moving to zero

Zero Emission Commercial Vehicle Guide

What are the benefits, obstacles and practicalities?

Zemo Partnership

Accelerating Transport to Zero Emissions

Moving to Zero: Zero Emission Commercial Vehicle Guide

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Introduction

This guide is intended for fleet decision-makers, such as fleet managers and procurement practitioners, from local authorities and small and medium enterprises (SMEs). The guide provides an initial overview about the benefits, obstacles and practicalities of deploying zero emission vans and HGVs, and associated infrastructure, and directs you to resources and tools to help you learn more and take the next steps. While it is intended to be relevant to any UK-based commercial vehicle fleet, it has some specific focus on Wales, having been produced as part of Zemo Partnership's *Moving to Zero | Symud i Sero* initiative, which is being funded by Welsh Government. More detailed guidance and updates to this guide will be presented as the initiative progresses.

There were 4.75 million light goods vehicles and just over 0.5 million HGVs licensed in Great Britian at the end of Q3 2025[1], together accounting for just under 13% of all licensed vehicles. For Wales, the figures were roughly 278,000 vans and 25,000 HGVs (14%). Vans and trucks play a vital role in moving goods and services around the country. However, the most recent emissions data shows that they are responsible for at least 40% of road transport nitrogen oxide emissions (NOx), 36% by mass of PM2.5 particle emissions and approximately 36 million tonnes (36%) of tailpipe Greenhouse Gas (GHG) emissions per year (CO_2 equivalent)[2]. This guide will help fleets transition away from these polluting vehicles, burning diesel or other fuels, to cleaner and better zero emission alternatives. The guide:

- Provides information on the zero emission commercial vehicle (ZECV) market and government policy.
- Helps operators to identify which technologies are appropriate now for their fleet, or very likely to become so in the near future.
- Provides case studies highlighting Welsh commercial vehicle fleets that are already switching to, and benefitting from, ZECVs.

In the following sections, this guide explains the factors to consider when choosing ZECVs, outlines the various grants and incentives available to help support your fleet transition and provides some key insights into the various vehicle and battery technologies, and infrastructure options. The guide concludes with a 'What to do next?' section that provides links and signposts to further sources of information, guidance and tools to help you make the switch.

[1] DFT VEH01 https://www.gov.uk/government/statistical-data-sets/all-vehicles-veh01
[2] National Atmospherics Emissions Inventory (NAEI), 2023, not including auxiliary Transport Refrigeration Units https://naei.energysecurity.gov.uk/data/data-selector

Why Choose Zero Emission Vehicles?

The right zero emission vehicles for you are the ones that save you money, reduce your environmental impact, meet your operational needs and help you to win new business.

Better for business

Reducing GHG emissions from your vehicle usage makes good business sense by helping to demonstrate an environmental commitment and enhance your organisation's image. Meeting corporate social responsibility and emission reduction targets are also more important than ever, especially for large fleets and large organisations using third-party fleet and logistics companies. Your organisation's reputation, in the eyes of the public, your customers, suppliers, competitors and the wider industry, has never been under greater scrutiny.

Fleets' environmental credentials are becoming more important to their customers, and this is feeding through into many procurement requirements. To support their carbon reduction commitments, some local authorities have introduced zero emission performance standards as part of their tendering process for contractors. Big companies and organisations across the UK and Europe are doing the same. By operating zero emission vehicles, you will be a step ahead of other companies bidding for work. Consumer surveys are pointing in the same direction; with sales of battery electric vehicles (BEVs) increasing rapidly over recent years (to around 25% of new car sales at the time of writing) and there is strong support for public policy to clean up transport now. Citizens expect their national and local governments to be ambitious about driving the shift to zero emission vehicles and they will increasingly expect the companies they spend their hard-earned money with to be just as committed.

But it's not just about your image and reputation, switching to ZECVs can increasingly make sound financial sense too, at least for BEVs. ZECVs generally come with higher upfront purchase prices compared to their diesel counterparts. However, with prices falling, and some bargains to be had, this initial investment is becoming easier to offset over time via significantly lower in-use costs, including reduced running costs from using electricity instead of diesel and lower maintenance requirements. These savings can make electric trucks and vans a more cost effective option in the long run and over the course of a typical first-user ownership period of 4-5 years.

Even before the Iran war, independent estimates such as those by Mercedes-Benz[3] and T&E[4] suggested that overall, including all upfront purchase and usage, first-user costs for battery electric vans are typically around 3-5 pence per kilometre cheaper than diesel equivalents. Vans averaging 200 km (125 miles) per day and about 50,000 km (30,000 miles) per year, typical of many UK fleets, could thus work out at around £10,000 cheaper to run over a 4-5 year period. For trucks (eHGVs), the market is less

[3] https://www.mercedes-benz.co.uk/vans/technology/electric-vans/running-costs.html

[4] https://www.transportenvironment.org/uploads/files/202203_vanTCO_nationalfiches_UK-1.pdf

well developed and the upfront costs are relatively high for now, but early feedback published recently by the Electric Freightway project[5] suggests that if the charging cost for an average long-haul eHGV travelling 100,000km/year is 24p/kWh (which is not unusual for a largely depot-based fleet), it will break even with a diesel equivalent vehicle within five years, and thus cost less overall if kept for only slightly longer.

Industry TCO forecasts now consistently predict that eHGVs will become widely cost effective, across most urban and regional duty cycles, by 2030 and by 2035 for long-haul operations – well ahead of the 2040 phase-out date. Zemo's own modelling for the Welsh Government forecasts cost effectiveness for battery electric vans and trucks across all use cases in the period 2028-2032, even sooner if appropriately targeted new policy interventions are introduced, particularly if the recent dramatic increases in oil prices are maintained.

Better for air quality and health

Exhaust emissions from vehicles contribute to air quality problems in cities, especially for other road users and pedestrians exposed to the poisonous fumes. Poor air quality is extremely harmful to health, affecting almost every organ in the human body. A recent report by the Royal College of Physicians estimates, for example, that 30,000 premature deaths each year (1,000 -1,400 in Wales) are attributable to air pollution, costing the UK £27-50 billion per annum[6]. Many UK cities are putting in place measures such as Clean Air Zones (CAZ), or even Zero Emission Zones (ZEZ), to reduce air pollution from the vehicles using their streets, including vans and trucks. London's CAZ is called the Ultra Low Emission Zone (ULEZ). This aims to discourage use of older, more polluting vehicles across the London area. Diesel vans operating in the London ULEZ must comply with the Euro 6 emissions standard or pay a daily charge.

Local air quality compliance is targeted through imposing restrictions and different charges on the types of vehicles that are allowed into CAZ areas such as London's ULEZ; if you're a fleet still using vehicles manufactured much before 2016, you may well be facing extra charges to conduct your business. Cities currently charging commercial vehicles for access to their streets, or in some cases restricting access completely, include Aberdeen, Bath, Bradford, Birmingham, Bristol, Dundee, Edinburgh, Glasgow, London, Newcastle, Oxford, Portsmouth and Sheffield.

While many companies and organisations are already making TCO savings from their investments in zero emission vehicles, improved vehicle availability – together with the introduction of Clean Air and/or Zero Emission Zones – will further strengthen the case for acquiring ZECVs over the next few years. By switching to zero emission vehicles now, you will not only immediately help to improve your own health prospects but help safeguard the wellbeing of your family, friends and customers too.

[5] https://www.hitachizerocarbon.com/wp-content/uploads/2025/10/Electric-Freightway-report-3-Interim-findings.pdf

[6] https://www.rcp.ac.uk/news-and-media/news-and-opinion/air-pollution-linked-to-30-000-uk-deaths-in-2025-and-costs-the-economy-and-nhs-billions-warns-rcp/

Better for the environment

We must all play our part to reduce greenhouse gas emissions. The UK Government has introduced regulations and incentives to encourage zero emission vehicle sales and use and has set an ambition to end the sale of conventional petrol and diesel cars, vans and HGVs up to 26 tonnes by 2035, with heavier HGVs following by 2040. The planet's average surface temperature has risen about 1.5°C since the late 19th century, a change driven largely by human-made greenhouse gas (GHG) emissions into the atmosphere.

The impacts of long-term global warming are already being felt across the planet, in coastal flooding, heatwaves, intense storms and ecosystem change. Scientists are clear that to limit these effects in future and avoid catastrophic changes to human society over the next few decades, we must stop burning fossil fuels and we should do so by the end of the 2020s, preferably sooner.

The period between October 2022 to March 2024 was the wettest 18-months on record for parts of the UK. Large amounts of farmland were underwater for long periods, which led to the second worst arable harvest since modern records began. This came on the back of record-breaking heatwaves in summer 2022, with temperatures exceeding 40°C for the first time in many places and nearly 3,000 heat-related deaths. Simultaneously, the hot and dry conditions led to an unprecedented number of wildfires, with many fire and rescue services declaring major incidents[7]. In 2022, Wales also recorded its highest ever temperature of 37.1°C at Hawarden Airport, Flintshire.

Transport is the largest source of UK emissions, and therefore time is of the essence, requiring urgent and rapid rollout of zero emission vehicles of all types and sizes .

Technologies for zero emission vans and trucks

There are two technologies for zero emission vans and trucks and each has different benefits and characteristics – battery electric vehicles (BEVs) and hydrogen fuel cell electric vehicles (HFCEVs).

Information on non-zero emission alternative combustion fuels and technologies, that can play an important decarbonisation role in the transition between diesel-based and fully zero emission fleets, is available via a separate Zemo guide to renewable fuels[8].

BEVs are currently the dominant zero emission technology and are becoming increasingly available for all common van and truck use cases. They are thus the key focus of this guide.

The niche future potential for HFCEVs remains uncertain, e.g. in certain extreme long-haul use cases, or for specialist vehicles. Presently, however, and for the foreseeable future, availability of HFCEVs is very limited, the vehicles and hydrogen are expensive and low carbon hydrogen supplies are highly constrained, although some publicly-funded HFCEV trucks and infrastructure will be trialled from 2026.

[7] https://www.theccc.org.uk/publication/progress-in-adapting-to-climate-change-2025/
[8] https://www.zemo.org.uk/assets/reports/Renewable%20Fuels%20Guide%202023.pdf

There are plenty of misconceptions and misinformation about battery electric vehicles, but trustworthy data from reliable, independent sources makes it easier to find the solutions that are (or soon will be) the perfect match for your business. This guide will therefore be the clear, reliable data source to assist your business decisions.

Factors to Consider

You can use this guide to undertake an assessment of the suitability of battery electric vehicles for your fleet. The assessment criteria are divided into three:

- Operational: vehicles must be practical, including having enough range, payload and load volume to meet your needs.
- Environment: vehicles should have clear environmental benefits compared to a conventional diesel model and be compliant with local regulations.
- Cost: vehicles should primarily be assessed on a TCO basis, though upfront cost and funding mechanisms should also be considered, including any depot-based charging infrastructure. TCO modelling, however, tends to overlook a wide range of less tangible likely benefits. Considering these alongside a conventional TCO calculation can be described as the Total Opportunities of Ownership (TOO)[9].

The Total Opportunities of Ownership

Under this wider TOO umbrella, operators might, for example, additionally factor into their thinking issues such as how making an early, trailblazing switch to ZECVs can:

- help to build brand image as leading this transition, thus attracting new customers, new recruits, additional sales, new investors and/or more favourable financing terms;
- help to win new contracts by making your fleet more attractive to client procurement teams, to benefit from lower Scope 3 emissions (and, of course, an enhanced brand image for them, too);
- help you to more readily recruit and retain HGV drivers, perhaps from more diverse backgrounds, and offer lower levels of sickness absence through the greater ease (and lower stress) of driving electric;
- enhance productivity through reductions in vehicle downtime;
- help to build links with your local community, providing a more supportive environment for business expansion and positive engagement with your local authorities; and
- dramatically reduce GHG emissions and eliminate the tailpipe pollutant emissions from your vehicles that don't just adversely impact the health of the communities you drive through, but also the health outcomes of your own drivers and the people who work at or near your depots.

The assessment criteria are set out in more detail in the table below:

[9] https://electrical.theiet.org/guidance-and-codes-of-practice/publications-by-category/electric-vehicles/guide-to-depot-charging-of-electric-heavy-goods-vehicles/

Operational	**Range**	Vehicle range requirements will depend on the intended duty cycle, access to recharging infrastructure, and dwell time to allow recharging to take place.
	Recharging infrastructure	Many vehicle duty cycles work best with depot-based recharging infrastructure. Others will need shared or public infrastructure.
	Payload	BEVs currently tend to have relatively heavy batteries which may limit payload in weight-constrained operations, although in many cases this is more than mitigated by maximum weight derogations. BEVs do not usually impact load volume, however, so will tend to have minimal productivity impacts for volume-constrained operations.
	Load volume	
	Drivers	BEVs are smoother, easier and less stressful to drive than combustion vehicles. Fleets that have adopted BEVs report positive feedback from their drivers, most of whom say they would never want to go back to driving combustion vehicles.
	Dealer support and servicing	Servicing and maintenance requirements tend to be less onerous and costly for BEVs, but you should still ensure that in-house or outsourced technicians are qualified to work on them.
Financial	**Upfront cost**	BEVs currently tend to have an upfront price premium over diesel models, which may put additional pressure on capital budgets. These differentials are falling however and when transactional costs are considered (vs list price), can in some cases be negligible.
	Running cost	BEVs can save you money in running costs, compared to diesel. With emission zone charges, road tolls and parking potentially differentiated by vehicle types, operational costs are becoming more complex. Public charging costs tend to be more variable and expensive than depot or shared charging.
	TCO	Financial assessment should be based on the total cost of ownership, rather than just upfront or running costs. Typically, savings will be achieved if your annual mileage is high enough to allow the lower running costs to offset the initial investment within the first-user lifetime of the vehicle.
	Funding mechanism	Higher capital costs, shifting residual values and vehicle availability all influence the decision on whether to purchase or lease. There is a rapidly expanding range of financing options for fleets, covering vehicles, recharging infrastructure or both.
Environmental	**Pollutant emissions**	Pollutant emissions should be assessed at the tailpipe; GHG emissions should be assessed on a well-to-wheel (WTW) basis[10]. You may place greater importance on reducing one or other types of emissions, depending on your organisation's priorities, customer demands, or local regulations. BEVs emit zero tailpipe pollution and their WTW (and lifecycle) GHG emissions are much lower than diesel equivalents, by up to almost 100% if using fully renewable electricity.
	GHG emissions	
	Noise	BEVs are much quieter in operation than a diesel vehicle.
	Local considerations	Local regulations such as Clean Air Zones or Zero Emission Zones may play a role in determining how quickly you should adopt BEVs.

[10] Well-to-wheel emissions include the emissions from producing, transporting and combusting fuel.

Grants and Incentives

The UK Government offers a range of grants and incentives to encourage the purchase and operation of ZECVs. Figures are correct at the time of writing.

Grants and incentives for zero emission vans

The UK Government provides capital grants through the Plug-in Van Grant of up to £2,500 and £5,000 for small (<2.5t) and large vans (2.5-4.25t) respectively. These grants are available until at least March 31st, 2027. The scheme works by offering a discount at the point of sale, which is applied automatically by dealerships and leasing companies. All the major manufacturers, established and new, have BEV vans eligible for the grants, including BD, Citroen, Farizon, Ford, Iveco, Kia, MAN, Maxus, Mercedes, Nissan, Peugeot, Renault, Vauxhall and VW.

There are a wide variety of grant schemes to provide funding towards the purchase and installation of charging infrastructure[11], at locations including outside flats and commercial premises, outside homes without off-street parking, at workplaces, in car parks, in depots and at educational institutions. Grants are now typically up to £500 per socket (rising to £2,000 for state-funded educational institutions) but can also help towards the cost of dedicated parking spaces. The total grants available to individual companies or premises are usually capped, e.g. at £20,000 in the case of the 'Workplace Charging Scheme'. These grants will typically be useful for van fleets installing 7, 11 or 22 kW AC chargepoints for overnight use or otherwise where vehicles are likely to be parked for several hours at a time.

The new 'Depot Charging Scheme' is also of potential relevance to van depots, including for the installation of higher power DC chargers of 50-350 kW. Further details are provided in the trucks section below.

UK legislation currently states that the end date for the sale of new non-zero tailpipe emission light duty vehicles will be 2035. Manufacturers are also required to supply a percentage of ZEV vans to the UK market based on total vehicle sales, through the ZEV Mandate. Though various flexibilities are in place, the ZEV Mandate basically requires each van OEM to supply 24% of their new vans as zero emission in 2026, increasing year-on-year to 70% by 2030 and 100% by 2035. There is currently no equivalent ZEV mandate mechanism for trucks, though the introduction of one is widely anticipated.

With similar requirements for sales of new cars, but with more aggressive annual targets (e.g. 33% in 2026 and 80% in 2030), the UK is now one of the leading markets for BEV car and van sales in Europe. As well as helping to scale up vehicle supplies, drive down manufacturing costs, and support innovation in battery technologies, this market growth is also driving a rapid expansion in public high-power charging infrastructure. Many of these charging sites will (and should) be accessible by BEV vans and some by eHGVs, too.

[11] https://www.gov.uk/guidance/electric-vehicle-chargepoint-grants

Grants and incentives for zero emission trucks

The UK Government also provides financial incentives for the procurement of trucks through the Plug-in Truck Grant, of up to £15,000 for vehicles between 4,250kg and 12,000kg gross weight, £37,000 for those in the 12-18t weight bracket, £52,000 for 18-26t vehicles and £81,000 for heavier vehicles (>26t gross weight). There are limitations on the number of plug-in truck grants that can be claimed annually. The current scheme will run until at least March 2030.

The Depot Charging Scheme[12] provides support to fleet operators on the costs of installing charging infrastructure for electric HGVs, vans and coaches at fleet depots. The scheme currently covers 70% of eligible costs (chargepoints, civil works, and where applicable, battery energy storage system or solar costs) incurred, up to a maximum of £1 million per organisation across all sites. There is no limit to the number of sites you can apply for, but the scheme is limited to one application per organisation.

The scheme applies to public and private sector fleets, local authorities and non-profit organisations, located in England, Scotland, Wales and/or Northern Ireland. The scheme will run until at least March 2030, though grant funding rates are planned to reduce over the lifetime of the programme as charging infrastructure becomes more affordable.

As well as grants, the tax environment also favours BEV adoption. For example, ZECVs qualify for 100% of the purchase costs to be offset against taxable profits in year one.

UK Government legislation currently states that the end date for the sale of new non-zero tailpipe emission vehicles is 2035 for HGVs up to 26t gross weight and 2040 for all heavier HGVs. There is as yet no ZEV mandate for vehicles above 4.25t to help scale the supply of eHGVs from now to those dates, but there is an industry-wide expectation that one will be introduced quite soon.

The UK Government is also supporting the transition to ZE trucks via £200m of Department for Transport (DfT) funding for the Zero Emission HGV and Infrastructure Demonstration programme (ZEHID). Deploying around 300 of the heaviest (40-44t) battery-electric HGVs on UK roads (and a small number of HFCEVs), the programme will also fund and support over 70 public and depot-based infrastructure installations by 2030, with eHGV projects led by companies such as Gridserve, Voltempo and Dynamon.

The funded projects are, and will be for the next five or more years, providing good quality operational data for the fleets involved and wider industry to prove and improve the business case for eHGVs. Much of the high-power infrastructure being rolled out will be available to any eHGV. This should help to reassure other HGV operators that switching to eHGVs is becoming increasingly viable and feasible, and not just for the back-to-base use cases typical of urban and regional delivery fleets, that can often operate entirely using private recharging infrastructure at their own depot.

[12] https://find-government-grants.service.gov.uk/grants/depot-charging-scheme-1

The private sector is also stepping up to expand public high-power charging infrastructure for eHGVs across the UK, outside of the ZEHID programme, e.g. Milence, Aegis and BP Pulse.

Battery Electric Vans: Key Insights

Technology overview

A battery electric vehicle (BEV) stores electrical energy (externally supplied via a chargepoint) in a battery and delivers power to the wheels through an electric motor. Some braking energy is put back into the battery by the motor temporarily acting as a generator as the vehicle decelerates or travels downhill.

Vehicle availability

Battery electric vans are a high maturity technology, with products available from an expanding range of major manufacturers. Vehicles are available across all size and weight categories and not just from the established OEMs like Ford, Mercedes and Renault but also from newer entrants to the van market like Kia, Farizon and Maxus. BEV van sales in the UK are increasing steadily, hitting a record 14% market share in February 2026.

Operational

Range: BEV vans have a typical real-world range of around 100-200 miles on a single charge, depending on battery capacity, payload, weather conditions and journey type. Driving on motorways, at high payload and during winter will typically give about half the range of driving in urban areas, lightly loaded in summer. As battery technologies improve, vehicle ranges are also improving, with some newer models quoting official ranges approaching 300 miles over a standardized mix of urban, rural and motorway driving, even higher for purely urban/city operations.

Payload: For large vans, the increased GVW allowance on the B category driving licence from 3.5 tonnes to 4.25 tonnes for BEV vans compensates for any lost payload due to the additional weight of the batteries. There may be a small loss of payload impact for smaller vans, however, depending on battery size.

Load volume: Load volume is the same as for an equivalent diesel model.

Recharging: There are now over 92,000 public chargepoint devices spread across the UK at around 46,000 locations[13]. Not all are suitable for vans, especially larger types, but more are being added each month in response to the rapid growth in EV uptake. BEV vans typically take up to 10 hours to recharge from a slow (7 kW AC) charge point but can take a 10-80% charge in around 30 minutes from an ultra-rapid charger (150 kW+ DC). Some manufacturers have recently announced plans for vans capable of charging in less than 20 minutes at up to 350 kW.

Financial

Upfront costs: Cost premiums are reducing and the OZEV Plug-in Van Grants further help to lower the additional upfront costs. To help achieve their ZEV Mandate targets,

[13] https://www.zap-map.com/ev-stats/how-many-charging-points

OEMs and dealerships are often offering quite substantial discounts on the list prices of new BEV vans – negotiating can yield significant savings for operators purchasing now.

Running costs: Electricity can be substantially cheaper than diesel on a pence per mile basis, especially if charging is predominantly done in a depot or outside a driver's house. BEVs have fewer moving parts and reduced brake wear due to regenerative braking, so maintenance costs are lower as well.

Total Costs of Ownership: Although BEV vans often have a higher upfront cost than their diesel counterparts, many businesses are finding that savings on fuel, maintenance, and taxes offset the initial investment within the vehicles' ownership period. Additional incentives such as enhanced brand image and driver satisfaction/retention (TOO factors) can further strengthen the business case.

Environmental

Pollutant emissions: BEVs produce zero tailpipe emissions, making them ideal for improving air quality in cities, and they are compliant with every current and planned clean air/low emission zone in the UK.

GHG emissions: They deliver GHG savings of about 70-80 per cent on a WTW basis, which accounts for the current average carbon intensity of UK electricity production. This benefit will increase as the electricity grid decarbonizes and if companies use their own renewable energy generation, e.g. via rooftop solar.

BEV vans typically have higher GHG intensity than their diesel counterparts as they first leave the factory, due largely to embedded emissions from battery manufacturing, but this "carbon debt" is typically paid off, through much lower in-use emissions, within the first one or two years of driving.

Noise: BEVs are nearly silent in operation (they are required by law to make some sound at low speeds), helping to reduce noise in urban environments.

Deployment

Ideal operation: BEV vans are best suited to city and urban environments where their relative efficiency over diesel vehicles is at its greatest, and daily driving distances are well within their capabilities on a single charge, though even high mileage operations can benefit from the savings in fuel and maintenance costs. Vehicles are typically returned to their base or depot to recharge overnight, with some organisations allowing employees to take them home to recharge. The growing number of public charging stations allows top-up charging during the day for use cases that exceed the available range of the vehicle, though this may adversely impact productivity in some cases.

BEV van case study: Tesco refrigerated home delivery fleet, Cardiff

Tesco has recently added its 1,000th battery electric van to its UK fleet, delivering shopping to customers' homes from their Cardiff Extra store. The store runs 20 vans, completing nearly 5,000 deliveries each week, and all charged back at base. This is now the third store in Wales to operate a fully electric fleet, after Talbot Green and Culverhouse Cross.

The retailer is rapidly expanding its electric home delivery vehicle fleet, growing from 720 vans in March 2025 to a projected 1,250 by Spring 2026, helping improve air quality in urban areas and reducing emissions. Tesco use a range of vehicles, from Ford, Iveco, Maxus and Mercedes, all being well suited to their needs. As part of its commitment to achieving carbon neutrality across operations by 2035, Tesco aims to operate a fully electric home delivery fleet in the UK by 2030.

Battery Electric Trucks: Key Insights

Vehicle availability

Battery electric trucks (eHGVs) are a rapidly maturing technology, with products now available to suit various operations and duty cycles. Vehicles are available in the UK across all size and weight categories from the established OEMs like DAF, Iveco, MAN, Mercedes-Benz, Renault, Scania and Volvo. New entrants like Tesla, Windrose and BYD are also starting to appear in Europe. BEV truck sales in the UK are increasing rapidly, hitting a record 2% market share at the end of September 2025.

Operational

Range: eHGVs are designed to have ranges suitable for the end-use applications they're intended for. For urban delivery vehicles, this typically means about 200-300 km on a single charge, while tractor units designed for regional or long-haul articulated vehicle operations have larger batteries and can travel up to 500-700 km on a charge.

Payload: There is for now a trade-off between range and payload loss, with larger batteries giving more range but their heavier weight having more of an impact on available payload. This is not a problem for hauliers predominantly carrying relatively light, low-density goods, but can be an issue for those operating close to the current maximum legal weights. Weight derogations are in place to allow up to an additional 2 tonnes gross weight for some eHGVs, so a 4x2 tractor unit can, for example, operate at up to 42t instead of 40t. The industry is lobbying the UK Government to make further amendments to Weights & Dimensions legislation to allow overall gross weights for artics to exceed the current 44t limit, and for 4-axle rigids to operate at more than 32t. As battery technologies (energy densities) improve, the payload loss issue is likely to diminish over the coming years in any case, and there are various other options on the horizon that could enable smaller batteries to be used (and thus higher payloads to be carried) without excessive down-time for recharging, including battery swapping and dynamic charging.

Load volume: Load volume is the same as for an equivalent diesel model.

Recharging: UK operators deploying eHGVs into their fleets are typically doing so with an expectation that most or all their recharging will be done at their home depots overnight, which suits the large number of back-to-base operations. High-power charging infrastructure for eHGVs away from their home depots to top-up during their journeys, is also developing at pace, however. These facilities can be in the depots of other HGV or bus operators, can be at logistics sites eHGVs frequently use as delivery and/or pick-up points, or in dedicated, publicly accessible eHGV charging sites. Overnight charging can typically be achieved with 22 or 43 kW AC chargers, while on-the-go top-ups require ultra rapid charging at 150-350 kW using the existing CCS2 charging standard, as used by EV cars. MCS (Megawatt Charging Standard) chargers are also starting to be rolled out specifically for eHGVs and other heavy duty, high mileage vehicles. They allow 10-80% top-ups well within a driver's statutory rest period of 45 minutes.

Financial

Upfront costs: Cost premiums for eHGVs are reducing quite rapidly but are still a significant hurdle to widespread adoption. OZEV Plug-in Truck Grants and tax breaks help to lower the additional upfront cost premiums. Innovative financing and leasing models are also being introduced to help spread these costs over longer periods and share some of the risks.

Running costs: Electricity can be substantially cheaper than combustion fuels on a pence per mile basis, especially if charging is predominantly done in a depot or using shared facilities in another operator's depot. BEVs have fewer moving parts and reduced brake wear due to regenerative braking, so maintenance costs are lower as well. As a rough rule of thumb, an eHGV will consume about 3.5-4 kWh of electricity for every one litre of fuel an equivalent diesel truck consumes. So, if you assume, as an example, that diesel fuel will cost about £1.60 per litre over the course of the next few years (it has varied between about £1.40 and £2.00 over the last 3 years), an eHGV fleet that can source electricity for less than about 40 p/kWh on average will likely make running cost savings – even more so when considering lower maintenance costs. There is intense pressure on the UK Government to lower electricity prices to consumers and businesses, not just to support BEV adoption but also to help struggling families and improve the international competitiveness of UK industry.

Total Cost of Ownership: Although electric models have a higher upfront cost than their diesel counterparts, early-adopter businesses such as those involved in the ZEHID programme are finding that savings on fuel, maintenance, and taxes can offset the initial investment within the vehicles' ownership period. Additional incentives such as enhanced brand image and driver satisfaction/retention (TOO factors) can further help to strengthen the business case. Residual values are another key determinant of overall financial viability but given the newness of the technology in real-world HGV applications, these remain highly uncertain. Operators can take advantage of the increased reliability of eHGVs by extending their first-user periods from, say, 3-5 years to more like 5-8 years, which further helps to generate TCO savings. The industry is also lobbying the UK Government to introduce some form of residual value guarantee scheme.

Environmental

Pollutant emissions: BEV trucks produce zero tailpipe emissions, making them ideal for improving air quality in cities.

GHG emissions: They deliver GHG savings of about 70-80 per cent on a WTW basis, which accounts for the current average carbon intensity of UK electricity production. This benefit will increase as the electricity grid decarbonises and if companies use their own renewable energy generation, e.g. via rooftop solar panels.

Like BEV vans and cars, eHGVs typically have higher GHG intensity than their diesel counterparts when they leave the factory, due largely to emissions from battery manufacturing. Even with their larger batteries, however, this "carbon debt" is still

typically paid off, through much lower in-use emissions and higher annual mileages, within the first one or two years of driving.

Noise: BEV trucks are nearly silent in operation, particularly at low speeds, helping reduce noise in urban environments and potentially opening up options for night-time deliveries on uncongested roads.

Deployment

Battery electric HGV case study: FSEW, South Wales

FSEW is working with Tesco to provide a fully electric distribution service lane between the supermarket's site in Maesteg and its distribution centre in Magor. The decarbonisation freight specialist operates four trucks using a combination of Volvo, DAF and Mercedes-Benz eHGVs to transport hygiene paper products. FSEW is also trialling eHGV operations for Tesco between Maesteg and Lichfield and has just started eHGV container transport from Maesteg to Southampton docks.

These fully electric services support FSEW's work to switch to fleet-wide net zero transport operation by 2030. In total, the freight forwarders now have 10 eHGVs in their fleet. For Tesco, working with innovative suppliers such as FSEW is seen as key to overcoming some of the barriers on their own journey to net zero.

|

Ideal Operation

B category driving licence best suited to back-to-base duty cycles typical of most urban and regional fleets, and volume-constrained long-haul operations. The rapidly growing number of vehicle models and chargepoints being provided for eHGVs will quickly enable an even larger proportion of duty cycles to be completed cost effectively.

Charging infrastructure: Key Insights

Your fleet's transition to BEVs requires a strategic approach, not just in identifying and financing suitable vehicles but crucially, too, in ensuring those vehicles will have access to appropriate, cost effective charging infrastructure. There are in essence two main types of infrastructure and you may need access to one or both. These can be described as depot-based and journey charging.

Even if today's battery electric vehicles are still not quite right for your business and you thus need to buy new combustion vehicles in 2026, there is a high likelihood that cost effective battery electric options will be available for you when you come to replace those vehicles in perhaps 3-5 years' time. You should start planning and preparing for depot electrification now.

Depot-based options

Depot charging is well-suited to fleet operators with a fixed base of operations and can have several major advantages. For example, when vehicles are parked up overnight and can be plugged in to a suitable charger, they can start the next day with a battery charged with enough energy to complete that day's duties, with minimal loss of driver time – it takes just a few seconds to plug in a vehicle and unplug it the next day and drivers don't need to be nearby while the vehicle charges. Charging costs can be minimised since overnight energy rates are usually lower than daytime rates and bulk procurement arrangements can be made with energy suppliers based on this routine. Smart charging technology can be deployed to control the charging schedule for each vehicle separately, allowing fleet managers to plan and prioritise vehicle availability and optimise charging times within depot electrical capacity limits – it is unlikely all your vehicles will need to be charged to 100% every night. There may also be opportunities to open your charging infrastructure for daytime use by third-parties, enabling additional income to help offset the infrastructure costs.

To decide whether depot-based charging is right for you (and it almost certainly will be in some form or other), you will need to plan carefully and consider how, where and when your vehicles will be available for recharging (while minimising additional downtime), what power is available across your site(s), the number, type and power rating of the chargepoints you'll need and what space you have or can make available for them.

Of these considerations, the most challenging is usually preparing for and securing sufficient power capacity for your depot. For large fleets, this can involve provisioning tens of megawatts (MW) of power and need significant engineering work and time to access grid connections. You'll also need to look ahead at your business growth plans and consider if and how they affect your future needs.

There is a wide selection of organisations which can help you plan and implement your depot charging strategy and plans, and guides to give you all the details you'll need, some of which are signposted in the 'What to do next' section at the end of this guide. In all cases, an early discussion with your Distribution Network Operator (DNO) is highly advisable.

Journey charging options

Journey charging involves charging when away from a home depot (or other location used routinely for overnight charging). Using a high proportion of depot charging is generally critical to the successful, cost-effective operation of BEV vans and trucks, largely by minimising charging/electricity costs, but journey charging can complement some operations. In the right circumstances, it can also be cost effective in its own right, by virtue of avoided costs for grid upgrades and the installation of your own depot charging infrastructure, particularly where high-power devices are needed, e.g. to support double-shift operations.

Journey charging infrastructure can be located either at specific drop-off/pick-up points (enabling rapid top-ups while the vehicle will be stationary anyway), or at dedicated en route charging sites. While most journey charging is likely to require high power DC chargers of 150 kW+ for vans and 350kW+ for eHGVs, lower power devices could still be useful if vehicles are parked up anyway for extended periods; particularly if the requirement is only for a small top-up to enable subsequent return to base, or at locations where long-haul vehicles will be parked up during drivers' mandatory rest periods. A strategically located network of very high power charging sites, using the Megawatt Charging Standard (MCS), is starting to be rolled out across the UK and mainland Europe.

One fleet's depot charging infrastructure can also, of course, be made available as journey charging infrastructure for other fleets to use, where it is feasible for the host depot. This can be done in such a way that all users can benefit financially. Such sharing of depot infrastructure is increasingly seen as an important solution, especially for SME fleets, both for expanding options for charging and reducing charging cost through higher utilisation of power capacity and assets. There are also options emerging for collaborative initiatives between different operators in the provision of co-located semi-public or public charging sites.

Infrastructure case studies: Royal Mail, Newport & FSEW, Cardiff

As part of the company's nationwide roll-out of electric vans, Royal Mail moved to an all-electric fleet of delivery and collection vehicles at its Newport West Delivery Office in 2022.

All 43 diesel and petrol vehicles at the unit were replaced by electric vans. 11 double electric AC charging posts (allowing for 22 vans to be charged at the same time) have also been installed on the site as part of the transformation, and the electricity for powering the office and for charging the vehicles is purchased via a 100% renewable tariff.

The Low Carbon Freight Hub is being developed in Cardiff and will primarily serve FSEW's eHGVs, but with potential availability for commercial third-party charging in the future. Zenobē has been appointed as charging infrastructure partner, drawing on its bus fleet electrification and battery storage expertise.

The hub will be powered entirely by renewable energy sources and one of the UK's first low carbon freight hubs. Zenobē will install eight 480kW DC chargers, with the option to expand in future. The infrastructure will utilise Zenobē's smart charging software to dynamically manage and balance power across the site and keep charging costs down for the operator. Zenobē will finance the infrastructure through a charging services agreement with FSEW, helping the firm avoid the upfront installation, grid connection and equipment costs.

Technology Developments: Key Insights

The current situation

LFP (lithium-iron- phosphate) and NMC (nickel-manganese-cobalt) dominate electric van and HGV battery packs today. Both fall under the general category of lithium-ion battery chemistries. LFP batteries give lower energy density (meaning higher battery weight for a given kWh energy capacity) but somewhat superior cycle life[14], safety and thermal stability; NMC delivers higher energy density, allowing lighter battery packs for long-range use, but tends to cost a little more. The energy-density, performance, cycle life and cost gaps are not massive, however, so choice is often about duty profile, not raw chemistry alone.

Costs per kWh are falling rapidly and on a clear long-term downward trend. LFP supply chains can often undercut those for NMC, largely by virtue of not requiring some expensive raw materials like cobalt. This drives many commercial vehicles toward LFP for TCO reasons, even though the batteries are heavier and therefore have a greater impact on payload for some hauliers.

NMC cells tend to have faster charging capabilities, useful if high-power journey charging is a major requirement for your fleet, while LFP batteries are more tolerant of high-rate cycling and abuse and more resistant to thermal runaway — potentially important for vehicle safety and depot charging. It is important to emphasise, however, that NMC batteries, used extensively in EV cars over many years, have an excellent fire safety record, with far fewer incidents per vehicle and per mile travelled than combustion engine vehicles.

Operationally, LFP batteries are probably best suited to high-utilisation, hub-and-spoke operations, urban delivery vans and rigid urban trucks with predictable routes and frequent opportunity charging where energy density is less critical but cycle life, durability and vehicle costs matter. NMC suits long-range BEV vans, and regional and long-haul eHGVs where payload and range are critical.

What the future holds

In the near to medium-term, we should expect a variety of alternative battery chemistries to change the trade-offs between cost, performance and longevity rather than a single ‘winner’. Sodium-ion is being commercialised (major suppliers planning production) and offers lower raw material cost, good fast-charge potential and safety; energy density is approaching LFP levels so it could start to displace LFP in some applications soon.

Solid-state batteries promise significantly higher energy densities than LFP or NMC, faster charge and improved safety but remain largely pilot-scale for now. Several suppliers are targeting commercialisation in the latter half of this decade, however, with early adoption likely to be in premium or specialised vehicles before mass commercial

[14] DAF, for example, provide 8 year warranties for their eHGVs with LFP batteries, with up to 4,000 charge cycles covered, equivalent to over 2 million kilometres on a maximum range variant.

vehicle rollout in the 2030s. Solid state batteries probably represent the nearest-term opportunity (beyond legislative changes) for eHGVs to have little or no payload loss compared to diesel equivalents; the energy densities involved would essentially mean the battery weighs no more than the diesel engine, fuel tank and exhaust systems are no longer required.

Other near-market improvements will raise LFP and NMC energy densities and charge speed incrementally while lowering cost, thereby continuing established trends.

In summary, fleet managers should understand that the art of the possible for battery electric vans and trucks is not a constant, it is developing and expanding at pace. You should absolutely avoid the mindset that because some or even all of your specific van or truck applications cannot feasibly be done with battery electric vehicles today, that they cannot be electrified before 2035/2040 either. Tomorrow's BEVs will not be the same as today's and the pace of battery technology development is so great, with such levels of investment behind it, that all things should be firmly considered as likely to become possible much sooner than you may otherwise think (or others may try to tell you).

Beyond the rapid development of battery and recharging technologies, various other technical improvements are being introduced to the ZE van and truck sectors. These include lightweighting through material innovation, e-axles to better capture regenerative braking energy, zero emission fridge units, onboard solar PVs and high efficiency motors.

Hydrogen Fuel Cell Vehicles: Key Insights

Hydrogen, supplied appropriately, can offer significant WTW GHG benefits. It can be stored on vehicles as a compressed gas or as a liquid at a very low temperature. A fuel cell electric vehicle shares similar drivetrain components to a battery electric vehicle, in that electrical energy from a battery is used to power motors. Rather than provide that electricity via an external chargepoint, however, HFCEVs combine the hydrogen stored on board with oxygen taken from the air to generate electrical energy that tops up a small onboard battery as the vehicle moves and water vapour is exhausted to atmosphere. The battery acts as a buffer to manage transient energy demands and capture regenerative braking energy.

Vehicle availability

There are no hydrogen fuel cell vans or trucks currently available on the UK market (and just two car models). In the van sector, Stellantis recently cancelled their fuel cell vehicle programme. Renault is producing a small number of prototype fuel cell vans in France, but no plans have yet been announced regarding a UK market launch. For trucks, the situation is slightly different, with some of the established OEMs such as Volvo and Mercedes-Benz retaining HFCEV development programmes. A handful of pre-release early demonstrator vehicles are scheduled to be deployed during 2026 as part of the DfT-funded ZEHID programme, but at the time of writing none of the vehicles had yet entered service. Industry expectations are broadly that HFCEV trucks could start to appear more widely, at least in European markets, towards the end of this decade.

Operational

Range: Being able to go much further on a single fill of hydrogen than is feasible on a single battery charge is one of the three key potential advantages for HFCEVs over BEVs put forward by advocates of the technology. Range depends on the size of hydrogen tanks specified and whether it is supplied as a gas or liquid. The Renault prototype van has a range of about 600 km, HFCEV articulated vehicles could have a range of 900 km or more. This advantage would only be relevant if electric vehicle drivers cannot access chargepoints (with sufficient power available) as and when they are stationary anyway.

Payload: Payload may be reduced slightly due to the additional weight of the hydrogen tanks and fuel cell systems, but not by enough to cause major concerns for weight-constrained hauliers. With current battery weights and legislation around vehicle weights and dimensions, avoiding payload loss issues is the second key advantage (over BEVs) being promoted, applicable only to weight-constrained operations.

Load volume: Most systems can be installed without affecting the load volume, though the tanks needed for very long-range applications may need to be of such a size as to reduce volumes slightly.

Safety: Hydrogen is a very light gas and therefore any leaks vent quickly to the atmosphere, rather than pooling on the ground like a liquid fuel. This makes it relatively

safe as an energy source, though additional safety arrangements may be needed for vehicle workshops or other enclosed spaces.

Infrastructure

Refuelling times: Hydrogen refuelling takes a similar amount of time to that of a conventional diesel or petrol vehicle. This is the third key advantage cited, though note it would be a disadvantage if comparing to depot-based electric trucks and vans that require just seconds to plug-in and un-plug the next day or at the start of the next shift.

Refuelling locations: There are currently less than ten publicly accessible hydrogen refuelling locations (at the time of writing), with most intended primarily to supply local bus operators trialling fuel cell vehicles.

Financial

Upfront cost: HFCEV vehicle purchase costs are currently very high, around twice the price of broadly similar BEV models.

Running cost: Hydrogen currently costs around £10-15 per kilogramme. One kilogramme of hydrogen going into a fuel cell would produce enough usable energy to take a vehicle about the same distance as an EV fuelled by 16 kWh of battery charge or an ICE by 4 litres of fuel. At these prices, therefore, running costs would be significantly higher than diesel or electric vehicles on a pence per mile basis – the diesel would cost about £7 at current prices and the EV somewhere between £1 and about £8, depending on where and when it is being charged.

TCO: Hydrogen vehicles are likely to be more expensive than diesel or electric vehicles on a TCO basis, although vehicle costs are expected to reduce as the technology matures and hydrogen costs may fall if demand increases. Independent studies forecast that HFCEVs may achieve TCO parity with diesel vehicles in the mid-late 2030s, but a roadmap to future TCO parity with BEV vehicles is very difficult to envisage.

Environmental

Pollutant emissions: Hydrogen fuel cell systems emit only water vapour so there are no pollutant emissions.

GHG emissions: Hydrogen fuel cell systems emit only water vapour so there are no tailpipe GHG emissions either. WTW emissions, however, vary significantly depending on the hydrogen manufacturing process. Unless the hydrogen is produced, compressed, stored and distributed using entirely renewable energy, its overall carbon intensity can be high. At the moment, the most common source of hydrogen is steam reformation of natural gas (a fossil fuel) – vehicles using this hydrogen supply source will have WTW GHG emissions substantially higher than diesel equivalents. Fleet managers considering the use of hydrogen powered vehicles should take steps to ensure any hydrogen their vehicles use is genuinely low carbon (known as green hydrogen) and obtain guarantees from their suppliers that it will remain green throughout the vehicles' lifetime.

Noise: Fuel cell vehicles are very quiet in operation, similar to electric vehicles.

Deployment

Ideal operation: If battery technologies, legislation and/or BEV charging solutions don't develop sufficiently, fuel cell systems, powered by green hydrogen, may become a viable alternative zero emission option for some niche truck applications, sometime in the 2030s. The application currently viewed as most likely to be viable for HFCEVs is very long, very heavy haulage HGVs.

What to do next

This section provides links, suggestions and signposts to further sources of information and advice. If you've made it this far, you've probably (and we hope) already decided that making a full or partial switch to zero emission, battery electric commercial vehicles makes sense for your fleet. The following is intended to help you take the next crucial steps to make that vision a reality.

Seek expert advice

A growing number of companies and organisations can help you with assessing your existing fleet, identifying appropriate BEV alternatives and developing your depot charging plans. These include a wide and growing variety of private sector organisations and service providers, and some independents such as:

Cenex

Energy Saving Trust (EST)

The Association for Renewable Energy and Clean Technology (REA)

Sub-National Transport Bodies, including Transport for Wales (TfW)

Join industry groups

Zemo Partnership offers a wide range of membership benefits for any organisation working towards zero emission mobility. Our Commercial Vehicle Working Group meets regularly and provides an excellent platform for knowledge sharing and discussion amongst your peers and other subject matter experts.

The main trade bodies, Logistics UK and RHA, have a keen interest in supporting their members on their net zero journeys. They, too, have forums for members to discuss issues, identify solutions and learn from other fleet managers.

The Association of Fleet Professionals (AFP), too, enables fleet decision-makers to obtain advice and guidance regarding the key issues that are impacting the running of their fleets, including electrification and decarbonisation.

The Centre for Sustainable Road Freight is a consortium of freight industry organisations and universities, carrying out real-world research and demonstrations of eHGV technologies.

Attend networking and knowledge sharing events

There are numerous conferences, exhibitions, workshops and training courses available for fleet managers to meet their peers, learn from experts and see first-hand the latest vehicles and technologies. There are too many to list them all, but a few key ones are:

Commericial Vehicle Show

Greenfleet events

IAA Transportation

Motor Transport Decarbonisation Summit

National EV Week

Road Transport Expo

Smart Freight Centre Academy

Transport + Energy Fleet Electrification Forum

Make use of the internet

There are lots of resources and tools to help you on the world wide web. In particular, we recommend:

eFreight 2030 Project

Electric Freightway Project

Electrive Commercial

Electric Van Man

Energy UK

EV Café

Energy Networks Association (ENA)

Freight Carbon Zero

Freight Portal

Grid Connections for Fleet Operators: Who Does What

IET Depot Charging Guide

ZENFreight Project

Glossary

(B)EV	(Battery) Electric Vehicle
CAZ	Clean Air Zone
CO_2e	Carbon Dioxide equivalent
DfT	Department for Transport
DNO	Distribution Network Operator
(e)HGV	(electric) Heavy Goods Vehicle
HFCEV	Hydrogen Fuel Cell Electric Vehicle
GHG	Greenhouse Gas
H_2	Hydrogen
kW	Kilowatt (unit of power, e.g. charging speed)
kWh	Kilowatt-hour (unit of energy, e.g. battery capacity)
MCS	Megawatt Charging Standard
NO_x	Nitrogen Oxides
OEM	Original Equipment Manufacturer
OZEV	Office for Zero Emission Vehicles
PIV/TG	Plug-In Van/Truck Grant
PM	Particulate Matter
SMMT	Society of Motor Manufacturers and Traders
TCO	Total Cost of Ownership
TOO	Total Opportunities of Ownership
ULEZ	Ultra Low Emission Zone
WTW	Well-to-Wheel
ZE(C)V	Zero Emission (Commercial) Vehicle
ZEHID	Zero Emission HGV & Infrastructure Demonstrations
ZEZ	Zero Emission Zone