Fire and Rescue Scrutiny Committee	
Report Title:	**Gloucestershire Fire and Rescue Service Fleet Carbon Reduction Plan**
Meeting Date:	27.05.22
Chair:	Cllr Jeremy Hilton
Presenting Officer:	Mark Preece – Chief Fire Officer Gloucestershire County Council Support from John Townsend – Corporate Fleet Unit Manager for Gloucestershire County Council
Purpose of Report:	To consider the proposed Gloucestershire Fire and Rescue Service fleet carbon reduction plan
Planned Dates	
Background documents:	Vehicle Asset Management Plan
Appendices	Appendix 1 – Vehicles aged stats Appendix 2 – euro 1 to 6 ratings
Recommendations	To…….. *note the report*

Gloucestershire Fire and Rescue Service Fleet Carbon Reduction Plan

1. Background

1.1. Gloucestershire Fire and Rescue Service (GFRS) currently runs a fleet of 128 vehicles, of which 74 are under 3.5 tonnes in weight. There are 54 heavy goods vehicles over 3.5 tonnes. These vehicles are a mixture of type and specialisms that are used for specific requirements for GFRS.

1.2. Many vehicles are now quite old and are therefore more polluting than more modern Vehicles. Gloucestershire Fire and Rescue service has bid for and has been successful in securing capital funding to drive the vehicle replacement programme forward. This provides a perfect opportunity to positively impact carbon reduction in Gloucestershire.

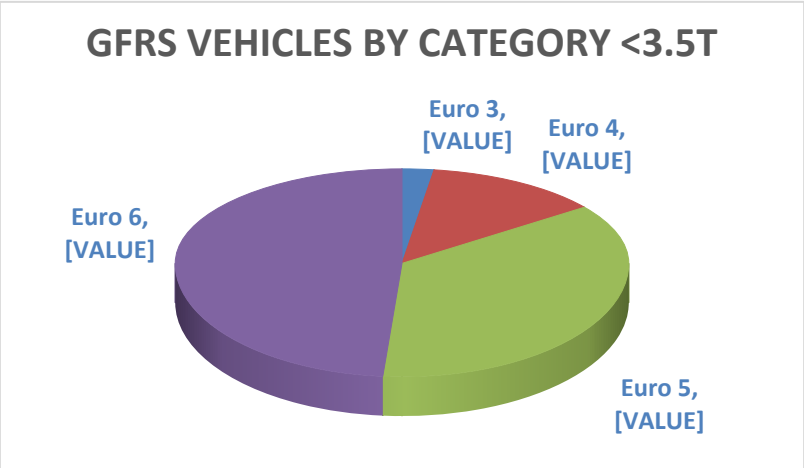
1.3. In order to target the most effective use of this capital, and as part of a wider GCC carbon reduction plan, GFRS plans to replace older sections of the light vehicle fleet using battery electric vehicles as far as practicably possible. Critical to this is the installation of charging infrastructure to allow deployment of these new vehicles.

1.4. In parallel to this, capital funding agreed for vehicles over 3.5 tonnes will allow replacement of vehicles, often at Euro 3 standard, with Euro 6 standards and above (see appendix 1 for Euro category definition). The emerging electric vehicle marketplace for this is under constant review, and any way that hybrid electric or full electric vehicles can be used, will be considered as appropriate.

2. Current Status

Light Vehicle Fleet

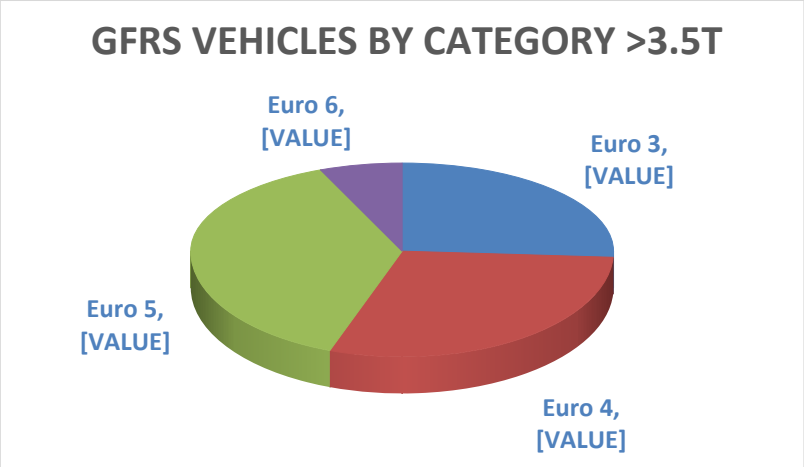
2.1. Of the current light vehicle fleet the numbers and categories of euro standards are shown in the graph below:



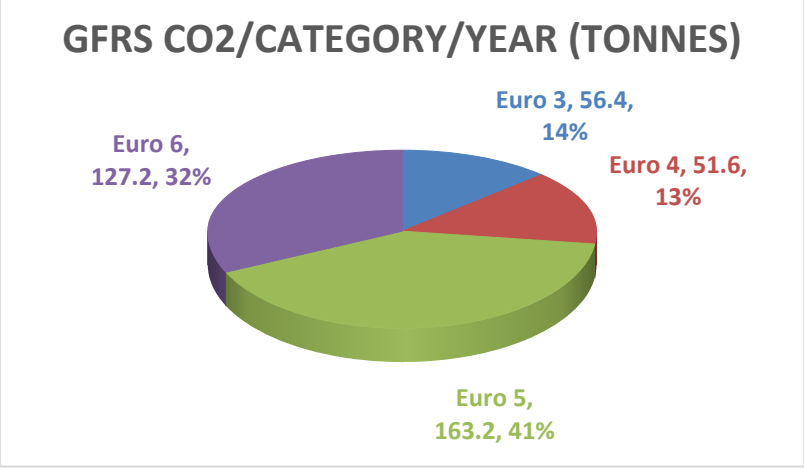
2.2. The number of vehicles at EURO 6 category has been influenced by the introduction of 18 officers' vehicles in 2021. Other than this there are a significant number of vehicles at, or below EURO 5 standard, and it is these that will be the focus of immediate replacement: ideally by electric vehicles as far as possible.

Heavy Vehicle Fleet

2.3. Of the 54 vehicles in the heavy vehicle category, the picture is worse, with over half the vehicles being Euro 3 or Euro 4. As above, the successful bid for capital funding has created the ability to drive the replacement of these as soon as is practically possible.



2.4. In terms of CO2 emissions across the whole fleet, the relative output is described in the graph below:



2.5. As can be seen from the above, well over half of the emissions come from the earlier vehicles. In the following paragraphs it outlines the approach to reducing this carbon footprint through the vehicle replacement programme.

3. Capital Funding Bid

3.1. Gloucestershire Fire and Rescue service has been successful in bidding for capital funds to the tune of c.£6.1m to be allocated over the next two years.

3.2. Of this, £1.15m is apportioned to light vehicles, with a further £4.8m being allocated for fire appliances and specialist heavy vehicles.

3.3. The vehicle replacement plan has been evaluated and the immediate next steps are being actioned:

4. Light Vehicle Fleet

Cars

4.1. Ten Vauxhall Corsa cars have been identified for immediate replacement. The critical dependency is installing the charging points for their replacements; however, the assumption is that all these will be replaced by Electric Vehicles (e.g. Nissan Leaf). This alone would save 12 tonnes of CO2 per year. In addition, a further six new vehicles will be purchased for the Business Fire Safety team; this would create a further 7.2 tonnes saving against equivalent ICE vehicles.

Light Vans

4.2. There are seven light vans that have been identified for replacement under the capital bid. As above, subject to charging points, their addition would reduce the annual CO2 emissions by a further 9 tonnes. A further four small vans have been identified for purchase, so again these would create a further offset of c.6 tonnes against ICE equivalents.

Large Vans

4.3. Four vehicles have been identified under the replacement plan (1 Euro 3 and 3 Euro 4 categories), all are being replaced by modern Euro 6 vehicles.

4x4 Pick up

4.4. Six vehicles (1 Euro 3 and 5 Euro 4) will be replaced with Euro 6 replacements

4x4

4.5. Eight ageing Land Rovers will be replaced by modern mild-hybrid vehicles (e.g. Volvo XC60), replacing Euro 4 and Euro 5 vehicles with modern Euro 6 equivalents.

5. LGV Fleet

Pumping Appliances

5.1. An initial ten front line appliances have been selected for replacement, including Euro 4 (5 off) and Euro 5 (3 off) category vehicles. The specification is under way and the order will be placed in the next quarter.

5.2. EV pumping appliances are a new concept that has been developed by a couple of suppliers. These vehicles although a good idea, are very expensive and a high infrastructure upgrade at stations would be required. These vehicles work off a Hybrid solution with a diesel engine back up to the electric battery. This is something to consider in the future as the price and technology improves.

Special Vehicles

5.3. Three Special vehicles are now going through the specification and procurement process (2 ALP and 1 Multi-role vehicle).

5.4. The summary table below shows the likely outcome of the initial tranche of vehicle replacements:

	Current Vehicles by Classification						
Vehicle type	Euro 3	Euro 4	Euro 5	Euro 6	Replacemt. No.	Replacemt. Type	Annual CO2 saving (tonnes)
Cars			10		10	EV	12
Cars (Projected)				6	6	EV	7.2
Vans Light		1	6		7	EV	9
Vans Light (projected)				4	4	EV	6
Vans Large	1	3			4	Euro 6	TBA
Pickup 4x4	1	5			6	Euro 6	TBA
4x4	1	2	5		8	Euro 6	TBA
Pumping Appliance		5	3	2	10	Euro 6	TBA
Specials	3				3	Euro 6	TBA

Projected against EV

6. Carbon Offset Opportunities

6.1. Whilst a number of the larger vehicles will need to be ordered as Euro 6 ICE vehicles, it is recognised that technology will continue to evolve, allowing subsequent replacements using Ultra Low Emission Vehicles (ULEVs) into the larger vehicle classes.

HVO

6.2. In the meantime, GCC has started to evaluate the use of carbon offsetting and greener fuels, such as Hydro Treated Vegetable Oil (HVO), which is entirely suitable for Euro 6 model vehicles.

6.3. HVO is a low carbon, low emission, fossil-free and sustainable alternative to conventional fossil diesel. It is fully interchangeable with conventional diesel, and can be mixed at any percentage, cutting CO2 emissions by up to 90%.

6.4. As this fuel can only be ordered off the normal supply grid, a project has been set up to evaluate the storage at a specific site as a trial. The nature of the site will depend on the use of only Euro 6 classification vehicles, so will rely on the vehicle replacement programme to some extent.

Off Setting

6.5. GFRS and GCC use the All Star fuel cards to fuel GCC vehicles, many card providers allow you to sign up to a tree planting off setting scheme such as ecopoint by the fuel card company and Greenprint. This is based on the more litres you use the more trees are planted and this offsets the fuel use. This will be pursued in 2022 for GCC to sign up to a scheme.

Hydrogen

6.6. Working in collaboration with other Fire and Rescue services, GCC and GFRS are looking at Hydrogen technology as a potential alternative to fossil fuels or EV, this technology being a possible good solution to the larger vehicles.

Solar

6.7. Solar supplementary panels fitted to vehicles is a concept currently being trailed within GFRS through Trailar. One of the Wholetime station vehicles has been fitted with a Solar panel to the roof of the vehicle.

6.8. This is a proven technology to reduce capacity on the alternator of the vehicle, reduce fuel and increase battery life. The Fire vehicles are on a constant charge at stations, and this will hopefully also reduce the mains supply power through Solar back up.

Solar production example

Location

6.9. Vehicle siting is also important, vehicles currently centralised in their location can then increase mileage due to locations that are too far away to maximise efficiency and utilisation of the vehicles. Spreading pool car use as an example around the county makes it easier and more efficient in their use. Likewise having vehicles that can cover different operational aspects could maximise use.

Idling

6.10. Anti-idling policy and training is an area that is underutilised for simple carbon reduction. A new policy across GCC including GFRS will be introduced to educate drivers on vehicles.

7. Future Replacement Policy

7.1. As the availability of a mature EV charging infrastructure evolves, consideration can be given to an increasing range of vehicles. Large utility vehicles are coming onto the market (for example, Refuse Vehicles, Road Cleaning Vehicles, and Buses), however, besides being extremely expensive, these will require Ultra Rapid Charging capability (almost certainly DC based), which, in itself, will necessitate the need for upgraded electrical infrastructure by the council. Having said this, there is no reason why future Fire Appliances should not be EVs. The evaluation of the everchanging market in terms of alternative powered vehicles should be reviewed each year.

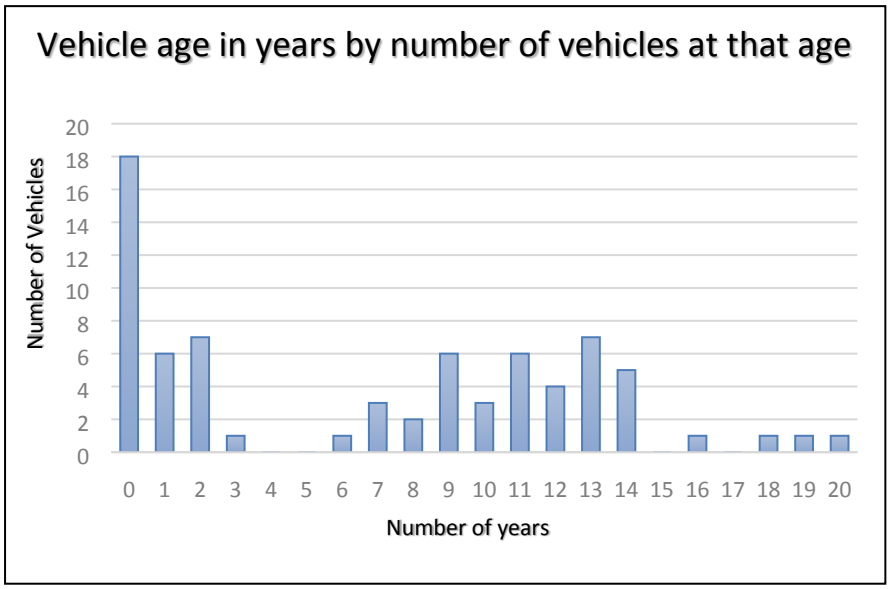
7.2. All vehicles have a life cycle identified as to when they should be replaced, with this information part of the GCC Vehicle asset management plan.

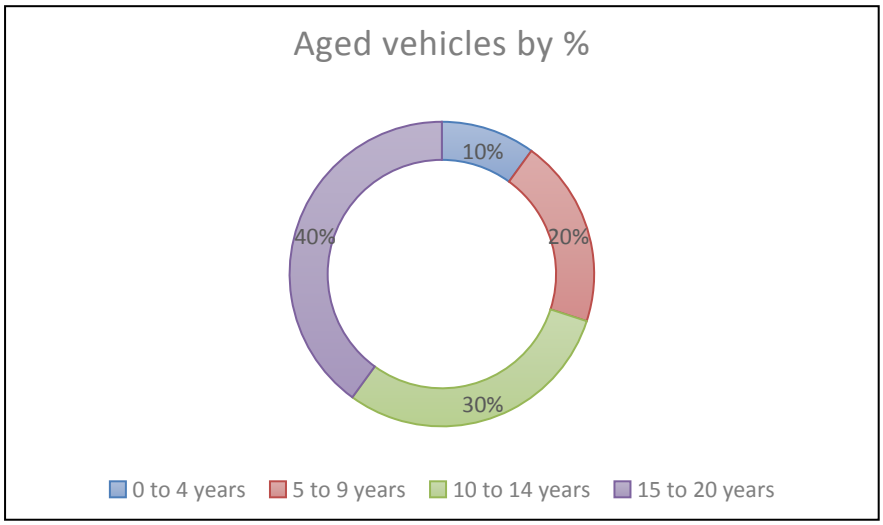
7.3. GFRS vehicles are overdue many replacements with vehicles being old and therefor more polluting. (see appendix 1 aged fleet stats) Further business cases will be created with subsequent bids submitted to fulfil an ongoing replacement program.

7.4. The GFRS carbon reduction plan will feed into the wider GCC Carbon reduction plan.

Appendix 1

Aged Vehicle Stats





Appendix 2

Euro 1 to 6 ratings

Since 1992, European Union regulations have been imposed on new vehicles, with the aim of improving air quality - meaning a vehicle has to meet a certain Euro emissions standard when it is made.

What are the European 'Euro' emissions standards?

Although emissions regulations date back to 1970, the first EU-wide standard – known as Euro 1 – wasn't introduced until 1992, which saw catalytic converters became compulsory on new cars, effectively standardising fuel injection.

Since then, there have been a series of Euro emissions standards, leading to the current Euro 6, introduced in September 2014 for new type approvals and rolled out for the majority of vehicle sales and registrations in September 2015.

The aim of Euro emissions standards is to reduce the levels of harmful exhaust emissions, chiefly:

- Nitrogen oxides (NOx)
- Carbon monoxide (CO)
- Hydrocarbons (HC)
- Particulate matter (PM)

These standards are having a positive effect, with the SMMT (Society of Motor Manufacturers and Traders), claiming: "It would take 50 new cars today to produce the same amount of pollutant emissions as one vehicle built in the 1970s."

In 2017, the SMMT quoted the following figures in support:

- Carbon monoxide (CO): petrol down 63%, diesel down 82% since 1993
- Hydrocarbons (HC): petrol down 50% since 2001
- Nitrogen oxide (NOx): down 84% since 2001
- Particulate matter (PM): diesel down 96% since 1993

Because petrol and diesel engines produce different types of emissions they are subject to different standards. Diesel, for example, produces more particulate matter – or soot – leading to the introduction of diesel particulate filters (DPFs).

Euro 6

The sixth and current incarnation of the Euro emissions standard was introduced on most new registrations in September 2015. For diesels

A focus on diesel NOx was the direct result of studies connecting these emissions with respiratory problems.

To meet the new targets, some manufactures have introduced Selective Catalytic Reduction (SCR), in which a liquid-reductant agent (**Adblu**) is injected through a catalyst into the exhaust of a diesel vehicle. A chemical reaction converts the nitrogen oxide into harmless water and nitrogen, which are expelled through the exhaust pipe.

The alternative method of meeting Euro 6 standards is Exhaust Gas Recirculation (EGR). A portion of the exhaust gas is mixed with intake air to lower the burning temperature. The vehicle's ECU controls the EGR in accordance with the engine load or speed.

Euro 5

Euro 5 was the introduction of particulate filters (DPFs) for diesel vehicles, along with lower limits across the board. For type approvals from September 2011 and new cars from January 2013, diesel vehicles were subject to a new limit on particulate numbers. DPFs capture 99% of all particulate matter.

Euro 4

Improved catalytic converter that is able to filter out atmospheric contaminants such as sulphur and carbon monoxide more effectively. They also have less THC + NOx (Total Hydrocarbon + Nitrogen Oxide) and Nitrogen Particle matter.

Euro 3

Euro 3 split the hydrocarbons and nitrogen oxide limits for petrol and diesel engines, as well as adding a separate nitrogen oxide limit for diesel vehicles. The warm-up period was removed from the test procedure.

Euro 2

Euro 2 reduced the limits for carbon monoxide and the combined limit for unburned hydrocarbons and nitrogen oxide, as well as introducing different levels for petrol and diesel engines.

Euro 1

The first Europe-wide euro emissions standards were introduced in July 1992 and the regulations weren't anywhere near as stringent as they are today.

The fitment of catalytic converters became compulsory on all new cars, and Euro 1 required the switch to unleaded petrol. Back then, only hydrocarbons and nitrogen oxide were tested, along with particulate matter in the case of diesel engines.