Briefing

Charging ahead: accelerating the uptake of zero emission HGVs

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Summary

Heavy goods vehicles (HGVs) are essential to keep the UK economy moving, ensuring shops and factories remain stocked. In 2023, over 1.5 billion tonnes of goods were transported by HGVs around the country.[1]

But these vehicles also generate pollution in the form of greenhouse gas emissions, harmful air pollutants and microplastic road runoff. With 91 per cent of goods uplifted onto HGVs in the UK, the transition to zero tailpipe emission alternatives is a crucial step in the UK's journey to a net zero carbon economy and cleaner air.[2,3]

Low emission technologies have not been adopted as quickly for road freight as they have for smaller vehicle types. But the necessary technology is maturing and offers a range of benefits to businesses that make the switch, including increased reliability and reduced maintenance costs. Without action, the UK risks falling behind other countries, such as Sweden and China, which are making strides in building and deploying zero emission HGVs.

Policy to encourage the shift must overcome several challenges. Grid connections are needed for the charging infrastructure in strategic locations across the UK. Hauliers with tight margins face higher upfront capital costs in using low emission vehicles, even though the lifetime costs will come down. And weight restrictions currently disadvantage the payload capacity of electric HGVs (eHGVs).

In this briefing, we look at how this transition can be accelerated, based on interviews with logistics, manufacturing, energy, trades union, academic and NGO stakeholders. We recommend that the government urgently brings forward regulation and incentives to facilitate companies in meeting proposed phase out dates and legally binding carbon budgets.

Action is crucial to bring down transport emissions

Transport is the UK's highest emitting sector, producing 30 per cent of domestic greenhouse gas (GHG) emissions. It is the economic sector where the greatest emissions savings are needed to meet national commitments under the Paris climate agreement and fulfil UK carbon budgets up to 2037.[4,5]

HGVs only make up 1.5 per cent of the vehicles on UK roads but, in 2023, they were responsible for 16 per cent of domestic transport emissions at 18 million tonnes of

carbon dioxide equivalent ($MtCO_2e$). [6,7] As of February 2025, only 500 of the UK's 535,000 HGVs were electric, with even fewer hydrogen models.[8] Sales of new zero emission HGVs remain below one per cent of total new sales.[9] The previous government announced, in 2021, that it would phase out sales of all new non-zero emission HGVs by 2040, with smaller vehicles (under 26 tonnes) reaching that goal in 2035. However, there is no policy pathway to achieve these targets set in law.

The UK's current HGV decarbonisation policy framework is derived from EU law, targeting a 15 per cent reduction in emissions by 2025 and 30 per cent reduction by 2030, below a 2019 baseline.[10] Initial indications show that most HGV manufacturers in Europe are on track to meet their 2025 decarbonisation targets, although most of the savings have so far been made from conventional vehicles rather than switching to zero emission versions.[11]

Since Brexit, the EU has increased its 2030 target to 45 per cent, which has not been adopted by the UK.[12] The previous government had also pledged to publish a zero emission HGV and coach infrastructure strategy in 2024 and had included quantified carbon savings from HGV regulations in its previous carbon budget delivery plan. But these policies have also failed to materialise.

Credible climate plans for the UK need additional policies to accelerate the decarbonisation of road freight. The Climate Change Committee's Balanced Pathway sets a trajectory of nearly two thirds of HGVs being electric by 2040.[13] The National Energy Systems Operator's (NESO) Future Energy Scenarios models 93 per cent of HGVs being electric by 2050.[14]

Zero emission freight is an economic opportunity

The government identified the transition to a net zero carbon economy as "the economic opportunity of the century" in its Industrial Strategy. It has sought to reorient the UK's approach to economic and infrastructure policy towards the long term. To "win the race", as the government wants to, direction is needed to grow the industries involved, like zero emission freight vehicle manufacturing, that otherwise risk being left behind.

Battery electric HGVs (eHGVs) are an increasingly established technology. For example, DAF Trucks have started series production of the fully electric DAF XD and XF Electric, which offer ranges of over 500 kilometre (310 miles).[15] Volvo's flagship model the FH Aero Electric can travel 600 kilometres (372 miles) on one charge and be charged in 40 minutes.[16] At 56 mph, these models can drive without stopping for the maximum 4.5 hours (252 miles) before drivers must rest, with significant battery capacity to spare. Real world data from Europe has shown ranges can be 11-19 per cent higher than advertised.[17] High powered megawatt charging technology for eHGVs is beginning to be rolled out across Europe.[18] Megawatt (1,000 kW) chargers can recharge eHGV batteries in the obligatory 45 minute driver rest period, making the economics of long distance charging more viable.[19]

Currently, as with other electrification technologies, eHGVs have a high upfront cost but lower running costs. It is common for an eHGV to cost twice as much upfront,

typically between £160,000-£200,000, compared to between £80,000-£100,000 for a diesel HGV (though there is limited publicly available data and prices are rarely publicised).[20] But lower fuel, maintenance and tax costs, and the government's plug-in truck grant of up to £25,000, all contribute to a total cost of ownership (TCO) that is already comparable in some instances and is converging in others. The Green Finance Institute (GFI) has modelled an average TCO for a 24-36 tonne eHGV at three per cent higher than a diesel equivalent over five years. A 40-44 tonne eHGV TCO is 23 per cent higher.[21]

eHGVs are also likely to be more reliable, with longer lifespans.[22] Operators who can agree long term power contracts, or produce their own electricity, can bank on much more stable fuel costs than those relying on international diesel markets. The benefits of more renewables on the grid, insulating the cost of electricity from volatile gas prices, as well maturing technology and increased eHGV model availability, will contribute to the falling cost of owning and running them, compared to their diesel equivalents, by the early 2030s, if not sooner.[23]

This shift is happening globally, with recent research finding that, for medium duty electric vehicles (ie with a gross vehicle weight of 3.5-7.5 tonnes), lifetime costs are already lower than those of petrol and diesel vehicles in China, roughly equal in the US and Germany, and only slightly higher than diesel versions in India.[24]

The cost profile of eHGVs is likely to increase the appeal of innovative leasing arrangements and new business models. Estimates suggest that just over half of HGVs are operated on leasing arrangements and projected second hand value, or residual value, is a key factor in determining leasing rates.[25]

China, the EU and California all have more ambitious policy around HGVs than the UK, which risks falling behind in this global shift. China's eHGV sales are surging, capturing almost 22 per cent of the market in the first half of 2025.[26] Sales in Sweden, the home of Volvo Trucks, reached seven per cent in the same time period.[27] Six global companies, including IKEA, Geopost (DPD), Unilever and Maersk are committed to the EV100+ initiative, pledging to only procure zero emission medium duty HGVs by 2030.[28]

The UK has a significant commercial vehicle manufacturing sector. The largest site is in Leyland in Lancashire, employing 1,100 people producing vehicles for the Dutch company DAF. DAF is the largest seller of commercial vehicles in the UK by some distance.[29] Volvo and Scania are second and third for sales respectively, and do not have a manufacturing presence in the UK. Government strategy and policy must enable UK manufacturing to keep pace with the global transition and protect domestic production, learning the lessons from the electric car transition and the zero emission vehicle (ZEV) mandate.

The main barriers to uptake

The transition to clean road freight will bring huge benefits to businesses and society. Companies that make the switch can gain from lower maintenance costs and increased reliability, greater control over fuel costs and smoother and more

comfortable driving. Switching to eHGVs will also cut carbon emissions, and the harmful air pollution which kills and harms tens of thousands of people every year.[30]

But, in the short term, there are hurdles to overcome to boost the market. Stakeholders across the HGV sector we spoke to, including hauliers, unions and industry representatives, were largely aligned on the challenges, even if their priorities differ.[31] Four of the most significant barriers are discussed below.

Barriers to less polluting road freight

1. Overarching uncertainty

Some firms are still uncertain about what the next five to 15 years will look like, in relation to decarbonisation technology and policies. They are unsure which technology will 'win' between hydrogen and electrification. This is despite hydrogen fuel cell vehicles being less efficient at converting energy to motion than electrified alternatives.[32,33,34] With inefficiency comes additional cost, making hydrogen fuel cell vehicles less cost competitive.[35]

The government's delay in setting out a clear regulatory roadmap has not helped. Our interviews showed that, while innovative hauliers are investing in eHGVs, some firms are understandably cautious until the level of investment in infrastructure and potential support available from the government becomes clearer.

2. Upfront costs of investing in new technology

For some companies, the significant upfront investment can be a barrier. Haulage firms tend to operate on tight margins of around three per cent, which means it can be challenging to afford the upfront costs of new vehicles and charging connections at depots. eHGVs are currently around twice as expensive as their diesel equivalents to purchase upfront.[36] Estimates suggest that a grid connection to serve multiple chargers could cost anywhere from tens to hundreds of thousands of pounds depending on specification and location.[37] However, if major distribution or transmission grid upgrades are needed, these figures could increase significantly.

The second hand market for zero emission HGVs is poorly established and prices (ie. residual values) remain uncertain. This can increase the cost of leasing for the first owner.

3. Charging and range

The UK's eHGV charging infrastructure also needs to grow. Despite there being over 85,000 public chargers suitable for electric cars, as of March 2025 there were only five chargers on the strategic road network suitable for eHGV charging.[38,39]

Fortunately, due to the UK's relatively dense population, many HGV journeys could be completed using depot-based charging alone. Element Energy modelling for Transport & Environment in 2022 suggested 65-75 per cent of rigid HGVs could be electrified with home depot charging alone, as well as a sizeable number of articulated vehicles.[40] Rigid HGVs tend to be smaller as the cab and cargo area are one fixed unit, articulated HGVs have separate cab and trailer and tend to be larger. But, with the average journey length for rigid vehicles in 2024 being only 58

kilometres (36 miles), and articulated vehicles travelling further at an average of 134 kilometres (83 miles), and the improved ranges of newer models, it is likely the number of depot charged journeys will rise rapidly.

Not all journeys can be completed, however, via depot charging alone. Infrastructure needs to be rolled out across the strategic road network. The UK's road freight traffic is most concentrated in the 'golden triangle' of London, Liverpool and Hull.[41] Megawatt charging is unavailable on the strategic road network, so well sited public chargers would improve user confidence.

Installing large scale charging infrastructure at depots and on the strategic road network will be a challenge. The electrification of the economy will lead to capacity constraints at many sites across the grid, particularly in the 2030s and 2040s, and will require grid upgrades.[42] As our previous research has shown, industrial and transport operators are being put off from electrifying their processes due to the perception of timescales and costs.[43] While reform is underway, the scale of delivery must speed up to support the transition to zero emission freight.

4. Payload loss

Domestic HGV use is governed by weight restrictions across different vehicle types, to increase road safety and reduce road wear.[44] For HGVs, the maximum loaded weight of the largest six axle vehicles is 44 tonnes. This is a challenge as batteries can weigh several tonnes in the largest vehicles. The 44 tonne limit means the largest eHGVs must carry several fewer tonnes of freight to comply with regulations, compared to diesel equivalents.

Restrictions across smaller HGV types also do not fully account for the weight of batteries. In 2023, the government tried to offset the battery weight of smaller eHGVs by increasing their weight allowance by two tonnes (up to but not including the 44 tonne limit).[45] For example, an electric equivalent of a 40 tonne diesel HGV has a gross combined weight allowance of up to 42 tonnes. But this additional allowance still does not fully account for current battery weights. Industry stakeholders we spoke to suggested they can lose ten to 15 per cent of their payload running a 42 tonne eHGV, compared to its diesel equivalent. This increases the cost of operations if additional vehicles are needed to provide the same freight services.

The government could snowball progress

Overcoming these policy barriers is possible and would put the UK at the forefront of the clean logistics revolution. The UK's proposed phase out dates for the sale of fossil fuel powered HGVs are ambitious. But, without a policy framework to guide manufacturers and businesses to invest, the market is unlikely to grow at the targeted rate. The government's Zero Emission HGV and Infrastructure Demonstrator (ZEHID) programme has introduced major logistics players to zero emission HGVs. It must now take the next step. Early action is crucial for the UK to keep pace in a transition that will define the global road freight sector over the coming decades. The transition must be managed to support domestic manufacturers and supply chains, retain jobs and maximise economic opportunities.

Supply

Primary approaches to scaling up the supply of eHGVs include a zero emission HGV mandate or a CO_2 emissions regulation. A mandate would directly increase zero emission vehicle sales by setting annual targets for manufacturers on the proportion of sales that must be zero emission, as the existing ZEV mandate does for electric cars and vans.

A CO_2 regulation sets targets for average fleet-wide carbon intensity that each manufacturer should adhere to. The UK's 30 per cent HGV fleet decarbonisation target for 2030 is now far below the 45 per cent target set by the EU. While paths to compliance will vary, the stakeholders we interviewed considered the UK's current targets to be insufficient to drive significant investment in zero emission alternatives.

A zero emission HGV mandate has the advantage of clarity. It directs investment in new technology. CO_2 regulations, on the other hand, can encourage investment in greater efficiency gains or problematic climate solutions, including biofuels. While this can lead to some emissions savings, it may result in perpetuating investment in polluting diesel HGVs and fewer zero emission HGVs on the road. Recently, there has been pressure within the EU to widen the scope of decarbonisation technologies allowed within the regulation, including the potential for polluting synthetic fuels to be included. A CO_2 regulation tends to set targets over a longer time span, which could lead to stagnating zero emission vehicle sales if manufacturers meet their targets early. However, the government may find it easier to implement an upgrade in the existing CO_2 target to match the EU's than to create a new mandate framework.

The government needs to establish its preferred regulation urgently, to establish a pathway to increase zero emission HGV sales steadily to reach the 2035 and 2040 phase out dates. This should be consulted on without further delay and the regulation should take effect at the start of 2027.

The level of ambition should, at least, match that of the EU to ensure the UK does not become a dumping ground for polluting HGVs. It is clear from the experience of the ZEV mandate for cars and vans that the subsequent revision of target trajectories up and down damages investor confidence.

We recommend a well communicated sales mandate paired with suitable demand side measures to boost sales, alongside measures to support domestic manufacturing.

From a supply point of view, the government should work with manufacturers, unions and local government to plan for the transition and ensure workers in the industry have the right skills for the future and sufficient retraining opportunities. If appropriate, incentives under the mandate, such as higher credits for domestically made vehicles, should be introduced to ensure UK based manufacturing is adequately protected.

A mandate should be accompanied by an automotive industrial strategy, encompassing HGV as well as car manufacturing. We are urging the government to address the competitiveness of industrial electricity prices, help manufacturers navigate incoming EU rules of origin and invest in the skills needed for the transition in the car industry. These issues will apply equally to the HGV transition and should be dealt with in the same way.

Demand

The government recently introduced an Electric Car Grant that uses sustainability criteria to put electric cars into two subsidy bands. Electric cars manufactured in the UK are more likely to receive the larger subsidy because of our lower carbon electricity supply. The government should explore if this approach could apply to zero emission HGVs too.

The government has extended the plug-in truck grant that offers discounts of up to £25,000 for HGVs over 12 tonnes to 2025-26, with rates still to be confirmed for 2026-27. As we have discussed, this discount still leaves a significant upfront cost gap between diesel and electric HGVs and a gap in the total cost of ownership (TCO). The government should look to base future subsidy on the TCO gap, ideally ensuring eHGVs have a lower TCO than diesel. Sweden, which has the highest zero emission HGV sales in the EU, and manufactures some of the most advanced vehicles, has a government subsidy of up to 25 per cent of the value of new electric models. In many instances this works out significantly above £25,000. The government could also consider low interest loans to help operators afford the initial purchase price.

Given the high upfront cost of eHGVs but lower running costs, leasing is likely to be increasingly appealing to operators. As explored by the GFI, the uncertain residual value of eHGVs makes competitive leasing deals difficult. A higher residual value can reduce the cost of leasing for first hand owners. A residual value guarantee from the government would therefore increase confidence and sales.

The government has recently announced a £30 million scheme to install charging infrastructure at fleet depots, covering up to 75 per cent of the cost, to a maximum of £1 million, with works to be completed by the end of March 2026.[46] This should be extended for a more prolonged period to meet the need for charging. While depot charging is going to be far more widespread than public charging, a national charging network on strategic roads could still significantly increase confidence. Sweden has a network of 150 public eHGV charging stations, compared to the UK's five, although more UK charging stations are being announced.[47]

The 2025 comprehensive spending review committed £1.4 billion to support the uptake of electric cars, vans and HGVs, so some initial funding should be available to promote demand. The government should be prepared to provide further financial backing to ensure the transition keeps up the pace.

Recommendations

To address the policy barriers identified in this briefing and accelerate the transition to zero emission HGVs the government should:

- **Secure phase out dates in law and introduce a clear regulatory pathway**
  A zero emission HGV mandate on manufacturers should be consulted on without further delay and begin in 2027, to keep emissions reductions on track. It should include stretching targets to drive significant progress in sales to meet the 2035 and 2040 phase out target dates.
- **Provide additional financial support to purchase eHGVs**
  Continuing and raising the plug-in truck grant to reduce the upfront cost of eHGVs, and preferably give them a positive comparative total cost of ownership, would increase incentives. Introducing a residual value guarantee would give operators unable to purchase upfront access to more competitive leasing rates instead.
- **Expand and extend subsidies for charging infrastructure**
  The depot charging scheme should be extended to 2030. This fund could prioritise SMEs which are less likely to be able to afford major works and encourage charger sharing. Funding a limited number of public chargers on the strategic road network would increase confidence.
- **Change payload regulations for eHGVs**
  Subject to safety requirements, eHGV weight regulations should be adjusted to avoid payload losses.
- **Integrate eHGV manufacturing into government Industrial Strategy priorities**
  Ensuring competitive industrial electricity prices, helping manufacturers navigate incoming EU rules of origin and investing in skills needed for the transition will be crucial for securing electric vehicle manufacturing in the UK, including HGVs.

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