# Future Fleet (SIF Alpha)

## UKRI Midpoint Review

15/06/2026

# Agenda

1 **Project Overview - Recap**

Project Partners • Project Background

2 **Project Progress**

Deliverables • Work Package Progress

3 **SIF Governance & Reporting**

SIF Specific Conditions • Risk Register • Finances • Communications & Engagement

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# Project Overview

Project Partners • Project Background

# Project Partners

| | |
|---|---|
| UK Power Networks | Electricity distributor delivering power to 8.5 million homes and businesses across the East of England, London, and the South-East. |
| Baringa | Are a consulting partner to global utilities and energy companies, supporting strategic planning through to transformation implementation. |
| Catapult Energy Systems | Facilitates collaboration between the energy and transport sectors. Bringing knowledge and understanding of transport decarbonisation alongside wider energy sector challenges and emerging demand patterns. |
| Maritime | One of the largest privately owned logistics companies in the UK specialising in Container Transport and Full Load Distribution. The company owns and operates nine rail terminals across the UK and is operating a significant fleet of eHGVs alongside a comprehensive national charging network. |
| Voltloader | Launched in 2023, Voltloader is the UK's first all-electric HGV transport service working alongside its own highly utilised network of depot-based chargers. |
| Voltempo | Voltempo's vision and mission is to decarbonisation of commercial transport through electrification and to accelerate the adoption and optimisation of electric freight solutions. |

Definitions: HGV's = Heavy Goods Vehicles

# Project Background

## Problem

Siloed decarbonisation of the logistics industry risks excessively straining electricity networks with clustered loads which will increase costs for operators and society.

Context: Decarbonising the logistics industry will be challenging due to the diversity of journeys, operators, and freight types, combined with high customer expectations, tight margins and the relative recent introduction of eHGVs.

### Networks

- Lack detailed knowledge of how, when, and where operators will decarbonise
- Difficult to efficiently plan network investment
- Risk of becoming a blocker to net zero with potential long connection timelines

### Logistics Operators

- Unfamiliar with smart energy management opportunities
- Operational and commercial models do not consider grid impacts
- Face longer connection timescales, high connection costs & volatile charging costs

### Society

- Lagging decarbonisation of freight and slow progress to net zero
- Risk of additional network charges and higher bills
- Highly congested local networks delay other demand projects

Definitions: eHGV's = Electric Heavy Goods Vehicles

# Project Background

## Solution

Future Fleet aims to **bridge the gap between the transport sector and the energy system by developing a comprehensive framework to support heavy goods vehicle decarbonisation.** This includes smart energy management, flexible connections, behind-the-meter assets, operational flexibility, and coordinated access models.

## Objectives

- Understand eHGV uptake archetypes for logistics operators
- Investigate the smart energy management opportunities for eHGV operators to minimise grid impact & costs
- Accelerate connection times and decarbonisation by exploring operational flexibility & coordinated business models with eHGV operators
- Map the network impact

## Outputs

- Logistics decarbonisation framework
- Optimal business models for different logistics operator archetypes
- Optimal smart energy opportunities for different operator provider archetypes
- Geospatial network impact of main logistics decarbonisation options

# Project Progress

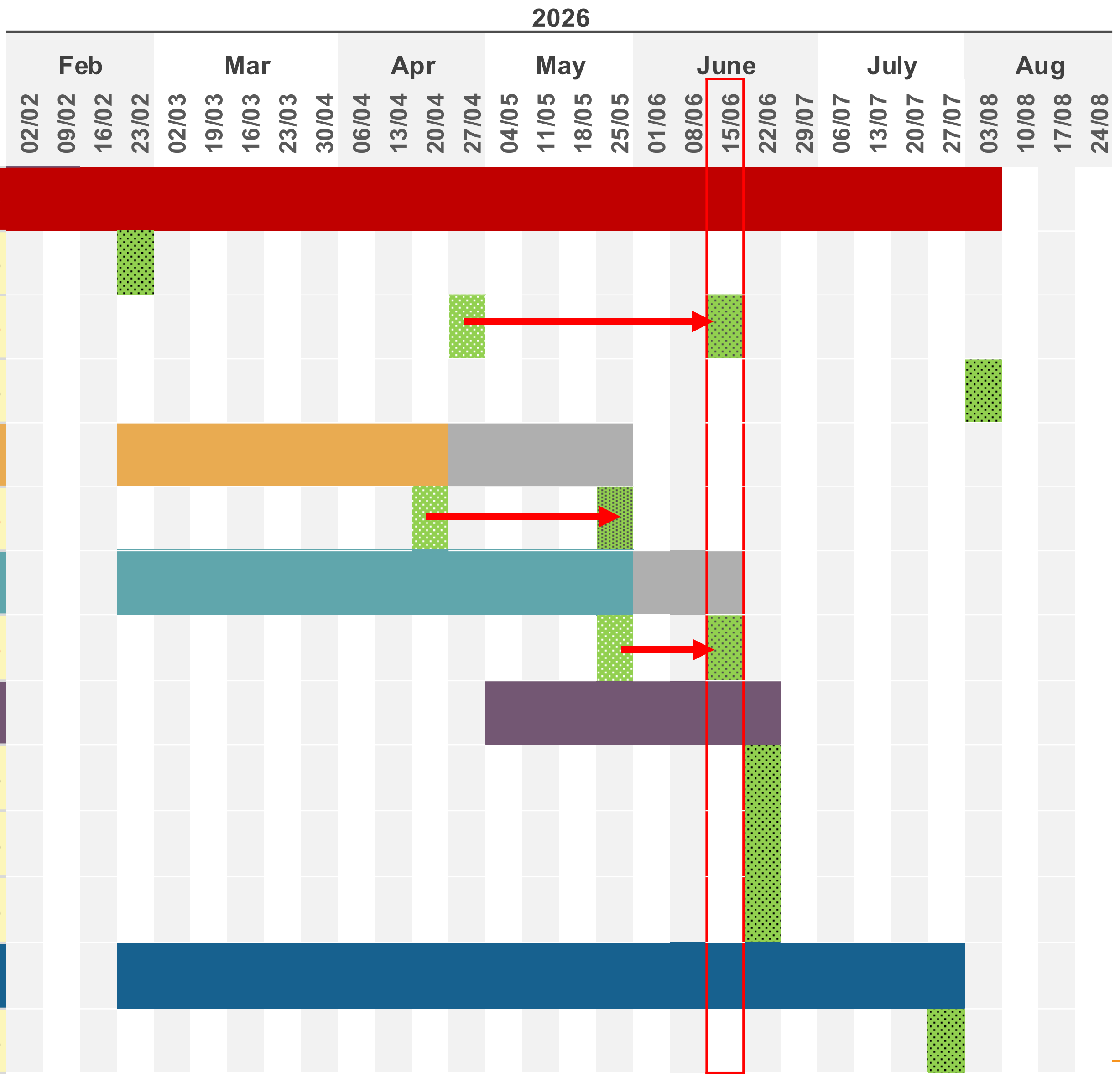
Deliverables • Work Package Progress

# Deliverables

Agreed Project Start Date: **01/03/2026**
UKRI Project completion deadline: **01/09/2026**

= Deliverable due

| NAME | DESRIPTION | START | END |
|---|---|---|---|
| **WP1** | **Project management** | 02/02/26 | 07/08/26 |
| D1.1.1 | Project Kick-off | 02/03/26 | 02/03/26 |
| D1.2.1 | Deliverable: Midpoint Report | 01/05/26 | 15/06/26 |
| D1.3.1 | Deliverable: End of Phase materials and Show and Tell slides | 07/08/26 | 07/08/26 |
| **WP2** | **eHGV fleet charging archetypes** | 02/03/26 | 29/05/26 |
| D2.1.1 | Deliverable: Fleet and charging location archetype report | 24/04/26 | 29/05/26 |
| **WP3** | **Smart energy management schemes and business models** | 02/03/26 | 18/06/26 |
| D3.1.1 | Deliverable: Smart energy schemes and business model options report | 29/05/26 | 18/06/26 |
| **WP4** | **Grid impacts and business case** | 12/05/26 | 26/06/26 |
| D4.1.1 | Deliverable: Geospatial grid impact model and methodology report | 26/06/26 | 26/06/26 |
| D4.2.1 | Deliverable: Energy system cost/benefit assessment model and report | 26/06/26 | 26/06/26 |
| D4.2.2 | Deliverable: Fleet operator TCO cost/benefit assessment model and report | 26/06/26 | 26/06/26 |
| **WP5** | **Future opportunities, trial requirements & stakeholder engagement** | 02/03/26 | 31/07/26 |
| D5.1.1 | Deliverable: Trials protocol document | 31/07/26 | 31/07/26 |




Definitions: TCO = Total Cost of Ownership, WP = Work Package

# Work Package 1: Project Management

Lead Partner: UK Power Networks

## Activities and Deliverables

**Project Mobilisation** ✓

- Collaboration agreement signed
- Timelines and work packages agreed
- Kick-off meeting co-ordinated

**Mid-point review** ✓

- Review project progress & documentation
- Q1 Presentation

**End of Phase & closure**

- Delivery & approval of all work packages
- Governance reporting complete
- Project Specific Conditions addressed & evidenced

**Success** will be that project is delivered on time and to budget while meeting reporting requirements, Project Conditions and ensuring that the knowledge generated is effectively disseminated

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# Work Package 2: eHGV fleet charging archetypes

## Lead Partner: Energy Systems Catapult

Leading the development of fleet and charging archetypes, building on Energy Systems Catapult's models developed during the eFREIGHT 2030 project funded via the ZEHID Programme.

**Main activities include:**

- Categorisation of fleet archetypes
- Understand fleet ownership models
- Develop duty cycle assumptions and translate into energy needs
- Capture energy management opportunities
- Develop charging facility archetypes
- Cross-reference fleet and charging archetypes

**Deliverables:**

- eHGV fleet charging archetypes report

**Success** will be that fleet and charging location archetypes are defined and tested with wider stakeholders and are suitable for use in Work Package 3

CATAPULT Energy Systems

Definitions: ZEHID = Zero Emission HGV and Infrastructure Demonstrations

# Work Package 2: eHGV fleet charging archetypes

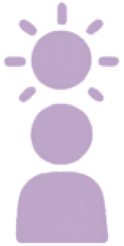
We have developed **fleet and charging location archetypes**, with associated insight into **operator needs**.

This is to inform energy demand modelling, opportunities for smart energy schemes and business models for access to charging.

# Work Package 2: eHGV fleet charging archetypes

## Driver Types

**Day Driver**



These drivers start early in the morning and finish in the afternoon, starting and stopping at the same location.

**Day + Night Driver**

HGV is double shifted, so once the day driver has finished another driver takes over for the night shift. The day and night drivers start and stop at the same location.

**Long-Haul Tramper**

These drivers have the same driving time limitations as the day driver but  sleep in their vehicles so can end their journey anywhere.

CATAPULT Energy Systems

# Work Package 2: eHGV fleet charging archetypes

## Journey Types

**Shunting**

Low mileage, high frequency, regular movements between a depot and a destination.

**Round Trip**

HGV starts at a depot with cargo, travels to a destination where it drops it off, then picks up cargo at the same location and travels back to the original depot.

**One-Way Trip**

HGV goes one-way (from a depot to a destination). If returning to a depot it could do this empty, or it can go to another destination to pick up cargo, then travel back to the original depot.

**Multi-Drop**

HGV has multiple customers' cargo, so the truck stops in multiple destinations along its route.

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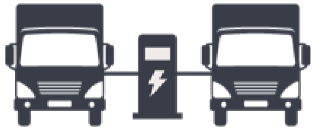
# Work Package 2: eHGV fleet charging archetypes

## HGV Stop Types

**Operators' Depot**

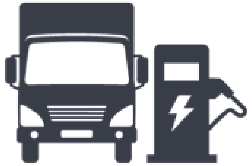


Depot owned by a fleet operator where HGVs stop when not in use.

**Destination**

A drop-off or pick-up location. This could be a fleet's own depot, a customer's depot or a location such as a port.

**Dedicated En-Route**



Anywhere outside of a depot or destination location (for example motorway services).

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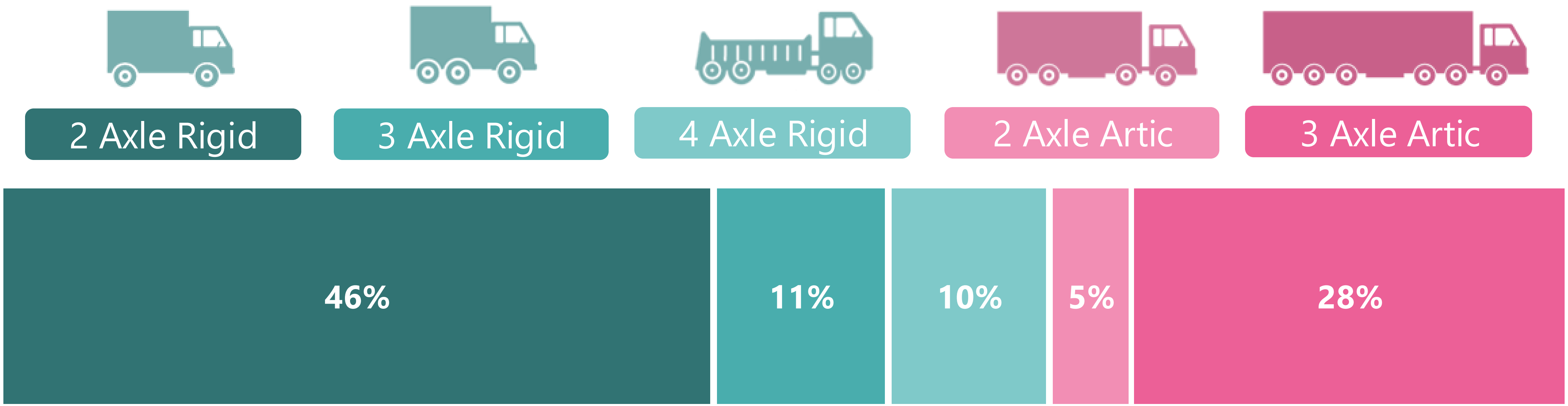
# Work Package 2: eHGV fleet charging archetypes

## HGV Wheel Configurations



# Work Package 2: eHGV fleet charging archetypes

## Fleet Types


Definitions: SME = Small Medium Enterprise

# Work Package 2: eHGV fleet charging archetypes

## Methodology

eFREIGHT 2030

Arrival times at depot and en-route locations

**Arrival and dwell times by location and operation**

voltloader CHARGED FOR TOMORROW

MARITIME

By operation:

- No. stops by location
- Dwell times

**Vehicles**

eFREIGHT 2030

- Consumption
- Distances
- Battery size

**Vehicle overview with charging potential by location**

voltloader CHARGED FOR TOMORROW

MARITIME

VOLTEMPO

- Distances per operation
- Operational split
- Charger ratings

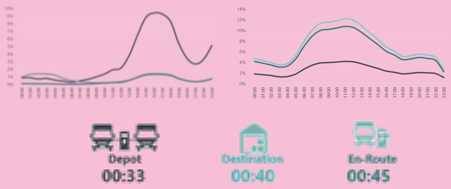
**Fleet type overview**

Vehicle Split

Operation Split

Charging Potential

Arrival & Dwell Times




Journey Details

# Work Package 2: eHGV fleet charging archetypes

## Standard National – Large Fleets

### Vehicle Types

3 Axle Artics
**42**

2 Axle Rigids
**20**

4 Axle Rigids
**9**

2 Axle Artics
**7**

3 Axle Rigids
**5**

### Driver Types

**75%**
Day Drivers

**10%**
Day + Night Drivers

**15%**
Long-Haul Trampers

### Journey Types

**38%**
Round Trips

**33%**
One-Way

**19%**
Multi-Drops

**9%**
Shunting

### Daily Electricity Demand

Average Daily Energy Consumption:
**37,000 kWh**

**73%** delivered at **Depot**

**18%** delivered at **Destination**
(potential for **62%**)

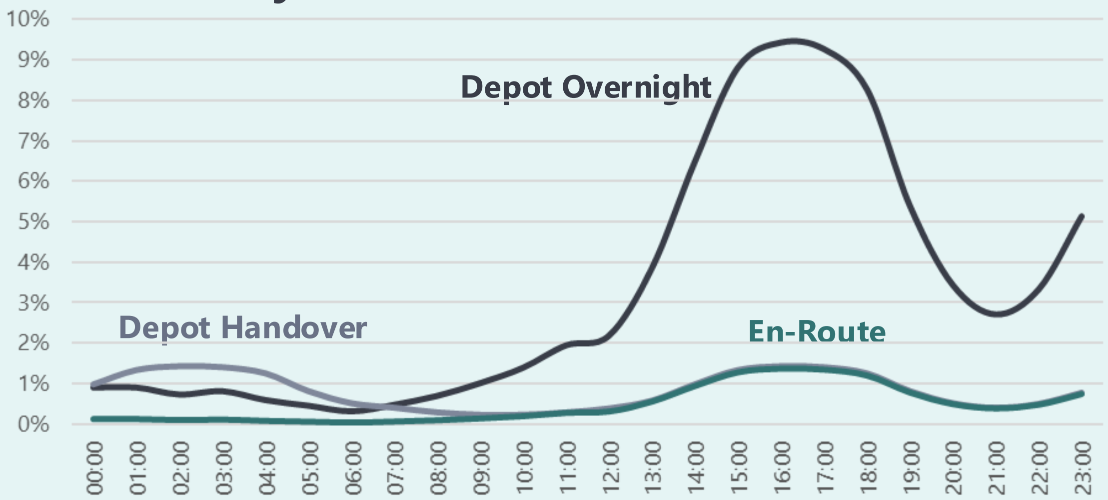
**9%** delivered at **Dedicated En-Route**
(potential for **84%**)

# Work Package 2: eHGV fleet charging archetypes

## Standard National – Large Fleets – Average Vehicle

| Daily energy consumption | Daily distance | In-Journey stops |
| --- | --- | --- |
| 450 kWh | 255 km | 4 |

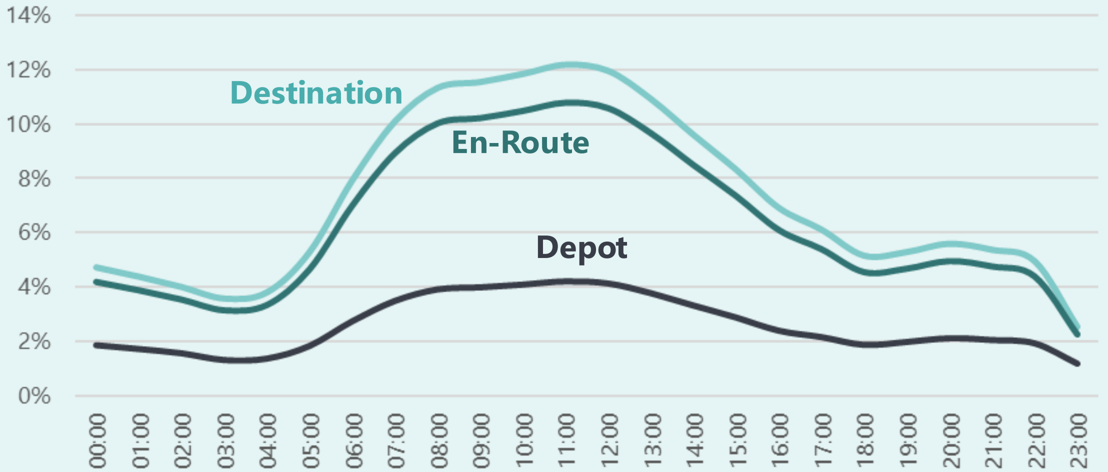
### Likely time of arrival for end of shift




**Dwell Time**

| Depot Overnight | Depot Handover | En-Route |
| --- | --- | --- |
| 12:00 | 01:00 | 03:00 |

### Likely time of arrival for in-journey stops




**Dwell Time**

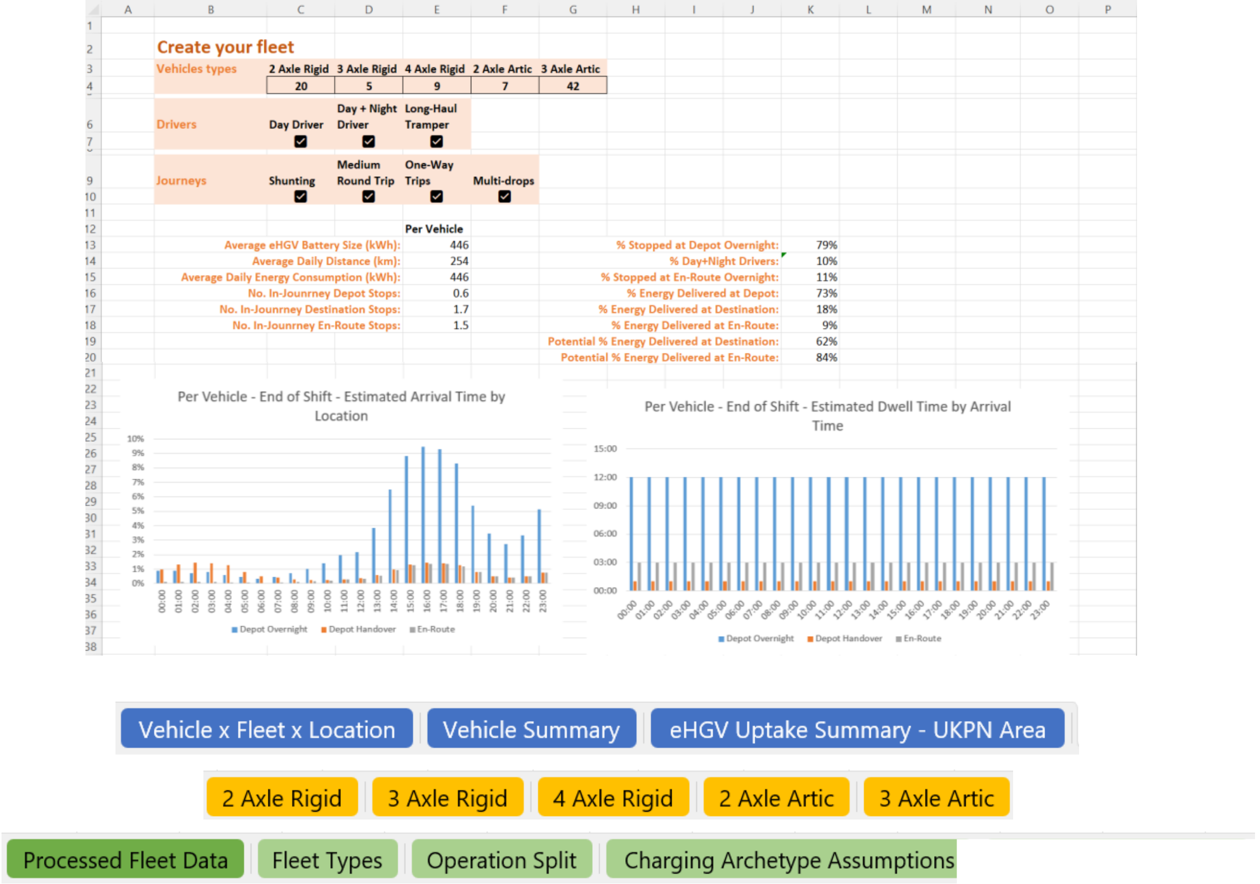
| Depot | Destination | En-Route |
| --- | --- | --- |
| 00:33 | 00:40 | 00:45 |

# Work Package 2: eHGV fleet charging archetypes

## Outputs

### Fleet and charging location archetype report


### Fleet archetype outputs spreadsheet



# Work Package 3: Smart energy management schemes and business models

## Lead Partner: Baringa

Assessing the potential for smart energy management strategies to support the integration of eHGV charging demand into the energy system, by reducing grid impacts and wider energy systems costs

**Main activities include:**

- Define a long-list of smart energy management opportunities that could reduce grid demand peaks and energy costs (e.g. charging dispersal, smart charging, use of DG/storage, I&C co-location, etc.)
- For prioritised schemes, assess use cases and benefits (grid demand peak, energy cost, carbon); set out required enablers (technical, business model, market, regulatory) and assess cost and complexity
- Investigate the impact of business model options that can provide charging access across the range of fleet archetypes, with a focus on affordable charging access for smaller fleets

**Deliverables:**

- Opportunities defined for input to grid impacts and business case scenario assessment
- Smart energy schemes and business model options report

**Success** will be a report delivered outlining smart energy schemes and business model options for affordable charging access across fleet types, including feasibility, scalability, and relevance to different fleet types.

Baringa

Definitions I&C = Industrial & Commercial, DG = Distributed Generation.

# Work Package 3: Smart energy management schemes and business models

## WP3 assesses how smart energy levers can reduce connection requirements and manage network constraints, informing the trial design and cost-benefit assessment

### Inputs into WP3

**WP2 archetypes**
- Fleet and depot archetypes
- Charging demand and duty cycles

**WP4 geospatial & network constraints context**
- Connection constraints and locational clustering
- Depot size distribution

### WP3: Smart Energy Levers & Business Model Assessment

**Define smart energy levers**
1. Smart charging
2. On-site energy
3. Dispersed charging
4. Shared Sites / Smart Energy Zones

**Site-level economic modelling**
- Representative depot archetypes
- Techno-economic comparison of scenarios
- Test connection and energy cost impacts

**Business model assessment**
- Value chains and commercial arrangements
- Enablers, barriers, and risks
- Applicability by archetype and location

### WP3 outputs

**Trial design requirements**
- Priority levers and use cases
- Potential trial sites and models

**Cost-benefit assessment**
- Wider network, system, and societal impacts
- GB-level extrapolation

**Methodology:** We worked collaboratively with UK Power Networks and project partners to define the smart energy levers and integrate WP2 and WP4 outputs into the site-level economic modelling and business model assessments

# Work Package 3: Smart energy management schemes and business models

## Smart energy levers can help integrate concentrated and growing eHGV fleet demand in areas with constrained grid capacity

### Grid challenges

**1. Peak capacity constraints causing slow and high-cost grid connections**
*Local networks cannot accommodate high, coincident charging demand*

**2. System balancing & renewable integration causing rising system costs**
*Greater need to match demand with variable renewable generation*

**3. . Maintaining high network utilisation while avoiding higher societal costs**
*Capacity is sized for peak demand, even where that peak capacity may only be used for limited periods, increasing societal costs*

**4. Concentrated demand causing localised network bottlenecks**
*Charging demand will cluster around depots and logistics hubs, creating peaks that may exceed available network capacity*

### Smart energy levers

**1. Smart Charging**
*Optimise charging away from peak network periods and towards periods with lower electricity costs*

**2. On-site Energy**
*Use on-site assets to reduce grid import (e.g. battery solutions, solar PV, vehicle-to-grid etc.)*

**3. Dispersed Charging**
*Locate charging where it best aligns with capacity, site operations, and cost, whether through dispersed sites or strategic clustering*

**4. Shared Sites with Spare Capacity / Smart Energy Zones**
*Co-locate charging at sites that have spare capacity and/or synergistic loads*

**The challenge is not just connecting load — it is integrating large, geographically concentrated demand into a constrained system with increasing intermittent renewable energy**

Definitions: Solar PV = Solar Photovoltaic

# Work Package 3: Smart energy management schemes and business models

## Our fleet and geospatial modelling suggests most charging demand will occur at depots overnight, with larger depots likely to be the most challenging to connect

| | Small depot | Medium depot | Large depot | Destination charging | En-route charging |
|---|---|---|---|---|---|
| **Description** | Average of 5 trucks charging per day, largely overnight | Average of 35 trucks charging per day, largely overnight | Average of 150-200 trucks charging per day, largely overnight | *Not estimated* | *Not estimated* |
| **# of sites in UKPN area** | 2,300 | 830 | 97 | *Not estimated* | *Not estimated* |
| **Average import capacity (kVA)** | **250-300** | **2,000** | **8,000 to 10,000** | **Highly site-specific** | **Highly site-specific** |
| **Share of total charging demand** | **20-25%** | **45-50%** | **22-28%** | **5-10%** | **3-7%** |
| **Potential connection challenges** | • Least challenging to connect but delays still possible in constrained areas<br>• Spare headroom may enable flexible charging in response to wholesale / network signals | • Increasingly constrained at upper end, may drive feeder reinforcements<br>• Battery storage may help avoid reinforcement thresholds<br>• Overnight charging may drive peak demand | • Most likely to trigger major reinforcement works<br>• Long lead times and high capex risk<br>• May require phased energisation or flexible connection arrangements<br>• Strongest case for coordinated / shared infrastructure approaches | • Wide variation in site suitability and dwell time<br>• Commercial ownership and operational complexity<br>• Urban sites may face space and connection constraints<br>• Charger mix (fast vs slow) strongly affects peak demand | • Low dwell times reduce charging flexibility<br>• High-power chargers drive large peak demand<br>• Motorway/strategic road locations may already be constrained<br>• Significant reinforcement risk for concentrated charging hubs |

**WP2 & WP4 outputs**

| |
|---|
| High |
| Medium |
| Low |

**Modelling implications**

- Medium and large depots are expected to be the most challenging to connect due to greater import capacity requirements and potential clustering, we intend to map the geographical distribution of depot archetypes to primary substations to test this hypothesis (WP4 synthesis)
- We are modelling these scenarios at a site level to test impact on grid requirements and smart energy lever economics, as well as extrapolating them to UK Power Networks and GB level for the CBA

Definitions CBA = Cost Benefit Analysis

# Work Package 3: Smart energy management schemes and business models

## A techno-economic model was developed to quantify the long-term impact of smart energy interventions on depot electrification costs and connection requirements

### Objective

To assess how different smart energy levers influence the economics and deliverability of eHGV depot electrification across a range of fleet and network archetypes, and to identify the most promising interventions to support scalable, cost-efficient network connections; acting as a key input into detailed business model assessment and future trial deployment.

### Modelling Approach

The analysis evaluates the long-term costs and benefits of Smart Energy Levers 1–2 across representative depot archetypes based on WP2 outputs, comparing conventional charging approaches against more sophisticated energy management solutions.

The model combines:

- Fleet charging demand profiles derived from WP2 operational archetypes
- Depot size archetypes (small, medium and large)
- Network connection requirements and UKPN connection cost assumptions
- Smart charging optimisation strategies (Lever 1)
- On-site solar and battery deployment scenarios (Lever 2)
- Wholesale electricity, flexibility and ancillary service revenues
- Asset capital expenditure, replacement, and O&M costs

### Scenarios Evaluated

The modelling compares a range of representative site archetypes:

- **Baseline charging** (unmanaged charging)
- **Lever 1: Smart charging optimisation**
- **Lever 2: Smart charging + battery storage**
- **Lever 2: Smart charging + battery storage + solar PV**

For each archetype, scenarios are assessed under different connection capacities and network cost assumptions to assess how levers interact with grid constraints.

### Outputs

**The modelling provides:**

- 20-year undiscounted energy and infrastructure site costs
- Discounted net site cashflow (£NPV)
- Levelised charging costs (£/kWh)
- Connection cost sensitivities
- Flexibility and energy value breakdowns
- Comparative economics across depot archetypes
- A benchmark of eHGV charging cost against diesel operating costs
- Insights to support trial site identification, business model design, and inputs for WP4 cost-benefit assessment

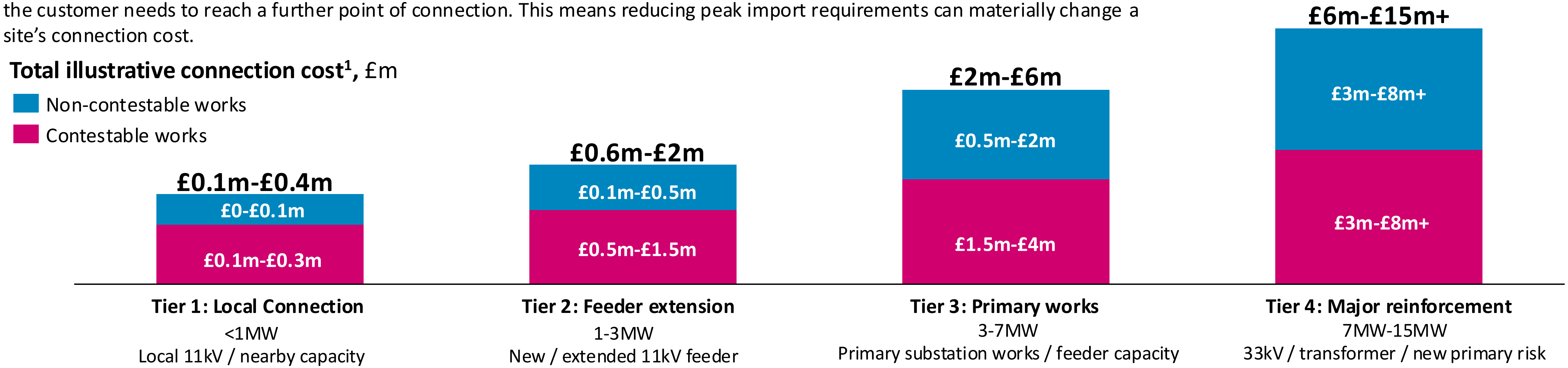
O&M = Operations and Maintenance

# Work Package 3: Smart energy management schemes and business models

## Connection costs are a key modelling input because smart energy levers are only economical at the site-level relative to a connection cost

Connection costs do not scale linearly on a £/MW basis. They are driven by threshold jumps, sole-use extension assets and whether the customer needs to reach a further point of connection. This means reducing peak import requirements can materially change a site's connection cost.

**Total illustrative connection cost[1]**, £m




### Modelling implications

- Connection capex is treated as a threshold-driven (Low/Medium/High) scenario input, not a linear £/MW assumption
- BESS and solar are tested against the cost of securing a larger firm maximum import capacity (MIC)
- The value case is driven by whether smart energy levers can meet site charging demand whilst reducing connection capex

### Case study example: Nissan Sunderland Plant & GRIDSERVE

- On-site civils and enabling works can be a material cost driver for eHGV charging sites, particularly where sites require significant groundworks
- The Nissan Sunderland & GRIDSERVE project delivered a £1.4m shared eHGV charging depot, with 10 high-power charging bays to support an initial 25 electric HGV fleet
- The project was enabled through the Innovate UK and DfT-funded ZEHID[2] programme, showing that high upfront infrastructure and civils costs may require public funding support to make early deployments viable

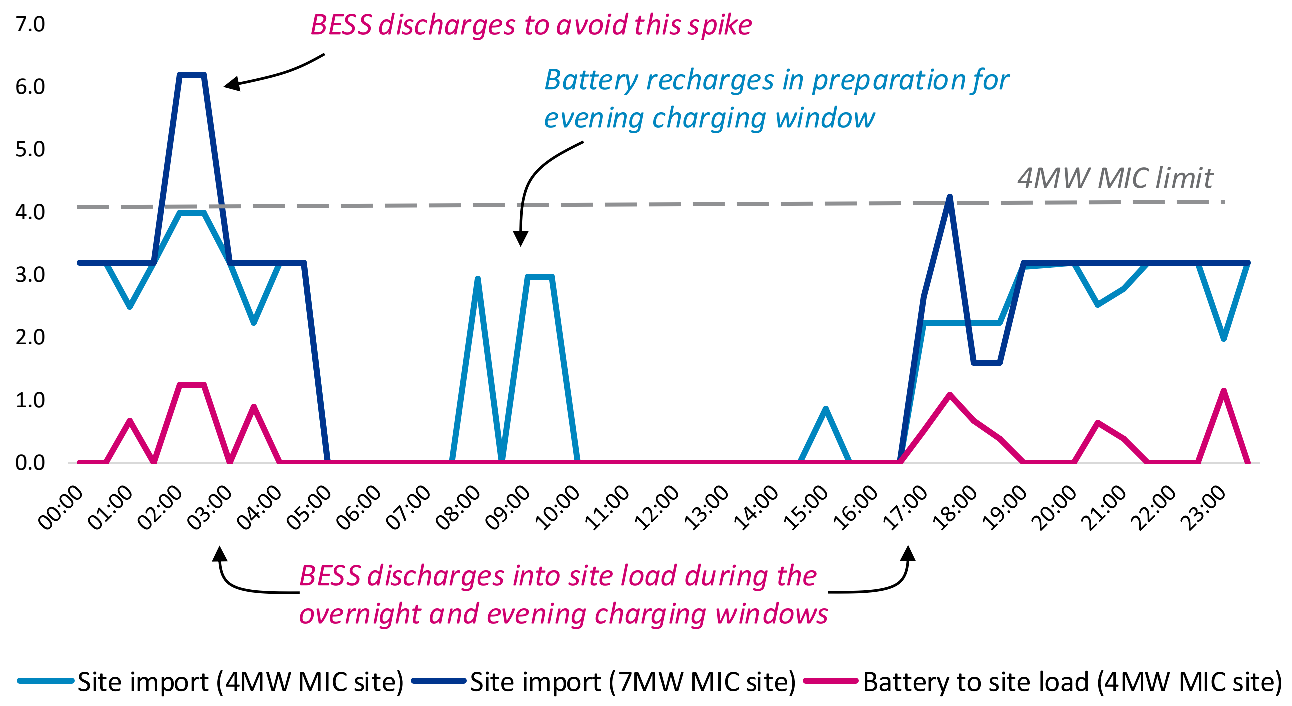
Notes: (1) Illustrative connection costs that were developed in discussion with the UK Power Networks Connections Team. (2) Zero Emission HGV and Infrastructure Demonstrator (ZEHID)

Definitions: BESS = Battery Energy Storage System

# Work Package 3: Smart energy management schemes and business models

## On-site BESS can reduce depot MIC requirements by meeting the gap between charging demand and lower grid import capacity

**Depot import profile showing how BESS supports charging demand under a lower MIC**
Example from the medium depot handover sensitivity, comparing a 7MW smart charging case with a 4MW smart charging + BESS case



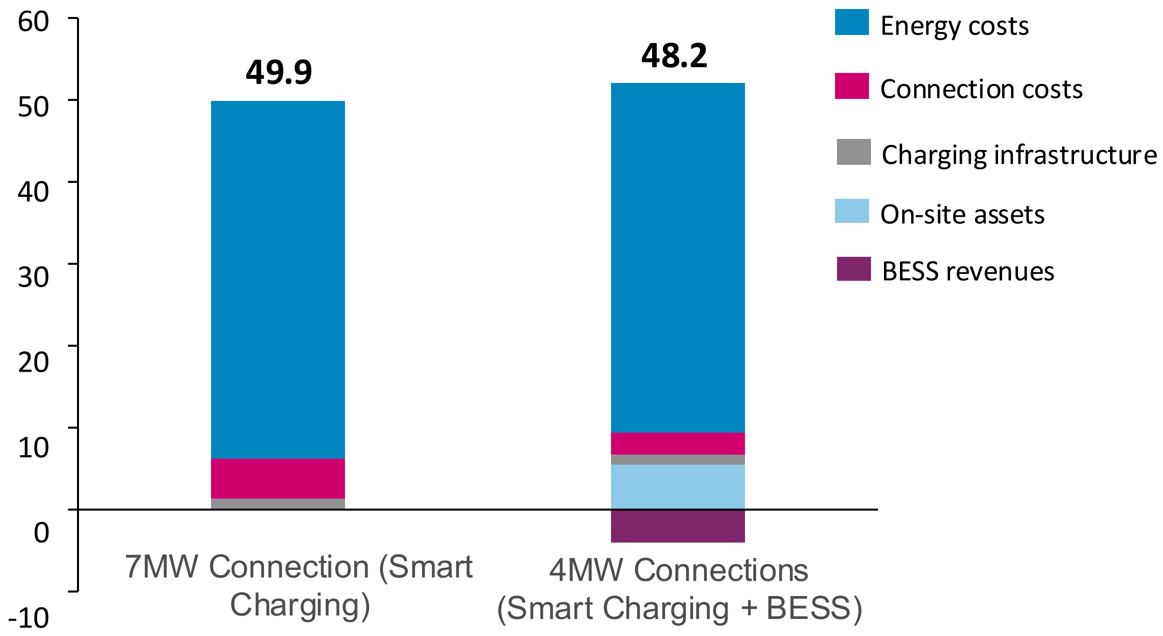

- **This profile shows how BESS can act as a bridging asset between site charging demand and a lower MIC, allowing the same fleet demand to be served.**
- **This sensitivity assumes overlapping overnight and handover[1] charging, creating a coincident peak that would require a 7MW firm connection.**
- In the 4 MW case, the BESS charges when there is headroom and discharges into site load during the charging windows.
- This reduces the grid import needed to serve the same charging demand, enabling a lower MIC.
- The sensitivity assumes overnight chargers are available 17:00–05:00, while handover chargers create short additional charging spikes at 02:00 and 17:00. The peak periods are driven by this overlap.

Definitions: MIC = Maximum Import Capacity

# Work Package 3: Smart energy management schemes and business models

## For medium depots with coincident evening peaks driven by handover duty cycles, BESS can reduce required MIC by ~40% while serving fleet demand at a lower overall cost

**20-year undiscounted cost stack for medium handover depot charging scenario[1], £m (real 2026)**




| | 7MW Connection (Smart Charging) | 4MW Connections (Smart Charging + BESS) |
|---|---|---|
| **Discounted net site cost NPV** (£m) | 31.8 | 31.3 |
| **LCOE** (p/kWh) | 10.7 | 10.6 |

Notes: (1) Based on WP2 outputs, assumes 65 × 50 kW overnight chargers with a 17:00–05:00 charging window and 15 × 200 kW handover chargers with 02:00–03:00 and 17:00–18:00 charging windows. Energy costs use Baringa's Wholesale and Retail Price projections. Bars show 20-year real costs in 2026 prices; NPV is discounted at 6%. Detailed modelling assumptions are included in the appendix. A "handover" duty cycle reflects vehicles returning briefly between shifts, creating a short charging window that can overlap with overnight charging.

### Modelling sensitivity

This sensitivity tests a medium depot where overnight and handover duty cycle charging overlap during the evening peak. This short coincident peak drives the need for a 7MW firm connection.

1. **BESS becomes the lowest-cost option where evening peaks exist**
   - Reduces site cost NPV from £31.8m to £31.3m
   - Marginally lowers LCOE from 10.7p/kWh to 10.6p/kWh
2. **BESS enables a 40% smaller connection**
   - Reduces max import capacity from 7MW to 4MW
   - Can lower connection capex by 50%, from £5m to £2.5m
3. **Value is driven by avoiding larger connection costs, not energy savings alone**
   - BESS bridges the short evening peak created by overlapping duty cycles
   - Additional value comes from avoided connection capex and flex revenues

**Key Takeaway**: **For medium depots with coincident peaks driven by overlapping charging patterns, BESS becomes valuable because it can avoid a larger grid connection threshold and enables a lower LCOE**

| Scenario | Connection capex (£m) | BESS capex (£m) | Total upfront CAPEX (£m) |
|---|---|---|---|
| 7MW Smart charging | 5 | - | 5 |
| 4MW Smart charging + BESS | 2.5 | 3.6 | 6.1 |

# Work Package 4: Geospatial analysis and cost/benefit assessment

## Lead Partner: Baringa, Support Partner: Energy Systems Catapult

Assessing the impact of eHGV charging demand on the network at a granular level, and modelling the potential opportunities to reduce energy system costs from a range of candidate smart energy management schemes

**Main activities include:**

- Develop geospatial model for allocation of eHGV charging demand against UK Power Networks' network model for impact assessments
- Assess smart energy schemes from WP3 and develop cost/benefit assessment model to bring together grid cost, energy cost, and carbon benefits from smart energy schemes
- Adapt ZEHID TCO model to assess impact of energy system benefits for fleet archetypes, including impact of business model options on CAPEX/OPEX requirements for access to charging, with a focus on smaller fleets

**Deliverables:**

- Geospatial grid impact model and methodology
- Energy system cost/benefit assessment report
- Fleet operator TCO cost/benefit assessment report

**Success** will be an energy system cost-benefit assessment report, comparing smart energy scenarios to business-as-usual, and a fleet operator TCO cost-benefit report, quantifying financial impacts of different charging and infrastructure strategies.

Definitions CBA = Cost Benefit Analysis

# Work Package 4: Geospatial analysis and cost/benefit assessment

## Work to date has focused on identifying data sources and developing the model architecture

**Expected outputs of the geospatial model …**
- Estimated charging-stop demand by location
- Spatial outputs showing hotspots and corridor demand
- Fallback-stop locations that indicate infrastructure gaps

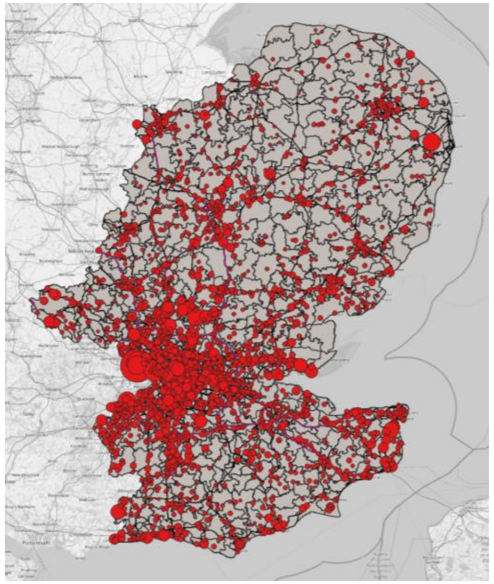
**… and how they are used in the project**
- eHGV stop counts and locations are linked to substation
- WP3's depot archetypes and smart levers turn these into demand profiles
- Network impact and costs are assessed using UK Power Networks' SFS platform

**What has been achieved so far**

- Prototype model in Python to demonstrate feasibility of the approach
- Cached road network from OpenStreetMap for realistic trip routing
- Per vehicle archetype origin-destination demand, including hubs outside the UK Power Networks' area, is used for trip generation. These use employment data as proxy for economic activity
- Land use and zone data is used for realistic trip placement within zones
- Vehicle archetypes with different battery, range, and trip-share assumptions based on Energy Systems Catapult's outputs
- Multi-processing support to reduce model runtime
- High level of configurability including:
  - Configurable study area to ensure applicability across Great Britain
  - Support for separate charging strategies per vehicle type
  - Support for road-type preference per vehicle type
  - Configurable rest and dwell times

**Focus for the upcoming period**

- Extend, enhance and quality assure the code base to move from proof of concept to MVP
- Run the model across a range of scenarios, including sensitivity checks
- Normalise outputs to existing eHGV growth projections (e.g. UK Power Networks DFES)
- Combine model outputs with WP3 outputs for SFS runs and subsequently the cost-benefit assessment



*Preliminary results from the prototype model, for illustrative purposes only. The map shows relative aggregated stop counts across all vehicle archetypes, together with primary substation area boundaries.*

*Areas with higher economic activity such as London, airports and seaports see more stops which translates into higher charging demand.*

Definitions: SFS = Strategic Forecasting System, MVP = Minimum Viable Product, DFES = Distributed Future Energy Scenarios

# Work Package 4: Geospatial analysis and cost/benefit assessment

## Fleet operator TCO cost/benefit assessment

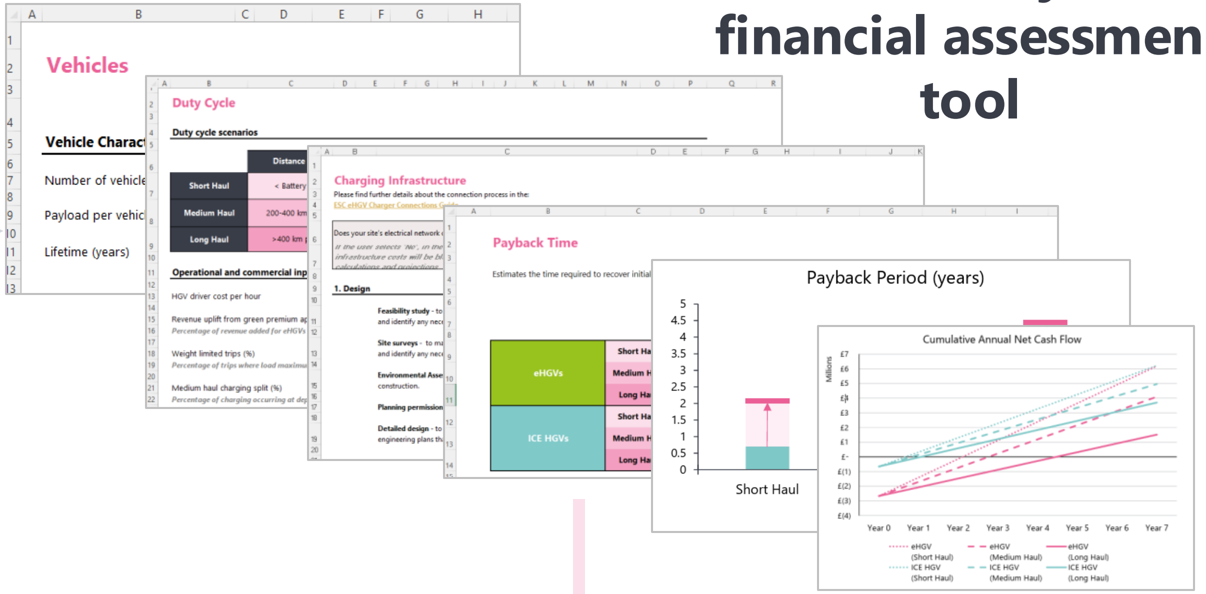
### WP2 – Fleet archetypes

- Restricted – One-Man Bands (1 HGV)
- Restricted – SME (11 HGVs)
- Standard National – SME (14 HGVs)
- Standard International – SME (14 HGVs)
- Standard National – Large Fleets (83 HGVs)
- Standard International – Large Fleets (99 HGVs)

### WP3 – Charging and business model options

1. Smart Charging
2. On-site Energy (Battery / Solar)
3. Charging in More Places
4. Shared Sites with Spare Capacity

### Pre-feasibility eHGV financial assessment tool




### WP4 – Output

- Assess impact of energy system benefits
- Assess impact of business model options – focusing on smaller fleets

# Work Package 5: Future opportunities, trial requirements & stakeholder engagement

Lead Partner: Voltempo, Engagement Support: UK Power Networks

**Main activities include:**

- Managing the stakeholder engagement and dissemination initiatives
- Further develop the learnings from the preceding work packages, moving them from theoretical actions into a realistic trial, with a specific structure, timeline, defined outputs and closing point.
- This business case should naturally flow into a Beta Phase proposal.

**Deliverables:**

- Trials Protocol Document

**Success** will be the delivery of a design for a real-world ready trial, with a repeatable structure that will deliver the key information required by all stakeholders.

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# Work Package 5: Future opportunities, trial requirements & stakeholder engagement

Work to date has focused on creating an engagement map and reaching out to stakeholders as well as beginning the framework and foundation work for the Trials Protocol Report

**Engagement Progress**

✅ Voltempo are seeking a new speaking slot to discuss the project as the CENEX Expo has been postponed.

✅ Contact has been made with SCANIA, DAF, MAN and Renault Trucks regarding the project, their plans and gauging future interest for any Beta Phase activity.

✅ Meetings have been taking place and ongoing slots have been made available for others to discuss.

✅ UK Power Networks have gauged interested from the RESP's team at NESO and Department for Transport with feedback sessions due to take place.

**Current Trial Progress**

✅ Initial trial planning framework established

✅ Core trial evaluation criteria defined

✅ Benchmarking against previous successful trials underway

✅ Foundations in place for future pilot/trial design and execution

Definitions: NESO = National Energy System Operator, RESP = Regional Energy Strategic Planning

# Work Package 5: Future opportunities, trial requirements & stakeholder engagement

## Trial Protocol Report Framework & Considerations

| | |
|---|---|
| **Safety Readiness** | Hazard identification & mitigation / Defined operational boundaries / Fallback and disengagement behaviour / Simulation & closed-course validation / Regulatory & legislative considerations |
| **Learning Value** | Prioritising high-value unresolved questions / Identifying edge cases & perception limitations / Avoiding duplicate / low-value trial activity |
| **Technical Readiness** | Stable autonomy stack assessment / Key Performance Indicator & disengagement metric planning / Data logging & replay requirements / Rollback & support strategy considerations |
| **Operational Feasibility** | Predictable operational environments / Escalation & trial shutdown procedures |
| **Business/Stakeholder Alignment** | Alignment with product, regulatory & policy goals / Path from trial → pilot → deployment / Cross-functional stakeholder coordination |

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# SIF Governance & Reporting

SIF Specific Conditions • Risk Register • Finances
Communications & Engagement

# Project Specific Conditions

| Condition | Description | Status |
|---|---|---|
| 1 | The Funding Party must not spend any SIF a until contracts are signed with the Project Partners. | Complete |
| 2 | The Funding Party must report on the financial contributions made to the Project as set out in its Application. Any financial contributions made over and above that stated in its Application should also be reported and included on the Innovation Funding Service (IFS). | Complete |
| 3 | The Funding Party must make reasonable endeavours to participate in all meetings related to the Project that they are invited to by Ofgem, UKRI and Department for Energy Security and Net Zero during the Alpha Phase. | In Progress |
| 4 | The Project will be allowed a flexible start date and duration within the 8-month period from the date the Project Direction is issued. The Project must tell the monitoring officer the start date and end date of the Project. | Complete |
| 5 | Prior to the end of Phase meeting, the Funding Party must provide to the Monitoring Officer a stakeholder engagement plan setting out how the Project will engage with a wider range of relevant stakeholders beyond the core consortium. This must include planned engagement with stakeholders from the Zero Emission HGV and Infrastructure Demonstrator (ZEHID) programme and with local and regional planning bodies, including Regional Energy Strategic Plans (RESPs). | In Progress |
| 6 | Prior to the end of Phase meeting, the Funding Party must provide to the Monitoring Officer an updated risk management summary addressing risks associated with data inputs, data quality, and data sources. This should set out mitigation measures and explain how data-related risks will be managed to ensure the Project can deliver its intended outputs in a timely manner. | In Progress |
| 7 | Prior to the end of Phase meeting, the Funding Party must provide to the Monitoring Officer:<br>• a summary of how learning from relevant international case studies has informed the Project's approach. This should include specific examples of comparable freight electrification or charging hub operational models and a clear explanation of how this learning has influenced the Project's proposed solutions;<br>• a dissemination summary setting out how key learning from the Project will be shared openly. This should include consideration of issues related to the provision, operation, and income distribution of electric HGV charging hubs, to support wider replication and competition. | In Progress |

# Risk Register

| Ref | Risk Description (Summarised) | Likelihood | Impact | Mitigation (Summarised) | Work Package | Risk Owner | Status |
|---|---|---|---|---|---|---|---|
| R18 | **Modelling Dependency on ERM** If ERM are unable to deliver on running the SFS models within the required timelines, this may delay the completion of WP4 | Medium | Low | Early engagement has been initiated with ERM to align on scope and timelines. The UKPN DSO team is actively involved in all interactions to support coordination, maintain momentum, and mitigate the risk of delays. | WP4 - Grid Impacts and Business Case | Partner 1 | Open |
| R6 | **Stakeholder Unavailability** If key stakeholders are unavailable or unidentifiable for user research, then understanding of user needs and requirements will be delayed. | Low | High | Stakeholder engagement will be conducted in the early phases of Alpha Phase to ensure input from engagement contacts. Project Partners have existing relationships including through their involvement with ZEHID that will be leveraged | WP5 - Future opportunities, trial requirements & stakeholder engagement | UK Power Networks and Voltempo | Open |
| R16 | **Geospatial Modelling Granularity** If available datasets, both geospatial and non-geospatial do not enable accurate and appropriate mapping to UK Power Networks network geospatial data, then the project may face delays or quality impacts to geospatial impact assessment. Knock on effects of delayed work from prior work packages resulting in data not being given on time. | Low | Medium | WP4 is led by Baringa, with specialist skills in geospatial data mapping and analysis. This will ensure the skills are available to overcome any unexpected data mapping challenges . Baringa has previously worked with UK Power Networks geospatial data and has a degree of existing familiarity. Engagement has been carried out with key partners including the UK Power Networks' DFES Team, eFreight 2030 partners, Baringa, to ensure that the required data is available and sufficient. | WP4 - Grid Impacts and Business Case | Baringa | Open |
| R17 | **Trails Protocol Development Dependency** If key outputs from earlier Work Packages, particularly WP3 and WP4, are delayed or incomplete, then the WP5 trials protocol document may be limited, reducing the quality and completeness of the trial design for a subsequent phase. | Low | Medium | The lead partner for WP5 will be actively involved in the preceding Work Packages to ensure the outputs align with the requirements of the protocol document. Early involvement will also ensure clear understanding of dependencies and timelines, reducing the risk of misalignment or late delivery | WP5 - Future opportunities, trial requirements & stakeholder engagement | UK Power Networks and Voltempo | Open |

# Finances

| Project Partner | Total project costs | Project contribution | Total SIF Funding requested |
|---|---|---|---|
| UK Power Networks (Operations) Limited | £63,060 | £6,306 | £56,754 |
| Baringa Partners LLP | £235,200 | £23,520 | £211,680 |
| Maritime Transport Limited | £33,000 | £3,300 | £29,700 |
| Energy Systems Catapult Limited | £124,490 | £12,449 | £112,041 |
| Voltempo Group Limited | £74,600 | £7,460 | £67,140 |
| Voltloader Limited | £25,000 | £2,500 | £22,500 |
| **Total** | **£555,350** | **£55,535** | **£499,815** |

# Communications & Engagement

## Engagement:

- Began developing an engagement map for delivery in the Beta Phase
- Gauged interest from the Department for Transport and the RESP’s team at NESO on the project. We will be meeting with them to get their feedback on the project so far and our plans for the Beta Phase.
- Energy Systems Catapult have spoken about the project at the Commercial Vehicle Show (April 2026)
- We will be having Alpha Phase Show and Tell session at the end of the project

## Publications and Outputs:

UK Power Networks have issued two press releases:

- **Project Announcement:** Funding fuels cleaner freight and a fairer energy future
- **Project Outline and Progression:** UK Power Networks clearing the path for electric heavy goods vehicles

UK Power Networks
Delivering your electricity

# Any Questions?