Appendix 3 – Vehicle Fleet Transition Background

This report presents the case studies from the Evenergi Fleet Transition Plan set out as combined fleet data, light fleet data, heavy fleet data and plant and equipment data. All the data provided below is derived from the commissioned Fleet Transition Plan provided by Evenergi.

To learn more about the Councils fleet transition plan, the full Evenergi plan/report the supplementary documents are available if requested.

An abbreviation list has been provided below.

Abbreviation	Meaning
BAU	Business as Usual
BEV	Battery Electric Vehicle
CMS	Charge Management System
EVSE	Electric Vehicle Supply Equipment
FCEV	Fuel Cell Electric Vehicle
HEV	Hybrid Electric Vehicle
ICEV	Internal Combustion Engine Vehicle
IPCC	Intergovernmental Panel on Climate Change
NULBC	Newcastle Under Lyme Borough Council
PHEV	Plug-in hybrid electric vehicle
TCO	Total cost of ownership
ZEV	Zero emissions vehicle

The Evenergi Fleet Transition Plan presents 3 main scenarios Business as usual (BAU), Economic scenario and leadership scenario which generate different costs, timelines of transitions and feasibility of transitions as shown in the figure below (. In this Appendix the focus will be on the Leadership scenario which will deliver a net zero fleet by 2030.

Fleet transition scenarios

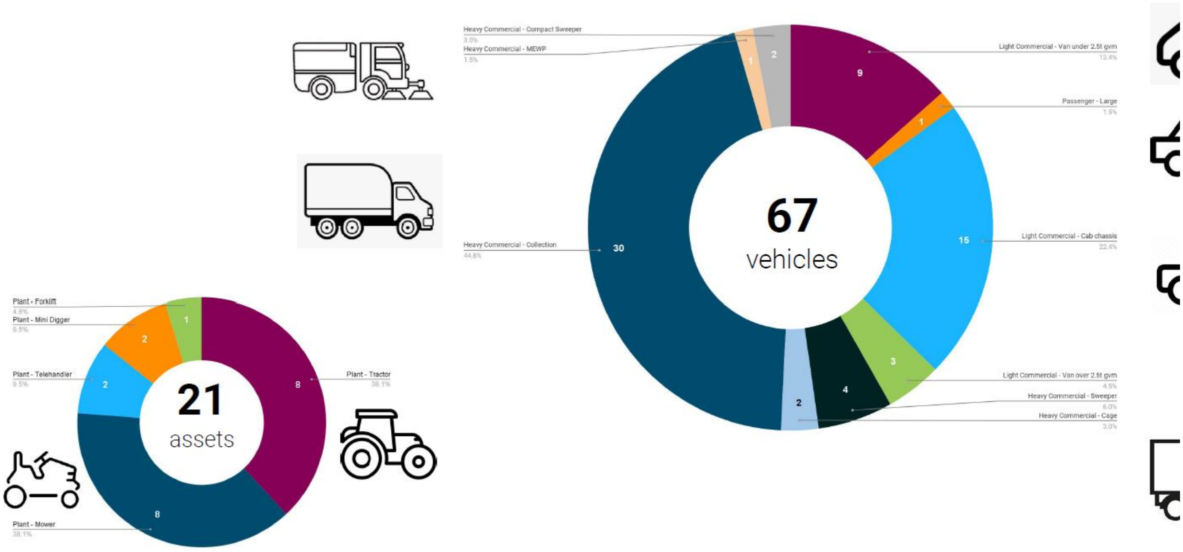
The fleet transition analysis considers two zero emission transition options (economic and leadership) them against a business-as-usual (BAU) scenario for both vehicles and associated infrastructure.

01	**Business as usual (BAU)**	• Replace ICE with ICE • Lowest cost modelling
02	**Economic scenario**	• Replace ICE with EV only if there is cost pa total cost of ownership profile • Lowest cost modelling
03	**Leadership scenario**	• Replace ICE with EV only if there is cost pa total cost of ownership profile • Force all vehicles to EV by last replacemer as there is fit-for-purpose suitability

Combined Fleet Transition Case Study

This section presents the combined fleet data of the Councils fleet surveyed by Evenergi, derived from the Evenergi Fleet Transition Plan. The section provides summary analysis and figures/tables to present the cost, energy, carbon savings and interventions needed by 2030 for the combined Council fleet to become net zero.

The figure below shows that the Councils fleet consists of 88 total assets which includes 28 light vehicles, 39 heavy vehicles and 21 plant equipment. As seen below the largest proportion of vehicles the Council use are heavy commercial vehicles which consists mostly of our recycling and waste collections vehicles.



The figure below maps the transition readiness of the Council and describes the steps that which the Council needs to take to assess the feasibility of transitioning our 88 assets. The transition steps/barriers range from zero emission vehicle model availability, good data on requirements, meeting energy requirements, charging solutions begin available and finally economic viability.

Transition readiness

Readiness to transition considers a number of factors (ie hurdles to overcome) to assess the feasibility of transitio vehicle in the fleet

1 ZEV Model Availability
High level comparison of vehicle functional requirements vs. those available on the market

2 Good Data on Requirements
Data exists to confidently understand the requirements and hence select a zero emissions vehicle which will work operationally

3 Can Meet Energy Requirements
Daily energy requirements for the vehicle are within the limits of what can be delivered with currently available zero emissions vehicles

4 Charging Solution Available
Vehicle logistics and operations allows for realistic charging solution to be utilised

5 Economic Viability
Total cost of ownersl comparison vs traditional vehicle options to ensure val is being created

The below figure shows the readiness of the current zero emissions vehicle market for the transition that the Council must make by 2030 to become net zero. The most notable mention is that most light vehicles will definitely be able to transition however zero emission heavy vehicles are still a new technology and being tested which makes them less ready for our transition needs and will hopefully be available in the market before 2030.

Market transition readiness

Typically the light vehicle fleet has less barriers to a complete transition, whereas currently the heavy veh have less vehicles that have fit-for-purpose suitability

Hurdles to Assess Transition Feasibility

	Total Pool	1 Zero Emissions Availability	2 Good Data on Requirements	3 Can Meet Energy Req'ts	4 Charging Solution Available	Ec Viabi
Passenger cars & SUVs	1	Maturing	Yes	100%	Yes	
Cab chassis and pickup trucks	15	Immature	Yes	79%	Yes	A f D
Vans and buses	12	Immature	Yes	87%	Yes	
Heavy - Light Duty	3	Immature	Yes	80%	Yes	A f D
Heavy -Medium Duty	9	Immature	Yes	77%	Yes	A f D
Heavy - Heavy Duty	18	Immature	Yes	79%	Yes	A f D

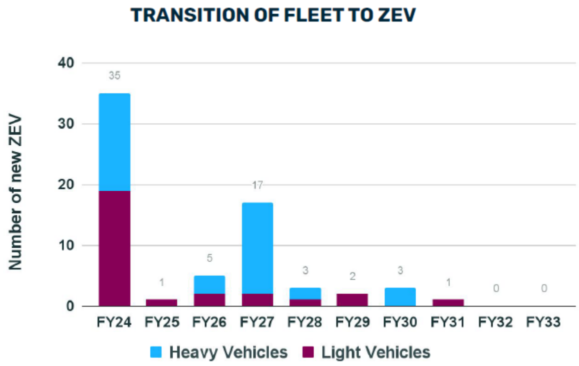
The below figure describes when zero emissions vehicle (ZEV) transitions and infrastructure upgrades will be made in the leadership scenario Evenergi have created which focuses on our net zero goal by 2030. Most notable is the signifcant amount of ZEV trnaisitons that are required in the year 2024 and 2027 which amounts to 36 transitioned vehicles. Another notable mention is the signifcant amount of infrastructure upgrades that must be made in 2024, 2027 and 2029 which together will cost the Council around £750,000.

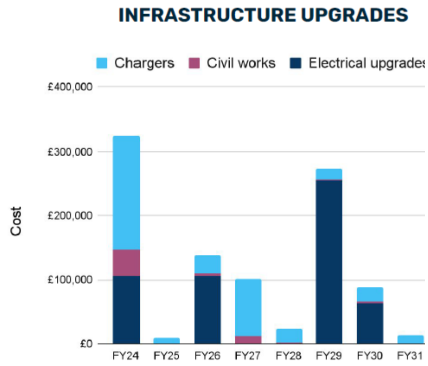
Scenario Analysis - A leadership transition

Under a leadership scenario all of the light and heavy vehicle fleets will transition by 2033 and this will require si ready in 2024. Many more light vehicles transition in this scenario.

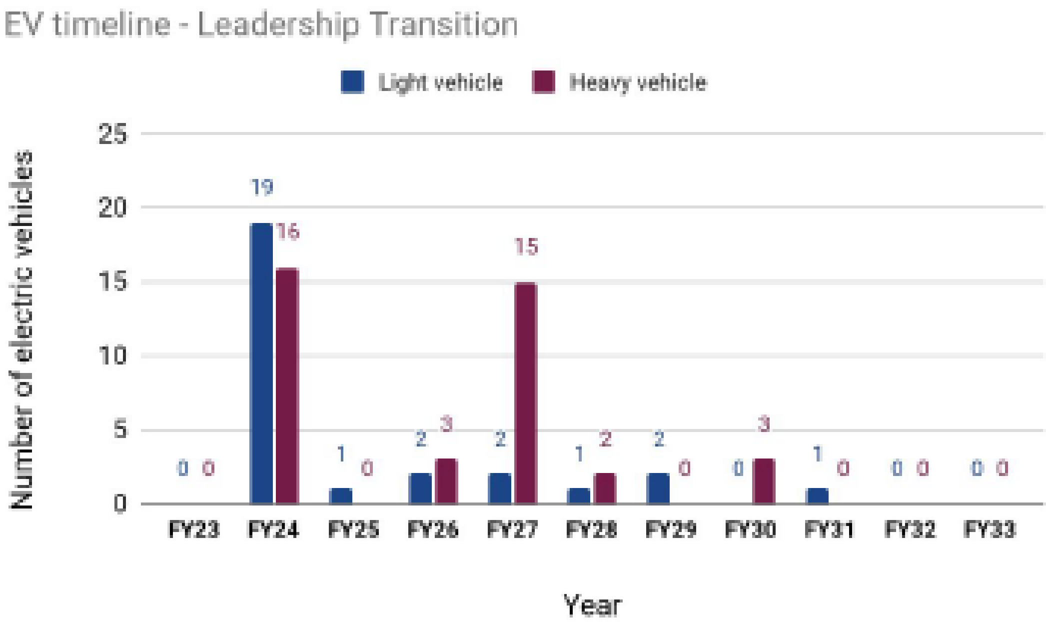
In this scenario EVs are selected based on a superior TCO or forced at the last transition prior to 2030. As in the previous sce for purpose check rules out vehicles that can not meet the duty requirements from transitioning.

In this scenario all 67 vehicles (28 light vehicles and 39 heavy vehicles) are electrified before 2033. This scenarios sees many vehicles transitioning than in the economic scenario. Many of the early transitions between FY24 and FY27 are light commer chassis. Major infrastructure upgrades at the depot site are required from 2024 to support the increase of EVs in the same ye spillover to 2033 is due to the replacing period of vehicles, where some vehicles only see their first (suitable) replacement aft





The below figure shows the comparison between light and heavy vehicle trnasitions that will be made overtime for our 2030 net zero goal. Most light vehicles will transition in 2024 due to the availability of the technology based on the leadership model and heavy vehicles will transition in 2024 and 2027 based on the time it takes for the relevant technology to develop and come to market.



The figure below focuses on the amount of vehicle fleet emissions from 2023 till 2033 based on different transition scenarios. It shows that by transitioning quicker (leadership scenario) that emissions would be reduced by around 96% once all transitions are completed by the early 2030s.

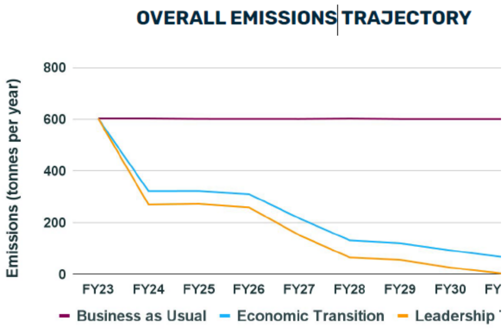
Impact on vehicle operating emissions FY24 to FY33

The economic transition achieves a 85% reduction in emissions by 2030; 96% reduction in fleet emissions is ach leadership scenario by 2030.

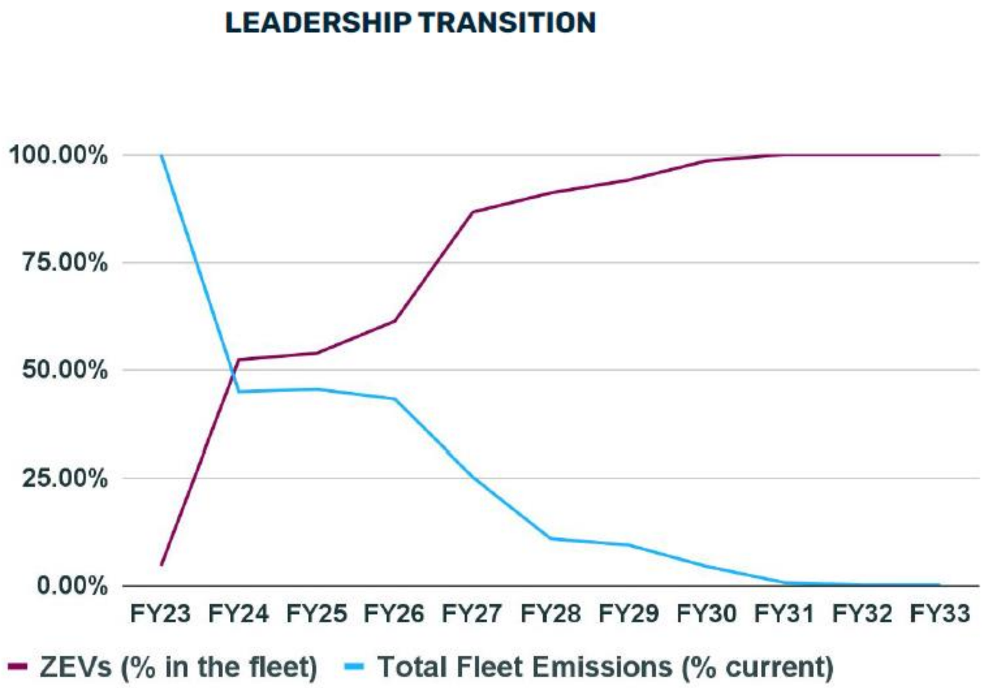
The economic scenario transition provides a total CO2 emissions reduction of around 4300 tonnes over the transition perioc - FY33) compared to BAU with annual emissions dropping by 85% by 2030. Under this scenario a large number of light vehic some of the heavy vehicles are yet to transition by FY30.

The leadership scenario results in total CO2 emissions reduction of around 4900 tonnes compared to BAU with annual em dropping by 96% by 2030. The remaining emissions are predominantly from heavy vehicles that are yet to transition.

Scenario (light and heavy vehicles)	Total CO_2 emissions FY 24 - FY33 (tonnes)	Total emissions reduction (tonnes)	CO_2 emissions FY30 (tonnes)	Emissions reduction (%)
BAU	6,014	N/A	601	0%
Economic	1,706	72%	93	85%
Leadership	1,104	82%	26	96%



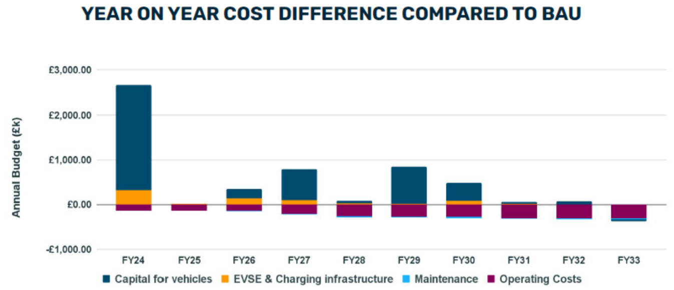
Based on the leadership transition scenario the figure below shows the transition of vehicles in the fleet compared to the level of emission from the vehicle fleet. It shows that as more vehicles in the the Councils fleet are transition to zero emission vehicles (in purple) that emissions greatly decrease from the fleet to 0 (in blue).

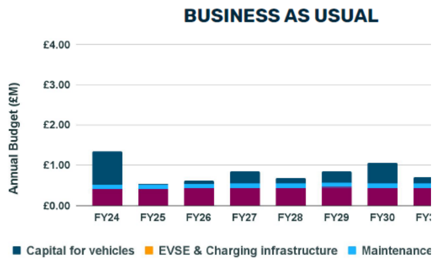


The figure below, based on the leadership scenario shows the cost associated with transitioning the Councils fleet by 2030 to become net zero. The most significant cost is predicted to occur in 2024 with the transition of the bulk of light and heavy vehicles and the costs of the infrastructure needed to support those transitioned vehicles. Overall the entire cost of transitioning to ZEVs, vehicle maintenance thereafter, operating costs and infrastructure capital expense is predicted to be around £10.76M.

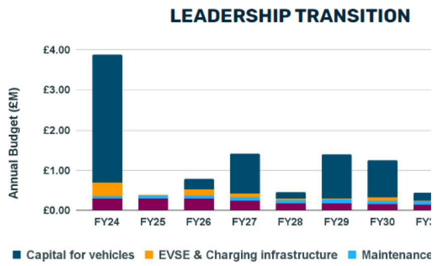
Scenario Analysis - Leadership transition FY 24 to FY33

The leadership scenario requires £2.86M extra over the period to FY33. Higher upfront vehicle purchases and the n
deploy infrastructure are only partially offset by operating and maintenance savings during the period to FY33.





Overall financial summary NPV 2023 to 2032			
Capital costs	**BAU (£M)**	**Leadership transition (£M)**	**Difference**
Vehicle operating costs	£4.41	£2.08	£2.34 M savings
Vehicle maintenance	£1.00	£0.84	£0.15 M savings
Vehicle capital expenses	£2.49	£7.11	£4.62 M additional
EVSE & charging capital expenses	£0	£0.73	£0.73 M additional
Total	**~£7.90**	**~£10.76**	**~£2.86 M additional**



The table below displays the overall transition summary of each scenario generated from the associated costs of each action, amount of vehicles transitioned and the associated emissions. To see the full breadth of the actions needed for the fleet please address the leadership column as this is the suggested path NuLBC take to become net zero by our 2030 goal.

Overall Transition Summary

Total Cost of ownership

- The economic costs are lower in terms of vehicle TCO but the additional costs for infrastructure capital expenses pushes it to a higher NPV vs. BaU
- Due to the current timeline dynamics that include a 7 year timeframe between 2024 and 2030, as well as he replacing periods of the fleet, the leadership scenario is similar to the economic scenario from a total cost of ownership perspective.

Fleet transition

- The leadership scenario achieves 100% light and heavy vehicle transition to net zero. Whereas the economic achieves 54% light and 97% heavy by 2033. This is mostly due to the low utilisation of light commercial vehicles.
- Economic scenario sees a 90% emissions reduction vs. BaU and the Leadership scenario 100% reduction by 2033.

	Overall summary FY24 to FY	
Capital costs	**BAU (£M)**	**Economic transition (£M)**
Vehicle operating costs	£4.41	£2.20
Vehicle maintenance	£1.00	£0.86
Vehicle capital expenses	£2.49	£6.44
EVSE & charging capital expenses	£0	£0.60
Total	**~£7.90**	**~£10.10**
Light Vehicles that are EVs (period end)	**3**	**15**
% of Light Vehicles that are EVs (period end)	**11%**	**54%**
Heavy Vehicles that are EVs (period end)	**0**	**66**
% of Heavy Vehicles that are EVs (period end)	**0%**	**97%**
Annual CO2 emissions in tonnes (period end)	603	61
Emissions reduction (%)	0 %	90 %

The pie chart below shows the associated current carbon emissions of the Councils vehicle fleet. Most notable is that the collection freighters, sweepers and cab chassis accoutn for around 89% of the Council's current emissions with many of the light vehciles making up the rest of our fleet emissions. In total the Councils fleet emmitts around 590 tonnes of CO2e per year. Note that all data was taken after the introduction of Hydrotreated Vegetable Oil (HVO) into 2023 of the collections vehicles in the fleet, which show a 90% decrease in the emissions from the heavy collection vehicles.As shown in the firue below even on HVO the emissions from those collection vehicles still contirbute to the Council’s total.

Carbon emissions combined

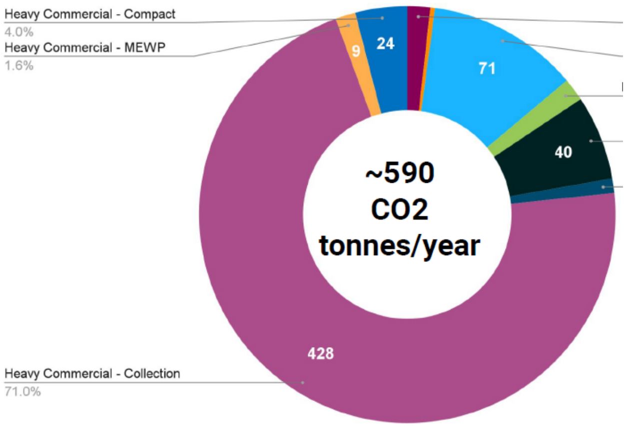
Collection freighters, Sweepers and Cab Chassis collectively account for around 89% of the Council’s fleet CC

Collection freighters, Sweepers and Light commercial cab chassis are the largest emitters of CO_2 emissions in the Council’s fleet, collectively contributing around 89% of total emissions as seen on the chart. This is due to their predominance in the share of total vehicles and their relatively higher levels of utilisation.

Transitioning these three vehicle types to EVs will therefore be key for the Council to mitigate a large share of the fleet’s CO_2 emissions.

Looking at the share between light and heavy vehicles, it is seen that heavy vehicles are contributing to around 84% of total fleet emissions (~496 tonnes out of ~590 tonnes of total fleet CO_2 emissions annually).

It should be noted that 23 heavy vehicles are indicated to use HVO as the main fuel. The carbon emissions of HVO can be upto 90% lower than diesel.



The figure below shows the total key recommendations from Evenergi for the Council’s fleet to become net zero by 2030. The recommendations are seperated by 10 key themes.

Key Recommendations

Many recommendations have been made based on this study. The key recommendations are shown below

01	Improve fleet productivity	• Consider if low utilisation vehicles can be removed (ie work plac • Ensure all vehicle selection leading to large and heavier vehicles
02	Prepare, conduct and initial replacements	• Continue with light vehicle EV trials. Expand trials to regional are • Look to begin trials of heavy electric vehicles.
03	Prepare for scaled deployment	• Set and communicate a transition target. • Develop detailed plans for charging infrastructure for depot site.
04	Use a framework for planning with frequent updates	• Develop and implement a planning framework to continually upc • In future iterations consider what TCO levers can be utilised to fa
05	Engaging the workforce	• Utilise change management principles and communication to er • Expose staff to EVs through trials and training sessions.
06	Engage the broader community	• Collaborate with industry and other organisations on shared solı infrastructure to minimise rollout costs. • Maintain ongoing engagement with suppliers of light and heavy
07	Vehicles with high energy requirements	• Focus on the majority of vehicles that have energy requirements • Ensure data such as telematics is analysed and available for rev
08	Internal policy & procedures	• Ensure policy and procedures do not disadvantage electric vehic ensure EVs are considered on both financial and social benefits
09	Implement iterative Planning Framework	• NULBC should focus on an iterative process for transitioning its the evolutionary nature of the ZEV market, while continuously im capturing opportunities of ZEVs.
10	Maximise the centralised depot approach	• NULBC can maximise the value of a centralised depot approach that include advanced CMS and others, exploring access to flexi

Light Fleet Transition Case Study

This section presents the light fleet data of the Council surveyed by Evenergi, derived from the Evenergi Fleet Transition Plan. The section provides summary analysis and figures/tables to present the cost, energy, carbon savings and interventions needed by 2030 for the Councils light fleet to become net zero.

The figure below details the 28 assets the Council has in their light vehicle fleet. The light vehicle fleet is mostly composed of cab chassis with the rest being light commercial vans and a passenger vehicle.

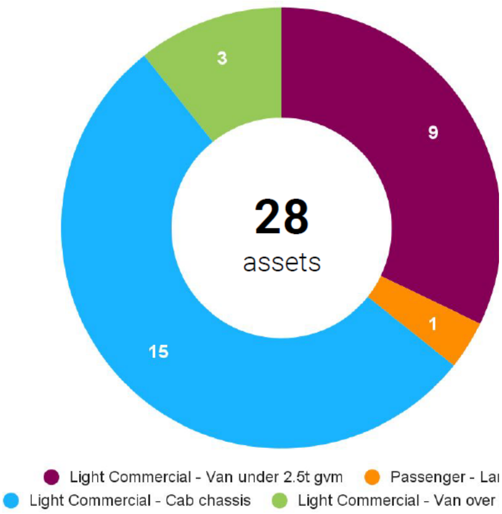
Light fleet composition

The light vehicle fleet consists of predominantly light commercial vehicles and vans. Several EV models availal market currently to cater for these models.

Vans of Cab chassis body type comprise the largest share of the light vehicle fleet, represented mainly by Vauxhall Movano.

Light vans (under 2.5t gvm) forms the second largest part of the fleet are represented mainly by Peugeot Partner, including three Nissan E-NV200 electric vans. Other vehicles in the fleet are vans over 2.5t represented by Ford Transit.

Several EV models available in the market currently to cater for all segments of light commercial vehicles included in the council's fleet.



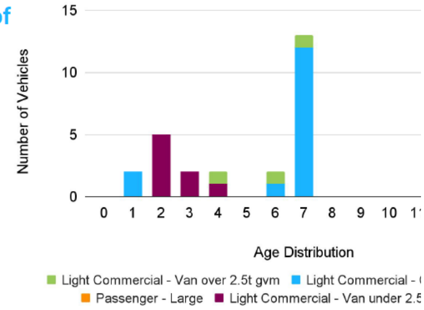
The figures below show the age distribution and time to replacement for the light vehciles in the Council's fleet. The oldest and most light vehicles (cab chassis mostly) are 7 years old with the majority of the rest being fairly new (0-4 years old). For the vehciles which are 7 years old, that make up most of the fleet will have to be replaced in the next year to ensure they are transitioned before major maintenance needs and to decarbonise them.

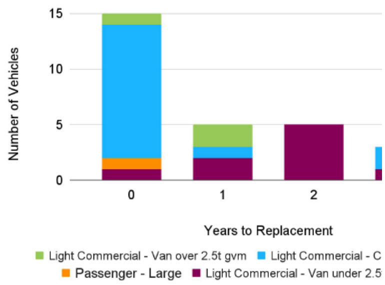
Age distribution & time to replacement - light fleet

Over 50% of the fleet is scheduled to be replaced in the near term - most of these are light commercial vehicles and vans.

The typical holding period based on the current council's policy is 5 or 7 years. The age chart (top) shows that vehicles are spanning in the range of 1 to 7 years with exception to the only passenger car and a van which are kept beyond their replacement time.

Light commercial cab chassis are mainly the oldest vehicles in the fleet, majority are 7 years old which contribute to the spike in the replacement graph (bottom).





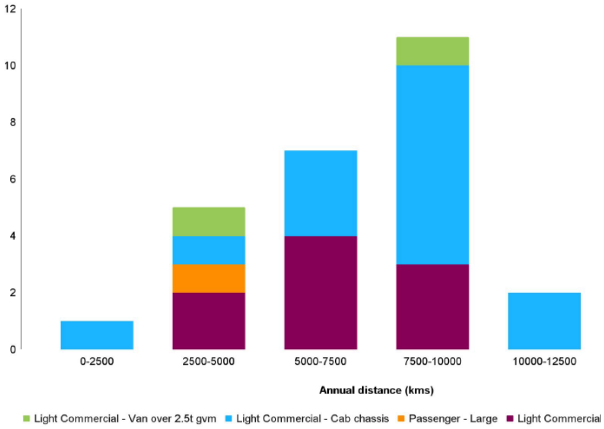
The table below shows the utilisation of the Council's light fleet and shows most light vehicles are used for an annual distance of 7500-10,000 kms. This shows a relatviely low utilisation which may show the need to decrease the total amount of light vehicles in the fleet to cosnolidate energy.

Annual utilisation - light fleet

The fleet has a low utilisation. Around 85% has annual utilisation of <10,000 kms, which can pose an economic c transition these vehicles.

Cab chassis span over an annual utilisation range of 2,000 to 15,000 kms with average utilisation of ~8,000 kms. Vans span over a similar range, with an average utilisation of 7,000 kms.

~20% of the fleet has an annual utilisation below 5,000 kms.



The table below shows the max daily energy requirements of a transitioned light vehicle fleet. It is estimated that all vehicles in the fleet based on current utilisation wouldn't need a second charge in a full day's duty cycle. Most transitioned light vehicles will only require 10-20 and 20-30 kWh per day to run.

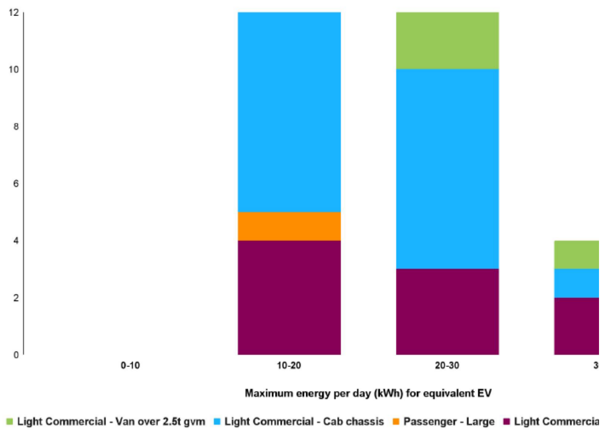
Max daily energy requirements - light fleet

It is estimated that, if transitioned to electric, all vehicles in the fleet will be able to complete a full day's duty cycle need for secondary charge.

Available battery sizes on standard models vary with vehicle type and size. Small passenger vehicles typically have standard batteries in the 60kWh or less range. 60-80kWh is typically available in the medium SUVs with longer range options up to 110kWh.

Smaller light commercial vans have EV variants with batteries in the range of 50kWh, with some options upto 75kWh. Larger LCVs and minibuses are available in battery sizes ranging between 40-100kWh.

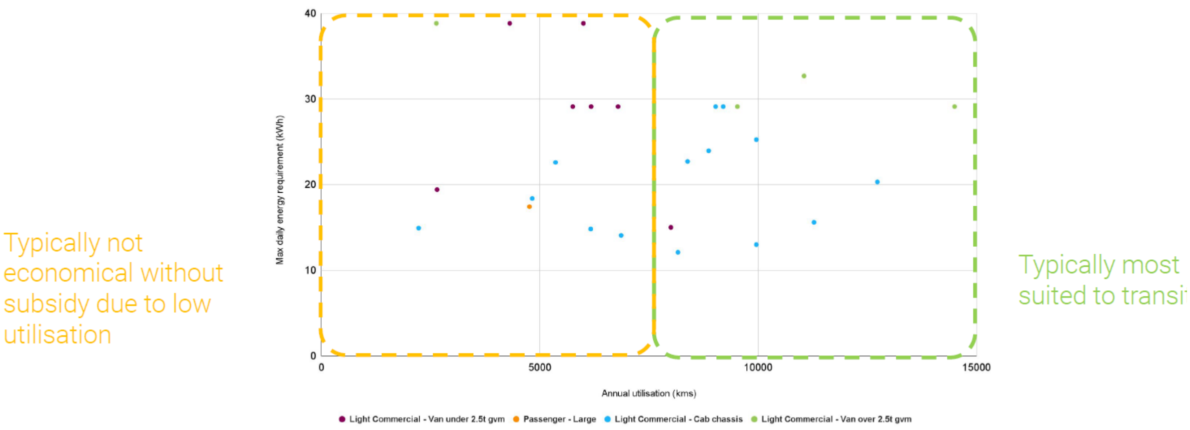
The next slide is a combination of utilisation and maximum energy requirements with each vehicle represented by a dot. Generally vehicles most suited to electrification are right on the x-axis (higher utilisation) and lower on the y-axis (lower maximum requirements).



The scatter plot graph below shows the entire light vehicle fleet and the associated suitability to transition based on energy requirement and annual utilisation. The vehicles located in the green area are of high utlisiationa nd relatively low energy requriements which makes them most economical to transitiona nd run. However the light vehicles located in the yellow/orange area are of lower utlisation and potneitally higher nergy requirement which mean they are less economical to transition and run. This begs the question if the Council should supercede vehicles like the 1 large passenger vehicle and some light commercial vans and should optimise it's light vehcile fleet use to ensure the vehicles the Council does have are used to their full potential. Which in turn would decrease the amount of vehicles in the fleet and optimise the one's the Council do have to decrease energy and resource waste.

Maximum energy requirement and utilisation scatterplot

Generally vehicles most suited to electrification have higher utilisation and lower maximum requirements.



*** Note:** *boxes are indicative. Full assessment that includes future technology evaluation is provided in the final transition plan*

The graph below shows the carbon reduction of transitioning the Council's light vehicle fleet. Under the leadership scenario the light vehcile fleets emissions would decrease by 73% and 6% of current levels by 2030.

Light vehicle transition CO2 reduction

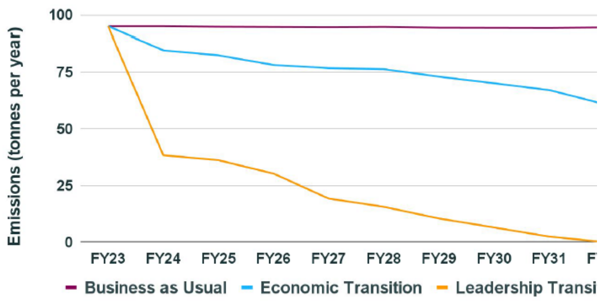
Light vehicle emissions fall to 73% and 6% of current levels by FY30 under the economic and leadership scenarios.

Light vehicle emissions fall to 73% and 6% of current levels by FY30 under the economic and leadership scenarios, respectively.

Under the economic transition, emissions fall to 63% of the current values by FY33. Largest reductions occur from FY28 to FY32 in line with relatively larger number of vehicles transitioning in those years.

Under the leadership transition scenario, emissions see a steeper decline in the early years, reaching zero in FY32 when all light vehicles are transitioned.

Note: FY31 includes emissions for those vehicles transitioning in FY31.



The graphs below show number of light vehicles that would need to be transitioned and the relative cost of those transitions by year. Most of the zero emission vehicle transitions would occur during 2024 which means the associated cost in the first year would be relatviely over £400,000. Overall transitioning the entire light vehicle fleet at NuLBC would cost around £1,011,000, which may mean optimsiing the lfeet could come at a lower cost as there would be less vehicles to transition.

Light vehicle transition analysis - Leadership scenario

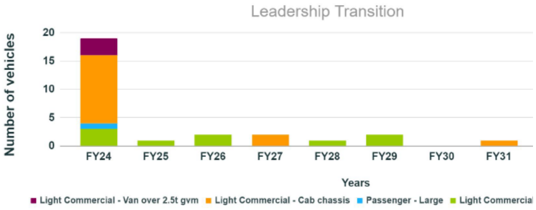
Leadership scenario: 100% of the light vehicle fleet will transition, with a total additional cost of £383K however between FY24, FY27 and FY30 an additional £628K is required to fund extra capital required for EVs.

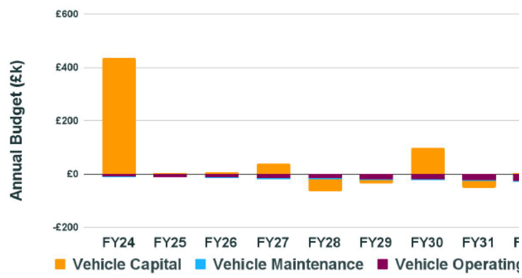
In the leadership scenario, 100% of the fleet will transition to electric vehicles by FY35. By FY30 96% of the fleet will transition.

The operating and maintenance savings fully offset the higher upfront capital spend over the whole period but only partially in FY24, FY27 and FY30.

The leadership scenario has a higher cost over the full period in the order of £383K however £628K additional needs to be spent between FY24, FY27 and FY30.

Note: These values do not include costs associated with charging infrastructure. These are added into the combined summary.





Heavy Fleet Transition Case Study

This section presents the heavy fleet data of the Council surveyed by Evenergi, derived from the Evenergi Fleet Transition Plan. The section provides summary analysis and figures/tables to present the cost, energy, carbon savings and interventions needed by 2030 for the Councils heavy fleet to become net zero.

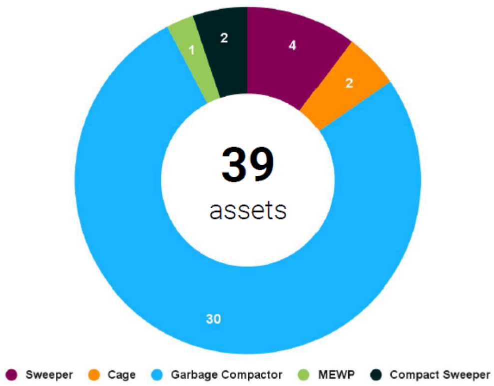
The first figures below show the heavy fleet composition at the Council based on the amount of each type of vehicle and how heavy they weigh in KG. Most of the fleet is consists of collection vehicles which consist of the heaviest vehicles in the fleet which mean they are the moste energy intensive.

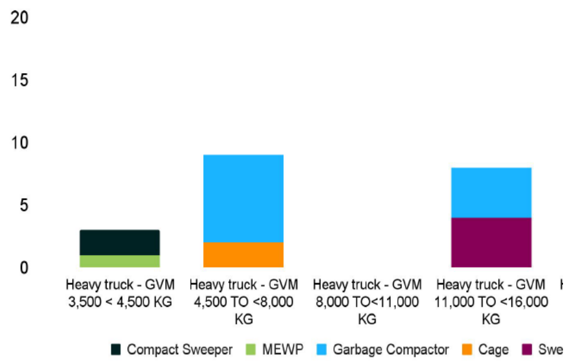
Heavy fleet composition

Majority of the heavy fleet comprised of Collection freighters, with potential for electrification in all GVM ranges than two-thirds of the fleet fall in the higher GVM band (from 11t - >16t).

Collection freighters and Sweeper trucks are the most significant groups by body type, comprising ~87% of the heavy vehic

The British EV market continues to mature for the high and low GVM heavy vehicles with options also available for specia such as the Collection freighters (eRCVs) and gritters. Electric compact sweepers (GVM<3.5t) have been adopted by m across the UK that could also replace the compact sweepers in Newcastle Borough Council's fleet.





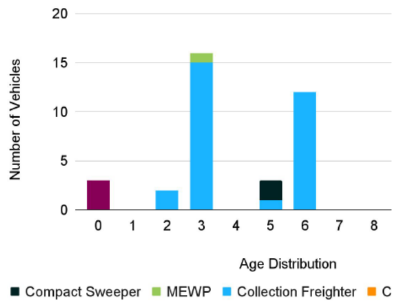
The graphs below show the age and time to replace different heavy vehicles in the Council's fleet. More specifically it shows that most heavy vehicles in the fleet are 3 or 6 years old with a couple younger and older outliers. The second graph shows that the older vehicles in the heavy vehicle fleet (after ~7 years old) should be scheduled for replacement/transitioning in the first iteration of this action plan and that many of the Council's collection vehicles need to be replaced and transitioned after another 4 years.

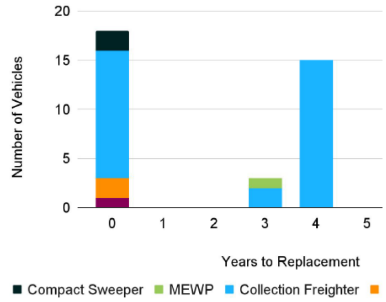
Age distribution & time to replacement - heavy fleet

Around 46%of the fleet is scheduled to be replaced immediately - mostly are Collection freighters.

The typical holding period based on the council's current policy is either 4, 6 or 7 years. The age chart (right) shows that vehicles are spanning to the range of 1 to 6 years with exception to cage and sweeper trucks which are kept beyond the holding period.

Based on the age profile and the holding periods, all of the fleet is due for replacement in the next seven years, with 18 trucks due for replacement immediately.





The graph below shows the annual utilisation of the Council's heavy vehicle fleet. The fleet in total has an average utilisation of 9000 kms with the collection vehicles being the most utilised among the entire heavy vehicle fleet. The majority of heavy collection vehicles are utilised over 10,000 kms.

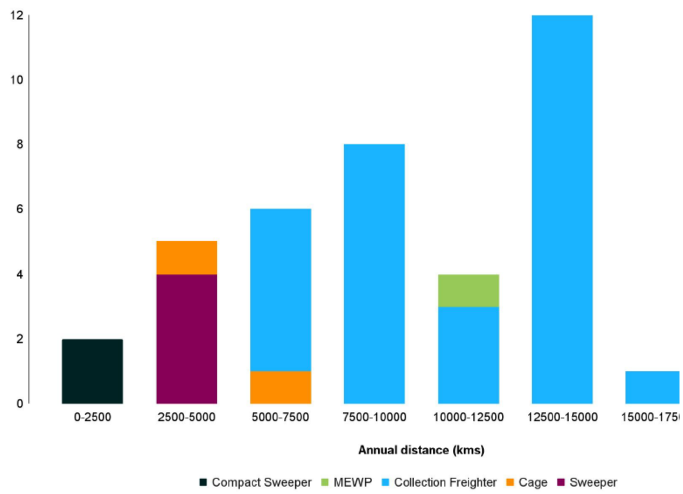
Annual utilisation - heavy fleet

The fleet has an average utilisation of 9000 kms with Collection freighters being the most utilised among the fle

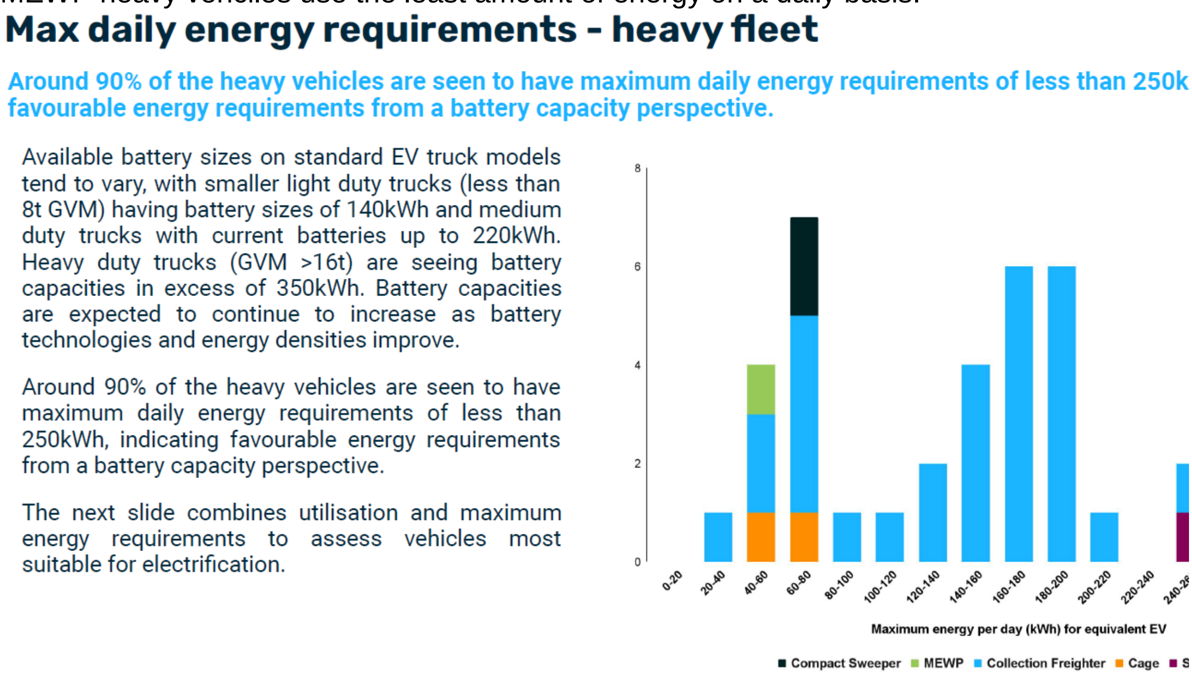
More than half of the fleet is seen to have low utilisation levels (<10,000 kms with 9 vehicles under 5,000 kms annually), which might impact the economic viability of transitioning them to EVs. Most of these vehicles are Collection freighters and sweepers.

The Council should consider the potential for consolidation of these vehicles or increase their utilisation subject to other considerations.

The highly used trucks on the right-hand side of the graph are mostly Collection freighters with an average utilisation around 10,000 kms .



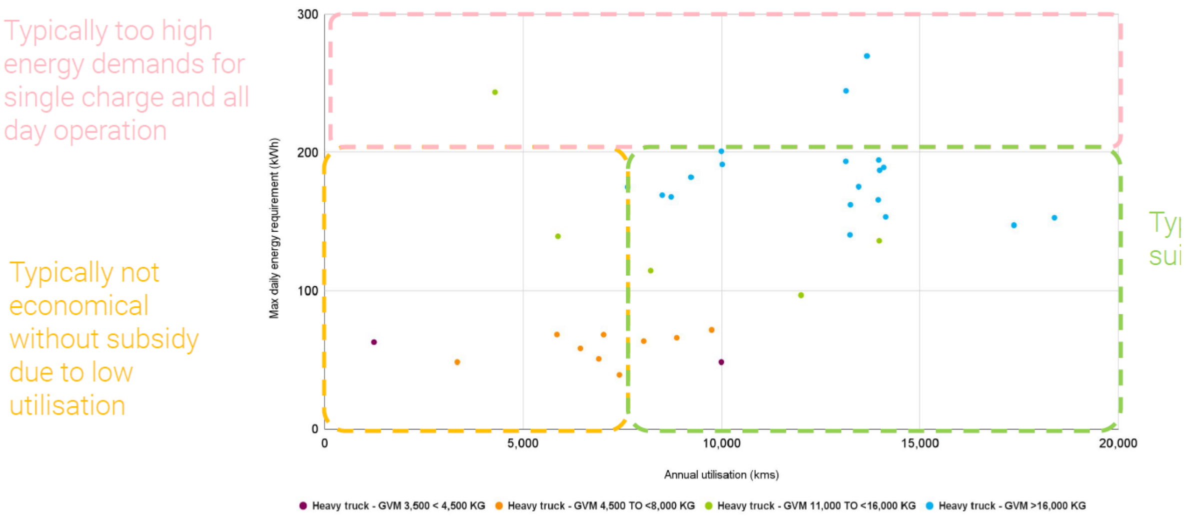
The graph below shows the max daily energy requirements for the Councils heavy vehicle fleet. It details how around 90% of heavy vehicles have a max daily energy requriement of less than 250kWh which indicates a favourable energy requirement for EV alternatives. Most collection vehicles see middle amount of daily energy requireent whilst regualr swepepers need the most daily energy to run their services. Compact sweepers, cage and MEWP heavy vehciles use the least amount of energy on a daily basis.



The scatterplot graph below shows the most heavy vehicles the most suited for transitioning based on the annual utilisation and max daily energy requirements of different heavy vehicles. It shows that the highly used 16,000 KG and above vehicles are most suited for transition out of the entire heavy vehicle fleet and that heavy vehicles such as the 4,500 to 8,000 KG are somewhat suited for transition. Some vehicles across the spectrum are not suited to be transitioned based on their low utilisation and high energy requirement which means the Council should look into optimising their heavy vhicle fleet to ensure all vehciles are being used to their full potential and can be transitioned and used on solely one charge per day.

Maximum energy requirement and utilisation scatterplot

Generally vehicles most suited to electrification have higher utilisation and lower maximum requirements.



*** Note:** *boxes are indicative based on current technology. Full assessment that includes future technology evaluation is provided in the final transition plan*

The line graph below shows the reduction in emissions as the amount of heavy vehicles are increased and presents the data based on different transition scenarios. By 2030 emissions from the heavy fleet could fall to less than 5% based on the economic and leadership scenario which would see a full decarnisation and optimisation of the heavy vehicle fleet by 2030.

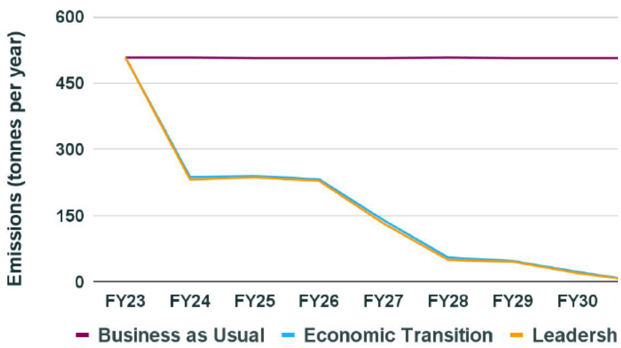
Heavy vehicle transition - CO2 operating emissions reduction

The economic and leadership transition scenarios provides a similar CO2 reduction profile for the two scena emissions falling to less than 5% of current levels by FY30

The similarity in transition timelines for the economic and leadership scenarios for heavy vehicles provides a similar emissions reduction profile, with the carbon output falling to 4.5% of current levels by FY30 in the economic case and 3.9% in the leadership.

The leadership scenario reduces heavy fleet emissions to zero by FY33 when all vehicles are transitioned to electric vehicles.

In the economic case, one vehicle from the heavy fleet remains as an ICE vehicle due to its lower utilisation. The vehicle is currently fuelled with crude oil based diesel fuel, if switched over to HVO fuel it would give larger emission reductions.



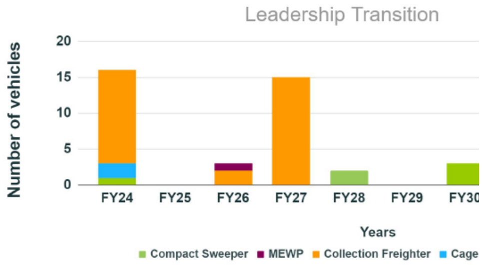
The graphs below show the timeline of heavy vehicle transitions and the relevant costs for those transitions based on the leadership scenario that .The heavy vehicle fleet at the Council would see most transitions to zero emissions vehicles duirng 2024 and 2027 of heavy vehciles and that for the total decarbonisation of the heavy fleet it would cost around £7.96M up to 2033. The most costly of years for the transition of the heavy vehicle fleet would be 2024, 2027 and 2029.

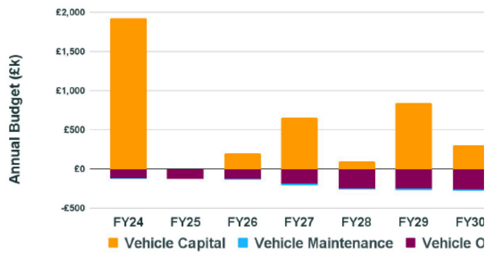
Heavy vehicle transition analysis - Leadership scenario

All of the heavy vehicles could transition to EVs, with a total cost of ~£7.96 million up to FY33.

In the Leadership scenario, all of the heavy fleet (39 vehicles) are expected to transition to electric by FY30.

The leadership transition scenario has a higher total cost compared to the BAU over the full period to FY33 in the order of ~£1.90M. This is a net result of £2.16M savings in operating costs and £126k savings in maintenance that partially offset the higher capital for vehicles increase of £4.18M.





<u>Plant and Equipment Transition Case Study</u>

This section presents the plant and equipment data of the Council surveyed by Evenergi, derived from the Evenergi Fleet Transition Plan. The section provides summary analysis and figures/tables to present the cost, energy, carbon savings and interventions needed by 2030 for the Councils plant and equipment to become net zero.

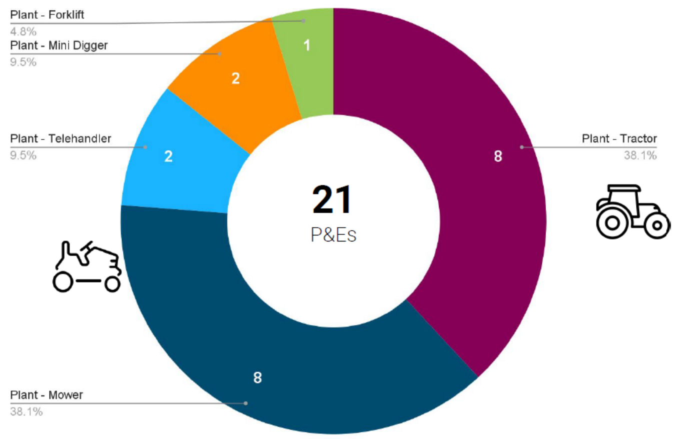
The pie chart below shows the amount of plant and equipment assets that the Council own and what it consists of. There are 21 P&Es (Plant and Equipment) mostly composed of tractors and mowers. Other P&Es include a forklift, mini diggers and tele handlers.

Plant composition

The council has light and heavy Plant & Equipment. Tractors and mowers are the prominent of the fleet.

The majority of the Council's P&E fleet are small light plant equipment, predominantly diesel powered, mainly represented by Massey Ferguson tractors and Ransome HR300 mowers, together they account for more than two thirds of the council's Plant & Equipment. Other P&Es in the fleet include mini diggers and telehandler.

The P&E fleet has a combined annual diesel fuel consumption of almost 35,500 litres, with the highest consumption by equipment type of tractors and telehandlers.



The figure below shows the transition plan for P&Es at the Council. Much of the technology for these is still in devleopemnt and wuld need to be tested and trialed in the early 2020s befor being rolled out before 2030 as seen on the figure. To learn more about the development of P&E technology and the barriers and risks they may cause please read after page 75 in the full Evenergi Fleet Transition Plan.

Next steps to transition plant and equipment

A staged approach to the transition is recommended for NULBC focusing current fit-for-purpose market ava total cost of ownership suitability. Periodic reevaluation will be required to update the plan.

The NULBC plat equipment fleet of 21 vehicles currently show low utilisation which typically does not show an optima from a total cost of ownership perspective. Below is an indicative suggested timeline for replacing NULBC plant e starting with Ride on Mowers.