BRIEFING - May 2025

Electric depots: the key to electrifying road logistics

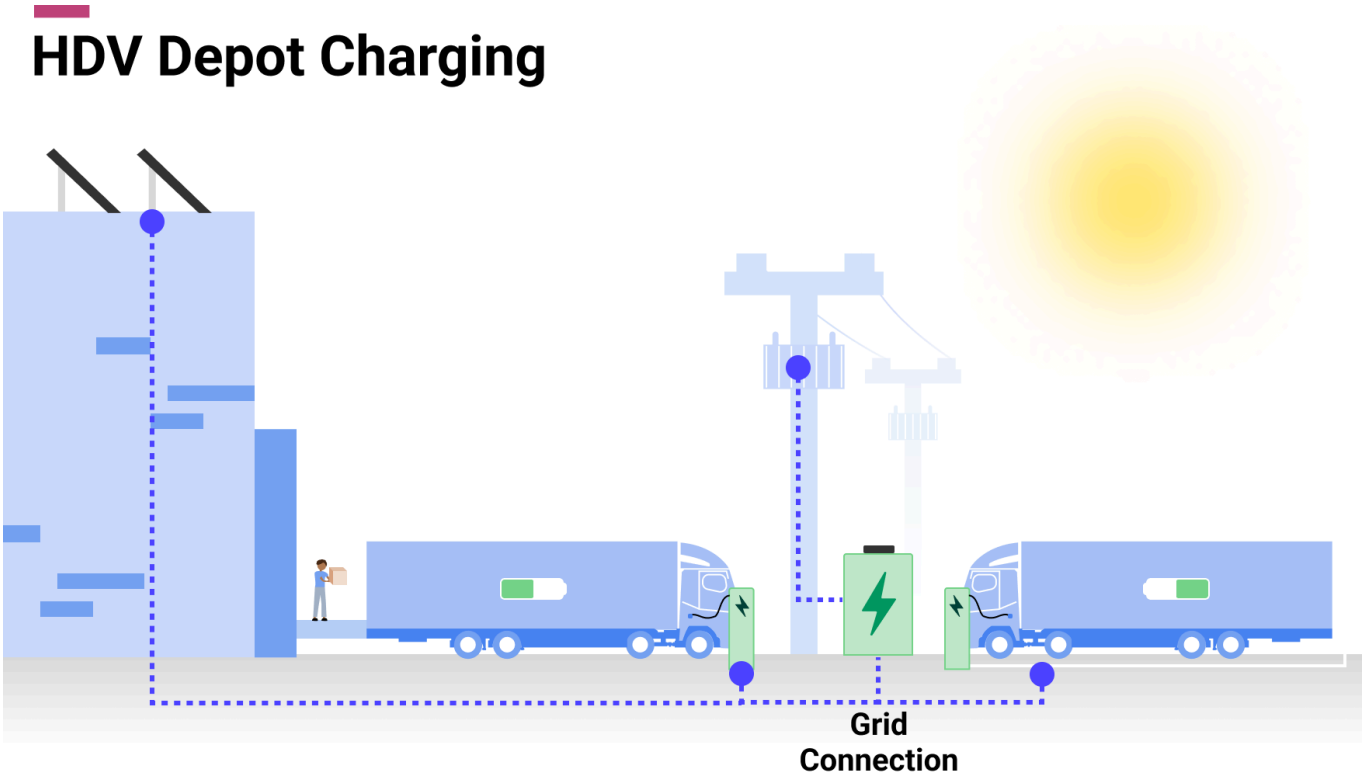
Battery-electric heavy-duty vehicles are ready for the road — now depots need to get ready to charge

A Fraunhofer ISI & Oeko Institute study commissioned by T&E

A new study shows that depot charging is the way forward for a rapid market ramp-up of battery-electric heavy-duty vehicles (HDVs). Battery-electric trucks (BETs) are already competitive with internal combustion engine (ICE) trucks in regional freight transport. OEMs expect that the share of BETs among European HDV sales in 2030 will be more than one-third. In anticipation of that, the time to electrify depots is now.

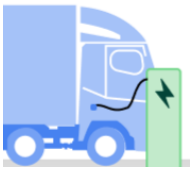
In 2021, trucks and buses accounted for 28% of CO_2 emissions in the EU transport sector, despite making up only 2% of all vehicles. Decarbonising road freight transport is therefore essential for meeting the EU's climate targets and reversing the trend of growing emissions in the transport sector.

Charging infrastructure for electric trucks is now the key lever for the rapid market ramp-up of BETs. While the EU regulation AFIR mandates the installation of fast-charging points along the TEN-T network for long-haul transport by 2030, depot charging plays a central role in regional freight transport.



Source: T&E

Focus of the study



Why depot charging?

Regional freight transport constitutes a significant share of truck trips. In France, Germany and the United Kingdom (UK) almost half of the trucks are used for regional transport. The majority of regional freight transport could already be electrified by depot charging today.

Which factors are in focus?

The study focuses on various factors in the fields of logistics and energy. Primarily, it examines the structure of the logistics industry and its government support on one hand, and energy grids, production, and costs on the other. Depot charging serves as a key example of how transport and energy considerations need to be strategically coordinated in the future.

Which countries are covered by the study?

The comparative study examines the current state of depot charging development in France, Germany, the UK and Spain as well as existing challenges.

Findings

1. Depot charging powers regional battery-electric logistics

Depot charging is sufficient for regional delivery (up to 300 km per day), as most trucks return to the depot at the end of the day and can be charged there overnight. Trucks used in shift operations can be electrified using fast charging infrastructure at the depot and at the destination. Almost half of the trucks in France, Germany and the UK could be covered by depot charging and would not rely on public charging infrastructure. This is particularly relevant in the coming years as the AFIR directive is being implemented. Depot charging significantly increases the planning security for the operation of BETs. This will also have a positive impact on the demand for public charging infrastructure.

Depot charging infrastructure can be operated in different ownership-user constellations:

- Private depot charging infrastructure: Access only for the company's own vehicles at its own depot.
- Semi-private depot charging infrastructure: Accessible to partners or customers but located on company premises.

- Semi-public charging infrastructure: Located in publicly accessible areas but with restricted access to the infrastructure.

Large logistics companies play a crucial role in the early phase of depot electrification. Their direct customer contracts and longer contract durations reduce investment risks when acquiring BETs and charging infrastructure. Additionally, large logistics companies can serve as providers of semi-private or semi-public charging infrastructure for their subcontractors.

Best Practice (Spain): In cooperation, small and medium-sized companies can set up **"mutual guarantee societies"** which allow them to gain access to better credit conditions. Public authorities can support these societies with information programmes tailored to SMEs, to help them modernise their fleets and facilities.

Small and medium-sized enterprises (SMEs) with five or fewer trucks make up 70 to 80% of logistics companies in the analysed countries. These businesses operate on short or ultra-short contracts with profit margins between 1 and 2 percent. Investing in new vehicles is already a challenge, even before considering the higher initial cost of charging infrastructure. Also, limited personnel capacity for knowledge development and limited investment abilities hinder SMEs from acquiring BETs.

2. Grid Readiness: The Bottleneck for Depot Electrification

In all analysed countries, grid extension plans underestimate the future demand for BET charging in depots. Of all countries, France's medium-voltage grid is best prepared for depot charging, particularly in industrial areas. As of mid 2025, the EU mandates grid capacity transparency through the revised electricity market legislation, which simplifies the planning of depot electrification in France, Germany and Spain.

Best Practice (Germany): An official report, the "Charging Infrastructure Master Plan", anticipates necessary investments and network planning to reach the target of 1 million charging points in Germany by 2030. The report identifies existing challenges and provides solutions to overcome them. For example, the needed cooperation between all stakeholders is supported through the StandortTOOL, which maps demand and supply of charging infrastructure in Germany. Also, the lack of space for charging infrastructure in densely populated areas is identified as a hurdle. One solution to this is the construction of charging points on state-owned properties.

Grid connection lead times span multiple years across all four countries. Connection costs depend heavily on local conditions. Coordinating a partly shared grid connection with multiple logistics companies or other major energy consumers can significantly reduce the high initial costs. To ensure effective regional or national grid planning and accommodate HDV

electrification, closer collaboration between logistics companies, public authorities, and grid operators is necessary.

Best Practice (France): France has updated its support scheme for the purchase and leasing of fully electric heavy-duty vehicles, both new and retrofitted. Since January 1, 2025, this support is based on the Energy Savings Certificates (CEE) mechanism, through the standardised sheet TRA-EQ-129. A fixed volume of certificates is granted for each vehicle, depending on the estimated energy savings compared to a reference diesel truck. This volume, set according to vehicle category, translates into a direct financial incentive for the buyer. Depending on the vehicle type, the support can range from approximately €15,000 to up to €50,000. The scheme is set to run for five years.
For depot charging, there is a dedicated program, ADVENIR, funding of up to €15,000 available for charging points and up to €960,000 for the depot grid connection.

Vehicle-to-Grid (V2G) has strong potential as a future business model for some HDV operators. Smart charging can lower total cost of ownership and bidirectional charging benefits flexible energy markets. Smart meters, required for smart charging and V2G, are common in Spain and France. In the UK, the rollout is progressing, while Germany is lagging behind. However, V2G-capable vehicles remain scarce in Europe, and interoperability is yet to be achieved.

Policy recommendations

1. **Plan grid capacities and depot-grid connections proactively**

Transmission System Operators (TSOs) and Distribution System Operators (DSOs) need to coordinate and plan for the geographical distribution of expected electricity needs from private depot charging, especially in commercial areas. For instance, German grid operators currently underestimate the future electricity needs by one-third, which will be a major barrier to the electrification of depots.

Grid operators should make information on grid capacity and grid planning available to help logistics companies electrify their depots, or share connections with other companies.

2. **Implement a right to plug for depot charging and encourage shared depot charging**

A large share of logistics companies rent or share the depots they operate in, and are therefore more likely to face administrative barriers when installing charging infrastructure due to the ownership structure. To support logistics companies operating in rented or shared depots, a regulatory framework should be implemented to allow an accelerated permitting process for the charging infrastructure, and to clarify ownership rights and cost distribution.

Logistics companies face land use constraints when trying to electrify their depots, as three parking spaces are needed to equip two parking spaces with charging infrastructure. They should therefore be encouraged to share charging infrastructure to optimise the use of depot parking space, and the cost of the grid connection and the charging infrastructure. Simplified procedures for shared grid connections should be implemented, and large companies should be mandated to open their charging infrastructure to subcontractors to ensure access to private or semi-private charging for all logistics companies.

3. **Support electrification of depots with simple funding instruments**

Logistics companies, especially SMEs, have very small margins and will need financial support and incentives to electrify their depots. Support should target grid connection costs, as well as the charging infrastructure itself. The application for, and the allocation of the funds should be simple, relying on a first-come first-served principle, and distributed via a lump sum payment.

Additionally, EU member states can unlock another source of funding for depot electrification by swiftly implementing the Renewable Energy Directive (RED III) crediting system for renewable electricity as a transport fuel. Such a crediting mechanism should also encompass private charging, and not just public charging. This system helps to make the use of HDVs charged at depots more profitable and therefore drives demand for battery electric HDVs, while avoiding the cost of subsidies or funding. The European Commission's Vehicle Energy Consumption Calculation Tool (VECTO) should be used to calculate energy consumption estimates for vehicles charged at the depot, to achieve an effective and fair crediting system across the EU.

In addition to support for the charging infrastructure, SMEs would benefit from funding to support the purchase of BETs. Fixed grants should be awarded on a first-come, first-served principle, and based on the cost difference between BETs and ICE trucks in relation to company size and vehicle type to ensure a fair and effective division of funds. Funding requests should be prioritised according to their CO_2 reduction potential.

4. **Ensure enabling conditions for depot charging**

Removing technical and regulatory barriers in the energy system will be essential to make sure that enabling conditions are in place to reap the benefits of depot charging.

Enabling smart charging, flexible pricing models and time-varying network tariffs can help regulate the strain of charging demand on the grid, and its price for logistics companies, which overall lowers the threshold to electrify depots.

5. **Mandate V2G-ready charging infrastructure**

Bidirectional charging would enable logistics companies to tap into another source of income by selling electricity back to the grid, thereby compensating for the investments in infrastructure

and BETs. Bidirectional charging infrastructure should be made mandatory for all new installations. Also, the vehicles need to be V2G-ready.

6. **Provide and improve accessible information for logistics companies, especially small and medium-sized companies**

Information on the planning, set-up and operation of depot charging and BETs should be made available to logistics companies, particularly focused and tailored to SMEs which don't have the capacity for knowledge building. A good example is the "Simple Depot Charging" guide published by the German National Centre for Charging Infrastructure.

Further information

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