

## 【欧州】 【Common】

Common - Outlook on recent trends and developments in logistics policies: Greening freight transport: EU legislation on supporting the decarbonisation of freight transport and of financing zero emission trucks (ZET)

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## 【概要 : Summary】

The European Green Deal includes the target to achieving a 90% reduction in the transport sector's GHG emissions by 2050. The GHG emissions of road transport, contributing 76.3% of the transport sector's GHG emissions in 2021, are a major concern. Also in freight transport, while being the backbone of the EU's Single Market, the reduction of GHG emissions must be achieved as Heavy-Duty Vehicles (HDV) and buses are responsible for 6% of the EU's total GHG emissions. These GHG emissions from HDVs are difficult to reduce as still nearly all HDVs are diesel-powered and only a fraction of trucks on EU roads has a zero-emission propulsion system. The legislative measures to push for a transition to low or zero emission HDVs include the revision of the Regulation EU 2019/1242 (COM (2023) 88 final), introducing stricter CO<sub>2</sub> emissions limits for HDVs and widening the scope to urban buses and coaches, among others. The average CO<sub>2</sub> emissions of HDVs should be reduced by 45% from 2030, by 65% from 2035, and by 90% from 2040 onwards, based on 2019 levels. The HDV manufacturing industry already announced to favour battery electric, fuel cell and

hydrogen combustion technologies for the shift to producing zero emission trucks (ZET). Considering the average age of HDVs in the EU of about 12 years, the stepwise introduction of stricter CO<sub>2</sub> emissions targets will allow the truck owners to gradually switch to ZET. The European Commission's "Greening Freight Transport" package includes the proposals COM (2023) 441 final and COM (2023) 445 final to introduce a methodological framework to give carriers the means to calculate more accurately the carbon footprint of freight transport services and to support the uptake of zero-emission truck (ZET). The purchase of ZET is mainly depending on the Total Cost of Ownership (TCO) and the operational requirements. There exist several public financial incentives in the EU Member States for bridging the investment gap between a diesel truck and a ZET, compensating up to 80% of the differences in purchase costs. However, since more than 95% of all trucks in the EU still have fossil fuel powered propulsion, it shows the dimension of the challenge that needs to be overcome to achieve the transition to a fleet of ZET.

【記事 : Article】

## 1. The EU transport sector's GHG emissions, the HDVs fleet's average age and fuel types in freight transport

Besides reaching climate neutrality by 2050, the European Green Deal also includes the target of reducing the transport sector's GHG emissions by 90% by 2050 (COM (2019) 640 final). However, the EU's transport sector is responsible for 28.6% of the EU's total GHG emissions in 2020 (EEA 2023, European Commission 2022). The EU-27 GHG emissions by transport mode in 2021 show that road transport is responsible for 76.3% of GHG emissions, followed by maritime transport 14.8%, aviation 8.1%, railways 0.4% and others 0.4% (Statista 2023a, EEA 2023).

Considering the importance of the EU's freight transport as the backbone of the EU's Single Market, most freight transport is conducted by maritime and road transport (DG Mobility 2023). Regarding the modal split in freight transport in the EU-27 in 2020, road transport covered 53.3%, rail 11.5%, inland waterways 4.0%, pipelines 2.8% and sea shipping 28.2% (European Commission 2022). Based on tonne-km, maritime transport accounted for more than two-thirds (67.9%) of freight transport performance in the EU, followed by road transport with 24.6%, rail transport with 5.4%, inland waterways 1.8% and air 0.2% (Eurostat 2023).

At the same time, freight transport has also some significant share of the transport sector's GHG emissions. HDVs are responsible for 28.2% of road transport's GHG emissions and for about 6% of the EU's total GHG emissions (European Commission 2022, T&E 2022b).

Since nearly the entire fleet of the EU's HDVs currently still run on internal combustion engines, the GHG emissions are expected to continue to increase, mainly driven by continuously increasing road transport demand (European Commission 2023b, 2023c). In 2022, nearly 327,000 new medium- and heavy-duty commercial vehicles in Europe were running on

diesel, being the most commonly used fuel type in this segment with about 96% of the market share (Statista 2023b).

Regarding the length of a possible transition from diesel powered HDVs to ZET, it is also important to consider the trucks' average age. According to statista (2024), the trucks' average age increased from 12.3 years in 2017 to 14.2 years in 2021 (statista 2024). Also, the average age of the bus fleet in the EU increased from 11.6 years in 2017 to 12.7 in 2021 (statista 2024). The average age for light commercial vehicles also increased slightly from 11.3 in 2017 to 12 years in 2021 (statista 2024).

However, although it can be expected to take decades until a significant share of ZET will run on EU roads, there is a slow shift towards alternative fuels visible (statista 2023b). The number of registrations for trucks with alternative fuels increased from 7,300 units to some 10,300 units from 2017 to 2020 and in 2022, registrations of trucks with alternative fuels increased by 90% (statista 2023b). However, only 0.1% of trucks on EU roads had a zero-emission powertrain in 2021 and at global level, the electric bus stock was 670,000 and electric HDVs was 66,000 in 2021, representing about 4% of the global fleet for buses and 0.1% for HDVs (IEA 2022, ACEA 2023). This underlines that it will be a lengthy process for the ZETs to become the majority of HDVs also on EU roads.

## 2. Legislative measures to reduce CO<sub>2</sub> emissions of HDVs

Since freight transport is expected to grow by around 25% by 2030, and 50% by 2050, a timely transition of the HDV fleets to zero-emission trucks (ZETs) needs to be achieved (DG Mobility 2023). To accelerate the decarbonisation of the HDV fleet road freight transport, as a first step, in 2019, Regulation (EU) 2019/1242 was introduced to monitor GHG emissions from HDVs (Regulation (EU) 2019/1242). To make also the

HDVs segment contributing to the European Green Deal's target with GHG emission reduction, the European Commission presented the proposal COM (2023) 88 final on the revision of the Regulation EU 2019/1242 on 14 February 2023. COM (2023) 88 final intends to introduce CO<sub>2</sub> emission reduction targets for HDVs and to widen the regulation's scope to include urban buses, coaches, trailers, and other types of lorries (European Parliament 2023, see also Antolini 2023a, European Commission 2023a). According to COM (2023) 88 final, the average CO<sub>2</sub> emissions of HDVs would have to decrease by 45% from 2030, by 65% from 2035, and by 90% from 2040 onwards, compared to 2019 levels (European Parliament 2023). To achieve these stricter CO<sub>2</sub> emission reduction targets, the proposal COM (2023) 88 final keeps a technology-open approach, to make manufacturers decide freely on the propulsion technologies e.g., electrification, hydrogen fuel cells or hydrogen with internal combustion that could be able to achieve the new GHG emission targets (European Commission 2023b).

While meanwhile the proposal is on its way through the legislative process, the European Parliament's ENVI Committee adopted a stricter CO<sub>2</sub> emissions reduction target for HDVs in the 2035-2039 period of a 70% reduction and extended the scope to vocational vehicles such as garbage trucks, among others (European Parliament 2023, see also Antolini 2023a). Instead, the Council of the European Union agreed on a general approach, allowing the EU Member States some more flexibility in the rules' implementation while maintaining the targets set by the European Commission of reducing CO<sub>2</sub> emissions, starting in 2025 with a 15% reduction and then reaching a 45% reduction from 2030 onward, a 65% CO<sub>2</sub> emissions reduction from 2035 and finally a 90% CO<sub>2</sub> emissions reduction from 2040 onward (Council of the EU 2023a, see also Antolini 2023b). The Council also intends to postpone the introduction date for the 100% zero-emission

urban buses, moving the introduction date from 2030 to 2035, but also setting an intermediate target of 85% for this category by 2030 (Council of the EU 2023a). The Council's general approach will serve as a mandate for negotiations with the European Parliament on the final version of the legislation (Council of the EU 2023a, European Commission 2023a).

According to the European Commission (2023c), the revised standards send a clear and long-term signal to guide EU industry investments in innovative zero-emission technologies, to boost the rollout of recharging and refuelling infrastructure and towards achieving the transition to low emission and zero emission trucks (ZET) (European Commission 2023b, 2023c). These strengthened GHG emissions standards are expected to ensure that this HDV segment of the road transport sector contributes to the shift to zero-emissions mobility and the decarbonisation of road transport (European Commission 2023c).

Since the EU is a market leader in the production of trucks and buses, the common legal framework on the GHG emission reduction of HDVs should help to secure that position for the future for clean and sustainable HDVs (European Commission 2023c). The HDV manufacturing industry has already announced the shift to zero emission technologies including battery electric, fuel cell and hydrogen combustion while stepping up the research, production, and sales of ZETs (Globaldrivetozero.org 2023, European Commission 2023b).

However, as T&E (2023) underlines, the current HDV CO<sub>2</sub> standards do not adequately stimulate the supply of ZETs and a delayed transition that would occur under current HDV CO<sub>2</sub> standards, which could put the European HDV manufacturing industry at risk of losing up to 11% of the EU market to competitors from the US and China by 2035 (T&E 2023).

### 3. Greening Freight transport and considering scope 3 emissions

According to a survey of Transporeon, Smart Freight Centre, & Kuhne Logistics University (2022), there seems to be a clear difference between the alternative fuel priorities of shippers and carriers. While the majority of shippers prioritize battery electric vehicles, carriers largely prioritize biodiesel and LNG (Transporeon, Smart Freight Centre, & Kuhne Logistics University's survey 2022, Globaldrivetozero.org 2023). These different priorities highlight the difficulties in choosing alternative HDVs and propulsion systems. Furthermore, carriers operate freight vehicles on behalf of shippers or logistics service providers and the structure of the market shows an overwhelming majority of 92% comprising of small or micro enterprises with less than 10 employees in the land transport sector in the EU in 2020. These enterprises tend to purchase their HDVs (Globaldrivetozero.org 2023). Therefore, the total cost of ownership (TCO) is an important aspect when deciding on the purchase of a new truck (Globaldrivetozero.org 2023).

Regarding scope 3 emissions, progressive organizations have interest in reducing their corporate value chain emissions, to comply with best practices and thereby to obtain a competitive advantage (Ragon/Rodriguez 2022). Several international shippers, such as Unilever, IKEA and Inditex have already committed to reduce these emissions in their supply chains. However, as they only have an indirect relationship towards freight vehicle ownership and operation, they can only influence electrification by engaging and collaborating with their logistics and transport service providers (Globaldrivetozero.org 2023).

To increase the transparency of GHG emissions in logistics, and to make the scope 3 emissions for shippers more transparent when choosing a carrier, the EU is in preparation of a

methodological framework to give carriers the means to calculate more accurately the carbon footprint of freight transport services. This proposal COM(2023) 441 final on the accounting of GHG emissions of transport services was presented by the European Commission as part of the “Greening Freight Transport” Package on 11 July 2023. The CountEmissionsEU of COM(2023) 441 final introduces a methodological framework to give carriers the means to calculate more accurately the carbon footprint of freight transport services (DG Mobility 2023, see also Antolini 2024). The transparent information will allow service providers to monitor and reduce their GHG emissions and improve the efficiency of their transport services. The comparability of calculated GHG emissions of transport services could create a competitive advantage for those companies that offer more sustainable transport service options and make the scope 3 indirect emissions in the value chain more transparent, eventually reducing scope 3 emissions (COM (2023) 441 final, see also Antolini 2024). However, to support small and medium-sized enterprises (SMEs) and the facilitation of the implementation of the regulation, the SMEs are not required to verify their calculation of GHG emissions (Council of the EU 2023b). This could be considered being a disadvantage of the legislation as the majority of carriers are SMEs, but they could be inclined to use the calculation as a competitive advantage over other carriers.

Furthermore, the proposal COM(2023) 445 final of the “Greening Freight Transport” Package for a Directive laying down for certain road vehicles circulating within the Community the maximum authorised dimensions in national and international traffic and the maximum authorised weights in international traffic (COM(2023) 445 final) aims at reducing the overall impact of heavy-duty road transport on CO<sub>2</sub> emissions and on increasing its energy and

operational efficiency (COM (2023) 445 final, see also Antolini 2024).

Proposal COM(2023) 445 final will increase the maximum authorised dimensions in national and international traffic and the maximum authorised weights for trucks with alternative fuels such as battery electric propulsion to accommodate the extra weight of batteries. The standard 40 metric ton truck would see an additional 4 metric tons added to its maximum weight restriction while hydrogen-powered trucks would be longer (COM (2023) 445 final). Thereby, the transition to and the purchase of ZET should be encouraged as disadvantages of heavier battery propulsion with the total weight of trucks would be eliminated and hydrogen-powered trucks could be longer, among others (COM(2023) 445 final).

By providing strong incentives in terms of additional loading capacity for zero-emission HDVs and for all types of vehicles involved in intermodal operations, the proposal COM (2023) 445 final is expected to help accelerating the uptake of ZETs and to promote the growth of intermodal transport (COM (2023) 445 final).

#### 4. Financing the transition to zero emission trucks (ZET)

Zero emission trucks (ZETs) comprise of two possible drivetrain technologies: battery electric (BET) and fuel cell electric trucks running on green hydrogen (FCET) (T&E 2022b). ZETs are in high demand amongst first mover hauliers, and 44% of new truck sales could be zero emissions by 2030 (T&E 2022b). Some manufacturers even aim to reach 60% of ZET sales by then (T&E 2022b).

However, in Europe, the fleet of ZETs is still limited to a few pilot models due to a lack of publicly accessible charging and refuelling infrastructure, the limited truck availability, and the high purchase price, which can be significantly higher than fossil fuelled trucks (Ragon/Rodriguez 2022). Furthermore, current

battery-electric truck models have driving ranges limited to 250-300 km, which creates significant operational challenges.

Therefore, the new Regulation on alternative fuel infrastructure (AFIR) (Regulation (EU) 2023/1804) sets mandatory deployment targets for electric recharging and hydrogen refuelling infrastructure for the road sector (European Commission 2023a). At EU level, the mandatory charging, and refuelling targets for HDVs under the AFIR as well as the corresponding funding instrument AFIF (Alternative Fuel Infrastructure Facility) will ensure that a basic HDV charging and refuelling network across Europe will make cross country and long-haul operations feasible by 2025 (T&E 2022b). Gaps in LNG refuelling infrastructure for trucks are expected to be filled until 2025 (European Commission 2023a).

Besides AFIF, also the Connecting Europe Facility (CEF) offers financing at EU-level within the TEN-T projects (T&E 2022b).

By making a minimum recharging and refuelling infrastructure available across the EU, the new rules will address concerns about the difficulty to recharge or refuel a vehicle/ZET (European Commission 2023a).

Regarding national level ZE infrastructure incentives, the most advanced programs are currently in place in France, Germany, and Sweden with an offer to compensate between 60-100% of the infrastructure costs, while in Belgium, Croatia, Italy, and Poland smaller cost contributions are available. Hydrogen refuelling stations are part of the German, Finnish, and Polish schemes (T&E 2022b).

According to the European Commission (2023b), ultimately, stronger CO<sub>2</sub> standards for HDVs will provide benefits for transport operators and users in the form of lower fuel costs and lower cost of ownership of the vehicles (European Commission 2023a). The Commission expects that “...the total cost of ownership for first users

of a new heavy-duty vehicle will reduce significantly: with savings on average around 9,000 € for a vehicle purchased in 2030 and 41,000€ for a vehicle purchased in 2040” (European Commission 2023b).

Ragon and Rodriguez analysed the European Clean Trucking Alliance (ECTA)’s readiness to transition to zero-emission freight vehicles and identified perceived barriers to the transition (Ragon/Rodriguez 2022). Truck ownership is still important to many small carriers, as it usually constitutes their only asset (Ragon/Rodriguez 2022). Among several limiting factors, they conclude that due to small profit margins, small carriers can usually not afford to finance zero-emission trucks (Ragon/Rodriguez 2022). Globaldrivetozero.org (2023) confirms in its analysis, that one of the largest financing challenges towards electric truck deployments is the total cost of ownership (TCO) and the initial investment costs for ZET.

However, despite their limited resources, many small fleet owners identify an opportunity in a switch to ZET (Ragon/Rodriguez 2022). Once a ZET alternative is cheaper to own and operate than its diesel counterpart, so-called TCO parity has been reached. (T&E 2022b). It is anticipated that once TCO parity is reached, the transition towards ZET will happen move swiftly (Globaldrivetozero.org (2023).

However, despite the promising outlook of a reduced TCO with battery-electric trucks, the economic challenge for carriers to face a two- to three-fold higher purchase price for ZET than for diesel trucks is the major obstacle (Ragon/Rodriguez 2022). However, according to T&E (2023), the TCO of battery-electric and fuel cell electric trucks are expected to decline below diesel trucks by the late 2020s and by 2035, 99.8% of new electric freight trucks could be cheaper to own and run than diesel trucks, while carrying the same weight of goods over the same distance and journey time (T&E 2022a). T&E

expects that electric trucks will beat diesel trucks on the total cost of ownership even sooner (T&E 2022a). According to T&E (2022b), public financial incentives have proven to be an effective catalyst and temporary fix for initially higher vehicle costs of electric cars. Therefore, to bridge the cost gap between fossil-powered and zero emission trucks, it will need a few years of national demand-side policies such as purchase premiums to help hauliers bridge the cost difference between a ZET and diesel (T&E 2022b). T&E briefing (2022b) maps the available support across Europe and suggests ways for national governments and the EU to improve their support schemes (T&E 2022b). The governmental support is encouraging for hauliers, but they struggle with the application procedures.

In fact, also according to Ragon/Rodriguez (2022) generous purchase premiums and other incentives by several EU Member States are often difficult to get for SMEs.

T&E (2022b) analysed the uptake potential of ZETs with existing ZET subsidy schemes in seven European countries (AT, DE, ES, FR, IT, PL) and the UK. The subsidies are all assumed to be phased out from 2025 onwards (T&E 2022b).

Austria, Germany, and France have the most generous programs in place with 65% and 80% of the difference in vehicle price between a ZET compared to the diesel (T&E 2022b). Regarding the supported drivetrain technologies, all countries offer aid for battery electric and hydrogen trucks (T&E 2022b). Sweden is the only country that supports vehicles running on biofuels, while Germany is the only country that includes overhead-catenary systems in its program (T&E 2022b). Few countries still invest in new fossil gas vehicles (T&E 2022b).

According to Tol et.al. (2022), the eight countries mentioned in Table 1 offer purchase grants for ZEVs for one or more vehicle configurations and are assumed to be phased out after the year 2024. Beyond this year, no other

purchase subsidies are included. However, according to the European Commission (2023b), although purchase subsidies are being phased out, the stronger CO<sub>2</sub> standards after 2025 will provide benefits for transport operators and users in the form of lower fuel costs and cost of ownership of the ZET compared to fossil fuel trucks.

Table 1: Purchase subsidies until the year 2024

	Rigid urban delivery truck			Articulated regional delivery truck / Articulated long haul truck / Articulated construction truck		
	Share of purchase price	amount in % of price difference with diesel equivalent	Funding cap	Share of purchase price	amount in % of price difference with diesel equivalent	Funding cap
Austria		80%	N/A		80%	N/A
Germany		80%	€ 350,000		80%	€ 450,000
Italy			€ 24,000			€ 24,000
Netherlands		45%	€ 84,000		45%	€ 131,900
Poland	30%		€ 43,280	30%		€ 43,280
Spain			€ 145,000			€ 160,000
United Kingdom	20%		€ 29,310	20%		€ 29,310
France*		40%	€ 50,000		40%	€ 50,000

\* Additionally France has a super depreciation scheme resulting in a cost reduction of 7.5% of the purchase price, cumulatively capped at €100,000

(Source: Tol et. al. 2022)

Moreover, rather than purchasing a ZET, there are also other alternatives to the traditional ownership model (Ragon/Rodriguez 2022). There exists the possibility of leasing, trucking as a service (TaaS), Pay to drive, Charging-as-a-service (CaaS) and other approaches (Ragon/Rodriguez 2022). While leasing solutions are already offered by manufacturers for diesel vehicles since a longer time, this could also become an option for carriers for leasing a ZET. According to Ragon/Rodriguez (2022), this business model allows SMEs to delay and spread the required investments and it is less tax intensive. Trucking-as-a-service (TaaS) solutions provided by a truck manufacturer, or by a third-party organization to the carrier also enables an easier transition to zero-emission trucks via increased financial support throughout the vehicle's lifetime, regarding charging or refuelling infrastructure management or customers can be charged based on their usage

of the truck, known as pay-as-you-drive, and therefore only pay for the energy they use (Ragon/Rodriguez 2022).

For carriers that wish to retain ownership of their fleets, similar integrated solutions can be considered for the charging or refuelling infrastructure only, referred to here as charging-as-a-service (CaaS), according to Ragon/Rodriguez (2022). The CaaS provider is responsible for the deployment, installation, operation, and maintenance of the charging or refuelling infrastructure. The customer is usually charged a fixed monthly fee (Ragon/Rodriguez 2022).

According to Ragon and Rodriguez 2022, third-party organizations can provide a platform to give those companies access to the zero-emission truck market, and therefore they could play an important role as trucking service providers and in facilitating small fleet adoption of zero-emission trucks (Ragon/Rodriguez 2022).

Finally, also the purchasing second-hand zero-emission vehicles could become an attractive option for small carriers to start transitioning their fleets at a lower cost. To enable this, both regulators and manufacturers have a key role to play in the development of a second-hand used vehicle market for zero-emission trucks (Ragon/Rodriguez 2022).

## 5. Conclusion

In 2021, the average age of HDVs in the EU was approximately 14 years and more than 95% are still diesel-powered trucks, which underlines that despite the policy change in recent years, the transition to ZET will be a longer process. Since the fleet of HDVs in the EU, is still mostly running on diesel, it shows that the transition towards a fleet of ZET will pose an enormous challenge.

However, considering the GHG emission limits envisaged by the proposal COM (2023) 88 final, it shows a long transition towards a 90% GHG

emission reduction to be reached by 2040 onwards making a smooth transition possible. The stricter CO<sub>2</sub> standards will provide benefits for transport operators and users in the form of lower fuel costs and cost of ownership of ZET even earlier. The various actors in the logistics sector all have a role to play in this transition towards zero emission freight transport, and enhanced collaboration between them is essential to ensure that barriers are overcome.

Furthermore, for carriers, there might arise new options beyond the traditional ownership of trucks, based on other models such as leasing, trucking-as-a-service (TaaS), Pay as you drive or Charging-as-a-service (CaaS), among others. At European level, the introduction of a binding regulation on the reduction of HDVs' GHG emissions will be of high importance as it establishes the legislative framework for the transition to zero emission freight transport and the decarbonisation of road freight transport, giving also planning security to manufacturers, carriers, and shippers.

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