Interim findings

Electric Freightway Report 3

GRIDSERVE ELECTRIC FREIGHTWAY

in partnership with

HITACHI
Inspire the Next

Innovate UK

Funded by UK Government

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Electric Freightway Report 3

Electric Freightway, part of the Zero Emission HGV and Infrastructure Demonstrator programme, is funded by the Department for Transport and delivered in partnership with Innovate UK.

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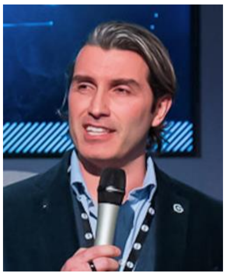
Cover image: 'Charge Yard' at Nissan Sunderland, courtesy of Nissan Motor Manufacturing UK Ltd.

Foreword



Our third Electric Freightway Report is all about progress. Since our last iteration, we have seen advancements on an unprecedented scale here in the UK and the data insights found in this document are testament to that achievement from a diverse and innovative consortium.

With half of our anticipated eHGVs now out on the road and having logged over a million kilometres already, things are quite literally moving. We are now able to demonstrate completed depots builds as well as showcase those members of the consortium to which construction has now begun. At the time of writing, we have also broken ground on Public eHGV locations and have begun initiating the first booking and bay management trials at shared depot sites.

In addition, the Project is delivering constant dissemination activity with 27 logged events since March 2024. We have also worked alongside think tanks, engaging in female talent initiatives through Hitachi ZeroCarbon, working with consortium members on location-based discovery days, providing work experience opportunities and completed the first-round user surveys across a varied demographic of transport sector professionals.

As shown in report two, Public EV charging provision however remains capital intensive and vastly complex. Infrastructure bottlenecks remain, including lack of power provision, convoluted and inconsistent local planning regulations and space constraints. The rule book is still being written with the support of our pioneering consortium partners and members, and we remain grateful for the unwavering support from all involved. This report goes some way to show how we're unpacking every detail, to ensure that we deliver on the project's objectives and celebrate deserved and material progress.

Sam Clarke Head of eHGV, GRIDSERVE

This report comes at an exciting time in the Electric Freightway project, as we welcome more eHGVs onto the road and complete our first high-power depot sites. Having the right infrastructure in place is a fundamental requirement to allow eHGVs to operate effectively, allowing multiple shifts and giving operators the confidence to push their vehicles harder, and further, making the most of their capabilities.

It is clear, however, that early adopters of the technology face numerous challenges when it comes to implementing eHGVs and that choosing appropriate use cases is incredibly important for a sustainable transition. Our data, gathered from the first year of project operations and presented in this report, is starting to help us identify what can and cannot be done – in terms of factors impacting range and efficiency, as well as practical problems like load limits and charger availability. Over the next six months we look forward to taking this analysis one step further, as the Electric Freightway network nears completion and the final trucks are delivered.

Leon Clarke Head of Operations and Delivery, Hitachi ZeroCarbon

01 Executive summary

Welcome to the third report from the Electric Freightway project. This report provides an overview of the work the project has done so far in planning and implementing eHGV infrastructure, highlighting the progress made in deploying eHGVs in the UK. We will share insights from eHGV use, explore the views of drivers and operational teams towards electrification and detail some of the challenges that vehicle and charge point operators (CPOs) need to overcome to transition HGVs to electric in the UK.

Electric Freightway

Electric Freightway is a collaborative demonstration project driven by GRIDSERVE, Hitachi and a consortium of industry stakeholders. The project aims to inform the UK's transition to zero tailpipe emissions freight, based on real-world experience. It is part of the Zero Emission HGV and Infrastructure Demonstrator programme, part funded by the Department for Transport and delivered in partnership with Innovate UK.

We are now well into the project's implementation phase, and the first eHGVs have been on the road for over a year, operating a range of use cases and we've now broken ground on the first two public charging sites. A number of UK industry firsts have been achieved, including the largest multi-user private eHGV charging hub at Nissan, served by the first all-electric car transporters. This report gives an insight into what we have learnt so far from these journeys.

More trucks have been delivered (a total of 79 at the time of writing) and are on the road with our haulier partners. The final few vehicles are awaiting infrastructure completion before they can hit the road.

Project progress

- **79 electric trucks now delivered** with 157 orders placed, exceeding the project's original aim of 140. The remainder are expected to join the demonstration this autumn.
- **Over 20 organisations** are benefiting from subsidised eHGVs within Electric Freightway.
- At the time of writing, **over one million electric kilometres** have been driven in the demonstration throughout England and Wales.
- The first **high-speed depot charging sites** have been completed including the 10-bay shared Charge Yard at Nissan's Sunderland factory.
- Construction has begun on the first two **public eHGV charging** sites.
- A **cost and carbon calculator** tool has been published based on project data, allowing operators to compare eHGVs with ICE trucks.

Key insights explored in this report

- **TCO analysis** has shown that an eHGV operating 100,000km/year can break even against diesel over five years with a power price of 24p/kWh. Vehicles operating more intensively may be able to economically use a proportion of public charging or contribute towards the upfront costs of electrifying sites.
- Analysis has shown payload and road type have significant impact on **vehicle efficiency.** A 23% difference between average urban and motorway efficiency was observed for eHGVs, though this is less than the 43% difference seen with ICE vehicles.
- In addition to cost, **power supply availability and planning processes** are significant barriers to quickly electrifying sites.
- **CO_2 benefits are clear** – lifetime emissions of diesel trucks can be three times those of eHGVs and initial higher embedded emissions are generally offset after a year of use.
- **Senior Managers and Schedulers** surveyed were largely positive towards eHGV technology, driven by environmental concerns and their wider experience owning EVs, though not all are convinced it is the long-term solution.
- Ahead of adoption, **Drivers** have more varied views, and while most support decarbonisation, many have concerns about eHGV practicality.

Hitachi ZeroCarbon is capturing and analysing data from the vehicles and infrastructure, has conducted the first round of stakeholder surveys and interviews, and is publishing the project's findings through these reports.

Following the first stage of the project, partners will continue to operate the trucks and chargers, reporting data for a total period of five years.

Findings so far

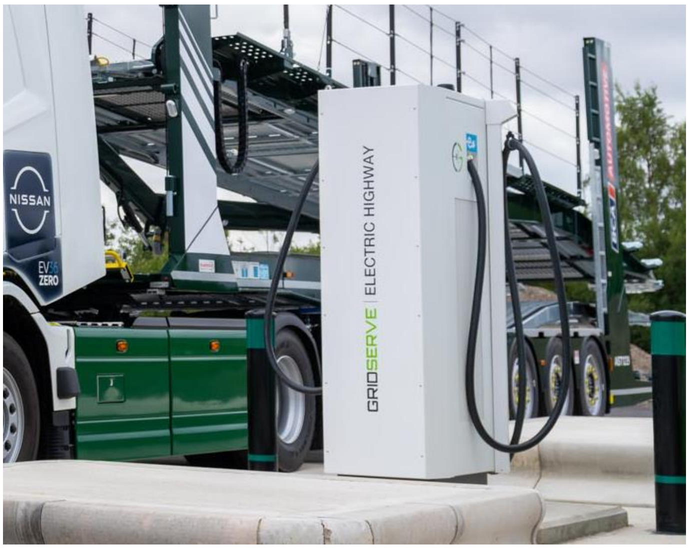
Where the first project report described the objectives and approach of the project, and report two focused on design challenges, this new report provides insights from the initial data we are getting from the Electric Freightway project.

The results presented here are at an interim stage in the project and come with a number of caveats – they relate to a relatively small group of vehicles, with most limited to relatively short duty cycles due to the use of slower, overnight charging in advance of the completion of high-power infrastructure. Nonetheless, the results provide some interesting insights into the use and performance of the vehicles, including how efficiency can vary with different road types and vehicle weights.

Insights from data can be found throughout this report, with Section 06 providing an overview of our key findings.

Electrifying depots

The 'Charge Yard' launched at Nissan's Sunderland manufacturing plant was the first of 12 depot-based charging sites the project is delivering. Section 04 details the progress being made in completing these sites.



Most operators are initially clear that having infrastructure at their own depots, that they control, is their preferred charging solution, but it is clear that a range of options are needed for the industry to enable electrification of all routes. Sharing depot infrastructure between operators has emerged as an important solution, both for expanding options for charging and reducing charging cost through higher utilisation of capacity. It is perhaps most important for smaller operators who may not be able to afford the high capital costs of building their own infrastructure.

Building the public network

Where depot charging is not available, public charging is expected to have an important role in helping hauliers go the extra mile. Since the last report, GRIDSERVE has progressed the development of seven sites across England's motorways.

The design of this public infrastructure has taken longer than originally envisaged. Charging hubs require both a significant amount of power and changes to site designs, both of which involve extensive planning and approval processes. Section 05 looks at the steps required to progress a site from planning through to delivery.

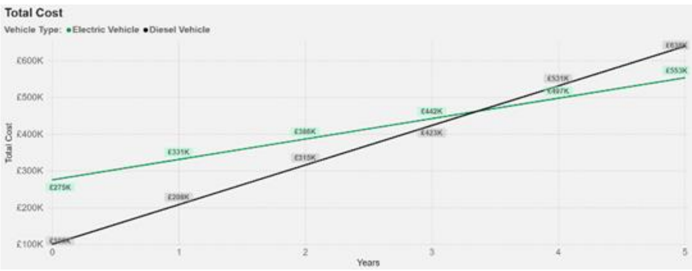
Understanding stakeholder attitudes

In order for the transition to be a success, it is important that stakeholders at all levels of haulier organisations are supportive. The first round of stakeholder surveys is now complete, with more than 500 questionnaires answered in advance of eHGV rollout. Section 07 presents the results of the survey.

Managers were broadly supportive of the move to eHGVs, despite having some concerns over the readiness of the grid and government policy. Drivers expressed much more varied views, with many not yet convinced that eHGVs will allow them to do their job well.

Building the business case for electrification

An improved understanding of vehicle efficiencies has helped us better assess the economic case for eHGVs. This has shown that if the charging cost for an average eHGV travelling 100,000km/year is 24p/kWh, it will break even with a diesel equivalent being fuelled at 120p/litre over five years. eHGVs travelling further, or kept for longer, can make use of higher cost electricity, such as limited use of public charging, economically.



Example output from the project's cost and carbon estimator tool

Despite this, challenges still exist for operators considering eHGVs, including the cost of installing and maintaining charging infrastructure, and weight limitations which can severely affect the practicality of eHGVs for hauliers who regularly operate fully loaded 44-tonne HGVs.

Hitachi ZeroCarbon has developed a cost and carbon calculator, drawing on the data gathered from the demonstration so far and discussions with the project's OEM partners, details of which can be found in Section 09.

Environmental benefits of eHGV adoption

The same tool can also be used to calculate lifetime carbon emissions for an eHGV. This has shown that even though eHGVs have a higher level of embedded emissions (the CO_2e emitted in the production of the vehicle), this is quickly offset by not burning diesel. This breakeven typically occurs in the first year or two of use. An eHGV only needs to be driven approximately 15,000km per year to be CO_2 positive over its life versus a diesel truck.

CO_2 is not the only measure of sustainability however, and Section 09 also looks at the potential impacts on air quality and the supply chain.

What's happening next?

The implementation stage of Electric Freightway is now entering its final phase. Over the coming months the final depot charging sites will be completed, the remaining eHGVs will hit the road and public charging sites will begin to open.

Alongside this we are continuing to collect more data, allowing us to continually refine our analysis of eHGV use. We look forward to sharing more insights in our final report early next year.

As the demonstration progresses, and charging facilities come online, we will be regularly sharing updates on our website at https://www.gridserve.com/electric-freightway/ and on the GRIDSERVE and Hitachi ZeroCarbon social media channels.

This is just the start of the demonstration and following the implementation stage the vehicles will continue to be operated for a period of five years, supported by extensive evaluation by Ricardo.

02 Introduction

Electric Freightway is a collaborative demonstration project of electric heavy goods vehicles (eHGVs) and associated charging infrastructure throughout the UK. This third report provides an insight into what we have learnt so far, drawing on practical experience, vehicle data and comprehensive surveys of participants. The key learnings found in this report are intended to help the industry and government develop business cases and solutions that will accelerate the adoption of zero emission HGVs. The first two reports, introducing the project's objectives and early design challenges can be found on our website.

The problem we are addressing

The objectives set for HGVs by the UK's net zero strategy are some of the most ambitious in the world, with all new HGVs under 26 tonnes expected to be zero emission from 2035 and all larger vehicles sold, such as those taking part in this demonstration by 2040[i].

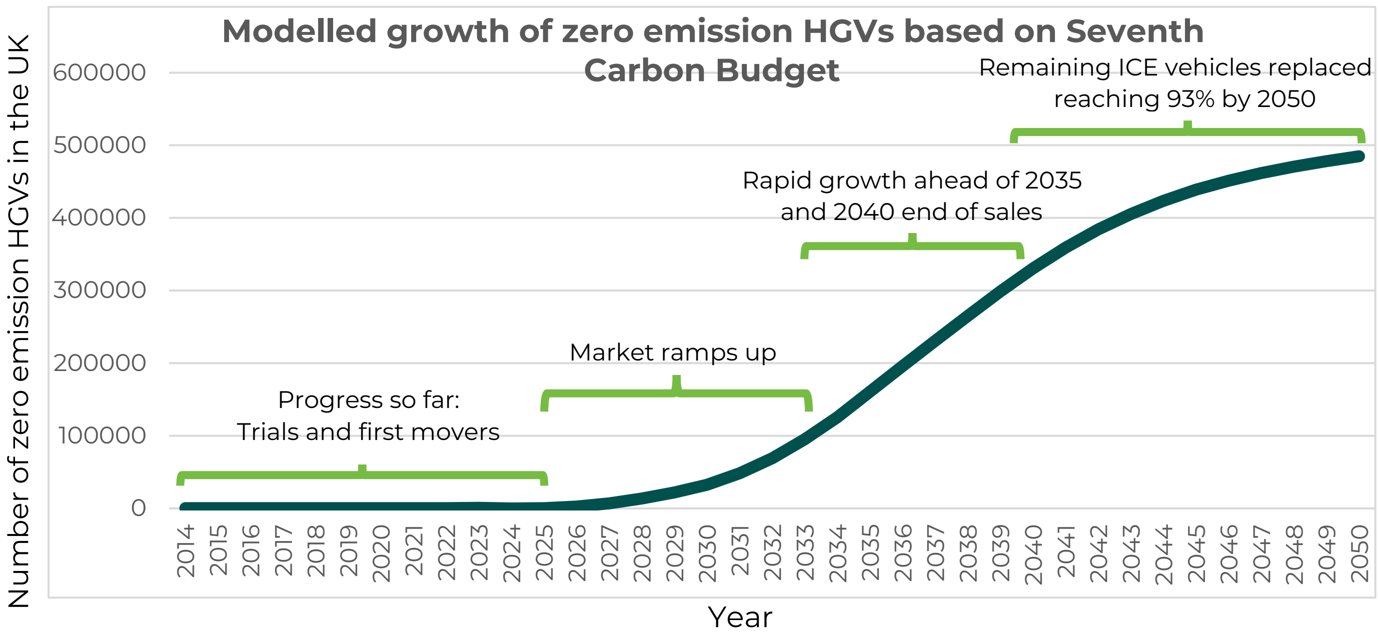
If the UK is to meet its net-zero goals by 2050, the scale of this transition will be unprecedented and will transform the transport sector. The Climate Change Committee's (CCC) recently published Seventh Carbon Budget[ii], sets out a pathway to net zero across all industries, and the potential impact on UK HGVs, presuming the total number of vehicles on the road is relatively static. Figure 1 shows around 1,000 zero emission eHGVs (in all weight categories) today, rising to 100,000 in the early 2030s and 300,000 by 2040. The CCC's market analysis assumes that the vast majority of these will be battery electric vehicles.

There is still a long way to go if we are to meet these goals. While there has been some recent progress, described in Section 05 of this report, there are, at present, very few dedicated eHGV charging stations in the UK, with most existing charging infrastructure not designed for the charging of large vehicles. Hauliers' depots also require significant modifications to allow for eHGV charging. The market for larger eHGVs is also in its infancy; the capital cost of vehicles is high compared to diesel HGVs, range and payload limitations need to be understood and operators require reassurance that eHGVs are capable of running their routes economically before they commit to investing in new technology.

What will the project result in?

The aim of Electric Freightway is to kick-start the deployment of long haul zero emission HGVs, with a multi-year demonstration of 40-44 tonne battery eHGVs and associated infrastructure.

Figure 1 - Modelled growth of zero emission HGV based on Seventh Carbon Budget



Hitachi ZeroCarbon analysis based on the Climate Change Committee's Seventh Carbon Budget milestones (Table 7.1.4) and DfT/DVLA licensing statistics (veh1103) assuming steady number of HGVs on the road to 2050

The scale of the demonstration is unprecedented in the UK, with over 150 vehicles, equivalent to around 15% of the eHGVs on the road at the end of 2024, due to be operated by consortium partners across some of the most demanding routes in the UK. This will help to prove the capability of these vehicles and identify any requirements for technical or policy innovations to enable the transition to net-zero road freight.

The project is creating a network of public charge points on major routes, designed specifically for eHGVs, together with private and shared depot charging. Project partners will also leverage the learnings from the project to develop commercial solutions to further accelerate their eHGV transition and that of other businesses in the sector.

Electric Freightway is analysing the operational, financial and environmental impacts of eHGVs, allowing the industry to develop business models for further scalable deployment of vehicles and dedicated infrastructure.

Where are we now?

Since the publication of the last report in September 2024, the Electric Freightway team has made significant progress in moving from planning to delivery. All of our project partners placed their orders for electric trucks by March 2025, with 79 vehicles in operation at the time of writing and the remainder expected to be on the road in the coming weeks. GRIDSERVE has delivered depot-based high-power charging stations, capable of serving multiple eHGVs simultaneously, with further depot and public sites under construction. The network is expected to be complete in 2026.

While the implementation is still ongoing, we have learnt a lot along the way, and this report details the insights that are beginning to emerge as Hitachi ZeroCarbon captures and analyses telematics data from the vehicles. This provides an insight into the performance of the vehicles currently operating across the UK, looking at how this compares to diesel fleets and what factors impact energy efficiency. You can find outcomes from the early analysis throughout this report.

Alongside this, the industry has continued to make progress towards decarbonisation. More organisations have announced their intention to adopt eHGVs and additional investments in EV charging facilities have been announced worldwide. In the UK, sales of eHGVs increased by almost 100% from Q1 2024 to Q1 2025, though from a very low base, with just under 100 vehicles sold in the quarter. This represented approximately 1% of all HGVs sold[iii].

Through its Depot Charging Scheme[iv], the UK Government has started to provide up to 75% funding for charge point and civil costs to HGV, van and coach operators. However, the tight timelines (requiring completion of works by 31 March 2026) and ineligibility of power connection upgrades, may limit its use for more complex eHGV projects.

Beyond the UK, the European Parliament has adopted new, more aggressive CO_2 emissions standards for heavy-duty vehicles, requiring a 45% reduction compared to 2019 levels by 2030, 65% by 2035 and 90% by 2040[v], providing a clear pathway to decarbonisation for European truck manufacturers.

How is the project funded?

Electric Freightway, part of the Zero Emission HGV and Infrastructure Demonstrator programme, is funded by the Department for Transport to the tune of almost £63m and delivered in partnership with Innovate UK.

Project partners are also committed to making significant investments in vehicles, infrastructure and resources to support the project, amounting to c.£37m of the £100m+ project budget.

Project objectives

The goal of the Electric Freightway project, as part of the Zero Emission HGV and Infrastructure Demonstrator programme is that it:

> **"Will stimulate multimodal transport and examine different use cases that will create invaluable insights to allow the wider market to follow."**

To do this, Electric Freightway will deliver:

> **"A demonstration which has a viable route to expanding nationally and internationally, as part of your long-term strategy to decarbonise the sector."**

In doing so, the project and GRIDSERVE will create a viable eHGV charging network:

- **At the lowest possible cost**
- **In the fastest possible timeframe**
- **Delivering maximum customer service**
- **At the forefront of eHGV electrification**
- **With net zero as the priority**

And prove or disprove our key hypothesis that:

> **Electric 40-44 tonne HGVs are ready to replace diesel HGVs and deliver the same function when the right infrastructure is in place.**

The scale of the project

The project is planned to involve:

Over 150 eHGV trucks

c.200 high-powered chargers

c.20 public and private sites

This will be achieved through collaboration with a network of partners throughout the sector. This wide-ranging group of companies includes independent and in-house hauliers, charge point operators (CPOs), landowners, financiers, eHGV manufacturers (OEMs) and solution providers.

We are also working closely with other stakeholders such as the Department for Transport, National Grid, National Highways, Connected Places Catapult and Innovate UK. All of these diverse organisations will need to come together to facilitate the transition to eHGVs and ensure that the required infrastructure is put in place.

Lead partner

GRIDSERVE

GRIDSERVE is developing, delivering and operating the network of charging hubs at motorway service areas as well as commercial depot charging solutions, and the underlying technology platforms needed to provide a seamless charging experience. GRIDSERVE is also sourcing and reporting data for the project.

Principal partner

HITACHI

Hitachi ZeroCarbon is collating, analysing and reporting on findings throughout the project, leveraging experience from similar EV demonstration projects such as Optimise Prime. The reports and outputs will inform stakeholders, the wider market and government policy to drive further decarbonisation of commercial fleets.

Project consortium

Hauliers

We are working with a range of companies across different aspects of the logistics chain, including dedicated third-party logistics companies as well as organisations operating their own vehicles in support of their wider business. For simplicity, we will collectively refer to these companies as 'hauliers' or 'operators' throughout this report. Over recent months we have welcomed several new organisations to the project and are now working with:

- ADM
- a.f. blakemore & son ltd
- amazon
- BCA
- Campeys of Selby Ltd
- cloudbass outside broadcast
- currys
- DP WORLD
- DSV
- FENN Logistics Solutions
- Fergusons Transport
- for farmers
- Graphic Packaging International
- GXO
- KUEHNE+NAGEL
- MARITIME
- Masters Always Evolving
- Royal Mail
- SAMWORTH BROTHERS
- TESCO
- United Utilities Water for the North West
- voltloader Charged for Tomorrow
- Wincanton
- XPO Logistics
- Yusen Logistics

OEMs and Dealers

The project is agnostic regarding vehicle OEMs and will work with whichever supplier hauliers choose to buy or lease from. The following companies are currently working closely with us as part of the consortium:

DAF

Ford&Slater

RENAULT TRUCKS

VOLVO

DAIMLER TRUCK

Charging locations

GRIDSERVE is working with landowners throughout the UK to secure locations for public and private charging infrastructure, including:

EXTRA

moto

NISSAN

roadchef

Leasing partners

Hauliers can choose to buy vehicles outright or through lease/contract hire arrangements with our leasing partners:

Novuna

PACCAR FINANCIAL

VOLVO Financial Services

Project supporters

The project will also work with observers from a range of stakeholders to ensure that findings from the project benefit the whole industry, including:

Department for Transport

UKRI Innovate UK

bsi.

CATAPULT Connected Places

nationalgrid

national highways

RICARDO

Zemo Partnership Accelerating Transport to Zero Emissions

Project timeline

Electric Freightway is being carried out in two phases. The main activities of the demonstrator started in July 2023 and will run until early 2026. This represents a small extension from the original expected end date of July 2025 to allow for the completion of sites and delivery of vehicles.

During this period, the project's infrastructure is being built and eHGVs are being put on the road. We are sharing insights through a series of reports and knowledge exchange activities based upon what we are learning from the examination of data and experiences of project partners.

Following this initial phase, the project's partners will continue to operate their eHGV fleets and infrastructure. Ricardo has been appointed by Innovate UK to act as an independent technical evaluator, continuing to collect and analyse data through regular reporting for a period of five years.

This report

Throughout the Electric Freightway project, we are publishing findings from the demonstration to help other hauliers and charge point operators make their transition to eHGVs as smooth as possible. For detailed background on the project objectives and approach, see report one. This third report shares insights gained from completing the first depot charging installations and the introduction of eHGVs to our partner operators.

Section 03 gives an overview of the eHGVs that have joined Electric Freightway and the use cases that they are demonstrating. Section 04 introduces the depot charging that has been installed across the UK and reflects on the challenges involved in installing high-power charging at haulier sites. Section 05 discusses on route charging, looking at progress of the project's public sites and considering the range of charging options the industry will need as it develops.

Section 06 provides some insights from the data that we have collected so far from vehicles in the demonstration.

Ahead of eHGV introduction, we have been asking drivers and managers about their views on the transition to zero tailpipe emission HGVs. The full results from the first round of surveys can be found in Section 07.

Section 08 details the Electric Freightway Female Talent Initiative, running alongside the project, aimed at encouraging a more diverse workforce into the industry.

Economic and environmental implications of eHGVs are considered in Section 09, introducing the project's cost and carbon calculator tool.

Finally, Section 10 contains a brief look ahead at what will be happening next in the project.

Contacting Electric Freightway

If you have any questions about the programme, this report, or have any suggestions for how our future publications and analysis could be improved, please contact the Electric Freightway team at: feedback@gridserve.com.

You can find out more about the project on our website https://www.gridserve.com/electric-freightway/ which will be updated as the demonstration progresses.

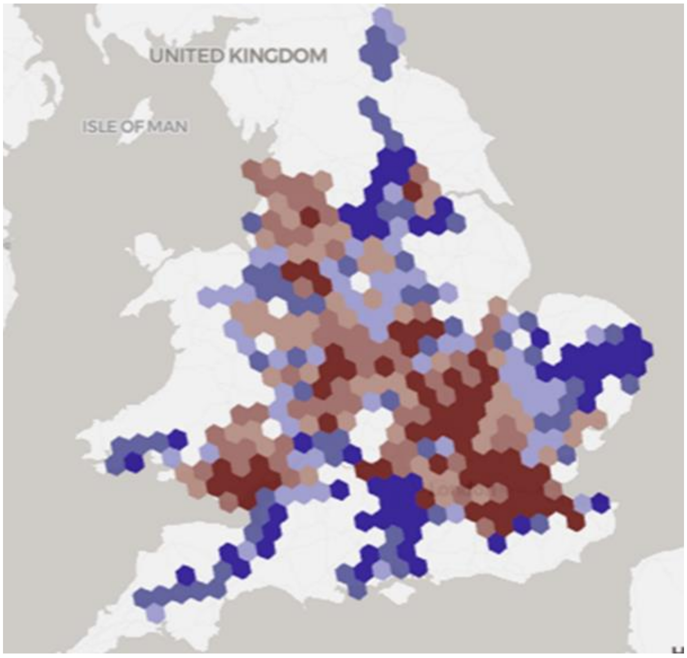
03 Getting eHGVs on the road

The project implementation stage is now well underway. 79 eHGVs are on the road, high-power chargers have been installed at depots, and construction work on public sites has begun. To enable the completion of this phase of the project, which has taken longer than originally envisaged, it is now expected that the implementation of infrastructure will continue until mid-2026. This section of the report highlights the achievements to date and what our operator partners are doing with their vehicles.

Key achievements

- ***79*** *eHGVs have now been delivered*
- *Over* ***one million*** *kilometres of zero tailpipe emissions journeys*
- ***1,100 MWh*** *of electricity used*
- *Estimated* ***over one million kg CO_2e*** *saved vs diesel operations*
- *Covering a growing network of routes throughout England and Wales* (Figure 2).

Figure 2 - eHGV operations as of September 2025; red represents most frequent routes.

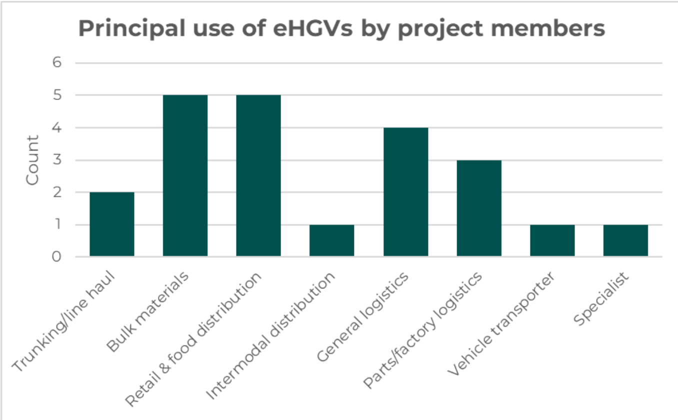


Our demonstrations

The core aim of the Zero Emission HGV and Infrastructure Demonstrator programme is to build public and depot infrastructure in order to test vehicles in a wide range of conditions to better understand their benefits and limitations.

With over 20 operators in the consortium the demonstration will be able to showcase a wide range of duty cycles. While hauliers often operate a range of routes, Figure 3 summarises the primary activity of each project member.

Figure 3 - eHGV use by sector in the demonstration



Electric Heavy Goods Vehicles

Electric Freightway's operator and OEM partners have made great progress in getting electric trucks on the road. At the time of the last report, 18 eHGVs had been delivered, this has now increased to 79. A total of 157 eHGVs have been ordered and the remainder are expected to be on the road over the next few months, exceeding the project's original target of 140.

Report two introduced the first operators to take eHGVs. They have continued to add vehicles to their fleets and have been joined by new members, as shown on the following pages:

Amazon

Since October 2024, Amazon's carrier partners have been operating a fleet of Volvo FM Electric tractor units, hauling trailers with products and customer packages to and from Amazon's fulfilment centres, sort centres and finally delivery stations, from where packages are delivered to customers' doorsteps. This small fleet alone has travelled over 450,000 kilometres at the time of writing.

Following on from this, Amazon has placed the UK's largest ever order for electric trucks, with 140 Mercedes-Benz eActros 600 eHGVs expected to join its fleet. Some of these are supported by Electric Freightway and will be contributing data for analysis by the project.

GXO

GXO is a provider of contract logistics to a number of high-profile brands in the UK. The company will be using Renault Trucks E-Tech T eHGVs across several accounts including:

- Iceland's North London distribution centre in Enfield.
- Nutritional products company, Huel, where an eHGV is performing shuttle runs between its factory and distribution centre.
- Distributing beer for a historic brewery – a site particularly sensitive to noise and pollution due to its location in the centre of a medieval town.
- Distributing goods for a fashion retailer.

Maritime Transport

Maritime Transport's eHGVs form part of an intermodal network connecting UK ports and rail freight terminals with customers throughout the UK.

Rail is already one of the most environmentally friendly distribution choices and a mixed fleet of Volvo and DAF eHGVs will further decarbonise the end-to-end journey for Maritime's customers from intermodal depots in Tamworth and Manchester, with zero-emission road transport.

Royal Mail

Royal Mail's regional Super Hubs sit at the core of the UK's letter and parcel distribution infrastructure. DAF eHGVs are being introduced on routes from Super Hubs in the Northwest and East Midlands. While Royal Mail's loads may be light, its double deck trailers can be up to 5m high in order to efficiently use the capacity of each truck.

Nissan

Yusen Logistics, Fergusons Transport and BCA all operate different aspects of the logistics at Nissan's Sunderland manufacturing plant, where they are sharing charging infrastructure.

Yusen is operating Volvo FM Electric eHGVs, collecting from suppliers in the Midlands and transporting parts to the Nissan factory via its sites in Derby and Leeds.

Fergusons is operating DAF eHGVs on a range of inbound logistics routes including local supplier milk runs.

BCA handles the outbound logistics, with DAF eHGV-hauled car transporters shuttling completed vehicles between the Nissan factory and the Port of Tyne ready for delivery to dealers. These are the first all-electric car transporters to operate in the UK.

Kuehne+Nagel

DAF eHGVs are joining Kuehne+Nagel's East Midlands-based fleet. The eHGVs will work alongside others being operated as part of the eFREIGHT 2030 project, sharing infrastructure provided as part of that project.

XPO

End-to-end logistics company, XPO, will shortly introduce Volvo and Renault Electric trucks to several of its customers. Including:

- Logistics for Saint Gobain Group at Gotham, Leicestershire
- Distribution for decorative coatings manufacturer AkzoNobel.

Wincanton

Wincanton will operate a mixed fleet of eHGVs, with Volvo, Renault and DAF serving multiple customers. Trucks will be at a number of sites, including its Greenford distribution centre in West London.

A growing consortium

Some new members have also joined the consortium in recent months, bringing a broader range of routes and operations, including several smaller businesses:

Voltloader is the UK's first all-electric haulage company. The operator has supplemented its existing eHGV fleet with additional DAF eHGVs through Electric Freightway. The vehicles will carry a wide range of loads throughout the East of England.

Ports and logistics operator, **DP World**, is adding DAF eHGVs to its UK automotive logistics operation.

ForFarmers has joined the project, demonstrating Volvo FM Electric trucks. The company delivers feed to the livestock industry throughout the UK and will base the vehicles at its Portbury facility near Bristol.

DSV has received Volvo FM Electric trucks at its Immingham site in Lincolnshire. The vehicles will take advantage of the Milence charging hub that recently opened nearby, to supplement lower-power overnight charging at DSV's own depot.

Fenn Logistics, based in Burton-on-Trent, is a family-owned haulier making its first investment in electric vehicles. Fenn decided to lease an eHGV to meet the needs of one of its major customers that is actively looking to decarbonise its supply chain.

Masters Logistical is collaborating with British Sugar to electrify routes serving its production facilities. Volvo FM Electric eHGVs are joining its Ely, Cambridgeshire-based operation and will completing overnight shuttles between British Sugar's factories and warehouse.

Cloudbass brings a unique use case to the consortium. Its Volvo eHGVs will be used to haul custom outside broadcast trailers to English and Scottish Premier League games. It is hoped that power take-off from the tractors will provide additional resilience to operations in the event of power failure, reducing reliance on diesel generators.

Leicester-based DAF dealer **Ford and Slater** is leasing eHGVs to other operators, allowing these companies to take their first steps into the electrification of their logistics at lower risk. These organisations include:

- Nationwide electrical retailer, **Currys**, is introducing eHGVs to its logistics operations, run by GXO.

- Family-owned haulage business, **Campeys of Selby**, is adding two DAF eHGVs to its Yorkshire-based fleet, alongside its existing rigid eHGV and fleet of bio-CNG trucks.

- **ADM**, a global nutritional products manufacturer is introducing eHGVs to its UK milling business. The trucks will transport wheat to the company's mills, and flour to its customers, complementing Voltloader eHGVs already serving the sites.

- **Tesco** will be using DAF eHGVs to deliver to stores from their Thurrock distribution centre.
- **Graphic Packaging International**, a designer and manufacturer of sustainable packaging solutions, is introducing eHGVs to routes operating from its facilities in the East Midlands and North East.

Following delivery last year, **United Utilities'** fleet of 6x2 Volvo FM Electric tractors are now in operation, together with custom tipper trailers.

A.F. Blakemore & Son and **Samworth Brothers** have also expanded their zero-emission fleets with the acquisition of additional vehicles. AF Blakemore has also invested in electrified refrigerated units to accompany its trucks

Keeping Cool

A.F. Blakemore & Son has retrofitted two of its existing refrigerated trailers with battery electric technology, allowing for temperature-controlled deliveries that are fully zero emissions at the tailpipe.

Retrofitting came at a lower cost than investing in new trailers and so far, the units have met performance expectations.

Orders and deliveries

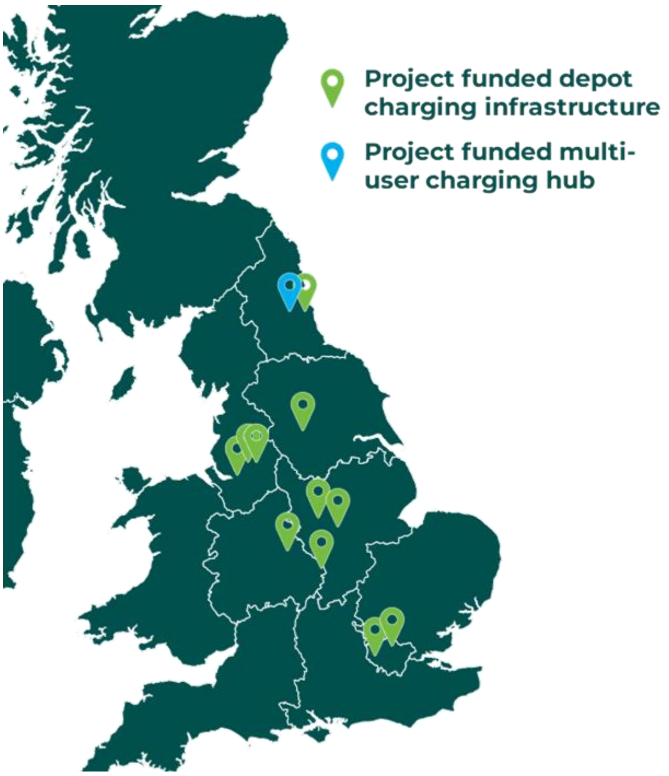
In summary, 157 eHGVs have been ordered by project members at the time of publication, exceeding the original target of 140 vehicles. Over half have now been delivered and are either on the road or are in the process of being prepared. We expect final deliveries to take place by the end of 2025, once charging infrastructure has been completed.

04 Electrifying depots

[Report two](#) explained many of the challenges faced when designing charging stations and getting them ready for delivery. GRIDSERVE has now overcome these issues with the first sites complete and several more under construction. This section gives an overview of these depot sites.

Following months of planning and design, 12 depots will feature high-power charging infrastructure funded by Electric Freightway, as shown in Figure 4. The first of these sites are complete, with the remainder coming online later this year. Complementing this, several project partners have funded their own charging infrastructure or are making use of existing chargers on their sites. Across Electric Freightway there is a combination of high-power DC charging, and slower overnight AC chargers in use.

Figure 4 - Depot based charging in Electric Freightway



Electric Freightway high-power charging

GRIDSERVE has installed charging infrastructure at a variety of locations, throughout the UK. This work is still ongoing with the final sites expected to be completed later this year. Most of the sites are located at existing warehouses or yards, which previously had limited power demand, requiring investment in significant upgrades in electrical infrastructure, such as upgraded connections and new substations.

Primarily the sites are designed as private facilities for operator partners. However, many are considering how third-party hauliers within and outside of the project can make use of the charging infrastructure. This sharing of facilities mirrors existing arrangements in the industry for sharing supplies of bunkered fuel in order to achieve a lower cost than using public filling stations. This is discussed in more detail in Section 05.

Sites being delivered

At **Nissan** in Sunderland, a multi-user charging hub opened in July. A detailed case study on this site can be found on page 19.

Yusen Logistics now has EV chargers at two locations, Derby and Leeds, to support its operations delivering to Nissan's Sunderland manufacturing facility. The Derby site has a small charging hub supporting local operations collecting parts from suppliers in the Midlands. Vehicles operating from Leeds will shuttle these parts up to the Nissan factory.

Fergusons Transport, based in Washington, Tyne and Wear, is installing a high-power charger at its depot in order to provide flexibility and resilience, supplementing the shared charging at the nearby Nissan factory.

Maritime's sites at Tamworth and Manchester are nearing completion, they feature some of the project's largest charger installations. Maritime plan to make third-party access to chargers available at most sites to support wider industry adoption of eHGVs.

Royal Mail's charging facilities will be located at two of its most advanced mail processing facilities – the Super Hubs serving the North West and the Midlands.

Avoiding grid upgrades

Managing load within existing limits

Royal Mail's sites feature a large amount of power-hungry machinery that can impact the capacity available for eHGV charging at certain times of day.

At one site there was power available on the existing connection at most times, but occasional spikes in demand reduced the available headroom.

As an alternative to costly connection reinforcement, a charge management solution has been specified to ensure the combined load does not exceed the site capacity, potentially blowing a fuse and disrupting operations:

- **Hitachi's ZeroCarbon Charge**[vi] is planned to be installed at one depot, where its dynamic load balancing functionality will constantly monitoring site load and adjusting the power available for eHGV charging.
- The solution will also provide Royal Mail with a dashboard displaying charge activity, that can be linked to its chargers and vehicle telematics.
- ZeroCarbon Charge also provides the opportunity to manage charging to take advantage of off-peak electricity rates where possible, while ensuring the vehicles have enough charge to cover their duties.

Figure 5 - Charging bays under construction for Maritime

United Utilities' treatment works at Davyhulme, one of the largest in Europe, works will soon complete on eHGV charging bays provided by Electric Freightway. The chargers will be supplied by energy generated by onsite infrastructure, including anaerobic digesters that are fed with waste products collected by the eHGVs – creating a truly circular energy supply.

Developing **Wincanton's** Greenford depot has necessitated the demolition of temporary buildings and reprovision of facilities elsewhere on the site in order to find a suitable location with access to power on the constrained West London site.

Figure 6 - Demolition works underway at Wincanton Greenford in preparation for charger install

This additional complexity has meant that it has taken longer than originally anticipated to get the site built – work is now well underway, and completion is expected in the coming months.

Charging facilities will be provided at Saint Gobain's site in Gotham, Leicestershire, which will be used by their logistics provider and project partner **XPO**.

Finally, **GXO** will operate eHGVs from Iceland's North London distribution centre in Enfield, which is receiving high-power chargers.

Charge Yard at Nissan Sunderland

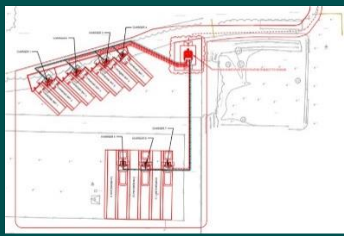
The first Electric Freightway charging site to be commissioned was also the project's most complex. The Charge Yard at Nissan's Sunderland manufacturing plant has transformed part of a storage area into an eHGV hub. A total of 10 high-power bays have been created, designed to support logistics across the Nissan Sunderland manufacturing plant. This includes both drive-through and reverse-in bays to accommodate the differing needs of depot users.

BCA required drive-through bays, so they can be used without uncoupling the complex vehicle transporters that take completed cars to the Port of Tyne. Trucks charge briefly between multiple shuttle runs carried out each day, depending on production demand.

Fergusons and **Yusen** share a bank of chargers. The hauliers generally uncouple from trailers on site and can use more space-efficient reverse-in, drive-out bays. Fergusons primarily collects materials from local suppliers, while Yusen brings components from manufacturers in the Midlands.

In addition to the charging infrastructure, welfare facilities for drivers and a parking area for trailers have been provided by Nissan on the site. The Charge Yard is integrated with Nissan's existing electrical infrastructure, which includes significant wind and solar power generation. This simplified some aspects of the development, as DNO connection upgrades were not needed. However, a significant amount of civil works was required to install cabling and make the ground ready for intensive HGV use.

The development of the site design required consultation between GRIDSERVE, Hitachi, Nissan and the hauliers to work within the constraints of a busy facility operating on a just-in-time basis. Several sites across the plant were considered before agreeing on the chosen location which had power nearby, minimised the need to dig across roads and avoided disruption to factory operations. Haulier operations and requirements were studied to specify an appropriate number of chargers and site layout.



As planning permission was required due to the scale of the development, biodiversity net gain was a key consideration. A butterfly bank created adjacent to the charging site adds greenery to the site and is predicted to provide net gain in excess of legal requirements.

Works to connect the site began over Christmas 2024 to avoid interruptions to production. Full construction commenced in January 2025. Long lead times for key components, including the transformer needed to connect the new chargers extended the time to complete the site, which opened in July 2025.

It is expected that the 25 trucks based at the site will operate **2.5 million kilometres per year**, resulting in an emissions saving of approximately **1,500 tonnes** annually.

The investment in the site forms part of a larger investment, EV36ZERO, supporting Nissan's transition of the Sunderland plant to an electric vehicle manufacturing hub.

Find out more at Nissan Stories.

Getting depots electrified

In report two we introduced some of the challenges that have been encountered in getting sites electrified. As implementation of depots has progressed, the project has continued to learn more about the practical challenges involved in powering depot sites.

Resolving or mitigating these issues will be key to enabling the wider electrification of depots in the UK.

Selecting sites

Most operators see depot charging as their preference, as it allows them to control operating costs, manage availability and charge when vehicles are otherwise idle, for example when loading. At the start of the project, almost all of the partners considered installing high-power chargers at one or more of their sites. A large number of these depots were surveyed to work out the feasibility, cost and potential timeline of electrifying each site.

To get to the final 12 depot sites that were able to be electrified, the GRIDSERVE team and our operator partners had to consider and rule out many more, for a wide variety of reasons, principally related to the high cost of installing high-power charging:

- Hauliers receiving only a small number of eHGVs often found it difficult to justify the expense of infrastructure investment, even with subsidy
- Where a power connection needs to be upgraded this can make the cost of the whole project significantly higher, depending on the work required
- Power connection timelines sometimes extended beyond the constraints of the project, sometimes into the 2030s
- Limitations on space at depots for installation of charging bays and associated infrastructure
- AC/slower charging was sometimes deemed sufficient for sites with longer dwell times, or for early use cases

Some hauliers have chosen to invest in their own charging infrastructure outside of the project's funding (principally where they chose to use slower overnight charging, or needed more control over what was being installed) or have used existing chargers already on their sites.

Gathering requirements

Developing an eHGV charging installation at a depot differs significantly from a car-focused hub or other development. On most projects, client requirements drive the scope, but few operators have clear requirements for eHGV charging at this early stage, as they have little knowledge of what they need or what is possible.

Project scope is therefore based on an analysis of what is required by the vehicles that are being ordered and what is possible with the constraints of the site.

Surveys were essential to understand where chargers could be placed and what impact this would have on site operations. Ground penetrating radar was used to ensure that works did not interfere with below-ground services on the site.

Designs were made based on these constraints and then discussed with site stakeholders through several rounds of revisions.

Cable lengths and charger positions need to be carefully considered on eHGV charging bays

Both left- and right-hand charging trucks exist, and the position of the charging port on the side of the truck can vary between OEMs.

On sites serving eHGVs from multiple OEMs longer cables may be needed to ensure eHGVs are able to charge at all bays while parked in the correct position.

Depot charging installations have to be much more bespoke than public sites and require a significant amount of discussion and agreement between different parties to ensure that the design meets the needs of the user and does not impact operations. In reaching agreements, the project's designs have had to overcome a number of challenges, examples include:

Client specific requirements

- Varying policies on whether drivers can reverse into, or out of parking spaces
- Specific requirements for long lead time items, such as substations and enclosures, to meet the client's electrical, safety and security standards
- Requirement for a site designed with futureproofing in mind, so more chargers can be added without having to repeat groundworks
- Reinforcing areas of bays that will have to support loaded trailers while charging

Safety requirements

- New substations need an exclusion zone around them which limits where they can be placed
- Limitations on placing chargers close to buildings which do not have adequate fire resistance

Site specific pre-start requirements

- Additional surveys may be needed on sites that feature diesel refuelling infrastructure
- Brownfield sites in urban areas (or on former industrial or military sites) often need more extensive surveys due to the potential for buried objects and services
- Requirement for the landlord to complete siteworks and other changes prior to commencement of charger installation works

Minimising disruption during works

- Mitigating impact of works on depot site, either by completing work during shutdown periods or utilising local backup generation
- Respecting 'no works' dates on sites at particularly busy operational periods
- Working with local businesses to minimise disruption during roadworks

Some learning by doing will take place, and flexibility is needed due to not all requirements being known at the outset. For example, some bays were designed with 5m charging cables, but these were changed to 8m following practical testing as it was found the shorter cables made it more difficult to open cab doors while vehicles were charging.

Electrifying sites

Alongside site design, sufficient electrical capacity needs to be secured to power the site. The distribution network operator (DNO) is responsible for managing and permitting new and upgraded electricity connections. Report two introduced some of the key aspects of this process, and how limited power capacity can impact what sites can and cannot be electrified. We will discuss the process of applying for power, and the challenges faced in more detail in the public charging section later in this report.

Specific to the depot sites, GRIDSERVE has been actively progressing connection requests with various DNOs. Through this we have experienced the impact of differing processes between DNOs, and often the inconsistency of process within the same DNO – with both positive and negative experiences encountered. Processes can differ between DNOs and while service level agreements are generally kept, requests for additional information that resets the clock are common. This can make the site development timeline difficult to plan.

Depot sites are often located on industrial premises where a large amount of specialist equipment and processes are in operation. This can add complications to the design because the sites need to be protected against disruptions, and issues like earthing can be more of a challenge.

Creating a 'cold' site: challenges with earthing

Getting power to site is often only part of the challenge when powering a depot. **Earthing** can be an important consideration when designing an EV charging installation at an existing site. DNOs require what is known as a 'cold' site – where a fault condition will not result in voltage rise beyond safe limits – in order to protect network integrity. This is achieved through adequate earthing.

On many sites this is simple to achieve, but there are a number of circumstances that can result in an inadequate level of earthing, including:

- Local ground conditions
- Rural locations far from the nearest substation
- Presence of on-site equipment and metal objects (including vehicles and trailers)

One project site is having to be delivered with a complex arrangement in order to overcome local earthing issues. A network of conductors had to be installed over a large area connected to the equipment being installed.

Doing this is not only expensive but resource intensive, requiring significant negotiation with the DNO. While GRIDSERVE and its contractors produced a design to meet the requirements set by the DNO, receiving approval from the DNO took a considerable amount of time.

The process is very contractual, requiring a design to be submitted to the DNO, which then has a set number of days to respond with comments. If there are comments then a re-submission and re-consideration is needed, often adding another month or more to the project timeline, even for minor changes.

On this specific application, six submissions were needed, with reasons for refusal varying and sometimes contradictory.

A benefit of the Electric Freightway project funding is that it allows sites such as this, which may not have been considered value for money without subsidy, to proceed.

Many more sites are likely to face similar hurdles in the future and may not be able to proceed without similar support.

Some partners, especially those on large industrial sites, operate their own electrical networks and did not need grid upgrades. However, most of these sites have their own design requirements often mirroring the standards set by the DNO.

Not all sites require extensive changes

While there are many barriers to electrification, there are locations where charging installations can proceed relatively quickly. At one site where no physical power upgrade was required, there was space within the depot to install a charger without disruption.

Agreeing contracts was the most drawn-out part of the process, and once this was finalised a pair of high-power charging bays were completed within a matter of weeks.

Right-sizing the site

The upfront costs of connections and civil works are not the only consideration when deciding what to build – the capacity of the site has a significant impact on ongoing cost. While there are benefits in terms of flexibility and futureproofing in over-sizing a site based on current demand, this can come at a cost when a larger power connection is needed.

Often a middle ground can be reached by designing civil works (like cable runs and bay layouts) with capacity for future expansion but not increasing power capacity until it is needed.

Future proofing vs Oversizing

Larger charging installations can result in scale benefits, as the cost of civil works and connections may be similar to a smaller site. Investing ahead of need can also make future fleet investments easier. However, committing to the large electricity connection needed to power many chargers can result in significant ongoing costs – known as 'non-commodity costs'.

These charges pay for the development and upkeep of the distribution (DUoS) and transmission (TNUoS) networks through charges that are principally based on connection size, connection type and location. The table below gives an example of the variation in fixed transmission charges by band:

Band[vii]	Connection size	Daily TNUoS Demand Residual[viii]
HV1	<=422kVA	£21.88
HV2	422-1000kVA	£66.03
HV3	1000-1800kVA	£126.71
HV4	>1800kVA	£323.99

(1kVA provides the capacity to supply approximately 0.9-1kW of real power, depending on the site)

In addition to these costs, there may be geographical and distribution charges, based on a combination of connection size, electricity use and demand at times of peak demand.

These can add significantly to the cost of powering a site and do not scale with the volume of charging that takes place. If high utilisation of chargers is not achieved, these chargers can make the actual cost of each kW delivered significantly higher.

Where initial demand is low but expected to increase, ramped connections (capacity increasing over time) might be available to reduce short-term costs. Timed or profiled connections may be able to help on sites where demand is likely to be concentrated – e.g. overnight charging.

Encouraging other operators on to site to share charging infrastructure can also help increase utilisation and reduce the cost to deliver each kW of electricity.

Securing agreement

Even where practical solutions could be found, the final step of securing the necessary contracts and legal agreements often took a long time to complete.

While motorway sites are generally similar, depot charging installations must be much more bespoke and require a significant amount of discussion and agreement between different parties to ensure that the design meets the needs of the user and does not impact operations. Involving all interested parties from the beginning may be more complex but will prevent later delays.

As with site design, a key issue with installing eHGV charging is that, in most cases, none of the stakeholders have previous experience in doing so. The depot operators were often unfamiliar with engineering contracts, requiring more time to agree to terms, or necessitating the use of external legal help. This can result in differing approaches, with some organisations being very cautious about legal matters and others being more commercially minded.

Some of the delays encountered were due to the requirements of project funding – such as the need for GRIDSERVE to act as a middleman between site owner and sub-contractor (a different role from what it usually takes on its own charging sites) and the complexities of agreeing appropriate liability for sites part-funded by government grants. The potential impact of incidents during installation can be much higher at active depot sites, where processes can be disrupted, than at public sites where the charging infrastructure is located in a car park.

All of this means that there are normally a lot of interested stakeholders who become involved in decision-making, often at a late stage in the process, slowing down progress or requiring multiple revisions of plans. Legal requirements can often extend beyond the operator of the site – landlord or freeholder consent is sometimes needed for development. This is especially the case in completing legal agreements where DNOs or Independent DNOs (iDNOs) adopt assets, involving the need to enter into a sub-lease for the land the asset sits on. While there were communication delays on some sites, this did not cause significant delay to the project overall.

05 Charging on route

At the core of Electric Freightway is the development of a network of public charging sites at motorway service areas (MSAs). Alongside this, the wider industry is starting to move at pace, developing a range of charging options away from the depot to meet the evolving needs of operators. This section gives an update on how the industry is starting to put in place the infrastructure required to enable the electrification of longer eHGV journeys.

Why is charging needed outside of the depot?

When asked where they would prefer to charge, the majority of operators would respond that they want to use facilities at their own depot, where they have control over the facilities and can negotiate competitive rates for power. So, why do we need on route charging?

One of the core aims of Electric Freightway is to enable the electrification of the most challenging HGV routes. A key challenge is the relatively limited range of current eHGVs – generally between 200-300 miles from a full charge.

Some diesel HGVs often travel more than 500 miles in a day and may spend multiple days away from their home depot. These routes are not possible with purely depot-based charging.

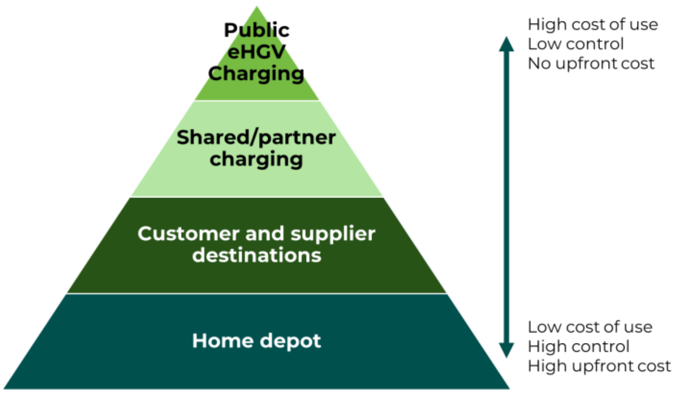
It is not just longer journeys that benefit from infrastructure provision. Much of the UK haulage industry is made up of many smaller businesses, often with fewer than 10 vehicles. Operators of this scale may find it difficult to invest in their own charging infrastructure, especially if electricity network upgrades are needed. This can be due both to the lack of access to capital and lower charger utilisation making each charge more expensive. Solutions are needed to help smaller businesses electrify while remaining competitive.

Even on shorter routes, the unexpected can occur – congestion and accidents can extend routes, and power supplies and equipment can suffer outages. A 'plan B' is needed to allow operators to ensure the continuity of their business.

A range of facilities to meet different needs

There is no one-size-fits-all solution to eHGV charging away from the depot – different use cases have different requirements. Some operators consider there to be a hierarchy of different charging types, with a preference for sites where they can control costs and availability, though they see the need for charging at destinations, partner and public sites to extend the range of their operations.

Figure 7 - Types of charging infrastructure



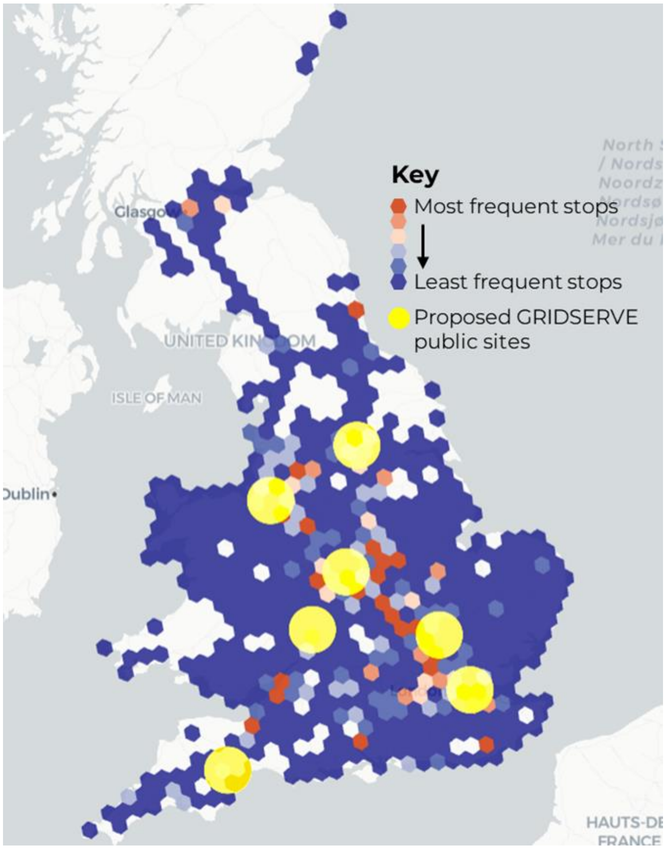
Charging speed is another important consideration. High-power charging is significantly more expensive to implement compared to slower overnight charging. Whether the latter is a feasible option depends on the usage pattern of the vehicles, with longer charging times impacting how long the eHGV can spend on the road.

Where and for how long do HGVs stop?

HGVs have to make regular stops during their days – either as part of their operations, such as when loading or unloading goods, or to give drivers their regulated rest period. If charging facilities are available, and if charging can take place without impacting on driver rest, these stops could be used to provide top-up charges for eHGVs.

We have used telematics from diesel vehicles being operated by our partners to visualise where they stop in their day-to-day operations, highlighting areas where charging facilities may be required (Figure 8).

Figure 8 - Where HGVs stop (ICE and eHGV)



The Electric Freightway Network

Significant progress has now been made with developing the GRIDSERVE Electric Freightway public charging network. Agreements have been concluded with three MSA operators to develop charging sites across the UK.

Development work is now well underway, and we expect eHGV charging hubs to be opened between late-2025 and mid-2026 at the following locations, as shown in Figure 9:

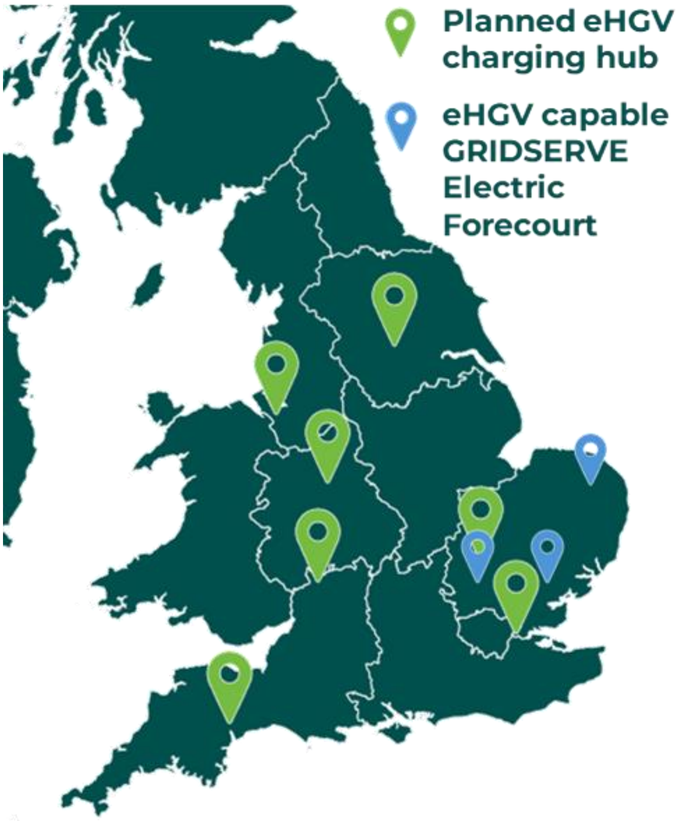
Moto – Exeter (M5), Tamworth (M42), Thurrock (M25)

Roadchef – Chester (M56), Strensham (M5 Northbound)

Extra – Baldock (A1(M)), Leeds Skelton Lake (M1)

In addition, GRIDSERVE's Electric Forecourt sites at Braintree, Norwich and Stevenage are capable of charging eHGVs, by arrangement with on-site staff, and have been used by a number of project partners.

Figure 9 - Planned GRIDSERVE public eHGV charging locations



Stretching range through public and shared charging: Voltloader

Although the project's dedicated eHGV sites are not yet complete, project member Voltloader has been making the most of an existing and growing network of chargers dotted across the UK. These include:

- Voltloader's own network
- Shared chargers on private sites
- Public charging hubs

Voltloader's model typically includes basing its own vehicles at clients' sites alongside newly installed chargers where they can perform full-time work.

In some cases, its customers may choose to make this charging capability available to other operators. For example, earlier this year, Voltloader completed the build of an ultra-rapid charger (240kW, upgradable to 360 kW) at its customer's site, ADM Milling in Corby. In this specific case, Voltloader has been supporting bringing in raw product (wheat) to the mill and then delivering finished product (flour) to customers. Most charging is performed overnight on this charging infrastructure, and during the day the charger is available for those same vehicles to use, as well as other pre-approved hauliers.

"The charger at Corby hasn't long been live, but it's been encouraging to see such interest in using it as other fleet operators look for new ways to open up routes which were previously constrained by range."

Steve Springett, Head of Charging, Voltloader

In addition to its own depot-based network, Voltloader is routinely pushing its vehicles further and supporting customers to open up new, longer routes by using shared chargers on private sites (for example, Welch Group's charger at Duxford) and public sites (like GRIDSERVE's Stevenage and Braintree Electric Forecourts).

In May, Voltloader supported a customer in delivering events equipment to the prestigious Chelsea Flower Show. Setting off from Voltloader's Peterborough site at 100%, having charged overnight at its own charger, the truck stopped at GRIDSERVE Stevenage on the way for a top-up before tackling a mazy route filled with one-way lanes and diversions on route to Chelsea – before heading home.

"Much of the work we do comprises pre-planned, regular routes using our own charging infrastructure – but it's great to show what's possible for one-off jobs. Chelsea Flower Show runs once a year and it'd have been a shame to miss out in supporting the event by not stepping outside of our day-to-day. Through using existing public charging infrastructure, we were able to comfortably get the job done."

Dave Rose, CEO & Founder, Voltloader

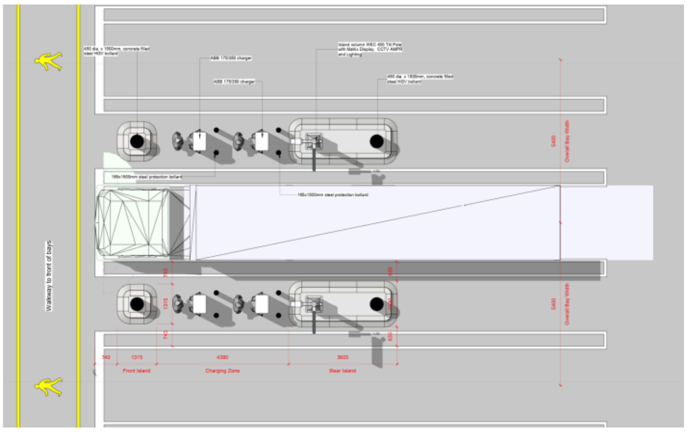
If you would like to speak with Voltloader about opening up new routes by using its chargers or to hear in more detail its experience of using the existing public shared-private network – please email: steve.springett@voltloader.com.

Designing the charging experience

GRIDSERVE's engineering team has worked with external architects to develop a design manual that will be implemented by the contractors building all of its sites, ensuring a consistent user experience. Following initial designs, bay layouts were tested using HGVs to make sure that drivers could easily drive in and out and chargers could be accessed.

Each eHGV charging hub will consist of at least four high-power charging bays. Each charger will be capable of delivering 350kW to eHGVs, although site load restrictions and vehicle limitations may result in slower charging at times, controlled through GRIDSERVE's load management systems.

Figure 10 - Typical drive through public bay layout

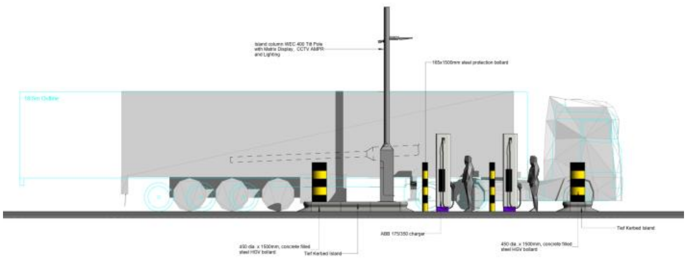


Bay and island width is a key consideration for drive-through sites. Given space is at a premium, compact ABB HP charge posts will be used at all public sites, allowing space for drivers to safely get in and out of their cabs. Separate power cabinets are located close to substations and feeder pillars at the end of each line of bays allow easy maintenance and prevent damage from manoeuvring vehicles.

Each island is designed to accommodate two charge posts so that vehicles with left- and right-mounted charging ports can be served, if this is required (Figure 10). Demand for this will be monitored as the demonstration progresses.

High-visibility bollards surrounded by Trief kerbs provide protection to the charge posts, which are mounted at ground level to provide accessibility, avoiding trip hazards for users. Bays include integrated lighting, as well as provision for ANPR CCTV and electronic signage capable of integration into bay reservation systems.

Figure 11 - Cross-section of typical charging bay



Where possible, bays are specified to accommodate longer semi-trailers up to 18.55m (Figure 11), with safe walking areas marked at the side and front of bays to provide access to the chargers and other on-site facilities. The majority of bays are designed to be drive-through, though reverse-in bays may also be provided at some sites where there are space restrictions. Figure 12 illustrates an example layout planned for one of the hubs.

Figure 12 - Proposed charging layout at Moto Tamworth MSA, featuring drive-through bays

Other considerations during the design development included:

- Use of prefabricated bases for chargers and associated infrastructure to cut installation time
- Lighting – making sure there is adequate light for all areas, including when trucks are parked on bays
- Earthing requirements can vary by site and versions with TT and TN-S earthing systems designed to cater for this

Public charging challenges

Developing public infrastructure involves a different set of challenges than seen at depots. Appropriate sites have to be found, commercial agreements entered into with landowners, and site designs need to accommodate unsupervised use by visiting drivers. This section highlights some of the challenges that the project has faced in developing the public network.

Power, space and commercial viability

These three constraints ultimately determine deliverability, and many sites considered lacked one of these factors:

- **Power**: Most MSAs do not have a large amount of spare electrical capacity, and their remote locations often mean that bringing new supplies to site can be costly and time consuming.
- **Space**: Truck parking at MSAs is generally oversubscribed and minimum numbers of spaces are required by the DfT. eHGV charging has to be developed without negatively impacting existing parking spaces.
- **Commercial viability**: eHGV charging needs to be located close to expected demand in order to meet users' needs and achieve infrastructure utilisation.

The limited duration of the Electric Freightway project exacerbated these challenges and has been a significant constraint on the number of sites that could be electrified.

Finding the right site

All UK MSAs and a number of truck stops were considered as potential locations for Electric Freightway charging hubs. From over 100 sites throughout the UK, the shortlist was reduced to 30, 18 entered detailed consideration and seven went forward to development.

HGV traffic levels were studied, together with the routes of our partner hauliers, to identify where there is expected to be a sufficient volume of traffic to make eHGV charging viable in the early years of adoption. Sites were then screened for feasibility – whether there appeared to be sufficient space for eHGV charging – before approaching operators to pitch the idea of eHGV charging.

Where operators were interested, further investigations could take place – looking at DNO connection maps for connection feasibility and considering other site-specific constraints. Sites were discounted at this stage for a number of reasons, including power availability, flood risk, presence of protected trees, scheduled monuments and layouts that would result in queuing vehicles on the off-ramp. While many of these issues could potentially be mitigated, it was not always possible within the project's limited time and budget.

Agreeing on design

The design of eHGV charging hubs involved extensive research into the needs of eHGV drivers. This included working with architects to design site layouts and prototyping those layouts with real trucks to show whether modelled swept paths were achievable in reality.

Once sites were agreed, the layout and location of chargers on each specific site needed to be considered. In some cases, this took up to a year with multiple revisions as landlords weighed up the options.

MSAs are often physically constrained and were not designed with vehicle charging in mind. Layouts often had to be significantly altered to ensure that numbers of HGV parking places were maintained in line with DfT requirements.

eHGV charging lanes take up significantly more room than a standard bay due to their drive-through nature requiring manoeuvring space at both ends, in addition to the space needed for charging islands and ancillary equipment. As a result, access roads had to be realigned, truck washes and caravan parking moved, replacement bays provided, and verges repurposed. All of this had to be balanced against budgets, as adding new areas of concrete and tarmac results in a significant increase in cost per bay.

Six to seven design revisions were needed on each site before the final plan could be agreed. On some sites the originally envisaged scale was not deliverable, and a smaller scope had to be implemented, or the development phased.

Meeting planning requirements

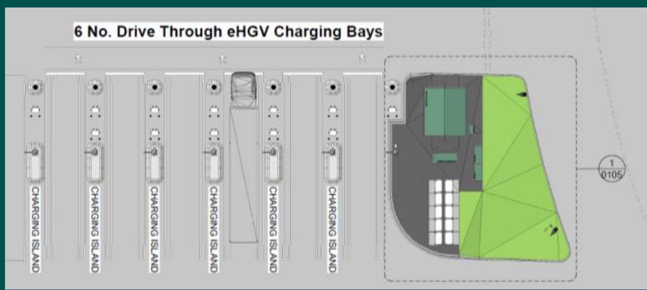
Public sites generally require more extensive changes than those at depots, resulting in a need for full planning permission from the local authority. The feature on the right highlights some of the planning challenges facing charge point infrastructure.

Navigating planning policy for public sites

One of the most time consuming and unpredictable aspects of delivering public sites is the planning process. Whenever development exceeds a very minor level of work (termed 'permitted development') it is necessary to make a full planning application to the local authority, which then reviews the plans and consults stakeholders before making a decision. While this process for minor applications should take around eight weeks, 12-13 weeks is not uncommon, with some decisions taking over 20 weeks due to limited local authority resources and consultees responding slowly.

While local authorities have generally been supportive of eHGV charging developments, they are also generally inexperienced with them and there are few standards or precedents. It is therefore often necessary to work closely with them throughout the process.

Amendments are often required, especially where landlord and DNO discussions are happening in parallel with the planning process. A decision needs to be made over whether an early approval with subsequent amendments is more efficient than waiting until everything is fully agreed before applying for planning permission.



Permitted development

To help make the installation of electric vehicle chargers simpler, the government has recently amended planning rules to allow more sites to be deemed 'permitted development', not requiring full planning permission[ix].

However, these changes do not go far enough to make most eHGV sites permitted development, as they limit the amount of equipment (such as feeder pillars) that can be installed for each bay to one item – often not sufficient for high-power charging. Charging bays must also be in areas "lawfully used for parking" to be considered permitted development, although the legislation is not specific about what this means. Existing HGV parking generally cannot be easily converted like car parking spaces – eHGV sites often need more extensive works due to their drive-through nature, the need for charging islands and manoeuvring space.

Navigating planning policy for public sites

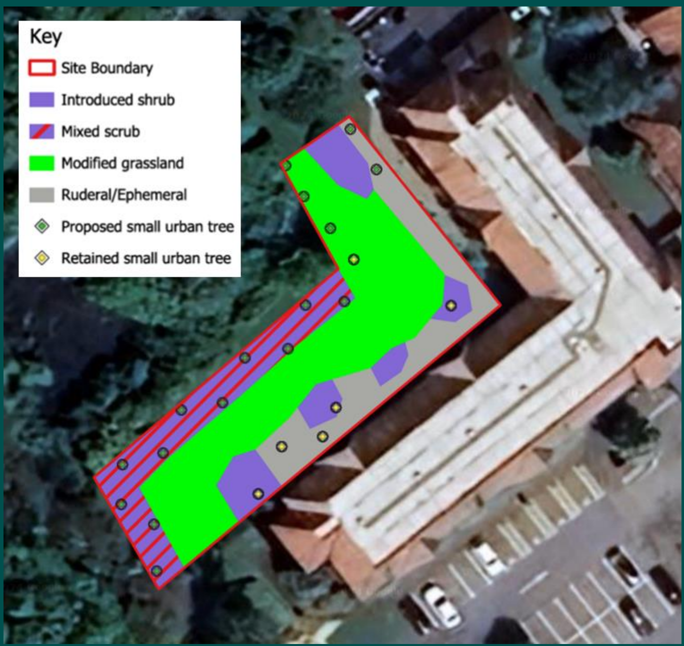
Biodiversity Net Gain

One of the more complex parts of planning a site is demonstrating biodiversity net gain (BNG). Improving BNG is a recent requirement, brought in to ensure that new developments not only preserve biodiversity, but improve it by at least 10%[x]. On large schemes this can have a positive impact, encouraging developers to include areas of green space, trees and other habitats.

On smaller projects like charging bays, on sites where space is already at a premium, there is often limited scope to enhance biodiversity. Most sites involve developing a small area of existing hardstanding or grass verge. The cost and effort of calculating the required amount of BNG required and then finding a suitable solution on a constrained site is often out of proportion to the benefit derived. BNG can sometimes cross over with other considerations; where trees need to be removed or replaced, arboriculture teams often have different requirements to BNG's ecology-based scoring – focusing on the number of trees, rather than quality of habitat provided.

Once developed, features designed to deliver BNG must be maintained for 30 years. This can create issues on sites like MSAs where space for charging is leased for a relatively short period of time, or where BNG measures need to be located elsewhere on the site. This, therefore, needs agreement with the landlord.

Figure 13 - Proposed BNG scheme to support eHGV charging at Extra Baldock MSA, adding mixed scrub and trees to grassland area



Revision of rules around BNG would be beneficial for future developers of charging sites, and there are a number of options:

- Extend the scope of permitted development and only apply BNG requirements to elements of schemes that are beyond that scope
- Accept other environmental benefits (such as emissions reductions as a result of eHGV use) as an alternative to BNG
- Increase the minimum size or scope of works where BNG is needed, or exempt certain categories of work, such as transport infrastructure

Despite the difficulties in designing-in BNG, a solution was found at each site, often in the form of additional trees or other planting within the MSA site.

Laying cables

Planning permission for the site is not the only obstacle; getting an upgraded power connection in place also requires permits and permissions to cross highways and private land. CPOs need to apply for a license to carry out works on the public highway (specified by Section 50 of the New Roads and Street Works Act 1991) if they are not classified as a 'Statutory Undertaker'. However, the process for acquiring the permits, and the cost of doing so, varies significantly across highway authorities.

Following a consultation in 2024[xi], the government agreed to proceed with changes to allow CPOs to become 'Statutory Undertakers' (subject to a less rigorous system of permits), though there is no clear deadline for when this change will take place. In the interim, the government has produced guidelines to try and encourage harmonisation, admitting the current processes are inconsistent and confusing, but authorities are not currently compelled to follow them.

Third parties over whose land cables may need to pass are not required to provide permissions, or to do so in any specific timescale. This can make the process of planning and delivering connection upgrades lengthy and unpredictable and has significantly delayed energisation of one of the project's public sites.

Conclusion

The project has managed to navigate the challenges well to make the sites ready for construction, but it is clear that there are a number of reforms that could be considered to make development of future sites quicker and more efficient.

Energising chargers

All of the public sites required some form of electricity connection upgrade due to the amount of power needed for eHGV charging – each location required a connection of approximately 2MW to supply between four and six high-power chargers. Given MSAs are often located in relatively isolated areas, which do not always have existing access to large electricity supplies, providing those supplies often required network extensions over a long distance – in some cases up to 6km.

Demand curves for public eHGV charging are currently unknown, making it more difficult to accurately predict when demand will occur and whether chargers will be used simultaneously at full power. Therefore, sites are designed to be able to provide full power to all charging stations. This differs from car charging hubs, where power demand can often be managed using load management systems based on knowledge of when vehicles charge, how much power they draw and how often multiple bays are in use.

The scale of charging on a site has a direct impact on the cost of connection. Under 2.5MVA is generally manageable, however, above this level, new cables are more likely to be needed, increasing costs substantially. Above 6MVA requires connections at a higher voltage level and is more expensive still.

The cost of connection is not the only consideration, just as with planning, the process to request a connection upgrade can be lengthy, bringing uncertainty to the lead time of developing a site.

The connection process

The regional DNO is responsible for managing the local electricity network and providing connections to the network. New and upgraded connections require customers to follow a set application and acceptance process, while developing designs for their site, as shown in Figure 14.

Figure 14 - Energisation process

Challenges faced

As can be seen, this process is lengthy, and a number of risks and challenges can further add to the uncertainty:

- **Limited information availability** – while DNO networks publish capacity maps, these only act as a general guide to power availability, and an application needs to be made to understand what is available at a specific connection point and what the cost will be.

- Where **reinforcements** are needed, the timescale can vary significantly, from a few months to several years, and consents needed for cable routes can add further uncertainty.

Long cable runs are not just expensive in terms of build costs, they will often cross many landowners' premises, requiring their consultation and permission.

On one site where a new cable needs to be laid, a single landowner has significantly delayed the upgrade, and there is no mechanism through which the process can be accelerated.

- An increasing number of projects trigger a '**transmission assessment**' to determine if reinforcement of transmission assets will be required. The assessment alone can take 9-12 months – if works are required it can take several years and incur significant costs.
- Using **renewables and batteries** behind the meter on a demand site can potentially reduce network load, but applications involving these technologies may be blocked in some areas where there are grid constraints.
- **Process delays** can occur, often due to DNO resource limitations and communication delays. Design reviews and legal approvals can take longer than expected, impacting energisation slots, which are often postponed.
- DNOs are less accepting of delays in customers' projects, setting '**milestones**' as part of their offers, which, if not met, can lead to offer termination.

Figure 15 – Equipment base and provision for cabling under construction on a depot site

Room for improvement

While some constraints require more fundamental network investments to resolve, there are a several actions that would make sites easier to deliver in the shorter term:

- Streamlining legal processes and approaches, making them common between all DNOs
- Establishing centralised communication points or dedicated account managers to help resolve issues more quickly
- Setting clear timeframes for network upgrades, so progress can be monitored and controlled
- Addressing resource shortages within DNOs to reduce process delays

iDNOs

Independent DNOs (iDNOs) have been used to provide connections at several charging hubs. These organisations offer some benefits over directly dealing with the DNO, though challenges remain:

iDNO Advantages	iDNO Challenges
Asset value payments (iDNO pays for assets which become part of their network)	Dependent on DNO for 'non contestable works'
Ramp-up capacity planning	Smaller workforce may respond to faults more slowly
Customised technical and commercial solutions	Less mature market with less regulation and project experience.

Ramping up of capacity can help manage ongoing cost in the short term where capacity is available. For example, while infrastructure may be designed for 2MVA, only 1MVA is used initially until demand increases, reducing capacity payments.

Getting the site built

Once the design is complete, all the permissions are in place and the connection agreed, the project proceeds to the build phase.

Work is now in progress at the first two sites, and the final report will detail any findings from this stage and the early operation of public eHGV charging hubs.

Megawatt charging

GRIDSERVE has continued to consider the potential for the provision of megawatt level charging at eHGV hubs and is actively working with technology partners to evaluate options as they come to market.

While there are benefits to being able to charge faster, it is not yet clear what the demand will be for this type of charging. Due to the high capacity needed to provide megawatt charging, the cost of providing it is likely to be substantial, unless high utilisation of chargers can be maintained. As described in report two, very few existing vehicles can make use of megawatt charging, meaning utilisation in the short term is likely to be low.

Transformers and feeder pillars on sites that the project is delivering are specified with excess capacity to allow future power upgrades. Islands are designed with ducting and universal mounting systems that will simplify upgrades should they be required.

Booking and bay management

Alongside the construction of charging sites, GRIDSERVE has been testing the solutions needed to manage them effectively.

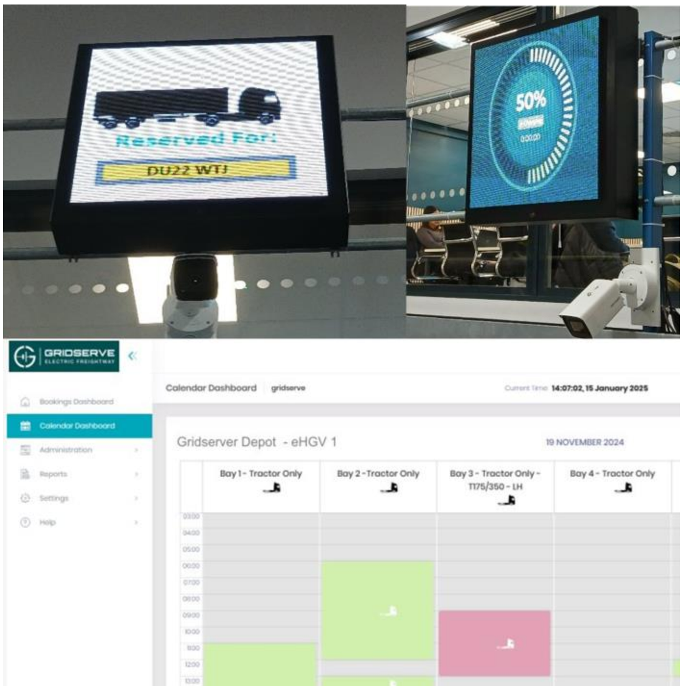
While the small number of eHGVs on the road currently limits demand for on route charging, it is clear that this will not always be the case, and technology will be needed to manage bookings and utilisation of chargers. Shared depots may also need to implement a system to manage bookings and payments, though this could be simpler due to the peer-to-peer nature of the agreements in place. GRIDSERVE has been testing a reservation, monitoring and signage system at its innovation centre (Figure 16) and is considering how and when this will be implemented at commercial and shared eHGV charging sites.

As noted in report two, there are potential disadvantages of implementing such a system from a CPO's point of view. The practical research that is happening in Electric Freightway is therefore needed to understand how operators interact with public sites.

Once developed, it is intended that the solution will have a number of benefits, including:

- Improving efficiency by managing bay assignments
- Simplicity of booking and scheduling
- Monetisation, handling external bookings
- Visibility of availability and utilisation
- Proactive alerting
- Insight into usage trends
- Security to manage access to chargers
- Connectivity with ANPR cameras, sensors and signage

Figure 16 - Testing bay reservation and monitoring systems at GRIDSERVE's innovation centre



Shared infrastructure

Some hauliers actively avoid fuelling at MSAs today, public charging at MSAs is not expected to be the only solution needed by operators who make long journeys or are unable to install their own infrastructure.

In addition to fully public or private charging sites, operators are looking at how they can share charging infrastructure. This brings several benefits:

- Better utilisation of chargers, helping with investment cases, subsidising running costs and significantly reducing cost-per-kWh of charging
- Wider range of charging locations enabling longer routes
- Potential for more economical charging due to lower operating costs compared to public facilities
- Reducing eHGV implementation cost, by avoiding need for investment in own infrastructure at all locations
- Increasing resilience with access to additional chargers in the event of equipment or supply failure

Members of Electric Freightway are encouraged to share their infrastructure with other operators where it is practical to do so.

Sharing arrangements differ from public charging stations because they are only open on a prearranged basis to specific partner eHGV operators. This allows site owners to ensure that visitors agree and comply with any site safety requirements and means that the site does not have to comply with the more onerous requirements for public charging sites regarding data, access and payment.

Many of the project's partners are looking at how they can make use of depot and charging facilities provided outside of the consortium to extend the capabilities of their eHGVs.

For example, Samworth Brothers, which operates from multiple locations in Leicester, has trialled charging at First Bus's Leicester depot[xii]. Kuehne+Nagel plans to make use of infrastructure provided through the eFREIGHT 2030 project, of which the company is also a member, together with GRIDSERVE's public charging sites.

Freight Carbon Zero Think Tank: Sharing Charging

On 21 May, Electric Freightway welcomed a Freight Carbon Zero Think Tank to Hitachi ZeroCarbon's London offices to discuss the infrastructure needed to support the electrification of HGVs.

Participants included hauliers, a distribution network operator, a charge point operator, a truck dealer and solution providers. Hitachi ZeroCarbon and GRIDSERVE set the scene with an insight into project findings. Following that, the wide-ranging discussion covered a number of topics, including how we select the right use cases for trucks, the importance of collaboration and sharing of infrastructure, and how the industry needs to work with electricity companies to plan future investments in grid capacity.

It was clear that there were many questions still to be answered, but some conclusions were reached:

- Operators have to specify vehicles and infrastructure to match their use case. While flexibility can be achieved it comes at a cost.
- Trust is key, operators need to be convinced by eHGV technology before they will push it to its full potential and adopt smarter charging.
- Planning needs to start now – even if electrification is many years away – if depots are to be electrified.

Read the full report on the Motor Transport website.

Zero Emission HGV and Infrastructure Demonstrators

Electric Freightway is not alone in bringing truck charging to the UK. Two other projects in the Zero Emission HGV and Infrastructure Demonstrator (ZEHID) programme are building eHGV charging facilities:

eFREIGHT 2030 is focused on depot-based charging, but in principle its depots are open to sharing with other partner fleets. This limited sharing of infrastructure helps ensure that partners can be briefed on any site-specific rules that may be in place. A range of power options are expected to be provided including a number of sites capable of megawatt level charging.

ZENFreight is establishing a national network of depot-based electric charging across the UK, together with a hydrogen refuelling station, providing fleets with flexible energy solutions to maximise operational efficiency.

Find out more about the projects at https://iuk-business-connect.org.uk/programme/zero-emission-heavy-goods-vehicles-and-infrastructure/. The map below shows the expected locations of ZEHID charging stations across all of the projects as of March 2024.

Other innovative projects

Several other projects are also actively developing technology solutions that will support the sharing of eHGV charging, including:

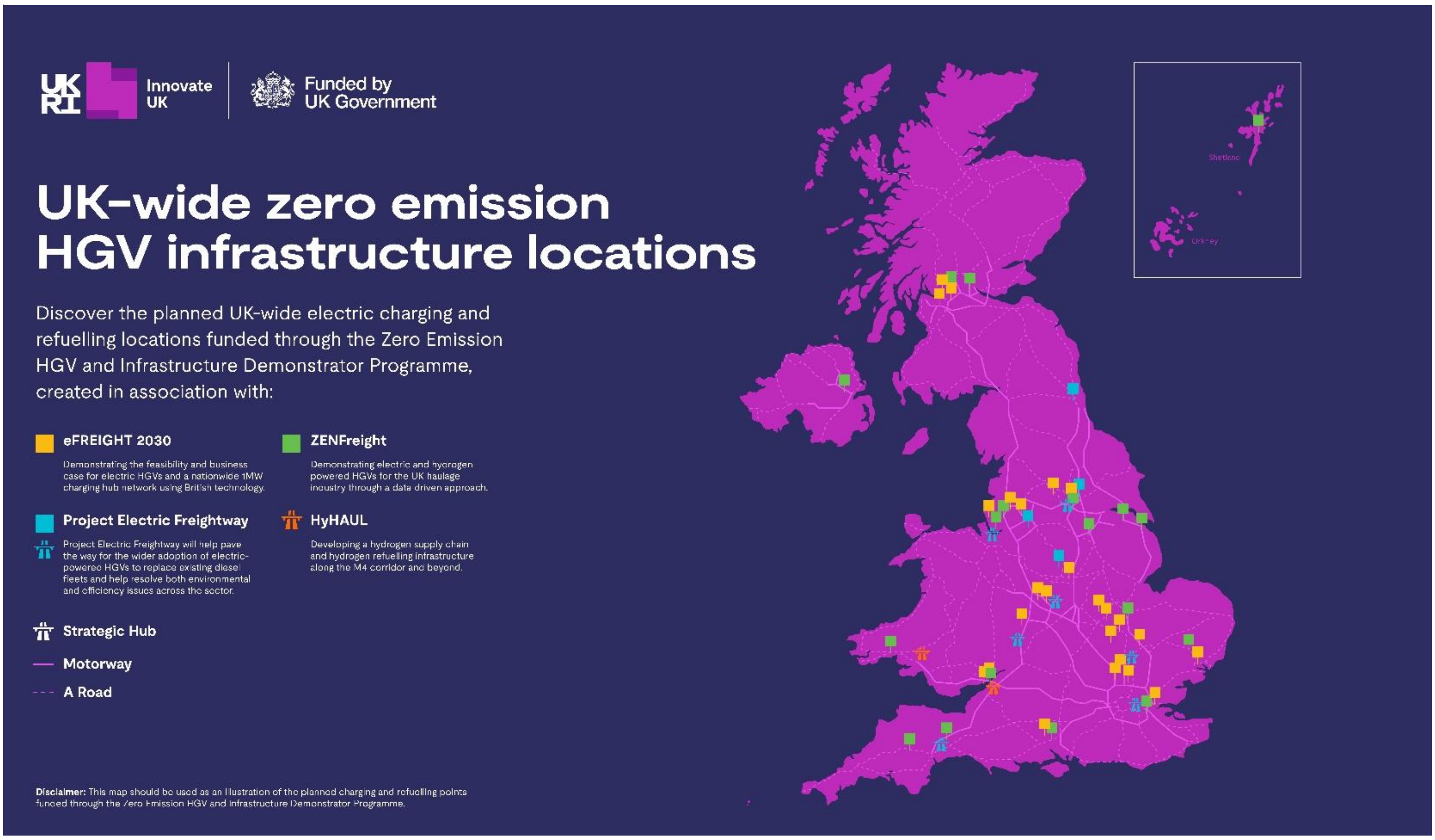
Flexible Power Systems

Flexible Power Systems has developed 'FPS Booking'[xiii], a platform aimed at allowing depot owners to open up their infrastructure to external parties in a controlled way. A nine-month trial implementation is currently underway with around 10 partners providing each other with access to their depot-based charging infrastructure.

Paua PINS

As part of the Transport Decarbonisation Demonstrators programme, Suffolk and Oxfordshire County Councils worked with Paua and Cenex to pilot a depot sharing system. The platform, now commercially available as Paua Share [xiv], enables matchmaking between fleets wanting to share or make use of infrastructure and management of payments.

Figure 17 - UK-wide zero emission HGV infrastructure locations - Source: Innovate UK



ENROUTE

Efficient Network for Road-freight Optimisation, Utilisation, and Transfer of Energy (*ENROUTE*) was a project co-funded through Innovate UK's Net Zero Mobility: Feasibility studies for optimal data exchange competition. As part of the project, Syselek developed a Dynamic Reservation Management[xv] system for charging stations, integrating with telematics and transport management systems to allow operators to delay bookings, or switch them to alternative locations when vehicles are not running to schedule, while ensuring the exact location of vehicles is kept anonymous.

Standards are also progressing. The EVRoaming Foundation launched a working group to develop standardised booking functionality for HGVs. The first outcome of this, providing the ability to book bays within charging stations, was recently published as part of the Open Charge Point Interface version 2.3 in June 2025[xvi]. Future requirements are currently under discussion and may include the development of more dynamic booking functionalities.

As covered in report two, BSI are developing a suite of standards to support the transition to Zero Emission HGVs. Three BSI Flex Standards have now been published covering public charging sites, workshops and hydrogen refuelling.

Commercial approaches

Significant developments are taking place involving commercial operators of eHGV charging in the UK, including:

Milence[xvii], a joint venture owned by several European truck manufacturers, opened its first UK site, adjacent to Able Humber Port, Immingham, North Lincolnshire in March 2025. This is the first UK example of a commercial vehicle-only charging hub and follows the designs piloted at sites elsewhere in Europe. Immingham initially offers eight eHGV charging bays, together with driver facilities, though the site has the capacity to be expanded as demand grows. Plans are also in place for a future Milence site in Kent.

In July 2024, **Relode**[xviii] announced its intention to develop 15 'Power Parks' across the UK, providing eHGV charging hubs and access to high-power connections for surrounding businesses.

Figure 18 - Milence Immingham. Source: Milence

Aegis Energy[xix] has announced plans for multi-fuel charging stations at logistics parks and transport nodes throughout the UK. These sites will deliver electric charging alongside other fuels including HVO, hydrogen and bio-CNG for vans and trucks. The first site is also expected to be at Immingham, followed by locations in Sheffield, Corby, Towcester and Warrington.

Fleete[xx] has begun construction of a 16-bay commercial vehicle charging hub at the Port of Tilbury. The site, funded as part of the Thames Freeport Seed Capital Programme, is expected to open in December 2025. Four of the chargers are being provided as part of the eFREIGHT 2030 project.

Project partner **Moto**[xxi] has announced a long-term plan for 300 high-power chargers for trucks across 23 locations by 2030, starting with the sites being delivered as part of Electric Freightway.

InstaVolt[xxii] recently opened its first Superhub in Winchester, featuring four large commercial vehicle bays alongside 40 car and van bays.

bp pulse[xxiii] has acquired Ashford International Truckstop in Kent, the largest in the UK, and plans significant investment in electrification. It is reported this could eventually result in 20 1MW chargers, 10 400kW chargers and 120 100kW chargers, subject to power availability and demand.

Shell [xxiv] opened its first eHGV charging location adjacent to Markham Moor Truckstop on the A1 in September 2024.

European progress

The UK is not alone in developing public infrastructure to support eHGVs. Countries throughout Europe are also developing eHGV charging across key corridors, including the TEN-T network of primary routes.

Development varies significantly by country and takes various forms including dedicated eHGV-specific charging hubs as well as eHGV charging bays at existing filling stations. Southern Sweden, Norway, Denmark and the Netherlands have seen the fastest development of infrastructure, this is now being followed by major routes through Germany and France. Some examples include:

- **Milence** has set out plans for 1,700 charge points by 2027, including 70 sites across the TEN-T network supported by €111m EU funding; 25 sites are currently operational[xxv].
- **Circle K** is planning to open 45-50 eHGV charging bays at 10-15 locations across Norway [xxvi], complementing 28 truck charging locations in Sweden. These sites are primarily based alongside existing fuel stations, though the first electric-only hub opened in spring 2025.
- Norwegian development agency **Enova** has part funded a 19-location, 108-charger network being delivered by five different operators[xxvii].
- **Aral Pulse**, part of bp, has expanded from an initial eHGV pilot in the Rhine-Alpine Corridor to 26 locations in Germany and the Netherlands[xxviii].

Electric Freightway partner Kuehne+Nagel demonstrated the importance of international connectivity in July 2025, when the haulier completed the first cross-channel ferry journey in an eHGV carrying freight. A Renault E-Tech T completed the 1,100km return journey from Kuehne+Nagel's East Midlands Gateway facility to Amiens, France, stopping for a top-up charge at GRIDSERVE's Electric Forecourt along the way.

06 Findings from the demonstration

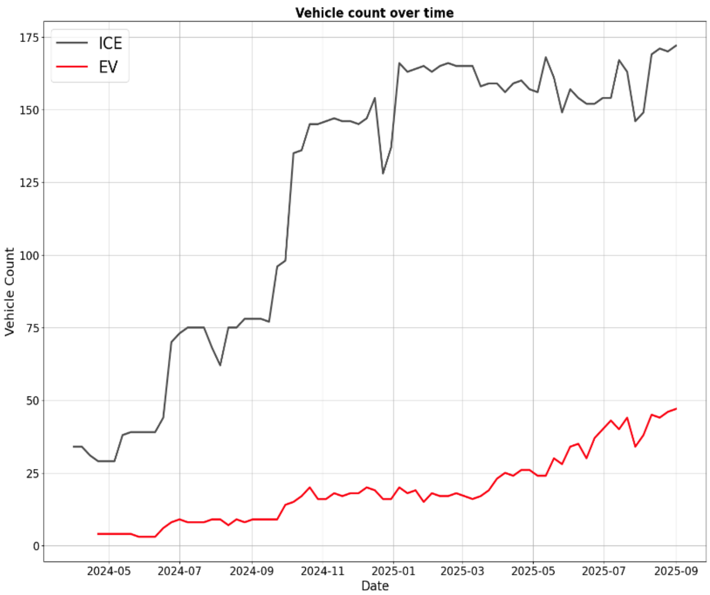
The first Electric Freightway eHGVs hit the road almost a year ago, and project partners have continued to grow their fleets. At the time of writing, the project has captured data from over one million kilometres of zero tailpipe emissions driving. This section highlights some of the key insights that we have uncovered through the analysis of telematics data from these vehicles.

Routes and range

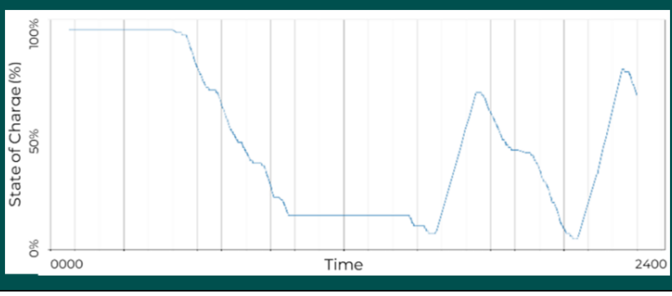
The first of the project's eHGVs hit the road in April 2024, with the 18 vehicles on the road by the Autumn. There are now 79 eHGVs taking part in the project, though some have only been on the road and contributing data for a short period of time.

We also ask our project members to provide data from a representative sample of their internal combustion engine (ICE) HGVs, allowing us to compare routes and performance. Figure 19 shows how the number of electric and ICE HGVs the project has been collecting data from has increased over time (this may slightly lag the actual number of vehicles on the road).

Figure 19 - Number of ICE and electric HGVs active each week



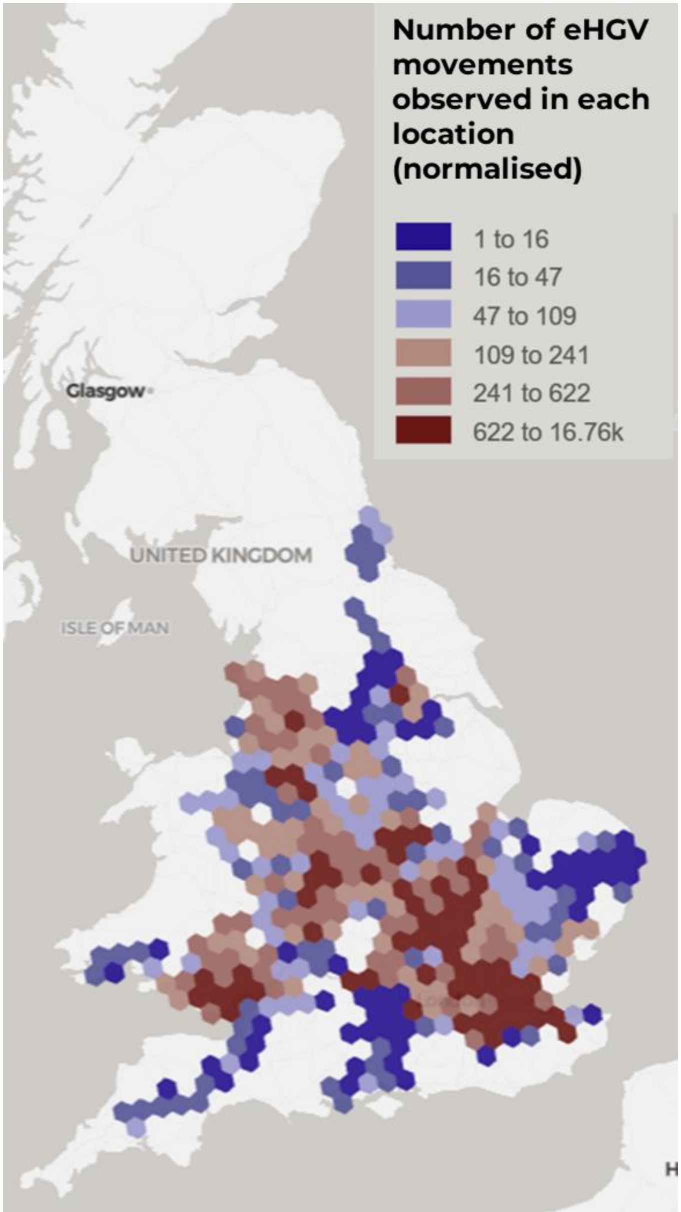
The longest daily duty so far has been **512km**, consuming 593kWh of energy. Two charging sessions delivered 446.3kWh.



Where our EVs have been

The map in Figure 20 illustrates where Electric Freightway eHGVs have travelled so far in the trials. The darker red hexagons indicate where the greatest concentration of vehicle movements have been observed. So far, operations have been focused on the corridor between London, the Midlands and the North West, based on the locations of our partners, but are beginning to expand as new vehicles are delivered.

Figure 20 - Where Electric Freightway eHGVs have travelled so far



Where ICE vehicles have been

We are also collecting data from a sample of ICE vehicles. Figure 21 shows where these vehicles have travelled. As can be seen, ICE routes cover greater distances across more of the UK, including more remote areas of Scotland and Wales, and do so more frequently. This data is, however, based on more vehicles from more operators than the initial EV data. As the project progresses, we expect to see the eHGV map develop to more closely resemble the ICE map.

How far our HGVs travel

Daily and weekly HGV duty cycles have been logged throughout the project. The average mileage across all vehicles has varied as more vehicles have joined the demonstration.

Figure 22 shows the average weekly distance travelled per vehicle for eHGVs (green) and ICE HGVs (red). The shaded areas show the range of distances travelled by the middle two quartiles of each sample.

The distance travelled by an eHGV each week is around one third of the average ICE HGV. However, there is also a lot more variation in ICE HGV mileage, indicating that the ICE HGVs serve a wider range of routes than eHGVs.

The longest individual trip segment seen so far covered **272.9km** utilising 272.2kWh of charge

Figure 21 - Where members' ICE HGVs have travelled

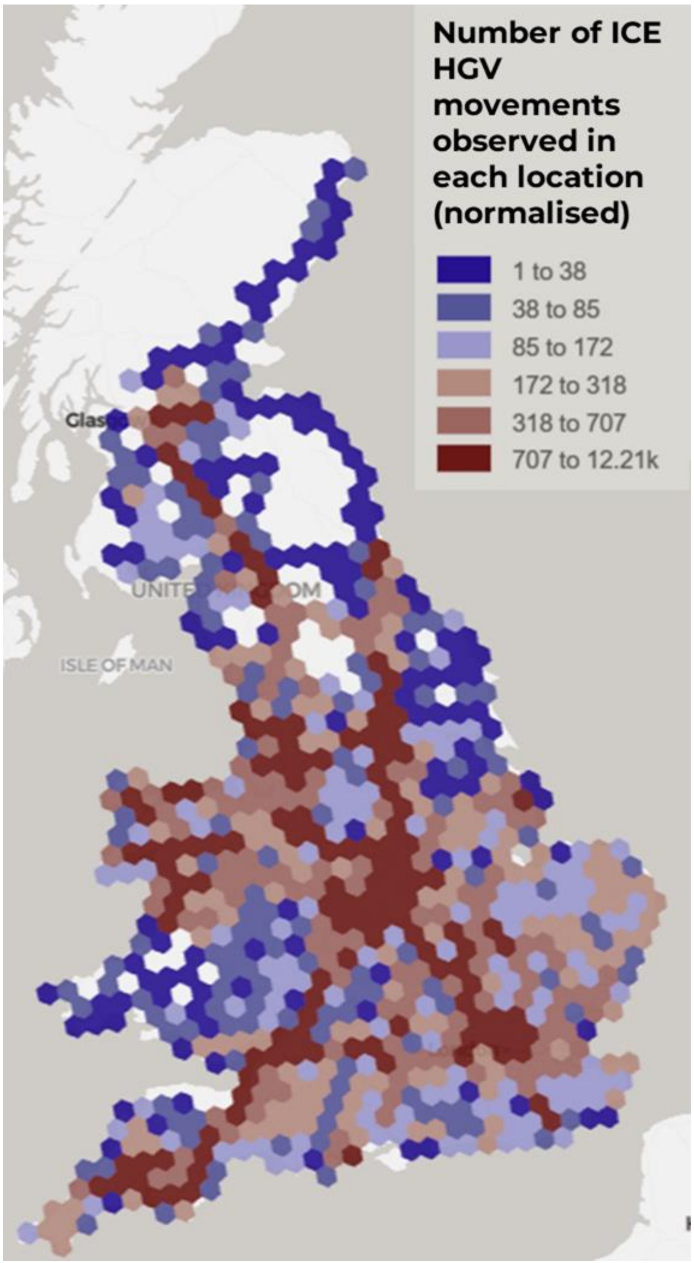


Figure 22 - Weekly distance driven, EV vs ICE

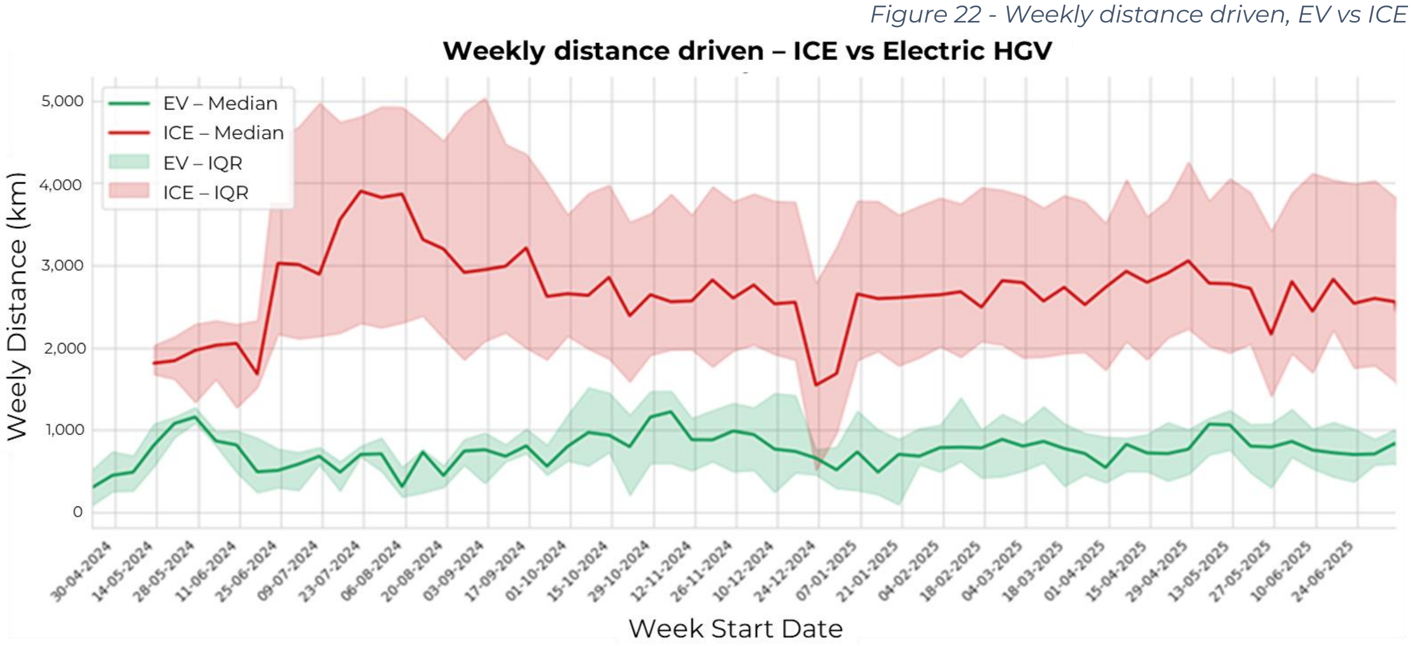
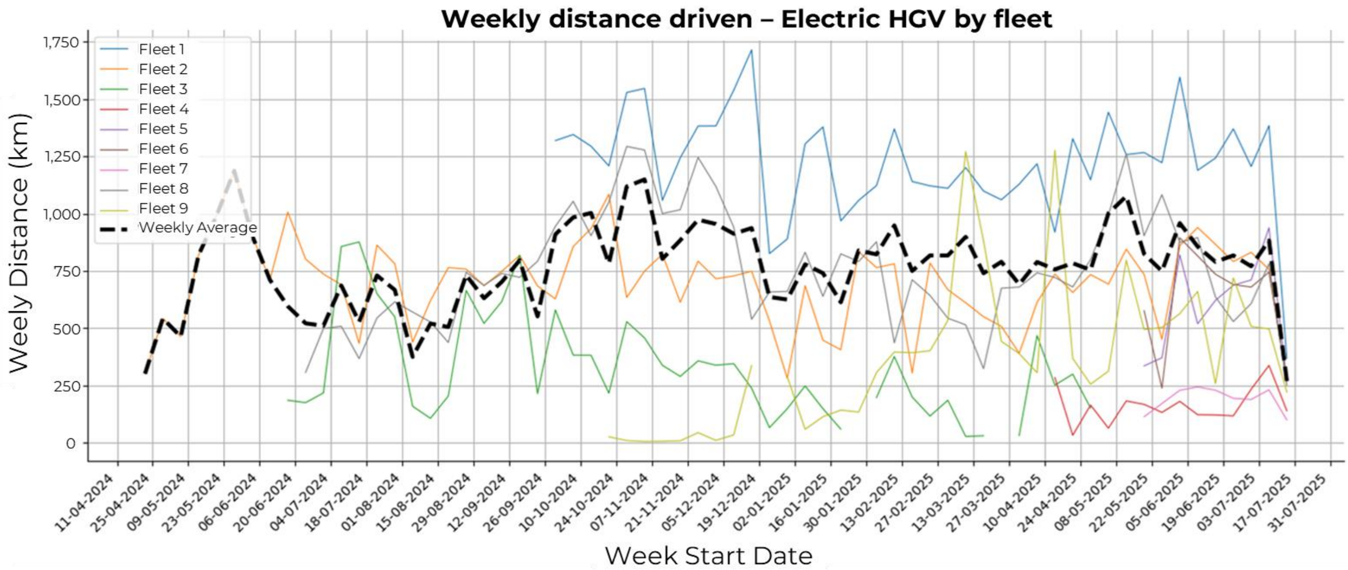


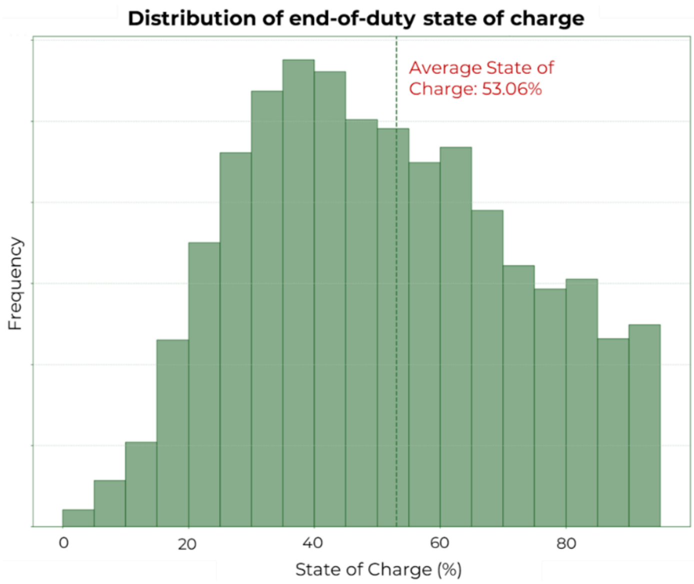
Figure 23 - Average weekly distance per eHGV by operator



When looking at an individual fleet level we can see that the overall total journey distance hides the variation between the routes operated by different operators. Figure 23 shows how weekly usage of eHGVs amongst each of the first nine operators is relatively consistent, however, the duty cycle of vehicles varies significantly by operator and is not necessarily related to vehicle capability.

Analysis of state of charge data shows that the eHGVs are operating well within their capabilities and many are capable of performing longer routes. As Figure 24 shows, on average, eHGVs end their duty with over 50% charge remaining.

Figure 24 - Distribution of end of duty state of charge



As the demonstration progresses, we will continue to monitor whether and how usage of eHGVs intensifies

Limitations of our data

As can be seen on the maps, the eHGVs in the project generally operate shorter routes than the ICE trucks and there are fewer of them. This is for a number of reasons:

- Operators have provided access to their diesel data in advance of receiving eHGVs, initially creating a larger and more varied sample of ICE HGV data.
- EV and ICE HGVs are often not operating the same routes side-by-side, so the sample of ICE HGVs is not fully comparable with the eHGVs.
- Often eHGVs are subject to lighter duties as operators train drivers and gain a better understanding of what eHGVs are capable of.
- Some of the earlier operators to join the demonstration operated regional route networks which did not require long journeys.
- Lack of high-power and on route charging in the early stages of the project may reduce the range or shift pattern that can be achieved.

The gradual build-up of the demonstration, with operators receiving their trucks at different times can also distort some trends over time.

For these reasons, although we can see some clear trends already, the early results should be treated with caution. Now that most of the eHGVs are on the road and infrastructure is coming online, we expect to collect more eHGV data that is more representative of real-world operations.

How the vehicles have performed

eHGV efficiency

The efficiency of an HGV is measured in terms of the fuel or electric charge used to make the vehicle move a set distance. There is a wide range of external factors that can affect this, in addition to the performance of the HGV itself.

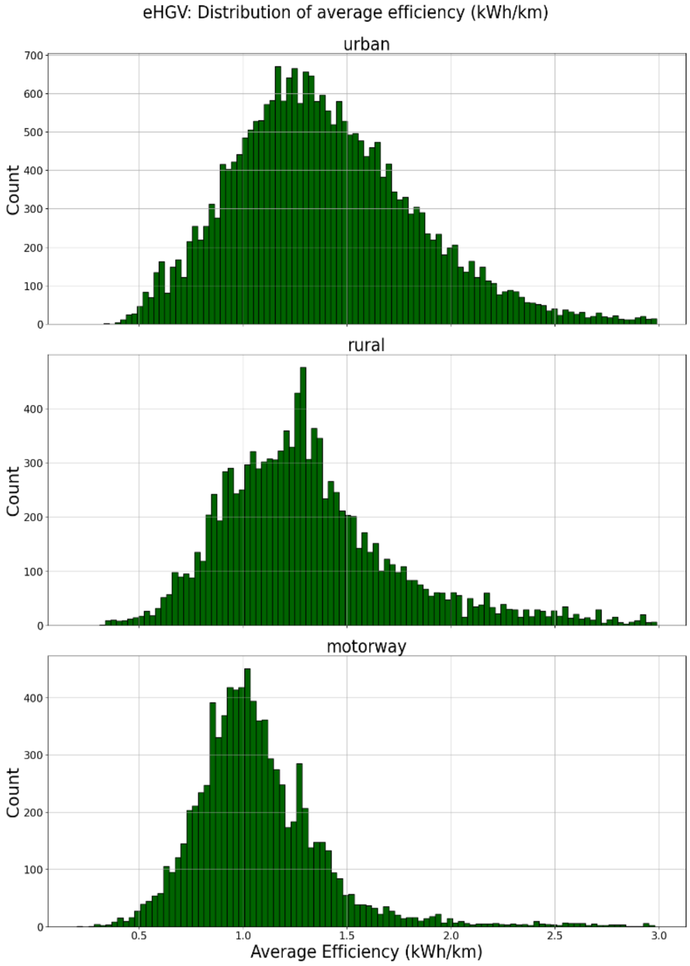
Several different conditions are being analysed so that we can understand how they affect efficiency and range.

Road types and speeds

We estimate how much distance is travelled on different types of roads by looking at vehicle location for each trip segment (whether the area is classified as urban or rural) and the type of road travelled on (to separate motorways from other road types).

Differences can be seen in the observed efficiency, as shown in Figure 25, with motorway trips the most efficient and most consistent, averaging **1.07kWh/km** with a standard deviation of 0.32.

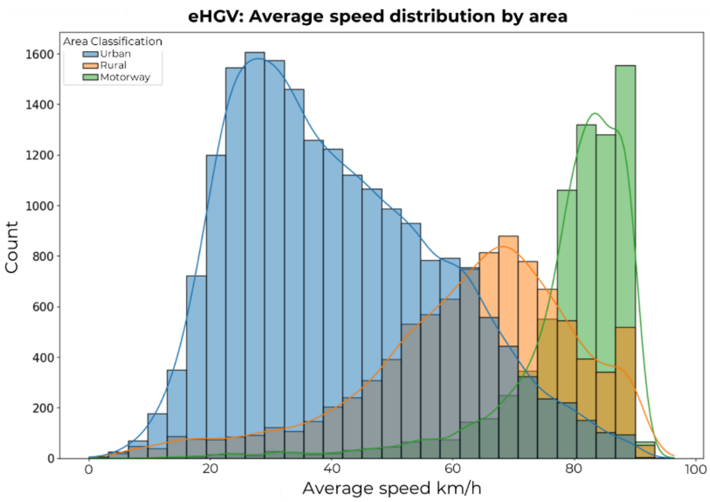
Figure 25 - Distribution of eHGV energy efficiency by area type



Urban journeys have more variation in efficiency, with a standard deviation of 0.44 and the average being **1.39kWh/km**. Rural sits between the two at **1.31kWh/km**.

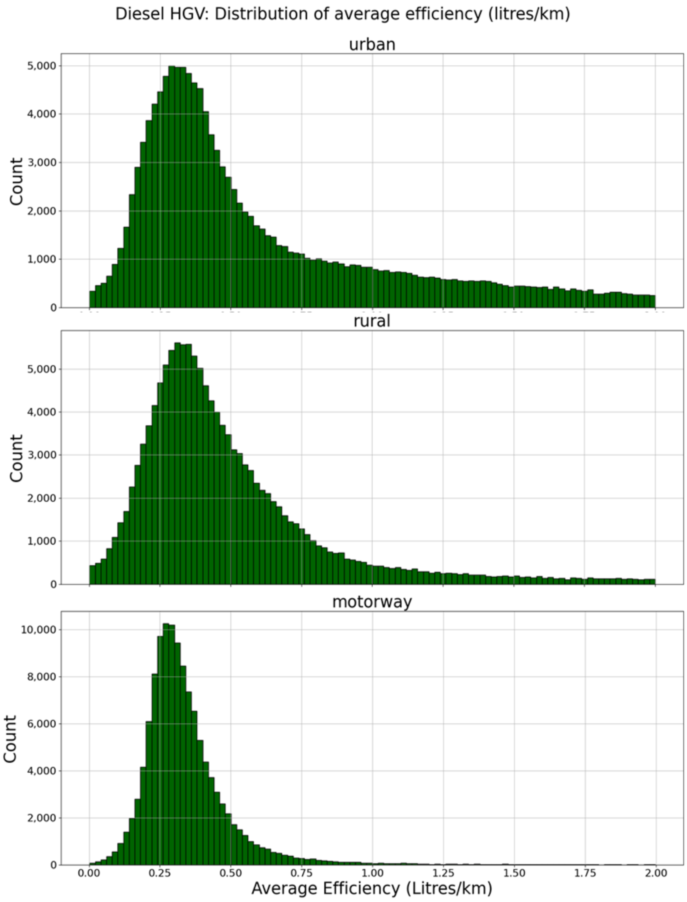
This likely reflects the slower speeds achieved (as shown in Figure 26) and more frequent stopping patterns seen in urban areas.

Figure 26 - eHGV average speed and efficiency by road type



These eHGV results can be compared to the ICE HGVs in Figure 27.

Figure 27 - Distribution of ICE HGV energy efficiency by area type



Here, we see a slightly different shape with less variation in efficiency, possibly caused, in part, by the higher number of vehicles in the sample. Overall, a similar pattern is evident: motorway driving is the most efficient (average 34.18/100km, standard deviation 16.12) and consistent while urban trips are less efficient and more varied (59.87/100km, standard deviation 44.48). Rural trips again sit in the middle at 49.47l/100km.

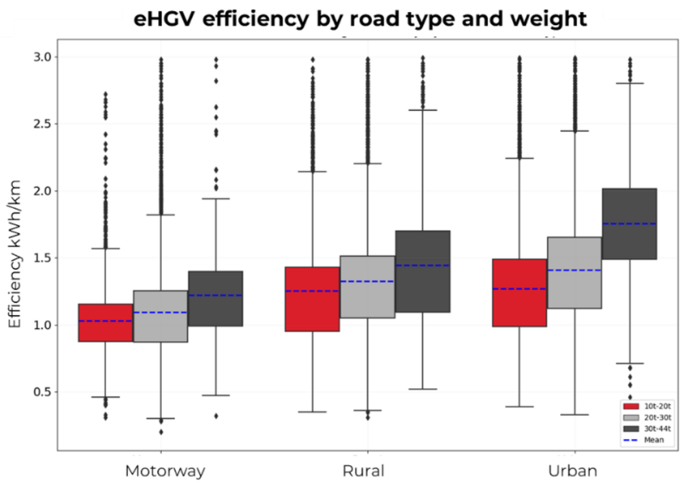
The difference in efficiency is much narrower for the eHGVs, where motorway driving is on average 23% more efficient than urban, vs ICE HGVs where motorway driving is 43% more efficient.

Load and trailers

Electric Freightway partners use a range of trailer types including standard hard and curtain sided trailers, refrigerated, containers, tipper trucks, tankers and car transporters. Different configurations are likely to have different aerodynamic effects. Some of these trailers use power take-off from the tractor unit to operate, reducing the efficiency of a combined truck. As relatively few different trailer types are in use so far, we have not yet conducted an analysis of how this affects efficiency.

The weight of the load also affects efficiency, with more heavily loaded trucks requiring more power. Figure 28 shows how vehicle gross weight (including tractor, trailer and load) affects the energy efficiency of the demonstration vehicles. The coloured blocks show the range of efficiencies for 50% of trips measured and the blue line shows the mean efficiency.

Figure 28 - eHGV energy efficiency by GCW and area type



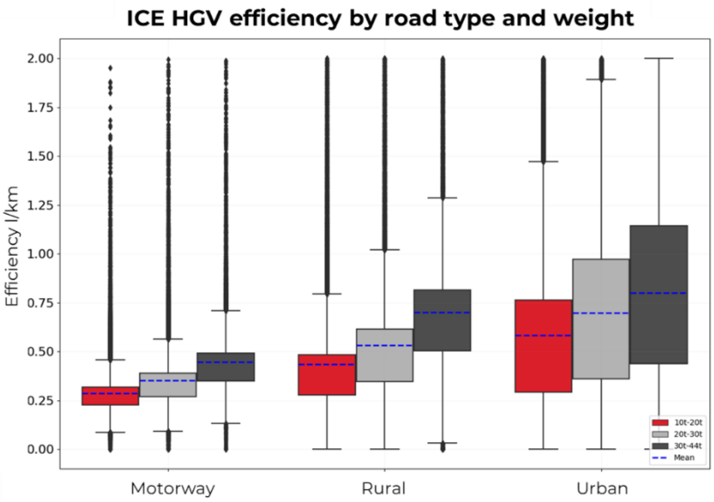
In all cases, the heavier trucks consume more power on average, with this most apparent on urban journeys, where there is greater variation generally.

The heaviest trucks (in the 30-44 tonne range) need between 1 and 2kW of power to travel 1km, while lightly loaded trucks (<20 tonnes) need between 0.8 and 1.5kW.

It should be noted that the sample for the heavier eHGVs is smaller than the other weight categories, reflecting the operations of the early adopter fleets in the project. We expect this to change as the demonstration progresses.

The weight impact of ICE HGVs was also analysed. As Figure 29 shows, the general pattern of efficiency is the same as EVs, with heavier vehicles consuming more fuel. The range of variance differs, however, with a wider variation on urban routes (potentially showing a greater impact from stop-start operations) and less variation on motorway journeys.

Figure 29 - ICE energy efficiency by GCW and area type



Weather and seasonality

Changes in average eHGV efficiency over time are shown in Figure 30. There are variations throughout the year, with the highest median efficiency seen in July and August (~1.2kWh/km) and the lowest in January and February (over 1.4kWh/km).

This is potentially caused by factors such as increased use of cab heating in the winter as well as performance of the truck in colder weather.

Figure 30 - Median eHGV efficiency over time

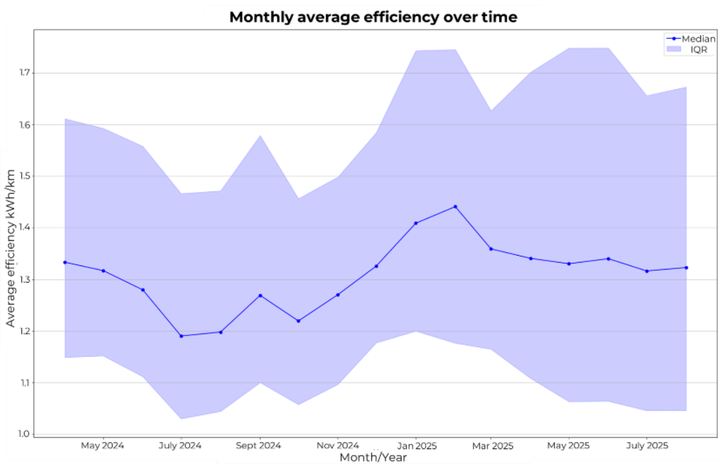
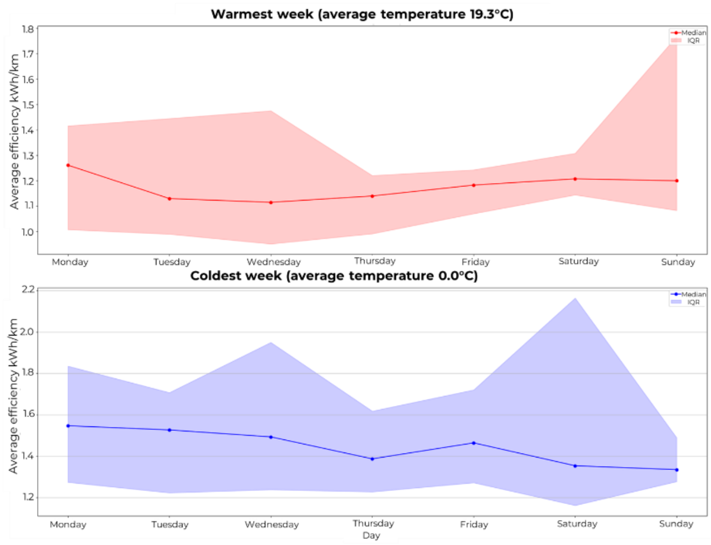


Figure 31 zooms in on the warmest and coldest weeks within the first year of operations, showing the range of performance within the Electric Freightway fleet.

Figure 31 - Median efficiency in the warmest and coldest week of the year



Combinations of factors

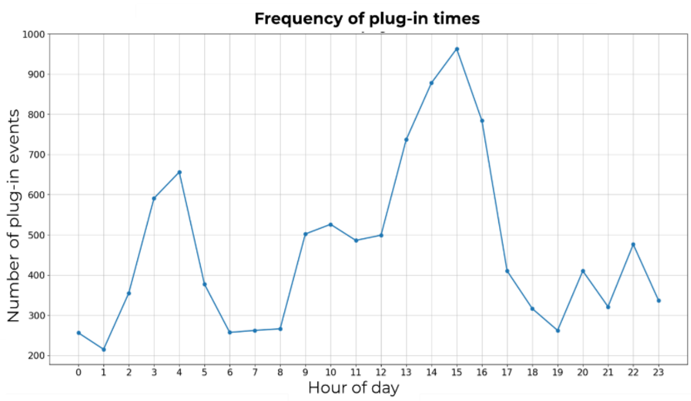
It is clear from the results presented above that the impact of each of these factors cannot always be viewed in isolation – there will generally be multiple factors at play which will together determine the overall efficiency of a vehicle. In the next report we will delve deeper into how the factors interact with each other.

When vehicles charge

In addition to route data, we have been analysing charging data, ahead of the rollout of the project's high-power chargers.

This has shown that the early vehicles mainly operated with overnight charging – the majority plugging in in the late afternoon between 1400 and 1700 hours.

Figure 32 - Plug in times of eHGVs



If charging is not actively managed, such a regime may result in charging at the most expensive time of the day. Savings may be available by delaying charging of some vehicles if sufficient time and charging capacity is available.

What's next?

Calculating total cost of ownership

The efficiencies identified from vehicle telematics give us a better understanding of the cost of operating the eHGVs that are now on the road. This is informing the project's TCO work, which is introduced in Section 09 of this report.

Building a more comprehensive dataset

While we have been collecting data on some eHGVs for over a year, the majority of vehicles have only joined their operators in recent months. As a result, the data covers a relatively small selection of use cases and vehicle OEMs.

On site high-power charging has also only recently started becoming available to many operators. Over the coming months we expect the data we have from eHGVs to grow significantly.

Future report

The final report of the project's implementation stage is due to be published in the first quarter of 2026.

The data insights will bring together everything we have observed from the operation of trucks and chargers covering the full range of project use cases.

07 Attitudes towards eHGVs

Prior to adding eHGVs to operators' fleets the project asked drivers and managers about their views on eHGV adoption. This section outlines some of the key findings from our questionnaires and interviews, identifying concerns and expectations held ahead of working with eHGVs. Later this year we will re-run the survey to establish whether views have changed following experience with the technology.

What has happened so far?

The methodology behind the Electric Freightway surveys was explained in detail in report two. Drivers and managers at partner organisations are being asked a series of questions through questionnaires and interviews in two rounds: before and after experience of driving eHGVs.

This section describes what we have learnt from the pre-adoption surveys. The answers often show that drivers and managers are unsure about, or unaware of, many aspects of eHGVs. However, there are strong opinions on eHGVs, potentially driven by experience with similar technologies, word of mouth from friends and colleagues, media reporting and assumptions.

Who have we surveyed?

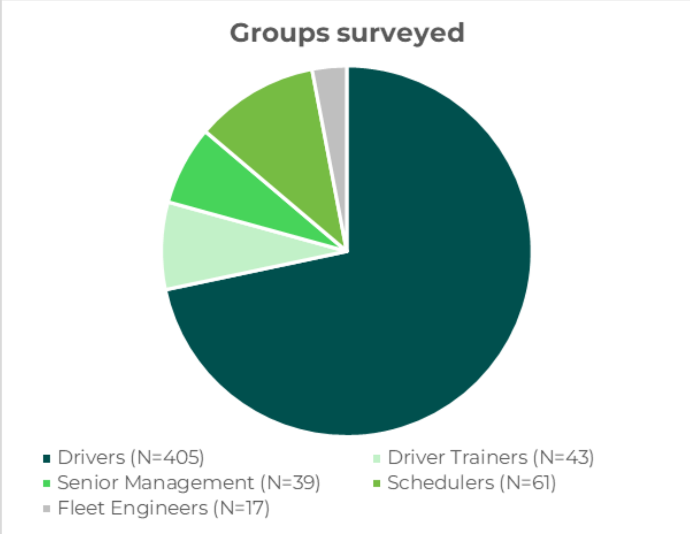
The survey collected views from more than 500 industry stakeholders representing 20 haulier organisations.

Five different stakeholder groups were surveyed to understand how views on eHGVs might differ depending on job role and level of involvement in the transition (see Figure 33).

There was some variation within the different respondent groups due to differences in organisational structures and role definitions. For example, Senior Management included roles such as Managing Director, Finance Director, Operations Director, ESG Director, Commercial Director. Schedulers included a variety of operational management roles, such as Planning Supervisors, regional/site Transport Manager and regional/site Operations Manager. Fleet Engineers included Workshop Managers and Technicians.

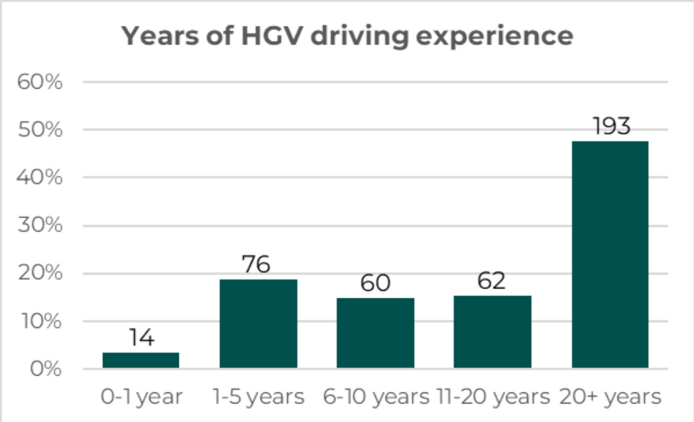
For the purposes of comparative analysis, the Scheduler and Fleet Engineer groups have been combined in some questions and results presented as 'Middle Managers'.

Figure 33 - Groups surveyed



The majority of drivers who responded have extensive experience in the industry (Figure 34).

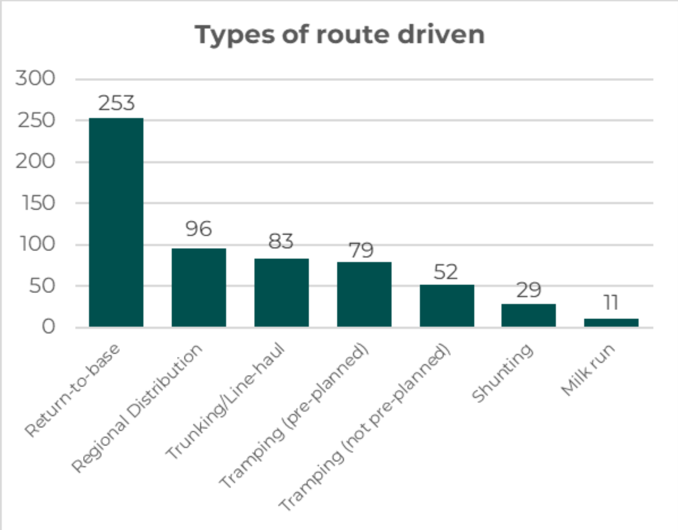
Figure 34 - Years of HGV driving experience



Most surveyed drivers were direct employees though some respondents were subcontractors, agency drivers or owner/operators.

In terms of the type of routes drivers were doing, the largest group worked 'back to base' trips involving local or regional distribution, though there was representation from drivers who completed longer distance trunking and tramping routes (Figure 35).

Figure 35 - Routes driven



Interviews

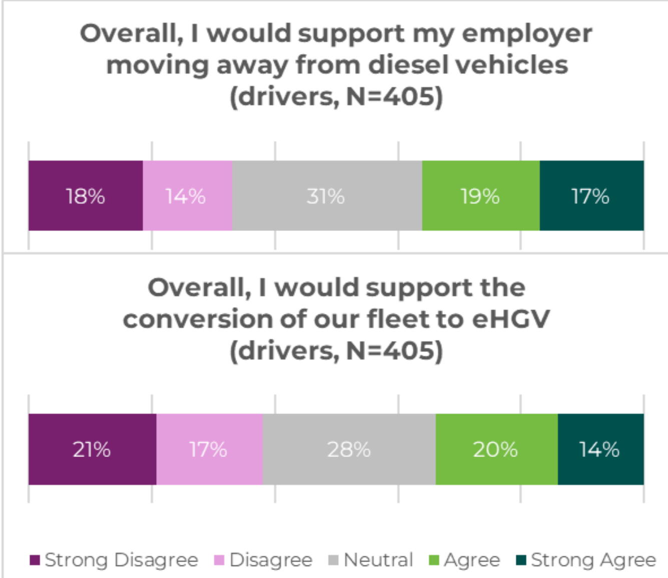
In addition to questionnaires, the project conducted 34 semi-structured, 30-minute interviews with Schedulers and Senior Managers. The interviews were scheduled following questionnaire completion and the interviewers had access to questionnaire responses to guide the conversation. The results are discussed below, together with questionnaire results.

Key findings

Overall attitudes to transition and future technology mix in the HGV sector

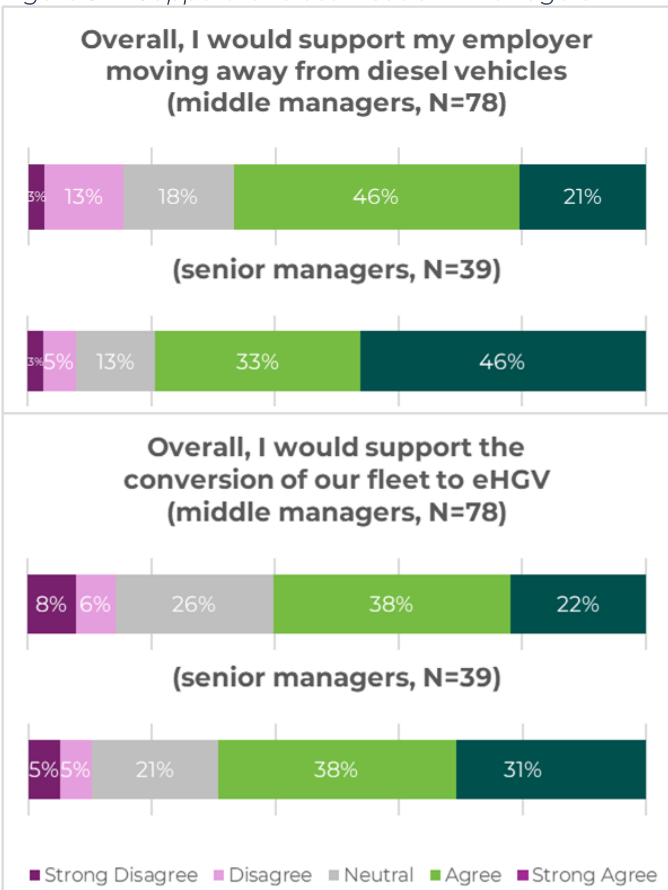
Drivers had mixed views about the move away from diesel. While almost 40% said they would support their employer doing so, roughly one third were undecided. When asked about fleet electrification, the proportion of those supportive and not supportive of the transition was roughly equal.

Figure 36 - Support for electrification - Drivers



More drivers were positive than negative towards transitioning away from diesel (36% vs 32%), but those who were not supportive or undecided accounted for roughly 60% (Figure 36).

Figure 37 - Support for electrification - Managers



Overall, Senior and Middle Managers were markedly more positive about moving away from diesel to electric than Drivers. This finding holds across different organisations. However, even within this group, a third of

respondents had reservations about supporting the move to electric.

Figure 36 shows 79% of Senior Managers and 67% of Middle Managers would support their employer moving away from diesel, as compared to only 36% of Drivers.

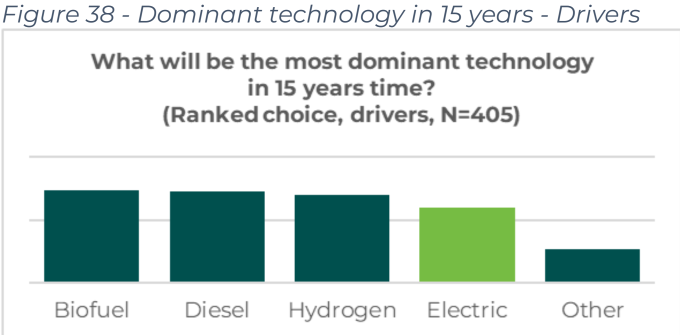
Support for moving away from diesel did not necessarily translate directly into support for fleet electrification, with only 69% of Senior Managers and 60% of Middle Managers agreeing that they would support the conversion of their employer's fleets to electric.

This appeared to be largely due to the role they see for biofuels and hydrogen as low and zero-emission alternatives for some applications (see Figure 38 and Figure 39 below).

Most Senior Managers see the future as a mix of different technologies with electric leading the way, while Middle Managers expect hydrogen to be dominant. Drivers hold more cautious views regarding the pace of the transition – the majority expect diesel and biofuel to still be predominant in 2040.

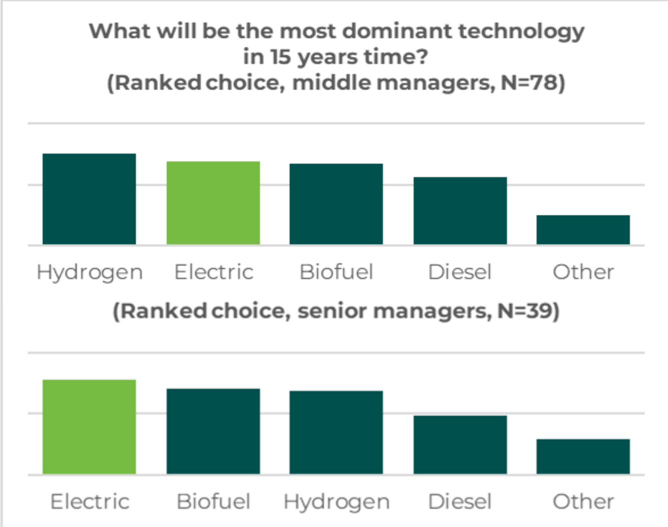
When asked to rank technologies according to their market prevalence in the HGV sector in 15 years' time, stark differences in expectations between stakeholder groups were notable. While Drivers expect biofuel and diesel to still be dominant (Figure 38), Senior Managers believe electric will overtake other technologies by 2040, followed by biofuel. In turn, Middle Managers expect hydrogen to be most prevalent, followed by electric (Figure 39).

Figure 38 - Dominant technology in 15 years - Drivers



Drivers ranked all other technologies above electric in response to this question.

Figure 39 - Dominant technology in 15 years - Managers



In management interviews, those who viewed eHGVs negatively were mainly concerned about range, speed of refuelling and reduced payload; there was also recognition that this cautious attitude is due to lack of experience. Hydrogen is often perceived as more similar to diesel from an operational point of view, with refuelling and range less of an issue.

"Electric is not practical, has its place on shorter routes, last mile delivery, but not efficient for longer routes. However, I hope to change my mind on this."

Senior Manager

"1st - hydrogen. 2nd - LNG. They have reduced CO2 compared to diesel, they're quiet. The edge these two have over electric is that they are considerably lighter to carry than a battery and therefore the vehicle payload and distance is not reduced."

Scheduler

The majority of managers see a role for fuels other than electric for specific applications in the future as well as during the transition.

"With our decarbonisation goal by 2030, electric will be an important part of the mix, but other technologies might be required for longer routes."

Scheduler

"Biofuels and HVO are good transitional fuels but will eventually not be able to compete with the innovations of electric in 5-10 years. It is important to keep an open mind, as new technologies might come up."

Senior Manager

Fact Checker

Considering the alternatives

While Electric Freightway is focused on electrification, other options exist for reducing carbon emissions from HGVs. The responses to the attitude surveys show that many operators are keeping an open mind about which technology will dominate in the future. We have looked in more depth at the pros and cons two of the most popular alternatives – hydrogen and HVO.

Hydrogen

Hydrogen has long been touted as a future fuel for replacing diesel and petrol in automotive applications. It has some clear advantages:

- Fuelling can take place quickly at a filling station in a similar way to liquid fuels
- Longer ranges can be achieved as hydrogen is lighter and more energy dense than batteries

Fuel cell vs combustion

There are two technology solutions available for hydrogen-powered vehicles:

- **Fuel Cell** is the most common method and involves an electrochemical reaction in the vehicle, creating electricity which is stored in a small battery before powering an electric motor, similar to an EV. The only other outputs from the reaction are water and heat. The process is around 40-60% efficient.
- **Combustion** is much more similar to a diesel or gas engine, burning hydrogen fuel in an engine – this requires fewer design changes, making vehicles more affordable, but brings disadvantages. The UK Government does not currently view hydrogen combustion as a zero emissions technology (there are still some emissions of nitrogen oxides) and the process is less efficient, at around 20-30%.

Fuel Cell appears to be the leading technology, but there are some standards that still need to be agreed upon, such as whether the gas is stored and dispensed at a pressure of 350 or 700 bar.

Making hydrogen green

'Green' hydrogen is produced through a process of electrolysis, utilising water and renewable electricity, and has no carbon emissions. The cleanliness of the hydrogen is dependent on the availability of a clean and reliable source of power.

However, most hydrogen currently produced does not use renewable electricity but a process of 'steam reforming' using natural gas – this is classified as 'grey' hydrogen, and its production results in CO_2 emissions (between 10-19 tonnes CO_2 per tonne H_2)[xxix], although this can be captured, resulting in 'blue' hydrogen (1-4 tonnes CO_2 per tonne H_2).

In addition to creating capacity to make clean hydrogen fuel for vehicles it will also be necessary to convert existing users of grey hydrogen (such as heavy industry and chemical production) to a green or blue alternative. Other clean fuels, such as e-ammonia, e-methanol and e-kerosene, that may be needed to decarbonise other sectors, such as aviation and shipping, all require clean hydrogen, increasing demand further.

There is, therefore, a need for a significant increase in hydrogen production to meet this demand. Uses where there are no clear alternatives (like some process industries) are likely to take precedence while supply is limited.

Volumes of UK green hydrogen capacity are currently low, under 10MW of production capacity has been built, a further 30MW is in the process of construction[xxx]. Across Europe as a whole, there is around 250MW water electrolysis in operation however this accounts for just 0.4% of the region's 11.23Mt annual hydrogen production capacity[xxxi]. New plants are being built however, with a further 1,800MW under construction.

Cost and efficiency

The price of green hydrogen is currently in the US$6-12/kg range, and while there were previously hopes (in the early 2020s) that it would fall to around $1-2/kg, Bloomberg's recent forecasts only expect prices to fall to $5.09/kg, citing doubts that production efficiency will increase significantly[xxxii].

The key problem with making hydrogen cost-effective is efficiency; electrolysis is around 70-80% efficient, compression for storage and transport further impacts efficiency and fuel cell vehicles themselves are only 40-60% efficient. Battery storage is closer to 80% efficient. Hydrogen therefore needs to use at least twice as much electricity to provide the same power to a vehicle, increasing cost.

A storage medium to help balance the grid

Where hydrogen potentially has advantages is the ability of electrolysis to use excess renewable generation from wind and solar, meaning there is no need to curtail generation. This power is essentially free (or sometimes a negative price), but its availability fluctuates. Converting it back into electricity at times of high demand is possible, but due to the low efficiency (18-46% for the round-trip process) cost effectiveness is poor.

Vehicle availability

The small scale of vehicle production at present, even compared to eHGVs, is likely to result in higher capital costs for vehicles.

Vehicles are becoming available from both established manufacturers (e.g. Iveco, Daimler, MAN) and startups, though are generally only produced in small quantities for trial applications. Some startups, like Hydrogen Vehicle Systems and Nikola, have struggled.

Lack of fuelling infrastructure

There are currently only around five hydrogen fuelling stations in the UK suited to larger vehicles [xxxiii]. Creating private fuelling facilities on sites is possible but can be expensive and space-intensive due to the cost of infrastructure and safety precautions.

Safety

Hydrogen can be a volatile substance. While it can be used, stored and handled safely, significant safeguards are needed. The cost of building and insuring fuelling and storage sites may be high as a result.

Other ZEHID projects

ZEHID is testing the use of hydrogen in haulage through the **HyHaul project**, in order to identify use cases, such as heavy loads, where the technology can provide a viable path to decarbonisation. Through HyHaul, hydrogen produced at a plant in South Wales will be made available at three sites along the M4 corridor, with the aim of establishing a blueprint for wider deployment.

Find out more about this demonstration at www.hyhaul.co.uk.

ZEN Freight[xxxiv] is also trialling a small number of hydrogen vehicles alongside eHGVs. It is expected that these projects will provide data that allows hauliers to compare hydrogen and electric HGVs to identify use cases where the benefits of hydrogen outweigh the costs.

HVO

Hydrotreated Vegetable Oil (HVO) has grown in popularity in recent years as a low-cost way of cutting emissions – many trucks can accept it without significant upgrades, and because it uses waste products such as used cooking oil (UCO), often from plant-based feedstock, its carbon impact is low. HVO can be used on its own or blended with diesel.

What is HVO?

HVO is fuel that is created through the hydrogenation or hydrocracking of vegetable oil, principally from rapeseed, algae, jatropha, salicornia, palm oil, tallow and soybeans. In both methods, hydrogen is introduced to the oil to create hydrocarbons.

HVO has a lower carbon and sulphur content than diesel. Net carbon emission reduction vs diesel is generally stated in the range of 80-90%, though the impact of the fuel is more complicated. Since the oil used is a waste product that was originally organic material, the CO_2 emitted at the tailpipe is offset against the CO_2 captured by the plant when it was growing, making the feedstock effectively carbon neutral. The net emissions are generally caused by the processing and transportation of the fuel.

Close to net zero, but not zero emissions

HVO can result in up to 90% less net CO_2 emissions but is not emissions free. The source of the material used to make HVO can impact the emissions across its lifecycle from production to use; for example, with rapeseed oil it is only 40% less than diesel[xxxv]. While HVO can help an organisation cut emissions and become 'net zero' in the short term, it does not meet the requirements of the 2035/2040 mandate for all new trucks sold to be zero emissions. So, unless there is a change to legislation, it is likely to be a useful but temporary solution.

A scalable solution?

The core problem with HVO is that there is not enough waste oil being generated to come close to providing enough fuel for a large-scale transition of trucks. Even at this early stage of adoption, European countries import far more UCO than they collect and use more than they could potentially collect.

High demand could result in virgin oil having to be used in HVO. This reduces the environmental benefits because it can result in other plants and agricultural land being displaced. Some feedstocks, such as palm oil and soy, result in significantly higher emissions than others such as UCO, especially when ILUC – the impact of land use change from other forms of agriculture to biofuel crop – is considered.

Palm oil-based biofuels are being phased out in Europe due to their high carbon intensity and the potential environmental impact from deforestation. However, while schemes exist to certify provenance of biofuels (such as International Sustainability and Carbon Certification, ISCC), they have some limitations due to most smaller sources of feedstock not requiring audits and relying on self-certification.

Currently only 9% of UCO sources in China, Malaysia and Indonesia are required to be audited. Because it is relatively easy for certificates to be obtained or used without full audit processes it is believed a significant proportion of UCO and other 'waste' products may actually contain virgin materials[xxxvi]. Choosing a reputable supplier that can evidence their supply chain is essential.

Impact of electrification on the future of the industry

Decision-makers within transport operators believe electrification has the potential to reshape the industry and result in operator consolidation, as well as enforce greater efficiency, use of new technologies and collaboration between parties across the value chain.

The road freight industry in the UK is highly fragmented, with 92% of the 42,000 road freight businesses operating fewer than 10 vehicles[xxxvii]. 35% of HGVs are operated by such small operators and only 32% by operators with over 50 HGVs in their fleet[xxxviii]. While most of our respondents represented larger operators, many believed that electrification would result in wider changes to the industry. It may lead to the consolidation/disappearance of smaller operators that are not able to afford the transition, but also to improved efficiency, use of new technologies, and increased collaboration, e.g. sharing charging infrastructure and last mile deliveries, as well as better utilisation of rail.

"Majority of the industry are smaller businesses, mostly family owned, not involved in the electrification conversation. They are a critical part of capacity contingency for larger companies. However, cost of entry to eHGV is going to be prohibitive for them. Big companies might take them under their wing and others will fall down. Not clear how industry will adapt."

Senior Manager

"Most people lease and a minority buy. We buy. Leasing will increase due to high capital costs, but the benefit goes to those who buy. SMEs can't afford 300k per truck."

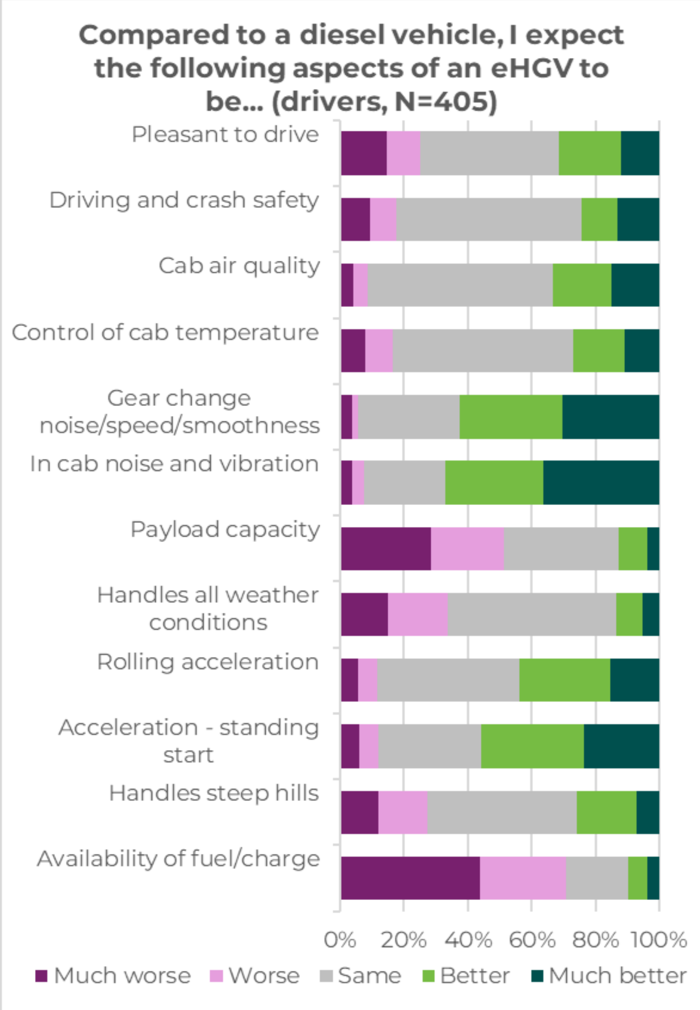
Senior Manager

Vehicle technology

Drivers expect eHGVs to provide a more comfortable working environment and better acceleration. At the same time, a large proportion of neutral views on several aspects of vehicle performance reflects the lack of experience with eHGVs prior to the questionnaire.

As expected, a lot of drivers did not yet have strong views on many aspects of eHGV performance. There were a few where strong expectations had already developed, with the most positive responses related to in-cab noise, gear change and acceleration (Figure 40).

Figure 40 - Drivers' perceptions on eHGV performance



Unsurprisingly, the most negative expectations relate to availability of charging and payload capacity.

While many Senior and Middle Managers expect eHGV technology to improve rapidly, uncertainty about range is a universal concern to a varying degree, largely depending on the characteristics of the routes.

In management interviews, many respondents recognised the uncertainty around range and vehicle performance in real-world conditions and emphasised the need to build confidence before supervisors are ready to assign eHGVs to more challenging routes.

"Range is sufficient for some applications. For longer routes technology it is not there yet. For example, Scotland-Midlands 600-650km refrigerated supplier runs in one shift – this route won't be electrified for a long time. However, technology is developing, batteries are getting smaller..."

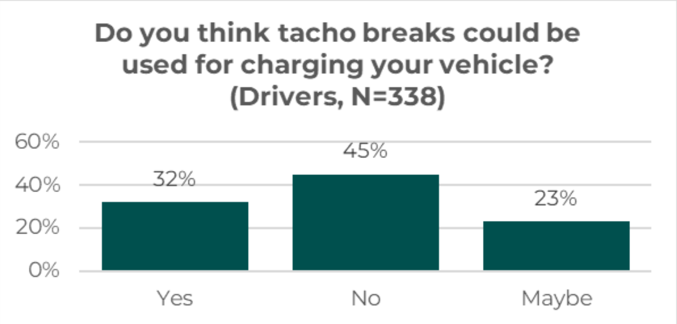
Scheduler

Driver hours rules

There has been an ongoing discussion, over whether the requisite 'tacho breaks', which are usually 45 minutes long could be used for charging.

96% of our driver respondents were required to take tacho breaks. Opinions as to whether these breaks could be used for charging were very much divided, with a third of Drivers agreeing and 23% unsure (Figure 41).

Figure 41 - Driver views on tacho breaks and charging



Comments of those who responded "No" or "Maybe" indicated three main areas of concern:

- The **location and availability** of chargers would limit the locations where breaks may be taken, taking flexibility/choice away from drivers – availability of suitable driver amenities matters in this context
- **Timing of breaks** might be difficult to coordinate with charger locations
- Charging would require **supervision**/driver intervention during the break

It is our understanding that in principle the regulations allow for charging during breaks, however, starting and ending the charging procedure would be classed as "other work". In management interviews, most respondents were confident that haulier best practices could be developed in consultation with drivers to allow for a satisfactory solution compliant with the regulations.

Environmental impacts

Most questionnaire respondents agreed that there is a need to decarbonise to reduce the impact on the climate. However, less than half believe eHGVs will deliver long-term environmental benefits, with nearly one third of participants remaining undecided. Notably, responses in this section revealed a clear divergence of opinion between drivers and managers, with managers expressing significantly more optimism regarding the environmental benefits of eHGVs.

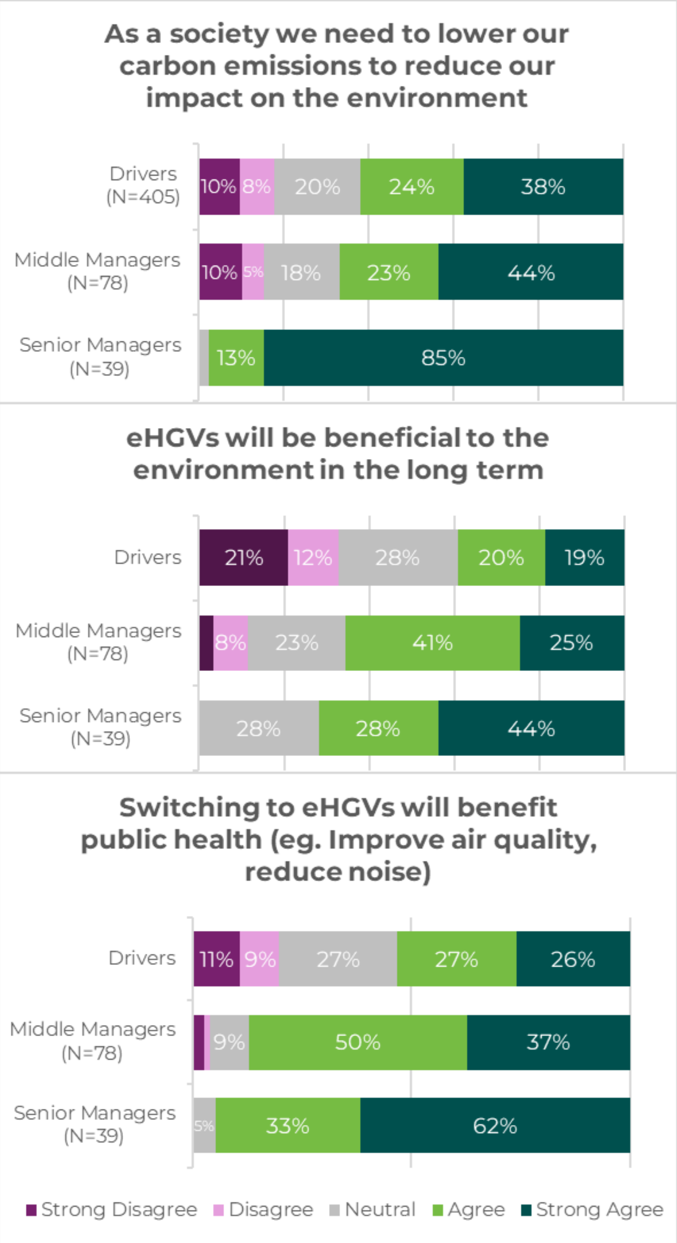
The majority of respondents at all levels agreed that there is a need to decarbonise, however, the level of support was much higher amongst Senior Managers (98%) than Drivers (62%), of whom 18% disagreed. Not all respondents who support decarbonisation believe that eHGVs will be beneficial to the environment. This gap persisted at all levels, with only 72% of Senior Managers and 39% of Drivers agreeing that eHGVs will bring about environmental benefits (Figure 42).

The concerns raised most frequently in interviews included the environmental and social impacts of battery production and disposal, as well as the availability of green electricity to power electrified fleets.

"Currently, until we are harvesting more renewable energy, we are too reliant on fossil fuels. I am also concerned about battery commodities. The source countries are unregulated, not following a green path, we are stripping minerals from underprivileged areas. We need to look globally at social impact. Second life – not enough learning on what we're going to do – reliant on companies to take the batteries. No supply at present so recyclers also have to make a leap. Will it end up in landfill?"

Senior Manager

Figure 42 - Environmental views



While there appears to be less controversy about the benefits of eHGVs for public health, the views across stakeholder groups followed a similar pattern – with 95% of Senior Managers and 53% of Drivers expecting positive impacts. A significant number (27%) of Drivers were undecided on this aspect. While we did not explore this in detail, comments raised in questionnaires indicate that these concerns might stem from uncertainty about other emission types, such as tyre use (this is explored later in this report in Section 09), as well as some drivers seeing quietness of the vehicles leading to an increase in safety risks for pedestrians.

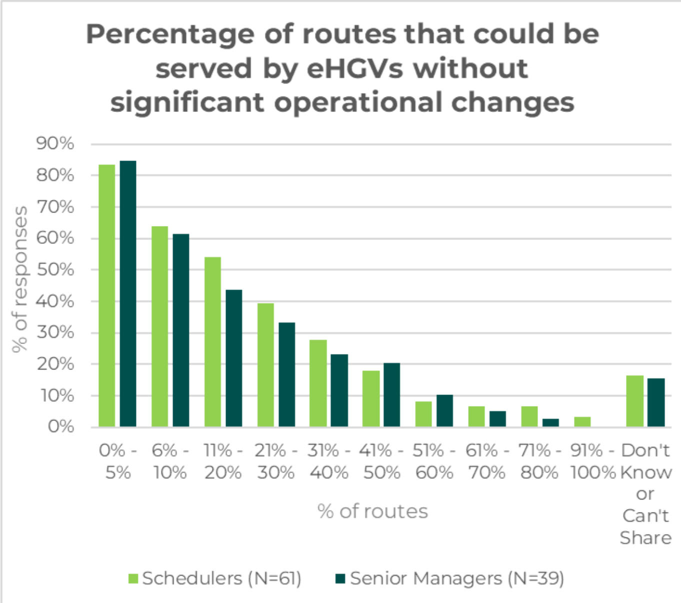
Feasibility of electrification and operational impacts

30% of Senior Managers and almost 40% of Schedulers think that at least a quarter of their routes could currently be electrified without significant operational changes.

However, only 10% of Senior Managers indicated that over 50% of routes could currently be electrified without significant operational changes (Figure 43). We have recorded a wide range overall and within the same organisations.

While this may have been partly due to different geographical areas of responsibility and different route characteristics, it also reflects a high level of uncertainty about the performance of the vehicles and the charging infrastructure.

Figure 43 - Potential to electrify



During interviews, the impact on the planning process was frequently mentioned. While the route planning process for diesel vehicles is often highly automated, the planning tools used by most respondents do not yet cater for eHGVs. Therefore, the planning process for these vehicles needs to be manual, at least in the initial stages of the transition.

A combination of infrastructure availability, charging time and vehicle range were the most frequently quoted reasons for the inability to electrify a larger proportion of routes. These were seen as complementary, i.e. significant improvement in any of these factors could enable electrification of additional routes.

"*Current range is insufficient, but I believe technology will advance. A tractor with 540kWh battery can do 300km+. I'd want to double the range. A diesel truck will do 700km in day, electric needs 2-hour charge to do the same, but this pushes total duty time over 12 hours to do same route.*"

Scheduler

Vehicle weight limits are a major issue for those transporting heavy loads, for whom load reduction means a higher cost to serve (due to the need to run more vehicles/ deliveries).

The issue of reduced payload is seen as a major regulatory barrier by those who transport heavy loads. Operational and cost impacts of reducing loads include the need to make additional deliveries (and related workforce impacts) or even add more vehicles to the fleet to make up for the shortfall.

"*This is a regulatory issue rather than a technology issue. Limit on vehicle weight reduces payload that can be transported by e.g. 4 pallets, so we would need more vehicles to transport the same payload. Overall, OEMs have done their job – vehicles are capable.*"

Senior Manager

"*Payload is a major policy issue. Vehicles are capable of higher load, but due to regulations they carry 3-3.5 tonnes of load less than diesel.*"

Senior Manager

Issues around eHGVs and weight limits are discussed further in Section 09

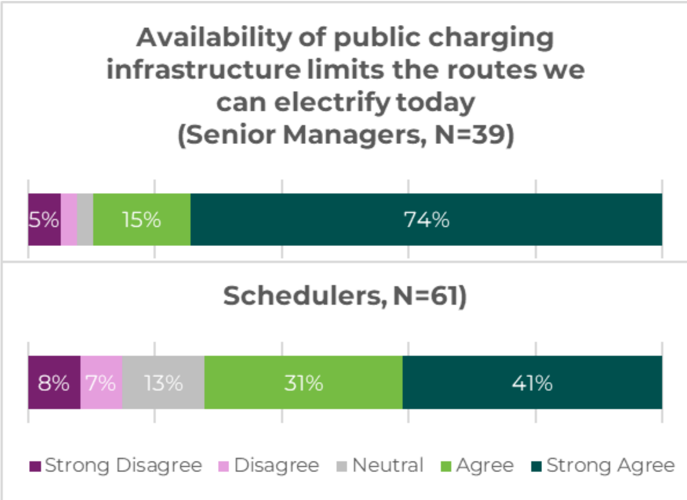
While the project's surveys were targeted at Electric Freightway members who have already made a commitment to trialling eHGVs, the **Road Haulage Association** has recently surveyed the views of all of their members regarding the net zero transition. Their report **The future of fleets**, highlights cost and insufficient mileage as the key factors preventing investment in eHGVs.

Public charging and grid infrastructure

Public charging was seen as an important enabler of longer routes. Lack of certainty about charger availability and potential impacts of resulting delays (operational disruption, financial penalties, impacts on driver working time), as well as high cost of public charging were seen as barriers.

89% of Senior Managers agreed that the availability of public charging infrastructure limits the routes they can electrify, only 7% disagreed (Figure 44).

Figure 44 - Limitations of public charging infrastructure



Amongst Schedulers, a larger portion (28%) did not see the availability of public infrastructure as a limiting factor. This was often because the areas within their responsibility covered shorter routes that could be fulfilled with depot charging alone.

These concerns were also apparent in the Driver's responses, 71% expect the availability of fuel for eHGVs to be worse than for diesel vehicles and a further 20% were undecided.

Particular concerns were raised in relation to rural routes, where infrastructure roll-out is not expected and there is a lack of overnight truck stops with secure parking and welfare facilities for drivers. It was also emphasised that different charging options will be required for shorter top-up charges as well as slower overnight charging.

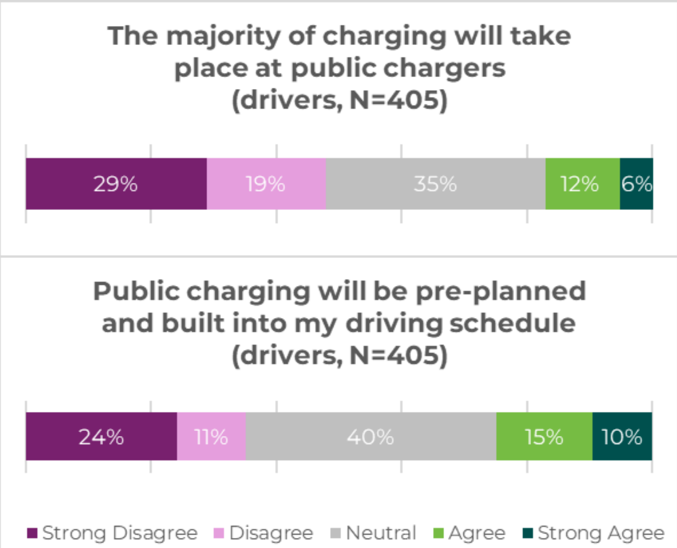
"Infrastructure is lacking in motorway services. Without that we won't be able to do longer routes. Only 50% routes could be covered with depot solutions."

Scheduler

While public charging will be critical to some routes, only 18% of Drivers expect most of their charging to take place at public chargers. The majority do not expect public charging to be pre-planned and built into their schedules (Figure 45).

At the time the survey was conducted, most organisations had not communicated to drivers whether/how public charging was going to be used.

Figure 45 - Driver views on public charging usage



In addition, there might be some cultural challenges if changes to the way schedules are managed is required, reducing the drivers' freedom to decide when and where to stop.

"Drivers on tramping routes are used to flexibility. Many see themselves as modern day cowboys and don't want to be told when and where to stop."

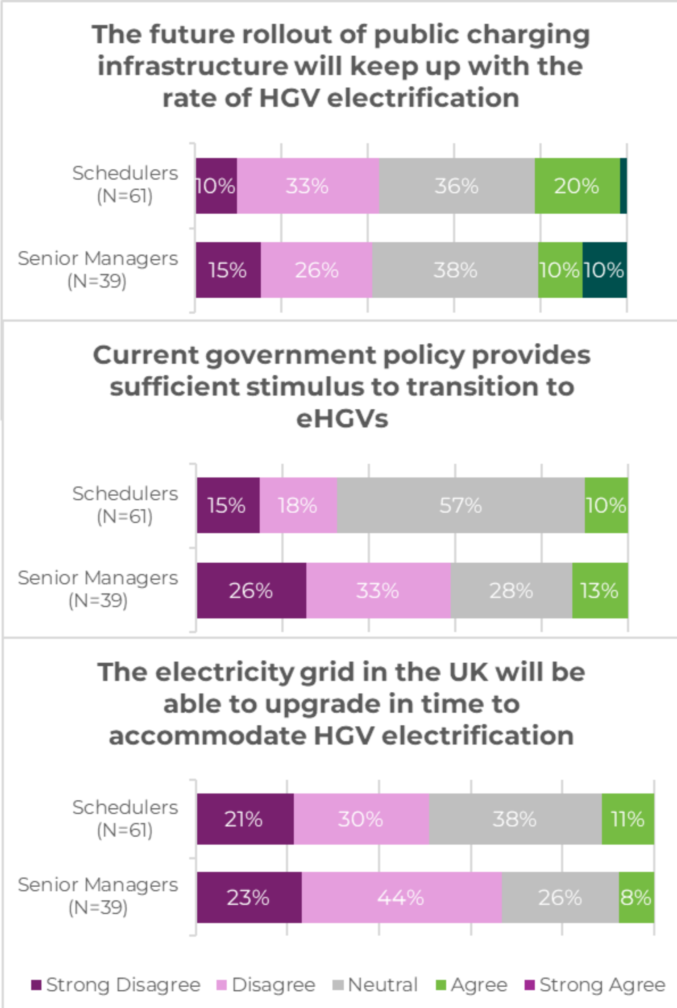
Senior Manager

There is a low level of confidence amongst Senior Managers and Schedulers that the pace of the rollout of public charging infrastructure and electricity grid infrastructure is going to keep up with the pace of HGV electrification.

Only 20% of Senior Managers and 21% of Schedulers believe that the rollout of public charging infrastructure will keep up with HGV electrification (Figure 46). Many interviewees spoke of issues they personally experienced while charging their EVs at motorway stations and concerns about charging in general, which influence their view on eHGV charging.

Confidence in the pace of grid upgrades to support HGV electrification was even lower, with 67% of Senior Managers and 51% of Schedulers disagreeing that upgrades will be achieved in time.

Figure 46 - Views on infrastructure, policy and grid



Concerns regarding the electricity grid were often driven by the difficulties experienced while putting depot infrastructure in place.

While a booking system was generally seen as helpful, some interviewees raised practical concerns, such as the ability of the system to effectively manage changes in schedules/delays in arrivals.

"A booking system would be good but how do you manage real time arrivals e.g. traffic or customer delays? Will there always be availability? Will there be long queues for charge points?"

Scheduler

"A booking system would be helpful, but the challenge is when drivers are stuck in traffic or break down. What happens if a charger is occupied or a driver misses their allocated slot? We need some level of certainty but also need to dynamically move in flight – we already do this with telematics for boards at stores predicting delivery times."

Scheduler

Booking systems are discussed further in Section 05

In addition to practical/operational challenges, the cost of public charging may limit the financial feasibility of electrifying longer routes.

Several interviewees expressed concerns about the cost of public charging and its impact on the TCO/feasibility of electrification of longer routes. Given the lack of eHGV-specific facilities, most based their opinions on prices for car charging at MSAs.

"Strategically placed charging hubs at a reasonable price are needed. The main concern is about the cost of public charging – at current high rates, there's no chance for TCO parity."

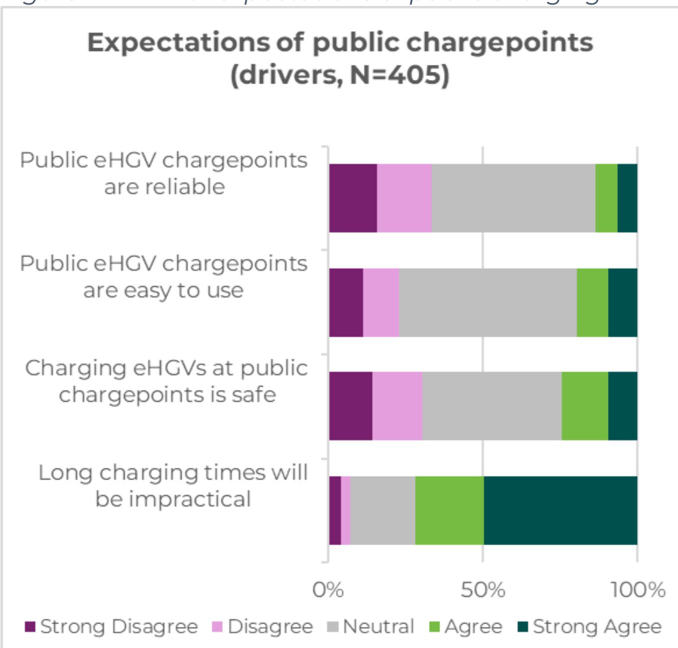
Senior Manager

"We are open to using it, but cost may be a barrier. Most of the routes wouldn't need it, only the longer ones."

Scheduler

Drivers expect long charging times to be impractical. This concern was more pronounced when it comes to public charging compared to depot charging.

Figure 47 - Driver expectations of public charging



A significant percentage of respondents were undecided about many aspects of charging (safety, ease of use, reliability), reflecting lack of previous experience with charging infrastructure. However, the majority agreed that long charging times will be impractical, both when charging at depots and at public charging stations (68% and 72% respectively) (Figure 47).

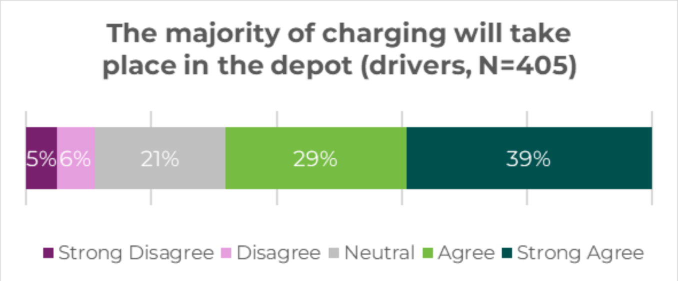
Depot charging and infrastructure sharing

Rollout of depot charging was seen as a key enabler of electrification, but Senior Managers recognised a wide range of issues, reflecting the challenges mentioned in Section 04 of this report. Most Senior Managers indicated a willingness to share infrastructure with other operators.

Over half of Drivers expect charging to take place mostly at depots. Unsurprisingly, 94% of those who were less concerned about fuel availability expect to charge mostly at the depot.

68% of all Drivers expect the majority of charging to take place in the depot, with a further 21% undecided (Figure 48).

Figure 48 - Driver expectation of depot charging



Grid connections and availability of zero carbon electricity

The availability of green power was a common concern expressed in interviews, but there was a lower awareness of the role of the grid and potential grid connection issues from those not directly involved with an electrification project.

"I'm concerned about the availability of electricity from the grid in the future once everyone's electrified and what will need to be done to flex the operations to fit in with it."

Senior Manager

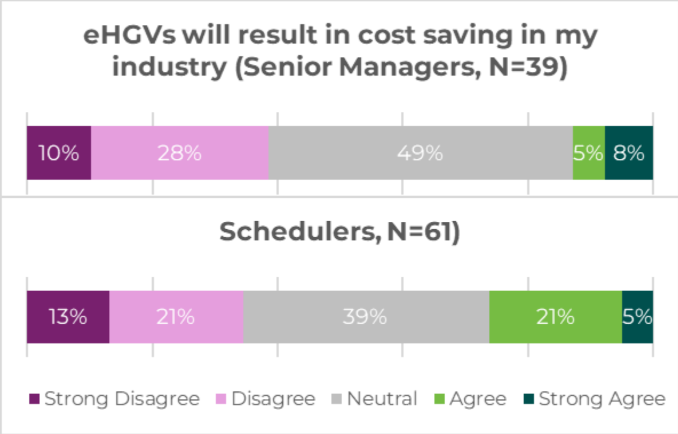
"It was only a visit to Germany that made me realise that the issue is not about electricity generation but getting it from where it is generated to where it's needed."

Senior Manager

Cost of transition

Almost half of Senior Managers are unsure whether eHGVs will result in cost savings in the industry, with close to 40% expecting negative cost impacts.

Figure 49 - Expectation of cost saving



Questionnaire results reflect significant uncertainty regarding the overall cost impact of electrification on the industry. A higher percentage of respondents expect cost increases rather than savings, but a significant proportion were undecided: 39% of Schedulers and 49% of Senior Managers (Figure 49).

With expectations of higher cost, the issue of cost apportionment along the value chain was raised. It was felt that with price-sensitive consumers, the cost burden would be split between the OEMs and the operators.

"It's not clear how cost of transition will be split between OEMs, owner operators and end customers. Need to share pain along value chain and OEMs taking a lot up front with £280k sticker price."

Senior Manager

Despite efforts put into modelling/business cases by many interviewees, there was significant uncertainty about whether and under what circumstances TCO parity might be achieved. While some believe TCO parity is possible with longer vehicle lifespan, others think that there is still a significant gap.

In interviews, opinions were roughly equally divided with half of the respondents expressing a negative view regarding achieving TCO parity in the near future, and half unsure or believing it could be possible.

"We don't have enough knowledge on cost yet. Our industry is very cost sensitive. Transport is a critical cost element and can make a difference to the competitiveness of the product."

Senior Manager

"There could be benefits from longer lifespans of the vehicle, but smaller operators may not be able to finance it."

Scheduler

Senior Managers in particular recognise that uncertainty about asset lifetime and residual value makes TCO comparison and financial planning difficult.

"We're unable to ascribe a residual value to eHGVs as opinion is heavily divided on what value should be used. This impacts the TCO. Residual value is anyone's guess – could be worth a lot or nothing. Finance department doesn't load in value unless it can be guaranteed, resulting in conservative financials. We are exploring end of life buyback option for batteries with OEMs. There may be a need for government guidance/rules, as smaller carriers don't have the leverage needed to reach similar deals."

Senior Manager

"Uncertainty around residual value and asset life – everyone you ask has a different opinion."

Senior Manager

To address this issue, work is currently underway at the Green Finance Institute to design financial products reducing the risk for lessors.

Expectations on maintenance costs vary widely. Most anticipate long-term savings, but concerns over spare parts prices and availability persist. As a result, more operators are turning to OEM maintenance packages, even where diesel fleets are serviced in-house.

"Spare parts availability – could be more expensive and have more lead time."

Scheduler

"Maintenance quotes from OEMs are high. For diesel, the costs are known exactly, for electric, there is uncertainty, therefore hauliers more likely to buy a maintenance package."

Senior Manager

Even operators that usually buy vehicles outright are wary of doing so with eHGVs, citing uncertainty over technology and operating costs. Smaller firms may be especially exposed to higher leasing charges.

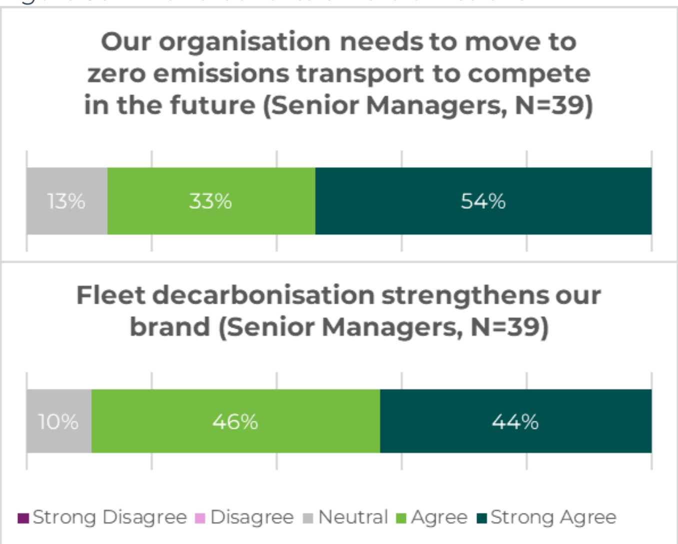
In the UK, most HGVs are either purchased outright (44%), leased long-term (33%), or rented short-term (23%). Larger operators are more likely to lease, and smaller firms favour second-hand purchases[xxxix]. Our interviewees represented hauliers with a mixture of approaches – while most lease, a few purchase outright. However, the shift to leasing in the face of high upfront costs and technological uncertainty around eHGVs raises the question of access to finance for SMEs to enable the transition.

Brand image and customer demand as fleet decarbonisation drivers

Industry decision-makers recognise the importance of decarbonisation for future competitiveness and brand image.

83% of Senior Managers agreed that their organisation must move to zero emission transport to be able to compete in the future and 87% agreed that decarbonisation is positive for their brand image (Figure 50).

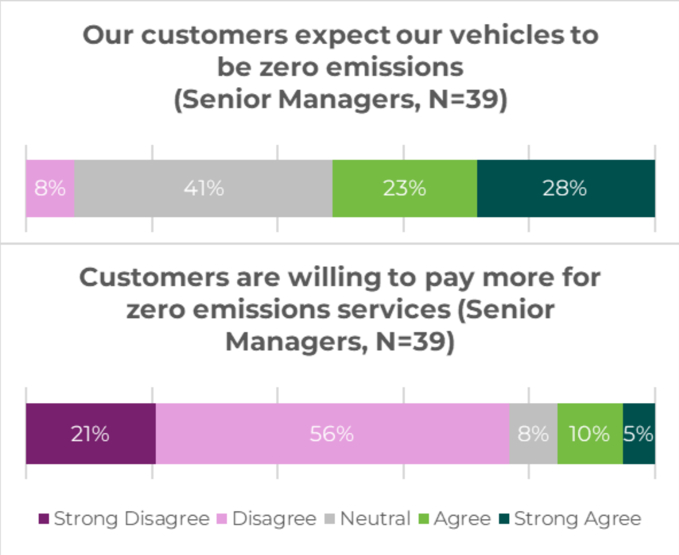
Figure 50 - Brand benefits of zero emissions



While customers increasingly expect zero emission services, this rarely translates into a willingness to pay a premium.

Operating in a highly competitive industry with wafer-thin margins typically between 2-3%[xl], most hauliers cannot absorb the cost of electrification without passing some of it onto their customers.

Figure 51 - Commercial need for zero emissions



77% of respondents believe that their customers are not willing to pay a premium for zero emission services (Figure 51).

Some customer sectors – such as strong B2C brands and high-margin industries – show willingness to pay a premium. Yet interviewees doubted that the full cost of electrification could be passed on.

"We see two types of customers – those that are in cash-rich industries are more willing to pay, but others in shrinking industries (e.g. hospitality) are more cost-sensitive. Customers need to pay, and it gets passed on to the consumer."

Senior Manager

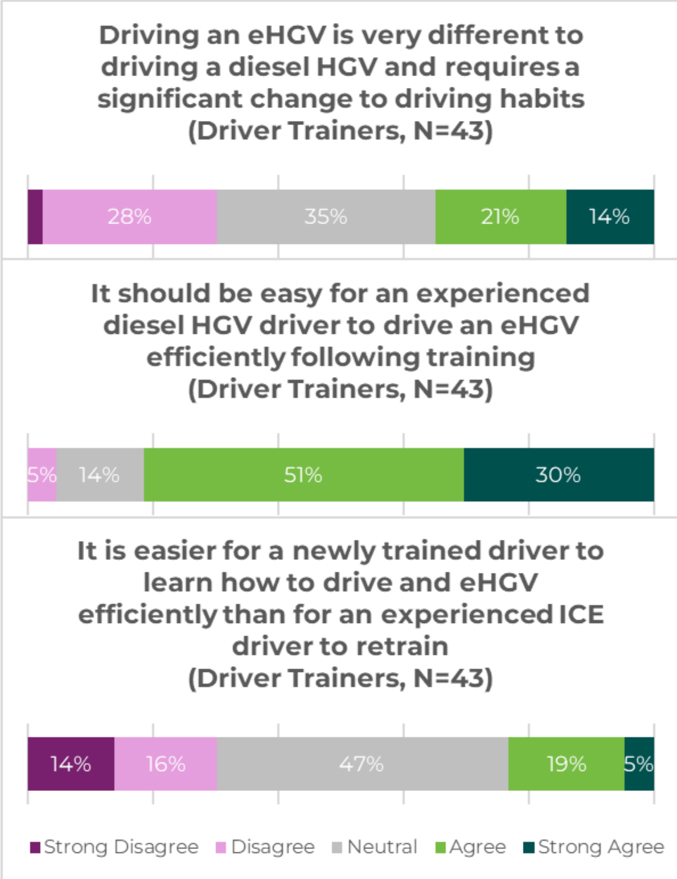
Difficulty of transition for drivers and driver training

The Driver Trainer survey explored the ease of transition and training needs, gauging the effort required from both drivers and hauliers to ensure efficient vehicle use.

Respondents included full time trainers and drivers with training duties, though 30 of the 43 came from a single organisation – so some caution may be needed in interpretation. Firms without dedicated trainers, where OEMs provide driver instruction directly, were not covered.

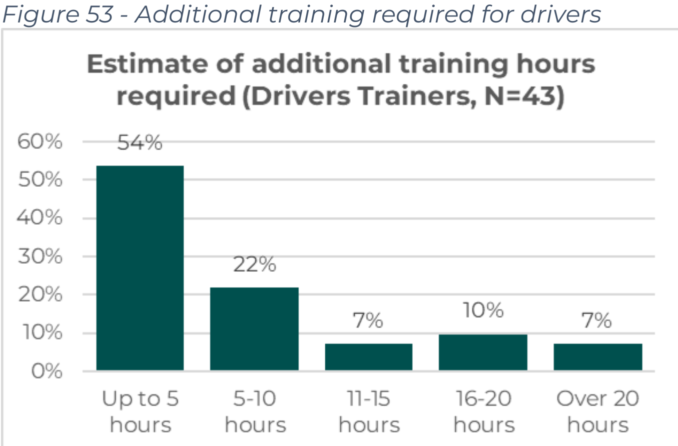
81% of Driver Trainers agreed that it should be easy for experienced diesel HGV drivers to retrain to drive eHGVs, though 30% judged the driving experience to be markedly different (Figure 52).

Figure 52 - Views on training requirements



eHGV training can be relatively easily incorporated into existing training and performance management approaches.

Figure 53 - Additional training required for drivers



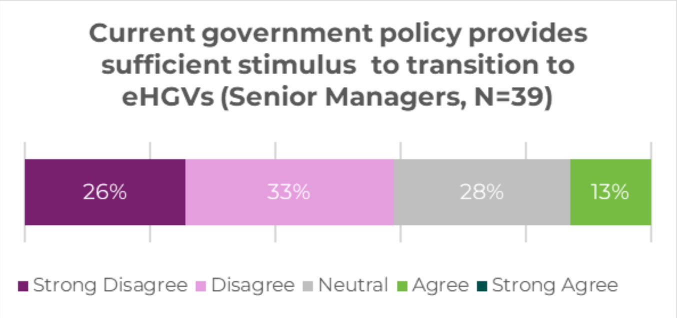
Over half of the Driver Trainers estimated the additional training needed per driver to be under five hours (Figure 53), with classroom/group training and in-cab one-to-one training being the most common approaches.

Similarly, in management interviews, most respondents were positive about this aspect of the transition and confident that their training staff and performance management processes can effectively support the transition.

Regulatory barriers and enablers

Only 13% of Senior Managers agreed that current government policy provided sufficient stimulus to transition to eHGVs, while 59% disagreed (Figure 54).

Figure 54 - Senior Manager views on policy



Among those with more exposure to international markets, there was a general impression that the UK is doing less to incentivise the transition than EU countries. The interviews were conducted prior to the government announcing the Depot Charging Scheme in July 2025.

The policy areas mentioned in the interviews can be broadly divided into wider measures promoting eHGV uptake and removal of barriers to adoption.

Subsidies to narrow the upfront price gap – through grants or tax breaks – and support for charging infrastructure were seen as essential, especially for SMEs. Interviewees also stressed that regulation should complement incentives, with 'sticks' reinforcing 'carrots' across the supply chain.

"In Germany there is a road toll which only applies to ICE HGVs, benefiting the TCO for eHGVs. Similar solutions should be considered for the UK. Spain gives more subsidy to smaller haulier companies to encourage investment. Also, from 2027, road transport becomes part of EU emissions trading scheme. Is UK planning similar?"

"Can be compared to Germany and Sweden where 80% of difference (purchase price) is funded as standard."

"Climate risk assessments for large fleet operators often identify the potential of carbon taxes as a material financial risk. Fleet decarbonisation is therefore a key strategy to reduce exposure to this risk and enhance long-term business resilience."

"Need a 'stick' – for some organisations price is the only motivator, will not be willing to change unless there is a penalty to using diesel."

Comments from Senior Managers

Supply and cost of electricity were also frequently mentioned by interviewees who thought that government intervention was needed to facilitate electricity network connections and to reduce the cost of electricity for charging.

"We need government intervention particularly around planning, grid and DNOs, unblocking the queue and expense."

Senior Manager

With regards to removing barriers, vehicle weight regulations were most frequently mentioned, alongside the need for guidance on residual value and buyback of end of use eHGVs.

The 44-tonne limit was seen as a major barrier to efficiency for those transporting heavy loads.

"Disappointed about the 44-tonne limit – will be able to transport 3 tonnes less as a result."

Scheduler

Our final report will consider regulatory interventions in more detail and include our recommendations and examples of measures that were successfully implemented in other countries.

Perceived benefits and concerns

Drivers and Senior Managers were asked to list top three benefits and concerns regarding eHGVs. The results are presented in the following word clouds. Charging and range were common concerns, while Drivers expressed more views about safety and environmental impact. Senior Managers saw benefits in terms of meeting customer expectations but have worries about cost.

Figure 55 - Benefits identified by drivers

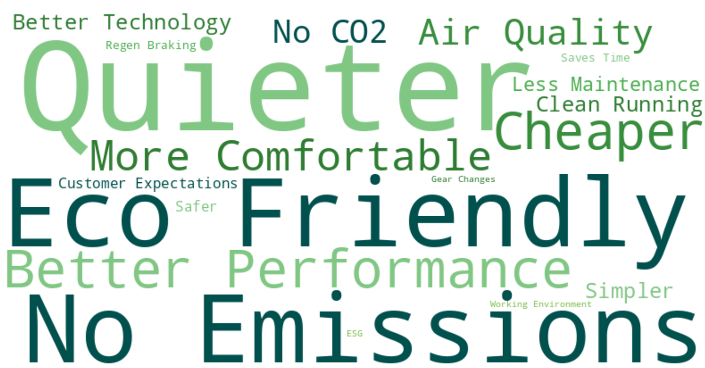


Figure 56 - Concerns expressed by drivers

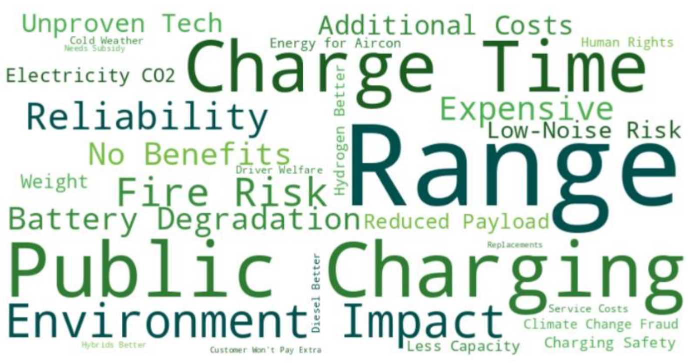


Figure 57 - Benefits identified by Senior Managers

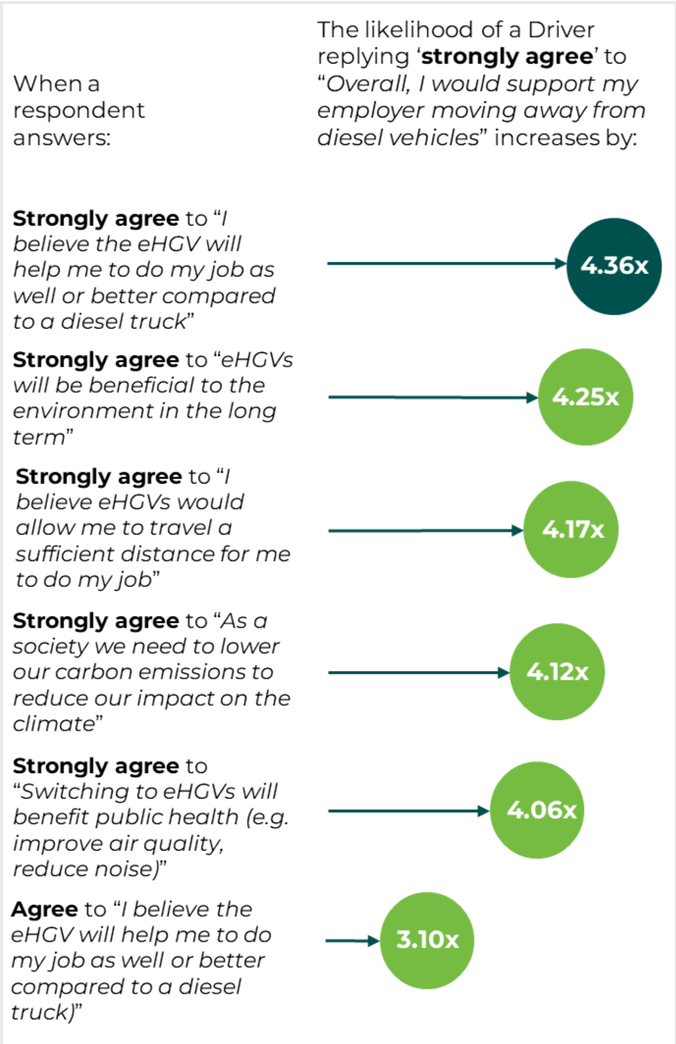
Figure 58 - Concerns expressed by Senior Managers

What influences support for moving away from diesel?

A key influencer analysis was conducted for Drivers and Schedulers (analysis was not possible for other stakeholder groups due to insufficient sample size) to understand which responses most strongly influence the overall support for one's employers moving away from diesel. Overall, the results point at a mixture of pro-environmental beliefs and practical considerations regarding the vehicles' capabilities.

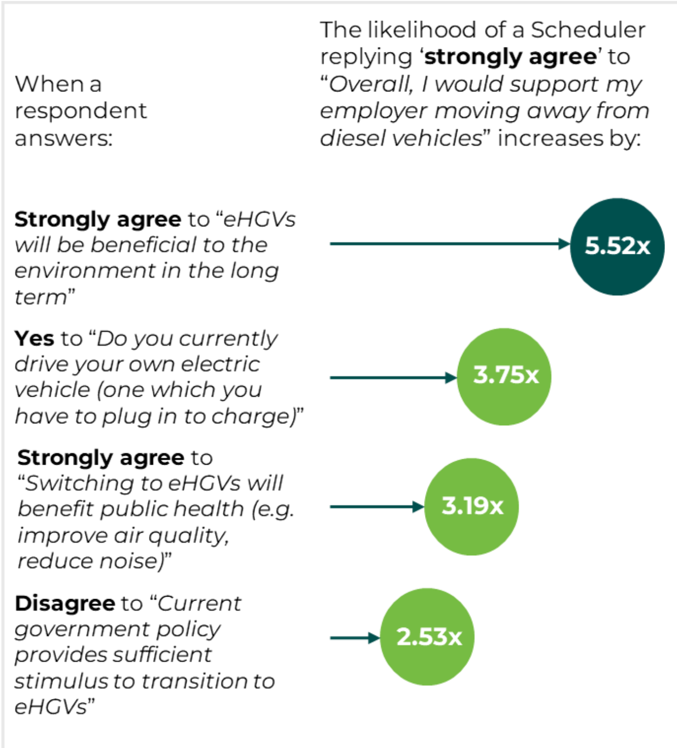
For Drivers, the most important factor influencing support for moving away from diesel was the belief that an eHGV will help them to do their job as well as, or better, compared to a diesel truck, followed by the belief that eHGVs will be beneficial to the environment in the long term (Figure 59).

Figure 59 - Key influencers - Drivers



For Schedulers, the most crucial influencing factor was the belief that eHGVs will be beneficial to the environment in the long term. Notably, those who drive personal EVs were almost four times more likely to be supportive of the transition away from diesel than those who do not (Figure 60).

Figure 60 - Key influencers - Schedulers



Schedulers placed more weight than Drivers on the long-term environmental case for eHGVs. Those strongly convinced of the benefits were over five times more likely to back a shift away from diesel. Yet doubts lingered among stakeholders over battery production and disposal, underscoring the need for clearer communication on industry efforts to address these concerns.

Design considerations for the next iteration

Iteration two of the survey will address a comparable range of issues, with particular emphasis on changes in perceptions and the evolving understanding of the factors influencing change over time. As before, it will engage a broad cross-section of respondents, including individuals without direct experience of the vehicles. It is anticipated that attitudes will shift not only as a result of first-hand experience but also through both formal and informal exchanges within organisations. In the first iteration, a significant share of drivers expressed uncertainty regarding both the vehicles and the charging infrastructure. The second iteration is expected to indicate a shift towards more defined positions.

08 Encouraging diverse talent in the transport sector

All Zero Emission Heavy Goods Vehicle and Infrastructure Demonstration projects have a focus on encouraging diversity, equity and inclusion through their activities. Electric Freightway is leading the way with the launch of the Female Talent Initiative.

Diverse talent required to support the EV transition

As highlighted by the demographics presented in the Attitudes section of this report, the workforce in the logistics and haulage industries is not representative of the wider workforce. Some groups, such as younger people and women are significantly underrepresented. Women in Transport's 2025 Equity Index[xli] found that just 27% of the wider transport sector's workforce identifies as women and 25% of those respondents are in non-transport roles.

The majority of companies in the industry do not have formal targets or commitments for increasing diversity and the lack of women in senior positions results in a significant gender pay gap. The gap does not just affect drivers, with management roles reporting similar gender disparity.

There are a number of other aspects that the industry can tackle, such as:

- Lack of relatable role models in the industry
- Lack (or poor quality) of facilities for drivers on the road, at depots and destinations
- Unsociable or unpredictable working hours with lack of flexible working arrangements
- The minimum age for an HGV license has only recently been reduced to 18, and cost of insurance for younger drivers may be higher
- Driver training can be expensive, unless covered by an apprenticeship. Smaller businesses find it difficult to offer apprenticeships as there are few jobs that can be carried out without a licence
- Jobs in the industry are not promoted to a wide enough pool of applicants.
- Limited information is available about the breadth and range of roles in the industry, with intakes and entries from all industry sectors possible at any stage in a woman's career
- The power of mentoring for career development

As the industry generally faces a shortage of talent, both for drivers and other roles, attracting a more diverse workforce is important to ensure the industry stays competitive. The reliance on older workers has resulted in driver shortages in recent years, as the number of retirees has exceeded the number joining the industry[xlii].

Figure 61 - Amazon presents details of their 'Women En-Route' discovery day

Electric Freightway has set up a Female Talent Initiative to introduce young women to opportunities in the industry and help operators understand what they can do. An initial workshop hosted at Hitachi ZeroCarbon's offices featured speakers from recruitment firm Piper Madox, the Department for Transport, Innovate UK, Amazon, Volvo Trucks, GRIDSERVE and Hitachi ZeroCarbon. Speakers provided insight into what it is like to work in the transport and logistics industry as a woman and presented opportunities for work experience while role-play sessions looked at the recruitment experience in more depth (Figure 61).

Business case and benefits for companies

Having more women in supply chain and logistics roles offers companies a competitive advantage. Diverse teams bring fresh perspectives, creativity, and problem-solving skills, leading to improved business performance and decision-making.

Gender diversity positively impacts productivity and revenue as diverse teams generate innovative ideas and solutions, driving business growth.

Furthermore, a diverse workforce attracts top talent and enhances employee retention, satisfaction and motivation as it feels more inclusive.

The facts speak for themselves – companies with gender-diverse leadership tend to outperform their peers financially.[xliii]

Enhancing diversity in the road transport sector is a multifaceted challenge that requires a concerted effort from various stakeholders. Initiatives like the Female Talent Initiative are pivotal in supporting women in the industry and encouraging them to overcome gender stereotypes. To further improve diversity, it is essential to continue these efforts and also focus on retention strategies, professional development, and clear career progression pathways, creating a more representative workforce and tapping into a broader talent pool. The industry must reflect the diversity of the UK to remain competitive and appealing to the next generation of workers.

Overcoming misconceptions of the logistics industry

The logistics industry is often associated with long hours involving physical labour and heavy lifting in polluted and dirty environments. Thus, it is often perceived as unsociable and associated with an inability to combine a job in the logistics industry with family life. However, a wide range of roles are available to suit different talent and preferences.

DP World engages with the Jane Goodall Institute which enters into dialogue with future female talents at schools. The company also offers a Mentor Her programme – an internal initiative to support young female talent. It is proven that mentoring has a profound impact on building self-confidence, employee motivation and career progression. Mentees benefit from practical context-specific advice and support.

Uplifting all talent, especially female talent, is a key priority for DP World. Through its dedicated mentor programme, *Mentor Her*, it has thoughtfully connected 64 women with mentors this year, supporting their growth, development, and leadership journey.

"*Being part of DP World's mentoring programme both as a mentor and mentee has been an invaluable experience. It has given me opportunities to collaborate with colleagues across the business, building relationships that encourage growth and development for all involved.*"

Shelley Starkey, QEHS Manager, DP World Minworth

Discovery days

Following the initial session, Amazon, Volvo Trucks and Hitachi ZeroCarbon arranged a series of discovery days to give more hands-on experience of roles in the sector.

Amazon career lunch

Amazon hosted two female students taking part in Hitachi ZeroCarbon's work experience for a sunny alfresco lunch at its UK HQ. Marina Lussich, Principal Worldwide Operations Sustainability at Amazon and Anna Maudet, Head of Bid Management at Hitachi ZeroCarbon were delighted to field questions and encourage potential future colleagues (Figure 62).

Figure 62 - Career talk at Amazon's offices

Marina and Anna explained how they got to work in transport, how GCSE choices do not dictate future career choices and that it is never too late to consider entering the transport industry.

Volvo Trucks introduction to sales day

This event took place in January 2025 and was aimed at attracting new talent to a role in sales. Volvo Trucks hosted a full day of interactive sessions to introduce non-salespeople to the fantastic career opportunities that a role in truck sales presents (Figure 63, Figure 64).

> *“Considerable research shows that ‘de-gendérised’ businesses perform better by bringing together varied perspectives that lead to improved decision-making. Having worked in male-dominated industries for over 15 years, I can testify that gender equality brings a lot of advantages to our business and improves decision making.”*
>
> **Amy Stokes, Head of e-Mobility, Volvo Trucks**

Figure 63 - Presenting a career journey at Volvo Trucks

Figure 64 - Participants experience Volvo Trucks first hand

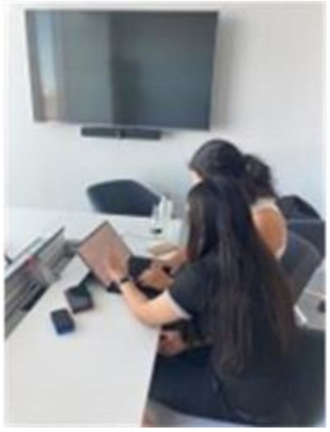
Work experience at Hitachi ZeroCarbon’s London office

The best way to learn and understand the possibilities the logistics and technology sector offers is through hands-on experience.

Hitachi ZeroCarbon was delighted to offer work experience, hosting two female students for one week at its London offices.

The students were introduced to different roles and responsibilities throughout the week (Figure 65).

Figure 65 - Female students working on a Hitachi ZeroCarbon assignment



Hitachi ZeroCarbon aimed to focus on ‘learning by doing’ and tasked them to complete mini assignments each day in the areas of sales and marketing, project management, battery data technology and data science.

Each day the students presented their findings back to their respective subject matter expert host of the day.

Why it matters

Gender diversity in transport and technology is not just a matter of fairness – it is a strategic imperative. Inclusive teams drive innovation, improve decision-making, and create services that better reflect the needs of all users. Moreover, closing the gender gap in these sectors could boost global GDP by nearly 20%.

Looking ahead

The momentum behind this initiative signals a broader cultural shift. As more organisations adopt inclusive policies and invest in female talent, the transport and technology sectors are poised to become more dynamic, equitable and resilient.

What can you do?

Interested in taking part or want to host work experience? Want to share what your organisation already does to stimulate diversity? Let us know at:

hello@hitachizerocarbon.com

Watch the video to find out more about the Electric Freightway Female Talent Initiative

09 Environmental and economic impacts

Developing deeper understanding of the costs and benefits of operating eHGVs, based on real-world experience, is a key aspect of Electric Freightway. This is crucial information for operators making decisions on investments, as increased costs may severely impact their ability to remain profitable in an extremely competitive market. Our initial analysis has shown how the day-to-day running costs of an eHGV can be lower than a diesel truck, but the cost of infrastructure (or extensive use of high cost on route charging) can erode any savings. Environmental and social benefits can be more difficult to measure but are becoming an increasingly important considerations as customer expectations change and regulations evolve.

The importance of a sustainable transition

The transition to zero emission vehicles in the transport sector needs to be both economically and environmentally sustainable to succeed.

If changes do not result in environmental benefits, then there is no clear reason for making the change. If the change is not economically viable, due to higher costs that cannot be passed on to customers, operators will incur losses. This is of crucial importance, as many transport companies work on very low margins.

While they may not always be willing to pay for it, many customers are increasingly looking for more environmentally friendly logistics, especially large companies that have targets for the reduction of Scope 3 emissions generated throughout their supply chain.

The structure of the UK haulage and logistics sectors

The road haulage industry in the UK is extremely fragmented, consisting of over 40,000 firms, ranging from sole traders with a single truck to large multinationals. Most companies are small- and medium-sized enterprises, although they often operate as subcontractors to larger companies, or as part of networks.

Cost pressures on the UK transport industry

The haulage and logistics industries in the UK are extremely price competitive due to the large number of businesses in the industry and low barriers to entry. This, coupled with falling freight volumes following high demand during the pandemic, allows customers to negotiate the price of services down, resulting in very low operating margins, and preventing hauliers from passing on inflationary cost increases. The cost-of-living crisis, and the need for retailers to drive down costs to keep consumer prices low has further exacerbated this for many operators.

Increasing regulations add to this burden. This includes emissions regulations, more rigorous training requirements for drivers and the Progressive Safety System for the Direct Vision Standard. Increases in National Insurance have also increased cost in this labour-reliant industry.

Typical margins are in the range of 2-3%, so there is limited ability to weather changes in the market or in operational costs. It also means that most operators have little ability to take risks or invest in new technologies, although such investments and innovations may be necessary to survive in the evolving and consolidating industry. This has been further exacerbated by higher interest rates that have increased the cost of borrowing, making it harder to get an adequate return on investment.

The impact of this can be seen in recent industry trends. In 2023, 494 haulage businesses entered insolvency and many more were deemed 'at risk'[xliv].

Managing the cost of electrification

Electrification of fleets will bring significant up front and ongoing costs for operators. Vehicles are currently significantly more expensive, and whether this can be offset by electricity costs being lower than diesel depends on the management of operational costs.

To help operators considering embarking on their journey to eHGVs, Hitachi ZeroCarbon has developed a simple tool to demonstrate the potential costs and savings, both in terms of carbon and economics, from operating an eHGV instead of a diesel vehicle.

The Cost & Carbon Calculator is designed to give high-level answers, based on vehicle efficiencies observed in the demonstration, together with user inputs, enabling operators to see whether different routes have the potential to economically transition. Changes in vehicle prices and fuel costs can also be modelled in order to show when routes might start to break even in the future.

Using the project's efficiency data

In Section 06 we outlined the analysis carried out on the efficiency of electric and diesel vehicles taking part in the trial.

The outcome from the analysis is used directly in the tool, with differing fuel and power efficiencies based both on vehicle gross weight and the types of trips being undertaken (motorway, urban or rural).

Throughout the project we will continue to monitor these efficiencies and will consider updating the tool if we see efficiencies change

Example TCO output

It is clear that, with current costs, electric HGVs will not always provide cost savings for operators. However, the tool can demonstrate cases where breakeven can be achieved and, in other cases, how much costs would have to change in the future to approach breakeven.

While there are many variables, three factors input by the user drive the calculation:

- The purchase/lease cost
- How many kilometres the vehicle covers each year
- Electricity and diesel costs

If we take an eHGV bought outright with a purchase cost of £305,000 and a diesel truck at £110,000, set the duty cycle to 100,000km/year, the charging to 100% depot (and use the defaults for all other parameters) we can see that an electricity price of 24p/kWh results in breakeven over five years against a diesel price of 120p/l (Figure 66).

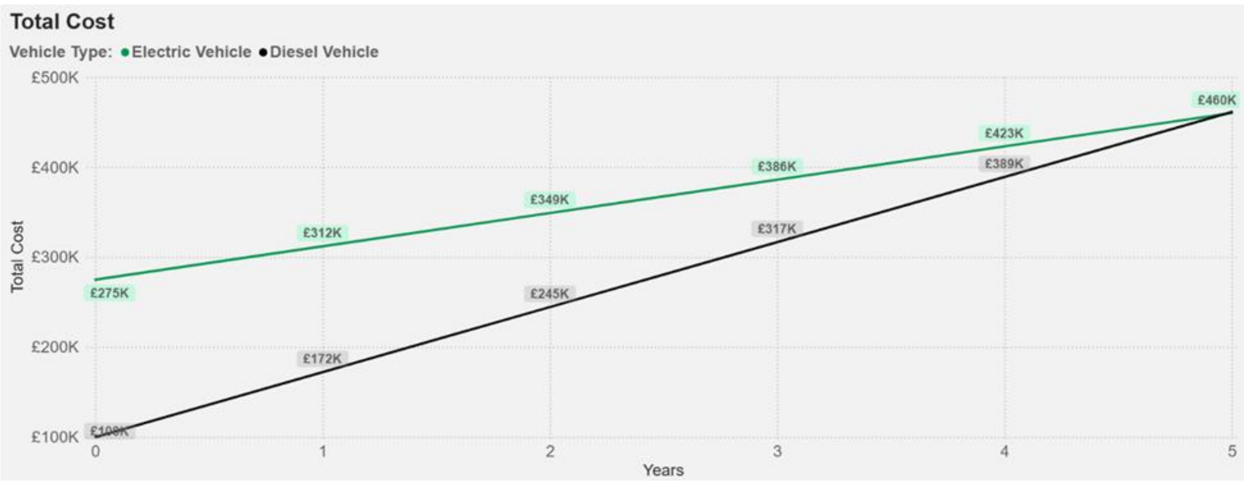


Figure 66 - Estimated five-year cost of an eHGV vs Diesel with 100,000km/year duty (green = eHGV, black = diesel)

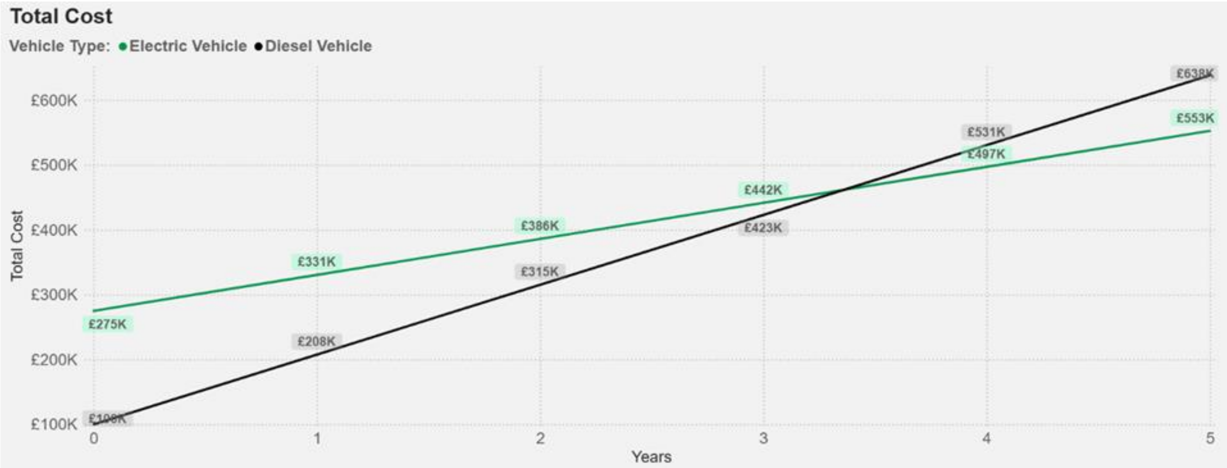


Figure 67 - Estimated five-year cost of an eHGV vs diesel with 150,000km/ year duty (green = eHGV, black = diesel)

Because the running cost per kilometre is lower, increasing the annual distance travelled will bring the breakeven point forward. Figure 67 shows how the same scenario, with 150,000km/year, results in breakeven in year four and an overall cost saving.

In this scenario, the average electricity price can increase to 32p/kWh while still achieving breakeven – potentially allowing some use of public charging, or inclusion of a proportion of the cost of infrastructure.

Keeping the vehicle for longer will increase savings further but may increase the likelihood of exceeding the battery warranty and/or needing to have batteries replaced.

Visit [the Hitachi ZeroCarbon website] to try out the Cost and Carbon Calculator for yourself.

Assumptions and limitations

The tool is a simplified first step in the process of considering whether eHGVs are a practical and cost-effective solution. The next step would then be to work with a vehicle OEM or other service provider to develop a solution for an operator's specific circumstances.

This is necessary due the wide range of factors that can impact cost to serve, which only apply to some operators and are difficult to generalise. Examples of this include:

- The cost of installing and operating **charging infrastructure** is not considered. The range of costs varies widely, is difficult to apportion to a single vehicle and cannot be predicted without surveys of specific sites and understanding utilisation.

  The price of electricity per kWh can be altered to take into account the cost of installing and operating infrastructure if this is known or can be estimated.

  For example, if your depot electricity cost is 25p /kWh, but the cost to install and maintain (CAPEX and OPEX) the chargers equates to an additional 10p/kWh, use the sum of these (35p/kWh) as a "blended" cost of delivering charging at the depot to model the true TCO. This can then be compared to on route charging prices, which do not incur these CAPEX costs.

- The tool does not make judgement on the **practicality** of any duty cycles that may be planned.
  A reasonable limit is placed on annual mileage, but daily times and distances operated need to be considered.
- **Annual duty cycles** are capped at, and lease/ownership length is limited to, eight years to prevent scenarios significantly exceeding OEM battery warranties. Annual duty is limited to 150,000km for the same reason.
  Longer lifetimes will be achievable, potentially improving overall lifetime cost-effectiveness of the truck but may require battery replacement or result in lower performance over time.
  Battery replacement has not been modelled due to the difficulty in predicting if and when battery replacement is needed and quantifying the CO_2 impact of battery second life and recycling.

- eHGV **maximum payload** is generally about 3 tonnes less than an equivalent ICE truck. This impacts individual hauliers differently, depending on what they carry. For organisations that routinely carry heavy loads in 44-tonne trucks, such as bulk materials, this difference in load can mean that more deliveries are needed and the size of each load sold has to be changed. *This cannot be calculated at a single vehicle level and must be considered as part of a fleet of vehicles. Issues around weight are explored in greater detail on the next page.*
- There is currently no resale market for used eHGVs, so conservative estimates have been made about **residual value**.
- The tool accounts for major cost categories but does not include everything.
  For example, we estimate costs for maintenance, repairs, tyres and vehicle excise duty/levy, but do not include the cost of vehicle insurance.

These costs will be considered as part of a more detailed TCO analysis in the project's final report once more data has been gathered to inform the modelling.

The FAQ and methodology sections of the tool provides more information on the assumptions made.

Weighty issues

In our interviews, some hauliers described weight restrictions as the **"single biggest factor in making the trucks economic"**. This is especially important to hauliers whose diesel trucks routinely carry loads of up to 27 tonnes, resulting in a GCW of 44 tonnes, currently the maximum permissible weight on UK roads for standard vehicles.

In these situations, an additional vehicle journey may be required for every eight loads using eHGVs, creating additional costs for vehicles and drivers, increasing the 'cost to serve' per tonne. There may be other consequences for operators, such as needing to renegotiate contracts with customers for different load sizes.

What causes this limitation?

The fundamental issue is that eHGVs weigh more that equivalent ICE units due to the weight of batteries. While eHGVs may be physically capable of carrying the same load as ICE trucks they are limited by several interacting restrictions:

eHGVs theoretically have an **additional weight allowance of 2 tonnes** compared to ICE equivalents. This does not always cover the weight of the battery (approximately 3 tonnes) and total weight is still capped at 44 tonnes, limiting the benefits for the heaviest trucks.

Load on the drive axle of a 4x2 truck is limited to 11.5 tonnes[xlv]. In the UK, this is generally mitigated in ICE vehicles by using 6x2 or 6x4 HGVs which have an additional axle on the tractor unit, reducing load on the drive axle. While these are available as eHGVs (and used by partners including United Utilities), these tractors are longer than their ICE equivalents due to the space needed for the batteries. If they are coupled with a standard trailer, they exceed the **maximum permitted length of 16.5m**.

The location of the battery in the tractor unit puts a significant proportion of the extra weight on the drive axle, further reducing the payload that can be carried. **Positioning of the load in a trailer becomes more critical**, to prevent extra weight being placed on the drive axle. Some operators carrying heavy loads have looked at blocking off the front of the trailer to move loads backwards to ensure limits are not exceeded.

Why do we have weight restrictions?

Heavy vehicles like HGVs and buses have a disproportionate impact on road surfaces. Research from the University of Edinburgh has estimated that there may be 20-40% additional road wear from electric vs ICE vehicles overall, with the vast majority caused by large trucks and buses.

Under the **fourth power law**, stress placed on a road by a vehicle increases in proportion to the fourth power of its axle load. Therefore a 30-tonne truck with three axles (10-tonne load per axle) has an impact 10,000 (10^4) times as high as a 2-tonne car with two axles (one tonne per axle)

Total vehicle weight has more of an impact on structures such as bridges, where the combined weight of vehicles places pressure on supports and other structural components.

However, the real impact is complex and there are several arguments for revising the limits further:

- The effect, in terms of both road damage and congestion, of additional vehicle journeys generated by weight restrictions needs to be considered.
- Five- and six-axle trucks in the 40-44 tonne category often cause less road damage than many 30-38 tonne trucks which only have four axles as the per-axle load can be less.
- Increasing weight on the twin-tyred drive axle may have a positive impact on roads if load on the single tyre steering axle can be reduced[xlvi].

Road safety is another reason for weight and length limits; however, vehicles would still operate within their design parameters and trials of longer semi-trailers did not find any significant additional safety issues.

What is happening outside the UK?

Across the EU there is a standardised weight limit of 40 tonnes with an 11.5 tonne driving axle load. 4x2 HGVs are more common as there is little benefit gained from the additional axle.

Many countries set higher domestic limits – up to 50-76 tonnes in some locations like Finland, Sweden and the Netherlands, but the higher limits are often limited to major roads and specific vehicle types.

The European Commission currently proposes[xlvii] that both two- and three-axle zero emission HGVs will receive a higher limit throughout the EU of 44 tonnes, with a drive axle limit of 12.5 tonnes to offset additional battery weight and allow similar payloads to be carried. Some organisations suggest modifications to this to reduce additional road maintenance cost impacts[xlviii].

Accounting for environmental impact

Environmental and economic sustainability are often closely related.

Not only are larger transport companies now needing to report their Scope 1 and Scope 2 emissions (relating, respectively, to the CO_2 impact of fuel they burn and power they use), but customers are also paying more attention to Scope 3 emissions[xlix] – CO_2 emitted within their supply chain. Larger companies are increasingly measuring their Scope 1, 2 and 3 emissions and setting targets for their reduction. This can have a knock-on effect for transport companies – environmental issues are becoming a consideration when tendering and some customers are willing to pay a higher price for low and zero-emission transport.

Understanding the full impact

As the attitude surveys have made clear, the environmental impact of eHGVs is not always well understood. A significant minority of respondents doubt the environmental benefits of electrification and stated a number of environmental concerns regarding their adoption. The issue of higher embedded carbon (the carbon used to manufacture a truck and its battery) in eHGVs is one of the recurring criticisms.

The **carbon and cost calculator** tool aims to illustrate the carbon impact of an eHGV compared to a diesel equivalent throughout its lifetime, starting with the embedded emissions, and showing how this compares to the CO_2e savings resulting from moving from diesel to electric power.

Similar to the TCO output, we present the cumulative CO_2e impact throughout the vehicle's life, showing if and when the lifetime emissions from a diesel truck exceed those of an eHGV.

When this happens depends on the duty cycle, the source of electricity and the battery type and size, which can be changed to demonstrate different scenarios.

Example carbon output

Taking the same example as in the previous section, we can use the tool to calculate the approximate breakeven point for carbon emissions when comparing an eHGV with an equivalent diesel HGV.

The result is shown in Figure 68 The diesel vehicle's emissions (black line) surpass the eHGV (red line) after less than one year of use. By the end of a five-year usage period the diesel truck has emitted over three times as much CO_2e emissions as the eHGV. If electricity from renewable sources was used, the difference would be even greater (diesel would emit more than six times the eHGV emissions).

What if the truck is used less? Our analysis shows that even if the eHGV does only 15,000km/year the crossover occurs in year three, even if a green tariff is not used.

Full details on how we estimated carbon impacts can be found in the tool's help section.

Looking beyond CO_2

While eHGVs may be free of CO_2 emissions at the tailpipe, these are not the only form of emissions coming from a truck while in use. The feature on the next page looks at some of the key differences between the air quality impacts of eHGVs and diesel trucks.

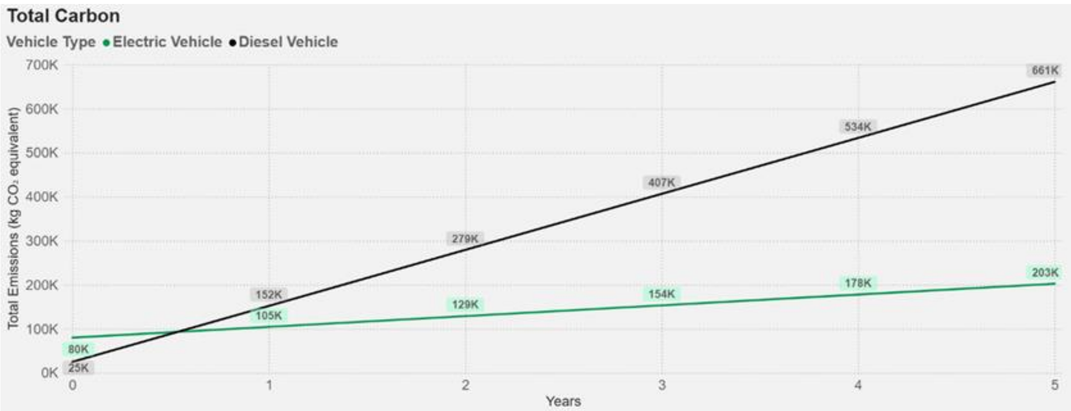


Figure 68 - Example of CO2e emissions over a five-year vehicle life with 100,000km annual duty (green = eHGV, black = diesel)

Beyond CO_2: focus on air quality

Do eHGVs create more air pollution than diesel HGVs?

Diesel HGVs are notorious for their tailpipe emissions, releasing carbon dioxide (CO_2), nitrogen oxides (NO_x), and particulate matter (PM) into the atmosphere. However, both diesel and electric HGVs also contribute to air pollution in less obvious ways through non-tailpipe emissions such as brake wear, tyre degradation, and road surface abrasion. Understanding these hidden sources is essential to answering whether electric trucks truly offer a cleaner alternative.

The hidden world of non-tailpipe pollution

As vehicles become cleaner in terms of exhaust emissions, non-tailpipe emissions are becoming more significant. Every time a truck brakes, tiny metal particles – copper, iron, and others – are released into the air from brake pads[l].

Tyre wear generates microplastics and toxic chemicals like zinc and polyaromatic hydrocarbons (PAHs), which can be washed into waterways or linger in the air[li]. Even the road itself contributes, as tyres grinding against asphalt release silica and other particles. Electric HGVs eliminate tailpipe emissions, but they are not exempt from these hidden pollution sources. The key question is:

Do their non-tailpipe emissions outweigh the benefits of ditching diesel?

Brake emissions: A clear win for electric

Diesel HGVs rely heavily on friction brakes, especially in stop-and-go traffic, which releases significant amounts of brake dust – a major contributor to urban particulate pollution.

Electric HGVs, by contrast, use regenerative braking systems that convert kinetic energy back into battery power. This results in a dramatic reduction in particulate emissions from brakes.

For example, a study by Imperial College London[lii]. found that electric and hybrid vehicles, despite being heavier, reduced brake wear by between 64% and 95% compared to internal combustion vehicles. In this category, electric trucks have a decisive edge.

Tyre wear: The weighty debate

The picture becomes more complex when it comes to tyre wear. Electric HGV tractor units are typically 20-40% heavier than diesel equivalents due to their batteries, and, while there is relatively little conclusive evidence on the impact of weight on truck tyre wear, modelling suggests[liii] that heavier vehicles experience greater wear, resulting in more particle emissions. Tyre wear particles (TWPs) are a major source of microplastics in the environment, with most particles being below 2.5 microns in size – small enough to become airborne or enter waterways.

However, innovation is narrowing this gap. Tyre manufacturers are developing advanced compounds, such as silica-infused rubber, that can reduce wear, while looking to replace materials with more sustainable alternatives. [liv] Additionally, smoother acceleration and regulated driving styles in electric trucks can minimize abrasion. While weight remains a challenge, it is not a dealbreaker.

The bigger picture: Energy and lifetime emissions

Evaluating pollution means looking beyond the vehicle itself. Electric HGVs produce zero tailpipe emissions, but their environmental footprint depends on the energy grid charging them.

As the project's carbon and cost calculator shows, electric trucks can emit two thirds less lifetime greenhouse gas emissions of diesel models, and using renewable energy has further benefits.

Diesel trucks, meanwhile, are dominated by their tailpipe impact – up to 90% of their lifetime emissions come from the exhaust, dwarfing contributions from brakes or tyres.

Even if non-tailpipe emissions were identical between electric and diesel HGVs (which they are not), the elimination of tailpipe pollutants gives electric models a clear advantage.

Cutting tyre emissions: Solutions in motion

Addressing tyre pollution requires a mix of technology, policy, and behaviour. Greener tyre designs using sustainable materials can reduce wear and rolling resistance.

Retreading tyres extends their life, saving materials and cutting CO_2 emissions by up to 51% by the third retread.

Regulation is also on the horizon, with the EU including tyre and brake emission limits in upcoming Euro 7 standards [lv]. Simple steps like maintaining proper tyre pressure can reduce wear and increase tyre lifetime by up to 25%[lvi].

The verdict

So, do electric HGVs pollute more than diesel ones? The evidence suggests not.

Brake emissions are dramatically lower in electric HGVs thanks to regenerative braking. Tyre emissions may be slightly higher due to increased vehicle weight, but advances in tyre technology and driving practices are mitigating this effect.

Overall, electric HGVs still come out ahead, especially as energy grids become greener and tyre technology continues to advance.

While non-tailpipe emissions deserve attention, they should not overshadow the fact that electric HGVs are a critical step toward cleaner air – especially in traffic-choked cities. As innovation continues, their environmental advantage will only grow.

Embedded emissions and recycling

The production of an eHGV generally has a higher impact than an equivalent diesel truck, due to the materials used.

The project's research and discussions with OEMs have identified that embedded CO_2 can be around three times higher in an eHGV, with several different components contributing to this:

- The battery, with impact varying depending on the chemistry used and place of manufacture
- Electronics such as inverters and battery control systems
- Strengthening of structural components to carry the heavier weight of batteries

CO_2 is not the only issue when looking at truck components, the source of battery materials and the energy and workforce used in extraction and production have also raised some concerns. The feature on the next page looks at some of these issues and how the industry is addressing them.

Crucial to further improving the sustainability of battery electric vehicles is ensuring that batteries are firstly re-used (referred to as "second life") and ultimately at recycled at end of life. Second life means that batteries can go on to a new life where performance is less critical – such as grid-scale batteries where they can continue to help decarbonise the energy system. While few eHGV batteries have reached end of life, OEMs are already putting in place solutions to manage second life[lvii]

Once the batteries are no longer usable, the next stage is recycling. Extracting minerals at this stage is expected to reduce the need to mine new material over time. Systems for the recycling of eHGV batteries are starting to emerge, as the number of batteries reaching the end of their first life gradually increases. Policy measures are also emerging, including the EU's battery regulations[lviii], which will require minimum levels of material recovery, reaching 80-95% for key materials by 2031.

Fact Checker

Environmental and Social Impacts of Batteries:

The Role of Traceability

Whilst the shift to electric is often applauded as a milestone in the decarbonisation of the transport sector, a complex web of ethical issues lies behind the curtain of battery production.

Issues of exploitative labour practices, community displacement and environmental degradation have increasingly drawn global attention. In response, new policies aim to increase accountability, traceability and ethical oversight throughout the production process. Fossil fuel extract, transport and refineries also have well documented impacts on the environment, human health and social-economic welfare, in addition to their CO2 impact; a fact often overlooked in this debate.

The critical battery materials which cause the greatest concern are cobalt, lithium and nickel. The Democratic Republic of Congo supplies 70% of the world's cobalt[lix]. While most of this material comes from industrial mines, artisanal mining still persists. This falls outside the reach of state oversight, leading to human rights abuses such as child labour and exploitation.

Furthermore, over half of the world's lithium reserves lie in South America's lithium triangle[lx] – which spans Argentina, Bolivia and Chile. In what is already one of the driest regions on Earth, water-intensive extraction of lithium means Indigenous communities face displacement and land conflicts. Meanwhile, Indonesia[lxi]. supplies 50% of the world's nickel Reported examples of high-emission mining are exacerbated by Indonesia's coal-dominant electricity grid and poorly regulated waste disposal which has caused widespread deforestation, biodiversity loss and water contamination.

While battery manufacturers have been reducing the amount of critical minerals needed in new chemistries, this is offset by the growth in the number of batteries produced [lxii] and traceability systems have become essential for enhancing supply chain transparency and accountability. They do this by tracking raw materials from extraction to end of life. Technologies like blockchain, satellite monitoring, digital product passports and real-time data reporting illuminate the obscured conditions in which materials are mined under and can flag risks within minutes. The EU's Digital Battery Passport [lxiii] will embed sustainability and human rights data in every battery sold in Europe such as GHG emissions, environmental degradation, worker rights and impact on local communities.

In addition, the UN's Transparency Protocol[lxiv] aims to standardise reporting across regions. Together, these tools advance a greener transport industry.

Some upstream suppliers often prioritise cost over responsible sourcing and therefore do not choose to participate in voluntary responsible sourcing initiatives. However, growing pressure from OEMs and upcoming mandatory policies means that non-compliant suppliers risk market exclusion as the industry shifts towards stricter environmental and social accountability.

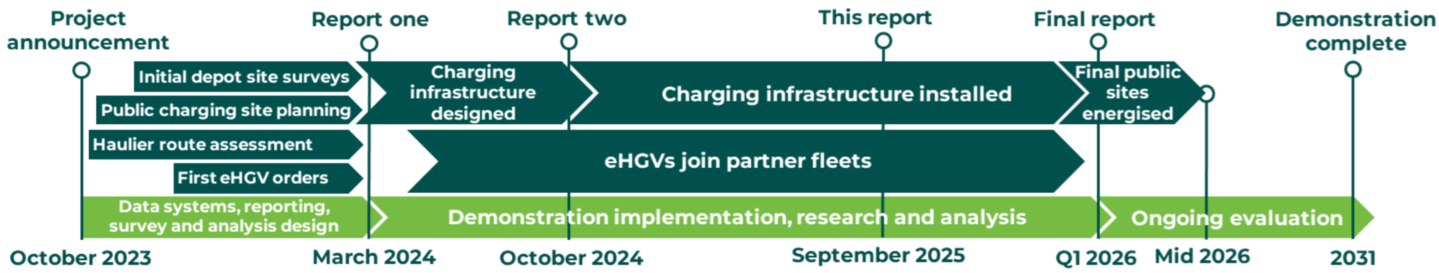
Traceability systems are only as effective as the data they are built on. In poorly regulated mining sectors, there is often little infrastructure or incentive to report accurate information. Without independent verification, there is a risk that traceability becomes a mere box-ticking exercise masquerading as sustainability. Strengthening traceability requires investment in artisanal miners, independent audits and community involvement to build a more verified system of accountability. However, the first implementation of the global battery passport in 2024[lxv] has been useful in uncovering data gaps in ESG metrics or steps of the supply chain, highlighting areas for improvement.

10 Next steps

Since the last report in October 2024, significant progress has been made in getting more vehicles on the road and installing charging infrastructure.

The project has exceeded target for vehicle orders, and the first eHGVs have now been successfully operating and making zero-carbon deliveries for over a year. With more vehicles on the road, and operators starting to use them on a wider range of more challenging journeys, we are continuing to capture more data and insights on the use of eHGVs across a variety of use cases.

However, given the challenges faced in developing the infrastructure and getting trucks on the road we have extended out the initial phase of the project to early 2026, ensuring Electric Freightway still captures the same insights from the commissioning period. Delivery of the final public sites may continue until mid-2026 due to planning and electrification delays. The timeline below shows where we are on a revised project timeline:



Charging infrastructure

As detailed in this report, the project's first depot site was unveiled in July, and almost all sites are now either under construction or complete.

Attention is turning to public sites, where the first location is expected to be completed towards the end of the year, with the full network following in the first half of 2026.

eHGV procurement

Over half of the project's eHGVs are now on the road and we are expecting the final few to join the project shortly, once the required infrastructure is completed, bringing the total number of vehicles up to 157. This comfortably exceeds our original aim of 140 vehicles.

Attitudes research

Following the first round of attitudes research, detailed in this report, round two is about to get underway. These surveys will allow us to gauge changes in opinion once drivers and managers experience having the vehicles in their fleet. The results are expected to be published in our final report next year.

Addressing our core hypothesis

Electric 40-44 tonne HGVs are ready to replace diesel HGVs and can deliver the same function when the right infrastructure is in place.

So far, our haulier partners have demonstrated how to successfully introduce eHGVs to their fleets. Over one million kilometres have been completed with zero emissions at the tailpipe. Some partners have made use of public and depot infrastructure to extend their operations and our TCO modelling has shown how eHGVs can be cost competitive with diesel in many situations.

However, so far this has been demonstrated with limited infrastructure in place and eHGVs have travelled less each week than their diesel counterparts. Now high-speed infrastructure is being delivered, and operators are becoming more confident in the abilities of their vehicles, we expect to be able to thoroughly test a wide range of routes.

Learning from implementation

This interim report focused on what we have learnt from the early adopters within the project. As the focus moves to public sites, and hauliers begin testing vehicles on more challenging routes, we expect to continue to discover more about eHGV implementation, and we will be sharing these insights through the final report.

Data gathering and analysis

The first results from our data analysis have revealed a range of interesting insights into eHGV efficiencies and usage.

Over the coming months we expect our sample of routes and vehicle types to continue to develop, allowing us to further refine our understanding of what really matters when planning the electrification of routes.

This will enable further development of our work on the total cost and carbon impact of eHGVs, taking into account sensitivity to a range of factors.

Future reports

Over the final few months of this phase of Electric Freightway we will continue to share further updates to keep the industry abreast of our progress in deploying infrastructure and vehicles and insights from our data analysis. Our final report, due to be published in early 2026, will provide a full roundup of what we have learnt through Electric Freightway.

Keep up to date with the progress of the demonstration on our website: https://www.gridserve.com/electric-freightway/.

11 Glossary, References and Links

Acknowledgements

The Electric Freightway team would like to thank all the partners and members of the consortium who have contributed to the demonstration and production of this report.

Whilst there will never be enough words to thank all those that have assisted in getting this project to where it is today, we would like to take this opportunity to recognise John Whybrow for his unwavering support and dedication to this project, having been involved from inception on the Hitachi side and more latterly as GRIDSERVE's eHGV Programme Director. John is leaving us for a new exciting opportunity and we wish him the utmost success as he ventures through his new endeavour. Thank you John, all the very best.

Glossary

AC	Alternating Current
ANPR	Automatic Number Plate Recognition
B2C	Business to Consumer
BNG	Biodiversity Net Gain
CCC	Climate Change Committee
CCTV	Closed Circuit Television
CO_2/CO_2e	Carbon Dioxide/Carbon Dioxide Equivalent
DC	Direct Current
DfT	Department for Transport
DNO	Distribution Network Operator
DUoS	Distribution Use of System charge, a charge payable for use of the electricity distribution network
eHGV	Electric Heavy Goods Vehicle, a zero-tailpipe emission HGV powered by electricity
ESG	Environment, Social and Governance principles
EU	European Union
EV	Electric Vehicle
GCW	Gross Combination Weight, the combined weight of the vehicle, its trailer and the maximum payload it can carry
GDP	Gross Domestic Product
GHG	Greenhouse Gas
High Power charger	A DC charger capable of charging an electric vehicle at 150kW or over
HGV	Heavy Goods Vehicle, also referred to as LGV (Large Goods Vehicle) or HDV (Heavy-Duty Vehicle). A vehicle with over 3.5 tonne GCW in UN(ECE) category N2 or N3.
HVO	Hydrotreated Vegetable Oil
iDNO	Independent Distribution Network Operator
ICE	Internal Combustion Engine
IET	Institute of Engineering and Technology
ILUC	Impact of Land Use Change
IQR	Interquartile Range
ISCC	International Sustainability and Carbon Certification
km	Kilometre
kVA/MVA	Kilovolt Ampere/Megavolt Ampere, a measure of apparent power
kW/MW	Kilowatt/Megawatt, a measure of real power
kWh/MWh	Kilowatt hour/Megawatt hour (electricity delivered over 1 hour at 1kW/1MW)
MSA	Motorway Service Area
OEM	Original Equipment Manufacturer, a term used to refer to the manufacturer of HGVs
RV	Residual Value
SME	Small and Medium Enterprises
TCO	Total Cost of Ownership
TNUoS	Transmission Network Use of System charge, a charge payable for use of the electricity transmission network
TT/TN-S	Terra-Terra/Terra Neutral-Separate. Earthing arrangements where the neutral is earthed at source with exposed conductive parts separately earthed (TT) or the earth and neutral are entirely separate (TN-S).
UCO	Used Cooking Oil
UK	United Kingdom
UN(ECE)	United Nations (Economic Commission for Europe)
ZEHID	Zero Emission HGV and Infrastructure Demonstrator programme

References and links

[i]HM Government, 'Outcome and response to the consultation on when to phase out the sale of zero emission models' (2022) https://www.gov.uk/government/consultations/heavy-goods-vehicles-ending-the-sale-of-new-non-zero-emission-models/outcome/outcome-and-response-to-the-consultation-on-when-to-phase-out-the-sale-of-new-non-zero-emission-hgvs
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