Lewes District Council

EASTBOURNE Borough Council

Working in partnership with Eastbourne Homes

Appendix 1 Vehicle Replacement Strategy April 2022

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Vehicle Replacement Strategy April 2022

Contents

Abbreviations

LDCWS – Lewes District Council Waste Services
HGV – Heavy Goods Vehicle
RCV – Refuse/Recycling Collection Vehicle
EV – Electric Vehicle
HV – Hydrogen Vehicle
HVO – Hydrotreated Vegetable Oil
FAME – Fatty Acid Methyl Esters
NOx – Nitric Oxide

Executive Summary

The purpose of this report is to set out the replacement pathway for the waste and recycling fleet to circa 2035, **a statutory service provided by Lewes District Council**. This is against a backdrop of new and emerging technologies, fuels and energy vectors, ageing vehicles, and **the council's net zero 2030 ambition.**

The **immediate priority is to upgrade the current fleet** at Robinson Road Depot from where the Lewes District councils waste service (LDCWS) operates. Industry standard replacement schedules for these collection vehicles are a **7–10-year cycle** and most of our vehicles are at **end of their economic life** (some beyond it, now replaced with hired vehicles – ref Pg5 "Current Recycle Fleet"). It is business critical to secure a fit for purpose fleet **to be in-situ for LDCWS by April/May 2023** that will see us through for the next 5 years, just ahead of the council's net zero 2030 milestone.

The requisite energy vector facilities will also need to be installed/provided in this interim period, either at the depot or in the vicinity, be that a charging infrastructure for EVs (Electric Vehicles, Pg7) and/or HVs (Hydrogen Vehicles. Pg 8) via the hydrogen hub in Newhaven.

Due to both the marketplace and depot infrastructure not ready for the immediate transition to EV or HV, we have **no option** but to consider the continued use of diesel as a fuel as well as a diesel substitute, most especially HVO (Hydrotreated Vegetable Oil, Page 8) which is not done lightly but from a position of no immediate alternative option.

Whilst ultra-low emission solutions are developing at a rapid pace, there are **significant advantages in delaying decisions** on new vehicle types while the market stabilises. The first version of electric RCVs (Refuse/Recycling Collection Vehicles) are beginning to be deployed at councils in London and other urban areas. The UK's first fuel cell hydrogen waste truck was launched in Aberdeen in February 2022 (ref Page 8).

The smaller fleet at Lewes mainly streets collection vehicles and the separate food collection vehicles are suitable for the EV model, as range and charging capacity are not as restrictive as on the HGV fleet. It is recommended to switch the streets fleet over in 2024/25 to fully electric once the depot has been modified. In the interim it is recommended that we switch the food waste vehicles to fully electric in 2023/24.

LDCWS can position itself to procure the best fit vehicles from 2028/29 when the market has matured, prices have normalised, and the most appropriate fuel or energy source is in place conscious of the unprecedented rise in the cost in fuel as well as the vulnerability in respect of guaranteed supply considering the ongoing conflict overseas.

Our closing summary (Pg15) provides not only **our recommendation** in respect of the immediate procurement need, but also the headline **opportunities** as well as **headline risks** associated with our decision making.

Procurement Timelines

Below is a summary of the timeline in respect of fleet procurement, explained more fully within the report, in the lead up to the 2030 and 2035 carbon commitment milestones, offered in sympathy with fiscal challenges (hence the phased approach), evolving technologies (including alternative fuels) and DeFRAs mandate in respect of Food Waste collections, also conscious of the unknown impact of the Environment Bill.

23/24 – Rebody of existing RCV (collection) fleet (using alternative diesel), Bin Delivery vehicle, Bulky Waste vehicle, Clinical Waste vehicle (EV), dedicated Food Waste (EV) fleet as moving away from Food Pods on Refuse vehicles, Supervisory fleet (EV) and Workshop vehicle for mobile on-site support (EV) and Telehandler
25/26 – Street Cleansing Fleet (EV) and large Mechanical Sweeper (EV)
28/29 – RCV collection fleet (based on Hydrogen valuations), Bin Delivery vehicle (EV/HV) and Bulky Waste vehicle (EV/HV), small/large Mechanical Sweeper (EV/HV) and Telehandler (EV/HV)

The above is based on Option 1 contained within the enclosed Appendix with fuller explanation contained within the narrative under "Bridging the Gap" **Page11.**

Background

The council fleet provides vehicles for specific job functions such as Refuse and Recycling collections, Garden Waste Collections, Trade Waste Collections, Clinical Waste Collections, Street Cleansing, Bulky Item Collections, Fly Tipping, and Workshop Maintenance. This report considers the replacement strategy for the collections fleet.

The current fleet is primarily fueled with diesel. Lewes District Council's **climate change and sustainability strategy** seeks to ensure that the council is **net zero carbon and fully climate resilient by 2030.**

The council's RCV fleet is currently 74% owned by the council, with **26% of the fleet hired** replacing fleet that was either **Beyond Economical Repair (BER) or written off** further to complete vehicle malfunction.

New vehicle technologies are rapidly developing primarily in the form of electric powered vehicles. Hydrogen cell fueled vehicles are now available but limited at present by hydrogen production and the infrastructure that is required to supply it.

In the context of limited resources and emerging technologies which may be effective but often initially expensive, the route to decarbonisation of the council fleet is a significant challenge.

A further challenge is the requirement for new clean fuel infrastructures and working with the partner organisations will be central to ensuring that the council fleet is ready to take advantage of new technologies.

Current Collections Fleet

Current Refuse Fleet

The Refuse fleet consists of 11 vehicles and it is primarily HGV that fall under the remit of the Traffic Commissioner requiring O licences. The service schedules are every 6 weeks, and it is the **most expensive fleet to maintain** within the council, due to the workload on the vehicles each working approx. 7hours daily, Monday to Friday plus additional days on Bank Holiday catch ups. Most of the vehicles in this fleet are 9 years old, and the expected lifespan of a refuse vehicle is 10 years, therefore several vehicles in the fleet will not be roadworthy to pass annual tests in 2024.

Crew	Service	Vehicle Reg	Reg Date	Age (Years)	Size	Owned
Crew 1	Refuse	VX13 LNJ	27/03/2013	9	26t	Yes
Crew 2	Refuse	VX13 LNO	02/04/2013	9	26t	Yes
Crew 3	Refuse	VX13 LNN	27/03/2013	9	26t	Yes
Crew 4	Refuse	VX13 LNP	02/04/2013	9	26t	Yes
Crew 5	Refuse	VX13 LNK	26/03/2013	9	26t	Yes
Crew 6	Refuse	VX13 LNH	27/03/2013	9	26t	Yes
Crew 7	Refuse	VX13 LNG	26/03/2013	9	26t	Yes
Crew 8 Narrow	Refuse	DX16 ANR	20/05/2016	6	15t	Yes
Crew 9 Narrow	Refuse	CE64 NTM	20/10/2014	7	7.5t	Yes
Service Spare 1	Refuse	VX13 LNF	26/03/2013	9	26t	Yes
Service Spare 2	Refuse	VX13 LNM	27/03/2013	9	26t	Yes

26t Refuse Truck with Food Pod

Current Recycle Fleet

The Recycle fleet consists of 8 vehicles and are all HGV that fall under the remit of the Traffic Commissioner requiring O licences. The service schedules are every 6 weeks. The average age of the owned Recycle fleet is 6 years. **6 of the 8 vehicles are currently hired** on this service. As with the refuse fleet the older vehicles **will not be roadworthy to pass annual tests in 2024**.

Crew	Service	Vehicle Reg	Reg Date	Age (Years)	Size	Owned
Crew 1	Recycle	KU69 AOO	01/12/2019	2	26t	Hire
Crew 2	Recycle	SF63 UJA	10/09/2013	8	26t	Hire
Crew 3	Recycle	SF63 UJM	26/09/2013	8	26t	Hire
Crew 4	Recycle	VX18 KFC	01/03/2018	4	26t	Hire
Crew 5	Recycle	CN70 UXO	01/09/2020	1	26t	Hire
Crew 6 Narrow	Recycle	CA67 LJL	01/02/2018	4	7.5t	Yes
Crew 7 Narrow	Recycle	RV18 RYY	31/05/2018	4	15t	Yes
Service Spare 1	Recycle	VU06 KLC	23/03/2006	16	26t	Yes

26t Recycle Truck

Current Garden Fleet

The Garden fleet consists of 3 vehicles and are all HGV that fall under the remit of the Traffic Commissioner requiring O Licences. As with the Refuse and Recycle Fleet, servicing schedules are every 6 weeks. The average age of the Garden fleet is 7 years, however this is due to 1 vehicle being 14 years old.

Crew	Service	Vehicle Reg	Reg Date	Age (Years)	Size	Owned
Garden 1	Garden	VX18 KLM	24/04/2018	4	26t	Yes
Garden 2	Garden	VX18 KKF	19/03/2018	4	26t	Yes
Garden 3	Garden	V008 RVZ	12/03/2008	14	26t	Yes

Current Trade Collection Fleet

The Trade Collection fleet consists of 1 vehicle, an HGV that falls under the remit of the Traffic Commissioner requiring an O Licence. As with the Refuse and Recycle Fleet, servicing schedules are every 6 weeks. The age of the Trade Collection vehicles 4 years.

Crew	Service	Vehicle Reg	Reg Date	Age (Years)	Size	Owned
Crew 1	Trade	VX18 KKG	19/03/2018	4	26t	Yes

26t Garden Waste Truck

Fleet Options

Electric Vehicle (EV) Option

It is expected that **new battery prices will fall 60% by 2030** (compared to 2020), rapidly reducing electric vehicle costs. The use of dedicated manufacturing platforms for battery electric vehicles will allow vehicle manufacturers to reduce costs by up to 25% thanks to simpler assembly, the use of standard battery packs, and the savings from producing higher volumes of various BEV models on the same chassis.

100% of Lewes District Council's HGVs are diesel-powered. For Lewes District Council to switch to electric, batteries will need to deliver the equivalent range and payload capacity of a conventional RCV. Even if battery developers make these evolutionary breakthroughs, it will also require installation of large DC charging points at the depot, potentially requiring a large capital investment (substation installed and power lines may have to be run) as the current infrastructure at the depot will not allow for DC charging.

The current EV RCV's have a stated range of 90 miles from the manufacturer, however this is an empty vehicle with a speed limit of 37mph maximum and **a price tag of £450,000**, twice the cost of a regular Diesel RCV. Once you start loading and going up hills the range decreases significantly. A full RCV would be unable to drive to the outskirts of Haywards Heath load 600 properties, drive back down to the tip and return to collect the other 400 properties, return tip and back to depot on one charge.

These EV RCV's are suitable for City Councils and small Boroughs, as the technology in the batteries does not currently exist for larger Districts to use confidently. Many in the industry predict that electric vehicles are part of the transition to hydrogen and not a long-term transport solution in their own right.

The smaller fleet at Lewes mainly streets collection vehicles and the separate food collection vehicles are suitable for the EV model, as range and charging capacity is not as restrictive as it is on the HGV fleet. It is recommended to switch the streets fleet over in 2024/25 to fully electric once the depot has been modified. In the interim it is recommended that we switch the food waste vehicles to fully electric in 2023/24, there are already two charging points at the depot, and to increase this to allow for the food waste fleet vehicles can be installed from the existing electric supply into the depot.

Hydrogen Vehicle Option

In January 2021 Europe's truck-makers agreed to work together to help create the right conditions for the mass-market roll-out of hydrogen trucks. Iveco, Daimler, and Volvo have joined forces with energy companies Shell and OMV to form H2Accelerate. They say hydrogen will be an essential fuel for the complete decarbonisation of the truck sector.

Julian Critchlow, director general for Energy Transformation and Clean Growth at the Department for Business Energy and Industrial Strategy (BEIS), told MPs on the Environmental Audit Committee in 2020, that the Government sees hydrogen "having a big role" in transport, especially for heavier vehicles. He highlighted the £23 million programme with the Office for Zero Emission Vehicles, which is looking at funding vehicles and refuelling stations, and the ultra-low emission bus scheme for hydrogen buses, along with the Prime Minister's commitment for 4,000 new zero-emission buses. "Upgrading fleet and refuelling infrastructure to adopt hydrogen or battery electric technology will be very expensive and the Government needs to help operators absorb that cost burden," he said.

Daimler Truck AG revealed its fuel-cell concept truck Mercedes-Benz GenH2 Truck in September 2020. It plans to begin customer trials in 2023, with series production to start in the second half of the decade. In November 2020, the Volvo Group and Daimler Truck AG signed a binding agreement for a joint venture to develop, produce and commercialise fuel-cell systems. The latest unit price we have for a Hydrogen powered dustcart is £650,000.

Aberdeen city council has unveiled the first hydrogen fuel cell refuse collection vehicle (RCV) to be put into operation in the UK in February 2022. The RCV will run on hydrogen created by hydrolysis at Aberdeen's two refuelling stations and was due to begin collecting waste from around the city from early March. Manufactured and supplied to Aberdeen via European waste vehicle manufacturer Geesinknorba at an undisclosed cost, the RCV is one of seven which will be deployed across seven pilot sites in northwest Europe, including the Netherlands, France, Belgium, and Germany. The council says the RCV's proposed route in Aberdeen will result in an estimated saving of more than 25kg of CO2 equivalents per litre when compared to a diesel truck.

Interreg North-West Europe, a programme funded by the European Commission which aims to make North-West Europe a "key economic player" and an "attractive place to work and live", has part-funded Aberdeen's purchase of the vehicle. The programme has provided funding for the seven RCVs across Europe as part of its Hydrogen Waste Collection Vehicles in North-West Europe (HECTOR) project. Each RCV will be tested in a range of environments, from rural areas to city centres, in an attempt to demonstrate that hydrogen waste trucks are "effective" at reducing emissions from road transport whilst also capable of covering the daily road-mile range.

With the local plan for a Hydrogen facility in Newhaven, once the infrastructure is in place (2024-25) a Hydrogen powered fleet for Lewes would be a viable solution assuming hydrogen vehicle costs reduce significantly.

Diesel Vehicle Alternative Fuel HVO Option

Hydrotreated Vegetable Oil (HVO) is a biofuel made by the hydrocracking or hydrogenation of vegetable oil. Hydrocracking breaks big molecules into smaller ones using hydrogen while hydrogenation adds hydrogen to molecules. These methods can be used to create substitutes for gasoline, diesel, propane, kerosene and other chemical feedstock. Diesel fuel created by Hydrotreating is called green diesel and is distinct from the biodiesel made through esterification.

HVO Fuel suppliers claim that powering your engines and vehicles with HVO fuel reduces greenhouse gas emissions by as much as 90%, NOx emissions by as much as 27% and Particle Matter emissions by as much as 84%, compared with conventional diesel, all of which are key components in achieving improved air quality. Because HVO fuel is a stable product, it doesn't react with water so is less susceptible to bacterial attack than biodiesel. This enables it to have a shelf life of up to 10 years as opposed to around 1 year for mineral diesel, as long as tank cleanliness procedures are maintained throughout storage.

Biodiesel and diesel producers face stability issues with fuel due to legislative increases in FAME content. Regular biodiesel (FAME) is made up of fatty acid methyl esters with varying degrees of saturation which are susceptible to oxidation which can cause logistical problems such as clogged filters. That's because FAME attracts water and increases diesel bug attack over time, meaning these fuels must be closely monitored to avoid equipment and machinery breakages. HVO fuel however is produced to remove unsaturation and contaminants, leading a pure hydrocarbon fuel. The main disadvantage of HVO fuel is its price. Compared to Diesel **its cost is 57% higher per litre (ref Pg10)**. Fuel consumption is on a par with regular diesel.

We have been in conversation with Horsham District Council, who are using HVO for all their Diesel fleet, and have had no issues with vehicles since switching (and have the same fuel supplier as ourselves). They did point out that Dennis Eagle vehicles did suffer with seals leaking on fuel pumps which we have taken into consideration when vetting Supply Chain options should councillors want us to pursue the HVO option.

Fuel Costs

The table below indicates the costs of the various fuel options available to Lewes District Council. Although EV appears to be the lowest cost for an RCV, there would be a need to purchase an additional 4 vehicles to ensure a charged vehicle was available at the depot to continue to collect from the extremes of the District. To date there are only 2 hydrogen RCV's in the UK and no fuel data is available currently for hydrogen.

EV	Distance per KWh in Miles	Cost per KWh	KWh per mile	Cost Per Mile
RCV	0.62	£0.28	2.41	£0.67
Van	3.5	£0.28	0.29	£0.08

Diesel	Distance per litre in Miles	Cost per litre	litres per mile	Cost Per Mile
RCV	0.62	£1.36	0.811	£1.10
Van	3.87	£1.36	0.26	£0.35

HVO	Distance per litre in Miles	Cost per litre	litres per mile	Cost Per Mile
RCV	0.62	£1.85	0.811	£1.50
Van	3.87	£1.85	0.26	£0.48

Hydrogen	Distance per kg in Miles	Cost per kg	kg per mile	Cost Per Mile
RCV	0	£0.00	0	£0.00
Van	0	£0.00	0	£0.00

Bridging the Gap – In order of our recommendation

As the Current Lewes HGV Collection fleet is **past its economical best**, there is **an urgent requirement to replace it**.

The EV Battery technology does not currently exist for it to be a viable option for the Lewes HGV fleet, due to a range of issues, cost, and infrastructure at the Robinson Road Depot.

Hydrogen fuelled vehicle infrastructure and price are prohibitive factors at this time, however it appears this is the most viable option from circa 2027/28. This leaves us with two fuel sources HVO or Diesel and three options to acquire vehicles to bridge the gap shown below. LDC is **undertaking trials of new fleet specifications** as a matter of course as part of our due diligence in advance of procuring the optimum solution in line with the prescribed 10year timeline, where we have full use of the vehicle for a minimum of one week, thereby **ensuring all staff have a first-hand opportunity to work with these vehicles** on collection rounds across the District.

Whilst these options are solely related to **collection vehicles** (due to them being the greatest capital cost consideration and not as advanced in the marketplace in respect of alternative fuel types), all other fleet requirements are included in the (capital/fuel/carbon) "Figures" section and associated tables further down, namely: **Food Waste, Street Cleansing (including Mechanical Sweepers), Bulky Waste collections, Clinical collections, Bin Deliveries, Workshop vehicle, Supervisory vehicles and Telehandler.**

Bridging the Gap Options

Option 1 - Reuse of existing fleet – "Preferred"

For some of the current Lewes HGV collection fleet, the chassis could be cleaned up and re-bodied offering a cheap solution to extend the life of the vehicle for 5 years to 2028/29. We estimate that possibly 6-10 of the 19 required can be re-used. For those of the fleet where this is not viable the purchase of used chassis and re-bodied is also a cheaper option than new. The estimated cost per vehicle of doing this is **£100,000** for the chassis we keep and **£120,000** to include the cost of a second-hand chassis (from auction). This is the cheapest capital expense option, and the preferred option for the officers.

Option 2 - Brand New Fleet

The second option we have is to replace the existing fleet with a brand-new fleet and depreciate this over 6 years instead of 10 in order to move to ZERO tailpipe emissions before 2030. This is a more expensive option than the Reuse/Re-Body option above, although there is potential for a residual value in 2029 after the 6 years are up – however, this is high risk as such is not guaranteed as we cannot predict the marketplace for diesel engines in 2029. There is also the option that hydrogen chassis conversions will be available by 2029 and we can convert the new diesel chassis to hydrogen. The cost of a brand-new Diesel vehicle currently stands at **£195,000** per vehicle.

Option 3 - Leased Fleet

The third option is to lease a fleet until 2029, eliminating the need for capital outlay. We have received quotes for this option. The cost per vehicle is £3,688 per month. The cost for this option is **£265,000** per vehicle for the 72 months (vs £100,000/£120,000 for the rebodied option, plus HVO), making this option the most expensive.

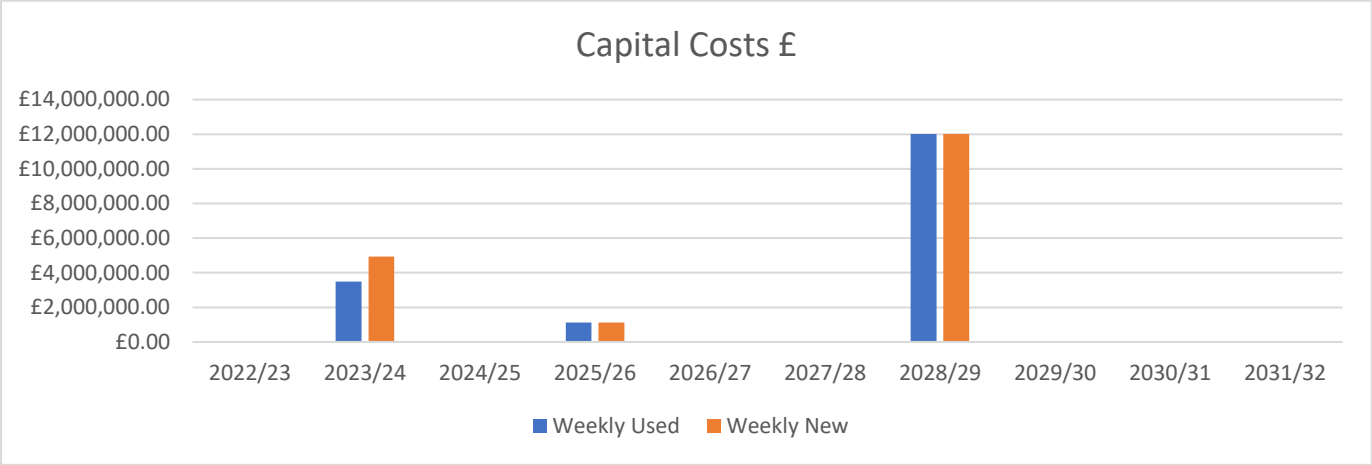
Any one of these options will "Bridge the Gap" allowing time for the new depot development (including the determined alternative fuel station infrastructure) and for new secondary legislation arising from the Environment Act and how that will shape collections for the next ten years. It will also allow the Newhaven hydrogen hub to become established from where we could potentially source our daily fuel stock requirements, and Lewes District Council to assess the ULE vehicle market further to ensure the vehicle selections are fit for the purpose of collecting waste with very little emissions.

Figures

Capital Costs

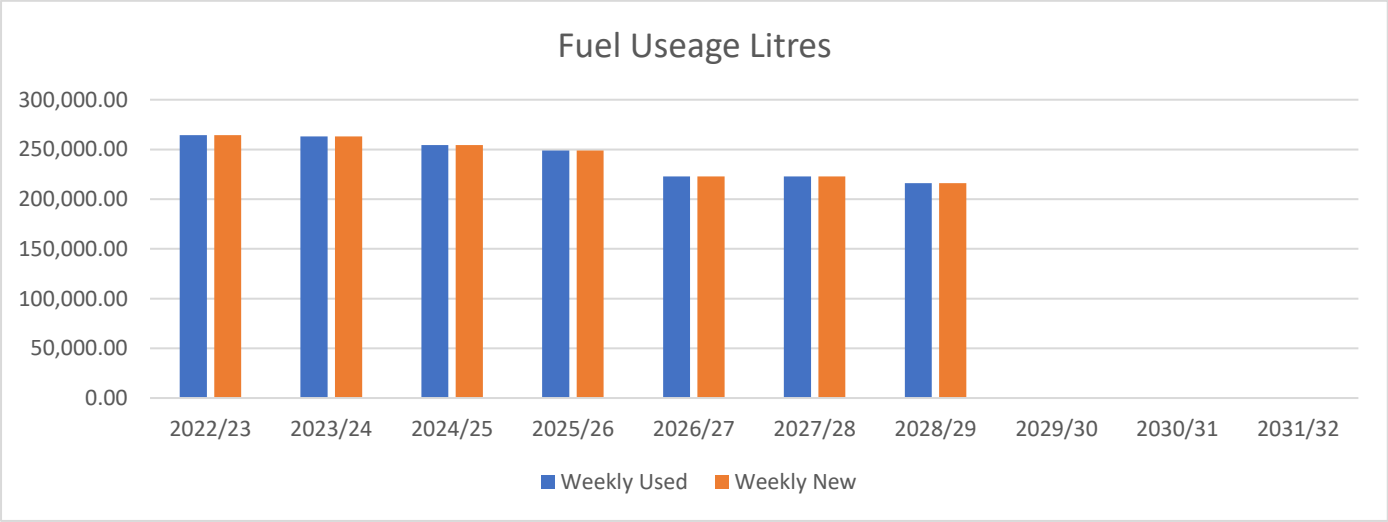
The tables and charts below detail the capital costs Lewes District Council will need to make available, dependant on the collection and Gap option selected.

The capital cost figures are based on quotes from suppliers see Appendix 2a and Appendix 2b for full breakdown of costs per year



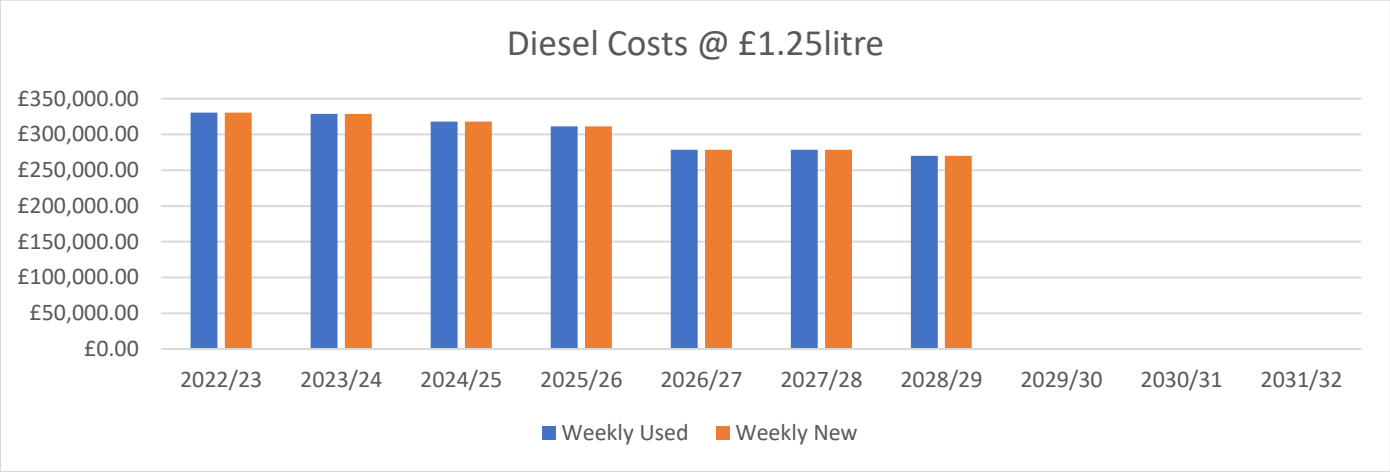
Predicted Fuel Usage

The table and chart below detail the predicted fuel usage in litres for the next 10 years. The figures are based on 2021 consumption by round, for full details see Appendix 2c



Predicted Fuel Costs Diesel

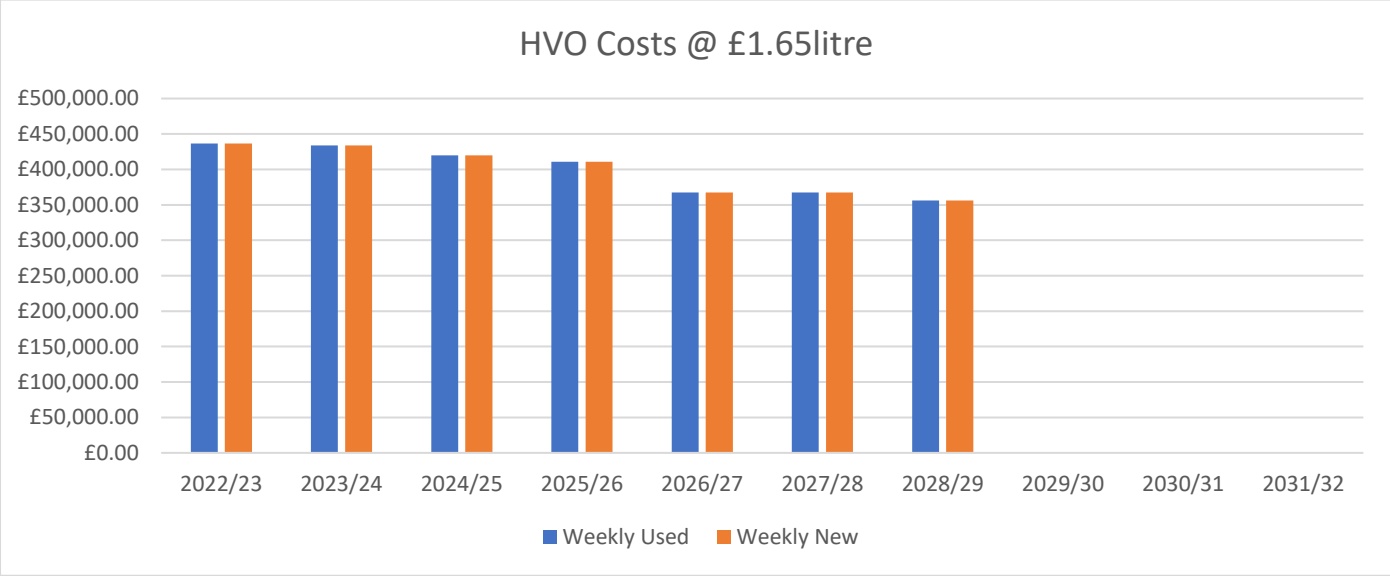
The table and chart below detail the predicted fuel costs for the next 10 years. The figures are based on 2021 consumption and a unit price of £1.25 per litre by round, see Appendix 2d for full breakdown.



Predicted Fuel Costs HVO

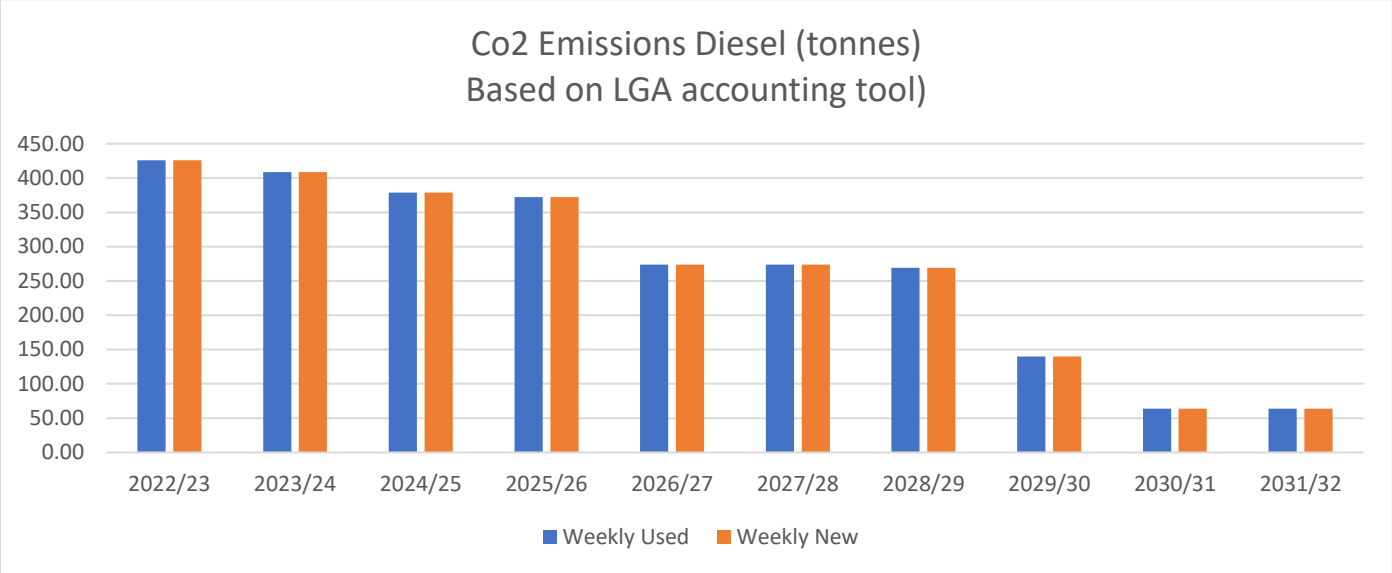
The table and chart below detail the predicted fuel costs should HVO be used instead of regular diesel for the next 10 years.

The figures are based on 2021 consumption and a unit price of £1.65 per litre by round, see Appendix 2e for full breakdown.



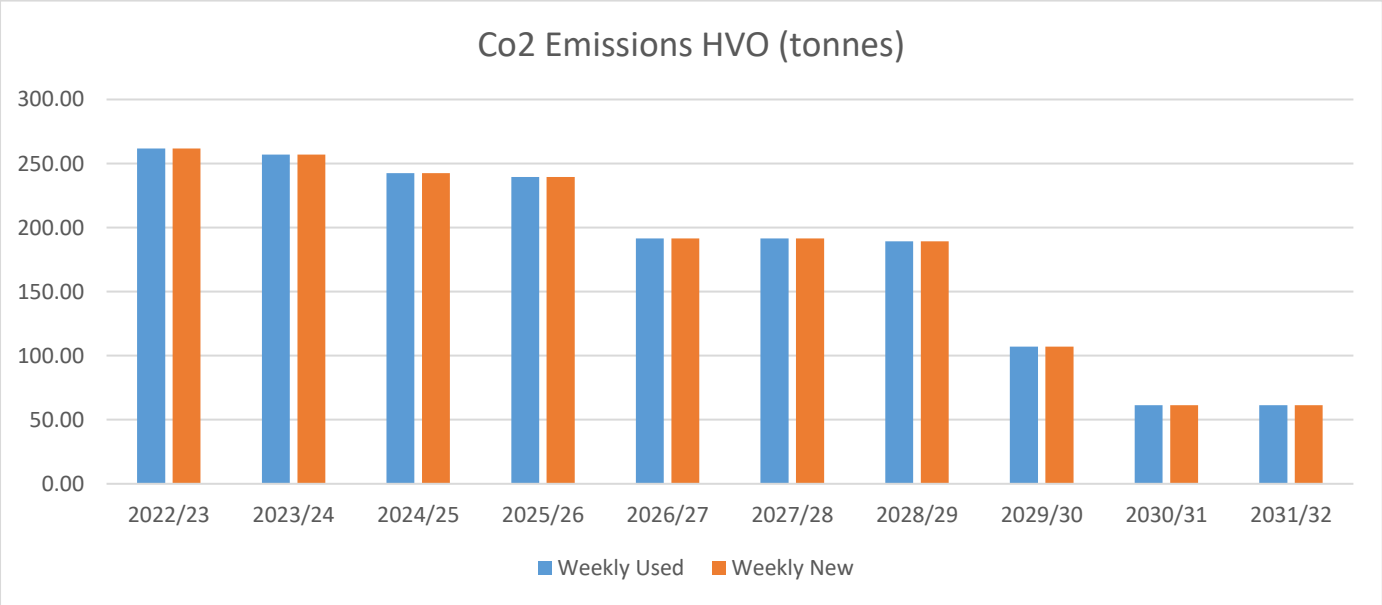
Predicted Carbon Emissions Diesel

The table and chart below detail the predicted carbon emissions based on diesel fuel emissions for the next 10 years. The figures are based on 2021 consumption and conversion figures of 1.239 per mile for diesel and 0.276 (Data compiled from LGA carbon accounting tool) for Electric, see Appendix 2f for full breakdown.



Predicted Carbon Emissions HVO

The table and chart below detail the predicted carbon emissions based on HVO fuel emissions for the next 10 years. The figures are based on 2021 consumption and conversion figures of 0.7434 per mile for HVO and 0.276 for Electric (Data compiled from LGA carbon accounting tool), see Appendix 2g for full breakdown.



Recommendation

We propose a hybrid of Diesel/HVO and EV Fleet for the fleet replacement plan for the 2022/23 to 2028/29 service period (ref Bridging the Gap Options above) and as new technologies and alternative fuel options such as Hydrogen and Electric become economically viable as well as the provision of a depot infrastructure that can support our fleet, then we will switch out before 2030 to this technology to help achieve the council's target of Net Zero by 2030.

Procurement Timeline by Vehicle Type and Year

- 23/24 – Rebody of existing RCV collection fleet (using alternative diesel), Bin Delivery vehicle, Bulky Waste vehicle, Clinical Waste vehicle (EV), dedicated Food Waste (EV) fleet as moving away from Food Pods on Refuse vehicles, Supervisor fleet (EV) and Workshop vehicle for mobile on-site support (EV) and Telehandler
- 25/26 – Street Cleansing Fleet (EV) and large Mechanical Sweeper (EV)
- 28/29 RCV collection fleet (based on Hydrogen valuations), Bin Delivery vehicle (EV/HV) and Bulky Waste vehicle (EV/HV), small/large Mechanical Sweeper (EV/HV) and Telehandler (EV/HV)

What's in ours/members control

- Right interim fleet choices in advance of the net zero 2030 milestone
- Best use of council monies over the above timeline against the Recover and Reset background
- Design of the depot though noting this is subject to fleet choices based on infrastructure

What's NOT ours/members control

- Technological developments to meet our service needs and targets – marketplace dependent
- Depot infrastructure, namely whether a Hydrogen Hub and/or UKPN electric supply
- Future costs of ULE fleet and costs of alternative fuels
- Global shortage of microchip (i.e., the brain of the engine)

Headline Opportunities

- Supporting LDCs net zero 2030 ambition
- Enhanced fleet will further optimise waste collections
- Having a dedicated Food Waste that will optimise participation
- All the above will support the councils Waste Reduction Strategy
- New fleet will positively impact on morale
- An enhanced depot will also positively impact on morale

Headline Risks

- **TIME** -
  - delays in the decision-making process at Cabinet level
  - delays in the above impacting on speed of executing tender process
  - delays in the above impacting on placing our orders

- Missing "slots" on the successful supplier(s) fleet production line
- Supply of alternative fuels (HVO) against the ongoing conflict in Ukraine
- Running existing fleet beyond April 2023 – this is NOT an option!
- Cost limitations to ULE EV/HV fleet and to alternative fuel (HVO)
- Cost limitations to alternative fuel (HVO)
- Viability of EV Infrastructure at Robinson Road Depot
- Viability of Hydrogen supply via Newhaven Hub or skid at Robinson Road Depot
- Covid (or similar) if the world stops ….. again!