TITLE: REPLACEMENT REFUSE COLLECTION VEHICLES

Committee: Add Text

Date: Add Text

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1.0 ISSUE

1.1. Information on cost of replacement Refuse Collection Vehicles (RCV) and outline savings on CO2 emissions from the use of alternative fuels.

1.2. Outline of efficiencies and improvements to service delivery brought with the introduction of in-cab technology.

2.0 RECOMMENDATION(S)

2.1. Instruct the Director Operations to proceed with the procurement of 10 replacement RCV's under the RECAP partnership framework, to include in-cab technology supported by a back-office system and retrofit existing operational RCV fleet with the same technology.

2.2. Approve the use of HVO in the RCV fleet in accordance with the cost threshold and monitoring regime outlined in 5.2.2

3.0 BACKGROUND/OPTIONS

3.1. The Council operate an aging fleet of RCV's. The estimated life of RCV's would typically be around 7-8 years. East Cambridgeshire Street Scene (ECSS) are operating the collection of dry recyclables/Green waste with vehicles which are 9-10 years old. This has led to a significant increase in the cost of maintenance and resulted in poor reliability of the vehicles over the past 3 years, which in turn has had an impact on the performance of the waste collection service. Therefore, it is an imperative for the Council to place an order for replacement fleet as soon as possible.

3.2. Vehicle procurement had been delayed due to the Covid 19 pandemic and because Local Authorities were waiting for guidance from DEFRA about the implementation and requirements of the Environment Act 2021. We are now clearer on the requirements of the Act and can move forward with procurement.

3.3. In October 2019, East Cambridgeshire District Council declared a climate emergency and published its first Environment plan in June 2020. In June 2022 the third addition of the plan was published.

3.4. Diesel is a significant contributor to the Council's carbon emissions. The waste fleet used over 270,000 litres of diesel in 2020/21 and emitted around 860 tCO2e

(when “well to tank” is factored in), and are therefore responsible for over two-thirds of the Council’s entire emissions. The Councils Environment action plan requires the Council to ensure any procurement of a new fleet of vehicles considers the potential for low carbon vehicles.

3.5. Low emission fuel options, Hydrogen, Electric and Hydrotreated Vegetable Oil (HVO) have been identified as three potential alternatives to diesel for the Council’s RCV fleet. An overview and analysis of each fuel option is included in appendix 1. The analysis is partly based on long term trials of low emission vehicles carried out by other Local Authorities.

3.6. New build vehicles typically provide digital telematic information including capability such as vehicle weighing and tracking, driver behaviour such as breaking, idling, and speed, and video technology to support the driver and review for insurance purposes. Further information is included in appendix 2.

3.7. The RECAP Waste Partnership completed a mini competition through the Crown Commercial Services procurement framework in 2021. The resulting contract was given to Dennis Eagle an established manufacturer providing a range of different style and size RCV’s. This enables all LA’s in Cambridgeshire to draw down directly from the framework without the need for a further procurement exercise. The current lead in times for orders of RCV’s is around 9 - 12 months.

3.8. The Council has made an allocation of £2,775,000 in the 2023/24 MTFS capital programme for the scheduled replacement of Waste and Street Scene fleet and costs associated with any modifications required to existing operational fleet to standardise our fleet stock. The Council will procure the vehicles and lease back to ECSS, with interest of 5% on the capital outlay

4.0 ARGUMENTS/CONCLUSION(S)

4.1. The Council is operating ten RCV’s that are well beyond their useful life. The impact financially as well as on performance has been significant through 2022 and will remain so in 2023. Therefore, replacing the fleet as expediently as possible via the RECAP framework will enable the council to address these issues.

4.2. The Council is committed to and recognises the need to act fast to reduce our net emissions as quickly as possible, and as deeply as possible, on our journey to net zero emissions. The Council has brought forward by 10 years, from 2050 to 2040, its own net zero carbon emissions target date.

4.3. Details gathered on the Council’s 2020/21 carbon footprint shows the largest single contributing area is a consequence of the Council’s fleet vehicles. Of the Council’s fleet vehicles, the councils waste collection vehicles used over 270,000 litres of diesel in 2020/21 and emitted around 860 tCO2e (when well to tank is factored in), and are therefore responsible for over two-thirds of the Councils entire emissions.

4.4. Replacement of 10 of our 16 RCV’s provides an opportunity to explore alternative fuel sources that will provide a sustainable and reliable fuel that results in lower carbon emissions.

4.5. Whilst electricity or hydrogen will be the most likely options for the Council’s RCV fleet in the long term, the availability, infrastructure costs, vehicle costs and lead

times are currently prohibitive to be a realistic option at this time. As the market develops it is anticipated that the costs and production timescales for the vehicles should reduce.

4.6. Additionally, any move to an EV fleet would require a multimillion-pound capital scheme to implement the appropriate infrastructure at the existing depot.

4.7. HVO provides a viable transitionary alternative until the other RCV markets mature. It significantly reduces emissions, is similar in cost to diesel and is being adopted by other Councils.

4.8. The introduction of in-cab technology will address performance issues and drive improvements for the waste collection service and provide our customers with an improved experience when requesting services. It will also contribute to a reduced carbon footprint as it will lead to reduced journeys as collection issues can be dealt with in real time.

5.0 FINANCIAL IMPLICATIONS / EQUALITY IMPACT STATEMENT / CARBON IMPACT ASSESSMENT

5.1 **Summary of cost per vehicle by alternative fuel option:**

	DIESEL per vehicle	HVO per vehicle	ELECTRIC per vehicle
CAPITAL COST	£187,215	£187,215	£450,000
ANNUAL FUEL/ELECTRICITY	£16,397*	£18,605*	£15,000 **
EMISSIONS PER ANNUM (tCO2e)[1]	27.7 tCO2e	9.57 tCO2e	8.89tCO2e

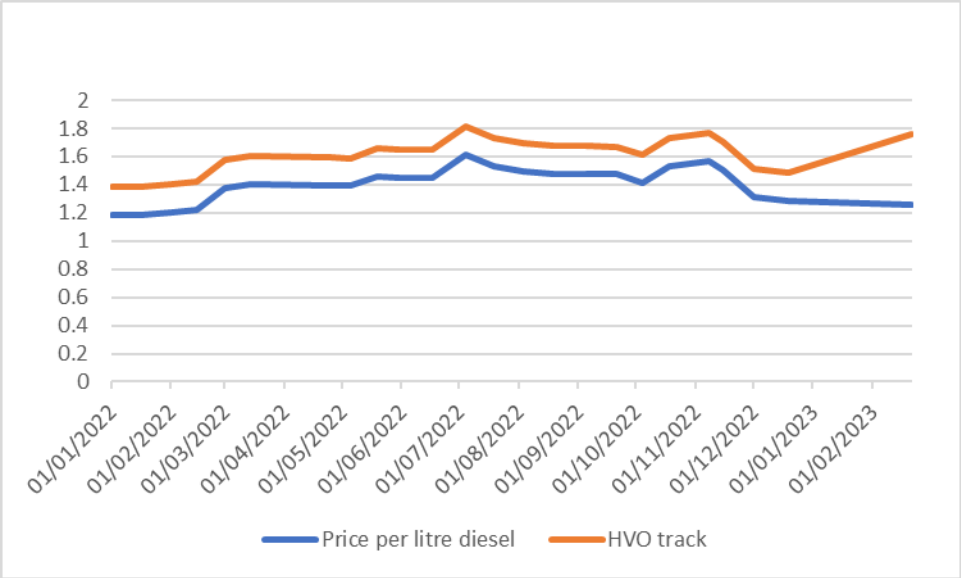
*Price point December 2022 per litre

**Assumes no energy produced on site via solar

5.2 **Fuel Costs**

5.2.1 Moving to HVO fuel will incur additional costs to ECSS, which in turn is likely to be reflected within the management fee charged to the Council. The price of diesel and HVO fluctuate and the graph below shows the cost of diesel and HVO over a 9-month period:

[1] The (tCO2e) emissions for new vehicles include embedded carbon that relates to the raw materials, manufacturing processes, logistics, etc. for production of a new vehicle. This report uses 'cradle to gate' measurements which represents the footprint up to the point when the vehicle is delivered to the first user. This is reflected in the whole of life modelling above. Cradle to gate modelling is used by many organisations, including the Energy Saving Trust, as the decommissioning footprint cannot be known ahead of time for example if batteries are re-purposed for use in buildings or disposed of.



5.2.2 HVO costs generally track around an average of 20p above the cost of diesel per litre. However as can be seen more recently the cost of HVO has spiked considerably. It is recommended that fuel costs are closely monitored and where HVO costs increase beyond the monthly average plus 5p, then ECSS should revert to using diesel until costs are back within the average threshold. This will provide a financially sustainable model and reduce carbon emissions. The cost of fuel will be monitored on a monthly basis to allow for bulk purchasing.

5.3 **Recommended option total costs:**

	Capital Costs	Annual revenue costs to ECSS
Capital – Vehicles	£1,872,150.00	
Capital In - cab system to all fleet	£40,184	
Revenue – Vehicles **		£273,191
Revenue - Interest		£88,787
Revenue – In cab system to 16 vehicles f		£21,440
Additional cost of HVO Fuel 16 vehicles		£35,335
Revenue – Maintenance saving		(145,562)
Total	**£1,912,334**	**£273,191**

*** New vehicles payback is annualised over 7 years.*

6.2 **Equality impact assessment** - not required.

6.3 **Carbon Impact Assessment (CIA)**

In summary, the CIA concluded as follows:

6.3.1 The Council is committed to and recognises the need to act fast to reduce our net emissions as quickly as possible, and as deeply as possible, on our journey to net zero emissions. The Council has brought forward by 10 years, from 2050 to 2040, its own net zero carbon emissions target date.

6.3.2 Details gathered on the Council's 2020/21 carbon footprint shows the largest single contributing area is a consequence of the Council's fleet vehicles. Of the Council's fleet vehicles, the council's waste collection vehicles consumed over 270,000 litres of diesel in 2020/21 and emitted around 860 tCO2e (when well to tank is factored in), and are therefore responsible for over two-thirds of the Council's entire emissions.

6.3.3 Ten of the RCV's are beyond their useful life and need replacing, and this provides an opportunity to investigate low carbon alternative fuel sources compared with conventional fossil fuels such as diesel.

6.3.4 HVO provides a viable transitionary alternative until the other RCV markets (such as electric RCVs) mature. It significantly reduces emissions by up to 90% (compared with conventional fossil fuels), is similar in cost to diesel and has been successfully trialled and adopted by other Councils.

6.3.5 Whilst the purchase of new vehicles will have a negative impact arising from the embodied carbon of such vehicles (i.e. the energy and emissions arising from the manufacturing of the new vehicles), such negative implications can reasonably be assumed to be offset within a short period of time as a consequence of having more fuel-efficient vehicles, together with such new vehicles consuming a low carbon fuel.

6.0 APPENDICES

1. Alternative fuel options
2. In cab Technology

Background Documents:

East Cambridgeshire Environment Plan (Year 3)

ALTERNATIVE FUEL OPTIONS

Hydrogen RCV's

Hydrogen fuel cell vehicles use electric motors for propulsion powered by a fuel cell, which works like a battery.

Only one type of hydrogen is created in a low emission way: There are several ways to produce hydrogen, all them are energy intensive and most result in carbon emissions. The only zero carbon approach is 'Green Hydrogen' created by extracting hydrogen atoms from water by a chemical reaction called electrolysis, using renewable power sources e.g., solar.

The infrastructure to produce Green Hydrogen locally does not exist: Green hydrogen can only be transported short distances i.e., under 30 miles. Beyond this distance, emissions related to transportation will adversely impact on the benefit of using Hydrogen. There are currently no known Green Hydrogen production facilities within the local area to allow efficient transportation of the fuel.

The infrastructure, vehicle and fuel costs are not yet clear: Hydrogen RCVs are being trialled in a small number of sites across Europe and Glasgow City Council. The lack of financial and performance data available means that it is too early to get an accurate understanding of whether this would be a feasible option for the Council today.

Tailpipe emissions from RCVs would be zero: The only emissions from the RCVs would be water vapour.

Hydrogen RCVs are not a viable option at this time when considering the findings outlined above.

Electric RCV's

An electric vehicle (EV) uses electric motors for propulsion powered by a battery. The batteries are plugged in to chargers as they become depleted.

The main benefit of EVs is the eradication of tail pipe emissions: There are zero carbon emissions from the vehicle itself.

The carbon footprint related to production of electric RCVs is higher than diesel RCVs: It is estimated that almost 80 tCO2e are emitted in producing an electric RCV, compared to 56 tCO2e for diesel.

Most of these additional emissions come from the mining and extraction of the metals needed for the manufacture of the lithium-ion batteries. These processes are water intensive and use toxic chemicals which can lead to water, soil, and air pollution.

The use of more EVs would increase the Council's consumption of electricity: To achieve the lowest Carbon Footprint, the Council would need to remain on a renewable energy tariff or build the infrastructure to generate renewable energy on site.

Electric RCVs are slightly cheaper to fuel than diesel: It costs around £16,397 a year to fuel an RCV with diesel. To power an electric RCV would cost around £15,000 a year (assuming no energy generation on site.)

The electric vehicle market is an evolving sector: For smaller vehicles (e.g. vans) there have been significant improvements on the distances they can travel and speed of charging. Electric RCVs have emerged on the market more recently and are only manufactured by a handful of suppliers, meaning the market is much less mature.

Electric vehicles are expensive to purchase: The cost of a new electric RCV is around £445,000. It is anticipated that as the electric RCV market matures costs should reduce. The cost of purchasing diesel RCVs through the RECAP framework is around £190,000 however, this may increase between now and 2040 as internal combustion engine vehicles are slowly phased out.

Infrastructure requirements are likely to be significant: Electric RCVs require powerful rapid chargers, which depending on the size of the fleet and number of chargers needed, is likely to require the creation of an additional substation and additional cabling in the depot vicinity.

Based on early analysis this would cost from £30,000 for a single rapid charger to £450,000 depending on the number of vehicles to be charged and the network upgrades needed. Solar and energy storage on site may also be feasible however costs would be significant and therefore has not been explored at this stage.

The manufacturers of EV's report a fully charged RCV to be able to undertake a full 8-hour shift, however recent trials of electric vehicles used by Cambridge City have found that the life of a fully charged battery is limited by the miles travelled on a round and the type of roads travelled on.

The maximum collection round is limited to 60 miles (including travel to and from disposal outlets), with performance being better when the speed of the vehicle is kept below 55 miles an hour. Performance is also dependent on the number of bins lifted, the air temperature, and whether air con is being used in the cab etc, which drains the battery. The average mileage for an ECSS round including disposal is 68 miles.

HVO Fuelled RCVs

Alternative fuels to diesel are available and the current best alternative is Hydrotreated Vegetable Oil (HVO). HVO takes feedstock such as vegetable oils and waste fats and processes them into a very clean burning fuel.

Modern diesel vehicles can run on HVO: HVO can run well on normal diesel engines without the need for modification and it can even be mixed with diesel in the event of significant supply or cost issues.

Emissions are significantly lower than diesel: HVO would reduce CO2e emissions by approximately 88% (in a recent trial, Cambridge City Council reported an average of 90% in their calculations, Broadland Council also report a 90% saving). The actual figure will be based on the type of engine and operating temperature when compared to diesel. This includes a reduction in Nitrous Oxide emissions which would be up to 27% lower and 84% lower production of particulate matter (data from Wessex Petroleum), helping to improve air quality.

HVO fuel costs are slightly higher than diesel: HVO fuel currently costs around 20 pence per litre above the rate of diesel. This would mean an increase annual cost of £2,209 per vehicle. However, if diesel fuel prices continue to rise, as they have over recent times, HVO could ultimately become a cheaper option. Additionally, in some

trials there is a marginal fuel efficiency of HVO compared to diesel. An improvement of just 1 mpg could lead to a cost neutral position for the Council. This is yet to be tested on a full-scale operational fleet and therefore an increase in fuel costs has been factored into the overall costings.

Other Councils are switching to HVO: Babergh District Council have replaced their entire RVC fleet following trials with their garden waste collection vehicles. Broadland District Council commenced a new contract with Veolia and have moved to a full fleet of HVO fuelled vehicles.

The other districts within Cambridgeshire are also looking to introduce HVO to their fleet. This gives us a further option of undertaking a combined procurement or development of a procurement framework for fuel to drive value for money.

Currently the waste partnership is exploring storage options for HVO at Waterbeach Waste Transfer Station (where all ECSS fleet currently fuel). A further paper will be brought forward setting out the options for fuel storage and any capital investment required. There may be options to explore funding via Environmental funds offered by the CPCA or the County Council. These options will be explored as part of the procurement for HVO, and do not have a bearing on the fleet procurement.

All RCV fleet operating at EURO 6 emissions standards can run on HVO. Therefore, existing fleet will also be able to be switched to HVO fuel.

DIGITAL SYSTEMS AND IN-CAB TECHNOLOGY

The introduction of in-cab technology will address performance issues and drive improvements for the waste collection service and provide our customers with an improved experience when requesting services. It will also contribute to a reduced carbon footprint as it will lead to reduced journeys as collection issues can be dealt with in real time.

Additionally, third party systems are able to integrate and provide added capability to the drivers, operations back office teams and the customer.

A digital system and in cab technology will enable ECSS and ECDC to record and view real time information relating to the completion of waste collection and delivery rounds, managing customer enquiries and service requests and providing collection crews with the data they require daily to undertake their rounds, such as identifying properties on assisted collections or additional collections required (missed bins)

Currently ECSS operate primarily from a paper based system. In-Cab technology replaces paper forms and records with touch-screen tablets, giving drivers the information needed to work safely and efficiently and at the same time providing the depot and customer services with real-time issues and performance information through desktop software. For example a customer may report a missed bin on line, this request can go directly to the in cab to alert the driver and if appropriate the crew can clear the missed bin on the same day. Currently this paper based process can take up to 48 hours before a missed bin is cleared.

Removing paper forms reduces errors and paper use. Drivers and crews are provided with accurate and up-to-date service information about the collections on their round. It supports customer service by making it quicker and easier for drivers to report issues such as bins not presented, and then share this information in real-time with Customer Services and the depot (and therefore dealing with resident complaints at the first stage). It enables the service to analyse performance and react quickly to crews who may be struggling to complete their collection rounds and also look at long term data to reallocate resources and optimise performance.

The introduction of in-cab technology will help address performance issues and drive improvements for the waste collection service, and would need to be installed on existing fleet so that one system runs across all our waste collection service.

The associated capital cost for implementing in cab technology is £33,590 on 10 new vehicles and £6,594 for our remaining operational fleet. The total ongoing annual revenue cost would be £21,440 for ECSS. Revenue costs are quickly recovered due to the improved reporting capability, more efficient collection regimes, reduction in paper costs and efficiencies in officer time.