including EDF – currently in the planning stages of the Sizewell C project – are considering the use of Hydrogen for their construction and logistics fleet, to drive down the carbon emissions of the build. Hydrogen could be produced on/near to site and is a zero-emissions fuel at the point of use. Companies such as JCB are developing hydrogen power units for use in future generations of their vehicles. This bodes well for this technology. The potential hydrogen economy offers East Suffolk a significant sustainable growth opportunity, supporting a wider ambition for the area to become carbon neutral, and a home for renewable energy innovation. However, it should be noted that hydrogen power is in its early stages of development. A suitable hydrogen engine is not yet available on the market, and no manufacturers of refuse collection vehicles (which account for 75% of the council's fleet emissions) are producing a vehicle powered by this fuel. Therefore, while monitoring of the development of this technology will continue, the Council may need to wait five or more years before the technology is available in a suitable form.
2.5	**Hydrotreated Vegetable Oil (HVO)** HVO is the recommended alternative fuel option. It is an alternative way to produce high-quality biobased diesel fuels without compromising fuel storage, engines, exhaust aftertreatment devices, or exhaust emissions. These fuels are colloquially referred to as "renewable diesel fuels" instead of "biodiesel". HVOs are mixtures of fully saturated hydrocarbons and are free of sulphur and aromatics, unlike fossil diesel. HVO is a 'drop-in' fuel, which means that it can be substituted, at any ratio, for, or with, conventional fossil fuel diesel in compatible engines (i.e. engines rated to Euro 6 standard) with no impact on operational requirements. This enables an immediate migration of Euro 6 compliant vehicles to HVO.
2.6	HVO lowers overall life cycle greenhouse gas emissions by up to 90% depending on the blend, with most of the emissions reduction coming from the uptake of CO_2 from the atmosphere whilst the feedstock is growing.

2.7	**Carbon footprint of HVO** The Department for Business, Energy and Industrial Strategy (BEIS) have recently published official conversion factors (CFs) that can be applied to the consumption of "biodiesel HVO" to calculate the emissions arising from its use. 2021 is the first year for which official government CFs for HVO have become available. Greenhouse gas reporting: conversion factors 2021 - GOV.UK (www.gov.uk) As with any CF, there is potential for future variation in the value of the conversion factors as BEIS develop and improve their methodology for calculating these values, and as real differences in the carbon impacts of different fuel and energies are reflected. However, given the considerably lower rate of emissions as compared to diesel, it would require an increase in the CFs for HVO of well over 1000% from the 2021 values to eliminate the carbon saving benefits of undergoing the transition proposed. **Impact of migration to HVO on fleet and corporate emissions** The following estimates of the carbon savings likely to arise from the migration to HVO apply the relevant CFs to the estimated consumption of HVO and to the estimated residual consumption of diesel. Calculations of the overall reduction in the Council's carbon footprint made during the migration are made against the 19/20 total. If the migration to HVO commences with current compatible vehicles from 1 January 2022, an emission saving of 287tCO_2e could be realised during Q4 21/22 alone. This would be a 12.9% reduction on the fleet's emissions, and a 4.6% reduction on the Council's emissions. This equates to an emission saving of approximately 1150tCO_2e in the first full year (2022/23) following the migration of this initial cohort of current compatible vehicles to HVO fuel. As a proportion of measured emissions within the scope of the 2020/21 greenhouse gas report, this equates to, 51.6% of the whole fleet emissions, and 18.3% of the entire council's emissions. When the remaining Euro 4 and Euro 5 HGVs are migrated, which is expected to take place by the end of 2022/23, this would bring the total emissions saving up to 1711tCO_2e, equal to 77% of total fleet emissions and 27.2% of the council's carbon footprint. Once the entire fleet has eventually migrated to Euro 6-engined vehicles, the emissions saving would be 2023tCO_2e. This would be 90.7% of all fleet emissions, and 32.1% of the Council's total emissions. Chart 1 shows the estimated fleet emissions during the migration to HVO.



2.8	**The challenge of palm oil** Whilst HVO provides excellent technical properties, it can have a major drawback in that the oil of choice for HVO is typically palm oil. However, discussions with the producers with whom the Council could contract have identified that their HVO can be specified and certified to be Palm Oil free. A pre-requisite will be built into the procurement specifications that the supplier is certificated by the International Sustainability & Carbon Certification (ISCC) who produce Proof of Sustainability (PoS) Certificates for the product from their refineries. A due diligence check on the ISCC website will be conducted to validate POS certificates that are independently audited to confirm that no palm oil is included.

3 How to address the current situation

3.1	There are several possible routes to the procurement of HVO. Frameworks exist e.g. the central government's Crown Commercial Service (CCS). CCS also have a reverse auction option run quarterly which aggregates all needs and can leverage better pricing. The Council can also opt to purchase directly or utilise the supply chain of our fleet management partner Norse. The main emphasis in a procurement will be in gaining security of supply and stability of price for the long term as the HVO market is relatively new and as more clients convert, it is possible that prices could increase with demand.
3.2	The other potential procurement requirement will be the purchase and installation of two additional bulk fuel storage tanks for the fleet, one per depot. If required, the cost is estimated to be circa £50,000 per tank plus a total installation cost of a further circa £50,000. Total £150,000. If required, delivery and installation of the bulk tanks would be approximately 12 weeks from award of contract. Tanks of this type are available with a 10-year manufacturer's guarantee.

	However, a feasibility study will be undertaken to determine whether the existing storage tanks can be used for HVO fuel. If they can, then the £150,000 will not be drawn down from the capital fund. If existing diesel tanks are used for HVO, then the remaining vehicles that are not able to run on the new fuel will be fuelled at forecourt pumps using fuel cards, until the time that they are replaced or deleted from the fleet.
3.3	Discussions have been held with key fuel suppliers. There is a plentiful supply of HVO base feedstock i.e. 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 continental market, recently significant traditional oil refining capacity has been converted to HVO production. This has led to an increase in refining capacity of more than 40% in the last five years.
3.4	To enable accurate monitoring of the impact of this proposal in terms of a reduction in the Council's carbon emissions, our operational partners East Suffolk Norse will be given a specific instruction to ensure the stringent and separate keeping of records of consumption of both fossil-fuel derived diesel, and HVO, for each individual vehicle, to enable accurate calculations of the resultant greenhouse gas emissions. Norse already record and supply data on the consumption of diesel, including diesel purchased using fuel cards at filling stations, for each vehicle on the wider fleet for this purpose.

4	Reasons for recommendation
4.1	The recommended action would allow the immediate migration of a significant element of the Council's diesel fleet from fossil-fuel derived diesel to Hydrotreated Vegetable Oil.
4.2	With more vehicles migrated to HVO in subsequent years, this migration has the potential to ultimately reduce the annual carbon emissions associated with the fleet by approximately 90.7% and reduce the council's total carbon emissions by around 32.1% against 19/20 levels, once the migration of the entire fleet to HVO is complete.
4.3	The advantage of HVO as a drop-in fuel requiring no modifications to the existing compatible fleet confers the ability to revert to the use of conventional diesel if required. This would safeguard the continuation of the Council's operations, for example, in the event of disruption to the supply of HVO fuel.
4.4	These recommendations present a cost-effective opportunity to achieve significant and immediate progress towards carbon neutrality.

Appendices

Appendices:
None.

Background reference papers:
None.