

Research for TRAN Committee – Alternative fuel infrastructures for heavy-duty vehicles

KEY FINDINGS

- Because of their GHG emission reduction potential, alternatively fuelled low and zero-emission trucks will play a major role in realising the **EU Green Deal and the 55% GHG reduction target for 2030**. It is therefore essential that there is **sufficient and widespread recharging and refuelling infrastructure** available.
- For trucks the Alternative Fuels Infrastructure Directive (AFID) is geared mainly to alternative fuels like CNG and LNG. Given the Green Deal decarbonisation target, **the AFID should shift its focus to creating refuelling infrastructure for battery electric trucks (BET) and hydrogen fuelling infrastructure**. Electric road systems (ERS) could be further piloted on specific corridors.
- At present there is **only minimal publicly accessible refuelling and recharging infrastructure** for BETs and hydrogen-fuelled trucks. Chargers up to 350 kW have been piloted, while chargers up to 1 MW are being developed to limit charging times. A limited number of hydrogen refuelling stations for passengers' cars and buses are already in operation. **Accessibility** for trucks seems very limited and needs attention with respect to **size, spatial integration, compatibility of tank pressure and location choice**.
- Estimated future infrastructure requirements point to **a need for overnight depot charging points as the main recharging concept for BETs. To a lesser extent public overnight chargers and ultra-fast opportunity charging are required**. For medium- and long-haul transport, however, **publicly accessible fast-charging infrastructure** is essential and needs to be addressed via TEN-T and the AFID.
- Given the high power demand of truck charging at depots and roadside public charging stations, **the power grid and its capacity need to be suitably prepared** and made future-proof. These developments should be taken into account in the TEN-E revision.
- Although action is required in the short term, **lack of investment security, a stable long-term policy framework and a targeted, uniform approach** are hampering accelerated roll-out and increasing realisation times. Policymakers need to take suitable policy initiatives.

The present document is the executive summary of the overview briefing on Alternative fuel infrastructures for heavy-duty vehicles. The full study, which is available in English can be downloaded at: <https://bit.ly/3mq9XZz>

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The need to decarbonise road freight transport



Given the Green Deal objective of reducing transport GHG emissions by 90% in 2050 and the current share of emissions from road transport and HDVs, trucks in particular, more effective action needs to be undertaken to decarbonise this vehicle segment. While alternative fuels and zero-emission powertrains offer major reduction potential, without sufficient and appropriate recharging and refuelling infrastructure they will fail to deliver. To date, however, policymakers and other stakeholders

have focused mainly on creating fuelling infrastructure for passenger cars rather than trucks. The anticipated revisions of the Alternative Fuels Infrastructure Directive (AFID) and TEN-T regulation may improve this situation, along with strategies at the national level.

Current technologies

While biofuels and liquefied natural gas (LNG) are more mature and already more widely available, battery electric trucks (BET), fuel cell electric trucks (FCET) and electric road systems (ERS) still need major development and investment to ensure sufficient coverage in the long term, preferably along the TEN-T corridors.

The economic and operational feasibility of recharging and refuelling concepts for alternative fuels are hampered by relatively long recharging and refuelling times and low capacities. Further technological development is needed to match the higher energy demand of trucks and to enable the shift to long distances. Most pilots and first-mover initiatives on these technologies are taking place in Western European countries, parallel to initial uptake of the associated vehicles.

Low-carbon fuels can result in major GHG emission reductions in internal combustion engines. Infrastructure for biofuels and e-fuels can be relatively easily extended, using the current infrastructure for diesel if necessary.

Existing infrastructure and estimate of future needs

Apart from infrastructure for trucks running on gaseous fuels, other types of alternative infrastructure are still virtually absent. There is a paucity of data on its accessibility for trucks. The number of 1042 (hybrid) BETs currently on the road will be served by private (depot) charging infrastructure where vehicles can be recharged for short- and medium-haul trips. Depot charging is also expected to be the main form of BET recharging infrastructure in the future. Publicly accessible fast charging stations are in any case essential for long-haul as well as medium-haul transport.

Nonetheless, estimates of demand in 2025 and 2030 point to a need for rapid roll-out of such infrastructure in the coming few years. Geographically, there also needs to be a shift from a limited number of Member States to full EU-wide coverage. Given the major uncertainties involved, studies on future infrastructure requirements are in fair agreement with their projections of the number of charging and refuelling points needed, though they differ on expectations regarding full electrification (or more hybrid forms of transport).

Barriers and enablers

Developments on recharging and refuelling infrastructure are currently hampered by limited investment security and the lack of a stable long-term policy framework, including binding targets. Investors are also looking for large potential user groups to ensure guaranteed utilisation rates. This is beneficial for larger companies seeking cooperation and disadvantageous for small and medium-sized enterprises.

Appropriate grid connections and adjustments by grid operators also require a coordinated approach, often resulting in long procedures and thus long lead times. These and other investments will need to be made by large energy suppliers, as well as by companies needing charging infrastructure at their depots. Shared public infrastructure provides opportunities for higher utilisation rates, but should come with additional measures to inform users on accessibility and procedures for guaranteed refuelling or recharging, as needed.

Overall, stakeholders often operate quite independently, while cooperation could be beneficial for knowledge exchange and could accelerate harmonisation and standardisation. The vehicle-infrastructure interface, in particular, requires standardisation initiatives. Infrastructure roll-out is also hampered by legislative barriers.

Policy recommendations aimed at removing barriers

Policy-makers can contribute to the development of infrastructure for trucks by removing barriers by means of:

- an increase in investment security for investors by creating a stable policy framework (such as binding targets) and via smart funding mechanisms;
- a reduction in lead times by removing any disproportionate permit requirements given the size and scale of recharging and refuelling infrastructure;
- a reduction of long procedures and lead times for appropriate grid connections and adjustments to ensure sufficient capacity;
- bringing stakeholders together in a coordinated approach in which small and medium-sized enterprises can also benefit from scale advantages and particular attention is paid to the role of grid operators and other stakeholders in the energy sector;
- seeking synergies and smart solutions to maximise utilisation rates;
- development of information and reservation systems to improve accessibility and to reduce uncertainties related to availability, mainly for shared public infrastructure;
- striving for standardisation and harmonisation from the outset, especially for the vehicle-infrastructure interface;
- ensuring all Member States are on board, not only frontrunners;
- finally, the decarbonisation potential of renewable fuels (biofuels and e-fuels) in diesel engines should not be overlooked. Additional actions focussing on feedstock mobilisation and realisation of supply chains should be taken.

Further information

This executive summary is available in the following languages: English, French, German, Italian and Spanish. The study, which is available in English, and the summaries can be downloaded at: <https://bit.ly/3mq9XZz>

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