

VOLTEMPO®

Changing the way the world travels

Electrifying Road Freight

The Next Big Challenge

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About Voltempo



Voltempo designs and builds megawatt level charging systems for heavy duty applications



We run the eFREIGHT 2030 consortium – rolling out articulated electric HGVs and charging infrastructure across the UK





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| Electric Heavy Goods Vehicles

Electric HGVs are now available

Rigid e-HGVs (< 20-tonnes) have been available for 3-4 years

Articulated e-HGVs (40-tonnes +) are just becoming available

Typically have 500-700kWh battery packs – 2-2½kWh/mile economy

Gen 1 vehicles: 180-250 mile range. Gen 2 vehicles: 350-400 mile range.

Recharge time: Gen 1 vehicles: 1½-2½ hours @ 250-370kW. Gen 2 vehicles: 45 minutes at 800-1,000kW



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| Truckers: the Kings of the Road

Drivers often
on the road
for 8+ hours
each day

Many drivers
routinely clock
up 250-350km
on one route

Driver hours
dictate a 45-
minute break
after 4½ hours



Vehicles are
often double-
shifted, running
day and night
shifts

100,000-
200,000km
per year is not
uncommon

Over 16,000
truckers live “on
the road” – they
don’t go back to
base each night



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└ This is not an easy industry to decarbonise

- └ Big powerful vehicles, high uptime, heavy energy consumption
- └ Need to charge lots of vehicles at the same time – big demands on infrastructure
- └ 15% of these trucks never return to base during the week – “tramping” across the country with no predefined routes
- └ Electric HGVs are a torture chamber for batteries – high power drain for continuous periods
- └ BUT: Drivers love the driveability – high torque plays into the hands of electric powertrains





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| Why is electric the right decarbonisation strategy for HGVs?



Vehicles are available now – hydrogen HGVs will not be available from the major OEMs for several years *(if at all)*



The price of new electric HGVs are falling. Running costs are less than half that of a diesel HGV. Hydrogen HGVs are still circa £500K. Fuel costs are still too high



Next generation electric HGVs will have 400+ mile range and recharge times of 45 minutes or less and can be charged during a driver's mandated rest period



We are actively working on updating legislation to enable electric HGVs to have load carrying capabilities that match that of diesel HGVs



Electric drivetrains are a marriage made in heaven for electric HGVs. Powerful torque, smooth drivetrains, quiet running. Drivers love them



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| Electric HGVs are not the thing...

| ...they are the thing that get's us to the thing.

| Autonomous HGVs are on the way







| These will be transformative to the freight industry

| New types of vehicles – with 20m² more space and 4-tonnes more payload than current diesel HGVs, 6-800km range, 24-hour operations

| Expect to see autonomous HGVs on trial in the UK before the end of the decade



| The challenges we face today... and how we overcome them

-  Trucks are too expensive
-  Range is insufficient
-  Not enough charging infrastructure
-  Infrastructure costs too high
-  Grid connections are a barrier
-  Legislation favours diesel HGVs over electric

Introducing the Billion Pound Club

A commitment from industry to spend £1,000,000,000 on electrifying fleets between now and 2030

Investment into vehicles and infrastructure from all the stakeholders

Leveraging this spend to get price reduction, legislation change and grid connectivity support



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