

The importance of hydrogen for the decarbonisation of heavy duty transport

EXECUTIVE SUMMARY

The decarbonisation of heavy duty transport is a central component of Germany's 2030/2035 climate targets and of industrial competitiveness. Hydrogen plays a key role in this – technically, economically and geopolitically. Germany has the technological basis and industrial strength to be a leader in this respect. Speed is now of the essence: If, starting immediately, we achieve a significant ramp-up of hydrogen applications in heavy duty transport, Germany and Europe will have a good chance of securing a strong position in the global market, including with respect to competitor regions that have considerable ambitions in this area (such as South Korea and China).

1. INITIAL SITUATION: URGENCY OF ACTION

Heavy duty transport is the backbone of the German and European economy. Over 70% of freight in Germany is transported by road – with a corresponding share of CO₂ emissions. While passenger cars are becoming increasingly electrified, the decarbonisation of road freight vehicles over 16 tonnes is still in its infancy. This is also of particular importance because CO₂ emissions from road freight vehicles rose by more than 30% between 1990 and 2005, largely stagnating in the following two decades. The next two years will decide whether Germany and Europe keep pace technologically and industrially in the field of zero-emission drives for heavy duty vehicles – or lose these future markets to Asia. China is investing heavily in battery-electric and hydrogen-based commercial vehicle technologies and their value chains.

2. TECHNOLOGIES FOR THE DECARBONISATION OF HEAVY DUTY TRANSPORT

Heavy duty transport can fundamentally be decarbonised in a number of ways. Going forward, directly electrified (battery-electric) or hydrogen-based drive systems are the most widely accepted and are also the most attractive options from a technical and economic perspective on the road to climate-neutral heavy duty transport.

Battery-electric heavy duty vehicles (BEV) will play a central role in the future freight transport system, particularly but not only for shorter transport distances. In light of the very different business models and truck deployment strategies in the heavy duty transport sector and the advantages and disadvantages of BEV and hydrogen trucks that are relevant to varying degrees (battery weight, charging times, ranges, infrastructure availability, operating conditions internationally, including outside Europe), **hydrogen drives** have a significant leverage effect **in long-distance heavy duty transport**. This applies both to hydrogen trucks with **fuel cell drives** and – particularly for the short-term timeframe – **hydrogen combustion engines**.

An approach that is open to these different drive options is necessary. Hydrogen drives will enable complete climate neutrality in the transport sector at a national, European and, above all, international level. They increase resilience, create industrial added value and strengthen plant engineering, the automotive industry and energy technology. Further technical and cost-cutting progress in the areas of vehicle technology and infrastructure as well as reasonable electricity and hydrogen prices are required.

3. IMPORTANCE OF HYDROGEN AS A CENTRAL PART OF THE SOLUTION

Hydrogen offers advantages where battery-electric solutions reach their physical, economic and infrastructural limits. It enables climate-neutral long-distance transport, high availability thanks to fast refuelling and less dependence on the expansion of the electricity grid.

4. WHAT NEEDS TO BE DONE NOW – RECOMMENDATIONS FOR ACTION

4.1 ACCELERATE INFRASTRUCTURE DEVELOPMENT

- ◆ National hydrogen refuelling station strategy for commercial vehicles: refuelling stations that can accommodate at least 100 trucks, more than 600 H₂ refuelling stations across Europe by 2030 along the TEN-T corridors and in urban centres
- ◆ European coordination: harmonisation of standards, support programmes and refuelling protocols
- ◆ Promote logistics chains: transport, liquefaction, distribution – ‘refuelling station of the future’ as a modular concept
- ◆ A majority of the German National Hydrogen Council (NWR) considers targeted sector prioritisation of electrolysis plants for mobility applications over established conventional technologies and battery-electric solutions already available on an industrial scale to be necessary and advisable for reasons of competitiveness in the ramp-up phase.
- ◆ A minority of the NWR does not consider targeted sector prioritisation of electrolysis applications to be sensible, as on the one hand support on both the supply and demand side appears to be very problematic from a strategic perspective and, on the other hand, sector prioritisation in the area of electrolysis support is not deemed to be appropriate or expedient.

4.2 CREATE MARKET INCENTIVES

- ◆ In heavy duty transport in particular, the cost-effectiveness of the various drive solutions plays a decisive role in market acceptance. At the moment, competitive TCO (Total Cost of Ownership) for battery and fuel cell electric vehicles manufactured in Europe is only possible in a few cases and in a few Member States of the European Union without targeted subsidies. This is why the German government is providing billions of euros to support the development of the charging infrastructure for battery-powered trucks and buses, and is also reducing the price of charging electricity through its general measures. There is no comparable support for hydrogen vehicles, which is a huge obstacle to the ramp-up of hydrogen mobility, particularly in heavy duty transport. For this reason, appropriate support measures must be developed to ensure genuine competitiveness.
- ◆ Expand existing support programmes (simplified funding that takes into account the specifics of hydrogen technology; H₂ fleet projects) with a focus on commercial vehicles over 16 tonnes
- ◆ Provide investment grants for H₂ trucks and refuelling stations, as has been adopted in Japan, for example
- ◆ Ambitious updating of the GHG quota including multiple counting of green hydrogen through to 2040
- ◆ Introduction of an RFNBO sub-quota exclusively for road transport of 2.7% (including triple counting; net 0.9%) for 2030 and increasing gradually through to 2040 as part of the RFNBO quota for transport as a whole (see Annex). The RFNBO sub-quota must be increased accordingly, as otherwise the projects for climate-neutral hydrogen for use in refineries, some of which have been approved or planned, could be jeopardised.
- ◆ Establish equal tax treatment of fuel cell drives and hydrogen combustion engines by exempting them from energy tax including where H₂ is used in the hydrogen engine

4.3 ENSURE THE SUPPLY OF VEHICLES AND HYDROGEN

- ◆ Support industry partnerships between vehicle manufacturers, logistics companies and energy suppliers
- ◆ Further develop fuel cell and hydrogen combustion technologies and bring them into series production
- ◆ Increase the supply of low-cost hydrogen by adapting certification regulations and various measures to reduce electricity costs for electrolysis
- ◆ Create suitable hedging instruments for the creation of a midstream segment through which volume and maturity risks on the supply and demand side can be reduced¹

¹ See [NWR statement on 'Hydrogen supply – term transformation, coordination and product structuring as essential elements of an ambitious and efficient hydrogen ramp-up' of 19 January 2024.](#)



THE GERMAN NATIONAL HYDROGEN COUNCIL

On 10 June 2020, the German Federal Government adopted the National Hydrogen Strategy and appointed the German National Hydrogen Council. The Council consists of 23 high-ranking experts in the fields of economy, science and civil society. These experts are not part of public administration. The members of the National Hydrogen Council are experts in the fields of production, research and innovation, industrial decarbonisation, transportation and buildings/heating, infrastructure, international partnerships as well as climate and sustainability. The National Hydrogen Council is temporarily chaired by Felix Chr. Matthes.

The task of the National Hydrogen Council is to advise and support the State Secretary's Committee for Hydrogen with proposals and recommendations for action in the implementation and further development of Germany's National Hydrogen Strategy.

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ANNEX: EXAMPLE OF ROAD TRANSPORT SUB-QUOTA

- ◆ Total energy demand for transport (incl. air and sea): 2,300 PJ
- ◆ RFNBO-Quote 2030: 1.20%
- ◆ H₂ equivalent: 230,000t
- ◆ Road transport sub-quota: 0.90%
- ◆ H₂ equivalent: 172,500t
- ◆ H₂ consumption per truck and year: 7t
- ◆ Truck equivalent: 24,643 vehicles