Green Fleet Strategy

Technical Appendices

The Green Fleet Strategy is supported by this technical document, which provides the technical information required for the successful delivery of the strategy.

Technical Appendices

Glossary of Terms

BEV Battery Electric Vehicle

GHG Greenhouse Gas emissions (used interchangeably with carbon)

ICE Internal Combustion Engine – Petrol/Diesel/Gas

HVO Hydrogenated Vegetable Oil – also known as biodiesel HVO

Appendix 1: Current Fleet Characteristics

1.1 The Council's Fleet

This Green Fleet Strategy will focus on vehicles used directly by the Council. The Council's grey fleet and vehicles used by contractors will be included, however, this strategy will be the first time these arms of the extended fleet are brought together. Based on this, the primary focus of this strategy will be the vehicles used by the Council, with a secondary focus on the extended fleet.

The Council runs a mixed fleet which procures, repairs and maintains vehicles and machinery for a variety of services including Waste, Street Scene, Housing and Markets. The current fleet is made up of 254 vehicles/machinery, Table 1 shows a breakdown of the vehicles and machinery.

Table 1: Current Fleet Breakdown

Vehicle Type	Service Area	Fleet Size
RCV 32 Tonne	Waste	4
RCV 26 Tonne	Waste	21
RCV 22 Tonne	Waste	2
RCV 18 Tonne	Waste	2
HGV – Other	Waste	8
Pool Cars	All	17
Hook lift	Waste	1
Pick Up	Street Cleansing	6
Large Sweeper	Street Cleansing	3
Small Sweeper	Street Cleansing	4
Tractor	Street Cleansing/Markets	12
Van	Street Cleansing/Housing/Waste	87
Machinery	Street Cleansing (Grounds Maintenance)	87
Total		**254**

Currently, only two of the vehicles operated by the Council are electric vehicles; these are two Renault Zoes which reside within the pool car stock.

1.2 The Carbon Footprint of the Fleet

In 2022, the Council commissioned a 'Transport Decarbonisation Report'. The report was written by the Energy Saving Trust, and it provided a benchmark for the greenhouse gas emissions and the energy consumption associated with its road transport fleet. Throughout 2021 (the operational year assessed by the report) SKDC's road transport drove 1,473,371 miles and consumed 6,741 megawatt of fossil fuel energy; around 1,988 tonnes of greenhouse gas emissions were produced. Table 2 shows the breakdown of greenhouse gas emissions and energy consumption by vehicle type for the Council's fleet (2021 figures).

Table 2: Greenhouse Gas Emissions and Energy Usage of Current Fleet (values)

Fleet Category	Fleet Size	Annual Mileage	Greenhouse Gas (tonnes)	Energy (MWh)

Refuse Collection Vehicle (RCV)	32	400,650	1,283	4,348
Heavy Commercial Vehicle (HCV)	12	161,287	216	731
Light Commercial Vehicle (LCV)	98	857,751	445	1,513
Car	15	53,683	15	50
Other	14	1,659	29	99
Total	**157***	**1,473,371**	**1,988**	**6,741**

**This total is different to Table 1 as the data is from 2021 and it does not include the machinery element which the workshop now maintain.*

Alongside the figures highlighted in Table 2, the Transport Decarbonisation Report highlighted that the RCV aspect of the fleet was responsible for 27.2% of the overall milage covered by the entire fleet. However, the RCV's were responsible for 64.5% of greenhouse gas emissions and 64.5% of energy usage. In contrast, the LCV's within the fleet account for 58.2% of the milage but only 22.4% of the greenhouse gas emissions and energy usage respectively. A full breakdown of the milage, greenhouse gas emissions, and energy usage by vehicle type can be viewed in Table 3.

Table 3: Greenhouse Gas Emissions and Energy Usage of Current Fleet (%)

Fleet Category	Fleet Size	Annual Mileage	Greenhouse Gas (tonnes)	Energy (MWh)
Refuse Collection Vehicle (RCV)	18.7	27.2	64.5	64.5
Heavy Commercial Vehicle (HCV)	7.0	10.9	10.8	10.8
Light Commercial Vehicle (LCV)	57.3	58.2	22.4	22.4
Car	8.8	3.6	0.7	0.7
Other	8.2	0.1	1.5	1.5
Total	**100**	**100**	**100**	**100**

It is evident from the information in Table 2 and Table 3 that to elicit the biggest greenhouse gas reduction, it is essential that the RCV fleet form part of the solution. Currently, only two vehicles within the fleet are electrically powered, these vehicles are small cars which reside within the pool car category. This category only accounts for 3.6% of the fleets total annual milage and 1.5% of the greenhouse gas emissions.

1.3 The Grey Fleet / Contractors Fleet

The 'grey fleet' refers to vehicles privately owned or leased by employees but used for business travel. This aspect of the fleet is hard to manage because the vehicles are not the property of the Council and as a result, the owners of the vehicles are solely responsible for making decisions on the environmental merits of the vehicle.

The Council currently operates 17 pool cars which can be used by employees to undertake work-related travel. Employees are encouraged to use the pool cars rather than using their own vehicle, however, there is no requirement to use a pool car.

Currently, there is no requirement for the vehicles used by contractors commissioned by the Council to have an environmental policy

Appendix 2: National Commitments and Council Priorities

2.1 National Commitments

The UK Government has pledged to reduce greenhouse gas (GHG) emissions and vehicle usage plays a large part in this commitment. Transport is the single largest contributor to domestic GHG emissions, responsible for 28% in 2022 (latest available data). Despite GHG reductions in other sectors of the economy, notably electricity generation and waste disposal, transport emissions remain stubbornly high. Key deadlines which the Council will be required to adhere to include:

1. To reach 'net zero' by 2050,
2. A ban on the sale of new petrol and diesel vehicles by 2035 (previously 2030).

In 2021 government published a *Decarbonising Transport* report, setting out how addressing carbon emissions fits into national net-zero carbon goals as well as delivering wider benefits. This outlines, amongst other transport-wide initiatives, a priority to decarbonise road vehicles, noting that a fleet of fully zero emissions vehicles will reduce

2.2 Our Council's Priorities

South Kesteven District Council declared a climate emergency in September 2019 and confirmed the target to reduce carbon emissions from Council operations by at least 30% by 2030 and to net zero as soon as viable before 2050.

SKDC have published an annual carbon emissions report every year since the baseline year of 2018/19, and in the latest update for the 2023/24 year reported an overall 25.3% reduction on the baseline year. Emissions from the vehicle fleet are now the single largest emissions category, responsible for a third of the Council's total reported carbon emissions. Sustained reductions have been implemented in other areas (including energy used in Council owned buildings and leisure facilities), yet emissions from the vehicle fleet have remained static. Figures 1 and 2 show a breakdown of the fleet carbon emissions by year and department. These figures clearly show that Waste Management and Street Cleansing are key areas of focus.

To work towards national net zero carbon targets, South Kesteven District Council will need to address the decarbonisation of the vehicle fleet to ensure that sustained reductions in carbon emissions are met.

Figure 1: Fleet Carbon Emissions by Financial Year

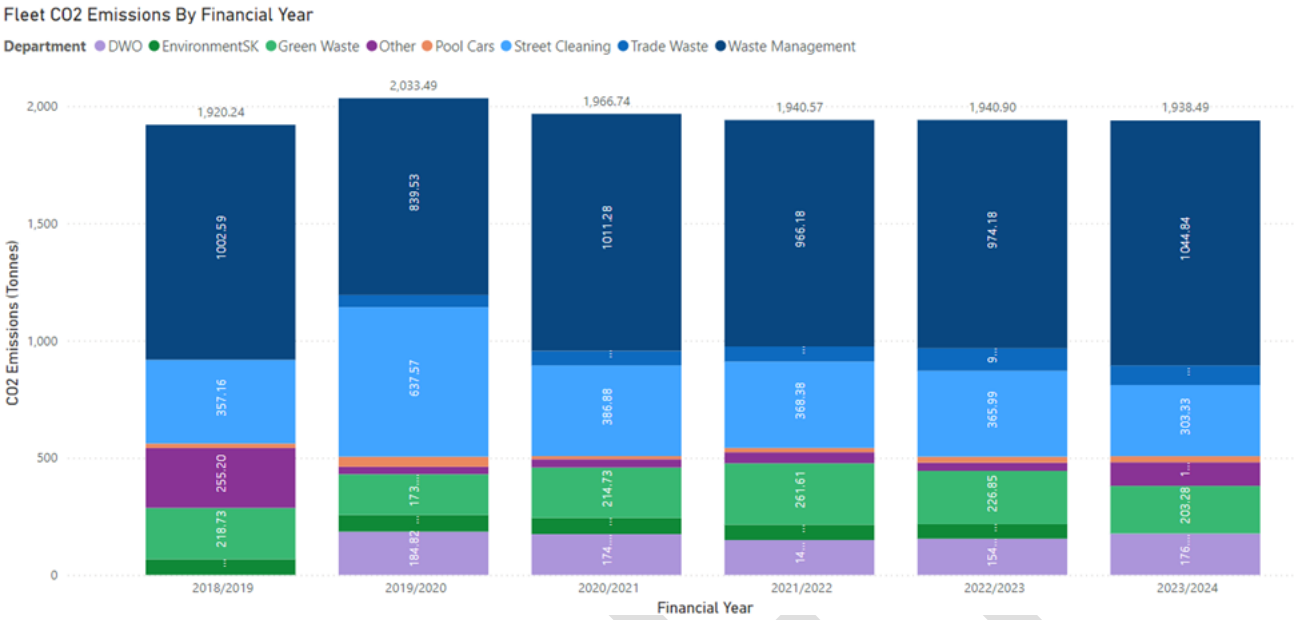
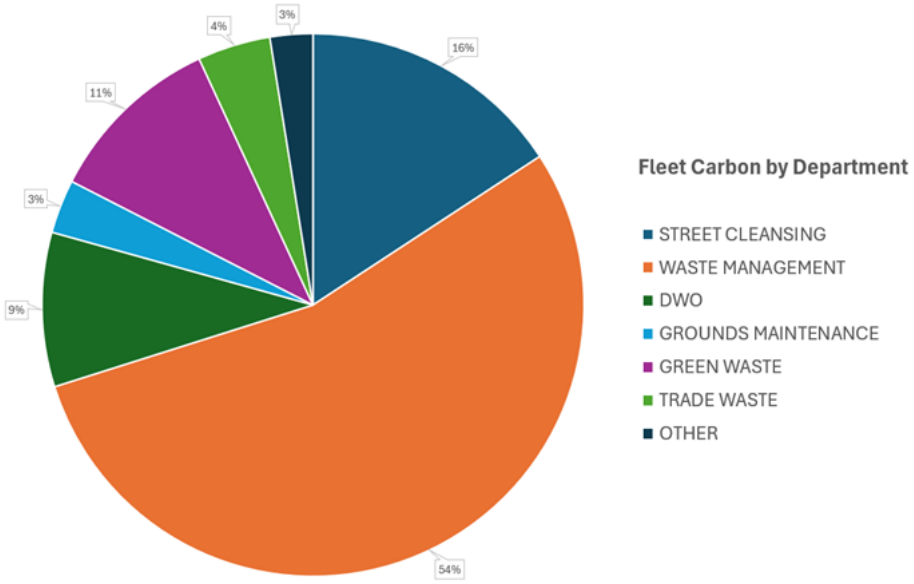


Figure 2: Fleet Carbon Emissions by Department



Appendix 3: Transport Decarbonisation Report Summary

3.1 Outline of the Report

South Kesteven District Council (SKDC) sought this report in 2022 to benchmark the greenhouse gas (GHG) emissions and the energy consumption (megawatt hours - MWh) associated with its road transport fleet in 2021 and to establish how its fleet could be decarbonised. The analysis was undertaken by Energy Saving Trust and funded by the Department for Transport (DfT).In 2021, SKDC's road transport drove 1,473,371 miles, producing 1,988 tonnes of GHG emissions. If the whole SKDC-operated road fleet could be transitioned to battery electric vehicles (BEVs) we would expect the energy use to fall by at least 70%, from 6,741 MWh to 2,022 MWh a year.

Costs associated with this fleet energy saving can contribute to funding the higher purchase (or lease) costs of the BEVs, as well as the electric vehicle charging infrastructure (EVCI). It is why the use of a whole life cost (WLC) procurement process is so important. Additional savings arise from the reduced cost of maintaining an electric vehicle drivetrain and chassis.

SKDC has declared a climate emergency and has committed to reducing GHG emissions by at least 30% by 2030 and achieving net zero as soon as is viable before 2050. The UK's new Nationally Determined Contribution, announced in December 2020, commits the UK under the 2015 Paris Agreement to a 68% reduction in GHG emissions from 1990 levels by 2030. Under UK law (Climate Change Act) the country is also committed to a 78% reduction in GHG emissions by 2035.

If entirely powered from the UK Grid in 2030, the fleet will still be associated with a predicted annual 102 t of GHG emissions, which is a 95% reduction from the 2021 baseline, but if powered from private wire renewable generation, the fleet would be net zero, with no requirement to fund off-sets of residual GHG emissions.

SKDC also have opportunities to further enhance the efficiency of their fleet operation and optimise emission reductions through:

- Integration of data sources and CAN bus connectivity with telematics.
- Establish a fleet transition team, to ensure all relevant aspects of electrification are covered.
- Review vehicle utilisation and downsize LCVs where possible. Review how vehicles are held by departments, how this is costed and if pooling could be more efficient in some cases.
- Review how pool car use is costed to internally to departments, with the clear aim to improve utilisation and prevent block booking.
- Introduce a BEV procurement policy that follows a clear process to prioritise BEV purchases (based on highest efficiency and the greatest potential to reduce GHG emissions). The process should consider utilisation, whole life costs and emissions as part of the vehicle procurement.
- Adapt fleet replacement cycles and procurement policies to BEV (in line with battery warranties to allow more cost recovery.

With a clear trajectory to decarbonisation based on the adoption of battery electric vehicles, SKDC should ensure that the depot facilities have sufficient power capacity to charge the fleet. It is likely that AC charging could form the vast majority of the infrastructure, and the

combined fleet would require a capacity of 775kVA across all locations where vehicles are charged. When installing infrastructure, SKDC should plan for the long term, in terms of capacity, wiring, and ducting to ensure costs aren't duplicated and sites do not need to be excavated more than once. If wiring is in place, chargers could be swiftly added at a later date when each subsequent tranche of electric vehicles are added to the fleet.

3.2 Recommendations from the Report

- Review and improve vehicle data integration, telematics capabilities.
- Conduct a review of vehicle utilisation and a right-sizing exercise, across the fleet.
- Replace 15 cars with BEV equivalents as replacements become due.
- Replace 24 small or medium vans with BEV equivalents as replacements become due.
- Replace 35 3.5t panel vans and 15 3.5t chassis with BEV equivalents as replacements become due.
- Replace RCVs with eRCVs where this is operationally viable
- Rearrange vehicle allocation to maximise the potential for BEV and eRCV replacement
- Plan and invest in a future BEV charging infrastructure

Appendix 4: Encouraging Active Travel

4.1 The Impacts of Vehicles and the Benefits of Active Travel

Reliance on vehicle transport can have a significant negative impact on our communities through air pollution, traffic noise and road safety as well as the wider impacts of climate change and associated greenhouse gas (GHG) emissions. Investment is needed in the transport network and across various schemes to support more journeys on foot, by bicycle and by public transport to rebalance movement away from the private car.

As economic growth brings in more people, businesses and opportunities, the demand for travel will increase across South Kesteven and its market towns. It is evident that the existing network does not fully meet the needs of the existing community. In order for the district to continue to flourish, inclusive and sustainable travel choices are a priority. There is a clear need to improve the reliability and resilience of the transport network, provide convenient public bus services, safe cycle routes and promote an attractive people focused town centre. This will support the move towards cleaner, more sustainable transport and reduce the environmental impacts of vehicle driven travel.

Furthermore, active travel is linked to health benefits that are achieved through an increase in physical activity and movement, boosting social connections and proximity to nature. Promoting a higher quality public realm can create more adaptive, resilient communities.

4.2 Promoting Active Travel in South Kesteven

In March 2023 South Kesteven District Council agreed to support the Lincolnshire's District Health and Wellbeing Strategy which is structured around 5 lever areas. Two of which focus on activity and wellbeing, and the environment and climate.

The Grantham Transport Strategy largely focuses on these key elements, highlighting the importance of active travel through walking and cycling. The purpose of the strategy is to provide a framework for improving the travel choices and everyday journeys for people living, working, and visiting Grantham in the short, medium, and longer term.

There are a range of challenges that the transport strategy will help the town and the surrounding area to meet, these include:

- The significant environmental challenges resulting from transport and travel and the transition to low carbon travel. This includes town centre air quality, protecting the town's historic nature and green spaces and seeking to tackle climate change by using more sustainable forms of travel and transitioning to low emission vehicles.
- Supporting the recovery and growth of Grantham's key economic sectors by improving the reliability and the resilience of the strategic highway network.
- The need to provide a connected and reliable transport network which serves both the urban centre and more rural areas.
- The need for travel choice and flexibility across different and changing travel demands and patterns, including how people access different activities such as employment, education, healthcare, retail, leisure, and tourism.

Appendix 5: Financial Benefits and Implications

5.1 Savings and Benefits of Going Electric

There are several significant benefits from moving from internal combustion engine (ICE) vehicles to battery electric vehicles (BEV). The main benefits are set to include:

Reduction in air pollution via tailpipe emissions

- Every litre of fuel burnt, or mile driven in an ICE vehicle, is associated with emissions of many substances of concern which have adverse impacts on human health. The emissions generated include hydrocarbons (HC), non-methane hydrocarbons (NMHC), carbon monoxide (CO), nitrogen oxides (NOX – nitrogen monoxide NO and nitrogen dioxide NO2) and particulate matter (PM).
- Moving to BEVs will eliminate tailpipe emissions of NOX and PM but will still leave particulate "emissions" associated with the brakes, tyres and recirculation.
- Air quality is an issue in South Kesteven. SKDC has one Air Quality Management Area (AQMA) covering central Grantham and is linked to transport emissions. Therefore, it is of vital importance to minimise contributions to poor air quality from the Council's vehicle fleet.

Reduction in overall energy use

- Many ICE vehicles are only 25% to 30% efficient (i.e. only 25% to 30% of energy in the fuel burnt translates to movement) withy the losses, mostly heat and friction, occurring in the engine and transmission.
- Electric vehicles are about 80% efficient, with most of the losses occurring in the conversion of AC to DC from the grid to the battery and then back from DC to AC for the electric motor. As a result, BEVs will typically use one quarter to one third of the ICE vehicle's energy.

Reduction in carbon emissions

- There are extremely significant carbon savings to be made moving from ICE vehicles to BEV. This accounts for both the lower overall energy use as described above, as well as the relatively lower carbon intensity of electricity versus diesel fuel.
- The ongoing decarbonisation of the electricity grid, powered by the increasing proportion of renewable energies, projects that electricity will continue to reduce carbon intensity over the next decade.
- Current expectations of carbon emissions can be seen in more detail across vehicle categories below in Table 2. On average an 88% saving can be achieved from moving from ICE to BEV.

Lower expected maintenance costs

- Electric vehicles are mechanically simpler than ICE vehicles, with significantly fewer components in the drive train and without a complex transmission and exhaust system. As a result, maintenance costs on average are a lot lower – this can be up to 40% less. Over extended operational periods of 8 to 10 years this can be even greater, as ICE vehicles can incur significant costs in later years.

5.2 Use of a Whole Life Cost (WLC) model

Critical to the comprehensive consideration of selection of vehicles for the fleet is use of a Whole Life Cost (WLC) selection model. A WLC model calculates al of the predicted costs of owning and operating a vehicle over its operational lifetime, including capital, servicing, vehicle excise duty and the fuel or energy cost.

In considering the benefits and drawbacks of both petrol/diesel and electric vehicles, it is necessary to consider the WLC in order to understand the large differences in fuel cost versus electricity consumption. Over an electric vehicle's operational life, the large reduction in energy cost to power the vehicle may completely offset the higher purchase cost and can result in an overall cost savings.

Table 1 below sets out a range of indicative WLCs across vehicle categories. These costs include a provision for: fixed overheads including insurance and fleet management; net capital cost of the vehicle using typical models; energy (either diesel or electricity); and a "shadow" carbon cost that represents the societal cost of GHG emissions. Further details on this are available within the Transport Decarbonisation Report completed by the Energy Saving Trust in 2022 on behalf of SKDC.

As a trend, the higher the vehicle mileage over the operation period, the more significant the financial saving of electric vehicles.

Table 4: Whole Life Costs across different vehicle categories

Vehicle category	Indicative mileage	Fuel type	Indicative whole life cost	Indicative £/mile
Small car	6,000	Diesel	£33,000	£0.60
		Electric	£29,000-£30,000	£0.59-0.62
	8,000	Diesel	£35,000	£0.48
		Electric	£30,000-31,500	£0.46-0.48
Mid-sized cars	6,000	Diesel	£33,000-38,000	£0.61-0.72
		Electric	£29,000-£32,500	£0.59-0.67
Small light commercial vehicle	6,000	Diesel	£34,000	£0.63
		Electric	£28,500-£32,000	£0.58-0.66
	8,000	Diesel	£38,000	£0.51
		Electric	£29,500-£33,000	£0.45-0.51
Medium light commercial vehicle	8,000	Diesel	£51,000	£0.68
		Electric	£40,000-45,000	£0.61-0.69
	12,000	Diesel	£63,000	£0.53
		Electric	£44,000-£49,000	£0.44-0.49

Large light commercial vehicle	8,000	Diesel	£61,000	£0.83
		Electric	£49,000-72,000	£1.15-0.73

Table 5: Expected GHG savings across vehicle categories

Vehicle category	Fuel type	Whole life average GHG emissions (t)	Whole life GHG saving (%) - electric vs diesel
Small car	Diesel	15.05	87%
	Electric	1.95	
Mid-sized cars	Diesel	13.5	88.5%
	Electric	1.7	
Small light commercial vehicle	Diesel	17.65	88%
	Electric	2.1	
Medium light commercial vehicle	Diesel	45.4	87%
	Electric	6	
Large light commercial vehicle	Diesel	32.9	86%
	Electric	4.7	

5.3 Implications of Going Electric

There are appreciable savings to be made in moving from a predominantly ICE vehicle fleet to a predominantly BEV fleet. To facilitate this transition effectively, it is helpful to consider a few critical conditions.

Provision of electric vehicle charging infrastructure is naturally fundamental to the provision of an electric fleet. The costs for installation of new charging infrastructure, as a single capital investment, are not included in the above WLCs. For some types of vehicles that do not currently operate on a return to base model, this will involve investigation of alternative methods of charging. This is reflected in the Fleet Strategy action plan.

Rationalising the overall energy consumption of the current vehicle fleet is also a valuable exercise to ensure an electric fleet is fit for purpose and not oversized. Firstly, opportunities to rationalise routes and reduce miles travelled will provide immediate cost and carbon

savings. Secondly, ensuring that each new vehicle purchased for the fleet is the correct specification and not oversized is crucial in moving from ICE to BEV.