

Zero Emission HGV and Infrastructure Demonstrator Programme (ZEHID)

Annual report 2026

Funded by UK Government

UKRI Innovate UK

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This report has been prepared by WSP as part of the Zero Emission HGV and Infrastructure Demonstrator (ZEHID) programme for which WSP acts as the Technical Evaluator on behalf of Innovate UK. Copyright Innovate UK. Published October 2026. Please cite this document as WSP (2026) ZEHID 2026 Annual Report.

Cover image: ZENFreight / DFDS

1 Executive Summary

Decarbonising road freight is a major challenge for both industry and government in meeting carbon targets cost-effectively. In 2021, the UK Government set a target to phase out the sale of new non-zero-emission heavy goods vehicles (HGVs) over 26 tonnes by 2040. The Zero Emission HGV and Infrastructure Demonstrator Programme (ZEHID), launched by the Department for Transport (DfT) and Innovate UK in 2022, aims to accelerate this transition by addressing key evidence gaps, particularly for the 38-44 tonne segment, which is widely regarded as "hard-to-abate". Insights from ZEHID are intended to inform future public and private decision making, especially in supporting infrastructure.

Four ambitious projects were funded following a competition held in summer 2022, combining capital and R&D grants for zero emission vehicles, energy infrastructure, and supporting technology. Three projects (Electric Freightway, ZEN Freight and eFreight 2030) are now progressing from deployment and testing into live commercial operation. Together, they have already deployed more than 240 vehicles and 40 charging sites, with totals expected to reach approximately 300 vehicles and 70 sites by the end of 2026. A fourth project, HyHAUL (focused on hydrogen fuel cell trucks and green hydrogen supply) was terminated in December 2025 after failing to secure binding customer or fleet leasing agreements within the ZEHID funding timeframe.

ZEHID projects include structured research and analytical activities, with more than 25 papers already published. A programme-level technical evaluation will run to 2031, capturing up to five years of operational data and experience.

This report summarises ZEHID partnerships, activities, achievement and insights to date, as well as outlining the approach to programme-wide evaluation. Key findings to date include:

1. Battery electric HGVs (eHGVs) up to 44 tonnes are now operating across the UK on commercial routes, supported by a growing network of static charging infrastructure across depots, shared sites, and public locations.

2. Charging infrastructure has been a key bottleneck for establishing ZEHID sites, with site-specific issues that have been costly, time-consuming and dependent on coordination and cooperation with landowners and distribution network operators (DNOs). Experience from ZEHID can help truck, charge point, and network operators plan for effective infrastructure deployment, and highlight the challenges to policymakers, regulators, and the power sector.

3. While the data sample is small, initial indications from WSP data and project feedback suggests that the monitored eHGV fleets currently achieve lower average utilisation than diesel vehicles, with lower average speeds and shorter average daily mileage. It should be noted that initial deployments will include training and testing, and routes that can be supported by the infrastructure available today.

4. New business models, data flows, and training approaches are emerging to support the effective deployment and operation of electric trucks and charging systems. With grants and effective utilisation over 8 years, a favourable total cost of ownership (TCO) is already possible for an eHGV.

5. Battery electric HGVs offer energy efficiency (typically less than half the energy use of diesel trucks) and can deliver substantial CO_2 savings relative to diesel supporting fleets and their customers in reducing emissions.

6. Fleet experience is generally positive, with drivers reporting benefits such as quieter, smoother operation and improved acceleration.

7. Significant barriers remain to accelerated adoption:
   - Without subsidy, total cost of ownership is currently typically higher than diesel due to high upfront costs, although total cost parity or savings can be achieved in some use cases with support.
   - Payload and axle load constraints can reduce revenue for battery electric HGVs on weight-sensitive routes, limiting viability in certain sectors.
   - Limited availability of suitable charging infrastructure at this early stage of eHGV adoption, often requiring grid upgrades and complex site arrangements, continues to constrain deployment.

8. Hydrogen fuel cell HGVs may offer potential advantages in range, payload, and short refuelling times, but progress has been limited in ZEHID due to low demand, supply chain immaturity, high costs, and challenges in aligning stakeholders. These barriers may be mitigated as the market develops.
   - Three pilot hydrogen HGVs are expected to enter service within the ZENFreight project shortly.

ZEHID is building a robust evidence base from operational data, surveys, and stakeholder insights. Key themes include operational performance, cost, reliability, deployment challenges, energy use, and safety. Findings will be shared regularly to help shape the pace, direction, and scale of zero-emission freight adoption in the UK.

1.1 About this report

This report provides an introduction and update on the ZEHID programme. It outlines the context for its launch, describes the funded projects, and shares early insights as deployments begin, alongside an overview of the programme's outlook over the next five years.

This report forms part of a wider series of publications that will report on topics of relevance to industry and policymakers, drawing on a growing evidence base from real-world fleet operations. Together, these outputs aim to support informed decision-making and help shape the transition to zero-emission freight in the UK.

ZEHID is building a robust evidence base from operational data, surveys, and stakeholder insights. Key themes include operational performance, cost, reliability, deployment challenges, energy use, and safety.



Electric Freightway / Gridserve

2 Context

While zero-emission cars, vans and buses are already growing rapidly, the transition for HGVs is at a much earlier stage. Globally and in Europe, uptake is increasing, with the International Council of Clean Transportation reporting over 23,700 zero-emission heavy-duty vehicles registered in the EU in 2025, but technologies and infrastructure are still developing.

2.1 The role of road freight in the UK economy

Road freight is fundamental to how the UK economy functions. It underpins supply chains, supports retail and construction, and ensures the delivery of essential goods and services across the country. Around half a million HGVs contribute approximately £17 billion in gross value added, employing around 280,000 drivers and transporting goods over 17 billion miles each year[1].

However, this essential activity comes with environmental impacts. HGVs are responsible for around 18 million tonnes of CO_2 each year, equivalent to approximately 17% of UK domestic transport emissions[2]. They also contribute significantly to air pollution, with associated health impacts estimated to exceed £150 million per year in healthcare costs[3].

Decarbonising HGVs is therefore critical to:

- Achieving the UK's legally binding Net Zero target by 2050, mitigating risks of climate change
- Improving air quality, particularly along freight corridors and in urban areas
- Supporting a more sustainable and resilient logistics system which is ready for the transition to zero emission vehicles and has less exposure to diesel price volatility

While zero-emission cars, vans and buses are already growing rapidly, the transition for HGVs is at a much earlier stage. Globally and in Europe, uptake is increasing, with the International Council of Clean Transportation reporting over 23,700 zero-emission heavy-duty vehicles registered in the EU in 2025, but technologies and infrastructure are still developing[4]. This creates both a challenge and an opportunity.

Early engagement by UK industry can help position businesses and supply chains at the forefront of a growing global market.

2.2 A changing policy and market landscape

The UK has set a clear direction for decarbonising road freight. The UK Government has previously stated a policy commitment to end the sale of new non-zero emission HGVs by:

- **2035** for vehicles up to and including 26 tonnes
- **2040** for vehicles over 26 tonnes[5]

A consultation on the future of HGV decarbonisation was launched earlier this year[6]. Alongside regulation, government is supporting the transition through funding, innovation programmes, and work to enable infrastructure and energy systems.

At the same time, the freight sector itself is complex and highly competitive, with several structural characteristics that are likely to shape how quickly decarbonisation can occur.

1 Overview of the road freight sector: 2024 - GOV.UK

2 https://www.gov.uk/government/statistics/transport-and-environment-statistics-2024--2/greenhouse-gas-emissions-from-transport-in-2024

3 Estimated healthcare costs linked to HGV-related air pollution. This figure is a high-level estimate derived by combining Department for Transport data on annual diesel consumption by HGVs (~5.9 million tonnes) with Department for Environment, Food & Rural Affairs (Defra) air quality damage cost values (~2.2p per litre of diesel). Assuming diesel density of ~0.85 kg/litre equates to ~2.6p per kg, giving an annual cost of approximately £154 million. This estimate is indicative and intended to provide an order-of-magnitude illustration of health impacts.

4 https://theicct.org/publication/r2z-eu-hdv-market-development-quarterly-jan-dec-2025-mar26/

5 https://www.gov.uk/government/news/uk-confirms-pledge-for-zero-emission-hgvs-by-2040-and-unveils-new-chargepoint-design

6 New HGV CO2 emissions regulatory framework for the UK - GOV.UK

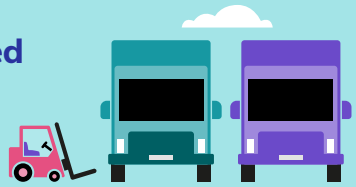
Low margins limit investment capacity



- The sector is characterised by tight profit margins, especially among hauliers
- This reduces the ability to absorb higher costs or risks

Implication: Decarbonisation technologies requiring significant capital investment (e.g. eHGVs, depot upgrades) face structural barriers.

Highly fragmented industry (SME dominated)



- The market consists of tens of thousands of businesses, over 90% of which are SMEs
- Many are small fleets with limited administrative and financial capacity

Implication: Adoption may be uneven and slower among smaller operators, and solutions need to work for diverse business sizes.

Wide diversity of operations and use cases



- Freight operations vary significantly by:
  - Vehicle type and goods carried
  - Journey length and duty cycle
- Includes everything from local deliveries to long-haul bulk transport

Implication: There is no single 'one-size fits all' decarbonisation pathway, technologies and solutions must match use case.

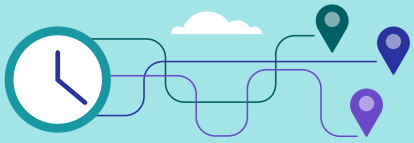
Strong competitive pressure and price sensitivity



- High levels of competition
- Pricing pressure from customers, especially large shippers
- Short contract durations

Implication: Operators have limited ability to pass through higher costs (e.g. for zero-emission vehicles), slowing adoption without incentives or demand pull.

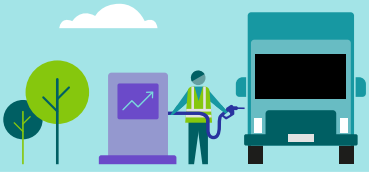
Operational flexibility is critical



- Haulage firms operate in dynamic, time- and location-sensitive environments
- Flexibility in routing, scheduling, and asset use is essential

Implication: Solutions that constrain flexibility (e.g. limited range, fixed charging) are harder to integrate without operational change.

Sensitivity to external shocks and costs



- The sector is exposed to:
  - Fuel/energy price volatility
  - Labour availability (e.g. drivers)
  - Wider economic conditions
- Limited resilience due to margins and fragmentation

Implication: Decarbonisation pathways must manage risk and avoid additional cost volatility.

Figure 1. Key freight market themes influencing decarbonisation[7]



eFreight2030 / Kuehne+Nagel

2.3 Market maturity and remaining gaps

Truck manufacturers are now bringing zero-emission vehicles to market across multiple weight classes, supported by growing activity from infrastructure providers, energy companies and financiers.

These actors are developing charging and refuelling solutions, alongside new business and ownership models.

Despite this progress, there remains a key gap: robust, real-world evidence at scale. Many current insights are based on pilots, modelling, or small-scale trials. For industry, investors and policymakers, understanding how these technologies perform in real operations is critical.

> **Truck manufacturers are now bringing zero-emission vehicles to market across multiple weight classes, supported by growing activity from infrastructure providers, energy companies and financiers.**

Why demonstrations matter for electric trucks

1. **Reducing uncertainty and risk**
   Demonstration projects enable operators to test electric HGVs in real-world conditions, building understanding of impacts on routes, payloads, charging and schedules – while helping to de risk high upfront costs, infrastructure investment and operational change.

2. **Generating trusted evidence**
   Real world trials produce robust data on energy use, reliability, downtime and total cost of ownership, providing a credible evidence base to inform fleet decisions, support manufacturer development and guide policy design.

3. **Accelerating market confidence**
   Shared learning from demonstrations helps build confidence across the sector, reduces duplication of effort, and highlights where electric trucks are already viable today – and where further innovation is still needed.



Electric Freightway / Gridserve

3 Introducing the Zero Emission HGV and Infrastructure Demonstrator (ZEHID)

ZEHID represents the largest coordinated UK demonstration of zero-emission HGVs to date, bringing together three major consortia deploying vehicles and infrastructure across real-world freight operations.

The Zero Emission HGV and Infrastructure Demonstrator (ZEHID) is a flagship UK Government programme, funded with approximately £150 million by the Department for Transport, and delivered through Innovate UK.

The programme is designed to:

- Kick-start the UK roll out of zero emission HGVs and infrastructure, and overcome barriers in their deployment.
- Demonstrate real-world zero emission HGV operations, and evaluate their costs and performance to reduce risks and optimise investments and operations.
- Provide the evidence and confidence to support long-term reduction of emissions from road freight, including the commitment to end the sale of new, non-zero emission HGVs by 2035/2040, and scale up the deployment of infrastructure.
- Enable the development of products, services and standards that are tailored to support a sustainable transition to zero emission HGVs in the UK.
- Demonstrate UK leadership, business and economic growth, emissions reductions and resilience, in sectors, regions and international markets that rely on zero emission road freight transport.

The programme was established in 2022 with a focus on two leading zero tailpipe emission pathways:

- Battery electric HGVs with static charging infrastructure
- Hydrogen fuel cell HGVs with low carbon hydrogen refuelling infrastructure



eFreight2030 / Welch's Transport

ZEHID represents the **largest coordinated UK demonstration of zero-emission HGVs to date**, bringing together three major consortia deploying vehicles and infrastructure across real-world freight operations. An overview of each is provided in Section 4.

The programme builds on earlier UK studies, including the Low Emission Freight Trial (LEFT)[8], the Battery Electric Truck Trial (BETT)[9], and the Zero Emission Road Freight Trial (ZERFT) feasibility studies[10]. It sits alongside wider industry and government activity, complementing earlier pilot projects, industry-led commitments to decarbonisation, and investment in energy and infrastructure systems. In doing so, it plays a distinct role: **bridging the gap between small-scale trials and commercial early adoption**, by testing technologies, infrastructure and operating models in real-world conditions.

8 LowCVP - LEFT Dissemination Report

9 Home | BETT - Battery Electric Truck Trial

10 Road freight goes green with £20 million funding boost - GOV.UK

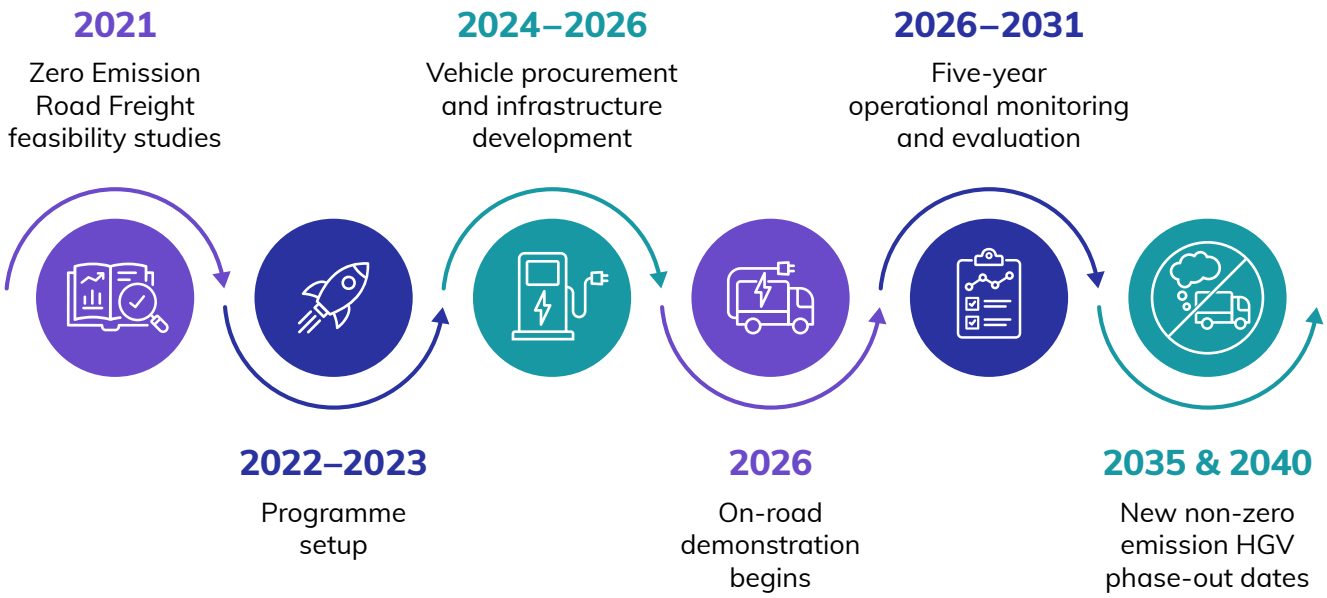


Figure 2. High level ZEHID timeline

ZEHID will support policy, industry and investment decisions

ZEHID plays a system-level role in supporting the transition to zero-emission freight by:

- Reducing risk for fleet operators considering new technologies
- Building confidence among manufacturers and infrastructure providers
- Supporting private investment in vehicles, charging and hydrogen networks
- Informing future government policy and regulation

The programme generates high-quality operational data, supported by independent monitoring and evaluation led by WSP, an experienced automotive, environmental and energy consultancy. WSP's role is to design and deliver the programme's evaluation approach, ensuring that data is collected, analysed and reported consistently across all projects. This independent oversight helps ensure that insights are robust, comparable and trusted by both industry and government. This is complemented by publications and insight produced by the projects themselves.

3.1 Overview of the monitoring and reporting journey

ZEHID has moved through phases of design, vehicle and chargepoint procurement, installation and commissioning, and is now transitioning into a sustained period of operational monitoring and reporting.

The programme evaluation (described in Section 3.2) will integrate automated, high-volume data – such as vehicle telematics and charger monitoring – with structured reporting from hauliers, alongside surveys and qualitative feedback from drivers and managers. This will be complemented by investigations using high-resolution activity datasets.

As shown in the figure below, the objective is to develop a comprehensive, system-level evidence base covering vehicles, infrastructure, costs, operations and safety.

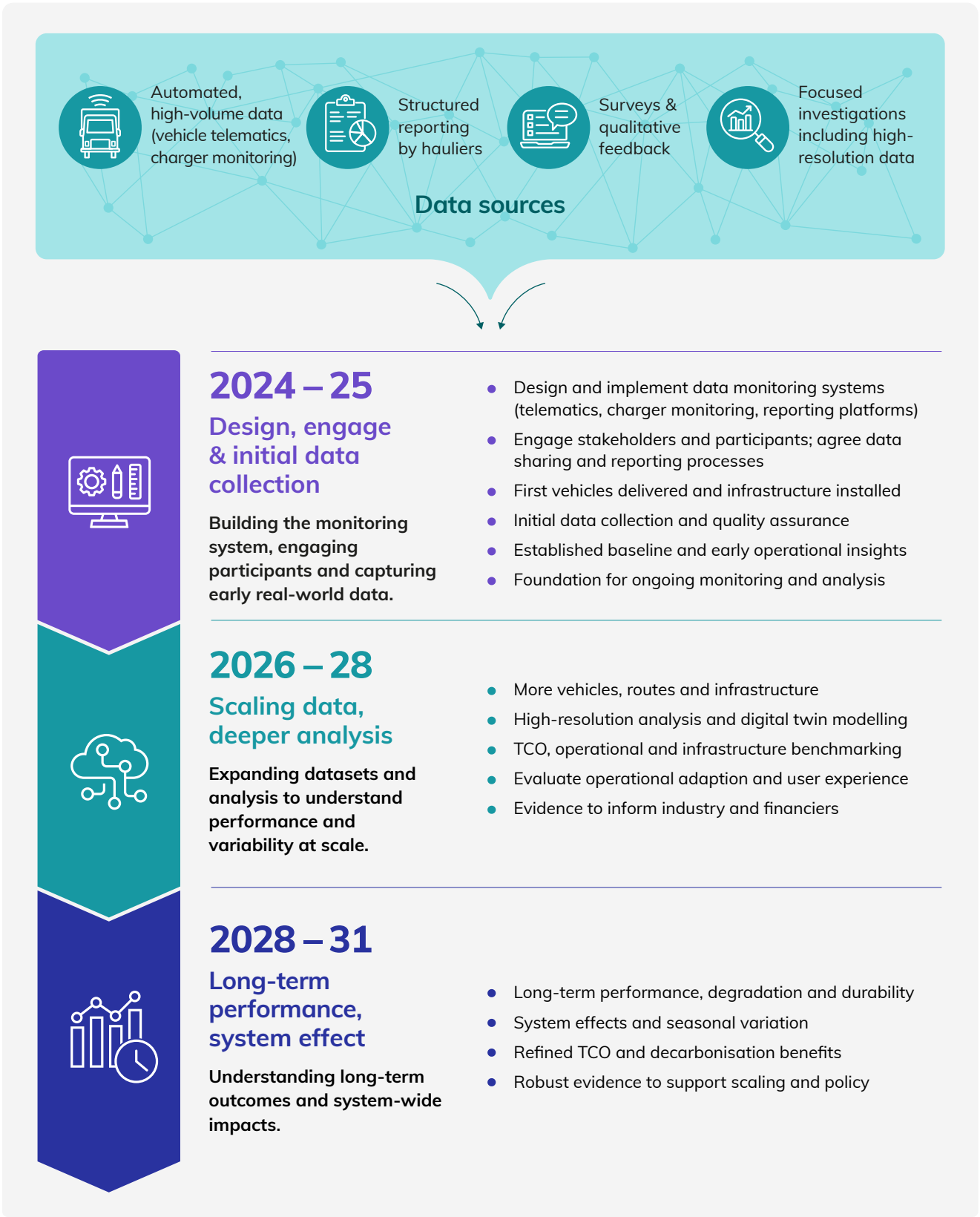


Figure 3. ZEHID monitoring and reporting

This approach supports the generation of early insights from initial deployments while enabling progressively deeper and more robust conclusions as fleets, routes and infrastructure scale.

The programme's five-year evaluation horizon is particularly important, as some operational challenges and system-level effects are expected to emerge only at scale and over time. Monitoring will increasingly capture long-term performance, system effects, operational adaption, degradation effects and evolving economics.

3.2 Key research topics and how the evaluation will address them

The road haulage industry, its customers, and policymakers are looking to ZEHID to provide robust operational evidence to support strategy and investment decisions.

Key questions include:

- How do zero-emission trucks and supporting infrastructure perform in real-world operations?
- What are their operational limitations and how do technologies compare?
- How do costs evolve across different use cases?
- What benefits can be delivered in practice?
- How can these technologies be deployed safely and effectively?

As illustrated in Figure 4, these questions are structured across six interconnected research topics, each underpinned by a clearly defined evaluation approach combining telematics, operational data, and stakeholder insight.



eFreight2030 / Voltempo

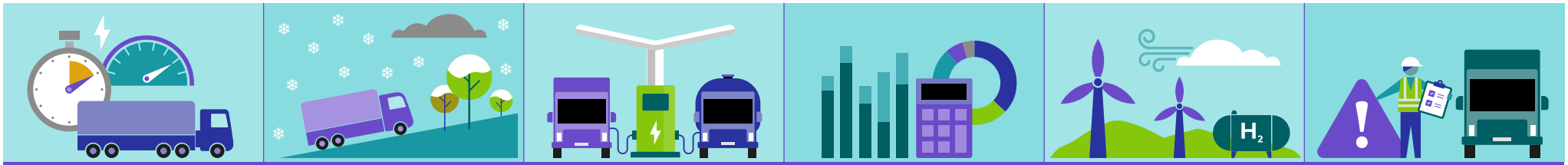
Despite being at an early stage of operational monitoring and reporting, WSP has already begun to capture programme-wide data on deployed vehicles and supporting infrastructure.

Early operational achievements include:[11]

- 172 of the funded trucks are already reporting telematics for evaluation
- 85,000 trips (over 1km) logged
- 3.60 million km of data (2.24 million miles)
- 550,000 tonnes carried
- 4,500 MWh of electricity delivered to trucks by chargers
- An 81% reduction in GHG emissions compared to diesel trucks (assuming average grid electricity)
- Over 4,000 tonnes cumulative CO_2 well-to-wheel savings from ZEHID operations compared to equivalent diesel truck operations[12]

11 From programme monitoring data as of 17/06/26. There may be a delay between truck delivery and data monitoring commencing. 76 trucks are in process of being added to monitoring and a further 62 are yet to enter service.

12 Comparing the well-to-wheel emissions a diesel truck would have made over the mileage covered by electric trucks to the electricity emissions of those trucks, assuming grid electricity and 10% losses. Electric trucks have zero tailpipe emissions. Emissions factors from DESNZ 2025: https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2025



Topic	1 Operational capability and flexibility	2 Energy efficiency across technologies	3 Infrastructure use and operational implications	4 Total cost of ownership (TCO)	5 ZE truck emissions and benefits	6 Operations and safety
Research focus	• Range, refuelling/charging time, payload, availability • Capability across duty cycles and environments – current and future • Impact of technology-related constraints on deployments	• Fuel and energy consumption per km and per tonne-km • Sensitivity to payload, route profile, weather, etc.	• Charging/refuelling turnaround time, use patterns, bottlenecks • Capital and operating cost per unit of energy delivered • Depot vs public charging • Issues, availability, and their impact on fleet scheduling	• Lifecycle TCO analysis by vehicle and by km of operation • Contribution of Vehicle cost, fuel/energy use (and efficiency), operational costs, infrastructure • Sensitivity to mileage, payload, utilisation and downtime, energy source and prices, financing options, residual value, grants	• Well-to-wheel greenhouse gas emissions and savings • Potential for pollutant emissions reduction • Experienced benefits	• Learnings and best practice for safe and effective operation identified through operators' real-world experience of zero emission trucks and infrastructure
Evaluation approach	• Vehicle telematics analysis of trips by trip characteristics and fuel type, and of charging events by event attributes • Evaluation of high-resolution and use of "digital twin" modelling • Survey feedback, consortium meetings and workshops	• Vehicle telematics analysis across trips, trip characteristics, and seasons • Use high-resolution data to explore factors that affect efficiency	• Charger and refuelling station monitoring • Vehicle telematics on charge events • Event-level analysis of speeds, durations, patterns of use. Charger utilisation • Survey feedback, consortium meetings and workshops	• Operator reported capital, energy and operational costs, supplemented with external sources • Telematics-derived data (e.g. fuel/energy use, example operations and utilisation) • Development of example TCO cases and diesel threshold for cost competitiveness	• Vehicle telematics of fuel/energy use • Electricity and hydrogen supply data • Established emission factors • Survey responses and operator engagement on driver and fleet manager experiences, customer feedback	• Operator reports on operational findings, safety incidents and risk profiling • Survey feedback • Consortium meetings and workshops
Challenges & limitations	• Protecting operators' commercially sensitive data • Diesel counterfactual sample will not reflect all possible operations • Survey and workshop engagement	• Telematics analysis is high-level across large dataset, limited context • High-resolution data has small sample size	• Granularity of available data – may vary by provider • Survey and workshop engagement	• Commercial sensitivities • Operational cost data limitations • Cannot cover all possible operations and scenarios • Hidden and indirect costs (e.g. site facility and energy complexities, operational flexibility or driver training) not captured	• Extent and granularity of electricity/fuel source data and emission factors, and necessary assumptions • Survey and workshop engagement	• Survey and workshop engagement, and depth of information shared while respecting confidentiality needs

Figure 4. ZEHID research topics and evaluation approach: Building evidence to understand performance, benefits and how to scale zero-emission HGVs.



Electric Freightway / Nissan

4 An overview of the funded projects

The ZEHID programme is delivered through a portfolio of large-scale demonstration projects, each operating as a multi-partner consortium led by a lead partner. These consortia bring together a diverse set of organisations to deliver integrated demonstrations of zero-emission HGVs and supporting charging or refuelling infrastructure.



Electric Freightway / GXO

The consortium-based structure enables coordinated deployment across the full freight value chain, while allowing each project to explore distinct operational models, technologies and commercial approaches.

Programme governance is provided centrally by Innovate UK and the Department for Transport, while lead partners are accountable for project management and partner coordination within their respective initiatives. WSP acts as the independent technical evaluator, implementing a common framework for data collection and analysis to ensure consistent, comparable evidence across the programme.

The four projects presented in this section (*Electric Freightway*, *eFreight 2030*, *Zero Emission National Freight*, and the now-closed *HyHaul*) were selected through a competitive Innovate UK funding process designed to support a small number of ambitious, large-scale demonstrations.

While each project was originally defined through this competition, all have undergone significant reconfiguration since inception, reflecting the evolving nature of technologies, partnerships, and deployment conditions. As such, the projects described in this report represent a combination of initial ambitions and subsequent adaptations, shaped by real-world delivery experience.

The following pages provide concise overviews of each project, outlining their structure, delivery approach, and role within the wider programme.

> **WSP acts as the independent technical evaluator, implementing a common framework for data collection and analysis.**

4.1 Project overview:

Electric Freightway

Electric Freightway is the UK's largest electric HGV demonstration programme, bringing together more than 40 organisations across the freight, energy and automotive sectors. The programme is deploying electric HGVs alongside a national network of depot, public and shared-user charging infrastructure to accelerate the decarbonisation of road freight.

- UK's largest eHGV demonstration, delivering 24% of all new UK eHGV registrations in 2025.
- National charging network spanning private depots, public charging hubs and shared-user charge yards.
- Industry-leading consortium generating real-world operational data, insights and best practice.

The project in numbers:

162
eHGVs

11
Public charging sites

11
Depot/private charging sites

1
Shared-user charging site
(used by multiple operators)

19
Partners

23
Affiliated and key supplier organisations

Objective:

Accelerate the transition to zero-emission road freight by deploying electric HGVs alongside a national charging ecosystem spanning private depot charging, public charging hubs and semi-public shared-user charging facilities. The programme is generating the operational evidence, infrastructure models and industry confidence needed to enable widespread eHGV adoption across the UK.

Financials:

£83.5m
Project cost

£60.9m
Grant

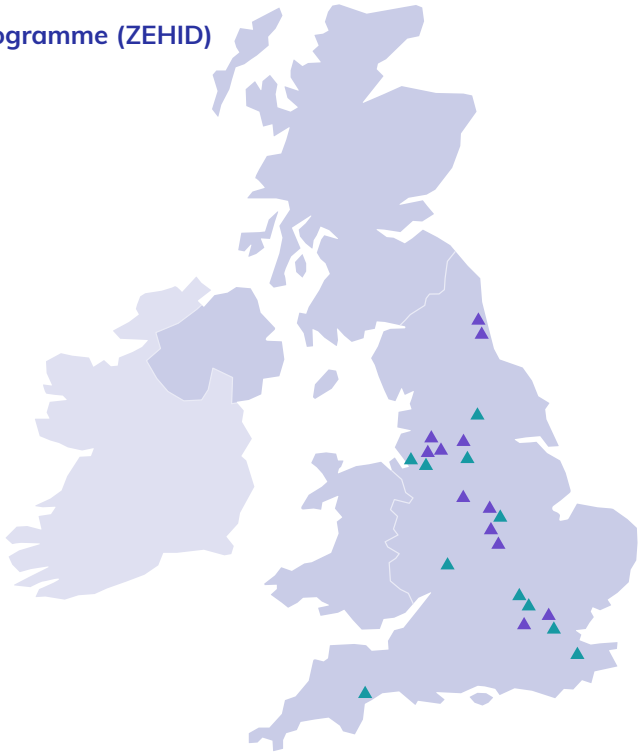
Online:

→ **GRIDSERVE – Electric Freightway**

Project changes:

- **Programme delivery evolved:** Programme delivery adapted to growing market maturity, enabling increased eHGV deployment and contributing to 24% of UK registrations in 2025.
- **Infrastructure strategy refined:** Charging approach adjusted to reflect grid constraints, delivering a mix of depot, public and shared-user infrastructure.
- **Focus shifted to evidence and scale:** Greater emphasis on operational evidence, commercial insights and scalable delivery models to support wider adoption beyond demonstration phase.

Reports by Electric Freightway/Hitachi are listed in Appendix A



Electric Freightway

▲ Depot/private charge points (x12)

▲ Public charge points (x11)

(Locations approximate)

Lead partner:

GRIDSERVE

Research partner:

HITACHI

Technology partners:

GRIDSERVE

VOLVO

VOLVO
Volvo Financial Services

DAF

RENAULT TRUCKS

Truck operators/hauliers:

A.F Blakemore & Son
ADM
Amazon
BCA
Campeys
Cloudbass
Currys
DP World
DSV
Fenn Logistics
Fergusons Transport
ForFarmers
Graphic Packaging
GXO
Knowles
Kuehne & Nagel
Maritime
Masters
Royal Mail Group
Samworth Brothers
Tesco
United Utilities
Voltloader
XPO
Yusen



Electric Freightway / Gridserve

Other partners and suppliers:

Nissan
Moto
Extra
Roadchef
Ford & Slater
PACCAR Financial
Daimler Truck UK

4.2 Project overview:

eFreight 2030

Demonstrating scalable business models for electrifying heavy road freight through real-world deployment and evaluation of eHGVs, supported by a national network of megawatt-scale public charging hubs and focused on demanding logistics use cases.

- Delivering the UK's first megawatt-scale charging hubs to enable future eHGV growth.
- Enabling wider participation through an associate scheme offering flexible access to eHGV trials.
- Testing innovative solutions across demanding use cases through applying route planning and range extending technology·

The project in numbers:



88
eHGVs



33
Depot charging sites



1
Public charging site



19
Partners
(+ associates and suppliers)



12
Associate lease scheme trucks

Objective:

Transform the UK heavy goods vehicle market by accelerating the transition from diesel to electric, enabling large-scale deployment across the logistics sector by 2030 and supporting the pathway to widespread electrification by 2035.

Financials:

£63.7m
Project cost

£49.2m
Grant

Online:

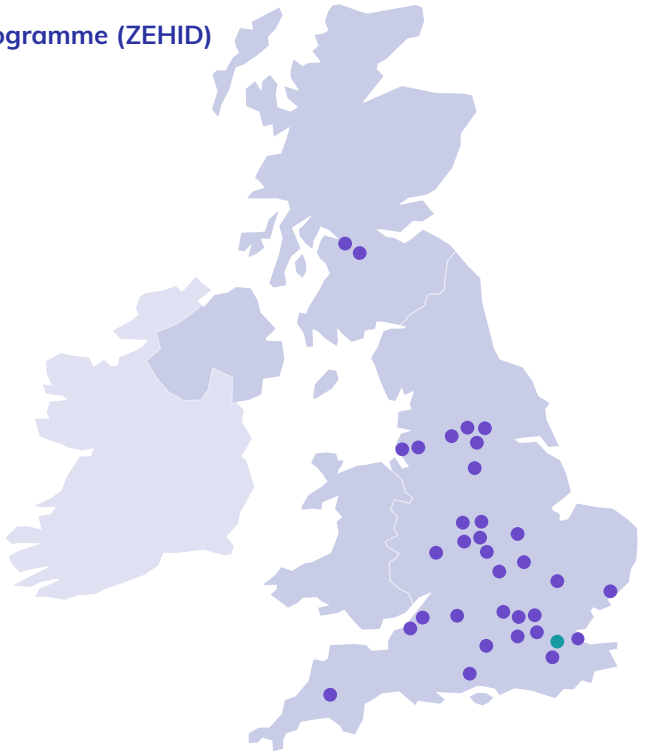
→ **eFreight 2030**

eFREIGHT 2030

Project changes:

- **Operator partnerships updated:**
  - Withdrawal of Eddie Stobart.
  - Onboarding of Tarmac and I.J. McGill, diversifying use-cases to include construction and SME logistics.
- **Vehicle allocation adjusted:** Vehicle availability and maintenance costs influenced truck supplier mix, with partners increasing volumes to support scaling of electrification in operations.
- **Depot site numbers revised:** High infrastructure costs have led to a reduction in charging sites, with focus shifting to fewer, higher-utilisation locations.

Reports by eFreight 2030/ESC are listed in Appendix A



eFreight 2030

- Depot/private charge points (x33)
- Public charge points (x1)

(Locations approximate)

Lead partner:

VOLTEMPO

Research partners:

CATAPULT Energy Systems

DYNAMON

greencollar valuing the environment

Technology partners:

VOLTEMPO

DAF

RENAULT TRUCKS

SCANIA

BERKELEY COACHWORKS



eFreight2030 / Kuehne+Nagel

Truck operators/hauliers:

Expect
Kuehne + Nagel (UK)
Maritime Transport
Marks and Spencer
I.J. McGill
Menzies Distribution Solutions
Tarmac
Welch's Transport
GXO (formerly Wincanton)

Other partners and suppliers:

Fleete
Volvo Financial Services
PACCAR Financial
Scania Finance
Vertellus
TVS Interfleet Limited

4.3 Project overview:

ZENFreight (Zero Emission National Freight)

Accelerating the decarbonisation of UK HGV fleets through deployment of battery-electric and hydrogen fuel cell trucks, supported by shared depot charging and refuelling infrastructure, and underpinned by data-driven insights using Dynamon's ZERO software.

- Unique dual technology trial comparing hydrogen and battery electric HGVs in real world operation.
- Flexible, shared depot infrastructure model supporting multiple fleets and operational requirements.
- Data-led approach using advanced modelling to optimise routes, infrastructure and cost performance.

The project in numbers:

56 eHGVs

3 Hydrogen HGVs

19 Depot charging sites

1 Depot hydrogen refuelling facility

11 Partners

6 Key suppliers

Objective:

Demonstrate the viability of zero-emission HGVs in long-distance and heavy-duty freight operations, supporting their future development through real world deployment of battery electric and hydrogen fuel cell vehicles across diverse routes, duty cycles and operating conditions.

Financials:

£34.7m
Project cost

£27.6m
Grant

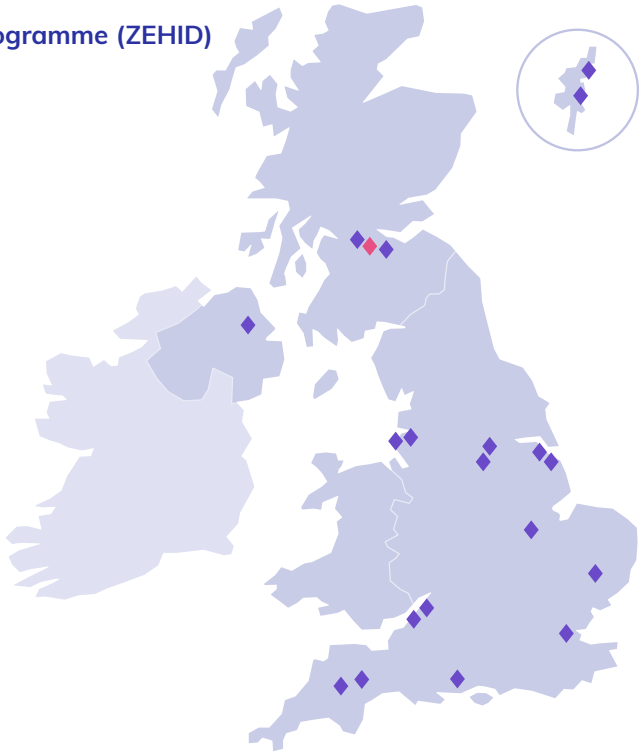
Online:

→ **ZENFreight – National Vision for Zero-Emission Road Transport / Dynamon**

ZENFreight
Accelerating Decarbonisation of HGVs

Project changes:

- **Hydrogen scope refocused:** Hydrogen deployment reduced from 16 to three vehicles, with a single operator leading activities.
- **Operator base expanded:** Additional operators were onboarded to maintain scale and resilience following the withdrawal of initial participants (including Wren Kitchens, BP, Royal Mail and Culina).
- **Resources reallocated to scale deployment:** Cost savings were redirected to expand charging infrastructure across more locations and increase the number of deployed electric trucks.



ZENFreight
Depot/private charge points (x19)
Depot hydrogen refuelling (x1)
(Locations approximate)

Lead partner:
DYNAMON

Research partners:
IMPERIAL
DYNAMON

Technology partners:
DAF
SCANIA
VOLVO



ZENFreight / DFDS

Truck operators/hauliers:
DFDS Logistics services
Gregory Distribution
Maritime Transport
Russell Logistics
WS Transportation

Other partners and suppliers:
Scania Financial Services
Daimler Truck UK
MAN Truck & Bus UK
VEV
Envevo
Amphos
Element2

RouteZero software developed by Dynamon as part of ZEHID Research & Development funding promises to help fleets plan and optimise eHGV routing, accounting for battery size, cargo weight, road speeds, temperature and topology. RouteZero has been piloted by truck operators within ZEHID.

4.4 Project overview:

HyHAUL (Hydrogen Aggregated UK Logistics)

A proposed large-scale hydrogen freight demonstrator centred on deploying fuel cell HGVs along the M4 corridor, combining green hydrogen production, refuelling infrastructure and fleet operations to test end-to-end system integration, performance and cost under real-world conditions. This project was terminated in December 2025.

- Integrated hydrogen ecosystem spanning production, refuelling infrastructure, and vehicle deployment.
- Corridor-based approach targeting high-intensity freight operations along the M4.
- Commercial demonstration testing fleet uptake, utilisation, and whole system economics.

The project in numbers (planned):

~30
Hydrogen fuel cell HGVs

Up to **100** HGVs by 2027 & **300** by 2030

1
Initial hydrogen refuelling station

Mobile refuelling service

2
Additional permanent HRS sites

~30 MW
Electrolysis capacity

Objective:

Demonstrate the role of hydrogen fuel cell HGVs in UK freight by trialling an integrated model linking vehicles, hydrogen production and refuelling infrastructure, and assessing technical feasibility, operational performance, and commercial viability in real-world logistics applications.

Why the project did not proceed
Despite supply chain and fleet engagement, HyHAUL could not secure sufficient customer commitments. This reflected challenges around cost, vehicle availability, infrastructure readiness, competitive value proposition, and the difficulty of aligning all elements including funding in a viable timeframe. HyHAUL Ltd advises that the infrastructure design, supply chain relationships, and customer pipeline developed under the HyHAUL project remain available to inform future hydrogen freight deployment.

Project partners:

Lead partner:
HyHaul Mobility Limited

Contributing partners:
Reynolds Logistics UK
Scania Finance GB
CNG Fuels
Mitsubishi Capital
Scania
Protium
Marubeni



eFreight2030 / Kuehne+Nagel

5 Early programme insights

A growing body of evidence has already been generated through the programme. To date, over 25 publications have been released (see Appendix A), capturing early operational findings, technical analysis and industry perspectives from across the ZEHID projects. Some of this evidence has been shared at industry events.

Much of this early evidence has been developed through three industry-led research initiatives embedded within each of the demonstration projects, with key organisations supporting analysis and insight generation in the early stages:

- **Energy Systems Catapult (eFREIGHT 2030)** – leading system-level analysis, with a focus on energy integration, infrastructure deployment and business models.
- **Hitachi ZeroCarbon (Electric Freightway)** – developing tools and analysis on fleet economics, carbon impacts and operational performance
- **Imperial College London (ZEN Freight)** – contributing academic research, modelling and evaluation to understand system performance and long-term implications.

This is the first ZEHID annual report, and insights are therefore necessarily based on the small number of vehicles, chargepoints and period of operation.

1 Electric HGVs (38-44t) are available and operating across the UK

- ZEHID includes zero emission trucks from 6 manufacturers, across 35 operators and multiple sectors and use cases.
- Procurement spans both direct manufacturer purchases and leasing arrangements.
- Vehicles are operating on real commercial routes, with most operators reporting minimal disruption to operations while carrying payloads of up to around 25 tonnes.
- Figure 5 on page 24 shows how ZEHID activity is distributed across the UK, but as zero-emission trucks remain a small share of the UK fleet, there is currently a gap between demonstration and widespread adoption.



ZENFreight / Maritime



eFreight 2030 / Marks & Spencer

"Our customers have commented on how little change they need to make to accommodate these trucks into their operations and how reliable the trucks have been."

Dave Rose CEO, Voltloader (Electric Freightway report)

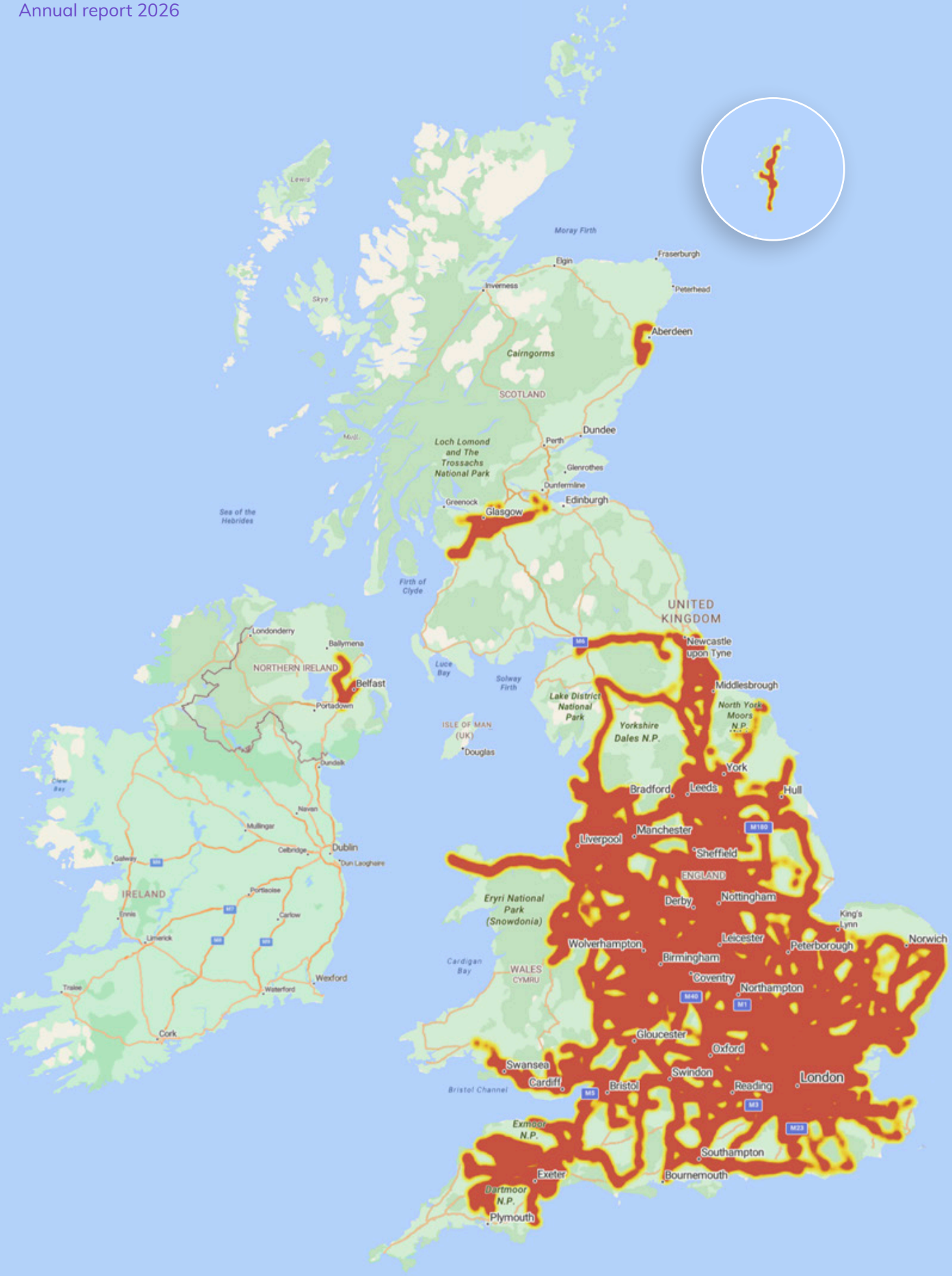


Figure 5. Heatmap of ZEHID trucks' activity

Map from WSP ZEHID data, Microsoft Azure © OSM 2026 © TomTom 2026

2 Charging infrastructure is a key bottleneck for early eHGV adoption

- Over 40 ZEHID-funded charging sites have been commissioned across depots, shared sites, public sites and customers' sites so far (July 2026).
  - ZEHID projects have used 6 chargepoint providers, with installations ranging from a 43kW charger to a 5MW facility of ultra-rapid chargers.
- This represents substantial early deployment from a base of very few dedicated eHGV chargers, and provides practical experience that can reduce uncertainty, duplication and delivery risk for subsequent sites.
- Initial projects have often been enabled by depots with existing grid headroom, supportive landownership (e.g. fleet-owned sites or strong landlord relationships), and fewer physical constraints. Even in these cases, delivery has followed complex and sometimes fragile timelines.
- Reduction of these barriers will likely be needed to speed up roll out more widely, these interventions could cover issues such as the need for grid reinforcements, multi-party land negotiations, and planning and permitting constraints. Few stakeholders can navigate this complexity efficiently without support.
- Infrastructure becomes a driver of operational redesign (i.e. routes, dwell times, charging strategies) and a constraint on eHGV adoption.

In a survey conducted at a start of ZEHID, fleet managers believe that the availability of chargers limits routes that can be electrified, with many of those surveyed saying only a small proportion of existing routes are currently suitable. The majority of managers and drivers surveyed say that operations will need to adapt to suit eHGV capabilities.

WSP survey of ZEHID drivers and managers

- A few ZEHID partners identified significant variability in grid connection times and costs between potential sites. Some potential sites initially considered were quoted long connection times (e.g. 5 years for one eFreight2030 site[13]) and development efforts were instead refocused towards other sites better able to meet ZEHID's ambitious demonstration timescales.

Managers expect depot-based, pre-planned charging. Drivers are less certain this will work in practice. Both highlight risks around operational disruption, including charging during breaks, time impacts, and public charger reliability.

WSP survey of ZEHID drivers and managers



eFreight2030 / Voltempo

13 WP5 eFreight The Road Ahead

3 Energy management and charging are core operational considerations

- Electricity is a major cost driver (20–60% of eHGV's TCO[14]) and one of the few areas that fleets can actively optimise.
- Charging behaviour directly affect costs, vehicle availability and grid impact, tightly linking energy management with day-to-day fleet operations.
- Smart charging presents a growing opportunity, enabling eHGVs to act as flexible energy assets and unlock additional value beyond transport.



4 Long-distance and heavy-duty use cases remain harder

- Initial data indicates the eHGVs are typically (but not exclusively) deployed on short-medium routes, currently averaging ~1,350km per week during early deployment, compared to ~2,600km per week for a sample of diesel trucks. However, a few eHGVs have demonstrated long-distance operation up to 800 km/day or 4,000km/week[15].
- Long-haul (>400km/day) and heavy duty (40t+) applications face slower progress to TCO parity due to larger batteries and reliance on en-route charging with typically higher costs.
- These vehicles are disproportionately important, accounting for ~45% of emissions despite only ~12% of the fleet, according to analysis by the Energy Systems Catapult[16].
- Payload and weight constraints remain a key challenge affecting vehicle deployment and commercial viability. eHGVs are typically ~3.5 tonnes heavier unladen than diesel, reducing payload by ~1.5 tonnes for a 42t 4x2 and up to ~3.5 tonnes for a 6x2, although hauliers report axle limits can be reached before gross weight limit which can reduce their effective capacity (and productiveness) further.
- Analysis from the Electric Freightway project suggests many lower-mass or volume-led duties are viable, but heavier sectors report payload and axle limits as a key barrier and are selectively deploying eHGVs on lighter, shorter routes.



An early message from eFreight was the need for additional grants for vehicles and/or infrastructure beyond ZEHID[16]. In 2026, DfT announced updates to the Zero Emission Truck Grant and Depot Charging Scheme to provide £1 billion additional support[17].

14 WP5 eFreight The Road Ahead – vehicle TCO depends on HGV type, operations, charging location, available grants.

15 Based on recent ZEHID data collected from 178 trucks. Diesel and eHGV vehicles may not be on comparable operations.

16 WP5 eFreight The Road Ahead.

17 DfT/OZEV: £1bn for depot charging scheme and zero emission truck grant

5 Cost outcomes vary widely and are driven by operational context, not just technology

- Electric Freightway calculated that, in limited specific use cases, eHGVs could deliver significant savings over an 8-year lifetime savings (£60-120k per vehicle) with current grants. However, in most cases a substantial TCO gap remains.[18]
- Upfront costs dominate (45–85% of TCO without grants), with outcomes varying significantly by vehicle type and duty cycle.[19]
- TCO is highly sensitive to utilisation, energy prices, charging mix (depot vs public), and how infrastructure costs are financed and amortised.
- Financial risk is uneven: smaller operators face greater risk due to capital constraints and limited flexibility in contracts or site investment.


Shutterstock

ZEHID data so far indicates that the funded trucks cost around 2.7 times diesel to buy but provide at least **double the energy efficiency**.



eFreight2030 / Welch's Transport

18 Electric Freightway final report

19 WP5 eFreight The Road Ahead

6 People, skills and organisational change are as critical as technology

- The transition to eHGVs impacts multiple roles across fleets, including site, logistics, procurement, maintenance, and drivers - many of whom are new to eHGV operations.
- Driver experience is generally positive and even initially sceptical drivers adapt quickly and report benefits such as smoother acceleration and reduced noise and vibration.
- eHGVs introduce new operational requirements, particularly the need to actively manage the balance between electricity supply and vehicle demand across sites, routes, and timescales.[20]



eFreight2030 / Voltempo

"Our EVs have been a hit with everyone including our drivers. Many of them were sceptical at the beginning but it took only one try to be convinced. Everyone enjoys their silence and reliability."

David Munday UK Transport Operations Manager, DP World (Electric Freightway report)

7 Hydrogen fuel cell vehicles face cost and coordination challenges that constrain adoption

- Hydrogen fuel cell vehicles could potentially offer payload, range and/or refuelling time advantages for scenarios where battery electric technology alone is not able to support zero emission transport.
- To date, alignment of the supply of hydrogen fuel cell vehicles, hydrogen refuelling infrastructure, low carbon hydrogen fuel, fleet demand, funding, and financing has been challenging in ZEHID.
- As a result of higher costs for vehicles and low carbon hydrogen fuel, projections for hydrogen fuel cell HGVs show a challenge for TCO , although this will be dependent on operational context and scale.
- With limited operational data to assess whether the operational flexibility of hydrogen vehicles can shift their business case, the fuel cell vehicles in the ZEN Freight trial are expected to provide valuable insight.


Innovate UK

20 eFreight Accelerating Transition D5

6 ZEHID: The next five years

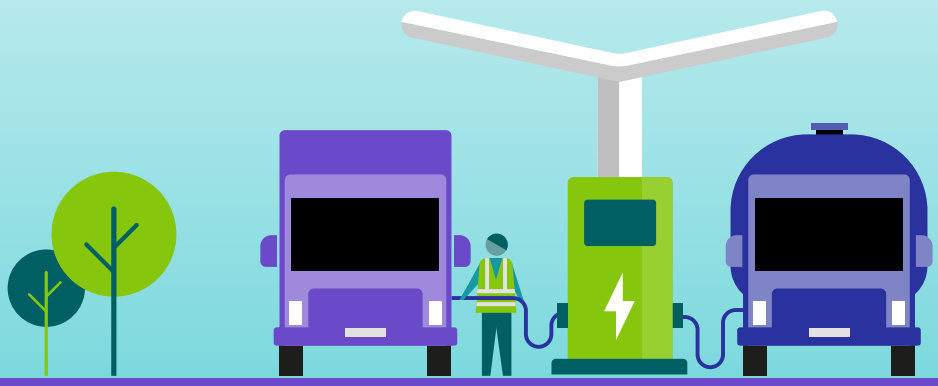
ZEHID is now entering its five-year operational monitoring and evaluation phase (2026–2031) at a time when the zero-emission freight market is evolving rapidly. New vehicles, charging and refuelling solutions, policy developments[22] and wider economic uncertainty are all shaping the pace of change. At the same time, the programme itself continues to scale, with further vehicles and infrastructure still coming into operation through 2026.

This next phase is critical. Success for ZEHID will not be measured only by the number of trucks and chargepoints deployed, but by utilisation and the quality of the evidence generated: growing carbon savings across a wider range of fleets and use cases; better understanding of costs, operational performance and infrastructure needs; and clearer insight into how zero-emission freight can scale in practice. As familiarity grows, partners are expected to use vehicles on increasingly demanding duty cycles, helping to move beyond carefully selected early operations.

Through this phase, WSP's independent evaluation will help deliver against the programme's objectives by building an authoritative dataset on how vehicles and infrastructure are used, how they perform, and what is needed to enable wider deployment.

This will support the programme in addressing the key research topics set out in Section 3.2 and help build understanding of how fleets respond to changing conditions and unexpected events, and what resilience looks like in practice.

→ **Discover emerging insight here:**
Zero emission heavy goods vehicles and infrastructure – Innovate UK Business Connect



22 https://www.gov.uk/government/news/1-billion-to-cut-costs-for-businesses-drive-growth-and-clean-up-uk-roads

7 Glossary

Term	Definition
BEV (Battery Electric Vehicle)	Vehicle powered entirely by electricity stored in batteries, with no combustion engine.
CO_2	Carbon dioxide, a greenhouse gas
Depot charging	Charging infrastructure located at an operator's base, typically used overnight.
Digital twin	Virtual model used to simulate real-world vehicle or system performance.
DNO (Distribution Network Operator)	Organisation responsible for local electricity distribution networks.
Duty cycle	Pattern of vehicle use, including distance, load, and operating schedule.
eHGV (Electric Heavy Goods Vehicle)	Heavy goods vehicle powered by electricity, typically battery electric.
FCEV (Fuel Cell Electric Vehicle)	Vehicle that generates electricity onboard using hydrogen fuel cells.
GHG (Greenhouse Gas Emissions)	Emissions that cause global warming
Grid connection	Physical connection linking infrastructure to the electricity network.
HGV (Heavy Goods Vehicle)	Large vehicle used for transporting goods, typically over 3.5 tonnes.
Hydrogen refuelling station (HRS)	Facility used to refuel hydrogen-powered vehicles.
ICE (Internal Combustion Engine)	Conventional engine using fossil fuels such as diesel.
Kilometre (km)	Kilometres, a measure of distance
Mega-Watt hour (MWh)	A measure of energy, such as electrical energy
Megawatt-scale charging system	High-power charging designed for rapid charging of heavy-duty electric vehicles.
Payload	Weight of goods carried by a vehicle.
Public charging	Charging infrastructure accessible to multiple operators at shared locations.
Residual value	Estimated value of a vehicle at the end of its life.
Shared-user charging	Charging infrastructure shared across operators but not fully public.
TCO (Total Cost of Ownership)	Full lifecycle cost of a vehicle, including purchase, operation and maintenance.
Turnaround time	Time required for charging or refuelling before a vehicle returns to service.
Utilisation	Degree to which vehicles or infrastructure are used relative to their capacity.
Well-to-wheel emissions	Total emissions from energy production through to vehicle operation.
ZE (Zero Emission)	Vehicles that produce no exhaust emissions during operation.
ZEHID	UK Government programme demonstrating zero-emission HGVs and infrastructure.

Appendix A
ZEHID publications

Set out below is a collection of 25 publications that reflect data collected and analysed through the Zero Emission HGV and Infrastructure Demonstrator (ZEHID) – it reflects operational and qualitative insights from vehicles, infrastructure, and engagement with participating organisations.

Reports will continue to be published each year to share emerging findings and lessons learned.

All reports can be found at: https://iuk-business-connect.org.uk/programme/zero-emission-heavy-goods-vehicles-and-infrastructure/.

Electric Freightway – publications

Report title	Description
Project Introduction and Approach	This report sets out the project's commitments, delivery timelines and approach to sharing insights with the haulage industry.
Demonstration Design and Implementation	An overview of the planning and delivery of eHGV infrastructure, progress with vehicle deployment, feedback from drivers and operations teams, and the challenges faced by vehicle manufacturers and charge point operators.
Interim Findings	An update on infrastructure and vehicle deployment, combined with insights from drivers and operators and a review of the barriers encountered during the transition to electric HGVs.
Final Report	This report details what the project has achieved and what has been learnt from this pioneering demonstration of eHGVs in the UK.
HGV Carbon and Cost Calculator	Developed by Hitachi ZeroCarbon, the HGV Carbon and Cost Calculator is an interactive tool designed to help operators understand the commercial and environmental implications of electrifying their fleets.

Standards and guidance – publications

Report title	Description
Zero Emission HGVs Safety and Security	Ensuring safety in the transition to zero emission road freight Best practice guidance for developing and operating safe refuelling and recharging infrastructure for zero emission HGVs.
Zero Emission HGVs and Infrastructure: Infrastructure Planning and Delivery	Planning and delivery of infrastructure for zero emission HGVs Setting out the key considerations and optimal pathways for the planning and delivery of zero-emission HGV infrastructure.
BSI Flex 2071 v2.0 – Publicly Accessible Charging Sites for Battery Electric HGVs.	BSI Flex 2071 offers recommendations on how to design charging sites for battery electric HGVs, including safety considerations and optimal layouts.
BSI Flex 2072 v1.0 – Workshops for Zero Emission Heavy-Duty Vehicles	Specification for operating workshops, inspection, and maintenance of battery electric and hydrogen-fuelled heavy-duty vehicles.
BSI Flex 2073 v1.0 – Design and Implementation of Hydrogen Refuelling Sites	Design recommendations and implementation of mobile and static hydrogen refuelling sites – Code of practice.

eFreight 2030 – publications

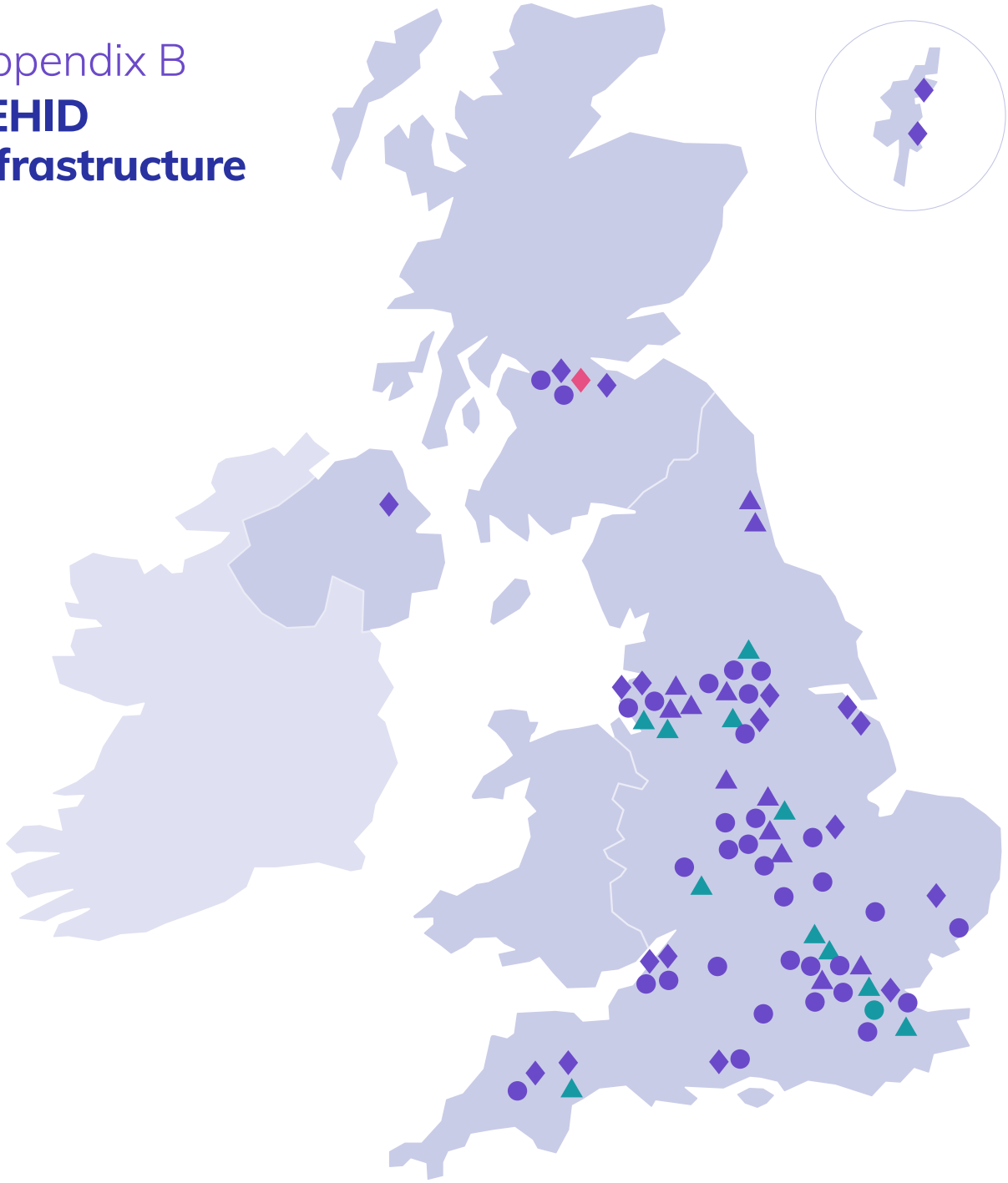
Report title	Description
The Road Ahead: National System Impacts of HGV Decarbonisation	This report explores how the UK's HGV fleet may evolve and highlights the potential infrastructure and energy demands ahead.
Accelerating the Transition: A Business Modelling Perspective for eHGV Scale-up	Based on direct feedback from fleet operators, this report dives into the business model features that matter most for those buying eHGVs and investing in depot-based and public charging.
Connecting HGVs and Electricity: Enabling Systems and Sites for eHGV Charger Integration	This report unpacks system-level challenges, offers case studies from real sites within the trial, and offers clear, actionable recommendations for those in the transport and energy sector.
Navigating Net Zero Road Freight: Stakeholder Insights for HGV Decarbonisation	This report will captures the views, uncertainties and recommendations from across the sector. It explores where live trials are answering key research questions and where gaps remain for future work.
eHGV Purchasing Options and Considerations	This report is aimed at fleet operators looking to navigate the transition with greater confidence, the report offers an in-depth analysis of the financial hurdles and practical solutions that can help guide informed procurement decisions.
Business Model Options and Considerations for Depot-Based Charging	A detailed report on business model options to facilitate the rollout and adoption of eHGVs.
Business Model Options and Considerations for Public eHGV Charging	This report evaluates a range of public charging business models that could overcome challenges related to operational downtime, financial constraints and route planning limitations.
Pre-feasibility eHGV Financial Assessment Tool: Excel-based Tool	The tool provides a structured framework for operators to assess the costs, revenues, cash flow and carbon savings associated with fleet electrification under a range of operational, infrastructure and vehicle purchasing scenarios.
Pre-feasibility eHGV Financial Assessment Tool: A Case Study Analysis	To demonstrate the application of the financial assessment tool, this case study explores the three key decision points a fleet operator would face when beginning to decarbonise their fleet.
eHGV Charger Connections Guide	This guide aims to demystify the complexities surrounding the connection of electric HGV (eHGV) chargers to the UK's electricity network.
eFREIGHT 2030 eHGV Charger Connections Case Study	To prepare for trials of electric Heavy Goods Vehicles (eHGVs), the eFREIGHT 2030 project lead, Voltempo, has been applying for connections to the electricity networks for high-capacity chargers throughout the country.
Cyber Security	This report covers what it takes to deliver safe, scalable electrified eHGV charging infrastructure across three key electrification roles.
Carbon Accounting and Carbon Credits for Freight	This report provides an overview of carbon accounting and carbon credits in the freight sector.

eFreight 2030 reports can be found at:
https://es.catapult.org.uk/project/efreight-2030/

Electric Freightway reports can be found at:
https://www.hitachizerocarbon.com/electric-freightway/

Connected Places Catapult (CPC) and British Standards Institution (BSI) reports can be found at:
https://cp.catapult.org.uk/programme/zero-emission-heavy-goods-vehicles/

Appendix B
ZEHID infrastructure



GRIDSERVE ELECTRIC FREIGHTWAY

Electric Freightway

- ▲ Depot/private charge points (x12)
- ▲ Public charge points (x11)

eFREIGHT 2030

eFreight 2030

- ● Depot/private charge points (x33)
- ● Public charge points (x1)

ZENFreight
Accelerating Decarbonisation of HGVs

ZENFreight

- ◆ Depot/private charge points (x19)
- ◆ Depot hydrogen refuelling (x1)

(All locations approximate)

Acknowledgements

Innovate UK and WSP would like to thank the following organisations for supporting ZEHID activities:

Data partners

IMPERIAL, DYNAMON, CATAPULT Energy Systems, HITACHI, greencollar

Infrastructure providers and hosts

moto, EXTRA, VOLTEMPO, GRIDSERVE, Fleete, NISSAN

OEMS & financing

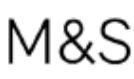
SCANIA, DAF, RENAULT TRUCKS, BERKELEY COACHWORKS, VOLVO, VOLVO Volvo Financial Services, TVS

Freight operators







































































Industry partnership board













ZENFreight / DFDS

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