European Commission

European Road Safety Observatory

Road Safety Thematic Report – Professional drivers of trucks and buses

This document is part of a series of 20 thematic reports on road safety. The purpose is to give road safety practitioners an overview of the most important research questions and results on the topic in question. The level of detail is intermediate, with more detailed papers or reports suggested for further reading. Each report has a 1-page summary.

The topic "Professional drivers, heavy goods vehicles and buses/coaches" is also addressed in the "Facts and Figures - Buses/ coaches/ heavy goods vehicles", presenting more detailed and up-to-date European data in addition to this qualitative analysis.

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Contents

Summary

Heavy goods vehicles, buses and coaches in road traffic

Crashes with heavy goods vehicles (HGVs) lead to around 14% of road fatalities in the EU, i.e. over 3000 fatalities in 2019. The vast majority of fatalities and serious injuries in HGV-related crashes are incurred by the crash opponent rather than the HGV occupants. Buses and coaches account for around 2% of EU road fatalities, i.e. over 500 fatalities in 2019. Again, the vast majority of these fatalities are incurred by the crash opponent rather than the bus occupants. Typical HGV crashes include rear-end collisions, particularly in traffic jams, blind spot crashes when turning right, and unintentional lane departure. Bus/coach crashes relatively often involve crossing pedestrians.

Professional drivers of an HGV or a bus must have a driver licence C and D respectively and a certificate of professional competence (Code 95) which needs to be renewed every 5 years. Many professional HGV and bus drivers work under tight time constraints, at irregular hours, and with long days. International drivers often have to sleep in their truck. Overall, this makes professional drivers particularly prone to fatigue and distraction as well as to health conditions that might affect safe driving, e.g. sleep apnoea.

The mass, manoeuvrability, and acceleration and deceleration characteristics of the vehicle make road infrastructure particularly critical for HGV and bus safety. Long braking distances, burst tires, and, for HGVs, overload or unbalanced load can also have a detrimental effect on safety. In addition, other road users may be insufficiently aware of the specific characteristics of HGVs and buses, including their large blind spots.

Countermeasures

The 2019 EU General Safety Regulation introduces the mandatory implementation of a number of relevant **vehicle safety** measures for new HGVs and buses by 2024, including advisory Intelligent Speed Assistance (ISA), blind spot systems, and attention detection. By 2029, new trucks and buses will have to comply with higher direct vision standards. Automatic Emergency Braking Systems (AEBS) have been compulsory for HGVs and buses since 2014. As from 2028, improved AEBS will have to be fitted on all new HGVs and buses.

In relation to **driver behaviour**, safety culture and safety management, targeting all levels of the company from management to driver, aim to make safe road behaviour a key concern. It is important that the company management sets working conditions that allow drivers to comply with driving and rest time regulations. More intensive enforcement would help to further improve compliance.

In terms of **infrastructure**, several concrete measures can be implemented. Separating HGVs and buses in space or in time from other road users (in particular unprotected road users) is at the heart of HGV/bus safety and in line with the Safe System approach. Warning professional drivers about - and helping them to avoid - specifically dangerous or restricted roads or road sections through signs or in-vehicle information can also improve road safety. Finally, sufficient and well managed vehicle parks to enable international HGV drivers to spend the night safely and securely deserve additional attention.

1 Highlights

- Crashes with HGVs lead to around 14% of road fatalities in the EU, amounting to 3040 lives lost in 2019. Crashes with buses/coaches lead to around 2% of road fatalities in the EU, amounting to 521 lives lost in 2019.
- HGVs and buses/coaches are particularly dangerous for other road users: around 90% of fatalities in HGV crashes and around 80% of fatalities in bus/coach crashes occur to other road users.
- The fatality risk (number of fatalities per distance driven) is substantially higher for HGVs and even higher for buses/coaches as compared to other road users.
- Crash causation factors include both vehicle features (in particular high mass and large blind spots) as well as features of the working conditions of professional drivers (e.g. fatigue, distraction).

2 What is the problem?

This thematic report concerns professional drivers of heavy goods vehicles (HGVs) and buses and coaches.

HGVs are very important for inland road freight transport. In 2020, EU road freight transport accounted for 77.4 % of inland road freight transport, followed by rail and inland waterways transport with 16.8 % and 5.8 % respectively (Eurostat, 2022a).

HGVs can be defined as motor vehicles with at least four wheels, with or without a trailer, with a permissible gross vehicle weight of over 3.5 tonnes and used only for the transport of goods. HGVs are involved in 4 to 5% of police-reported road crashes in Europe (Schindler et al., 2022), but HGV crashes result in 14% of road fatalities (EC, 2021a). This clearly shows that crashes that involve HGVs often have very serious consequences. The vast majority of fatalities and serious injuries in HGV-related crashes affect the crash opponent rather than the occupants of the HGV. The reason for this is that HGVs are much heavier than most other road users. It is a physical law that, if two vehicles collide, most of the energy released is absorbed by the lighter crash partner. As a result, the lighter vehicle will be more damaged, and its occupants or riders more seriously injured. EU-wide almost 90% of fatalities in HGV crashes were other road users, mainly car occupants (EC, 2021a).

Buses and coaches are defined as vehicles with more than 16 seats and designed to transport people. Buses are used mostly for public transport, coaches mostly for inter-urban movements and tourist trips. Buses and coaches account for around 2% of EU fatalities (EC, 2021a). Around 80% of these fatalities in bus/coach crashes are other road users, while 20% are bus/coach occupants (EC, 2021a). As buses in particular often drive in urban areas, pedestrians feature significantly within bus/coach-related fatalities outside the bus: around 30% (EC, 2021a). As with HGVs, the huge differences in mass are the main reason for the relatively low proportion of casualties among bus/coach occupants.

3 How do professional drivers participate in traffic?

Driving licence and certificate of professional competence
Based on Directive 2006/126/EC (EU, 2006a), HGV and bus/coach drivers in the EU need to possess a specific driving licence (category C for driving an HGV and category D for driving a bus or coach). In addition, professional drivers of such vehicles also need to have a certificate of professional competence (CPC) (Code 95) on their driving licence or on a driver qualification card (EU, 2022a)). Both driving licence and CPC are valid for 5 years, and can be renewed after passing a refresher CPC training of 35 hours.

Driving and working times
Professional HGV and bus/coach drivers not only need to comply with national and European road regulations, but also with specific EU regulations on driving time and rest periods (EU, 2006b) as well as the more general Working Time Directive for "persons performing mobile road transport activities".(EU, 2002) In general, an HGV and bus/coach driver has a driving limit of 9 hours a day and working time must not exceed an average of 48 hours a week. Temporary exceptions are allowed. For transport operations from and to non-EU and non-EFTA countries in Europe (incl. all of the former Soviet Union), the rules of the AETR Agreement apply (UNECE, 2010).

Driver age
The minimum age for professional truck drivers is 18 years and for bus drivers 21 years across the EU if they have acquired a standard initial qualification (EU, 2022a). Member States can lower the minimum age for bus drivers to 20 or 18 years in some cases but only for certain operations and only on their respective territories (EU, 2022a). A recent Commission proposal for the revision of the driving licence directive (EC, 2023) foresees the introduction of an accompanied driving scheme for HGV drivers from the age of 17 years.

Work and working conditions
In 2020, 10.8 million people aged over 15 were employed in transport occupations in the EU. Around 35% of these people (3.8 million) were HGV or bus/coach drivers (Eurostat, 2021). Currently there is a substantial shortage of professional drivers. According to the international Road Transport Union (IRU, 2022), 10% of the HGV positions and 7% of the bus/coach positions remained unfilled in 2021. During their work, both bus/coach drivers and HGV drivers must deal with strict time constraints related to serving passengers and complying with timetables (bus/coach drivers) or agreements with clients or the company, and these reflect increasing levels of economic competition (HGV drivers). At the same time these professional drivers have to respect the rules related to driving time and rest periods.

Exposure
Detailed EU data on the distance covered by an individual HGV or bus driver is lacking. The average annual distance of an HGV in the EU is estimated to be around 110.000 km (Earl et al., 2018). There will of course be great differences between drivers, given the varying type of journeys made (national or international).

4 Professional drivers and road safety

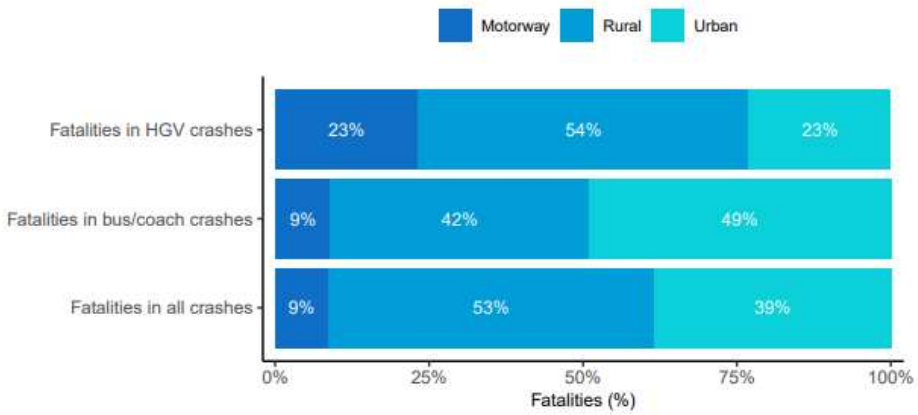
4.1 Fatalities and crash characteristics

Crashes with HGVs lead to around 14% of road fatalities in the EU, amounting to 3040 lives lost in 2019; crashes with buses/coaches lead to around 2% of road fatalities in the EU, amounting to 521 lives lost in 2019 (EC, 2021a).

The most prominent feature of HGV and bus/coach crashes is that the vast majority of fatalities (around 90% for HGV crashes and around 80% for bus/coach crashes) occur among other road users rather than the HGV or bus/coach occupants. In crashes involving HGVs, most fatalities occur among car occupants (around 50%), followed by pedestrians (around 13%), and cyclists (around 7%). For bus/coach crashes, most fatalities occur among car occupants and pedestrians equally (both around 30%).

As shown in Figure 1, fatal HGV crashes occur relatively often on motorways. However, most of the fatal HGV crashes occur on rural roads. Most fatal bus/coach crashes occur in urban areas and somewhat less on rural roads.

Figure 1. Distribution of fatalities by road type in HGV crashes, bus/coach crashes and all crashes in the EU27 (2012-2019). Source: EC, 2021a.



Around three quarters of the HGV and bus/coach crashes occur on road stretches and around 15% at junctions. This is comparable with the proportions in all fatal crashes. HGVs and buses/coaches are more often than average involved in crashes during the daytime on working days.

A detailed overview of the characteristics of HGV and bus/coach (fatal) crashes in the EU can be found in the ERSO publication Facts and Figures – Buses / coaches / heavy goods vehicles (EC, 2021a).

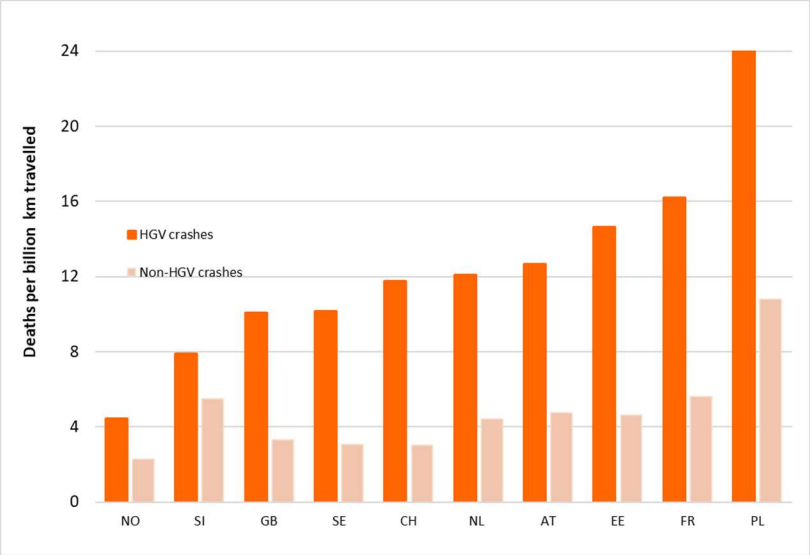
4.2 Crash risk

It is not possible to compute the crash risk of HGVs and buses/coaches at EU level as several EU countries do not have the required exposure data. However, some individual countries have these statistics, and these show that the probability of a fatal injury in a crash involving an HGV or bus/coach is higher than the overall probability of fatal injury

in that country. Most fatalities of HGV and bus/coach crashes occur to other road users; the fatality risk for HGV and bus occupants is relatively low.

ETSC reports the risk of being killed in HGV and non-HGV crashes in 10 countries (Figure 2), showing substantial differences between countries.

Figure 2. The number of fatalities in crashes involving HGVs per billion km travelled by HGVs and the number of fatalities in crashes not involving HGVs per billion km travelled by non-HGVs in 10 European countries (period 2016-2018). Source: ETSC, 2020.



A somewhat older publication of ETSC (ETSC, 2013) also reported on the relative risk of fatal injury for buses, coaches and trolley buses (Figure 3).

Figure 3. The number of fatalities in crashes with a bus, coach or trolley per billion kilometres travelled by those vehicles and the corresponding rate for all vehicles in nine European countries (period 2009-2011, PL 2008-2009). Source: ETSC, 2013.

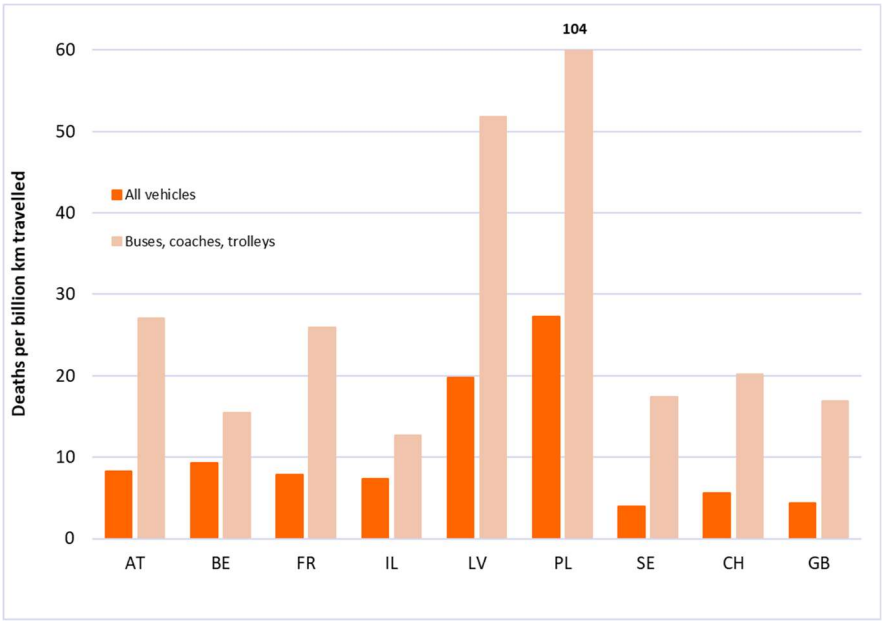


Figure 3 shows that these fatality rates are substantially higher than those for HGVs. This may be partly explained by the difference in the period covered. However, data on Belgium confirm that the fatality rates for buses and coaches are higher than those for HGVs: in the period 2010-2017 the average for all vehicle categories was 7.7 fatalities in road crashes per billion vehicle kilometres, whereas for HGV crashes it was 14 fatalities and for bus/coach crashes 19.8 (Meunier, 2020). The higher fatality risk per distance travelled of buses/coaches as compared to HGVs is at least partly related to a larger share of bus crashes in urban areas (see Section 4.1) and, consequently, a higher number of encounters in general and with vulnerable road users in particular. As there are fewer buses/coaches, driving fewer kilometres, the absolute number of fatalities in bus/coach crashes is much lower than those in HGV crashes (around an annual 500 and an annual 3000 respectively – see again Section 4.1).

As indicated, only a minority of fatalities occur to the occupants of these heavy vehicles. Dutch data (period 2011-2020) explicitly makes this distinction and shows that the fatality rate per billion kilometres is much higher for HGV and bus crash opponents than for HGV and bus occupants, and the difference is much greater than with car and delivery van crashes (Table 1).

Table 1. Number of fatalities among crash opponents and occupants of passenger cars, delivery vans, HGVs and buses in the Netherlands per billion kilometres travelled by each of these vehicle types respectively (kilometres travelled by the crash opponent not considered). Period 2011-2020. Source: Dutch police crash database BRON, processed by SWOV. (*Note: the number of fatalities in bus crashes are small, so reported fatality rates are less reliable.*)

Vehicle type	Number of fatalities	Fatality rate for crash opponents	Fatality rate for vehicle occupants
Passenger cars	3 449	1.7	2.0
Delivery vans	585	2.4	1.0
HGVs	697	9.3	0.9
Buses/coaches	96	15.0	0.6

4.3 Typical crashes

Most research on typical crashes concerns HGVs. There is hardly any information on typical crashes involving buses and coaches.

4.3.1 HGVs

There is considerable consensus across studies when looking at typical HGV crashes (IRU, 2007; Temmerman et al., 2016; SWOV, 2020, Volvo trucks, 2022, Schindler et al., 2022). The most common crash types are:

- rear-end collisions, in particular in traffic jams
- side impact collision at intersections
- blind spot crashes when turning right (or left in left-driving countries)
- unintentional lane departure

- crashes due to overtaking errors
- crashes with crossing pedestrians.

4.3.2 Buses and coaches

Fewer studies have focused on bus and coach crash types.

One study focused on bus crashes in the city of London (Edwards et al., 2018). In this context, pedestrians accounted for around two-thirds of fatalities. The most typical fatal crash was a pedestrian colliding with the front of the bus when crossing from the near-side, for example stepping out from the kerb. Car occupants were the next largest fatality group in these bus collisions: they were also most often killed in impacts with the front of the bus. For most fatal crashes, no precipitating factor on the part of the bus driver was established.

A somewhat older literature review (Albertsson & Falkmer, 2005) showed three main crash types for buses and coaches in Europe: buses/coaches colliding with cars, unprotected road users being hit by a bus/coach, and roll-overs.

Italian statistics from 2009 on bus crashes, reported by Cafiso et al. (2013), show that hard braking is the most common crash characteristic, followed by left turns and lane changes.

4.4 Causation factors

The most common causation factors of professional driver crashes have been categorised under human factors, infrastructure factors, and vehicle factors, although it should be noted that a crash is seldom caused by one factor alone. Again, the vast majority of information available concerns HGV crashes rather than bus/coach crashes.

4.4.1 Human factors

All the human factors that affect crash risk generally also apply to professional drivers. These include excessive and inappropriate speed, driving under the influence, tailgating, etc. Professional drivers are, more than non-professional drivers, prone to fatigued and distracted driving.

Fatigued driving is particularly common among long-distance professional drivers. This is related to long hours behind the wheel (at times longer than legally allowed), driving during periods when the human body wants to sleep (biological clock), poor sleep quality during trips, and a sleep-inducing climate in the cabin (heat, vibrations, noise). As on average truck drivers are more often obese, they are also more prone to sleeping disorders that affect driving skills, in particular sleep apnoea. (For more details, see the Road Safety Thematic Report on fatigue (EC, 2021b).) A recent European survey (Vitols & Voss, 2021) showed that one third of bus/coach drivers and more than a quarter of HGV drivers indicated that they often felt tired when driving (every fourth drive or more). Another one third of bus/coach drivers as well as one third of truck drivers said that they sometimes felt tired when driving (every fifth to ninth drive).

Distracted driving is also likely to be more common among professional drivers (TRL, TNO and Rapp Trans, 2015). Bus drivers may need to interact with passengers while driving and, also for HGV drivers, there are regular contacts with the operational unit and driver colleagues, both for work-related instructions and for social interaction.

4.4.2 Infrastructure factors

Meunier (2019) lists several features of the road infrastructure that are specifically critical for HGV-related safety. These factors most likely affect bus/coach safety also.

- Sharp bends: in sharp bends the truck load can start moving, changing the centre of gravity, and making the truck tip over. Sharp bends can also force the HGV to use the driving lane used by oncoming traffic.
- Narrow driving lanes: narrow driving lanes force HGV drivers to use part of the lane used by oncoming traffic.
- Short entry and exit lanes: short entry lanes may result in too low speeds when merging onto the motorway. Short exit lanes may provide insufficient opportunity to decelerate, resulting in either too high speeds at the exit or starting to decelerate already on the motorway.
- Steep slopes: steep ascending roads result in speed loss in HGVs and consequently increased speed differences with passenger cars.

4.4.3 Vehicle factors

HGV and bus/coach vehicle factors contributing to the occurrence of crashes include long braking distances due to the mass of the vehicle. This is particularly critical if the driver is not fully attentive due to distraction or fatigue.

Another very relevant vehicle factor is the large blind spot of HGVs and buses/coaches. This means that the driver cannot see road users, in particular pedestrians and cyclists, who are next to or in front of the vehicle. Dedicated mirrors and camera systems help to reduce the blind spot. However, these systems do not cover the full blind spot. In addition, drivers must carefully adjust the mirrors and actively use the various mirrors and camera images.

Yet another vehicle factor is the load of the vehicle, which can be unbalanced or too heavy, causing problems with abrupt braking manoeuvres, sharp turns or steep slopes.

Burst tyres or tyre blowouts are more common among heavy vehicles and cause the vehicle to be less controllable, which can cause startled responses in the professional driver as well as in other road users.

Finally, other road users may insufficiently understand the driving and vehicle characteristics of HGVs and buses, including their long braking distance and their blind spots. Consequently, their anticipation may be inadequate.

5 Countermeasures

5.1 Behavioural measures

5.1.1 Training, education, and information

Professional HGV and bus drivers must accomplish basic training and, every five years, a periodic refresher course (EU, 2022a). The effects of driver training are difficult to assess objectively (Helman et al., 2017). Based on self-reports, Elvebakk et al. (2020) evaluated the implementation of the mandatory periodic refresher course in Norway and reported some positive outcomes: many participants said that they had acquired new knowledge and changed their driving practices.

Some companies offer courses or provide information as part of the company's safety culture (see Paragraph 5.1.3), generally focusing on specific topics, e.g. driver fatigue, distraction, or interaction with vulnerable road users. Whether such a course, as a stand-alone measure, has an effect depends on many factors. For example, Pylkkönen et al. (2018) failed to find evidence of a positive effect of an alertness-management training programme. Vitols & Voss (2022) concluded that training courses on fatigue do not necessarily improve the alertness of drivers since they often fail to address the real underlying causes of driver fatigue.

5.1.2 Regulation and enforcement

A very relevant regulation for professional drivers is the driving time and rest periods regulation (see Section 3). One of the aims of this regulation is to improve road safety by limiting driving time and imposing breaks and rest periods and thereby reducing driver fatigue. The levels of enforcement of these regulations vary between countries and are sometimes low. In the EU, based on reports from Member States, almost 2 million offences were detected in the period 2017-2018 (EC, 2021c).

The effects of the *introduction* of driving and rest time regulations are hard to study, as most countries have had some form of regulation for a long time. For example, the first European rules on driving periods and breaks were adopted in 1969 (EEC, 1969). Research into the effect of *changes* in existing regulations, mainly from the United States, leads to the conclusion that increased or improved monitoring and enforcement of these regulations result in higher compliance and greater safety (Goldenbeld, 2017).

5.1.3 Safety culture and safety management

A company's safety culture can be described as the shared safety values and standards within a company (SWOV, 2020). In a transport company, safety culture is a joint effort by the company management, the planning department, and the drivers (Grinerud, 2022). Research shows that improving the safety culture often results in safer driving behaviour in the company's drivers (SWOV, 2020). In a company with a prominent safety culture, there are clear rules related to, for example, speeding, using seatbelts, and using mobile phones. In-vehicle monitoring systems (IVMS) can play a useful role here. Fatigue is another common topic, not only informing drivers about the risk of fatigued driving and the

causes of fatigued driving, but also avoiding fatigued driving by realistic time planning that enables drivers to comply with driving times and rest periods at all times. Based on a survey and interviews in 17 companies in Norway, Nævestad, Blom & Phillips (2020) defined 11 practical requirements for good safety management, such as implementing a policy on speed, driving style, seat belt use, regular feedback about driving style to drivers, and encouraging drivers to stop and postpone assignments if considered unsafe.

5.1.4 Driver health promotion

There is a close relationship between the professional driver's health and well-being and safe driving (Batson et al., 2022; Crizzle et al., 2017; Hickman et al., 2022; Peters et al., 2021). Bad driver health will lead to more fatigue and lower alertness and performance. The nature of the job exposes professional drivers to long work hours, shift work, sleep deprivation, noise, vibration, physical inactivity, unhealthy diet, and exposure to diesel fumes, all these being risk factors for developing cardiovascular disease, obesity and sleep apnoea (Crizzle et al., 2017). There is evidence that health promotion interventions for HGV drivers can be beneficial (Ng et al., 2014).

5.2 Infrastructure measures

5.2.1 Separating heavy vehicles from other traffic

Spatial or time separation of buses and HGVs from other traffic, in particular away from unprotected road users such as cyclists and pedestrians, is a very effective safety measure for both road sections and junctions and both urban and non-urban roads (SWOV, 2020). Due to the great difference in mass between buses and HGVs and most other road users, collisions involving these vehicles generally result in very serious injuries or death. This measure reflects one of the central elements of the Safe System approach: "ensure that crash impact forces remain below levels that will cause death or serious injury" (ITF, 2022, page 13). Concrete examples of achieving separation of heavy vehicles from other road users are: dedicated bicycle/pedestrian facilities with conflict-free traffic lights, dedicated HGV/bus lanes, and restricted inner-urban distribution times and routes.

5.2.2 Overtaking bans for HGVs

Overtaking bans for HGVs on the motorway network can help reduce speed differences between HGVs and lighter and faster passenger cars and other light vehicles. Many countries have already implemented overtaking bans for HGVs on some motorway stretches (sometimes for specific periods of the day). TRL (2010) concludes that the overall safety benefits can be expected to be small. Most benefits can be expected on sections with uphill gradients and with junctions spaced at least 3 km apart.

5.2.3 Avoiding or warning for infrastructure bottlenecks

HGVs and buses/coaches have specific operational attributes. Their drivers could benefit from special safety messages and signs about road characteristics that take these attributes into account. Such signs can include warning of limited clearance at bridges, warning of truck rollover risk due to geometric conditions, warning of long and steep grades, and

curve and ramp warnings (US DOT, 2016). Specific HGV navigation systems prevent HGV drivers from taking routes which enter residential areas, and lead them to avoid too narrow rural roads or too small overhead clearances.

5.2.4 Sufficient safe and facilitating HGV parking

Particularly for international HGV drivers, it is important to have sufficient overnight parking and rest areas. These spaces must be secure and safe and offer facilities that allow for a good rest and freshening-up. Currently, there appear to be too few good parking areas for HGVs in Europe (see e.g. Poliak & Poliakova, 2020). A study, commissioned by the EC, made a series of recommendations for ensuring a denser network of safe and secure truck parking areas (De Leeuw van Weenen et al., 2019). Recently, the EU published new standards for safe and secure parking areas for trucks and commercial vehicles and procedures for their certification (EU, 2022b) and is co-financing the construction of safe and secure parkings (EU, 2021). A plan to impose a certain minimum density of those parking areas along the TEN-T network with high intensity of freight traffic (EC, 2021d) is under discussion.

5.3 Vehicle measures

5.3.1 Vehicle General Safety Regulation

The 2019 EU Vehicle General Safety Regulation (EU, 2019) introduces a range of vehicle measures to improve road safety for passenger cars, light commercial vehicles, buses and trucks. The regulation requires several road safety features that (also) affect HGVs and buses, seven becoming required for all new trucks from July 2024 (EC, 2022):

1. Intelligent speed assistance (ISA), alerting the driver if exceeding the speed limit.
2. Reversing information, giving an overview of objects and people behind the vehicle.
3. Attention detection, giving a warning in case of driver drowsiness.
4. Emergency stop signal, alerting road users that a vehicle in front is braking heavily.
5. Cybersecurity measures.
6. Detection and warnings to prevent collisions with pedestrians or cyclists.
7. Tyre pressure monitoring system, reporting tyre pressure loss in real time.

Between 2024 and 2029 additional measures will follow: an advanced system that recognizes and prevents distraction; safe and longer lasting tyre performance; and, for HGVs and buses, requirements for improving the driver's view through the vehicle windows; and an event data recorder. ETSC (2020) calls for further strengthening some of these measures to be considered, notably a mandatory alcohol interlock for all professional drivers and non-overridable ISA.

5.3.2 AEBS

Advanced Emergency Braking System (AEBS) has been compulsory in the European Union for all new trucks and coaches since 1 November 2015 (EU, 2012). There are no exact figures on the road safety effect of AEBS currently fitted on trucks. Theoretically, the effects are positive (Mettel, 2018), but tests on a test track showed that they are not always reliable in the timely detection of obstacles (Van Hattem, Klem & Gorter, 2017). Moreover,

in-depth collision investigations in Germany found that the AEB system had been switched off by the truck driver in several fatal collisions involving trucks fitted with AEBS (Berg & Petersen, 2018, cited in Mettel, 2018).

AEBS for HGVs initially aimed at improving safety on motorways. Recently, the UNECE adopted a regulation that will widen its scope to also include urban areas, aligning with new concepts developed for AEBS for cars and vans (UNECE, 2022a). The new regulation requires an emergency stop when travelling towards a stationary vehicle or a vehicle coming to a standstill before collision. This reflects improvements in technology since earlier systems worked only with moving 'targets' ahead of the vehicle. The system will also have to detect a single pedestrian crossing in front of the vehicle (although not cyclists or groups of pedestrians). Moreover, the conditions under which AEBS can be switched off have been restricted, and once switched off, the systems will automatically reactivate after 15 minutes.

The amended regulation will apply from 1 September 2025 to new models and from 1 September 2028 to all new trucks and coaches (UNECE, 2022b).

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