**URN:** 22-257

**Subject:** **Green Fleet Strategy (2022 to 2032)**

**Report to:** **Policy & Resources Committee – 8 November 2022**

**Council – 15 December 2022**

**Report by:** **Chris Silverwood, Director of Operational Services, James Wilson, Head of Environment and Sustainability, Paula Boyce, Strategic Director**

## SUBJECT MATTER

This report provides members with a proposed Green Fleet Strategy which spans the Borough Council's service vehicles and those of the new wholly owned company Great Yarmouth Services (GYS) Limited. In doing so the report sets out how the Council will invest in its operational fleet driven by available and emerging low carbon technologies. The report goes on to ask members to support an investment and replacement programme to create a new green fleet with a significant reduction in carbon emissions by way of available procurement frameworks. The early adoption of a more sustainable fleet will ensure the Council moves towards in line with its net zero target by 2035.

## RECOMMENDATIONS

That Policy & Resources Committee:

1. Agrees the Green Fleet Strategy as set out in this report including the conversion of the whole fleet from diesel to sustainably sourced fuels including Hydrotreated Vegetable Oil (HVO) and electric where possible to achieve immediate carbon savings.
2. Supports the replacement of:
    - Six Refuse Collection Vehicles (RCV) with the latest Euro 6 vehicles to run on HVO in 2022/23 to deliver frontline operational services via the new GYS Limited company.
    - Six Refuse Collection Vehicles (RCV) with the latest Euro 6 vehicles to run on HVO in 2023/24
    - One Refuse Collection Vehicle (RCV) with electric Refuse Collection Vehicles (eRCV) in 2023/24.
    - One panel van with an electric equivalent in 2023/24.
3. Agrees that up to £20,000 per vehicle can be made available to retrofit emerging fuel technology including hydrogen within the fleet of Euro 6 RCVs to reduce fuel and associated carbon emissions further. Subject to the success of the initial trial, there would be an outlay of £20,000 for one vehicle retrofit funded from the invest-to-save reserve.
4. Agrees to release £50,000 from invest-to-save for a feasibility study to assess the current depot's ability to deliver the future needs of the service.
5. Agrees to investigate options for members and the workforce which encourage greater active travel including use of public transport, lift-sharing and salary sacrifice schemes which enable greater uptake of electric vehicles.
5. **Recommends to Council** the release of the agreed capital budget allocation of £1.13 million, with the addition of an extra £106,000 (due to a cost increase since the budget was agreed last year) making it **£1.236 million in 2022/23** and the allocation of a further capital spend of **£1.7 million in 2023/24** for vehicle acquisitions.
6. **Recommends to Council** to agree to lease all operational vehicles to the new company Great Yarmouth Services (GYS) Limited and delegates authority to the Deputy Section 151 Officer to agree the lease terms.

## 1. INTRODUCTION

1.1 The Council's adopted Sustainability Strategy (July 2022) sets out the ambition for the organisation to be a Net Zero local authority by 2035. To move the Council towards this goal, work was undertaken by the Carbon Trust to assess the organisation's current Carbon Footprint. This work identified the main sources of CO2 emissions; one of which is the Council's fleet of vehicles. This includes services vehicles and those utilised by frontline operational services (waste/recycling collection & cleansing fleet). Together, given its reliance on fossil fuels, the Council's fleet is responsible for one third of the Borough Council's carbon emissions (based on 2019/20 data).

1.2 Work has been undertaken to prepare a Green Fleet Strategy informed by a technical study of operational vehicles undertaken by SLR Consulting in July 2022. The Council is also part of the Norfolk Climate Change Partnership and has benefitted from access to its study into alternative fuels in particular the use of hydrogen for Refuse Collection Vehicles (RCVs).

1.3 On the 9 December 2021 the Borough Council made a decision not to continue with the GYBS Ltd Joint Venture Company, choosing to bring the partnership agreement to its natural end of with Norse on 31 March 2023. At that point, the Council has agreed it will be changing its delivery model for operational services through the creation of a Great Yarmouth Borough Council wholly owned Local Authority Trading Company (LATCo) to undertake existing operational services from 1 April 2023 called Great Yarmouth Services (GYS) Limited. In order to achieve this, the new LATCo requires a fit for purpose operational fleet which is less reliant fossil fuels and supports the Council's ambition of net zero by 2035. As part of the preparatory work to transfer the waste collection, street cleansing and grounds maintenance to the LATCo GYS Limited, it is clear that investment is needed in this operational fleet.

1.4. The intention, as set out in this report, is for the Borough Council to procure a new operational fleet which will be transferred to the new company GYS Limited from the 1 April 2023 via a lease arrangement. Leasing vehicles from a parent company or group is a similar business model used by Norse for its Joint Venture companies and is widely used in the waste and cleansing sector. Other service vehicles will be replaced for Ultra Low Emission Vehicles (ULEV) on an as and when basis supported by Business Cases.

1.5. With alternative fuel options available for RCVs, the Green Fleet Strategy provides demonstrable examples of each of these alternative fuel options and their financial feasibility for use now and in the future.

1.6. The Strategy is presented to members to provide a framework to decarbonise the whole of the Borough Council's fleet and encourage sustainable modes of transport for its workforce and members including active travel planning.

## 2. GREEN FLEET STRATEGY

2.1 The Green Fleet Strategy provides practical advice and guidance to council services, members, staff and suppliers, that make use of vehicles to deliver public services in the borough. It sets out how the Council will implement sustainable fleet management practices and encourage active travel amongst drivers.

2.2 The aims of the Strategy are to:

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|---|
| 1. Provide a Council fleet that underpins the delivery of high quality, cost effective and efficient services with minimum environmental impact. |
| 2. Minimise the carbon produced across the whole life cycle of vehicles in the Council's fleet from production to emissions. |
| 3. Adopt cleaner fuels and technologies by embedding green criteria in the fleet procurement process to reduce greenhouse gas emissions and convert to Ultra Low Emission Vehicles (ULEV) where possible as an alternative to diesel or petrol. |
| 4. Achieve the highest possible vehicle maintenance and driving standards across the fleet, ensuring regulatory compliance for staff and customers. |
| 5. Work with contractors, suppliers and partner organisations to encourage and promote low carbon infrastructure as a catalyst to provide clean energy solutions and new fleet technologies. |
| 6. Promote and encourage active travel to reduce the environmental impact of work-related journeys and improve people's health and well-being. |

2.3 Achieving decarbonisation of the Council's fleet requires a significant investment funded through efficiencies derived from the reduction in use of fossil fuels, and by driving down costs in fleet maintenance.

2.4 In making its decisions to switch to ULEVs, the Council will on each occasion carry out an appraisal looking at the environmental, technical, social and financial impact and benefits using the Council's standard Business Case modelling and make of its decision based on value for money and carbon impact.

2.5 The commitment and investment in line with a Green Fleet Strategy demonstrates that Great Yarmouth Borough Council is leading by example and aims to inspire others to also take action.

## 3. FLEET ASSESSMENT & ACQUISITION OF ULTRA LOW EMISSION VEHICLES

3.1. With the Borough Council adopting a Sustainability Strategy in July 2022, it is clear that like for like replacement would not meet the Council's low carbon requirements. A carbon assessment undertaken by the Carbon Trust for the Council in 2021 showed the current fleet of 122 vehicles operated by the Joint Venture Company GYBS Limited to be the largest Scope 3 emitters of Carbon Dioxide (CO2). Together with the Council's other service vehicles the fleet accounts for one third of overall emissions.

3.2. Across other council services there are 9 small vans and cars in use. As and when these vehicles come-up for replacement, a Business Case will be developed to support a capital application or revenue funded lease. Whilst these vehicles are petrol and diesel currently, in line with the proposed Green Fleet Strategy, options to replace each vehicle with an Ultra Low Emission Vehicle (ULEV), likely to be electric, will be explored.

3.3. Whilst the market for alternative fuels is still fairly limited, there are now practical options the Council can take to decarbonise its most heavily reliant fossil fuel vehicles.

3.4. A review of the existing GYBS Limited fleet has been undertaken with the primary focus being on the fifteen RCVs used to deliver the household waste & recycling collection function. Six of these diesel vehicles are over 9 years old and in need of immediate replacement in 2022/23. A subsequent seven RCVs are also due for replacement in 2023/24 financial year. The remainder of RCVs need replacing in 2025/26.

3.5. Options for replacement ULEV RCVs have been explored by SLR Consulting and this report recommends the Council moves to the most up-to-date engine (Euro 6) available at the time of procurement and switches to fuel these RCVs with Hydrotreated Vegetable Oil (HVO) rather than diesel. It has been confirmed that the existing depot infrastructure, in particular the diesel storage tanks, would require no modification to store HVO. Indeed, it is also possible to mix HVO with diesel.

3.6. In addition, the Council is also looking to procure one electric RCV for an urban collection round. In September 2022 GYBS Ltd successfully trialled the Dennis Eagle eCollect fully electric RCV for three full days on the three different waste streams (recycling, mixed waste and garden waste). Each day the e-RCV returned having completed the whole of its route with the vehicle collecting up to 11 tonnes throughout the trial days and having between 30% and 50% range remaining in the fuel cell. Additionally, feedback from the crews has been positive given it is a much quieter vehicle and provided a good working environment.

3.7. Decarbonisation of whole of the Council's fleet will be driven by the development of Business Cases which take in account the whole life running costs of each vehicle or family of vehicles in order to make sound financial investments which deliver carbon and financial revenue savings in the medium to long term. It is anticipated that savings will be derived from the reduction in use of fossil fuels and by driving down costs in fleet maintenance.

3.8. An 8-year and in some instances, 10-year Vehicle Replacement Programme will be developed for each service area in order to plot the course towards a completely carbon neutral fleet. These replacement programmes will be iterative responding to changing service needs, emerging technologies and future funding parameters.

3.9. In doing so the Council will weigh-up the purchase costs and potential vehicle lifetime costs against carbon reduction benefits for each purchase. As new technologies mature, the costs will reduce, new suppliers will come into the market and reliability will improve.

3.10. Whilst across the UK there is general lack of hydrogen refuelling infrastructure presently, there are local green shoots which this Council could help nurture. Of most relevance to Great Yarmouth is a project called 'Hydrogen East' which is underway in Norfolk commissioned by the Norfolk Climate Change Partnership (NCCP). The project looks to identify and assess options for the development of hydrogen infrastructure opportunities in the East of England, including production and fuelling infrastructure in Norfolk.

3.10 Working as part of the NCCP and cooperating with the Hydrogen East project, officers have been able to understand more about the requirements of hydrogen fuelling infrastructure; especially when taking into account other industry sector applications for hydrogen as a sustainable fuel source. Consequently, there may be opportunities for the Council to undertake a feasibility study into the running of a hydrogen fuelled RCV fleet working with key partners in this field to support the decarbonisation of transport and industry in the local area.

However, with no clear timescale for the introduction of local availability of hydrogen fuel, SLR has recommended that the Council should not plan on a full transition to hydrogen fuelled vehicles in either the short or medium term.

3.11 Officers have however determined a cost (£20,000) to trial a retrofit hydrogen solution which is at the prototype stage after a second trial was undertaken using an RCV in October 2022. This trail was carried out in partnership with a local engineering company which develops cleaner diesel, hybrid, electric and hydrogen powered products. The trial consisted of installing a hydrogen introduction system onto a RCV which injects a small amount of hydrogen into the engine's air intake producing a cleaner burn with the intention of reducing fuel consumption by up to 14%, carbon monoxide by 25%, carbon dioxide by 8% with an overall reduction in other emissions by some 80%. Once fully evaluated, it is proposed that a unit of this nature is retrofitted to a RCV to trial results over a longer time period with a view to a future investment decision in relation to hydrogen.

## 4. DEPOT & INFRASTRUCTURE

4.1. The technical study by SLR Consulting conducted in July 2022 looked at the existing depot on Churchill Road in Great Yarmouth which is an old Victorian site with limited scope for additional services or vehicles without significant investment to facilitate reconfiguration of some parts of the site. As well as vehicle parking provision, the site has a vehicle maintenance workshop which is comprised of three RCV bays and two bays for grounds maintenance and landscaping vehicles.

4.2. The depot is in a residential area with a new housing development having been created on adjacent land. The depot is also known to have poor drainage which has led to incidents of flooding. In the longer term, the Council will therefore need to consider whether the existing depot is sustainable and can meet the needs of a new fleet.

4.3 From a survey previously carried out at the Churchill Road depot which assessed the possibility of installing four electric charging points for panel vans & tippers, the cost of installation was estimated in the region of £6,500. This cost has been included in the eRCV investment figures. A follow up assessment will now be undertaken to establish if charging points can also be installed for eRCVs including a "nature of supply" application to UK Power Networks to determine if additional electricity can be supplied without further substation investment. Clearly to support eRCVs to recharge at the existing depot, wider power network infrastructure will need to be confirmed first. Acquisition of eRCVs will be conditional on being able to connect to the existing UK Power Networks supply infrastructure.

4.4 Members are asked to make available £50,000 to undertake a full feasibility study on the depot and possible alternative sites as part of this report's recommendations.

## 5. OPTIONS

5.1. A tried and tested solution for applying ULEVs to refuse and recycling collections services is yet to be proven fully in the UK. However, looking at the best examples operating in the UK presently, it is clear that the vehicle manufacturing sector is now responding to demand for lower carbon, cleaner technology vehicles at pace but with a higher capital cost than the typical diesel powered RCV. Members therefore have decisions to make in considering this report in relation to short, medium, and long-term plans for a new ULEV fleet:

5.2. **Option 1: Do nothing** – The ageing fleet is currently costing over £20,000 per vehicle per year to maintain with some of the vehicles being nearly double the age of expected life of an RCV. There is therefore a real possibility of complete vehicle failure which could have significant impact on the ability to deliver waste collection services. Therefore, doing nothing this is not an option.

5.3. **Option 2: Replace all RCVs with new Euro 6 engines & use of HVO** – This would provide a reliable and more fuel-efficient diesel fleet which would thereby give the industry time to develop and deliver sustainable and affordable ULEV vehicles. However, remaining with diesel alone will not meet the Council's sustainable objectives in relation to reducing its carbon footprint and achieving net zero by 2035.

5.4. The cost of replacing the vehicles with a modern like for like Euro 6 engines is in the region of £206,000 per vehicle. This is the cheapest and most reliable option available to the Council for wholesale fleet replacement.

5.5. Fuelling these vehicles with diesel in the short term would provide only a small marginal reduction in carbon dioxide emissions based on a more efficient and modern engine. However as the largest Scope 3 emitter within the Council's carbon footprint, it can be argued that there is an expectation to deliver significant carbon savings across the fleet which would mean moving as soon as possible away from diesel.

5.6. Euro 6 engines can instead be fuelled entirely with HVO which would reduce the carbon dioxide emissions by over 80%. This does however come with an increase in fuel costs in the region of 18% which amounts to an annual increase of £47,000 per year based on current mileage. The big advantage with purchasing Euro 6 engines and fuelling them with HVO in the short term however is that there would be no other infrastructure changes or costs required. Existing fuel tanks could be reused for HVO.

5.7. **Option 3: Replace all RCVs with eRCVs** – This would provide a near virtual zero emission eRCV fleet, proving a cleaner quieter working environment for the operatives and residents of the Borough. It would also make a significant contribution to the Council's aims of being net zero by 2035. There are however significant cost implications of this option with the eRCVs costing in the region of £450,000 and hydrogen RCVs ranging from £365,000 to £800,000 plus the infrastructure required for repairs, maintenance and charging and staff training.

5.8. Should eRCVs be the preferred option, there is a lack of knowledge around the nature and size of electric supply to the Churchill Road depot and there are significant risks that charging infrastructure might not be feasible or would come at a significant cost. Although the depot would be able to fit infrastructure on its current site for all RCVs this would be very tight and would not leave any flexibility for future growth in the fleet in relation to food waste collection or other commercial waste collection aspirations.

5.9. Hydrogen technology is slightly further behind electric technology in terms of its development in this sector. In addition to this either a hydrogen production facility and/or fuelling station or storage of hydrogen tanks would be required to ensure certainty of fuel supply with the depot's limited footprint not providing the size and space necessary in its current location.

5.10. **Option 4: Mixed fleet using ULEV where possible** – The use of a mixed fleet with mostly Euro 6 engines with a small number of ULEV e.g. eRCVs is the most widely adopted combination in use presently by UK local authorities. This would deliver the reliability of a traditional diesel

fleet with the benefit of ULEV in terms of carbon reduction and reduces initial outlay costs. Several Councils are using HVO in place of diesel in Euro 6 engine RCVs, thereby giving additional carbon savings whilst utilising the ULEV technology in specific areas of their service. The type of ULEV technology being deployed ranges from eRCV, hydrogen and hybrid vehicles.

5.11. This option would enable the Council and its new LATCo GYS Limited to continue to utilise the existing depot in the short to medium term, giving reliability and confidence from having at worst a Euro 6 fleet whilst testing the feasibility of the ULEV with the smaller number of vehicles utilising this technology including investment in eRCVs for some collection rounds.

5.12. Although this option would require an increase in capital investment to purchase vehicles compared to a like for like diesel replacement programme, this option would allow for a transition to ULEV as the market and technology develops over the lifetime of the new vehicles (8-10 years). It also significantly reduces the carbon footprint of the fleet with the introduction of HVO as a fuel instead of diesel.

5.13. Option 4 is the officers' recommendation supported by the findings from the work of SLR Consultancy and has been costed for members consideration in the recommendations of this report.

## 6. FINANCIAL IMPLICATIONS

6.1. It is proposed that all commercial vehicles and plant are purchased outright where possible with funding provided through the management of a Vehicle and Plant Renewal Fund. The fleet would remain the Borough Council's asset and would be leased to GYS Limited, ensuring there is sufficient budget to allow for vehicle replacement at the end of the agreed lifetime of the vehicle. Where outright purchase is not possible the Council would look to purchase through a finance lease arrangement, and then sub lease to GYS Limited covering lease costs in full.

6.2. There are several options for the procurement of vehicles. The Council has employed the services of vehicle procurement specialist who has reviewed the different options and has recommended Outright Purchase for RCV's.

6.5 Finance Lease has been costed for the 2023/24 over the planned 8-year lifetime of the vehicle as this is an additional cost to the Council as such it has been discounted as an option based on the increased costs and less flexibility over the outright purchased option.

6.6 Based on the findings and recommendations of the Green Fleet Strategy this report requests release of funds from the Capital programme of £1.13 million (Price in October 2021) to replace 6 x RCV's, which was agreed in 2022/23 budget. Due to the delay in procurement the revised costs for these 6 x RCV's are now £1.236 million (Price in August 2022), an increase in £106,000.

6.7 Also based on the findings and recommendations of the Fleet Strategy this report requests release of capital funding of an additional £1.7 million in the 2023/24 financial year to replace the 7 RCVs (one being electric). Funding for installation of electric charging points to be confirmed with a provisional sum of £6,000 included in the eRCV costing presented in this report.

6.8 The annual revenue costs for financing the new capital purchase of the vehicles would be £185,000 per annum for those purchased in 2022/23, and an additional £275,000 for those purchased in 2023/24 based on current prices.

6.9 The current budget allows for annual lease costs of £220,000 and £230,000 repairs and maintenance, although with a new fleet of vehicles there would be a lower requirement for repairs due to the age of the vehicles and enable a more efficient operation of the fleet of vehicles. These would then mitigate the annual capital costs of the purchase of the vehicles.

6.10 There was never any annual vehicle replace provision made within the GYBS accounts as far as we can tell, so irrespective of the end of the GYBS arrangement date, there was likely to be an additional cost of the Vehicle Replacement Programme.

6.11 Funding for feasibility study on options for the relocation of the depot £50,000 future proofing frontline services for technology and Government policy changes.

6.12 It should be noted that HVO fuel costs 18% more than diesel. However this additional cost may be offset by the hydrogen injection technology, if proven successful post trial. Members can be updated on the outcomes of this trial technology.

6.13 A £3,300 cost of a 5-day accredited training course for the vehicle fitters and a high voltage Safety Board costing of £2,995 which will need to be built into the GYS 2023/24 training budget has also been included.

6.14 For the remainder of the HGV fleet there are 2 x RCV's that will need to be replaced 2025/26.

6.15 Against these additional costs, there are positive fuel (Diesel & AdBlue) and revenue & maintenance (R&M) related savings which can be made switching to ULEVs. For noting R&M will reduce year on year with ULEVs when compared to diesel engines which after Year 3 vehicles start to get older, their traditional warranties expire, and vehicle parts start to need replacing etc. A summary of costs and savings in Table 1 below.

6.16 The annual financial implications assumes that the vehicle purchases are financed from borrowing. Due to the relatively short asset life it would be a more prudent approach to finance these from capital receipts should there be sufficient at the end of the year, this would then reduce the in-year financial implications. However in order to smooth the impact of replacing vehicle in the future, even if the vehicles were financed from capital receipts it would be prudent to allow for a Vehicle Replacement Programme as part of the annual budget.

## 7 LEGAL IMPLICATIONS

7.1 The Council undertakes all procurement in accordance with the Contract Standing Orders (CSOs). These are the rules that incorporate national and European procurement legislation and ensure that all commercial relationships are compliant with the law and follow good practice. The CSOs form part of the Council's Constitution. Great Yarmouth Borough Council is a Waste Collection Authority and has a statutory duty to collect domestic residual and recycling waste under the Environmental Protection Act 1990.

## 8 RISK IMPLICATIONS

8.1 Further delays on the procurement of all RCV's will have a financial impact on repairs & maintenance and potential service failure due to breakdowns also it could impact on the costs of any new vehicles with the delay already costing in the region of £106,000.

8.2 In January 2022 there were HVO fuel supply chain issues which delayed some local authorities using HVO on their fleet, we have been given reassurances regarding supply chain from our supplier. However, we can switch back to diesel short term if required with no impact on infrastructure or fleet.

8.3 Lead times for the delivery of new vehicles remains at around 12-18months, so even if ordered now the vehicle would not be on the road for up to a year, leaving the service exposed should an existing vehicle be taken off the road for a long period.

8.4 UK Power Networks have confirmed they have no supply details for the Churchill Road depot as such we are unable to ascertain whether the current supply would be able to use to install the larger charging units for the RCVs. As such a "nature of supply" application has been made to establish this information. If the supply is not sufficient then there would be significant additional cost associated with the installation of sufficient supply for this charging units and this might impact on the feasibility of the site for the future and for the 1 proposed eRCV.

8.5 Due to the age of the depot, changes in technologies for vehicles, new housing developments in the vicinity of the depot it may not be fit for purpose.

## 9 CONCLUSION

9.1 In preparing the proposed Green Fleet Strategy, the Council commissioned SLR consultants to consider options for an Ultra Low Emission Vehicle (ULEV) fleet replacement to ensure the Council makes its decisions based on the best available low carbon technologies and emerging low emission fuels. The Green Fleet Strategy (Appendix 1) spans the whole of the fleet of vehicles needed to deliver the existing frontline operational services being transferred from GYBS Limited to GYS Limited.

| **Area for consideration** | **Comment** |
|---|---|
| Monitoring Officer Consultation: | As part of ELT. |
| Section 151 Officer Consultation: | As part of ELT. |
| Existing Council Policies: | Great Yarmouth Sustainability Strategy<br>Carbon Reduction Plan |
| Financial Implications (including VAT & tax): | As detailed above. |
| Legal Implications (including human rights): | As detailed above. |
| Risk Implications: | As detailed above. |
| Equality Issues/EQIA assessment: | N/A |
| Crime & Disorder: | N/A |
| Every Child Matters: | N/A |

# Green Fleet Strategy (2022-2032)

## 1. Introduction

Great Yarmouth Borough Council's Sustainability Strategy (July 2022) set the commitment to be a Net Zero local authority by 2035. Through an independent study carried out by the Carbon Trust, the Borough Council identified that its organisational carbon footprint resulted in 7,843.76 tonne of CO2e. Whilst the borough of Great Yarmouth as a geographic area currently produces the lowest amount of CO2 emissions when compared to the other local council areas in Norfolk, we are not complacent in needing to do more.

With a Carbon Reduction Plan agreed (Environment Committee March 2022), work has been undertaken to prepare a Fleet Strategy to decarbonise the Council's vehicle fleet. Council vehicles and those of GYB Services Limited (the operational collection fleet) are responsible for a third of the Borough Council's emitted carbon (based on 2019/20 data):

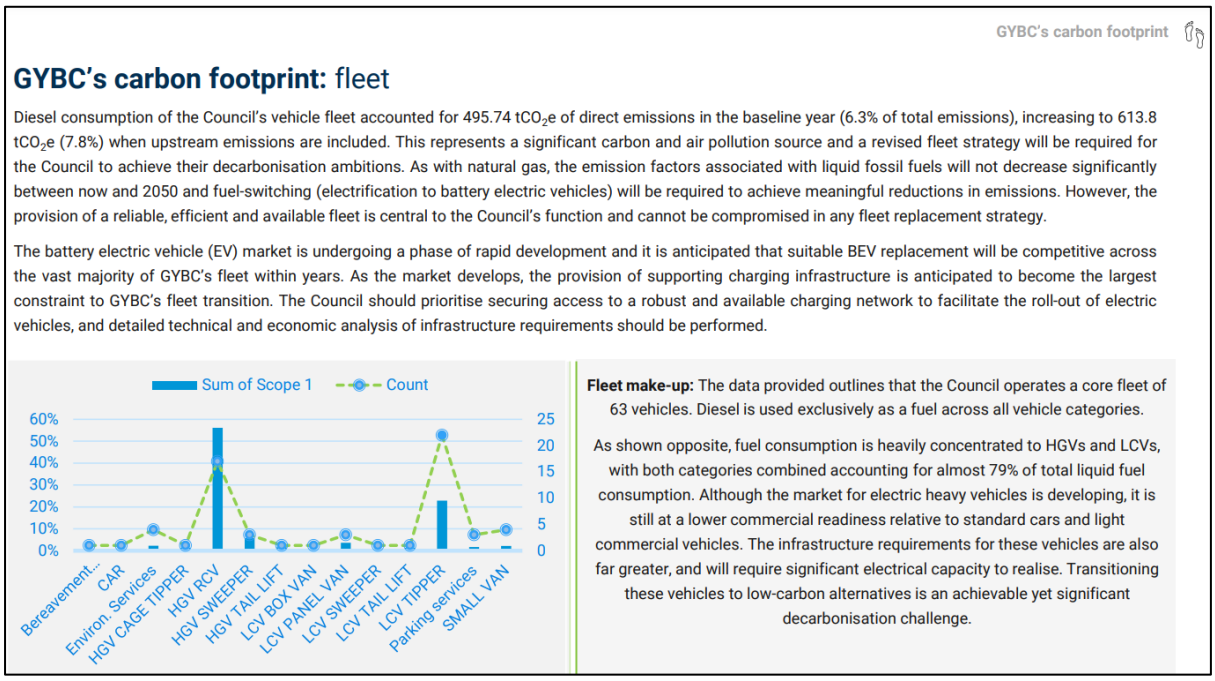


***Table 1 - Great Yarmouth Borough Council – Extract from Carbon Footprint Report, The Carbon Trust (2022)***

This Green Fleet Strategy provides an overarching Strategy to decarbonise the whole of the Council's fleet informed by bespoke technical support from SLR Consulting and a wider literature review of industry technical reports at the time of writing.

During the life of the Green Fleet Strategy, the Council will review its vehicle usage and as the opportunity arises, replacing vehicles with more fuel-efficient or alternative fuel/power options whilst ensuring household waste & recycling collection routes are optimised. Taking a pragmatic approach to action at a local level will reduce the carbon impact of the Council's vehicle fleet. At the same time as investing in new low carbon technologies, it recognises that its vehicles must be fit for purpose and environmental cost effective in the long term. A key element of the Green Fleet Strategy is to improve staff health and wellbeing by introducing a travel hierarchy to encourage Council staff to be physically active by replacing car journeys with cycling and walking where appropriate. Ultimately the Council would like its workforce, residents, businesses and suppliers together with the huge number of people who work and visit our borough to look at sustainable alternatives to using motor vehicles in their day to day lives and help make Great Yarmouth cleaner and greener.

*"We recognise the world is changing and we must meet the challenge of global climate change by playing a positive local role leading by example. Great Yarmouth will be a place where sustainability is at the heart of our work and where people take pride in the clean and attractive environments found here"*

*(Corporate Plan 2020-2025)"*

Achieving decarbonisation of the Council's fleet requires a significant investment funded through efficiencies derived from the reduction in use of fossil fuels, and by driving down costs in fleet maintenance. In making its decisions to switch to ULEVs, the Council will on each occasion carry out an appraisal looking at the environmental, technical, social and financial impact and benefits using the Council's standard Business Case modelling and make of its decision based on value for money and carbon impact.

The commitment and investment in a Green Fleet Strategy demonstrates that Great Yarmouth Borough Council is leading by example and aims to inspire others to also take action.

## 2. Aims of the Green Fleet Strategy

The Green Fleet Strategy provides practical advice and guidance to council services, members, staff and suppliers that make use of vehicles to deliver public services. It sets out how the Council will implement sustainable fleet management practices and encouraging active travel amongst drivers.

Great Yarmouth Borough Council aims to:

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|---|
| 1. Provide a Council fleet that underpins the delivery of high quality, cost effective and efficient services with minimum environmental impact. |
| 2. Minimise the carbon produced across the whole life cycle of vehicles in the Council's fleet from production to emissions. |
| 3. Adopt cleaner fuels and technologies by embedding green criteria in the fleet procurement process to reduce greenhouse gas emissions and convert to Ultra Low Emission Vehicles (ULEV) where possible as an alternative to diesel or petrol. |
| 4. Achieve the highest possible vehicle maintenance and driving standards across the fleet, ensuring regulatory compliance for staff and customers. |
| 5. Work with contractors, suppliers and partner organisations to encourage and promote low carbon infrastructure as a catalyst to provide clean energy solutions and new fleet technologies. |

6. Promote and encourage active travel to reduce the environmental impact of work-related journeys and improve people's health and well-being.

## 3. Fleet Inventory

The Council's fleet provides vehicles for specific job functions such as refuse and recycling collections, maintenance operatives, deliveries and for visiting officers. The Council's fleet currently comprises of only nine vehicles which are cars and vans of various sizes used by environmental rangers, civil enforcement (car parking), bereavement services, property and portering services. Eight these vehicles are fuelled by diesel, one by petrol (Table 2).

| Service | Vehicle Type | Fuel | Finance | Year |
|---|---|---|---|---|
| Bereavement Services | Ford Fiesta 1.25 Finesse | Petrol | Owned | 2003 |
| Environmental Health | Ford Transit Connect T230 L90 Panel Van 1753cc | Diesel | Owned | 2007 |
| Environmental Health | Ford Ranger Pick Up Double Cab Limited 1 2.2 Tdci 16c | Diesel | Leased | 2017 |
| Porter Service | Vauxhall Vivaro Van 1.6 CDTI120 | Diesel | Leased | 2018 |
| Environmental Health | Commercial Vauxhall Box Van - Combo LI 2000 1.6 CDTi 100ps H1 Sportive | Diesel | Leased | 2019 |
| Property Services | Peugeot Expert Standard 1400 2.0 Blue Hdi 120 Asphalt | Diesel | Leased | 2020 |
| Car Parking | Citroen Berlingo | Diesel | Leased | 2020 |
| Car Parking | Citroen Berlingo 1000 Driver Blue HDI | Diesel | Leased | 2021 |
| Car Parking | Vauxhall Combo Van 1499 cc | Diesel | Leased | 2021 |
| Operational Services | 122 vehicles * (15 narrow body RCVs, 93 smaller vehicles and 24 trailers) | Diesel | Owned | Various |

***Table 2 - Great Yarmouth Borough Council – Fleet Vehicles by Service***

The larger source of CO2 emissions results from frontline operational services e.g. waste & collections, street cleansing, grounds maintenance services, currently delivered by GYBS Limited, and from 1 April 2023, delivered by GYS Limited. The operational fleet for frontline services comprises of 122 vehicles, ranging from HGV's, tippers, tractors, vans and cars also mowers, hand tools and equipment for grounds maintenance work - all of which are maintained by an in-house vehicle workshop. This includes 15 Refuse Collection Vehicles (RCV) which are subject to Operator Licence Requirements, this current fleet is primarily fuelled with diesel.

| * Operational Services (all Diesel) | Vehicle Type | Number of Vehicles |
|---|---|---|
| Refuse and Recycling | RCV (18t / 24t / 26t) | 15 |
| Refuse and Recycling | RCV (7.5t) | 2 |

| * Operational Services (all Diesel) | Vehicle Type | Number of Vehicles |
|---|---|---|
| Refuse and Recycling / Street cleansing / Grounds maintenance / Depot / Pest Control / Toilet Maintenance | Panel Van | 8 |
| Street cleansing | Road Sweeper (2.4t / 3.5t / 4.5t / 15t) | 4 |
| Street cleansing / Grounds maintenance | Crew / Single Cab Tipper | 25 |
| Street cleansing | Single Cab Luton Van / Tail Lift | 3 |
| Street cleansing / Grounds maintenance | 1 / 2 Axle Trailer | 24 |
| Grounds maintenance | Car | 1 |
| Grounds maintenance / Depot | Miscellaneous small vehicles (mowers, tractor, hook loader, digger gaiter, forklift) | 40 |
| **Total GYBS/GYS Vehicles =** | | **122** |

***Table 3 - Great Yarmouth Borough Council – Operational Fleet***

The Council's overall fleet of 131 vehicles are primarily owned (93% are owned) rather than leased through unsupported borrowing. The majority of the fleet is presently and will continue to be procured through framework agreements.

All RCVs in the existing operational fleet are supplied in need of replacement – six RCVs need replacing with immediate effect having exceeded their anticipated service lifespan with the remaining RCVs reaching the end of their service lifespan in 2023/24. Based on the total mileage and age of the RCV fleet, the average annual mileage of an RCV in the operational fleet is approximately 8,000 miles per annum.

Given none of the vehicles in the fleet are subjected to particularly aggressive or harsh ground or driving conditions (e.g. driving on an active landfill site), are maintained regularly, and undertake relatively low annual mileage, for the period of this Green Fleet Strategy, new vehicles (having the benefit of technological engineering advances) will be deemed to have a lifespan of least 8 years and in some cases, the 10-years in order to even out the capital spend on moving to ULEVs.

## 4. Transition to a Greener Fleet

New vehicle technologies are rapidly developing (October 2022) primarily in the form of electric powered vehicles. Hydrogen cell, biomethane, hydrotreated vegetable oil and fully electric fuelled vehicles are now available albeit that hydrogen infrastructure is in its infancy in the UK and hence there are barriers to production and distribution networks required to supply it.

Decarbonising the fleet is predicated on deployment of ULEVs (Ultra Low Emission Vehicles) for frontline operational (waste collection) services which are shown to have the largest CO2 impact together with 'as and when' replacement of ULEV alternatives for the remaining council vehicles.

**Ultra Low Emission Vehicles (ULEVs)** - are currently defined as having less than 75 grammes of CO2 per kilometre (g/km) from the exhaust. Pure electric vehicles, and other plug-in electric vehicles when driving in the electric mode, produce no emissions of CO2 or other pollutants, are cheaper to run compared to conventional vehicles.

Recognising advances in technology from 2021, the Council expects to define an ULEV as a car or van that emit less than 50g/km CO2. Pure electric vehicles attract a zero first year Vehicle Excise Duty rate (car tax) and for those under £40,000, a zero rate for supplementary years. Electricity used to recharge a plug-in vehicle at home attracts only a 5% level of VAT, much lower than road fuels (20%).

Looking at a recent study report (March 2022) on behalf of the International Solid Waste Association (ISWA) examining the take-up of alternative fuels for RCVs, the author (Frith Resource Management) identifies the following key points for each fuel type based on the experience of 26 municipalities, fleet operators and vehicle manufacturers (Table 4):

| Fuel type | Key benefits | Key challenges |
|---|---|---|
| Electric | - Zero emissions<br>- Improved driving conditions<br>- Lower operating costs | - High vehicle capital cost<br>- Charging infrastructure<br>- Vehicle supply chain<br>- Battery range<br>- Other environmental impacts (e.g. battery production) |
| Hydrogen fuel cell | - Zero emissions<br>- Increased travel range<br>- Speed of fuelling<br>- Vehicle life | - Hydrogen supply<br>- High vehicle capex<br>- Vehicle supply chain |
| Hydrogen / diesel hybrid combustion[1] | - Moderate capex for conversion<br>- Ease of use | - Hydrogen supply<br>- Conversion considerations<br>- Limited carbon reductions |
| Natural gas | - Reduced emissions<br>- Lower fuel cost<br>- Similar performance | - High vehicle capital cost<br>- Fuelling infrastructure |
| HVO | - Ease of use<br>- Lower emissions | - Fuel supply<br>- Fuel cost<br>- Performance efficiency |

***Table 4 - Research into Sustainable and Alternative Waste Collection Vehicle Usage***
***Source: ISWA, CIWM, Frith Resource Management (March 2022)***

**Alternative Fuels -** Significant capital expenditure is required to move to ULEVs. For example, ULEV RCVs can be prohibitive when compared to replacing current RCVs with equivalent tried and tested diesel fuelled vehicles. A modern diesel RCV with a Euro 6 engine or newer can however be fuelled with diesel and Hydrotreated Vegetable Oil (HVO) interchangeably. Using HVO provides significant carbon benefits as it is a biofuel. Other tried and tested alternative fuel options for the remainder of the Council's fleet, primarily comprising small vehicles (e.g., panel vans and tippers) is limited to electric only.

A summary of alternative fuels and market engagement can be found in Appendix 1.

In the Great Yarmouth study undertaken by SLR Consulting (July 2022), the net carbon benefit of transitioning to a ULEV operational fleet is shown in Table 5. It compares a 'Business as Usual' scenario against conversion to the use of HVO, electric and hydrogen RCV alternatives.

| Item | Unit | Diesel RCV | HVO RCV | Electric RCV | Hydrogen RCV |
|---|---|---|---|---|---|
| RCV fuelled by: | | | | | |
| • Diesel | Litres | 11,531 | - | - | - |
| • Hydrotreated Vegetable Oil | Litres | - | 10,995 | - | - |
| • Electricity | kWh | - | - | 36,951 | - |
| • Hydrogen | kg | - | - | - | 2,494 |
| Direct carbon emissions (scope 1, direct emissions from fleet exhaust pipes) | $kgCO_2e$ | 28,971 | 1,835 | - | - |
| Indirect carbon emissions (scope 2 indirect emissions from fuel production) | $kgCO_2e$ | 7,033 | 3,823 | 7,846 | 21,931 |
| Total carbon emissions (scope 1 and 2 combined) | $kgCO_2e$ | 36,003 | 5,658 | 7,846 | 21,931 |
| **Net carbon benefit of deployment of ULEV relative to Business as Usual** | **$kgCO_2e$** | **-** | **-30,345** | **-28,158** | **-14,073** |
| Comparison provides for the typical the carbon emissions of a 26 tonne Diesel RCV covering a typical average distance of 8,000 miles per annum. | | | | | |

***Table 5 - Carbon Comparison of Diesel and ULEV RCVs***

The HVO RCV comparator provides the greatest carbon reduction, however there is no saving in the operational costs over the life of the RCV given the engine is existing Euro 6 technology. Electric RCVs deliver operational savings due to lower fuel costs, lower servicing requirements, reported lower repair and maintenance costs and tax savings.

Direct carbon emissions (scope 1, direct emissions from fleet exhaust pipes) for the current diesel fleet have been calculated based on GYBS provided vehicle data (a total annual fleet diesel consumption of c. 165,146 litres) and DBEIS/DEFRA GHG Conversion Factors[1]. Therefore, based on the vehicle fuel consumption data provided for current collection rounds (i.e. not taking account of additional food waste and commercial waste collection services) the scope 1 emissions of c. 28,971 $kgCO_2e$/year per RCV associated with diesel combustion could be avoided if the fleet transitioned to ULEVs.

There are however carbon emissions associated with fuel production in the scenarios considered – these are referred to as indirect carbon emissions (scope 2, indirect emissions from fuel production). Adding together the scope 1 and 2 emissions gives the total carbon emissions associated with the production and use of fuel used for the RCVs based on a typical annual mileage. The analysis shows that switching to fuelling a diesel RCV with HVO or a ULEV RCV would yield a net carbon benefit of c. 30,345, 28,158 and 14,073 $kgCO_2e$/year for HVO, electric and hydrogen respectively when compared to a diesel RCV.

The SLR analysis assumes that all electricity purchased for vehicle charging or hydrogen production is purchased from the grid and as such has been produced from a mix of fossil fuels and renewable

[1] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/891106/Conversion_Factors_2020_-_Full_set__for_advanced_users_.xlsx

sources. If this electricity is provided by renewable sources (either from direct generation on site (e.g. photovoltaics), or via a renewable energy purchase agreement), transition to ULEVs would not result in the transfer of carbon emissions from scope 1 to Scope 2 (indirect emissions, including carbon emissions from the generation of electricity from non-renewable sources).

## 5. Sustainable Active Travel

The Council will promote to its staff, partners and suppliers consideration of a travel hierarchy to encourage active travel such as walking, cycling, public transport and car sharing where possible and when delivery of public services allows, thereby improving the health and well-being of staff and limiting the impact of regular car journeys.

Staff are encouraged to review travel options available to them, which can increase help increase efficiency, reduce travel time and mileage and minimise emissions. An active travel hierarchy which minimises travel and its impact is summarised below:

a. Does there need to be an 'in person' meeting? Will an audio or virtual conference meet the business needs.
b. Can a more sustainable mode of travel be used such as walking, cycling or public transport?
c. Is there a low emission pool or car club shared vehicle available?
d. Can the journey be shared with a colleague?
e. Can an e-scooter or electric bike be used instead?

The Council will investigate partnerships with active travel, car sharing organisations and salary sacrifice schemes that favour switching to electric vehicles to provide mutual benefit for staff and the environment, thereby supporting a modal shift in sustainable transport and travel.

## 6. Investment Decisions

In order to ensure the highest carbon reduction per £ in the future, all purchasing will be informed by this Green Fleet Strategy.

Decarbonisation of whole of the Council's fleet will be driven by the development of **Business Cases** which take in account the whole life running costs of each vehicle or family of vehicles in order to make sound financial investments which deliver carbon and financial revenue savings in the medium to long term. It is anticipated that savings will be derived from the reduction in use of fossil fuels and by driving down costs in fleet maintenance.

An 8-year and in some instances, 10-year Vehicle Replacement Programme will be developed for each service area in order to plot the course towards a completely carbon neutral fleet. These replacement programmes will be iterative responding to changing service needs, emerging technologies and future funding parameters.

In doing so the Council will weigh-up the purchase costs and potential vehicle lifetime costs against carbon reduction benefits for each purchase. As new technologies mature, the costs will reduce, new suppliers will come into the market and reliability will improve.

Table 6 provides a high-level analysis comparing the costs of a traditional diesel RCV against the costs of electric, HVO and hydrogen fuelled alternatives.

| **Capital** | **Diesel RCV (£)** | **HVO fuelled Diesel RCV (£)** | **Electric RCV (£)** | **Hydrogen* RCV (£)** |
|---|---|---|---|---|
| Purchase | 206,000 | 206,000 | 450,000 | 600,000 |
| Interest (for 8 year loan over life of asset) | 40,000 | 40,000 | 90,000 | 120,000 |
| Total cost | 246,000 | 246,000 | 540,000 | 720,000 |
| * Hydrogen vehicles range in price from £400k to £800k | | | | |
| | | | | |
| **Annual Costs** | | | | |
| Cost of capital (@ 8 year life) | 30,750 | 30,750 | 67,500 | 90,000 |
| Annual Fuel | 12,000 | 12,500 | 6,000 | 32,000 |
| Annual Servicing, maintenance, repair (SMR) and tax | 16,500 | 16,500 | 13,000 | 14,500 |
| | 59,250 | 59,750 | 86,500 | 136,500 |
| | | | | |
| **Annual comparison to cost of Diesel RCV:** | | | | |
| Annual running costs | | 500 | (9,500) | 18,000 |
| Overall cost comparison inc. capital costs | | 500 | 26,750 | 50,000 |

***Table 6 - Cost Comparison of Diesel and ULEV RCV***

| ** Fuel Assumptions (July 22) | Unit | Price |
|---|---|---|
| Diesel | £ / litre | 0.96 |
| Hydrotreated Vegetable Oil (HVO) | £/litre | 1.11 |
| Petrol | £ / litre | 1.52 |
| Electric | £ / kWh | 0.15 |
| Hydrogen | £ / kg | 12.50 |

***Table 7 - Summary of Fuel Costs used in Modelling***

## 7. Implementation

It is critical the Council moves towards low carbon vehicle options as demand is rapidly increasing and production slots are limited. This is particularly relevant in the case of specialist vehicles such as waste and recycling collection vehicles which can take twelve months or more from procurement to delivery.

**In order to ensure maximum carbon reduction per pound a Business Case will be produced for each purchase of a new vehicle type/technology together with an assessment of environmental, technical, social and financial benefit/impact.**

The Council will continue to monitor and assess advancements in other ULEV technologies, with a view to potentially adopting one of these in the medium to long term. As the ULEV market becomes more established, capital costs are anticipated to reduce, resulting in a greater degree of parity between ULEV and diesel vehicle costs over the entire vehicle life cycle i.e. as new technologies mature, the costs will reduce, new suppliers will come into the market and reliability will improve.

Other challenges relate to the requirement for new clean fuel infrastructure. Great Yarmouth Borough Council will work with New Anglia LEP, Norfolk County Council and other partner organisations to ensure that the Council's fleet and those of its suppliers are ready to take advantage of new and emerging technologies and infrastructure.

**Great Yarmouth Borough Council will deliver its Green Fleet Strategy by:**

- Collaborating with national, regional and local partners.
- Providing effective training and development of our workforce.
- Using reliable, informative and real-time information in relation to driving habits through technological solutions.
- Ensuring effective communications across the council including active travel behaviour change.

A Vehicle Replacement Programme will be developed for each service area in order to plot the course towards a completely carbon neutral fleet. These replacement programmes will need to be iterative responding to changing service needs, emerging technologies and future funding parameters. The council will have to weigh up the purchase costs and potential vehicle lifetime costs against carbon reduction benefits for each purchase.

**The anticipated benefits can be summarised as:**

- **Environmental –** less reliance on carbon-sourced and fossil fuels and improved emission standards.
- **Health -** increased opportunity for staff well-being through active travel e.g. mileage reductions through car sharing and use of public transport, the replacement of car journeys with walking and cycling respectively.
- **Financial -** reduced operating and maintenance costs and savings on fuel.

In summary, the Council will replace existing vehicles with modern like-for-like Euro 6 or better engine vehicles (i.e. for those vehicles requiring immediate replacement), whilst considering the opportunity to switch to a clean fuel such as HVO rather than continue to fuel Euro 6 engines with diesel. This will achieve immediate carbon savings.

The Council will also look to replace a smaller number of RCVs (e.g. the garden waste collection service) with electric RCVs and replace its other nine service vehicles with a greener alternative on and as and when basis. Such a pragmatic approach will enable the Borough Council to have certainty and provide continuity of service, while taking immediate and longer term decisions to green the fleet in step with advancements in other ULEV technologies, fuel and vehicles.

## 8. Governance and Review

A set of Key Performance Indicators has been developed (Table 8) in order to monitor the outcomes of the strategy delivery. In some cases further development of recording systems will be required in order to provide the data required.

| | **Indicator Description** | **Reporting Frequency** |
|---|---|---|
| **Operational** | CO2 emissions | Annually |
| | Fuel usage – incl. average mpg per vehicle type/age | Annually |
| **Fleet Use** | Vehicle Downtime – days lost due to maintenance and repair | Monthly |

| | | |
|---|---|---|
| | Vehicle Utilisation – days fleet is available but unused | Quarterly |
| **Compliance** | Number of Accidents | Quarterly |
| | Number of vehicle defects | Quarterly |
| | Number of MOT first time passes/failures | Quarterly |
| **Costs** | Maintenance cost per vehicle type/age | Annually |
| | Tyre costs per vehicle | Annually |
| | Operating costs per vehicle type/age | Annually |
| | Insurance claims awarded against the council - number and total costs | Quarterly |

***Table 8 – Monitoring and Performance Indicators***

**Appendix 1**

## Review of Alternative Fuel Technology

An overview of the current ULEV market and deployment, focusing on biofuel, electric and hydrogen powered vehicles (undertaken by SLR Consulting, July 2022). It should be noted that technology and fleet developments are fast moving at present, and therefore this summary presents a snapshot of the ULEV market at the time of preparing the fleet strategy.

**Hydrotreated Vegetable Oil -** Hydrotreated Vegetable Oil (HVO) is a biofuel made by the hydrocracking of vegetable oils. It is regarded as a sustainable / renewable diesel alternative that meets the fuel specification BS EN 15940 and is therefore suitable for use in diesel engines and vehicles compatible with paraffinic diesel fuel. In such instances, HVO and diesel can be used interchangeably without the need for vehicle modifications[1].

Therefore, adoption of HVO as a fuel will have no implications on infrastructure or vehicles as it can be used in most vehicles currently fuelled by diesel. Dennis Eagle has indicated that HVO is compatible with diesel engines in its vehicle fleet (i.e. Euro 6 (VI) engine classifications).

It is understood that HVO has been trialled by a number of local authorities across the country including Bournemouth, Christchurch & Poole Council[2], Eastleigh Borough Council[3] and North West Leicestershire District Council[4] to name a few.

**Electric -** There have been numerous electric RCV deployments across the UK in recent years, both for vehicle conversions and new eRCVs. Initially vehicles were being deployed on a trial basis, or by operating one or two vehicles in the fleet as battery electric vehicles (BEVs), but more recently there have been announcements regarding full fleet roll out / changeover to BEVs.

For example City of London Corporation[5], Manchester City Council[6], Sheffield City Council and Westminster City Council[7].

Capital expenditure for BEVs is high (circa. 2 x cost of diesel equivalent) as well as costs for associated charging infrastructure, but maintenance costs are understood to be low compared to the diesel equivalent. There remains some uncertainty regarding 'real world' ranges and there is limited visibility of 'real world' driving data. However, increasing deployment suggests that range is not an issue on some collection rounds. This uncertainty regarding driving range could be mitigated through the use of a trial vehicle from a manufacturer to test on the most arduous collection round(s).

In September 2022 GYBS trialled the Dennis Eagle eCollect fully electric RCV for 3 full days on the 3 different waste streams, each day the vehicle returned after completing the route with between 30% and 50% range, feedback from the crews; it was much quieter at the rear of the vehicle and a good working environment.

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1 https://shop.bsigroup.com/products/automotive-fuels-paraffinic-diesel-fuel-from-synthesis-or-hydrotreatment-requirements-andtest-methods/standard
2 https://www.localgov.co.uk/Council-to-trial-hydrotreated-vegetable-oil-fuelled-waste-collections-/51849
3 https://www.eastleigh.gov.uk/latest-news/council-to-cut-its-vehicle-emissions-by-up-to-90
4https://www.nwleics.gov.uk/news/2021/09/30/battery_powered_or_fuelled_by_waste_food_oil_n_all_change_for_nwldcrs_vehicles_as_it_strives_for_zero_carbon
5 https://news.cityoflondon.gov.uk/clean-air-city-corporation-to-become-first-uk-authority-to-run-fully-electric-refuse-truck-fleet/
6 https://www.letsrecycle.com/news/biffa-rolls-out-electric-rcv-fleet-in-manchester/
7 https://www.letsrecycle.com/news/sheffield-and-westminster-councils-begin-electric-rcv-trials

**Biomethane -** Biomethane is a renewable transport fuel produced through upgrading biogas and syngas to natural gas quality. It can be compressed to compressed natural gas (CNG) or liquefied to liquified natural gas (LNG). The technologies to enable the further deployment of biomethane are readily available. It can meet all technical requirements set by vehicle manufacturers and can be used in the same way as natural gas in many applications.

Biomethane is already being used in light passenger vehicles as bio-CNG, but also in heavy transport as bio-LNG and bio-CNG. SLR has identified a number of case studies across the UK where the deployment of biomethane in RCVs has been trialled – these include Warrens Group[8], Liverpool City Council[9], Sheffield City Council[10] and Leeds City Council[11]. We have liaised with a representative from Leeds City Council to get a better understanding of their views on the trial they ran. The trial commenced in 2008 with two 26 tonne vehicles – a Mercedes and a Dennis Eagle RCV. The Mercedes was run on 100% biomethane, and the Dennis Eagle was run on 50% biomethane and 50% diesel. The Mercedes lasted 9 years and was described as a 'success' from an operational and reliability point of view, but the Dennis Eagle was described as a 'disappointment', with advertised emissions and fuel savings not being achieved.

At the start of the trial, biomethane was a viable alternative fuel however was still at an early stage of development. It is understood that Leeds CC struggled with getting fuelling infrastructure in place and arranging a fuel supply agreement to provide certainty of availability. Furthermore, installing a biomethane fuelling station comes under the Dangerous Substances and Explosive Atmospheres Regulations, 2002 (DSEAR) which presented additional site management challenges and costs.

**Hydrogen -** Hydrogen fuelled RCVs run all electric drivetrains. The power to charge the battery is provided by the onboard hydrogen 'fuel cell'. While uncertainty remains regarding 'real world' ranges due to limited visibility of 'real world' driving data, anecdotally, research suggests that longer ranges are possible with hydrogen powered vehicles when compared to BEV equivalents. Further to this, there remains a lack of hydrogen refuelling station infrastructure nationally. As such, there is potentially an additional capital expenditure and space requirement for localised hydrogen production in absence of national infrastructure.

In recent years, hydrogen use as a fuel in RCV fleets has been trialled by a few local authorities across the UK including Aberdeen City Council[12], Fife Council[13], Glasgow City Council[14] and Cheshire East Council[15]. Notably, a project called 'Hydrogen East' is underway in Norfolk to identify and assess options for the development of hydrogen opportunities in the East of England, including production and fuelling infrastructure[16]. If the Hydrogen East project and fuelling infrastructure can be realised, this would open up an opportunity for GYBC to assess the feasibility of running a hydrogen fuelled RCV fleet.

Through engagement with GYBC and its partners, SLR understands that the Council is working with the Norfolk Climate Change Partnership (NCCP) and has been shortlisted for a feasibility study for the generation and use of hydrogen fuel in RCVs and other larger fleet vehicles in support of the decarbonisation of transport and industry in the area. However, with no clear timescale for the introduction of local availability of hydrogen fuel, the Council should not plan on a transition to hydrogen fuelled vehicles in either the short or medium term.

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8 https://warrens-group.com/news/new-biogas-truck-helping-us-work-towards-a-cleaner-greener-tomorrow/
9 https://www.edie.net/liverpool-city-council-unveils-biogas-powered-refuse-trucks/
10 https://www.veolia.co.uk/press-releases/veolia-launches-uks-largest-fleet-gas-fuelled-refuse-collection-vehicles
11 https://www.letsrecycle.com/news/leeds-opens-biomethane-fuelling-station-for-rcvs/
12 https://www.letsrecycle.com/news/aberdeen-unveils-uks-first-hydrogen-fuel-cell-rcv/
13 https://www.letsrecycle.com/news/fife-converts-two-rcv-to-use-hydrogen-fuel/
14 https://www.bbc.co.uk/news/uk-scotland-glasgow-west-54364426
15 https://resource.co/article/cheshire-east-council-secures-funding-hydrogen-refuse-vehicles
16 https://hydrogeneast.uk/about-us/