Progress Summit 2025

Zero Emission HGV and Infrastructure Demonstrator Programme

6 March 2025 | London

UKRI Innovate UK

Funded by UK Government

Agenda – Morning Session

Time	Title	Presenter
09:30	Arrival and Refreshments	All
10:00	Welcome	Simon Buckley, KTM - Zero Emission Mobility, Innovate UK BC
10:05	Keynote	Lilian Greenwood, Minister of State for Transport (Minister for Future of Roads)
10:20	Zero Emission HGV and Demonstrator Programme - An Overview	Dr Isabella Panovic, Programme Manager – Zero Emission Road Freight, Innovate UK
10:40	eFREIGHT 2030 update	Michael Boxwell, Group Chief Executive Officer, Voltempo
11:00	HyHAUL Project update	Dr Kyle Arnold, Managing Director, Hyhaul
11:20	Networking break	All
11:50	Project Electric Freightway update	Sam Clarke, Commercial Lead, Gridserve
12:10	ZENFreight update	Angus Webb,CEO, Dynamon
12:30	Panel Discussion	All
13:00	Lunch and Networking	All

Agenda – Afternoon Session

Time	Title	Presenter
14:00	Scaling eHGV in the Construction Materials sector	Ben Garner, Head of Logistics Development & Standard
14:10	Launching a national network of clean, multi energy hubs for CVs	Kasia Chodurek, Business Development Director, Aegis Energy
14:20	Shared bus infrastructure as a solution to electrifying heavy road transport	Andy Gwilliam, Decarbonisation Delivery Programme Manager,First UK Bus
14:30	Q and A	All
14:50	Refreshment break	All
15:05	Scaling up zero-emission HGVs through standards, best practice and investment	Matteo Novati,Consulting Manager BSI and Alan Nettleton, Concept Demonstration Team Lead, Connected Places Catapult
15:25	Project data - What we know so far	Dr. Louise Evans and Michael Campbell Principal Consultant(s) , Ricardo
15:45	Q and A	All
16:00	Networking	All
17:00	Close	Simon Buckley, KTM - Zero Emission Mobility, Innovate UK BC

Progress Summit 2025

Zero Emission HGV and Infrastructure Demonstrator Programme

6 March 2025 | London

Lilian Greenwood
Minister of State for Transport
(Minister for Future of Roads)

KEYNOTE SPEAKER

UKRI Innovate UK

Funded by UK Government

Innovate UK

Funded by UK Government

UK-wide zero emission HGV infrastructure locations

Discover the planned UK-wide electric charging and refuelling locations funded through the Zero Emission HGV and Infrastructure Demonstrator Programme, created in association with:

eFREIGHT 2030

Demonstrating the feasibility and business case for electric HGVs and a nationwide 1MW charging hub network using British technology.

ZENFreight

Demonstrating electric and hydrogen powered HGVs for the UK haulage industry through a data driven approach.

Project Electric Freightway

Project Electric Freightway will help pave the way for the wider adoption of electric-powered HGVs to replace existing diesel fleets and help resolve both environmental and efficiency issues across the sector.

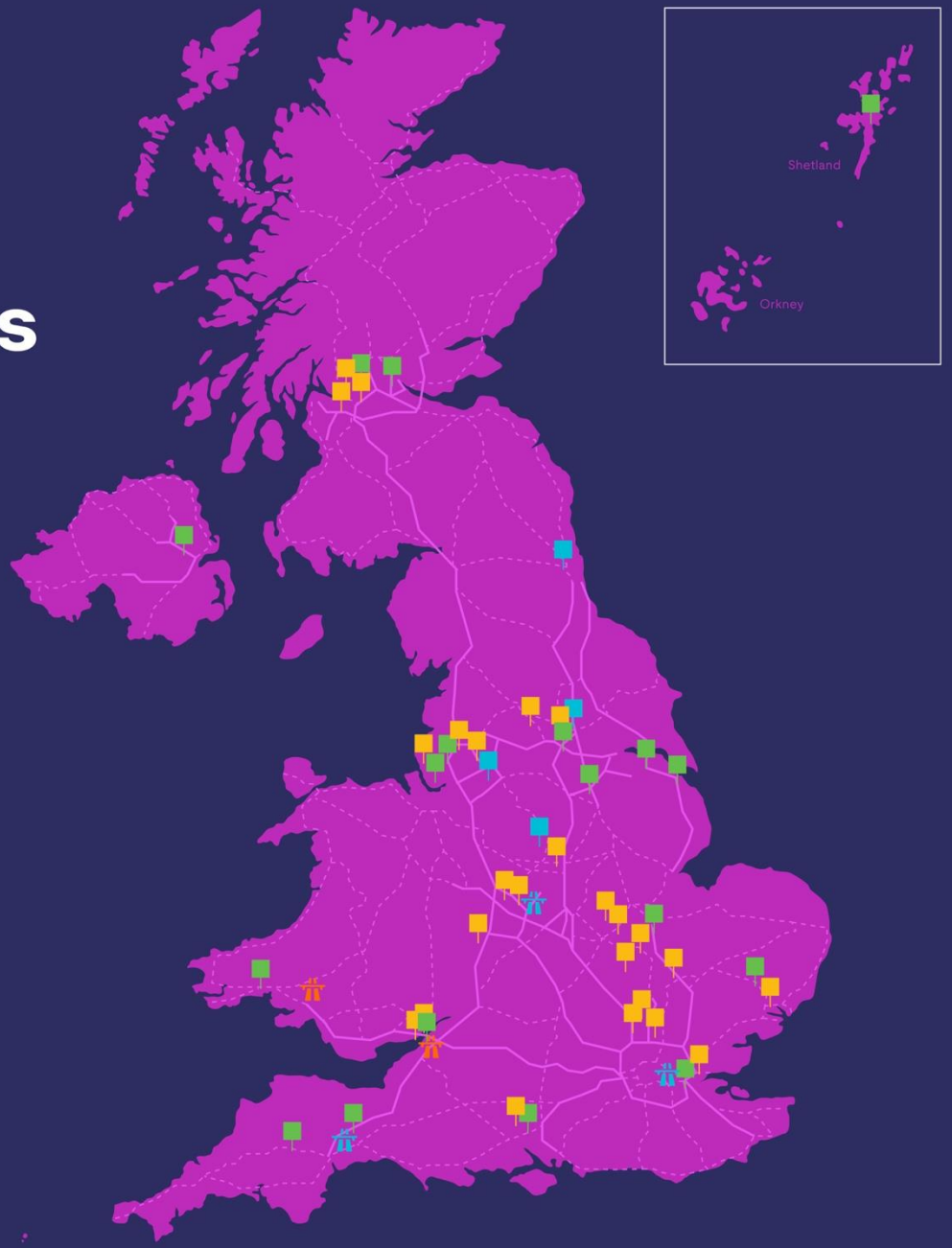
HyHAUL

Developing a hydrogen supply chain and hydrogen refuelling infrastructure along the M4 corridor and beyond.

Strategic Hub

Motorway

A Road



Disclaimer: This map should be used as an illustration of the planned charging and refuelling points funded through the Zero Emission HGV and Infrastructure Demonstrator Programme.

Zero Emission HGV and Infrastructure Demonstrator Programme

Innovate UK

Funded by UK Government

06 March 2025

Innovate UK

- The UK's innovation agency, at the heart of delivering UK Research and Development funding to industry
- We invest in new ideas and technologies and connect businesses to the right people to drive economic growth and social benefits

UK Research and Innovation

Innovate UK

Innovate UK Business Connect
Innovate UK Business Connect exists to connect innovators with new partners and new opportunities beyond their existing thinking – accelerating ambitious ideas into real-world solutions.

UK Transport Vision 2050

What the transport system looks like in 2050, and the steps along the way

To…

- Inform Innovate UK's strategy and investments
- Influence investment and actions of others
- Stimulate discussion and increase alignment

The strategic imperatives are:

Net zero

scale-up manufacturing to deliver net zero products

Digitally enabled

greater efficiency and new products and services

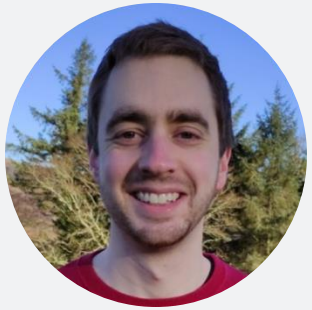
Resilient and responsive

continuous safe and secure operation

The UK Transport Vision 2050 is a living report, which will evolve over time. Learn more about this significant report and download it

iuk.ktn-uk.org/perspectives/uk-transport-vision/

The ZEHID Innovate UK/IUK Business Connect Team



Dr Alistair Barnes
Senior Programme Manager, Land and Maritime Transport

Steffan Eldred
Innovation Lead, Zero Emission Vehicles

Victoria Saunders
Innovation Lead, Hydrogen in Transport

Jesse Prendergast
Knowledge Transfer Manager, Transport Infrastructure

Simon Buckley
Knowledge Transfer Manager, Zero Emission Mobility

Dr Isabella Panovic
Programme Manager, Zero Emission Road Freight

UKRI Innovate UK

Programme Overview

Projects launched
2023-2024

Project funded period
Ends March 2026
Procurement of vehicles and infrastructure
Early data collection

Project demonstration period
Ends March 2031
Demonstration of vehicles and infrastructure
Extensive data collection

Main aims:

- Support commitment to end the sale of new, non-zero emission HGVs by 2035/2040
- Understand the costs and merits of various zero emission HGV technologies, based on large real-world operations (collect data and analyse)

UKRI Innovate UK

Funded by UK Government

GRIDSERVE - Project Electric Freightway

- 140 battery electric HGVs provided by DAF and Volvo
- Depot based charging and motorway service area infrastructure

Dynamon - Zero Emission Northern (ZEN) Freight

- Battery Electric and Hydrogen Fuel Cell vehicles (50+)
- Operator led model with efforts to share infrastructure wherever possible

HyHAUL-Hydrogen Aggregated UK Logistics

- Hydrogen fuel cell vehicles along the M4
- Hydrogen refuelling stations

Voltempo - eFREIGHT 2030

- Next-generation eHGVs, Renault Trucks, DAF and Scania
- British-designed 1MW charging technology

UKRI Innovate UK

Funded by UK Government

Recent updates & developments

Gridserve - Project Electric Freightway

Zero Emission National (ZEN) Freight

HyHAUL - Hydrogen Aggregated UK Logistics

Voltempo - eFREIGHT 2030

UKRI Innovate UK

Funded by UK Government

Gridserve - Project Electric Freightway

Zero Emission National (ZEN) Freight

HyHAUL - Hydr

Some of the largest Innovate UK projects ever, both in terms of value and number of participants
>20 changes in participants supported to date
Projects are still growing!

Not including the wider members participating in the projects, e.g. Associate Membership schemes

Innovate UK

Funded by UK Government

Vehicles

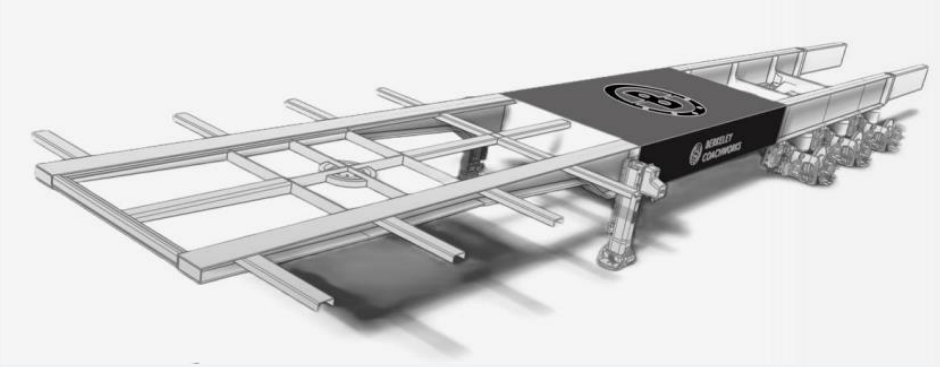
Vehicles planned	**>300**
Vehicles ordered	**>230**
Vehicles delivered	**>35**

- Mostly 4x2 tractor units (Scania HFC are 6x2)
- All in the 40-44t GVW category
- Range of OEMs involved
- Most ordered vehicles are BEVs, but some HFCEVs too

Funded by UK Government
UKRI Innovate UK

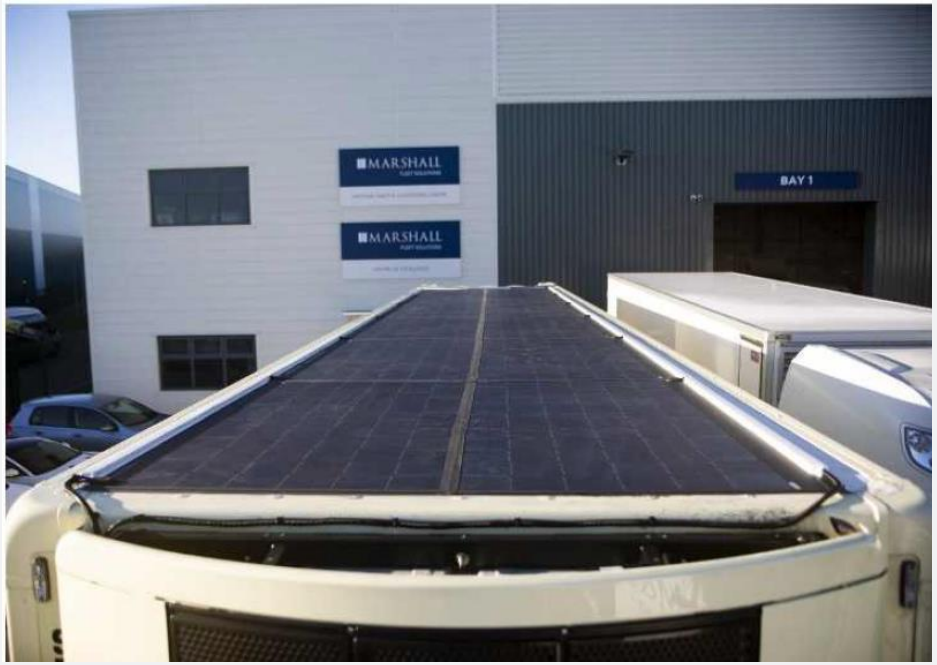
Ancillary equipment

BERKELEY COACHWORKS



Range extension trailer developments

Refrigerated trailer units – A F Blakemore solar powered Titan trailer systems



Funded by UK Government

UKRI Innovate UK

THERMO KING

SUNSWAP

Infrastructure

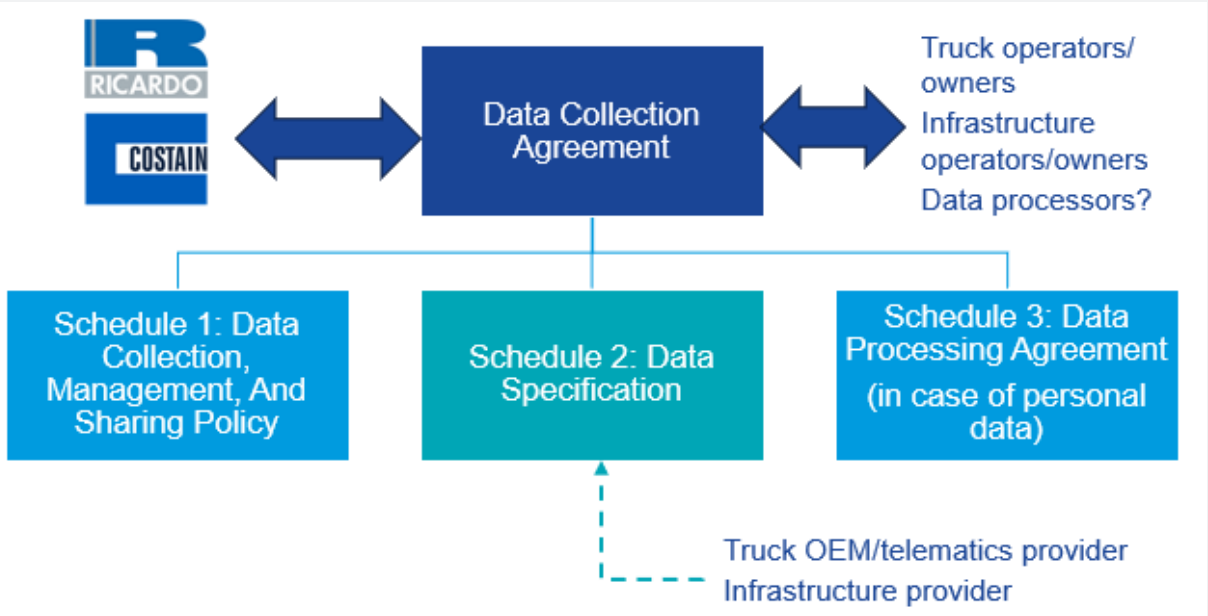
- Electric installations - approximately 10% motorway service areas/90% depot
- 3 public access hydrogen refuellers
- Challenges:
  - Supply upgrade timelines and costs despite early engagement with DNOS
  - Contractual negotiations with landowners

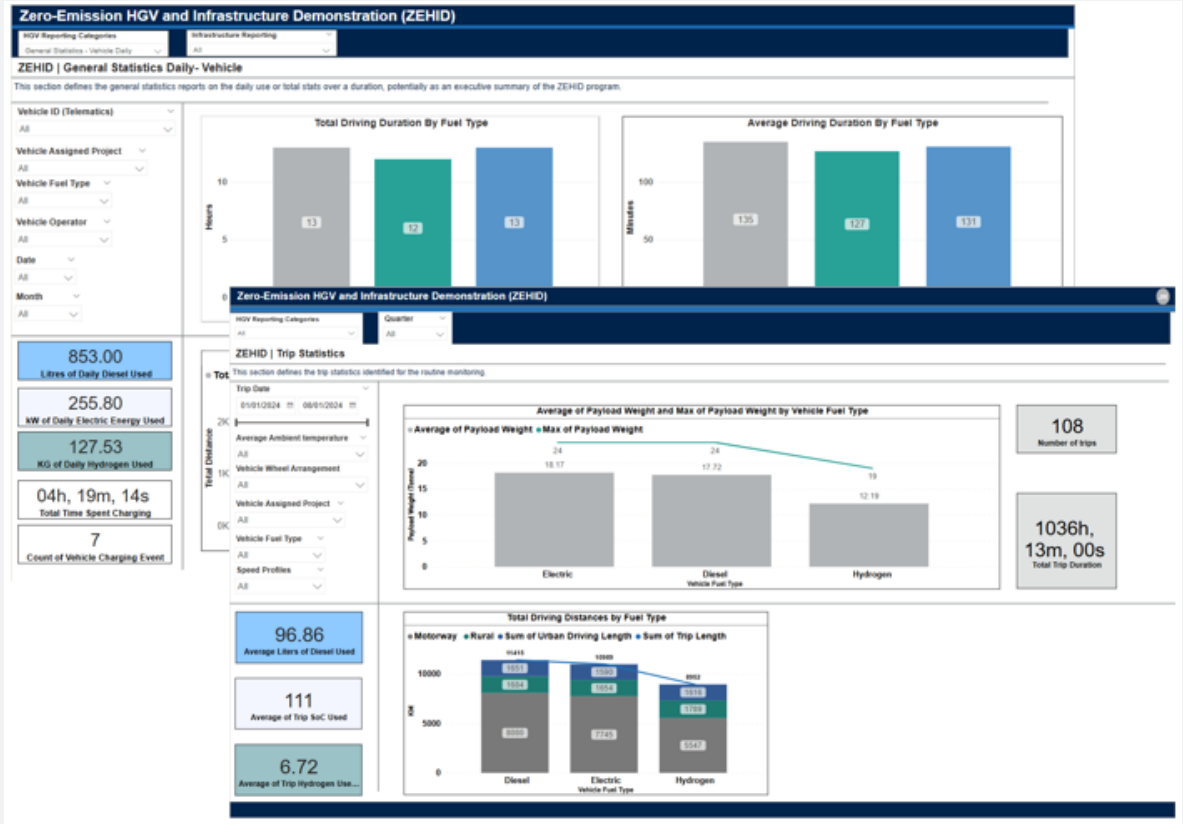
Maritime Wakefield site installation / ZEN Freight

Funded by UK Government
UKRI Innovate UK

Data collection is key

- Ricardo engaged to independently evaluate all projects
- Learning will be public and fed to the Department for Transport





Funded by UK Government

Innovate UK

Programme wide learning

- The vehicles are real, available and many are operational
- The charging technology is coming quickly, with our cohort key to this
- Operators see the need and many are demonstrating now
- Grid connections remain a challenge
- Early engagement with DNOs is key whether sites are depot or public

Funded by UK Government
UKRI Innovate UK

Strong directional movement outside the programme

European Commission

Cross-border Alternative Fuels Infrastructure Regulation (AFIR)

[A summary of shared EV charge points for heavy vehicles in the UK - Zenobē]

Funded by UK Government

UKRI Innovate UK

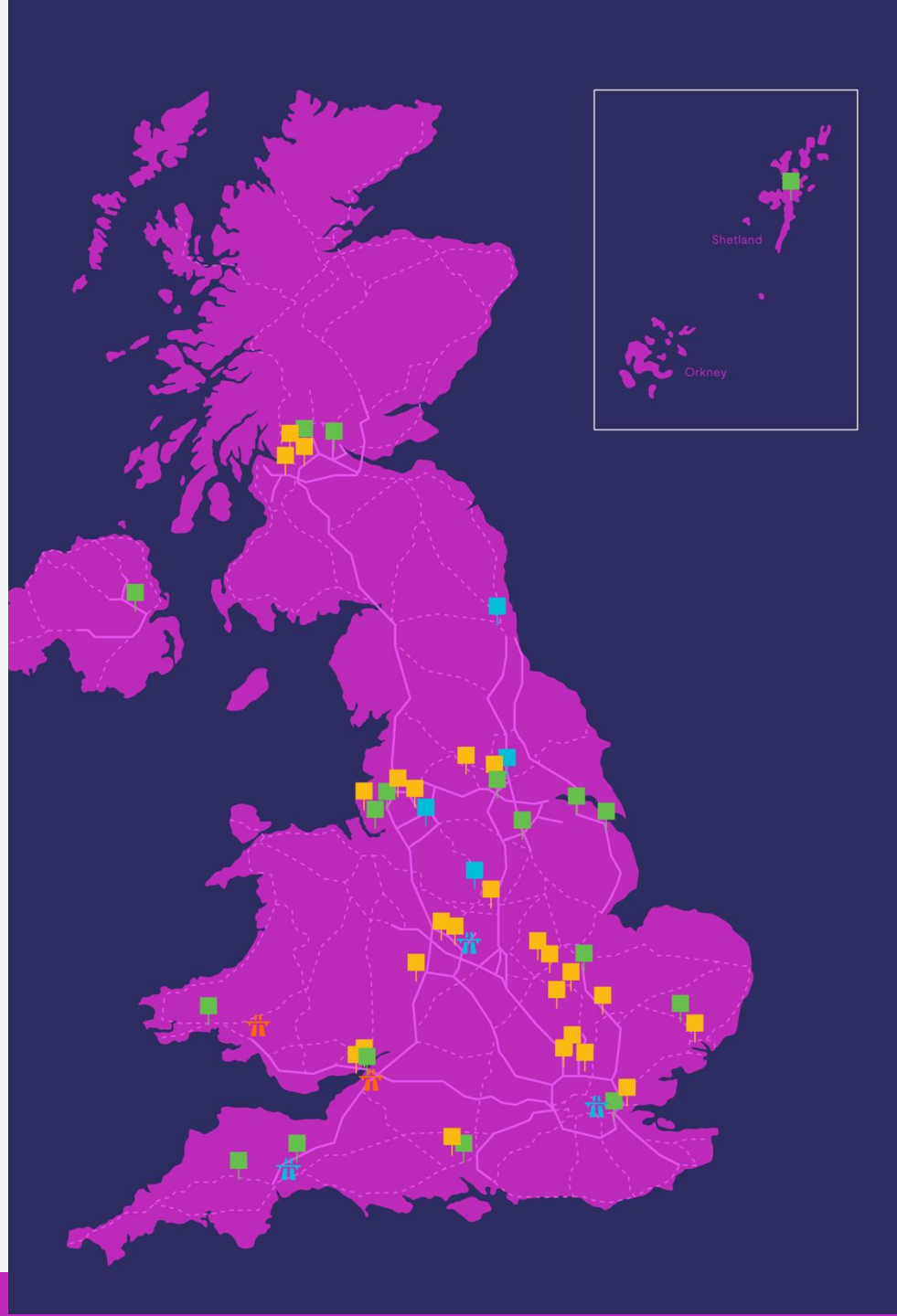
Your Involvement?

- Open access infrastructure

- Website and bulletin

- Report publication, Ricardo and projects

- Upcoming webinars and future events



UKRI Innovate UK
Funded by UK Government

Stay in touch via our website

Funded by UK Government

Innovate UK


UKRI
Innovate UK
Questions?

EFREIGHT 2030 PROJECT UPDATE

MICHAEL BOXWELL

eFREIGHT 2030

Funded by UK Government

ABOUT EFREIGHT 2030

eFREIGHT 2030

Multi-year programme rolling out electric HGVs and electric HGV charging infrastructure across the country, running until 2031

Collaboration between major fleets, vehicle manufacturers, data providers and Voltempo

Phase one is £76M project – with £49.2M coming from the Department for Transport – setting up the network and getting the first 100 vehicles on the road by January 2026

An Associate Member programme to allow new fleets to join the journey, benefitting from the grant funding through subsidised leases

Funded by UK Government

OUR CULTURE

eFREIGHT 2030

Fleets come first: what do fleets need to make the transition?

Genuine collaboration between project partners – sharing learnings, experience, charging infrastructure, expertise

A bigger agenda than just a trial – it's about transforming an industry

We're bringing end users along on the journey: Sainsbury's, Primark, Card Factory, Adidas and others

Our ultimate aim is to create the foundation that enables the tipping point for industry to switch to electric HGVs

Funded by UK Government

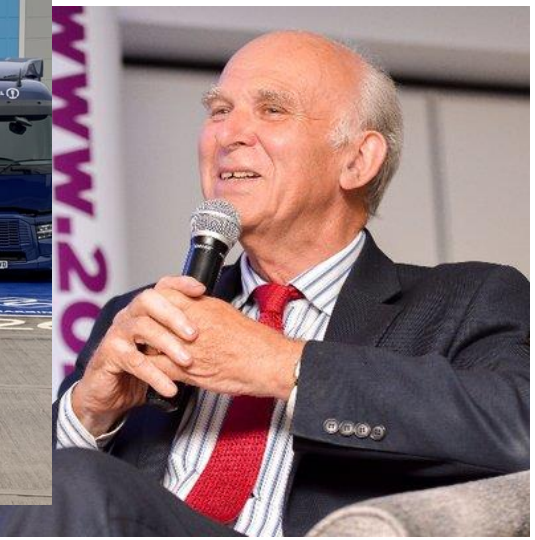
WORK TO DATE

eFREIGHT 2030

- Modelling Total Cost of Ownership, and modelling vehicle routes and operations across 15,000 vehicles and 220 sites
- Building charging infrastructure – currently in Welham Green, Cambridge and East Midlands
- Trucks rolled out with Marks & Spencer, Kuehne+Nagel and Welch's Transport
- Building the first 1MW multi-bay charging hubs – British technology, the first public charging hubs in the world with 1MW charging
- Driven through legislation changes with HGV Driver Hours to reflect electric HGV operations

Funded by UK Government

eFREIGHT 2030



EFREIGHT 2030 CHARGING

eFREIGHT 2030

- Most of our charging locations are based at operator's facilities
- Sharing facilities across the country, for the benefit of everybody
- Fleet focused, not profit focused
- Installing twice as many chargers as electric HGVs
- Megawatt level charging across the country – ready for the next generation of electric HGVs
- We are also working with Fleet-e, supporting their public and shared charging network

Funded by UK Government

EFREIGHT 2030 CHARGING

eFREIGHT 2030

Funded by UK Government

CURRENT TASKS

eFREIGHT 2030

- Completing our 1MW HyperCharging testing
- Installing grid upgrades on our next tranche of sites
- First 1MW HyperCharging systems to be installed and fully operational by June
- Next sites to be installed and trucks delivered with Expect Distribution, Wincanton and Maritime

Funded by UK Government

OTHER ACTIVITIES

eFREIGHT 2030

eFREIGHT Autonomous

Autonomous Vehicle feasibility study

£250,000 grant to investigate the opportunities for autonomous vehicles, potentially leading to road trials by 2027

Commences May 2025

eFREIGHT A.I.

Artificial Intelligence feasibility study

Understanding how A.I. can streamline fleet operations, boost productivity and support the rollout of electric HGVs

Commences Summer 2025

Funded by UK Government

THE BILLION POUND CLUB

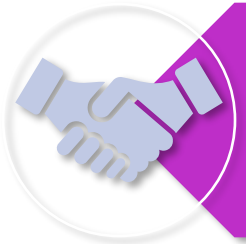
eFREIGHT 2030

- We are looking to raise £1,000,000,000 to electrify HGVs at scale between now and 2030
- Why? Vehicles and charging equipment is too expensive, grid connections are difficult and complex, and we need to get changes to legislation for electric HGVs
- All those problems are solved by creating a long-term, funded scale up plan, supported by a commitment from Government to help with legislation

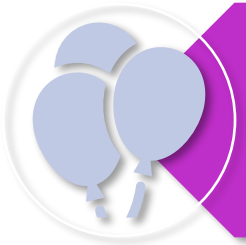
Funded by UK Government

JOINING IN

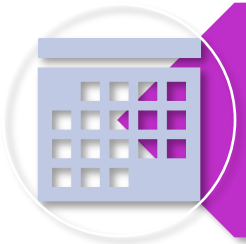
eFREIGHT 2030



We've recently welcomed two new members: Tarmac and I.J. McGill Transport



There are more opportunities to join the party



This project runs until January 2031 – if it isn't right for you now, we'll be here when you need us

Funded by UK Government

THANK YOU

WWW.EFREIGHT2030.COM

MICHAEL.BOXWELL@VOLTEMPO.COM

eFREIGHT 2030

Funded by
UK Government

ZEHID HyHAUL

6th of March 2025

Dr Kyle Arnold

Funded by UK Government

ZEHID HyHAUL | Consortium

H_2 Supply

Protium and **Marubeni** will provide hydrogen according to the UK low-carbon hydrogen standard. Hydrogen will be sourced from various production projects, some of which already in operation.

H_2 Distribution

Reynolds Logistics will be transporting the hydrogen from the production sites to the refuelling stations. They have vast experience in the transport of industrial gases.

H_2 Refuelling

The hydrogen refueling stations will be operated by **HyHAUL Mobility Limited** (HML), comprised of an experienced team who have built, owned, and operated these stations in the past. HML is a 50/50 JV between Marubeni and Protium, securing supply for the duration of the project.

FCETs

Fuel cell-electric trucks are available from a wide range of OEMs. Vehicles are offered via lease predominantly through HyHAUL's leasing party

What are we trying to offer through the consortium project?

HyHAUL

H_2 Supply
By HyHAUL Mobility Limited parent companies:
Protium and Marubeni

H_2 Distribution
Reynolds Logistics

H_2 Refuelling
HyHAUL Mobility Ltd.

FCETs
Supplied by LeaseCo's
OEM's are subcontractors

Benefits | HyHAUL is the **simplest and most cost-effective option** to decarbonise heavy haulage with FCETs

1. **Supply** 30 off >40t FCETs via various lease options
2. **80% FCET cost subsidy** via DfT grant
3. **Predictable** and **stable** hydrogen fuel prices leveraging other subsidies
4. **Refueling infrastructure** following demand with **80% subsidized equipment**
5. **Service, Maintenance, and Repair support** through the LeaseCo's
6. **Commercial improvements** over time
7. **Digitally integrated** network.
8. **Platform for sustainable growth** due to limited offer

Funded by UK Government

ZEHID HyHAUL | Update

Focus has centered on the on securing the H2 FCEV OEMs with HyHAUL and Novuna completing detailed due-diligence on the technical, financial and aftersales offerings which have been being added to the customer pricing matrix.

The refueling network has taken significant forward steps, with the preferred equipment supplier contract being in the final stages of negotiation. This is for the equipment supply for all sites within the ZEHID project.

Locations: Avonmouth continues to be the most active location, Other locations are review to best utilise demand for truck. Swansea panning application has been submitted. Reading, Carlisle, Exeter and other are all being investigated to increase utilisation of the trucks and the refueling Network

Reynolds Transport (MEGC) - Hydrogen Logistics have progressed to contract and order stage. Continued technical reviews to optimize the MEGC, these would improve the efficiency refueling station operations. Recent positive ADR regulation update has also opened further use cases for the H2 FCEV.

Ambition | Beyond 2026, HyHAUL is destined to expand with interested hauliers and partners, towards the M5 and M6 in the first instance

M6 **Natural transport network extension**

>20,000 HGVs per day

Integrating **North of UK**, starting from Birmingham

Birmingham **High demand logistics hub**

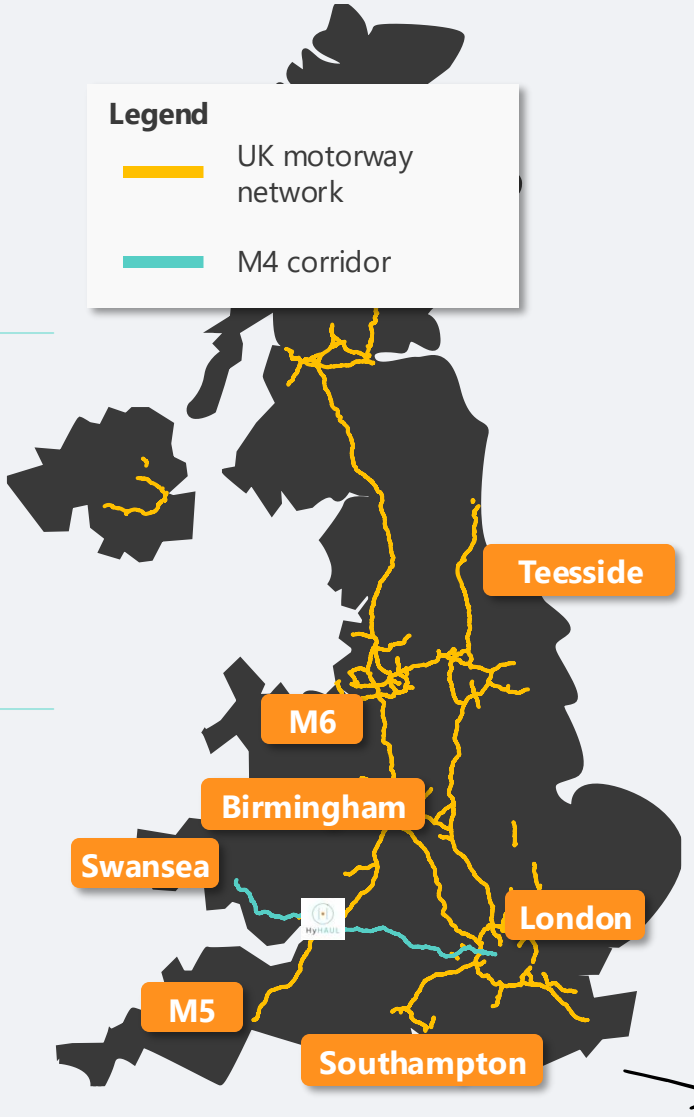
> 23,000 HGVs per day on Gravelly Hill Interchange

Access to **"golden logistics triangle"**

M5 **Natural transport network extension**

> 13,000 HGVs per day

Linking Birmingham and Bristol with **Southeast** of UK



Teesside **High demand industrial hub**

> 2,000 HGVs per day on A174 around Middlesbrough

Hydrogen hub linked via A1 (M)

Southampton **Gate to international logistics**

3rd largest port in the UK, largest hub for non-EU exports

Handling **>1.5 million TEU[1]** per year in port

EU / International **Long-term scale**

3.9 million goods vehicles

>40t representing over **22% of tonne-kilometres** in 2021 in EU

Funded by UK Government

HyHAUL Project Benefits which are flow through to End Users

Funded under the ZEHID

- HyHAUL has secured grant funding from the Department for Transport. As part of the grant funding, **H2 FCEV are 80% funded**
- The **latest technology** and **market leading equipment** to be deployed, ensuring reliability of the stations, **minimizing negative impacts** upon users.

HRS Infrastructure

- Each Hydrogen Refueling Station is capable of dispensing 2t per day in **Phase 1**. The station designs are future proofed for expansion, meaning they can **increase** dispensing **capability with demand**.
- Refueling 350bar and 700bar vehicles, meeting the latest compliance requirements.
- HyHAUL stations will have **98% availability, as its baseline target,** using internal engineering capabilities and market leading aftersales agreements.

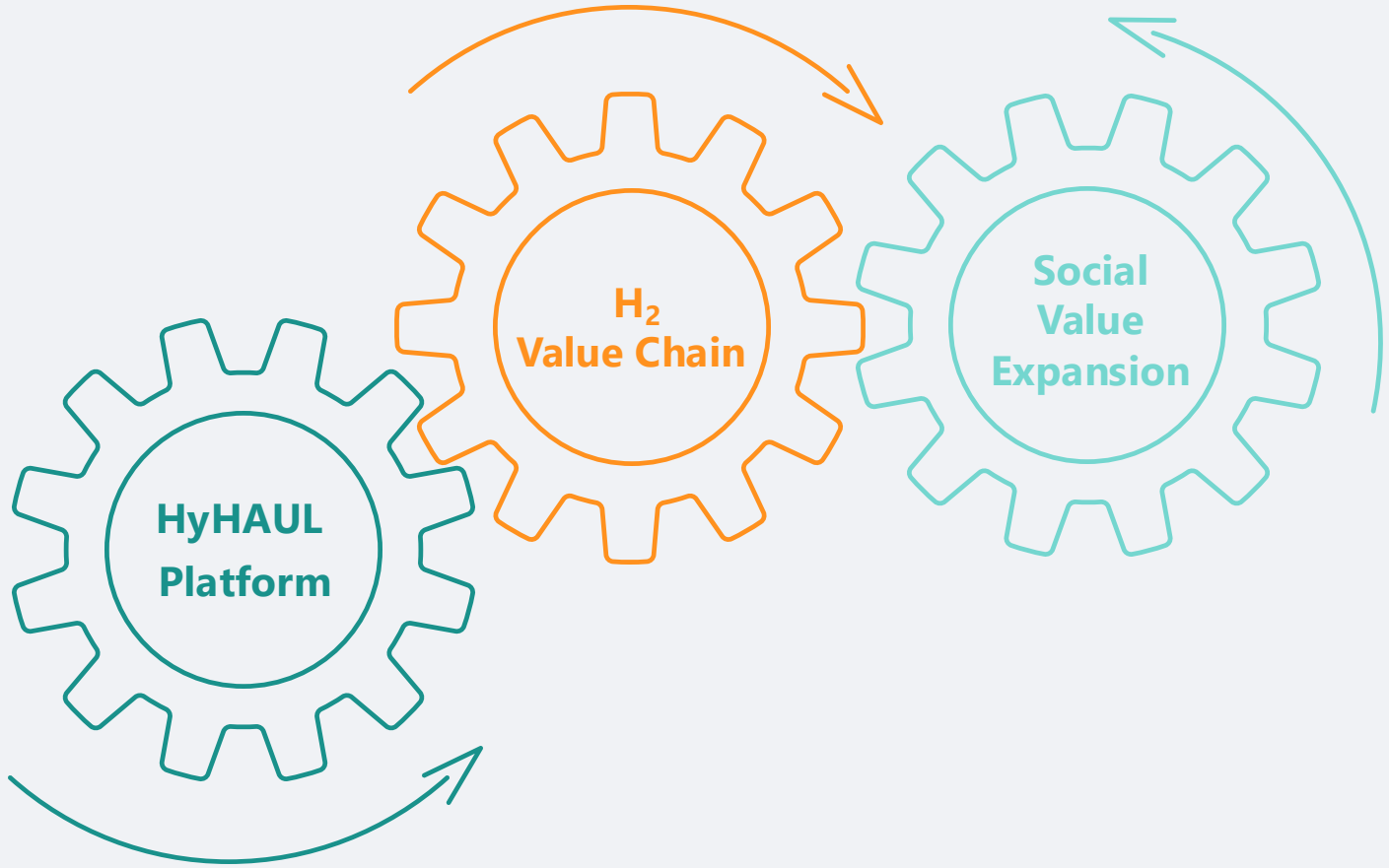
Hydrogen supply

- HyHAUL Shareholders have minimum supply agreements in place, guaranteeing hydrogen **supply security** to HyHAUL.
- Additional supply from shareholders or go to market, providing a balance of risk mitigation and guaranteeing **low fixed pricing**

Overview | Risks

HyHAUL creates positive cycle for environmental & social benefit

The main beneficiaries of the funding are fast growing, innovative UK companies seeking to decarbonise their activities and the winder economy – with this funding benefitting UK economically and otherwise



Social & Environmental Benefit

Decarbonization
Annually ~2,400 T-CO2e will be avoided vs. diesel HGVs, or 874 T-CO2e against BEVs

Air Quality Improvement
32 kg-PM2.5 9.7 kg-NH3, 2.5 kg-SO2 and 3.6 T-NOx elimination, with a £1.2m benefit[1]

Create New Job
192[2] jobs within the broader economy from ZEHID with potentially more than 140[3] further jobs created by consortium members by 2030, not including drivers!

Enhance Local Supply Chain
Expansion opportunity for UK based supply chain

Community Engagement
Close communication with the local community

Education & Knowledge Share
Observer Panel and Public receive regular update from the demonstration.

[1] Defra Air Quality Damage Cost Toolkit; [2] Applying IEA assumptions; [3] Only includes HML, Novuna, Electra;

Customers | Customer Landscape

Customer Stage	Number of trucks	Next steps
Ready to sign	**~14**	▪ Commercial offers received for fueling ▪ Meetings being scheduled for contract signatures ▪ Press Releases issued for all first movers
At investment committee	**~14**	▪ Route analysis completed ▪ Commercial offers received for the fuel offtake – Including first mover benefits ▪ Including EPTO for a large Varity of use cases (Wet Packs, Tippers….)
Investment committee preparation	**>25**	▪ Route and duty cycle analysis. ▪ Vehicle selection based on route analysis and technical review meeting ▪ Prepare for investment committee.

ZEHID HyHAUL | First Movers

ZEHID HyHAUL | Explore Transport and Logistics

PRESS RELEASE – 4th MARCH 2025

EXPLORE TRANSPORT SECURES THE FIRST SCANIA FCEV (FUEL CELL ELECTRIC VEHICLE) PROTOTYPE FOR UK OPERATIONS

Summary

- Explore Transport secures the first Scania FCEV (Fuel Cell Electric Vehicle) prototype for their UK operations.
- The Scania FCEV (Fuel Cell Electric Vehicle) prototype is expected to join the Explore Fleet and begin operations in Q1 2026.
- **High Resolution Imagery:** High Resolution Imagery
  - Featured in photos left to right: Warren Wilkinson (Explore Operations Director), Tim Edwards (ZEHID Lead & Regional Sales Manager at Scania UK), Bradley Cooper (Explore Finance Director), Karima Haji (Managing Director at Scania Financial Services UK), David Cox (Explore Managing Director), Chris Gatheridge (Explore Operations Director), and Mark Penn (Transformation Director at Scania UK).

Thursday 27th February 2025. Explore Transport, logistics specialists with over 50 years of experience in construction, rail, aerospace and nuclear sectors, have secured the first Scania FCEV (Fuel Cell Electric Vehicle) prototype for UK operations. The acquisition marks a clear step forward towards net-zero transport solutions for tier one contractors and large-scale infrastructure projects in the UK.

Explore Transport is committed to leading the industry in reducing 'Scope 3' emissions, delivering environmentally friendly logistics without compromising efficiency or reliability. Under the UK Government's Zero Emission HGV Infrastructure Demonstrator Programme (ZEHID), funded by the Department for Transport (DfT) and delivered in collaboration with Innovate UK, Explore Transport and HyHAUL are driving forward the future of sustainable zero-emission logistics. Through HyHAUL, we are leading the way in the demonstration of Hydrogen Fuel Cell capability with real-world operational data on performance, efficiency, sustainability and the long-term viability of zero emission transport in construction logistics.

Chris Gatheridge, Operations Director at Explore: "Our investment into Scania FCEV (Fuel Cell Electric Vehicle) marks a major milestone in our journey towards sustainable transport solutions. By adopting this cutting-edge technology from an industry leading OEM, we are not only taking measures to reduce our own carbon footprint, but we are also providing customers with a sustainable alternative that is not yet readily available in the logistics sector: cleaner, greener, zero-emission transport solutions."

Chris continued, "We believe that Hydrogen has the potential to meet the unique demands of construction logistics, with the performance and capability to manage heavy loads. By securing the first Scania FCEV (Fuel Cell Electric Vehicle) prototype in the UK, we are further demonstrating our commitment to a greener future for logistics, with the unit set to be on the road and in operation by Q1 2026."

Mark Bridgland, Sales Director at Scania UK, said: "We're delighted to be working with Explore and helping them on their decarbonisation journey.

"It is vital that we as manufacturers work with our customers to find solutions that work for them, as well as help them cut emissions and remain profitable. In this case, we chose to involve our Pilot Partner team, to help us and Explore find a zero emissions solution for their specific use case and needs.

"Seeing how our prototype FCEV truck performs for Explore day-to-day will be fascinating, plus it will provide us with invaluable insight and data."

Kyle Arnold, Managing Director at HyHAUL: "HyHAUL is leading the way in hydrogen heavy transport supply chain, we are committed to demonstrating the real-world practical application of H2 FCEV in real-world conditions. Our collaboration with Explore Transport and Scania underscores our dedication to decarbonising the heaviest transport sectors. By providing expert analysis, operational support, and strategic implementation of the Hydrogen Refuelling Infrastructure and H2FCEV HGVs, we are ensuring that zero-emission transport solutions are both feasible and scalable. This initiative is a significant step forward in proving that hydrogen technology can meet the demanding needs of HGV transportation, paving the way for a cleaner, greener future. Having Explore as the first customer is a significant milestone for the project, HyHAUL and the UK pathway to a greener future, this is fantastic partnership that will only continue to grow."

Scania's Pilot Partner division based in Sweden has developed a group of fuel cell prototype tractor units to test the viability of hydrogen to support logistics operations similar to Explore's.

This 6x2*4 tractor unit is built on Scania's battery electric platform fitted with a 400kW electric machine and 416kWh of batteries. In addition, the truck is fitted with fuel cell motor, cooling fans and 56kg hydrogen storage tanks, which gives the vehicle an estimated range up to 850 km.

Explore Plant and Transport Solutions is a specialist supplier of transport and plant hire services in the UK with a fleet of 200 trucks, 6,000 plant hire assets and 7 depots nationwide. It employs over 300 people and generates an annual turnover in excess of £70 million.

The Transport division combines over 50 years of construction logistics and haulage expertise, and the Plant and Rail division boasts one of the largest, most diverse and modern ranges of plant equipment, small tools, formwork and falsework systems. Both in-house divisions providing bespoke end to end services tailored to customer requirements.

www.exploretransport.co.uk

Scania, a part of TRATON GROUP, is a world-leading provider of transport solutions combined with an extensive product-related service offering. Scania also offers vehicle financing, insurance and rental services, allowing our customers to focus on their business.

Operating in more than 100 countries and employing more than 57,000 people worldwide, Scania is a major supplier of trucks, buses, coaches and engines for industrial and marine applications into the UK. Additionally, the company provides a wide range of complementary and ancillary services in support of its products and customers through its 84-strong network of service centres.

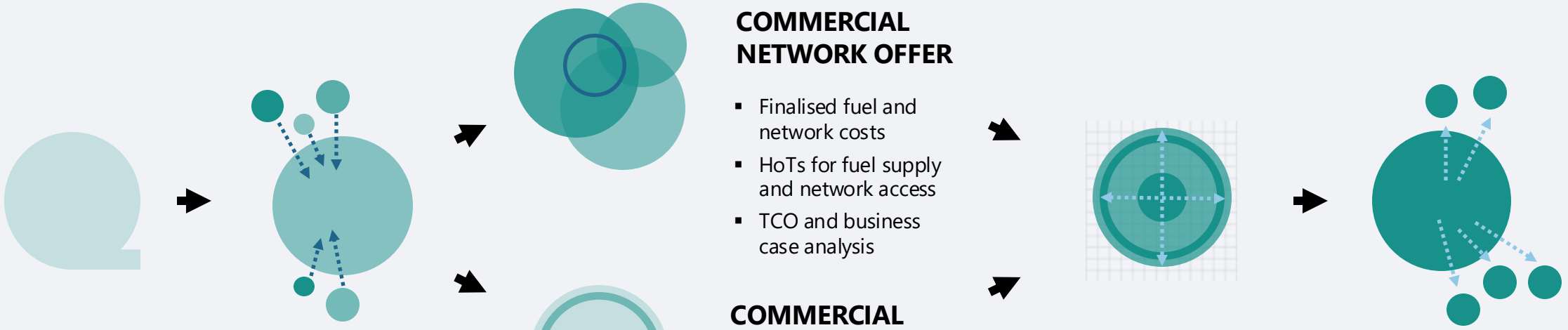
Sustainability is central to Scania's operations, and driving the shift to more sustainable transport solutions is a key element of the organisation's global strategy and philosophy today. Scania adheres to Science Based Targets set by sustainability partnership, SBTi, and became the first manufacturer in the sector to have its Science Based Targets approved.

For further information on Scania and its range of products and services, see: www.scania.co.uk

HyHAUL is establishing the UK's first dedicated HGV hydrogen mobility network, setting a new benchmark in sustainable transport by proving the feasibility and scalability of hydrogen in heavy-duty freight operations. By leveraging hydrogen's potential to power zero-emission vehicles, HyHAUL directly addresses the decarbonisation of the most challenging and emission-intensive duty cycles in road transport. This pioneering effort supports the UK's broader commitment to net zero.

Further info can be found at www.hyhaul.co.uk

HyHAUL | Customer Journey



REGISTRATION OF INTEREST

- Intro Meetings and Q&A
- Jon_Perry@hyhaul.co.uk

ROUTE & DUTY CYCLE ANALYSIS

- Route and duty cycle data collection
- Pre-feasibility analysis, in line with network and truck capabilities
- Data analysis to optimise network configuration

COMMERCIAL NETWORK OFFER

- Finalised fuel and network costs
- HoTs for fuel supply and network access
- TCO and business case analysis

COMMERCIAL TRUCK OFFER

- Introduction to truck OEMs and lease providers
- Technical viability assessment
- R&M alignment

COMMERCIAL AGREEMENT

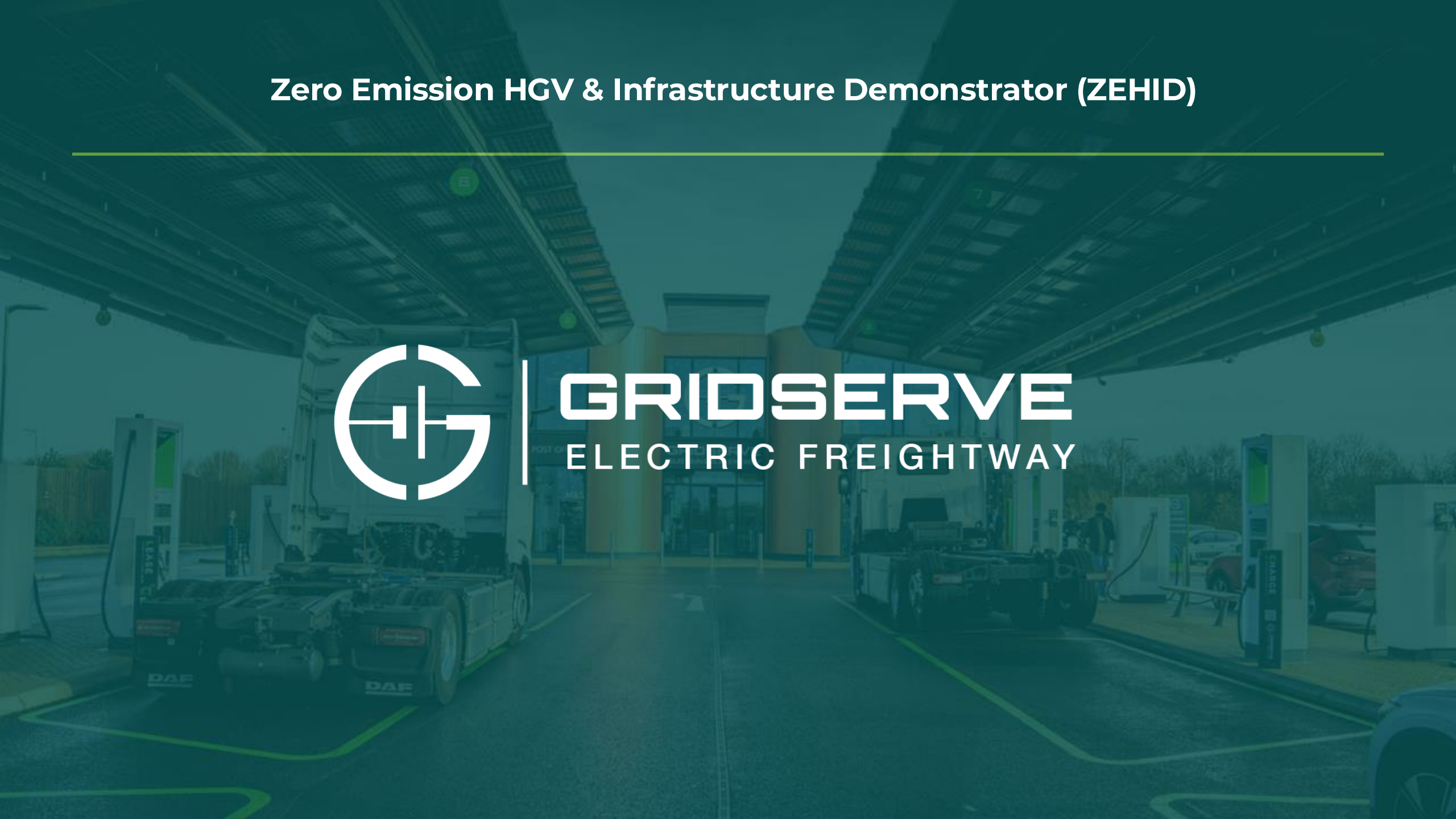
- Signed fuel, network, and vehicle contracts and orders
- Placing truck orders for delivery

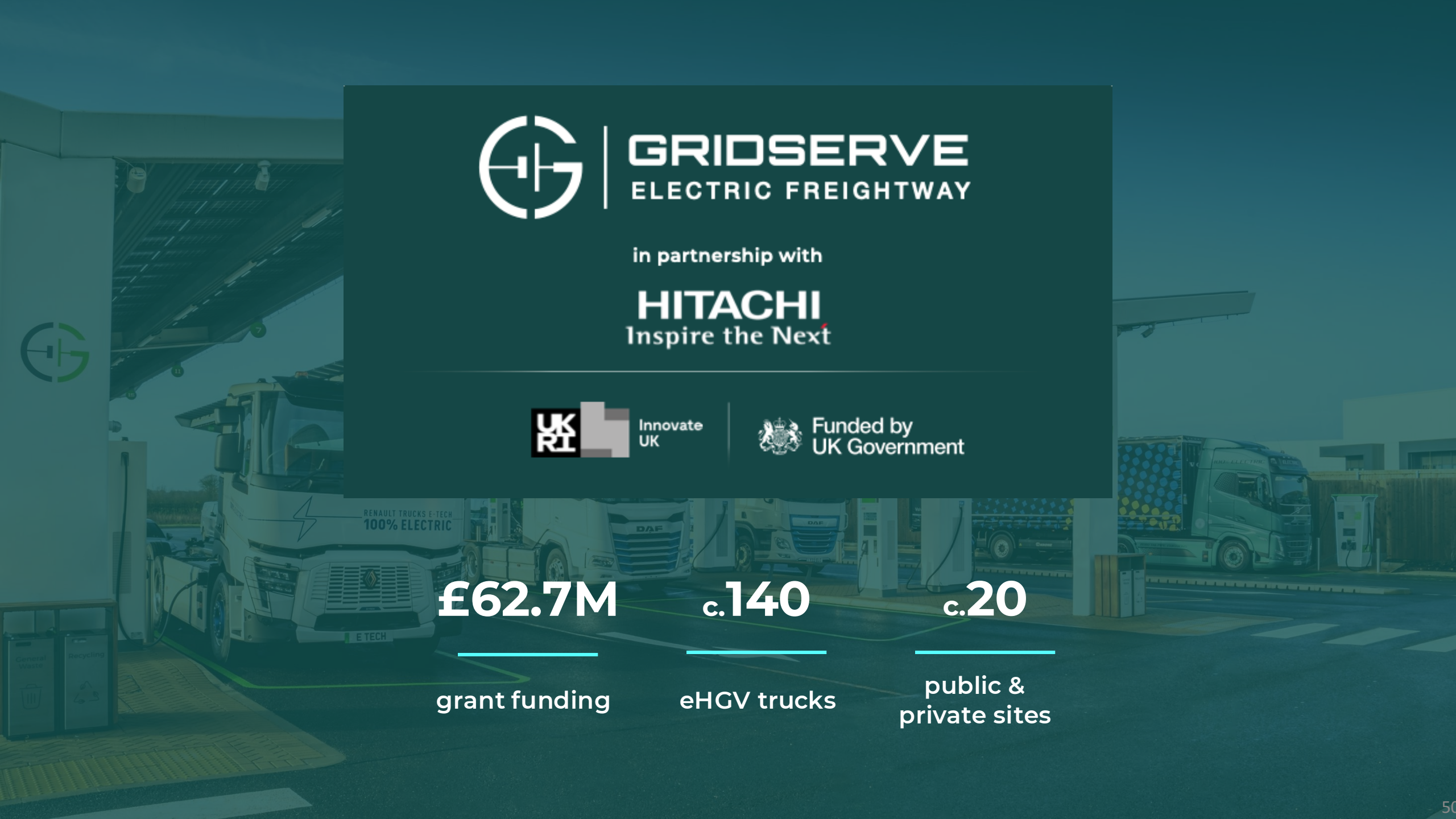
OPERATIONS PERIOD

- 5-year demonstration period
- Continued customer management

Funded by UK Government

Zero Emission HGV & Infrastructure Demonstrator (ZEHID)




GRIDSERVE
ELECTRIC FREIGHTWAY
in partnership with
HITACHI
Inspire the Next
UKRI
Innovate UK
Funded by UK Government
£62.7M
grant funding
c.140
eHGV trucks
c.20
public & private sites

The problem being addressed

Transport accounts for **29%** of the UK's domestic greenhouse gas emissions [1]

HGVs account for only **5%** of vehicle mileage on UK roads [2]

They contribute **19%** of transport emissions [3]

[1] https://www.ons.gov.uk/economy/environmentalaccounts/methodologies/measuringukgreenhousegasemissions

[2] https://roadtraffic.dft.gov.uk/summary

[3] https://www.gov.uk/government/statistics/transport-and-environment-statistics-2023/transport-and-environment-statistics-2023

The challenge

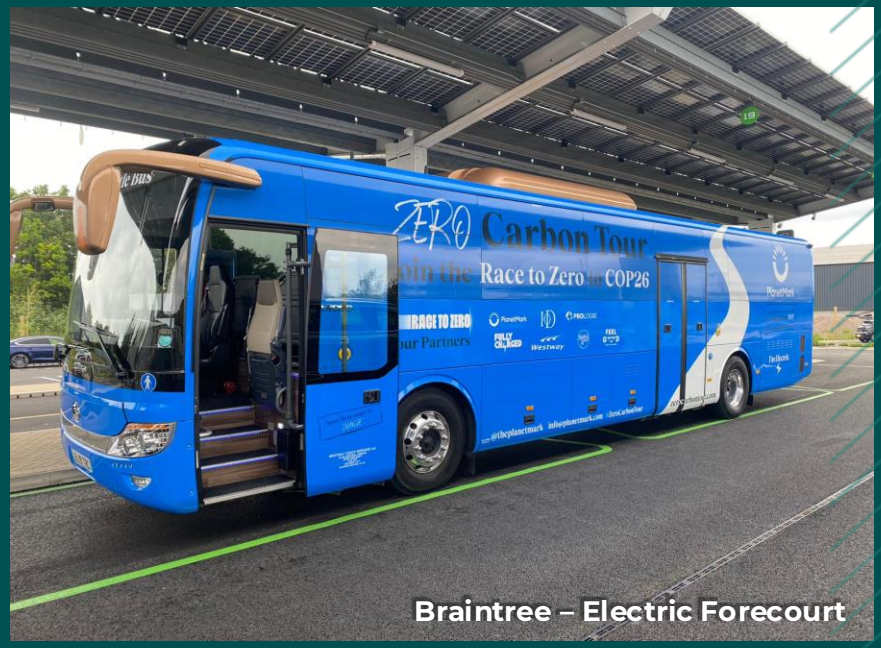
Norwich – Electric Forecourt


Rugby Motorway Service Area


Rugby Motorway Service Area


Norwich – Electric Forecourt

Beaconsfield Motorway Service Area



Braintree – Electric Forecourt

Why are we building a Public network for eHGVs?

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

Does increased infrastructure investment allow more intensive use of eHGVs?

What is the environmental impact of eHGV adoption?

What factors drive eHGV efficiency?

Are eHGVs more or less expensive to run than diesel HGVs in different scenarios?

Can public charging be an economical and practical option for eHGV operations?

How does this impact cost?

Project Consortium

Lead Partner

GRIDSERVE SUSTAINABLE ENERGY

Principal Partner

HITACHI Inspire the Next

OEM Partners

DAF
RENAULT TRUCKS
VOLVO
DAIMLER TRUCK

Leasing Partners

Novuna
PACCAR FINANCIAL
VOLVO Financial Services

Charging location Partners

moto
NISSAN

Haulier Partners Members

a.f. blakemore & son ltd
amazon
DP WORLD
boughey
Fergusons Transport
KUEHNE+NAGEL
voltloader CHARGED FOR TOMORROW
Samworth Brothers QUALITY FOODS
MARITIME
Royal Mail
Wincanton
XPOLogistics
United Utilities Water for the North West
Ford&Slater
Yusen Logistics
GXO

Third party stakeholders

Department for Transport
UKRI Innovate UK
bsi.
CATAPULT Connected Places
nationalgrid
national highways
RICARDO
Zemo Partnership Accelerating Transport to Zero Emissions

Electric Freightway – Roadmap to #deliver

Develop
- Origination
- Development
- Permits and Planning
- Legals
- Grid
- Contracts

01

Approvals
- Land and leases
- Budgets
- Delivery frameworks
- Commercials
- Investment/Board approvals

03

Operate
- Operations
- Customer
- Consortium

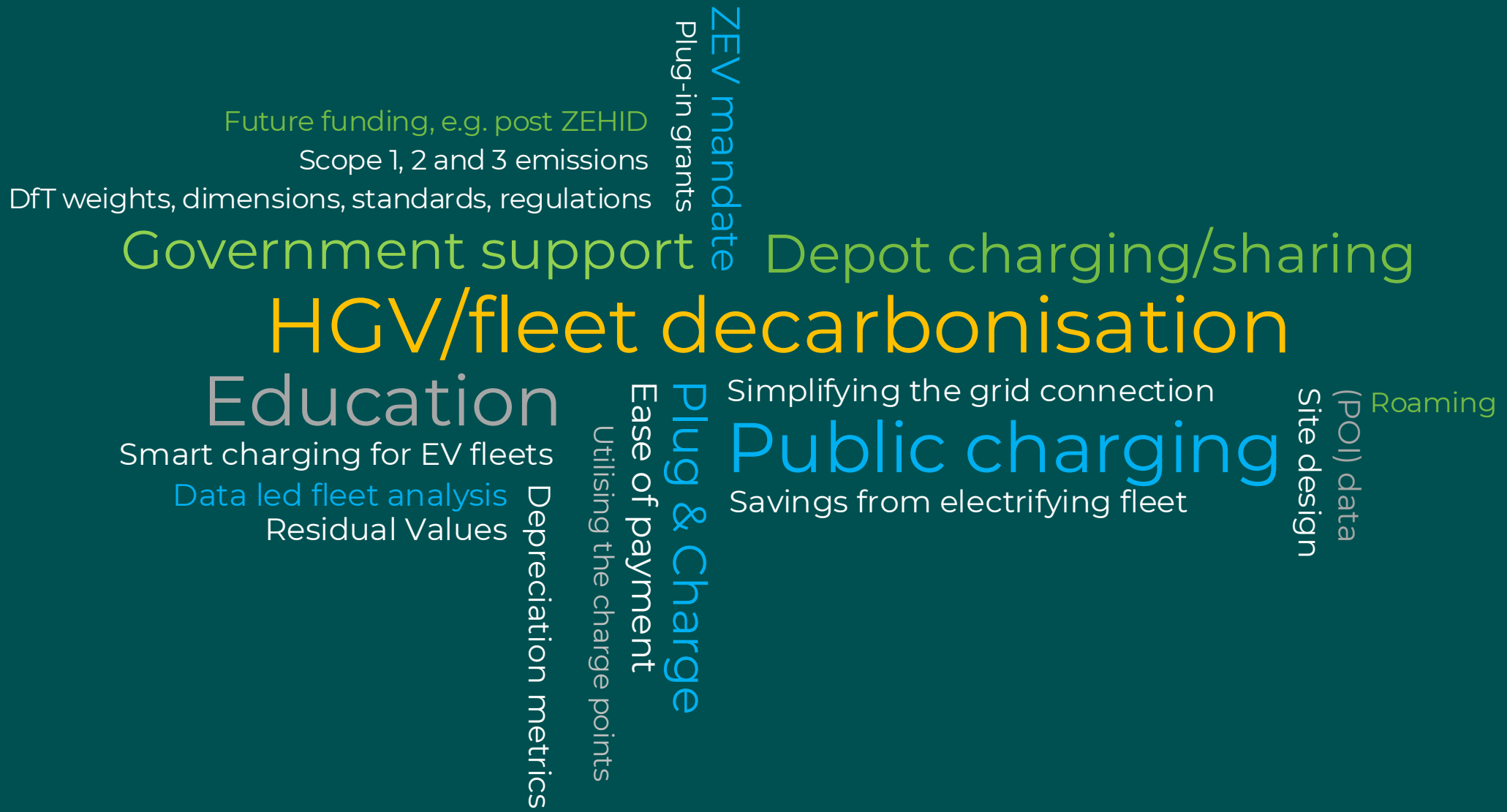
05

02

Design
- eHGV Islands
- Engineering
- Hardware
- Architects
- Innovation in hardware e.g. MCS
- Software system design e.g. bookable charging

04

Deliver
- Governance
- Construction
- Principal Contractors

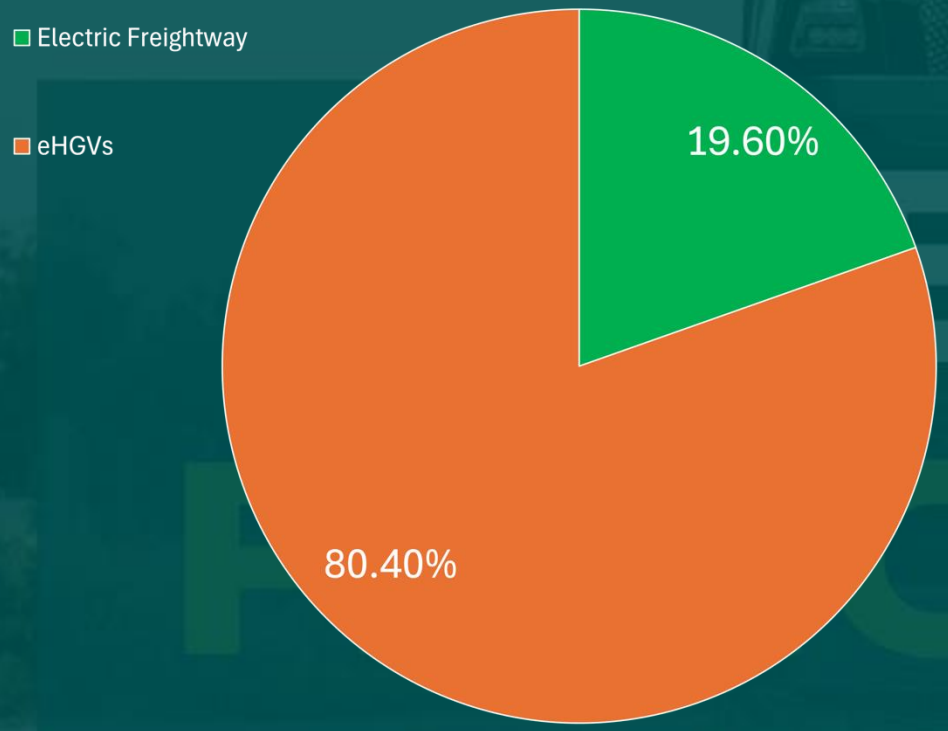

Future funding, e.g. post ZEHID
Scope 1, 2 and 3 emissions
DfT weights, dimensions, standards, regulations
ZEV mandate
Plug-in grants
Government support
Depot charging/sharing
HGV/fleet decarbonisation
Education
Smart charging for EV fleets
Data led fleet analysis
Residual Values
Depreciation metrics
Plug & Charge
Ease of payment
Utilising the charge points
Simplifying the grid connection
Public charging
Savings from electrifying fleet
Roaming
(POI) data
Site design

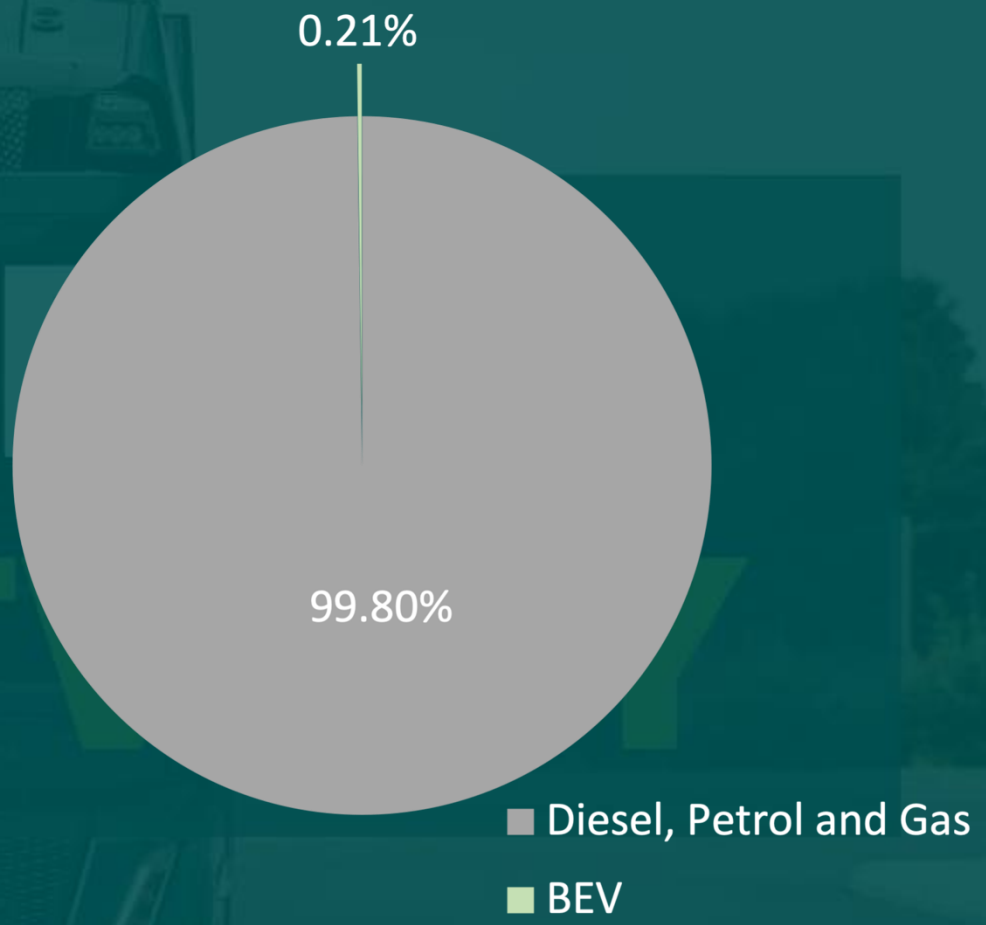
Progress

First trucks on the road and trucks on charge at depots

GRIDSERVE
ELECTRIC FREIGHTWAY

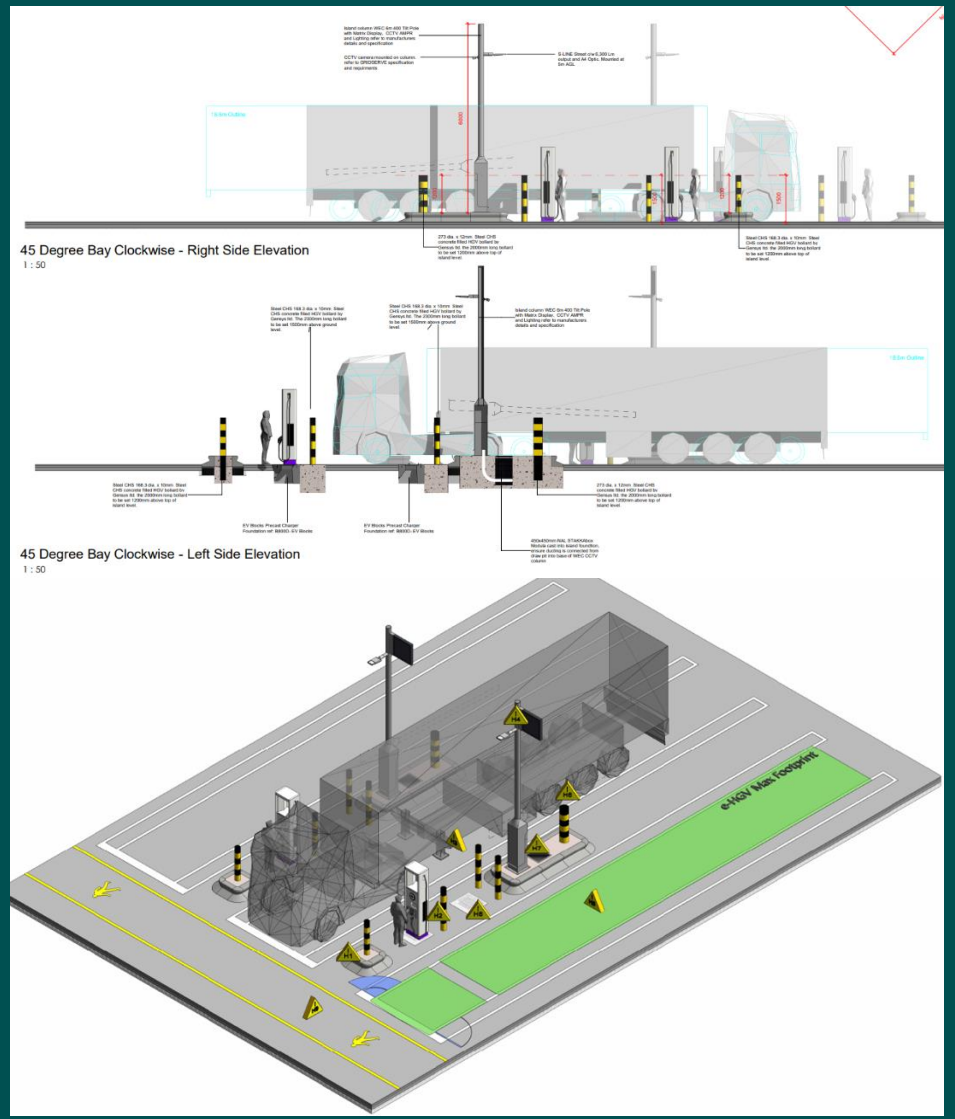
Electric Freightway statistics





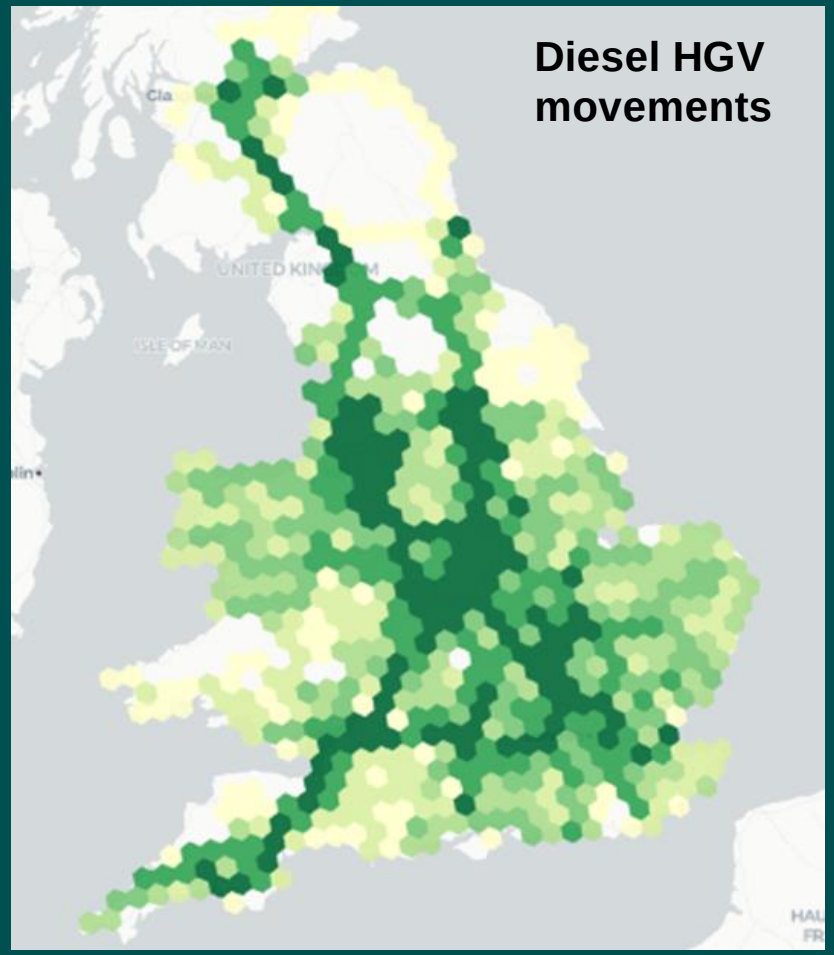
https://www.gov.uk/government/statistical-data-sets/vehicle-licensing-statistics-data-tables#all-vehicles

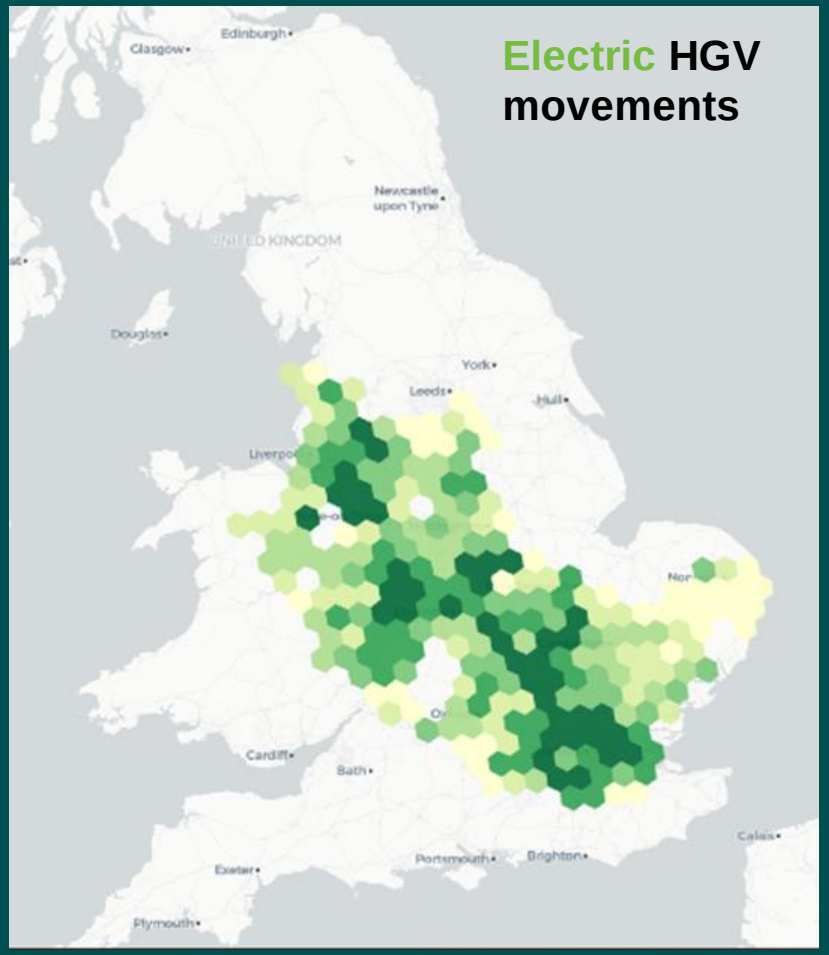
First trucks Public charging

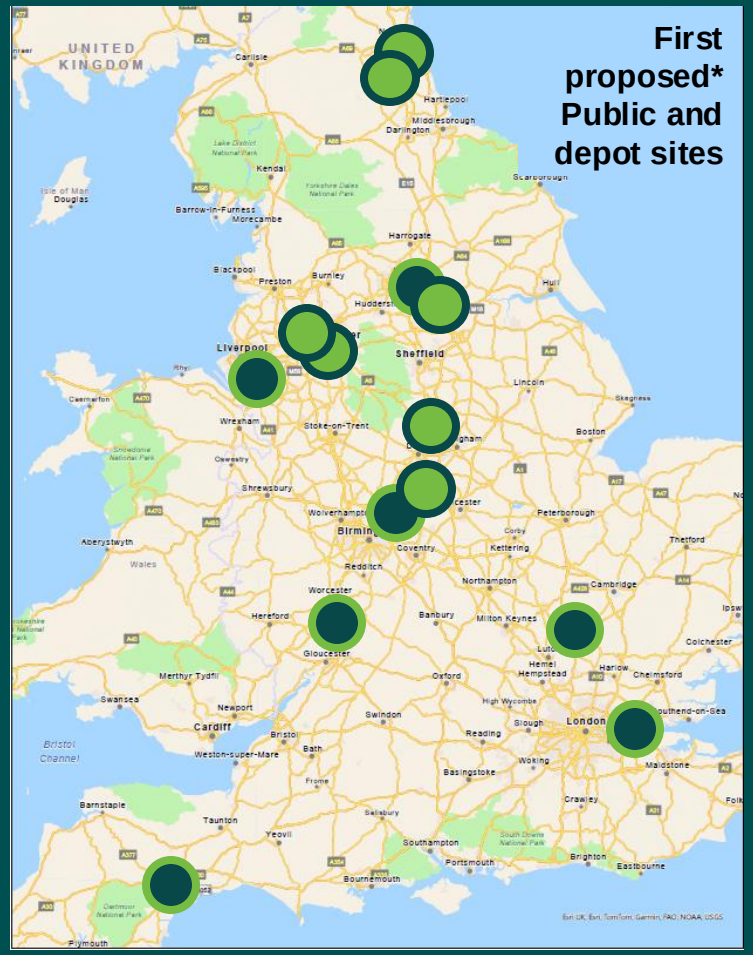


GRIDSERVE
ELECTRIC FREIGHTWAY

First trucks and charging sites







*Some proposed sites still subject to contract and/or funding

Electric Freightway: future reports & media events (subject to agreement for new baseline plan)

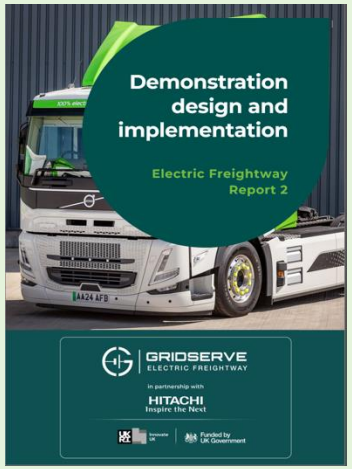
HITACHI
Inspire the Next

Published February 2024

Report 1
Project introduction and approach

Published October 2024

Report 2
Demonstration design & Implementation



February & March 2025

Project media events update

- Podcast interview: Hosted by Logistics Business: Early insights from eHGV fleet integration
- Round table webinar + campaign with hauliers Hosted by Road Transport Media

July 2025

Report 3
Interim findings

- Key findings to date (practical, economic, environmental)
- Update on attitudes towards eHGVs
- TCO and business model considerations
- Learning from depots deployed

By November 2025

Autumn update

- An update on project outcomes in a lighter format than standard report. Issues. E.G.>>>
- Final analysis of user surveys including 2nd round or driver surveys.
- Innovate report re commercialisation opportunities that have arisen from the project

By February 2026

Report 4
Final Report

- Key findings (practical, economic, environmental)
- Changes in perceptions
- TCO and environmental analysis to support scalable business models for eHGV fleets and charging
- Policy and Regulatory considerations

Thank you

GRIDSERVE
ELECTRIC FREIGHTWAY

https://www.linkedin.com/in/samclarke946/

ZENFreight

Accelerating Decarbonisation of HGVs

The Fleet Optimisation ZEHID Consortium

DYNAMON

Empowering fleets for tomorrow. Today

UKRI Innovate UK

Funded by UK Government

ZENFreight – Project Partners

Fleet Partners

Maritime
Great Bear
DFDS
Stobart
Gregory Delivering winners
Russell Logistics

Vehicle Manufacturers

Volvo
DAF
Scania
Daimler Truck
MAN

Charging Infrastructure Partners

enevo
VEV
VOLTEMPO™

Analysis, Optimisation, and dissemination

DYNAMON
RICARDO
Imperial College London

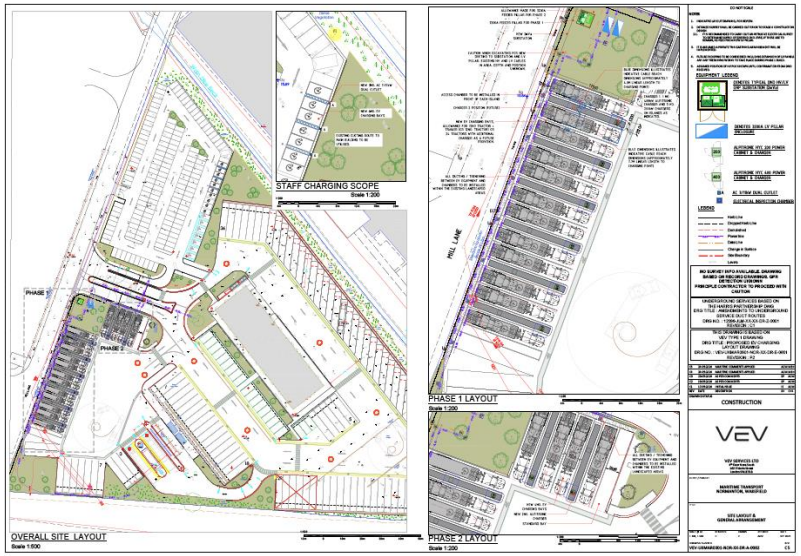
UKRI Innovate UK
Funded by UK Government

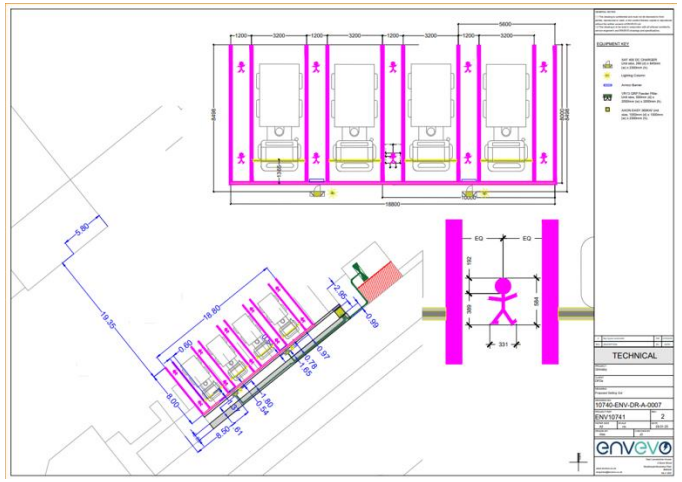
ZENFreight – Project Partners

- 62 BEV Trucks
- 19 depots - going live in 2025
- Charger power from 43kW AC – 250kW DC – 1MW DC
- 3 Hydrogen Fuel Cell Vehicles

Innovate UK
Funded by UK Government

ZENFreight – Planned Depot Charging

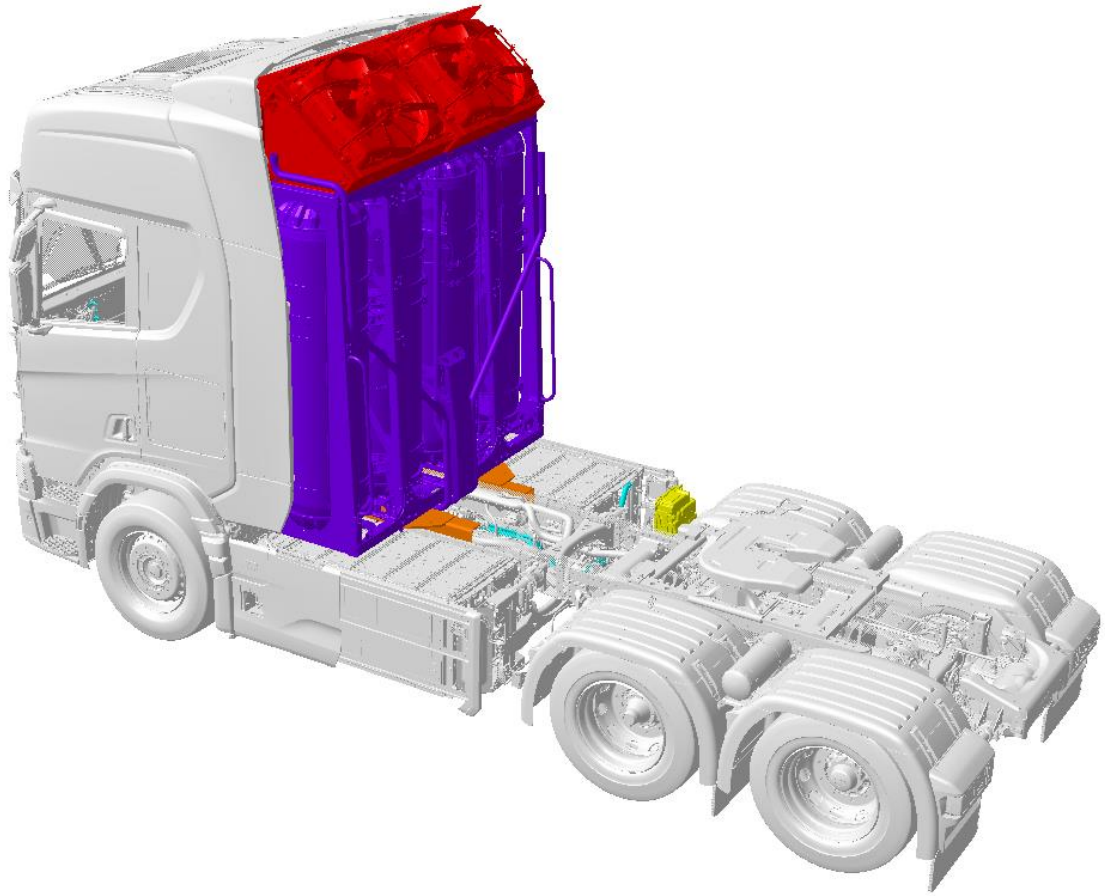




Innovate UK

Funded by UK Government

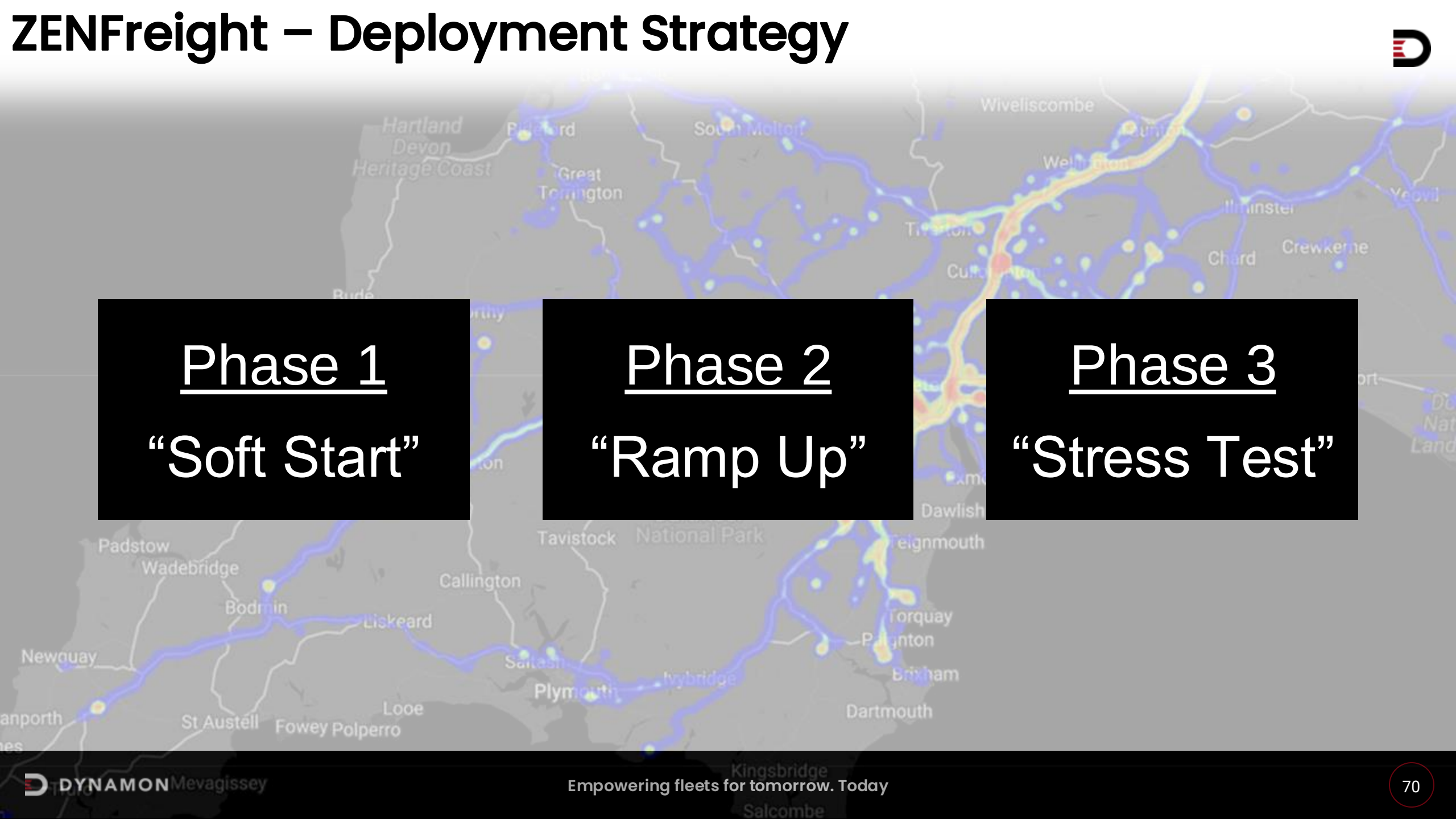
ZENFreight – Scania Fuel Cell EV



Innovate UK

Funded by UK Government

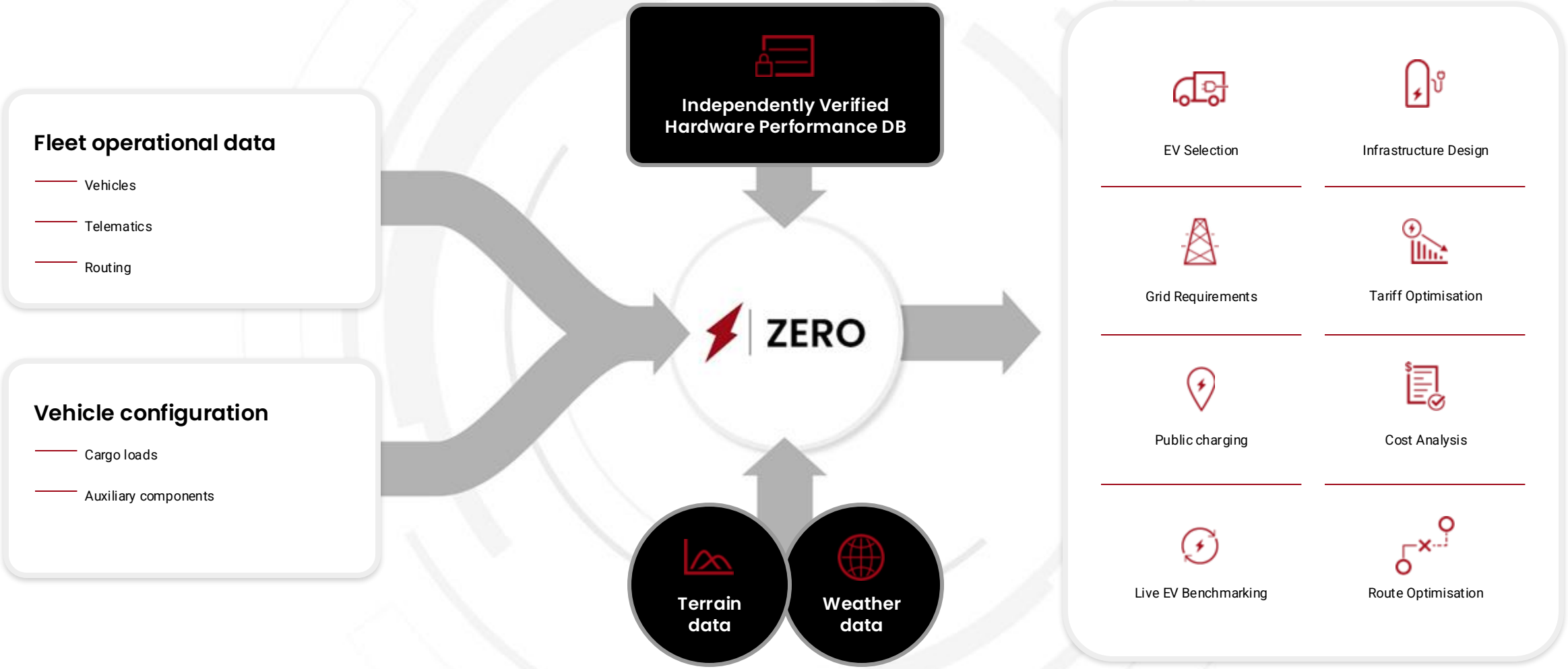
ZENFreight – Deployment Strategy



01

ZERO

ZENFreight – EV Fleet Optimisation with ZERO



ZERO

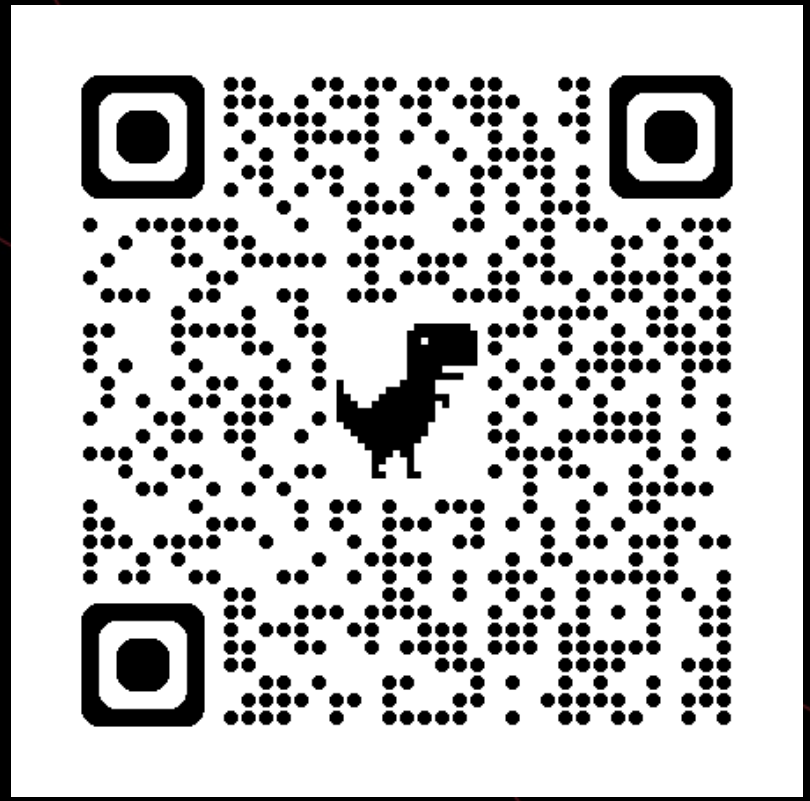
Benefits of Dynamon Report Offering:

- PDF Report with results
- Fleet electrification roadmap and executive summary
- Vehicle and location specific electrification insights
- Total cost of ownership (TCO) & rollout strategy recommendations
- Fleet activity and utilisation analysis
- Low battery hotspots and top-up charging analysis
- Delivering immediate, actionable business insights

Angus Webb

CEO

angus.webb@dynamon.co.uk



Scaling eHGV for Construction Materials

Ben Garner
Head of Logistics Development & Standards
Tarmac

Tarmac at a glance

Leading
materials capability

6,000
people within our organisation

UK wide
Contracting and Highways Services

Materials
Building products
Aggregates
Readymix
Pre-cast
Cement
Asphalt
Lime

2,500
fleet vehicles

30
Tarmac trains daily

51
Recycling/RAP plants

3
Cement plants

10
Marine wharves

2
Lime plants

93
Quarries

45
Building products sites

4
Marine dredgers

97
Readymix plants

17
Contracting depots

56
Asphalt plants

Sustainability

Sustainability is about securing long-term success for our business, our customers and communities by continually improving environmental, social and economic performance throughout the whole lifecycle of our products, services and solutions.

Our approach to sustainability is founded on whole life thinking and pushing the boundaries to develop innovative solutions, which help our customers create sustainable buildings and infrastructure.

Let's *Act* together.

38% reduction in CO_2
since 1990

Reduce our absolute carbon emissions by 30%
by 2030

100% clean energy
since 2018

Net zero
by 2050

Transport Decarbonisation
It's no longer a choice…

Zero Emission Zones

- 30 in the Netherlands by 2030
- Expected to expand across Europe through 2030s

Binding Targets on Truck Manufacturers

- 45% fewer emissions by 2030
- 65% fewer emissions by 2035
- 90% fewer emissions by 2040
- 100% by 2040 in the UK?

Improving Cost Model

- TCO for eHGV expected to be same or better vs. ICE consistently by 2030 across most truck use cases

Client Demand

- Key lever to meet corporate decarbonisation targets
- Carbon reduction for improved access to finance

Our Logistics Model

Raw Materials Production

Rail Movement

Local RMX Concrete & Asphalt Production

Last Mile by Road

30
Tarmac trains daily

1,479t
Average train load

2,500
Tarmac trucks on the road daily

900+
SME hauliers operate liveried trucks

UK First

electric concrete mixer truck

- **First-of-a-Kind** truck developed in partnership with Renault Trucks and TVS Interfleet.
- Multiple innovations around truck and drum.
- Conceived initially through **Tarmac's Supplier Innovation Challenge**.
- De-risk provided by the **CRH Innovation Fund**.

RENAULT TRUCKS

TVS Interfleet

iCSC Innovation Centre for Sustainable Construction

Last Mile – Back to Base

The RMX Concrete Logistics model is perfect for EV

The eMixer developed our understanding

Performance

1
Overnight charge to meet duty range

0
Loss of payload

Innovation

.

7
Patents filed by TVS

x3
Less likely to roll over

TCO

-£477
Annualised TCO Comparison to Diesel

174%
Acquisition cost to mitigate

Charging

=
eMixer can carry out equal duty cycle of ICE engine

22kw
Charger required to top up. Higher power charging required to top up charge to extend daily range

Maintenance

-40%
R&M Cost

Driver Experience

<70dB
Low noise levels

00:01
Instant torque helps on busy roads

<10m
Range anxiety at end of day

Our Trucks

Artic & Drawbar Cranes

Curtain Siders

Tippers

Low Loaders

Bulk Tankers

Mixers

Artic – Non Tipping

Gritters

Vacuum Tankers

LGV Tippers

Artic – Tipping

Grabs

Our Approach

Build Our Capability

Exploit Initial Scaling Opportunities

Unlock the Barriers

eMixer Discovery Programme

Building our Capability

- We have > 650 separate Independent Contract Hauliers operating in our business and in the coming years each of these will need to take their first step with eHGVs.
- In 2025 we are introducing five new 8m^3 eMixers to our fleet through our eMixer Discovery Programme, with the first already in operation in Kings Cross with Concrete Haulage Ltd.
- The eMixer Discovery Programme will allow hauliers to rent an eMixer at a similar Total Cost of Ownership to a new diesel equivalent for a minimum 6-month period, allowing them to build up their understanding of electric trucks in a low-cost and low-risk way (try-before-you-buy).
- The knowledge built up by hauliers through this programme will be invaluable in ensuring that they can adopt eHGV with confidence.

RENAULT TRUCKS

eFreight2030

Building our Capability

The Project

- eFreight2030 is an InnovateUK supported project which will deliver five first-of-a-kind electric artics moving a range of materials and create a strategic eHGV charging network for Tarmac across London.
- The project will provide:
  - 1x eTanker for bulk cement from Northfleet
  - 1x eLow Loader for moving mobile plant to road schemes across London from Snodland
  - 3x electric artics for asphalt and aggregates from Harper Lane
  - Multiple chargers across five locations.
- Artics supplied by Renault and DAF to allow us to explore different technologies.

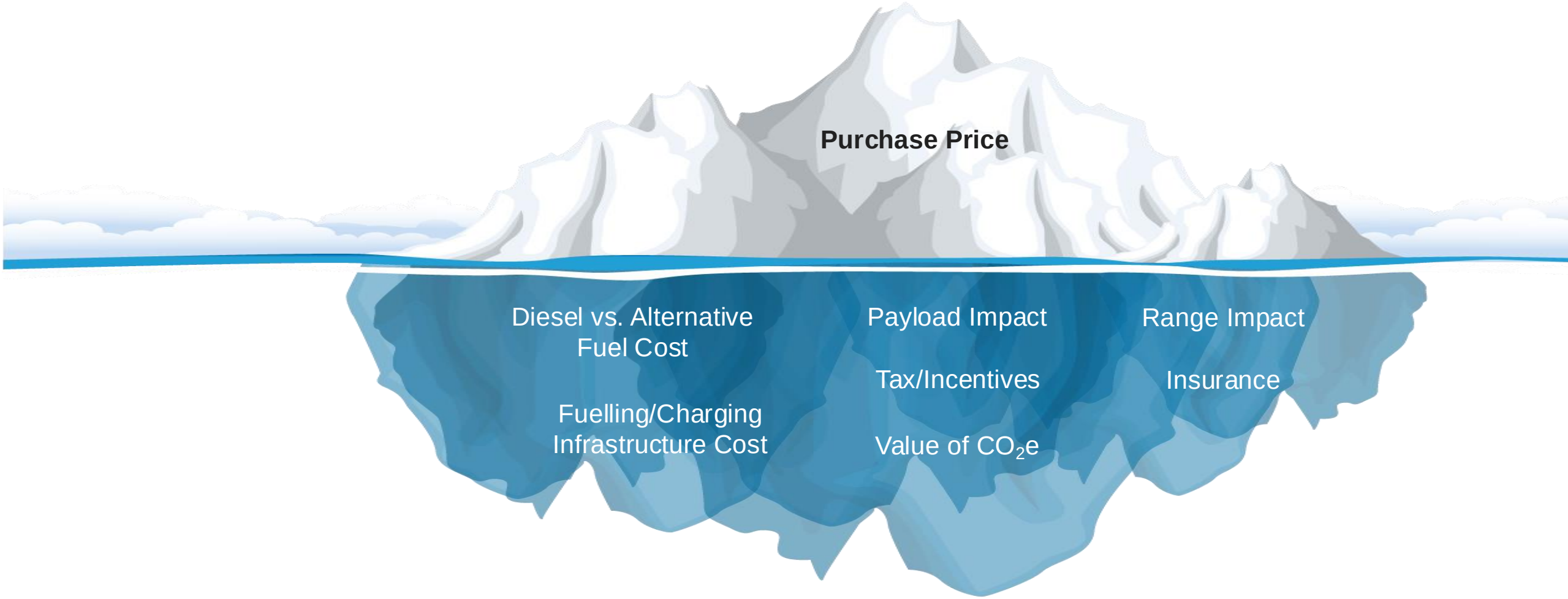
Creating a Tarmac Charging Network

Hyperchargers at Northfleet & Harper Lane (350kW) can fast charge (350kW) six trucks at a time and are MegaWatt charging compatible.

Network to extend range and enhance operational capability / flexibility.

The TCO Challenge

Unlocking the Barriers



The Payload Challenge

Unlocking the Barriers

- Vehicle payload is governed by a combination of Gross Vehicle Weight and Axle Weight limits.
- Majority of construction materials vehicles are 8-wheel rigid trucks or large articulated tractor-trailers. These vehicle types made up >50% of new truck sales last year. eHGV tare weights are 2-4 tonnes higher than diesel today and forecast to still be 1-2 tonnes heavier by 2035.
- There is currently no dispensation to allow these types of eHGV to operate at heavier weights meaning a loss of payload.

20% reduced payload

=

20% more trucks + 20% more cost + 20% more drivers + 20% more parking space + more road congestion + more wear on roads


WE STAND TOGETHER TO
REINVENT
THE WAY
OUR WORLD
IS BUILT

aegis energy

Accelerating the decarbonisation of commercial transport

Aegis Energy are building **the UK's first network of clean, multi-energy hubs** dedicated to commercial transport

Our hubs will offer electric charging, HVO, hydrogen and bio-CNG across the UK

Public infrastructure that meets the needs of commercial vehicle operators

aegis energy

Meeting the needs of commercial vehicle operators and drivers:

reliable

flexible

affordable

Where we are building our energy hubs:

logistics hubs

strategic road network

key transport nodes

Our hubs

Immingham

Sheffield

Corby

Towcester

Warrington

With more
to come

Multi-energy hubs - so you can decarbonise on your terms

Electric charging and HVO at every location, with ability to add bio-CNG and Hydrogen

aegis energy

Bookable, high-speed HGV charging

Overnight HGV parking and charging

Driver facilities

Bookable, high-speed van charging

Key Info	#s
Location	Sheffield
Hub size	6.2 acres
# of LGV bays	51
# of HGV bays	33
Time to junction	~1-2 mins

Secure: drive in barriers/ cameras

HVO and AdBlue

Planning permission and space for bio-CNG and Hydrogen

Enabling a seamless transition to zero-emission vehicles
Via bookable charging, flexible payments, high security standards

aegis energy

✓**New standards for security and driver facilities**

✓**Flexible prebooking of your charging slots via an online fleet portal**

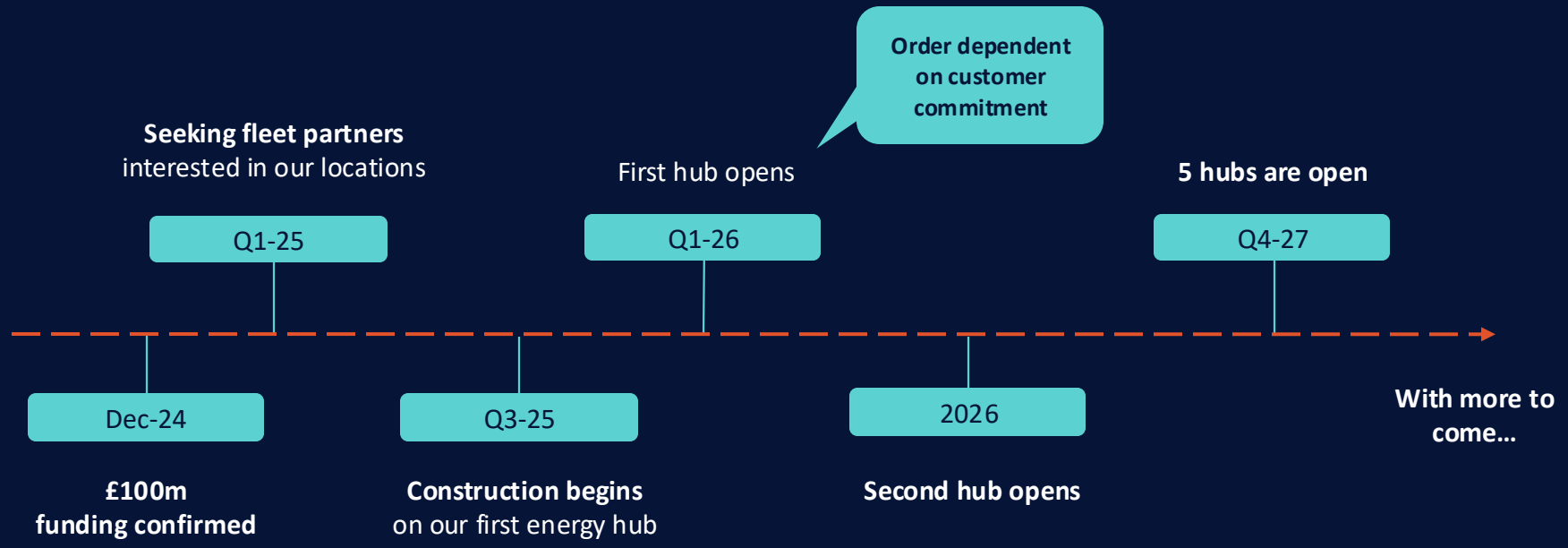
✓ **Simple payment methods**

Timelines

Opening our first hub in early 2026, with planned completion of 5 energy hubs by 2027

aegis energy

Timeline



Accelerating the decarbonisation of commercial transport
Working closely with fleets to ensure our hubs meet your needs

aegis energy

Reliable

Charging reliably available when your vehicles need it via bookable HGV and van charging

Flexible

In the low carbon energy we offer, in how you book, in how you pay

Affordable

Preferential tariffs available for committed customers

aegis energy

hello@aegisenergy.uk

https://www.aegisenergy.uk/

Wakefield

Langham House Business Centre, 140-148 Westgate, Wakefield, WF2 9SR

London

27-31 Clerkenwell Close, Unit G21, Clerkenwell Workshops, London, EC1R 0AT

first bus

Shared Bus Infrastructure as a Solution for Electrifying Heavy Road Transport

Andy Gwilliam

Product and Propositions Manager, First Bus

andrew.gwilliam@firstbus.co.uk

15,000
employees across the UK

1.1m
passenger journeys a day in 2022/23

More than
5,500
buses operated

20%
market share outside of London

60+
depots and outstations across the UK

Zero-emission bus fleet by 2035

Supporting Government aim to remove all diesel-only trains by 2040

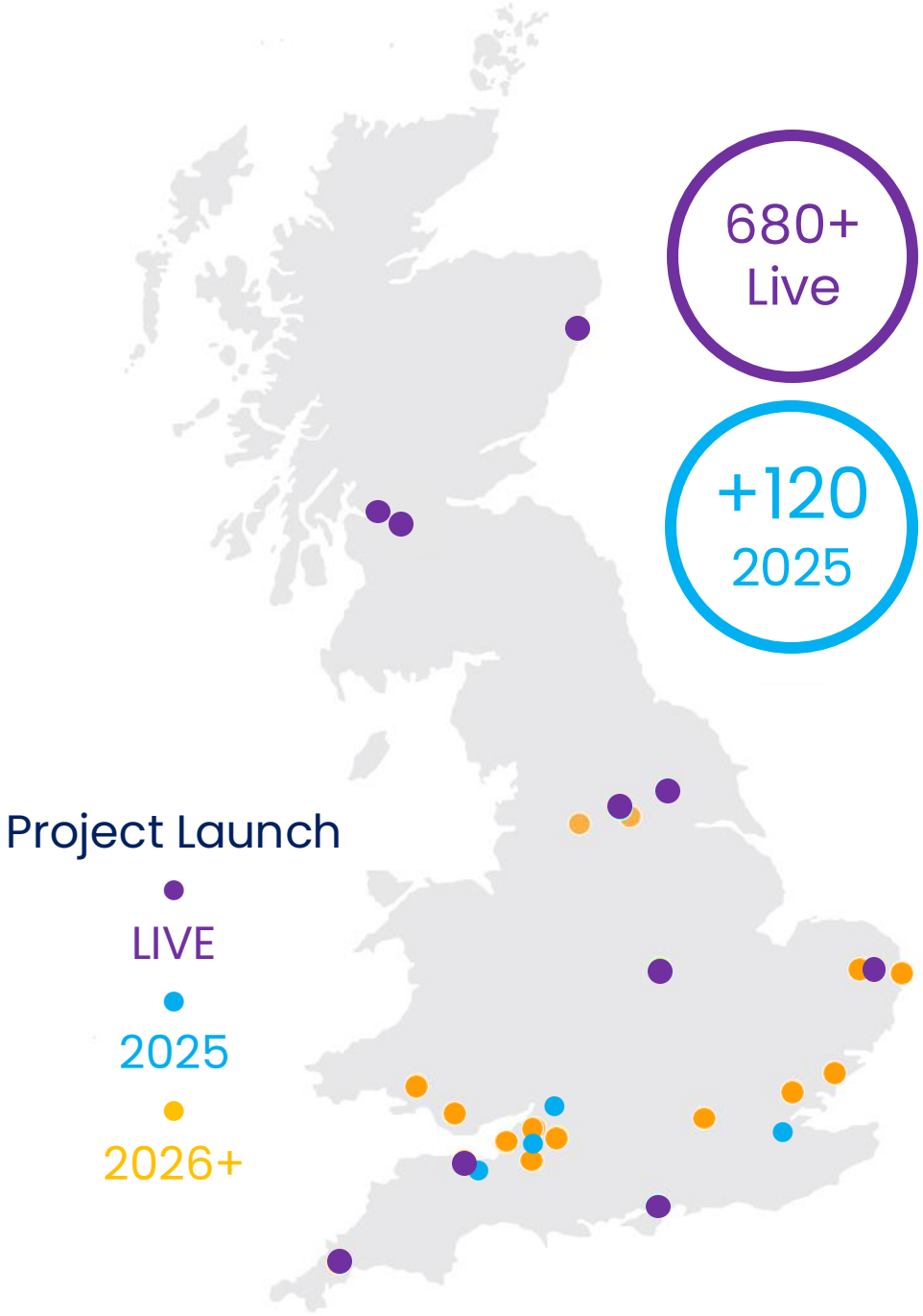
Setting science based targets for sustainability

Net-zero emissions by 2050 or earlier

First UK public transport operator to sign up to the TCFD guidelines

Signatory to the UN's Business Ambition 1.5 pledge

First Bus Rapid Charging Hub Locations



75kW-350kW Charging Capability

Location	Status	Charging Outlets	Units Accepted
Leicester	Live	86	
Aberdeen	Live	24	
Glasgow 1	Live	147	
Glasgow 2	Live	50	
Cornwall	Live	8	
Leeds	Live	57	
York	Live	53	
Norwich	Live	70	
Portsmouth	Live	62	
Minehead	Live	8	

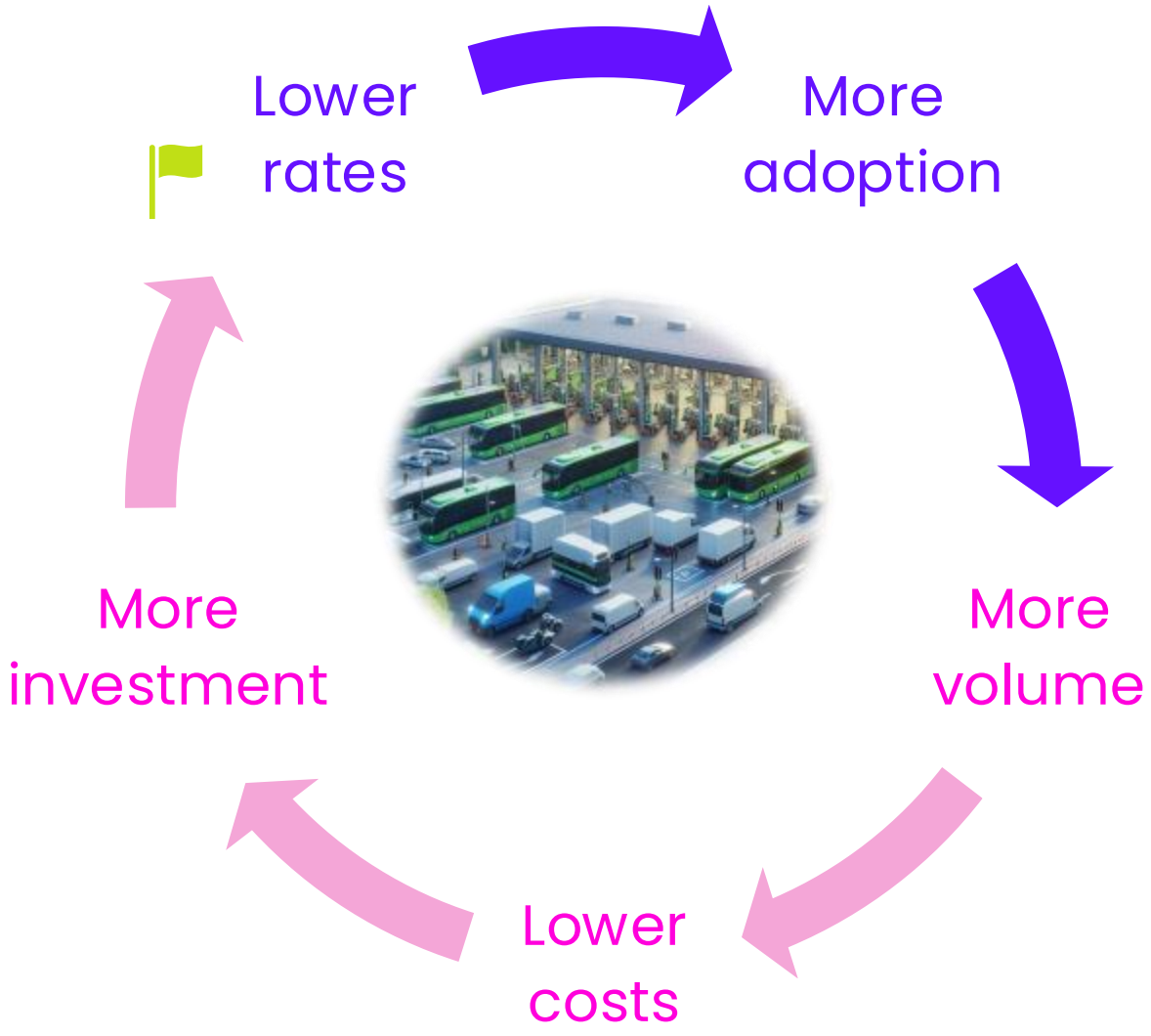
Full site details including location coordinates available on request

Our Sites

Already sharing our infrastructure

first bus

Consolidation drives down costs for everyone, speeding up progress



Less grid connections, easing DNO waiting lists.

Less planning permissions, easing local authority planning offices.

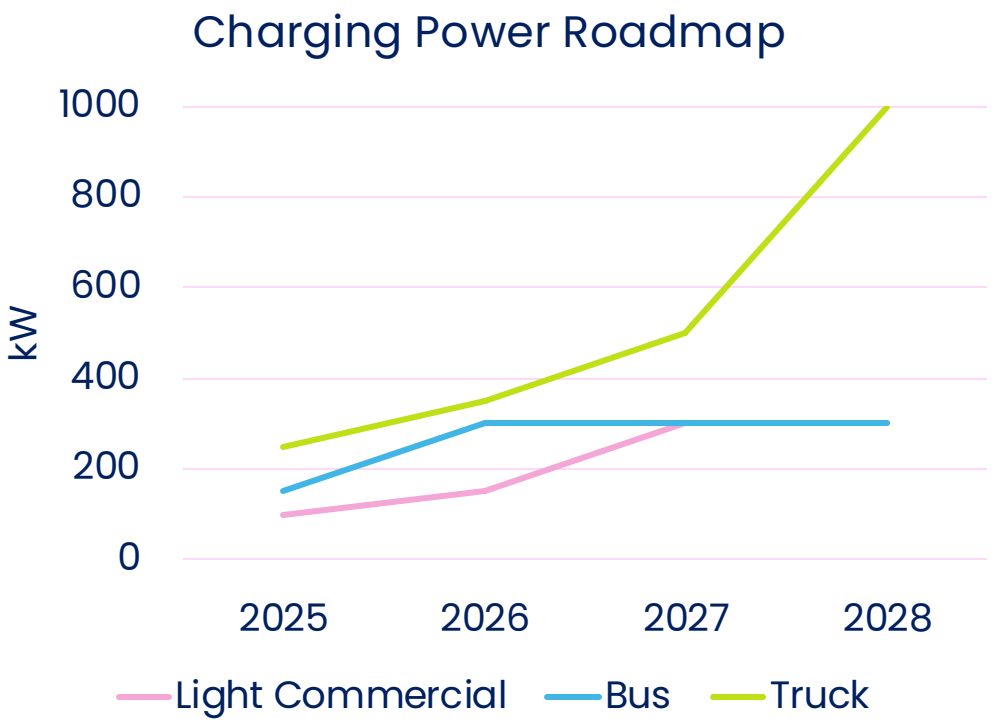
Less chargers and other equipment being produced and shipped around the world so less cost, and less CO2.

Less mileage for field engineers, less cost, and less CO2.

More time to focus on shaping successful low carbon businesses.

first bus

Investing now in shared infrastructure



Every newly electrified depot from 2025 is **designed as a shared space.**

350kW chargers will be available at all newly electrified sites and are being offered at **no additional cost**.

Current roadmap to 540kW in the next two years in place, MCS capability will follow **led by market demand.**

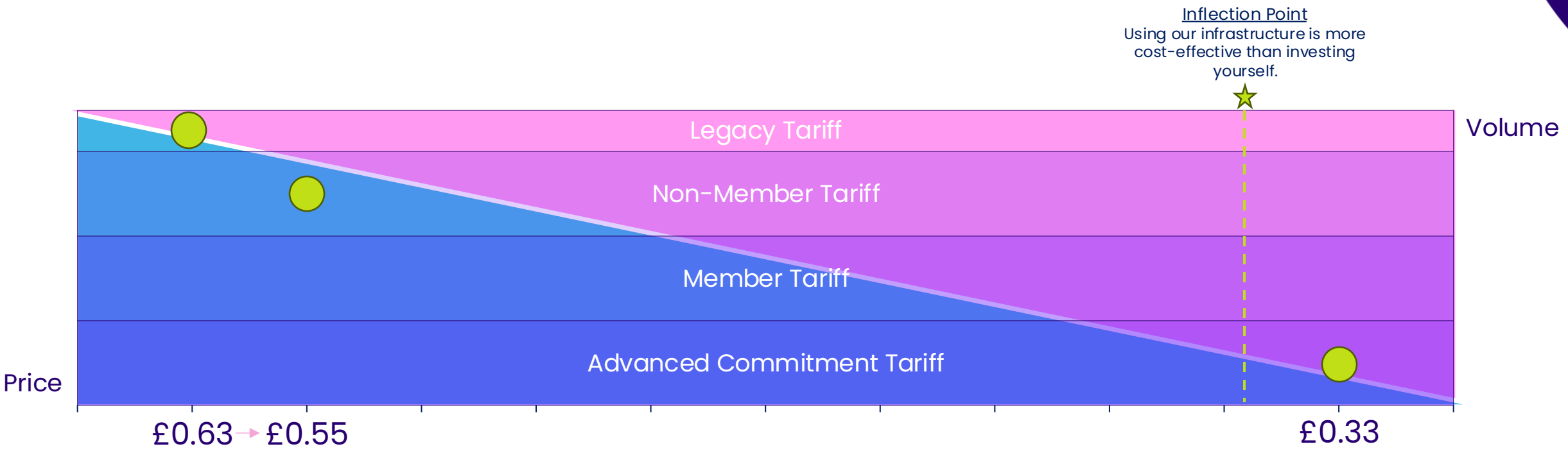
Parking layouts designed for **bus, truck, coach and van from the outset**.

Big grid connections (<10MW) and low daytime demand mean **your vehicles will be offered the maximum charge rate** in most circumstances.

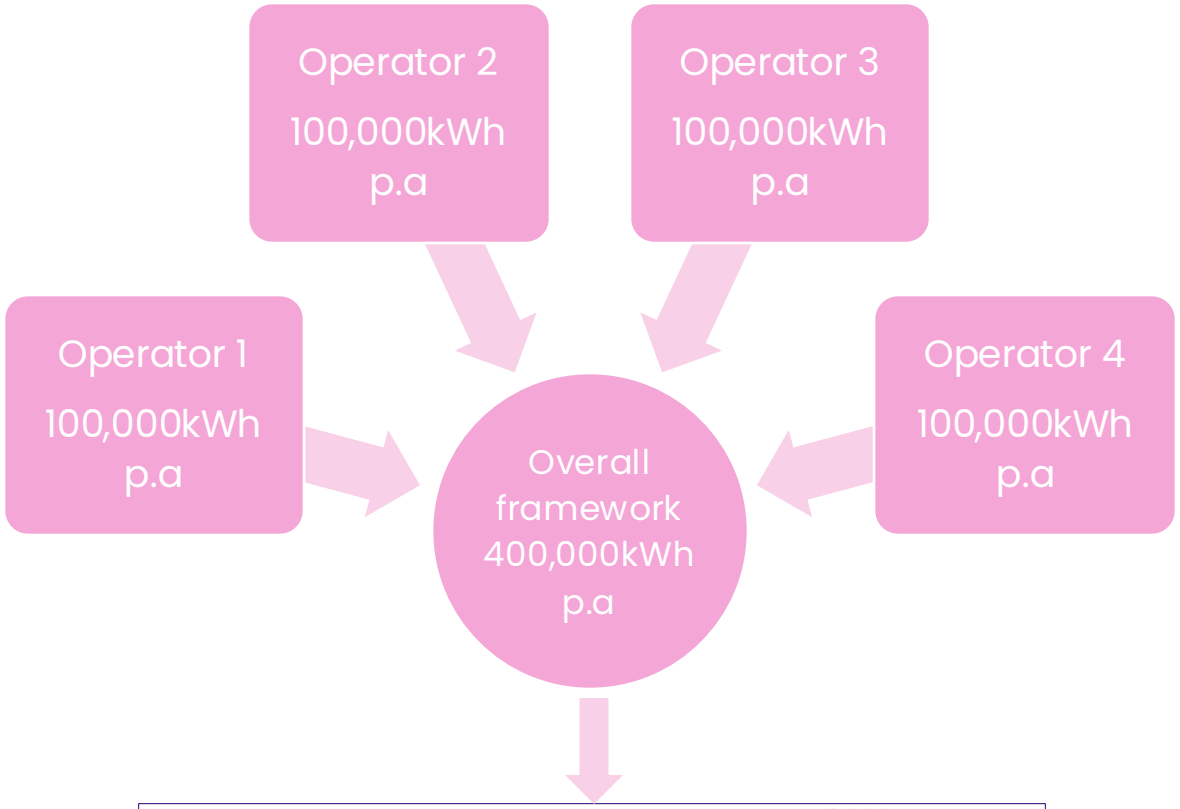
Roaming cards will be accepted at all sites shortly.

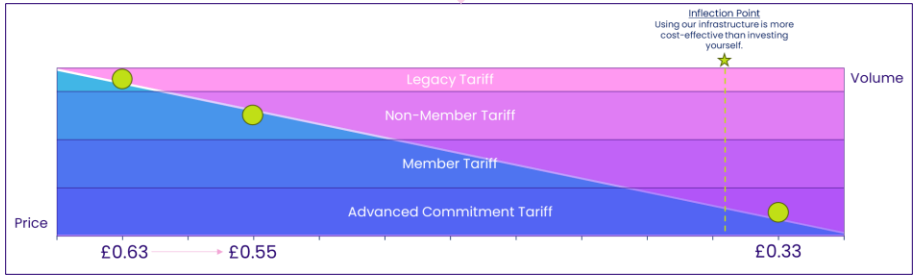
first bus

Tariffs designed to seriously impact TCO



Aggregating volume to build confidence within an emerging market





First Bus encourages multi-operator framework agreements, aggregating demand and giving confidence in volume in exchange for better pricing:

Average charge session kWh	200
Vehicles per customer	5
Customers per consortium	5
Vehicles per consortium	25
Visits per vehicle per week	3
Visits per customer per year	468
kWh per customer per year	93,600
kWh per consortium per year	468,000

Next steps:
Discussions and feedback from the consortia and broader operator community, starting to shape these agreements.

first bus


first bus
Moving the everyday

SCALING UP ZERO-EMISSION HGVS

…through Standards, Best Practice, and Investment

Alan Nettleton, Connected Places Catapult

Matteo Novati, BSI

THE CATAPULT NETWORK

A network of world leading centres designed to transform and accelerate the UKs capability for innovation and future economic growth.

CONNECTED PLACES CATAPULT

The UK’s innovation accelerator for transport, the built environment, cities and local growth.

Connect
the market

Spark
new possibilities

Accelerate
commercialisation

Examples of hazards discussed:

- Fire
- Collision
- Electrocution
- Hydrogen leakage

"Consider safety and security measures as early as site selection stage to ensure that sites with sufficient space can be selected."

"Engage with emergency services to discuss access requirements, water supply, etc."

"Mobile and temporary charging or refuelling systems should undergo the same level of risk assessment as permanent facilities."

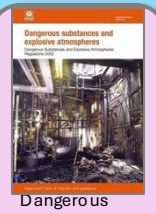
"Train employees on the risks and hazards associated with the fuels and infrastructure and ensure only certified personnel conduct maintenance on systems."

Key: Hydrogen | Battery Electric

Regulations
Outline legal requirements

- The Dangerous Substances and Explosive Atmospheres Regulation 2002
- Control of Major Accident Hazards (2015)
- The Pressure Systems Safety Regulations 2000
- Pressure Equipment Safety Regulations 2016
- The Planning (Hazardous Substances) Regulations 2015
- Control of Substances Hazardous to Health 2002 (COSHH)
- Hazardous Substances Act
- Manual Handling Operations Regulations 1992 (MHOR)
- The Confined Spaces Regulations 1997
- Alternative Fuels Infrastructure (AFI) Regulation 2017
- The Health and Safety (Safety Signs and Signals) Regulations 1996 (S.I. 1996/341)
- Management of Health and Safety at Work Regulations 1999
- Electricity at Work Regulations 1989 + Guidance HSR 25
- The Electric Vehicles (Smart Charge Points) Regulations 2021
- Electricity Safety, Quality and Continuity Regulations (ESQCR) 2002
- Building Regulations Document B & S
- Electromagnetic Compatibility Regulations 2016
- Electrical Equipment (Safety) Regulations 2016
- IET Wiring Regulations 2018

Approved codes of practice
Provide guidance on regulation requirements


Dangerous Substances and Explosive Atmospheres- Guidance

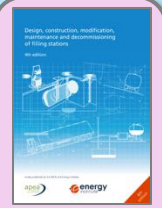

Control of Substances Hazardous to Health – HSE Guidance


Safe Work in Confined Spaces – HSE Guidance


Accident Hazards – HSE Guidance


Manual Handling – HSE Guidance


Pressure Equipment (Safety) - Guidance


The Blue Book (Gaseous Fuels Addendum)


Safety of Pressure Systems HSE guidance


Fuels Infrastructure 2017 Guidance

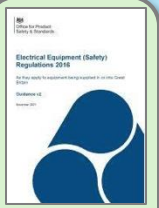

IET Code of Practice for EV charging equipment installation

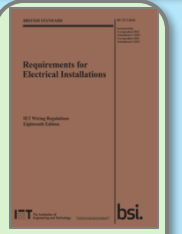

Vehicles Smart Charge Point Guidance


Safety, Quality, and Continuity – IET Guide


Building Regulations Requirements document – Fire Safety


The Electricity at Work Regulation - Guidance


Electrical Equipment (Safety) - Guidance


Requirements for wiring installations

Standards and Industry Codes of Practice
Outline methodologies for consistent practice

- IEC 60079:10 Explosive Atmospheres – Classification of Areas
- BSI ISO 19880-1:2020 Gaseous Hydrogen. Fuelling Stations. General Requirements
- ISO 19885: Gaseous Hydrogen – Fuelling protocols for hydrogen-fuelled vehicles.
- BSI 2073 Code of Practice for Hydrogen refuelling sites
- ISO/TR 15916 Basic considerations for the safety of hydrogen systems
- ATEX directives 137 and 114
- BSI 2072 Battery electric and hydrogen-fuelled heavy-duty vehicles – Workshops and protocols for maintenance and inspection
- BSI 2071 Publicly Accessible Charging Sites for Battery Electric HGVs
- EN62196-2(Type 2) & EN62196-3(CCS) AC connector & DC connector
- PD IEC PAS 61851-23 Electric Vehicle Conductive charging system
- Open Charge Point Protocol
- BSEN 50110-1 Operation of Electrical Installations – General Requirements
- SAE J3235 Best Practice for Storage of Lithium–ion batteries
- BSEN 61851 Weatherproofing IP rating
- IEC 61851-1:2017 Charging station design
- ISO 5475 Electrically propelled road vehicles – power transfer safety requirements

eHGV Battery Fire Risks report available to download

50-page report to raise awareness and share best practices.

Authors

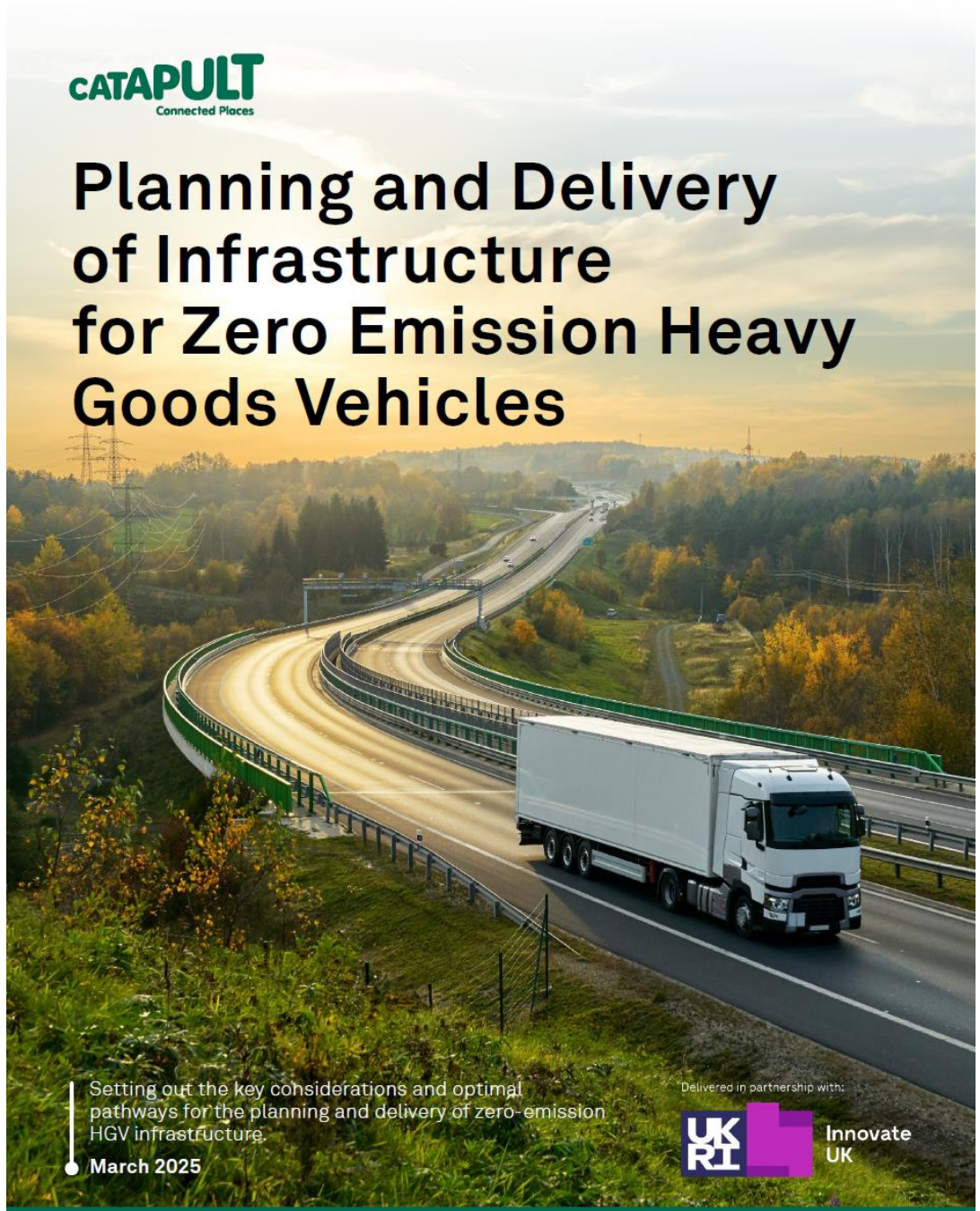
- Bo Gao (Syselek), Alan Walker (Syselek), Matthew Dear (BEAT)

Acknowledgements (expert contributions):

- EV-Exbox
- GoAhead Group
- Innovate UK/Faraday Institute, Battery Training Programme
- London Fire Brigade
- Metroline
- National Fire Chiefs Council
- National Grid Fleet
- Newcastle University
- StorTera
- TfL
- TPS
- University of Warwick, WMG

Download link:
https://www.syselek.com/ehgv-battery-fire-risks

Download code:



Strategic planning

Assessing policy an forecasted market growth for vehicles and infrastructure to identify the opportunity for development

Funding and investment

Identifying public funding and private investment opportunities to support upfront and operational costs

Site location and site design

Planning and viability studies for highly utilised sites considering fleet demand, energy/space requirements, accessibility and local policy

Utility planning

Assessing existing and required grid capacity and planning for upgrades to electrical transmission assets with distribution network operators

Land acquisition

Undertaking surveys and land assessments prior to negotiating and agreeing the terms and conditions of sale

Pre-application process

Engaging with the local planning authority, regulators and other stakeholders to shape an attractive and compliant proposal

Detailed design

Site detailing, confirming specific infrastructure components with continued stakeholder engagement

Planning process

Applying for planning permission through the local planning authority, agreeing planning conditions and consulting with the local community

Procurement

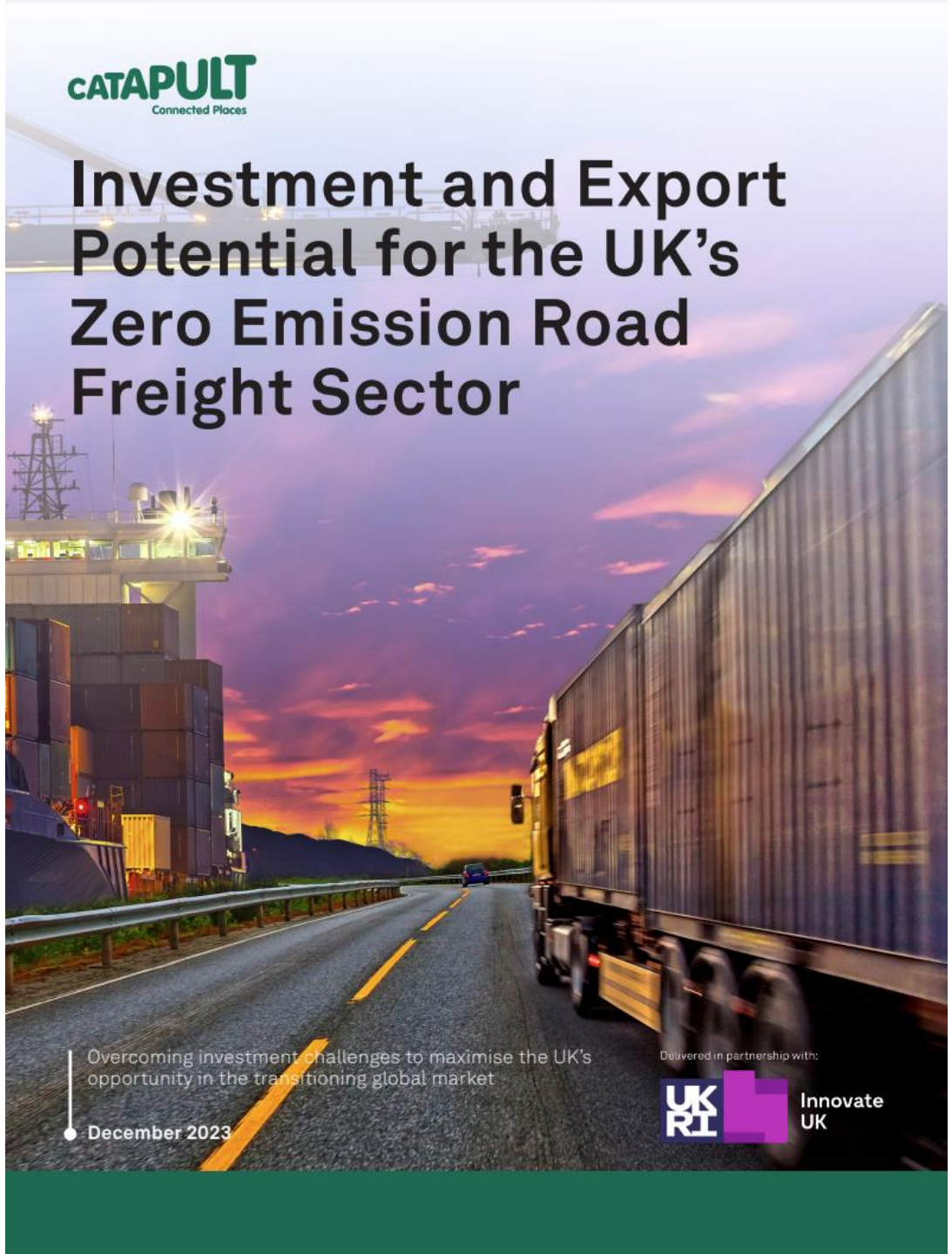
Setting up a procurement strategy and principles, followed by tendering and award of contract

Construction

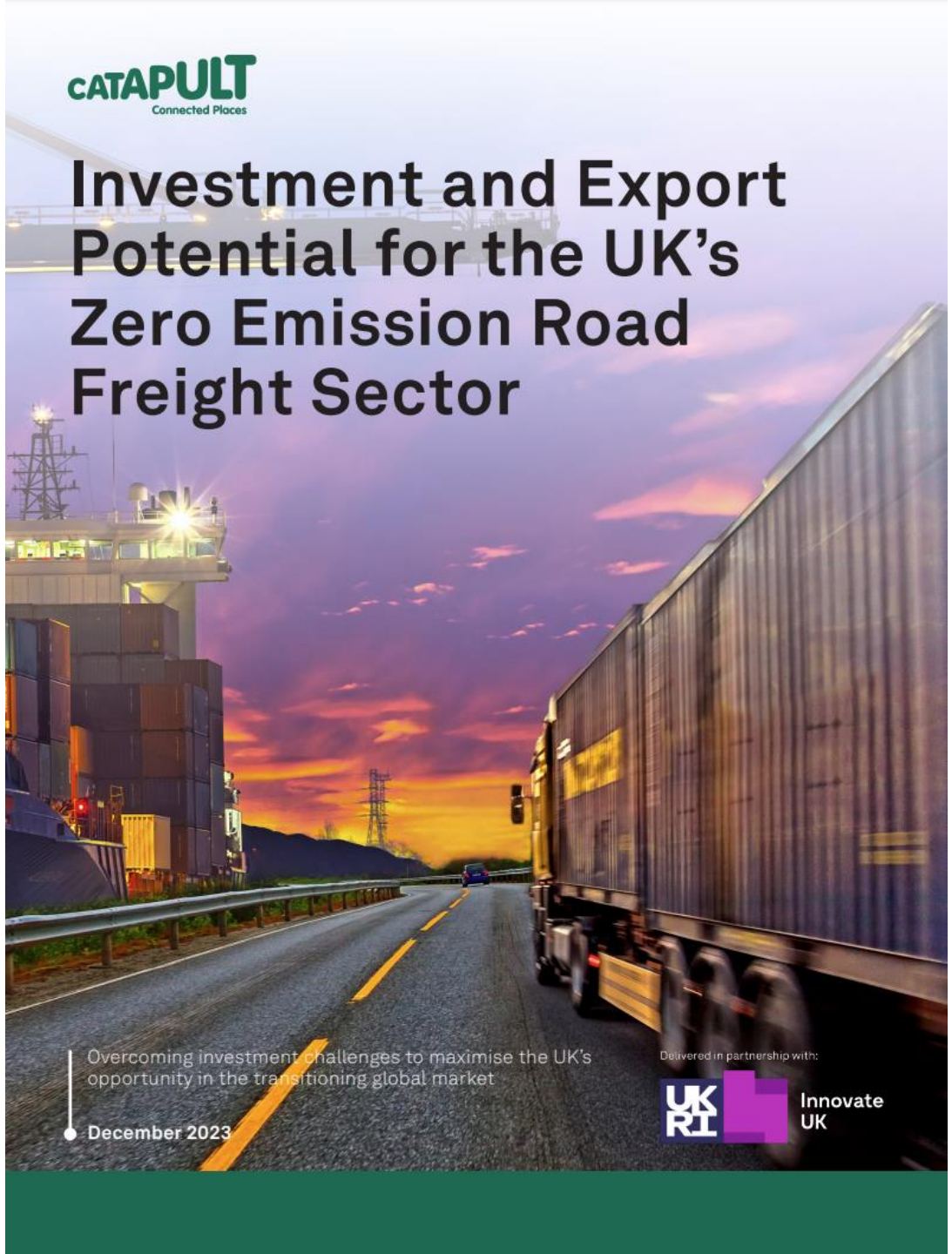
Developing regulatory compliant infrastructure guided by standards and supporting management functions

Operation

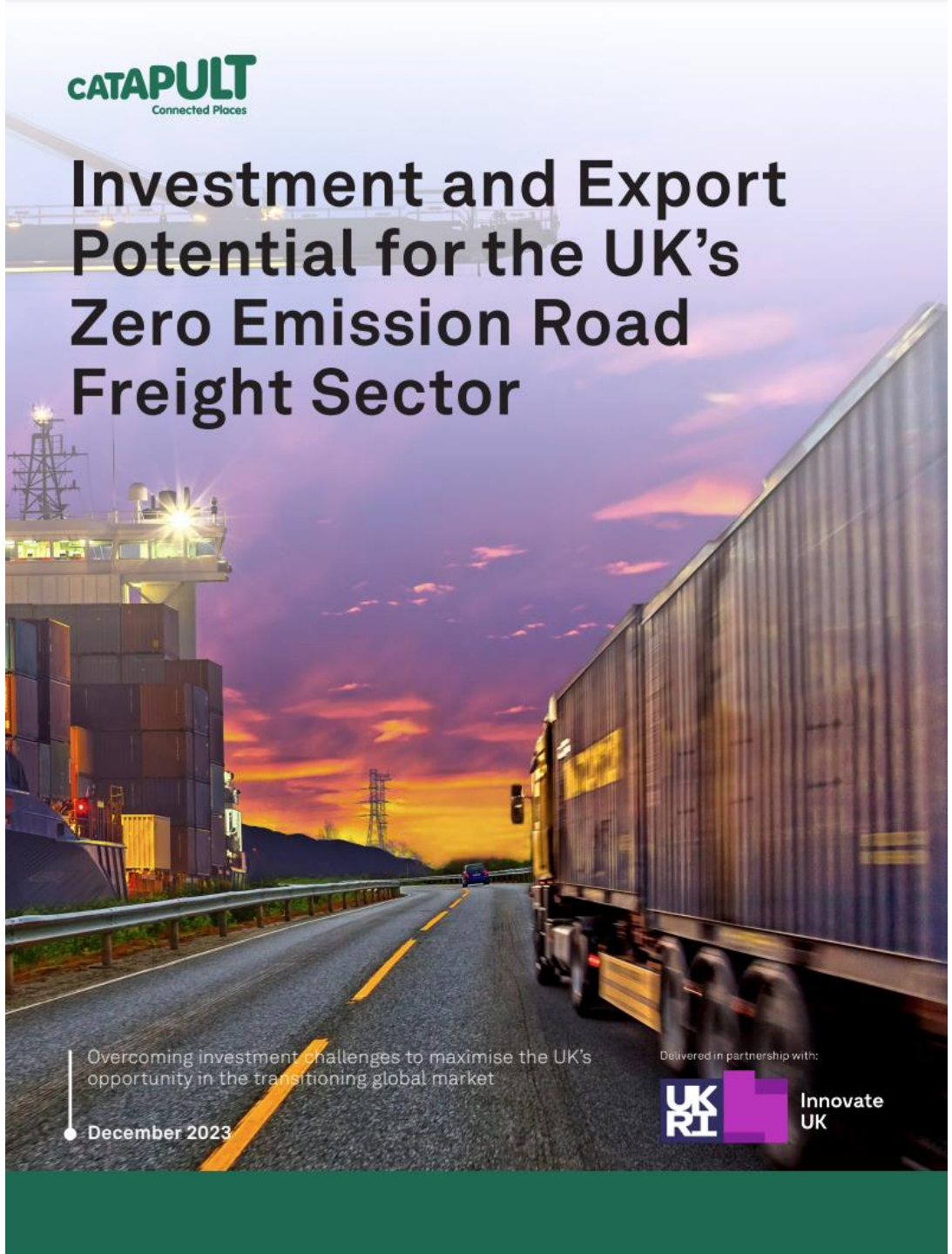
Ensuring safe charging and refuelling operations that approves a reliable service for fleets which can meet increasing industry demand



- HGV market overview
- UK strengths and capabilities
- Challenges in attracting finance
- Policy recommendations



"Strategic investment is required to both support the UK's domestic transition, and to unlock export opportunities in the future."



Recommendations for policy makers and industry to support investment across:

- Policy drivers
- Funding support
- Investment models
- Maximising demonstration outputs

Investment opportunities

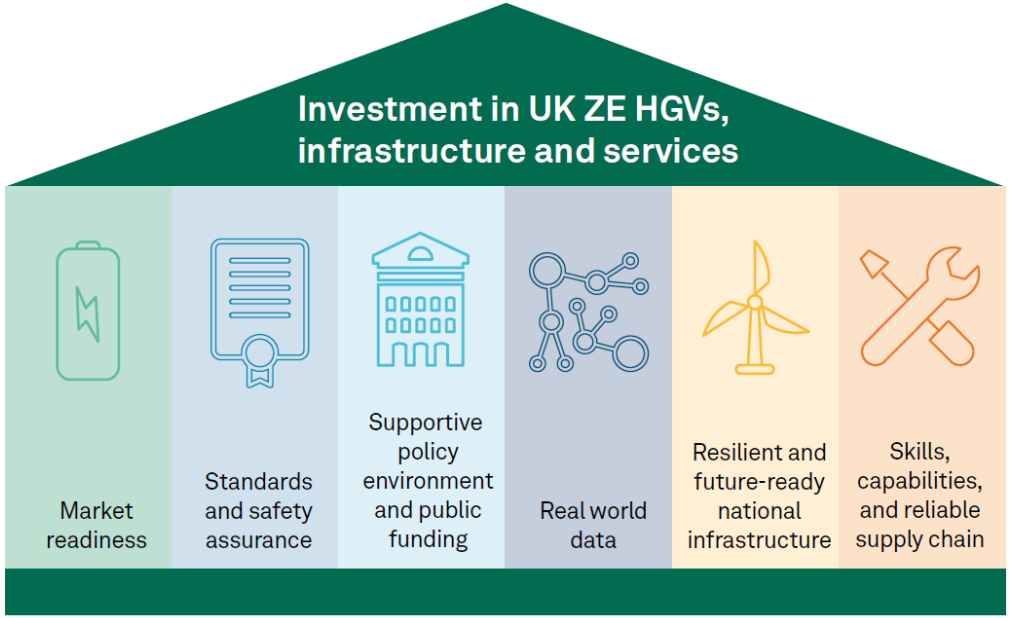
Zero emission HGVs

- Vehicle leasing
- Battery leasing
- Used batteries
- Green bonds
- Grid balancing

Charging and refuelling infrastructure

- Charging-as-a-Service
- Shared charging solutions
- New business models for fleet operators
- Data

The UK's strong foundation for zero emission HGV investment



How ZEHID is supporting each of the pillars:

- Installing charging and refuelling infrastructure around UK
- Gathering and sharing real-world data
- Developing collaborative industry and knowledge base

Standards and industry transitions

During periods of technological transformation, standards help industries to:

- Enable **innovation** (de-risk emerging tech) through development of good practice
- Ensure **quality, sustainability** and **safety** performance to build users confidence
- Achieve **global harmonisation and interoperability**, supporting scale up and savings

ZEHID standards programme

Working alongside the demonstrations is allowing us to:

- **Leverage momentum** and collaborative spirit among stakeholders
- **Identify early barriers,** challenges and opportunities to capture shared practices
- **Learn directly from trials, and feed back learnings** from existing good practice in adjacent sectors

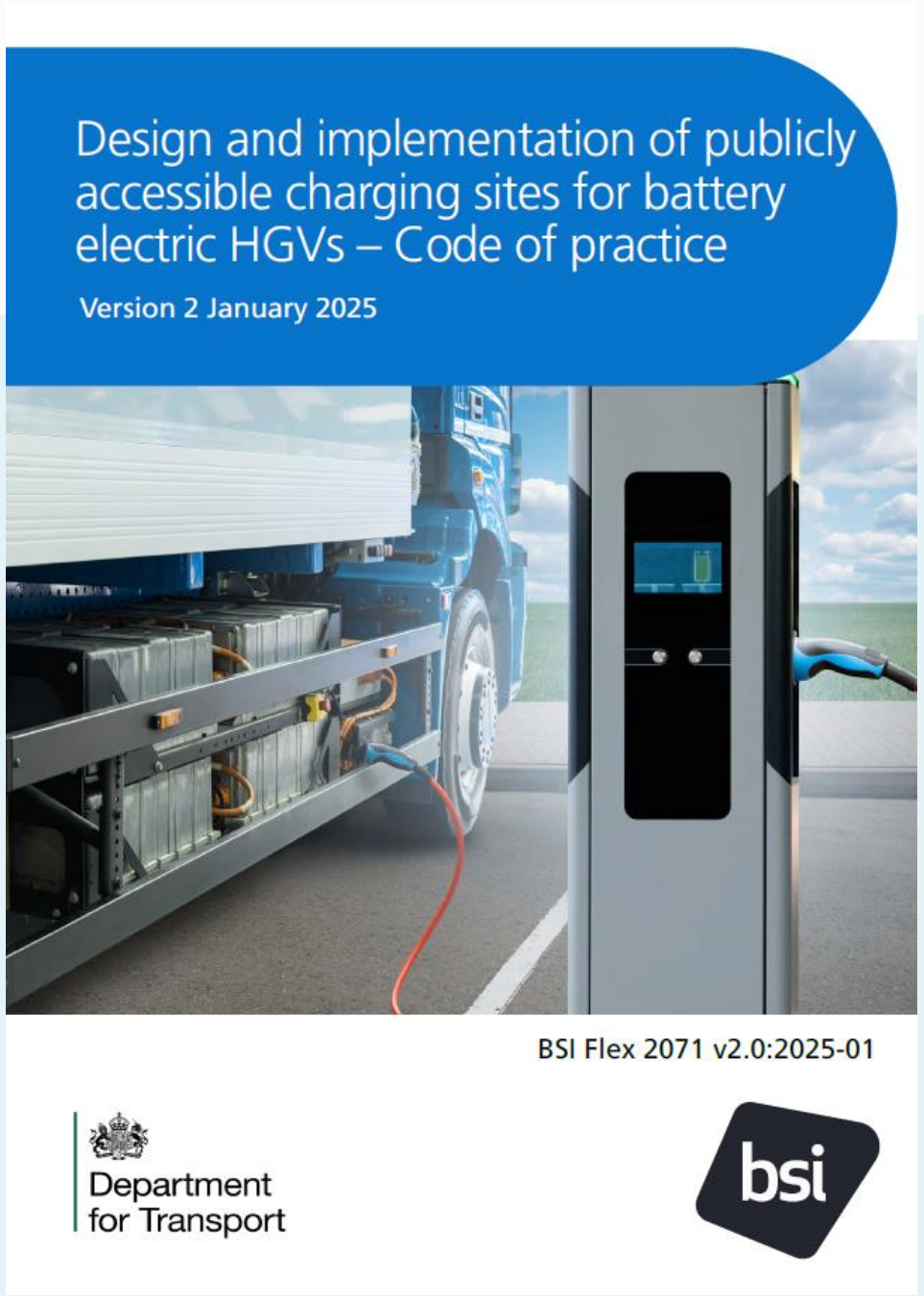
BSI Flex 2071

Focuses on publicly accessible charging sites, with practical recommendations on:

- Layout & accessibility
- Electrical & fire safety, pedestrian safety

Revision aligns with CDM regulations and RIBA plan of work.

New section with guidance on the development of a detailed operational plan (traffic management, risk assessment…)



BSI Flex 2072

Requirements for workshops, inspection/repair activities, risk management, planning, personnel.

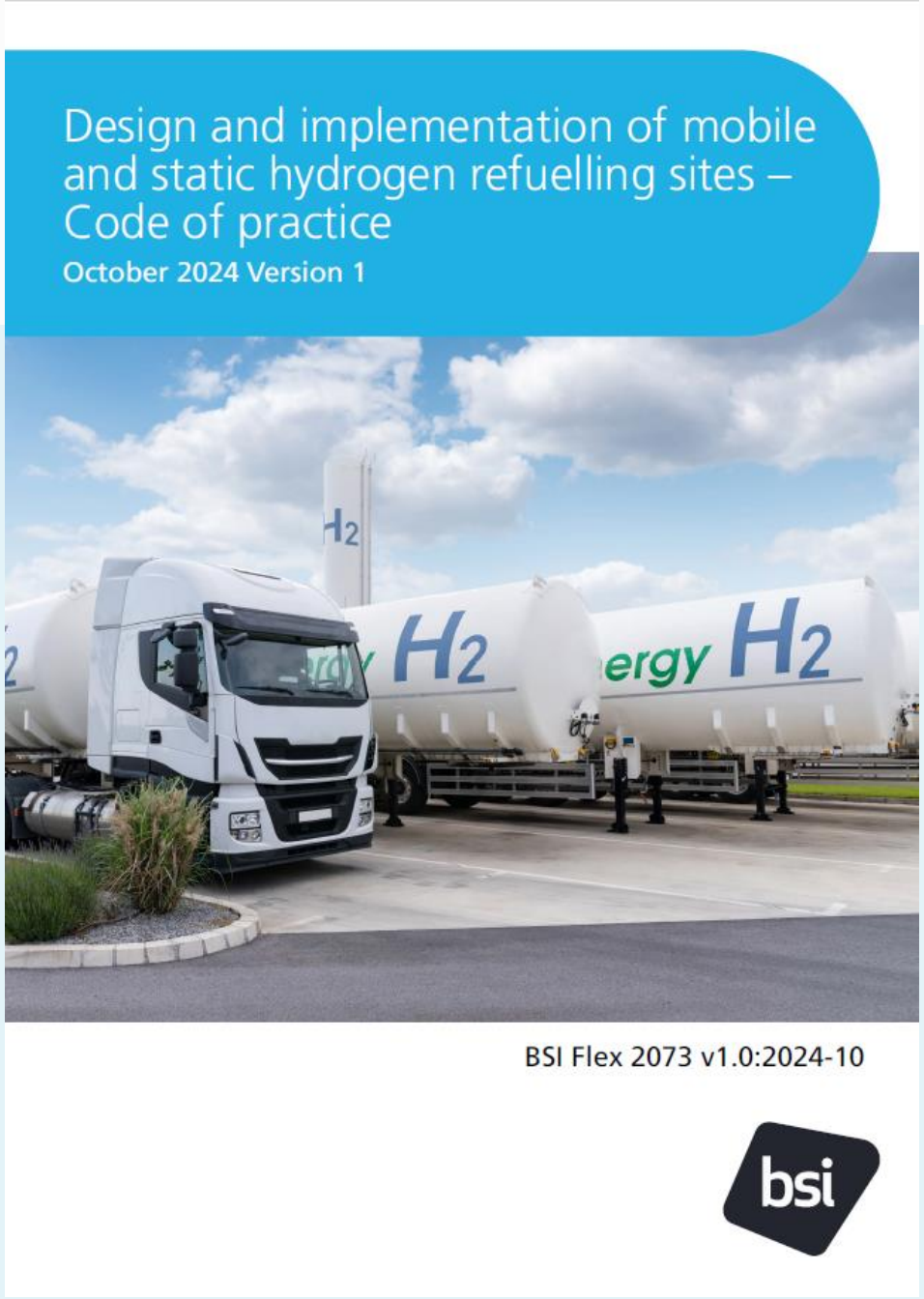
Intended for use by:

- Fleet managers (trucks, coaches and buses)
- Designers, owners and staff of workshops carrying out inspections, diagnostic, maintenance and inspection – but also retrofit and MOT testing

Recently included in the curriculum for the IRTEC technician qualification

BSI Flex 2073

- Design, installation and operation of mobile and static gaseous hydrogen refuelling systems intended for roadworthy heavy-duty vehicles.
- Revision includes several inputs from Health & Safety Executive
- Intended for use by: designers, manufacturers, installers, operators, inspectors and maintenance personnel.
- Potentially applicable to non-road mobile machinery (NRMM).



Next Steps

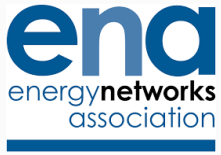
Work with Innovate UK and ZEHID consortia to capture learnings and monitor adoption of guidance and good practice.

Disseminate across wider road freight sector and beyond, looking for crossovers with adjacent transport industries.

Facilitate occasions for industry to discuss challenges and priorities for standards towards zero-emission transition

Thank you

to over 50 organisations that helped us shaping the standards!



THANK YOU

Any Questions?

Alan Nettleton
alan.nettleton@cp.catapult.org.uk

Matteo Novati
matteo.novati@bsigroup.com

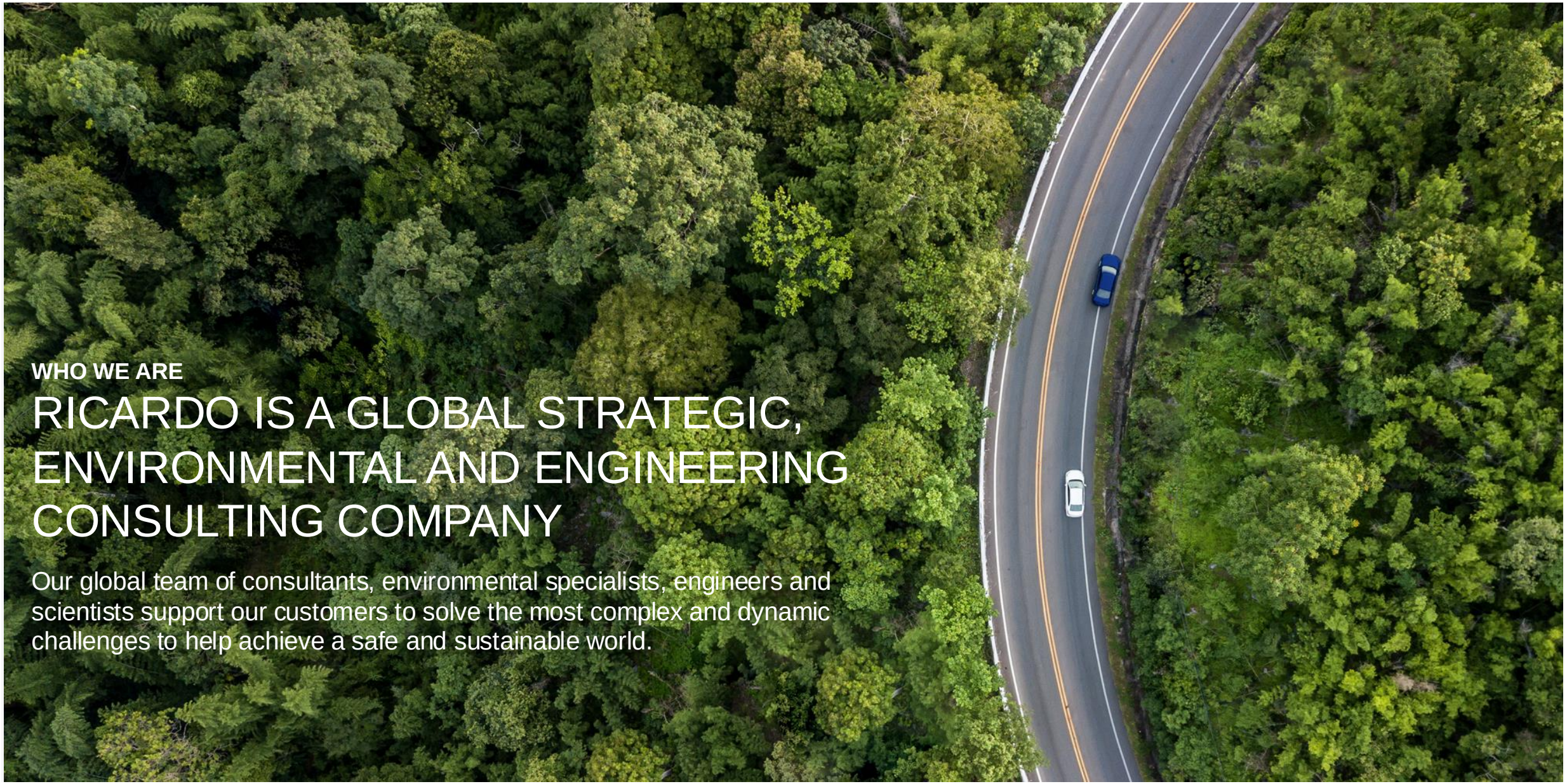
https://cp.catapult.org.uk/programme/zero-emission-heavy-goods-vehicles/

Data – What do we know so far?

Technical monitoring and evaluation of the ZEHID Programme

Michael Campbell and Louise Evans

RICARDO



WHO WE ARE

RICARDO IS A GLOBAL STRATEGIC, ENVIRONMENTAL AND ENGINEERING CONSULTING COMPANY

Our global team of consultants, environmental specialists, engineers and scientists support our customers to solve the most complex and dynamic challenges to help achieve a safe and sustainable world.

ZEHID Technical Monitoring and Evaluation

Aims

- Ricardo, with partners Costain, are providing technical monitoring and evaluation on behalf of UKRI
- The evaluation covers the full 5-year demonstration over all four consortia
- This involves evaluating the electric and hydrogen fuel cell trucks (vs diesel) for:
  - business acceptability
  - vehicle and infrastructure cost
  - reliability and ease of implementation
  - efficiency
  - safety and reliability
  - refuelling provision and convenience
- The evaluation will provide the evidence to inform future government investment decisions to decarbonise road freight

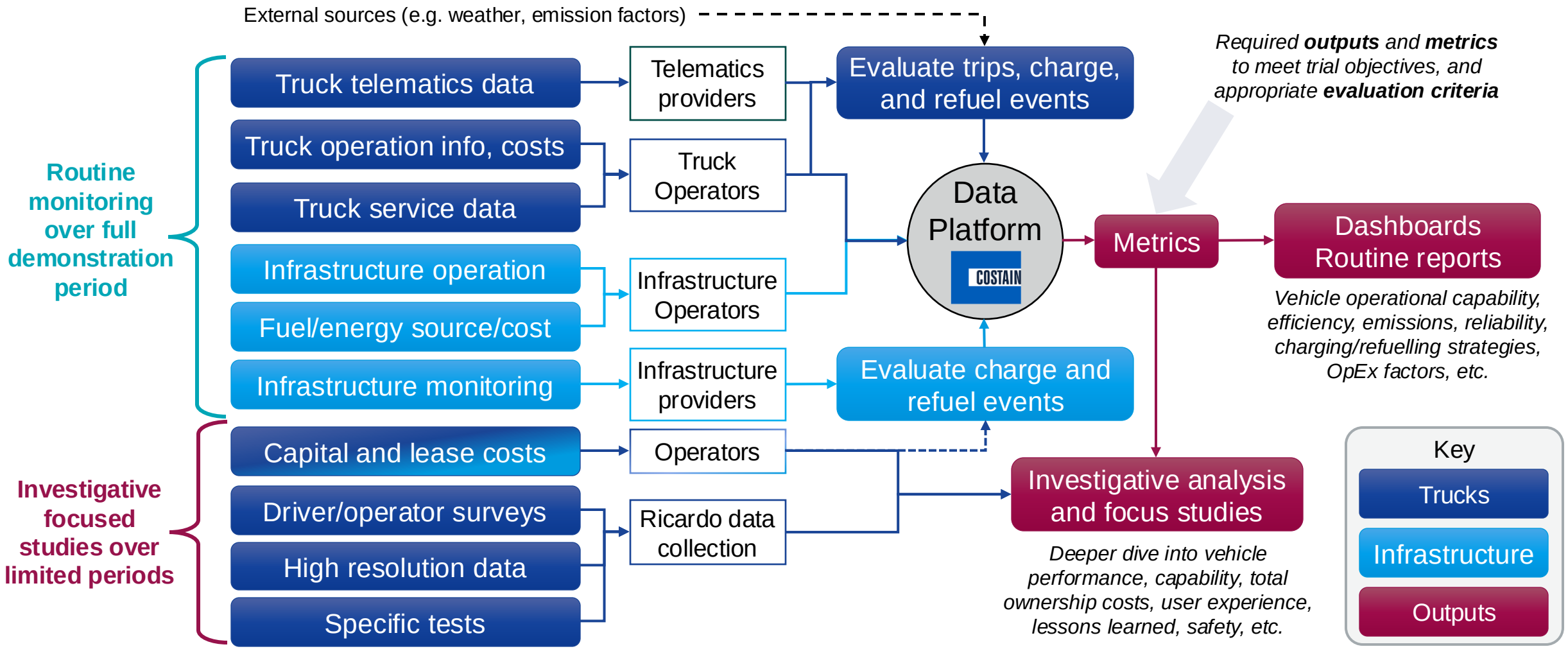
Approach

- A technical evaluation requires data
- This includes telematics from the electric and hydrogen trucks, and some diesel "comparators", plus monitoring data from funded infrastructure
- It will also need specifications, service records, capital and operational costs, details of fuel and electricity used, incident reports, survey responses…
- As well as collecting ongoing monitoring data from trucks, infrastructure, and participants, Ricardo will carry out:
  - surveys of drivers and operator staff
  - "high-resolution" data logging of some vehicles for deeper analysis
- Evaluation process uses both monitoring "big data" and detailed analysis

Challenges

- Scale of project:
  - 30+ truck operators
  - 6+ truck manufacturers
  - At least 4 infrastructure providers
- Timeframe – a lot can happen in 5 years
- A range of stakeholders with different interests and objectives
- Four consortiums, each with different approaches, some common partners
- A need to respect confidential and commercially sensitive data of private businesses – agreements needed
- Gathering consistent and robust data from so many participants – while minimising burden of data provision

Data collection and evaluation system concept overview

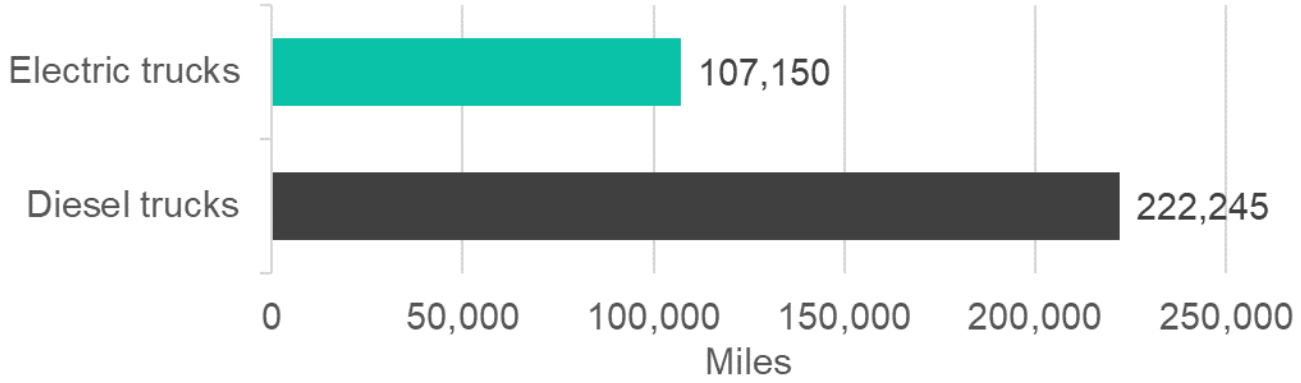


Data collected so far

Data acquired so far	Diesel trucks	Electric trucks	Total
Number of trucks	18	21	39
Total distance driven (km)	357,668	172,442	530,110
Total driving time (hours)	222,245	107,150	329,395

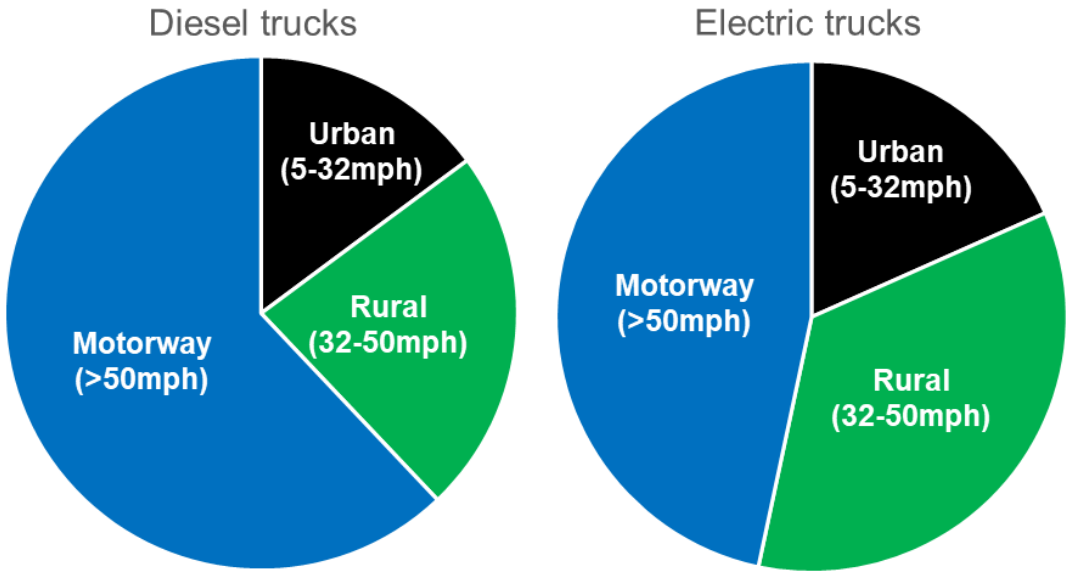
- Truck telematics data collection has started as operators receive their trucks, and once necessary agreements are in place with the operators
- Data for some trucks has been collected for months, some for a couple of weeks, and more vehicles are being added as they are delivered

Total miles of truck telematics data



Electric trucks have charged 1283 times

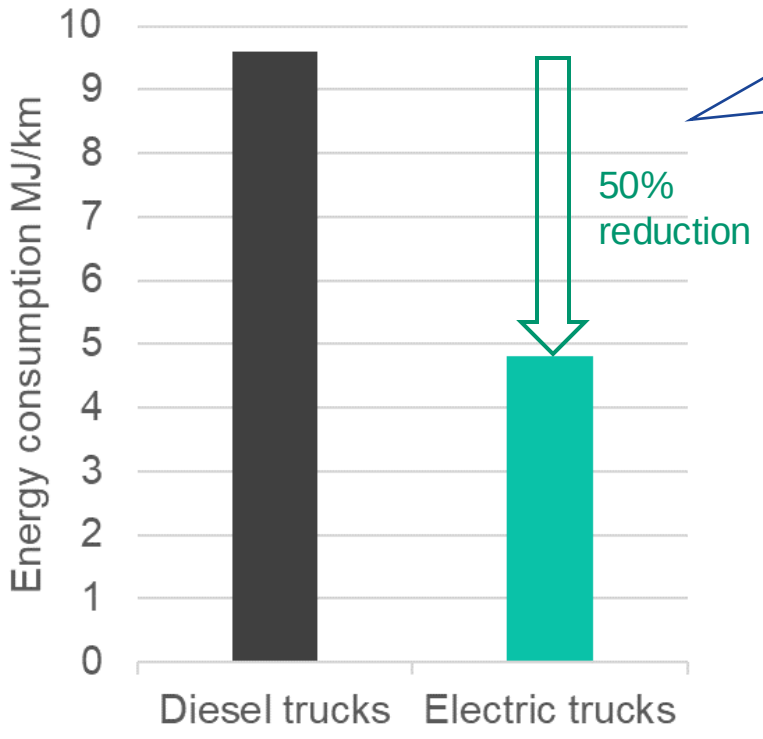
Share of distance by road type



Distance split by speed band as a proxy for road type is similar to the technique used to evaluate on-road emissions tests

Comparing energy efficiency and emissions

Energy consumption (Megajoules per kilometre)



Fuel or electricity use converted to energy in Megajoules for comparison. Does not account for charging losses

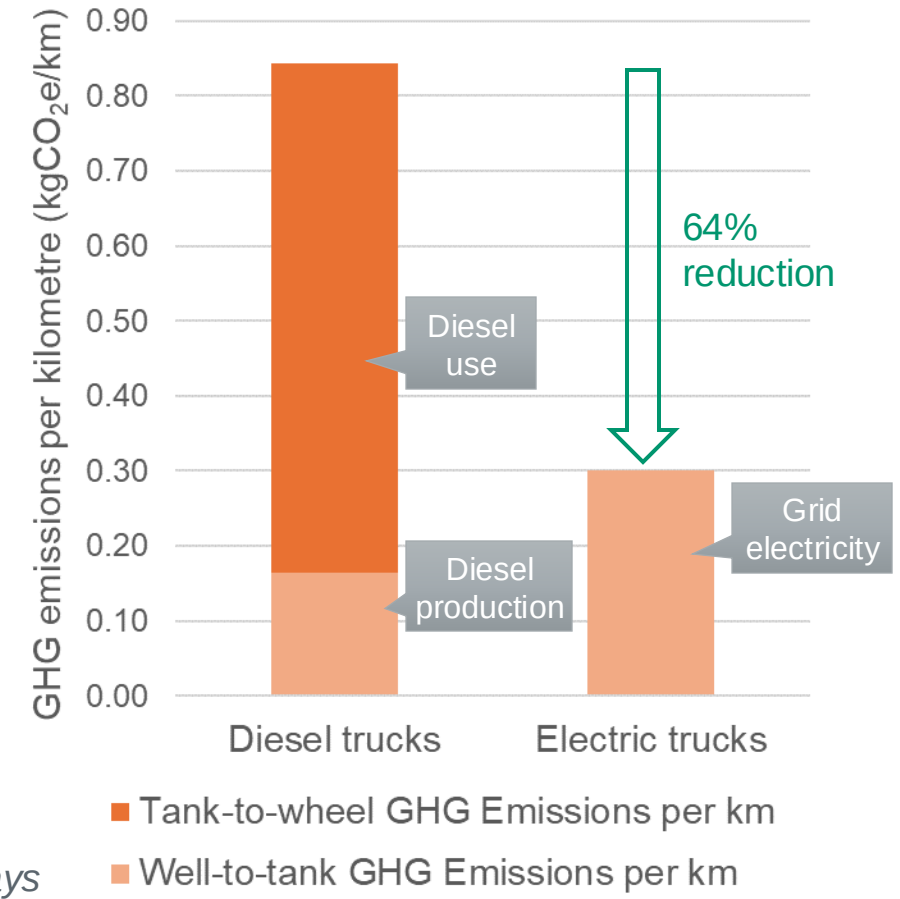
Electric trucks have around half the energy demand – **double the efficiency** – of diesel trucks

Electric trucks are **reducing GHG emissions** by an estimated 64% compared to diesel, even assuming use of grid electricity

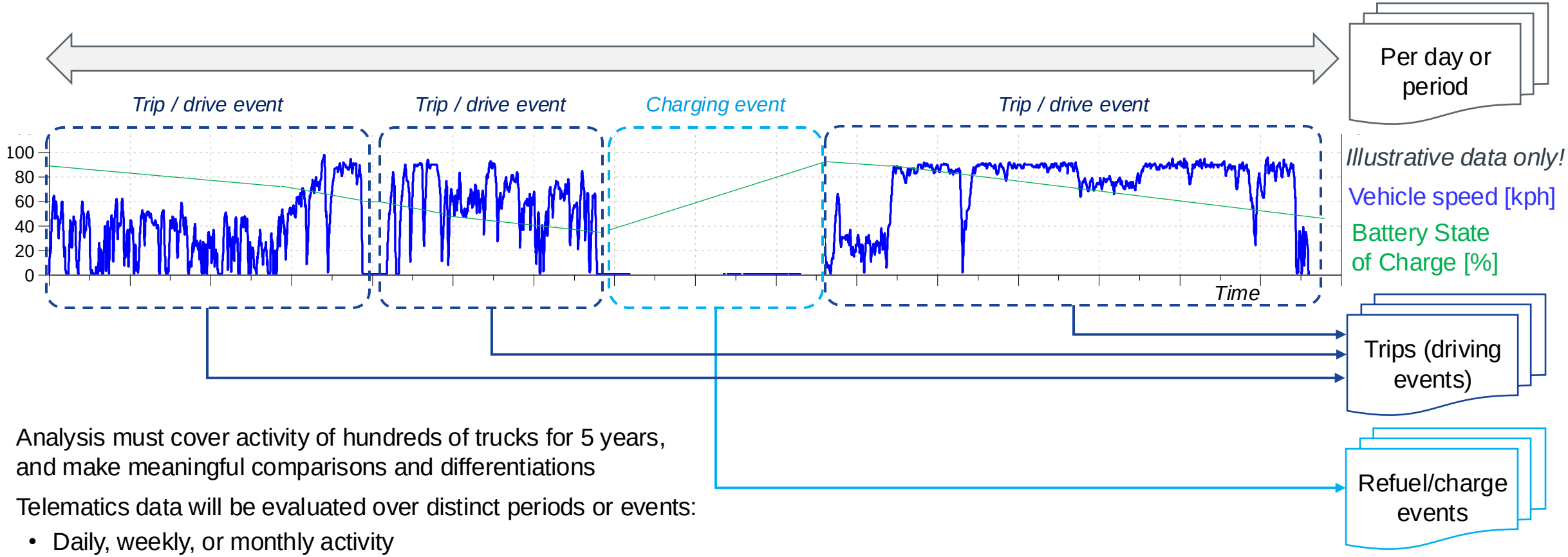
So far, an estimated **93 tonnes** of GHG emissions have been saved by electric trucks

Preliminary analysis based on limited data
Trucks may not be being used in comparable ways

Greenhouse Gas Emissions per kilometre (kg CO_2e)



Evaluation of telematics data by event – day, trip, charge/refuel event



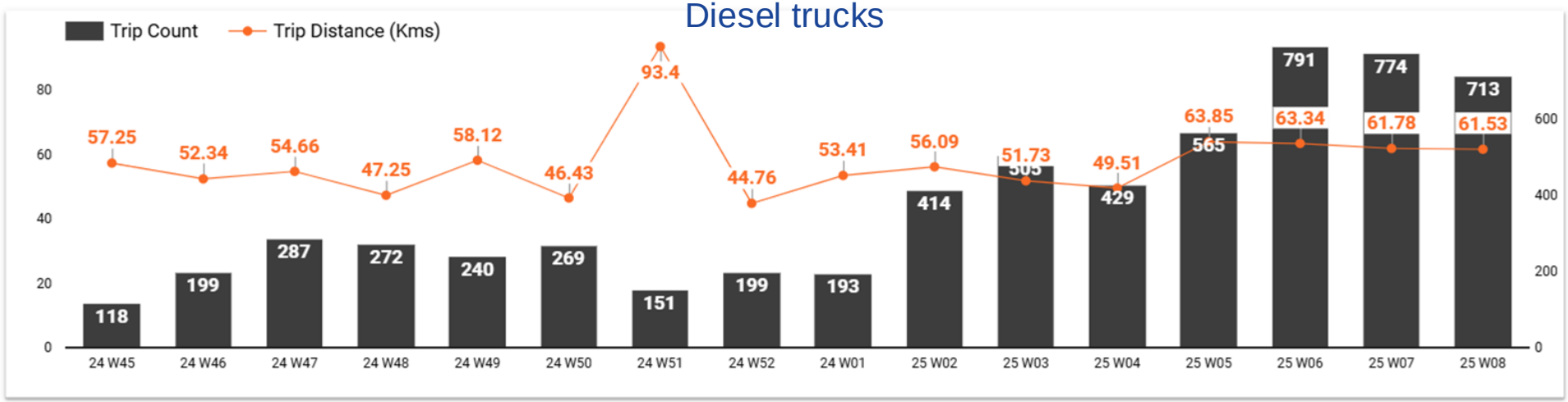
- Analysis must cover activity of hundreds of trucks for 5 years, and make meaningful comparisons and differentiations
- Telematics data will be evaluated over distinct periods or events:
  - Daily, weekly, or monthly activity
  - Drive events or **trips** – ignition on to ignition off
  - Recharging or refuelling events
- The attributes of each event can be used for evaluation

Trip analysis will be used to isolate different factors – payload carried, truck type, weather conditions, route characteristics, etc.

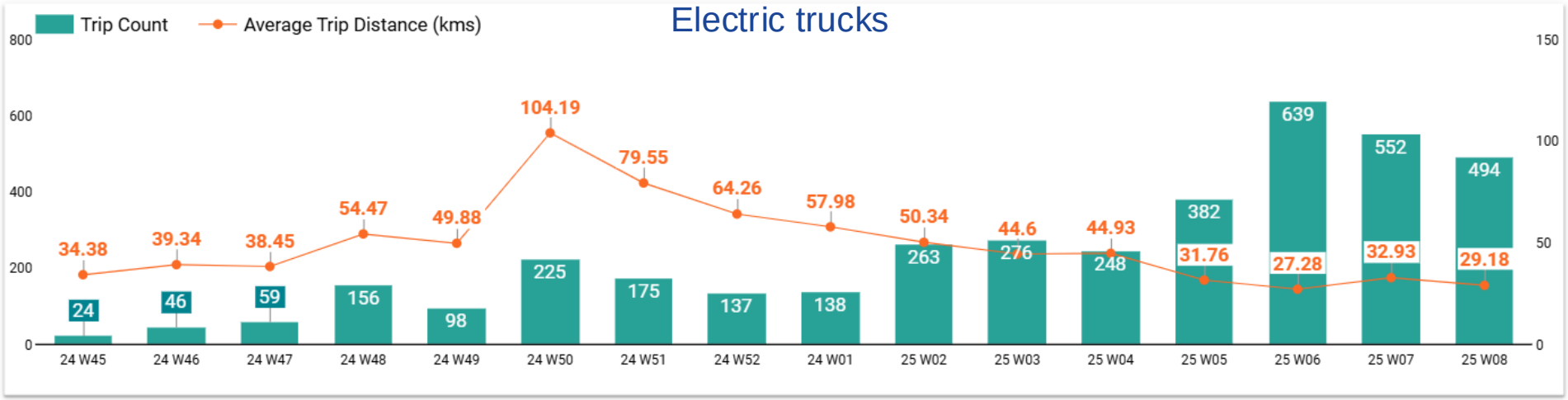
Number of trips and average trip distance by week

- Trips **over 1km** defined by ignition on to ignition off evaluated over 16 weeks of data
- The number of vehicles being monitored increases over the period
- As more electric trucks are added, the number of trips increases, but the average distance falls
- This may be as electric trucks are used for shorter trips when first introduced – trials, training, etc.

Diesel trucks

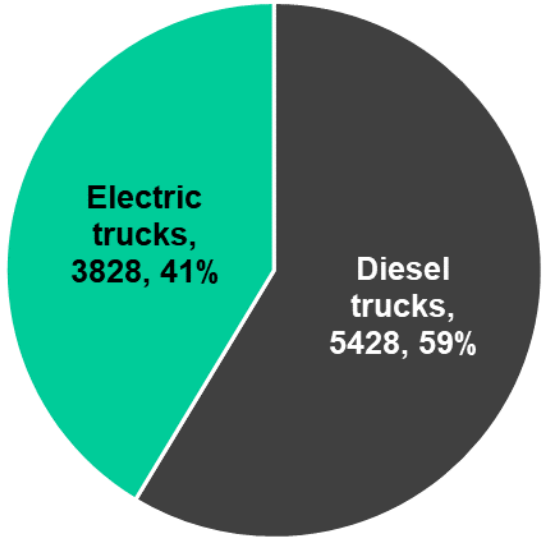


Electric trucks



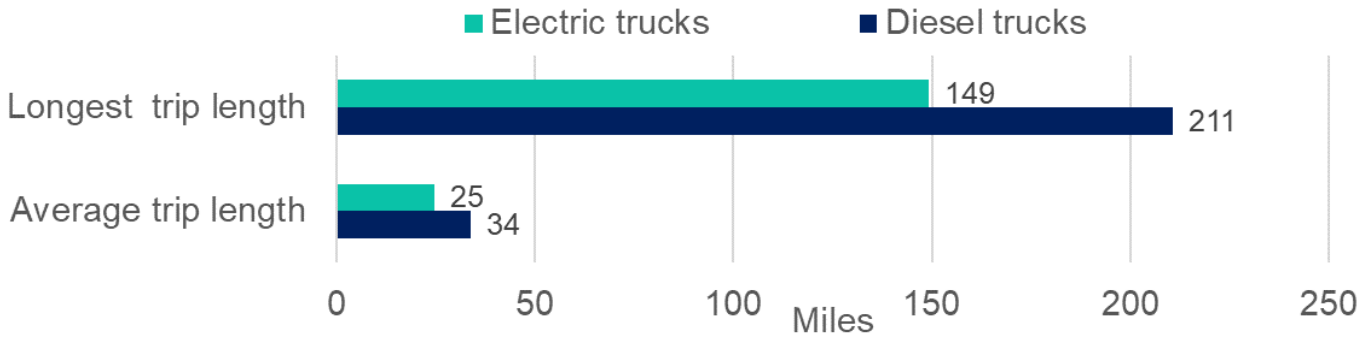
Analysis by trips

Number and split of trips

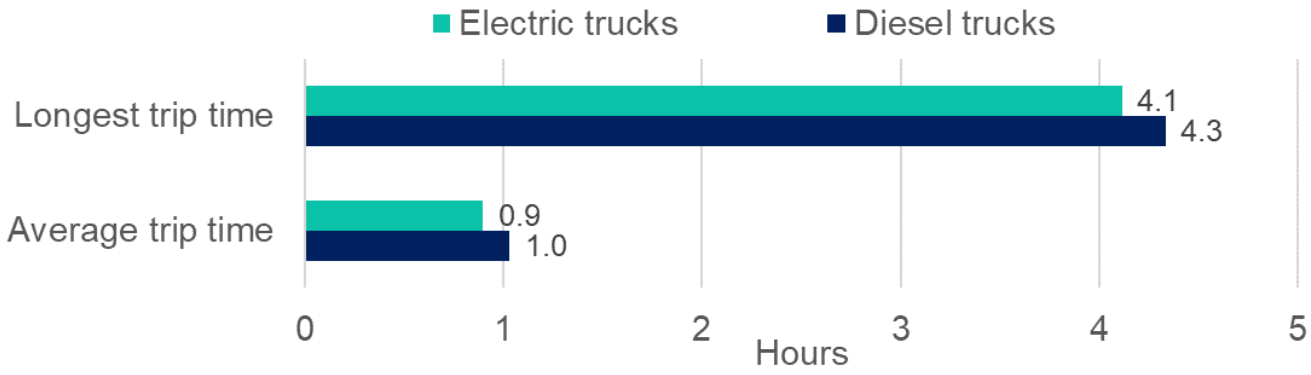


- Early data indicates electric trucks are being used for shorter trips than diesels – although trip durations are similar suggesting they are on lower speed (urban) routes
- This may be expected for commissioning and driver training, and with limited infrastructure so far

Trips by distance covered



Trips by duration

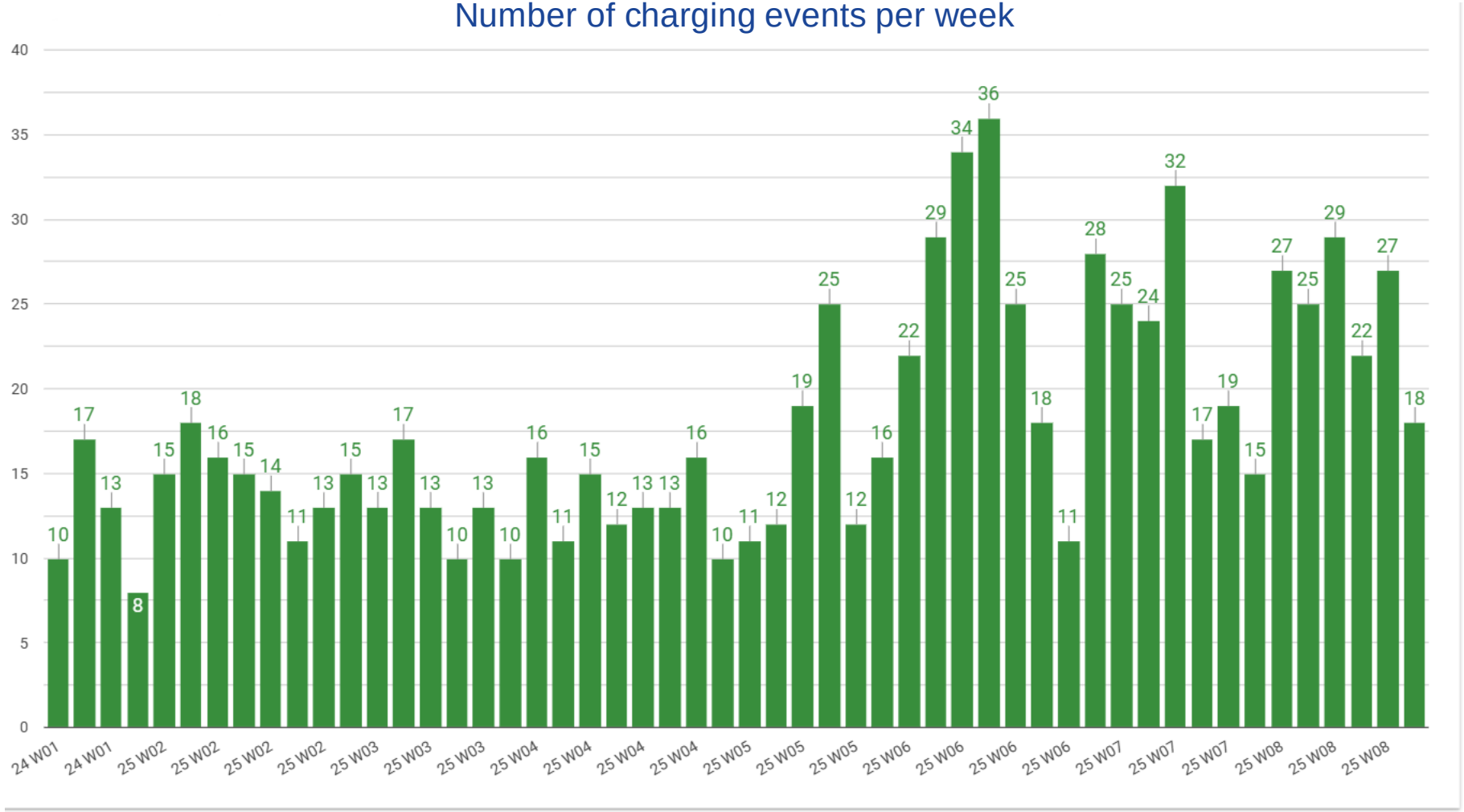


Analysis of all recorded trips over 1km

Charging Events

- Charge events captured by **truck telematics**
- In total, **1283 charging events** have been captured so far
- Data will also be collected from funded infrastructure monitoring
  - However, no funded chargers deployed yet
  - These are 3rd party or temporary chargers
- Analysis will cover both how and when **trucks** are charged, and how different **chargers** are utilised

Number of charging events per week



Watch this space…

- Data from many more vehicles will start being collected over the next few months as they are delivered
  - As the dataset increases, more detailed and meaningful analyses will become possible
- Data on their operations and costs will also be collected, and driver and fleet operator surveys are underway
- Analysis processes are still being implemented as the incoming data formats are confirmed
- A public website will go live soon, and evaluation reports will be published via UKRI throughout the demonstration period
  - Public data and analysis must anonymise truck operator and individual truck data
- Contact ZEHID@ricardo.com with any questions