

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

### KEY FINDINGS

- Given the Green Deal decarbonisation targets, there is a need to decarbonise truck transport, but at present there is only minimal publicly accessible refuelling and recharging infrastructure for battery electric trucks (BETs) and hydrogen-fuelled trucks.
- The proposal for an Alternative Fuels Infrastructure Regulation (AFIR) aims to ensure a **minimum level of infrastructure** and includes binding **distance-based targets** for the realisation of recharging and hydrogen refuelling points for trucks.
- 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 and lower power overnight charging infrastructure is essential**.
- 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** extended and adjusted to become future-proof.
- A strategic roll-out plan published together with the proposed Regulation contains a strategy and clearly defined actions to reduce barriers. For example, by means of funding mechanisms, standardisation and development of a data governance framework.

The present document is the executive summary of the final study on Alternative fuel infrastructures for heavy-duty vehicles. The full study, which is available in English can be downloaded at: <https://bit.ly/3o58pml>

Policy Department for Structural and Cohesion Policies  
Directorate-General for Internal Policies

Author: Anouk VAN GRINSVEN, Matthijs OTTEN, Emiel VAN DEN TOORN, Reinier VAN DER VEEN, Julius KIRÁLY, Roy VAN DEN BERG (CE Delft)  
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## Vehicle technologies and their need for infrastructure



About 19% of transport green house gas (GHG) emissions are caused by heavy-duty vehicles (HDV's) in road transport ([EEA, 2020](#))<sup>1</sup>. Given the Green Deal objective of reducing transport GHG emissions by 90% in 2050, more effective action is required to decarbonise this vehicle segment. To reach the goals, zero emission technologies such as battery electric and hydrogen fuelled trucks will play an important role. All Original Equipment Manufacturers (OEMs) have battery electric trucks (BETs) ready to

enter the market, while fuel cell electric trucks (FCETs) are likely to become commercially available after 2025. Electric Road System (ERS) trucks are not commercially available yet, but are piloted in Germany and Sweden. These zero-emission powertrains offer major reduction potential, however, without sufficient and appropriate recharging and refuelling infrastructure they will fail to deliver. At the moment there is still little infrastructure installed for these new technologies, and a scale up is needed. Charging systems up to 350 kW are already available for battery electric trucks (BETs), while Megawatt Charging Systems (MCS) are in development. Compressed hydrogen refuelling stations are available in an early phase of commercialisation but limited in terms of daily capacities, while liquid hydrogen fuel stations are not yet available. Electric road systems (ERS) as a charging concept for BETs are only in the pilot phase.

### Minimum infrastructure

As an important next step, the objective of the [proposal for an Alternative Fuels Infrastructure Regulation \(AFIR proposal\)](#) is to ensure 'minimum infrastructure to support the required uptake of alternative fuel vehicles across all transport modes and in all Member States to meet the EU's climate objectives'. This AFIR proposal is accompanied by [a strategic roll-out plan](#) to overcome major barriers. Both documents are part of the 'Fit for 55' legislative package aimed at aligning EU policies with the Green Deal objectives.

### Distance-based targets

For trucks, the **AFIR proposal contains distance-based targets for both recharging points and refuelling stations for BETs and FCETs along the Trans-European Transport Network (TEN-T) corridors**. Fleet-based targets and population density are less suitable indicators to base the location of truck recharging and refuelling infrastructure on, as these indicators have no direct correlation with the need for public charging infrastructure due to the long distances and transboundary nature of international goods transport. The **TEN-T network is a relevant choice as a starting point for the roll-out of infrastructure** as the network has a relatively high traffic intensity of long distance trucks that particularly will need public recharging and refuelling infrastructure when electrified or fuelled with hydrogen.

<sup>1</sup> See [EEA, 2020](#), table and dashboard of Figure 3

## Location of recharging and refuelling infrastructure

In terms of geographical location of recharging and refuelling infrastructure, the Commission has opted for infrastructure along the TEN-T core and comprehensive networks, at urban nodes and with due attention to safe and secure parking areas and fast-charging provisions. For hydrogen, freight terminals are to play a key role as well. **The AFIR proposal seems to cover the most relevant types of recharging and refuelling locations.** The proposed Regulation states, however, that authorities will need to support private parties in deploying such infrastructure at private locations as well. This is crucial, because overnight charging and destination charging at specific (private) locations are expected to be the most important means of recharging and infrastructure realisation will be challenging for private actors.

## Technological choices

Regarding the technological requirements in the AFIR proposal, the choice for at least 700 bar hydrogen refuelling points seems to be justified, since both heavy duty vehicles and light duty vehicles can make use of these refuelling points. Although liquid hydrogen can be a game changer in the coming years, the introduction of **binding targets for liquid hydrogen might be too early given the early phase of development of liquid hydrogen technology.** Indicative targets might be an alternative.

For battery electric trucks, the minimum power output levels of 350 kW are a good start for trucks with a high number of stops and longer legal breaks but might not be sufficient in case of breaks close to the legal minimum. **Higher minimum levels of power output (>500 kW) might be considered in the AFIR. The sector itself is also working on higher power output levels such as 1 MW and above.**

The Commission has decided to extend the 2020 targets for LNG until 2025, but no further policy incentives will be provided. LNG and other fossil fuels need to be replaced by biofuels or low carbon synthetic fuels. Given the technological developments, these choices seem to be justified.

## The level of ambition of the AFIR proposal given future needs

Based on the length of the TEN-T network and the number of urban nodes and safe and secure parking areas, we have estimated that the targets for 2030 in the [AFIR proposal](#) correspond to a total of 17,314 charging points and 728 hydrogen refuelling stations (HRS). The four studies examined for the analysis on the future needs of charging infrastructure expect the need for 11,000-85,000 public charging points by 2030, with two studies (ACEA and T&E) expecting a considerably higher number of charging points needed than the minimum estimated based on the AFIR proposal. The AFIR proposal, however, sets targets for a minimum of infrastructure to allow BETs and FCETs to circulate through the EU and allows the market to further develop the required infrastructure based on demand. To allow circulation through the EU, however, the estimated minimum number of charging points at overnight parking areas seems low (a factor 10 lower) as compared to the expected required charging points. **A higher minimum requirement of charging stations for each safe and secure (overnight) parking area dedicated to heavy-duty vehicles might be considered.**

## Other preconditions

Lack of investment security as well as a lack of a stable long-term policy framework and of a targeted, uniform approach are hampering the accelerated roll-out and increasing realisation times of infrastructure. The AFIR proposal therefore places a strong emphasis on technological

standardisation to reach harmonisation. Several provisions lay down requirements for user-friendliness (of payment options, for example), information provision at recharging and refuelling points and data governance (with respect to e.g. reservation systems). In the strategic roll-out plan these issues are addressed as well, together with the power output implications, funding mechanisms and stakeholder cooperation.

## Other Policy recommendations

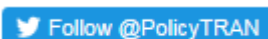
Furthermore, policy makers can contribute to the development of infrastructure for trucks by removing barriers in the following ways:

- There is only limited time for testing and revision of national policies and revision of the AFIR before 2030. One option would be to speed up the development of national policy frameworks;
- Provide sufficient support to local authorities (financially, but also in terms of knowledge and organisationally), since much of the progress will depend on procurement procedures;
- In terms of grid capacities, Member States should ensure that sufficient grid capacity is available for deployment of fast charging stations, as fast charging is important to reduce both recharging times and other operational barriers. Grid developments should be taken into account in the Trans-European Networks for Energy (TEN-E) Regulation revision and are also partly addressed in the AFIR;
- Grid impacts of 'Fit for 55' policy proposals should be further investigated, including cost projections for grid adjustment (in addition to those for recharging and refuelling points) and the impact of additional renewable energy.

## Further information

This executive summary will be 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/3o58pmI>

More information on Policy Department research for TRAN: <https://research4committees.blog/tran/>



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Research administrator: Ariane DEBYSER

Editorial assistant: Mariana VÁCLAVOVÁ

Contact: [Poldep-cohesion@ep.europa.eu](mailto:Poldep-cohesion@ep.europa.eu)

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