



HGVs on the road to net zero

How battery electric trucks can decarbonise GB road freight

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Summary

Transport & Environment UK commissioned **Element Energy** (an ERM Group company) to examine the techno-economic feasibility of accelerating the adoption of battery electric trucks with static charging infrastructure across England, Scotland and Wales (Great Britain). The study evaluates a wide range of common operational profiles and develops optimal combinations of battery size, depot-based charging infrastructure, opportunity-charging at pick-up/delivery sites and (for those use cases that would need it) high-power public charging infrastructure. A large number of vehicle duty cycles have been studied, capturing (from a comprehensive dataset) a large and representative spread of different HGV operations, including those pushing the extremes of payload and journey distances.

The study does not assess the techno-economic feasibility of other battery electric technologies and options such as dynamic public charging (e.g. overhead catenary Electric Road Systems), battery swapping or “pony-express” vehicle swapping, nor does it consider other zero tailpipe emission technologies such as fuel-cell vehicles or the role of alternative fuels – it only considers battery electric trucks with static charging and only compares their technical and commercial viability with diesel-powered, conventional truck operations.

This report summarises the findings of the technical study and provides actionable recommendations for UK policymakers and fleet managers to speed up the transition in ways that could not only support decarbonisation, net zero, energy security and air quality agendas but also cut costs, strengthen technology leadership, boost economic growth, and enhance profitability for operators.

The first phase of the research assessed logistics operations that would not be reliant on public charging infrastructure and thus could, with the right policy environment, potentially be electrified very quickly. The second phase covered use cases that will need public truck charging infrastructure.

Back-to-base use cases

Phase one of the study shows that in this decade – well ahead of the UK Government’s 2035/40 phase-out dates for diesel trucks – 65-75% of Britain’s rigid HGVs and 30-35% of articulated HGVs could operate sustainably and productively with battery electric trucks without significant reliance on future public charging infrastructure. Together, these back-to-base use cases capture over half of HGVs and currently account for around 25-35% of all HGV greenhouse gas emissions.

Long-distance, heavy-duty use cases

Phase two of the study shows that GB long-distance, heavy duty 40-44t articulated HGVs could be able to perform their operations using battery electric vehicles and appropriate static charging infrastructure with technology set to be available from 2024. Battery electric HGVs are projected to become cost competitive with diesel equivalents for many long-distance, heavy-duty use cases around 2030, even with any potential payload losses and charging downtime fully considered. We emphasize here that we do not assert that battery electric HGVs with static chargers are the only solution for long-distance, heavy-duty trucking but our study results certainly indicate that this provides one highly cost effective and rapidly scalable solution for decarbonising such operations.

Roughly half of GB HGVs and two thirds of GB HGV emissions are from vehicles that would require some form of charging outside their home depot to complete longer trips. Most charging will occur at depots (for all HGV types including 40-44t artics), but a public charging network will be needed.

Recommendations for policymakers

The research has firmly indicated that a battery-electric truck future for the HGV fleet is an achievable objective. It has also shown that this transition is likely to be achievable, in terms of the business case to support new truck purchases, well ahead of the existing 2035 and 2040 UK phase-out dates for sales of new non-zero emission HGVs. But we are in a climate emergency and a volatile global economy, so the researchers have also looked at a wide range of near-term policy interventions that could accelerate and bring forward that transition and thus make an even stronger contribution to carbon budgets and air quality improvements while boosting economic growth and energy security. If all eight recommendations were implemented, the modelling indicates that TCO parity dates for battery electric HGVs of all types and use cases would typically be brought forward by 2-5 years, depending on the specific circumstances, a change which could significantly increase the number of zero emission HGVs on Britain's roads in 2030.

1. Strengthen the phase-out dates policy by introducing interim ZEV mandates.

Supply side regulation in the form of ZEV mandates is essential to ensure there are sufficient zero emission trucks available to meet the likely demand.

2. Support supply chain development for battery electric trucks.

Strengthening and expanding our supply chain and positioning it for the coming global transformation to battery electric trucks could and should be a much stronger pillar of UK automotive industrial strategy.

3. Provide more effective vehicle acquisition incentives.

The current high upfront costs of battery electric trucks highlight the need for more effective vehicle acquisition incentives (than current Plug-In Truck and Van Grant levels), which the Government should urgently explore and propose.

4. Support the roll-out of private charging infrastructure for depot-based fleets.

Regulation must mandate and support sufficient, smart and cost-effective charging infrastructure supply for depot-based commercial vehicle fleets and remove the various existing barriers to rapid deployment.

5. Lower the early-years risks to public truck charging infrastructure providers.

If private sector balance sheet investment could be leveraged against a zero/low interest loan from government, this would improve the internal rate of return during the early years of potentially low

utilisation and help to reduce the level of risk to the private investor.

6. Fund truck public charging at major warehouses and develop planning policies to further incentivise charging infrastructure at logistics hubs.

Tax breaks and other policies that would incentivise multiple stakeholders and landowners in warehousing areas to install charging infrastructure could help overcome issues caused by low land availability in warehousing areas. Planning rules could be adjusted to incentivise and remove barriers to charge point installation and shorten lead-times.

7. Consider changes to maximum vehicle weight and length regulations.

A one-metre increase in allowed vehicle length and two-tonne increase in allowed gross vehicle weight would allow operators to switch from the heaviest 44 tonne diesel HGVs to 44 + 2 tonne battery electric HGVs without loss of payload, deterring adoption. Opportunities to trial such interventions and assess fully their real-world impacts exist through current and planned demonstration programmes.

8. Review and amend where appropriate driver hours regulations and rest stops.

Some targeted flexibility in the driver hours regulations and working-time definitions could allow more drivers to make use of a fixed number of charging locations without resulting in additional downtime.

These specific recommendations arise directly from this study's assessment of the potential benefits of accelerating the uptake of battery electric trucks. But there are a range of potential complementary measures that would serve to further accelerate the decarbonisation of the sector and its transition away from fossil fuels. For example, the deployment of alternative fuels, the electrification of auxiliary loads and the use of the latest aerodynamic / rolling resistance features can all play important roles during the transition period towards 100% zero-emission vehicles.

Endorsements

The above summary has been prepared by Transport & Environment with the assistance, guidance, support and endorsement of an advisory group of expert stakeholders, collectively known as the UK Platform for Battery Electric Trucking. Signatories include:

- Andy Eastlake, Chief Executive Office, Zemo Partnership
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