Drink driving in commercial transport

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ISBN-NUMBER: 9789081467513

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Acknowledgements

ETSC is grateful for the contributions of all experts and ETSC members to this report. This report would not have been possible without their kind support.

This report has been prepared within the *Safe and Sober Campaign* of ETSC supported by Volvo Group.

The European Transport Safety Council

The European Transport Safety Council (ETSC) is an international non-governmental organisation which was formed in 1993 in response to the persistent and unacceptably high European road casualty toll and public concern about individual transport tragedies. ETSC provides an impartial source of advice on transport safety matters to the European Commission, the European Parliament and to national governments and organisations concerned with safety throughout Europe.

ETSC brings together experts of international reputation and representatives of a wide range of national and international organisations with transport safety interests to exchange experience and knowledge and to identify and promote research-based contributions to transport safety.

Contents

Executive summary

This ETSC policy paper on *Drink-driving in commercial transport* gives an overview of how drink-driving could be effectively tackled in commercial transport through various regulations and initiatives. The paper illustrates how alcohol is affecting driving skills and its effect on crash rates. Moreover against the background of their alcohol policies, it shows how successful a number of countries are in tackling drink driving.

Focusing on commercial transport, the paper presents the comprehensive regulatory framework existing in Europe and its Member States and shows the role that private stakeholders can play with their own initiatives to bring even more safety to road transport by eliminating drink-driving.

It appears that there is no one-fits-all solution to takle drink-driving in commercial transport and that current technologies such as alcohol interlocks do not represent an end in themselves to solve the problem. The experience with the use of alcohol interlocks across Europe is summarised in this paper and a detailed overview is provided of their widespread use in Sweden. The role of private stakeholders is crucial in guaranteeing high levels of safe driving culture and assuring sober driving in all circumstances

1 Introduction

Alcohol plays an important role in the lifestyles of European citizens and cultures of European countries. Alcohol is also an important driving force behind the European economy. It creates jobs, generates fiscal revenues and contributes to the EU economy by around €9 billion annually through trade (Anderson & Baumberg 2006). But while alcohol has been, and continues to be, consumed by many people in an unproblematic way, a significant proportion of alcohol consumption generates harm for individuals and society. Alcohol is nowadays the third leading cause of premature death and disability in the European Union, after tobacco and high blood pressure. Europe has the highest proportion of drinkers and the highest levels of alcohol consumption per head in the world. The misuse of alcohol generates high costs to society, which are estimated to be as high as 1.3% of the European GDP (EC 2008). Thus, the costs exceed the benefits by more than 17 times.

The consumption of alcohol in the EU is widespread. An average European consumes 12.1 litres of pure alcohol per year, far more than people in any other region in the world. In most of the Southern wine producing countries like Spain, Italy and Portugal people tend to drink daily, and in the Northern countries (Finland and Sweden) people tend to drink only at weekends. A Eurobarometer special report, *Attitudes towards alcohol*, published in 2007 showed that the majority of Europeans drink, with 66% stating that they had consumed an alcoholic beverage in the preceding 30 days (TNS, 2007).

Alcohol is easily absorbed in the bloodstream and has direct effects on the central nervous system (brain, spinal cord and the nerves originating from it). In the first place alcohol depresses the central nervous system. This is to say that after having consumed low quantities of alcohol, social inhibition starts to become less stringent and one begins to act and feel more emotional. However, cognitive, visual, and motor functions also begin to deteriorate after small quantities of alcohol have been consumed. Even with a BAC as low as 0.3 g/l, most people can divide their attention less adequately and are less vigilant than without alcohol. With the BAC just above 0.5 g/l, most people also start to get perception problems; start to perform less well on cognitive tasks and tracking tasks. Also reaction times become longer. Motor impairment can be observed in most people with a BAC of 1.5 g/l and higher (Koelega 1995).

Alcohol has a strong motivational and emotional impact. Individuals become more euphoric, more impulsive and start to show off with more risk-taking behaviour. After consuming large quantities of alcohol people can become aggressive. High doses of alcohol lead to alcohol poisoning which can cause brain damage and death. There are not only acute effects because of brain dysfunctions due to alcohol, but also other parts of the body get affected. An important acute effect in relation to road safety is that the muscles weaken. This means that in case of a crash, the injuries will be more severe if a road user has consumed alcohol (ERSO 2008).

The consequences of harmful and hazardous alcohol consumption include, amongst others, a considerable number of deaths on EU roads. Driving whilst under the influence of alcohol contributes annually to around 10,000 deaths on EU roads. In the EU as a whole, at least 1% of journeys are associated with an illegal Blood Alcohol Content (BAC) (ESCAPE 2003, ETSC 2003). National data show that typically 15-25% of deaths are associated with alcohol impairment of an active accident participant. If the number of alcohol impaired drivers had dropped to zero, some 6,800 lives could have been saved in 2007, representing some 16% of the total number of deaths. Among all road deaths, those related to alcohol are most regrettable, as they arise from a well known risk behaviour. Based on the above figures and assuming the average social costs per death at €1.5 million in the EU, the costs of drink-driving could be estimated at €12 billion. This practically equals fiscal revenues generated through the alcohol trade. Therefore tackling drink-driving is economically vital.

Where else than in commercial transport should this effort be highlighted, having itself a great economic value? It is unacceptable that commercial transport brings along alcohol-related deaths, which are easily preventable. Against this background, the European Transport Safety Council has started the *Safe and Sober* Campaign with the support of the Volvo Group to help reduce alcohol related deaths in commercial transport. The objective of "Safe and Sober" is to raise awareness amongst policy makers, the private sector as well as some key opinion leaders for a systemic approach to reduce alcohol misuse in road transport, especially in less well-performing EU member states.

This paper summarises experience of European Countries in tackling drink-driving in commercial transport and presents best practice examples in the area. It first looks at the issue of drink-driving from a general perspective and then looks at the particular area of drink-driving in commercial transport. By doing so, it seeks to fill the gap in the knowledge on drink-driving in commercial transport.

In this paper the term drink-driving is consistently used. It replaces other common terms referring to the act of operating a road vehicle with alcohol in the driver's blood (driving under the influence of alcohol, or driving while intoxicated, drunk driving, operating under the influence, drinking and driving).

Similarly, when referring to the blood alcohol concentration, the unit of g/l (gram of alcohol per litre of blood) is preferred and sometimes referred in the text as permille BAC by volume (‰). This is indeed a common usage in most European countries, as in the US, Australia and Canada, the percent mass per volume unit is used (%) corresponding to the cg/ml unit. Also, in Nordic countries, the unit of permille BAC by mass is used, roughly corresponding to the above unit, as 1 millilitre of blood is approximately equivalent to 1 gram of blood. In Britain and Ireland the unit used is mg/100ml.

The BAC concentration should not be confused with breath alcohol concentration, measured in mg ethanol per litre of breath air, what is the legal unit of measurement in some European countries. Statutory limits of BAC existed in several countries before methods of analyzing the breath were developed. It therefore became a standard practice to convert the concentration of ethanol measured in the breath (BrAC) into the presumed concentration in the blood. Accordingly, breath-ethanol analyzers were calibrated in such a way that the readout was obtained directly in terms of the presumed BAC.

2 Alcohol in road traffic

In Europe, at least 20% of all road deaths in Europe are alcohol related whereas about only 1% of all kilometres driven in Europe are driven by drivers with 0.5 g/l alcohol in their blood or more. So drink drivers are greatly over-represented in road traffic crashes. While the alcohol impairment is usually associated with vehicle drivers, drunk pedestrians and riders of two wheelers are also present on roads. But it can be claimed that they represent a specific group of road users and therefore deserve targeted policy interventions.

As the Blood Alcohol Concentration (BAC) in the driver increases, the crash rate also rises. The relationship between relative *crash* rate and *BAC*-level is exponential. It has been estimated that a Blood Alcohol Content (BAC) of 0.8 g/l (‰) increases the crash risk of a driver by 2.7 times compared to having a zero BAC (ERSO 2006). At a BAC of 1.5 g/l the crash rate becomes 22 times higher. But also the accident severity grows with an increasing BAC. With a BAC of 1.5 g/l the crash rate for fatal crashes is about 200 times higher compared to sober drivers (ERSO 2006).

Alcohol diminishes one's driving skills at all possible levels. Alcohol has immediate effects on the brain (Table 1). After drinking, the brain works inefficiently, taking longer to receive messages from the eye; processing information becomes more difficult and instructions to the muscles are delayed. Alcohol results in poor judgment, increased reaction time, lower vigilance and decreased visual acuity. The reaction time, for example, can be increased by 10 to 30% (IAS 2007). At the same time, alcohol reduces the ability to perform two or more tasks.

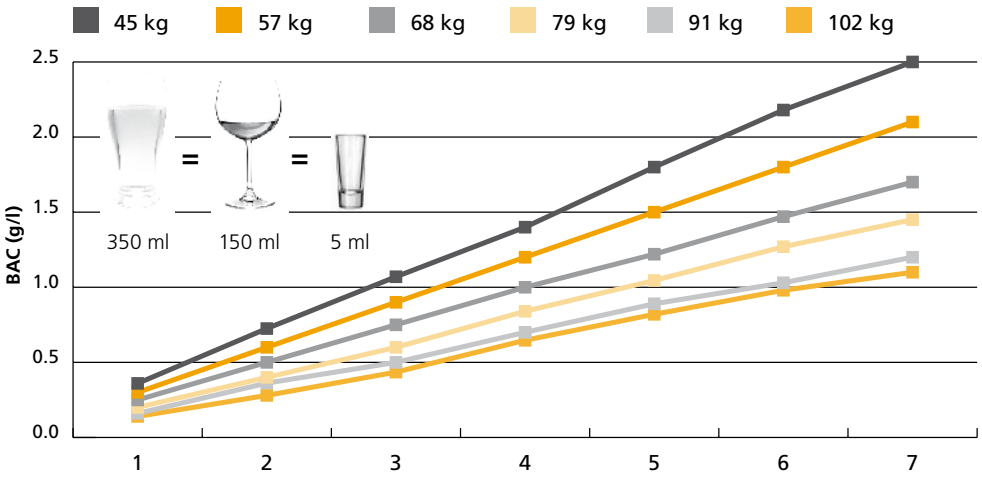
Tab.1: Effects of BAC on the body and performance

BAC (g/l)	Effects on the body
0.1 - 0.5	Increase in heart and respiration rates
	Decrease in various brain centre functions
	Inconsistent effects on behavioural task performances
	Decrease in judgment and inhibitions
	Mild sense of elation, relaxation and pleasure
0.6 - 1.0	Physiological sedation of nearly all systems
	Decreased attention and alertness, slowed reactions, impaired coordination and reduced muscle strength
	Reduced ability to make rational decisions or exercise good judgment
	Increase in anxiety and depression
	Decrease in patience
1.0 - 1.5	Dramatic slowing of reactions
	Impairment of balance and movement
	Impairment of some visual functions
	Slurred speech
	Vomiting, especially if this BAC is reached rapidly
1.6 - 2.9	Severe sensory impairment, including reduced awareness of external stimulation
	Severe motor impairment, e.g. frequently staggering or falling
3.0 - 3.9	Non-responsive stupor
	Loss of consciousness
	Anaesthesia comparable to that for surgery
	Death (for many)
≥ 4.0	Unconsciousness
	Cessation of breathing
	Death, usually due to respiratory failure

source: GRSP 2007

The chemical ingredient that gives alcohol beverages their intoxicating effect is ethyl alcohol. Beer is generally 3-6% alcohol by volume, wine is generally 10-20% alcohol and spirits are generally bottled at 40% alcohol. But despite these differences, alcoholic drinks usually contain approximately the same alcohol content. Alcohol is absorbed in the stomach and in the small intestine. The BAC can rise significantly within 20 minutes after having a drink and its final level depends on many different individual characteristics and circumstances, amongst which the most important are body weight and sex (Fig.1). Alcohol is removed from the bloodstream by a combination of metabolism excretion and evaporation. The rate of elimination in the average person is commonly estimated at 0.15 to 0.20 permille per hour being slightly faster for an experienced drinker and slightly slower for an inexperienced one. Therefore a person who reaches a BAC of 0.5 permille (g/l) needs more than three hours to get the alcohol out of his/her system. Even moderate alcohol consumption can lead to a long alcohol intoxication, which can still affect a driver during the following morning. A so called hangover can further slow down the reduction in accident risk, as it involves fatigue and distraction (Howland et al. 2008).

Fig.1: Intoxication by the intake of alcohol in the number of drinks for male individuals

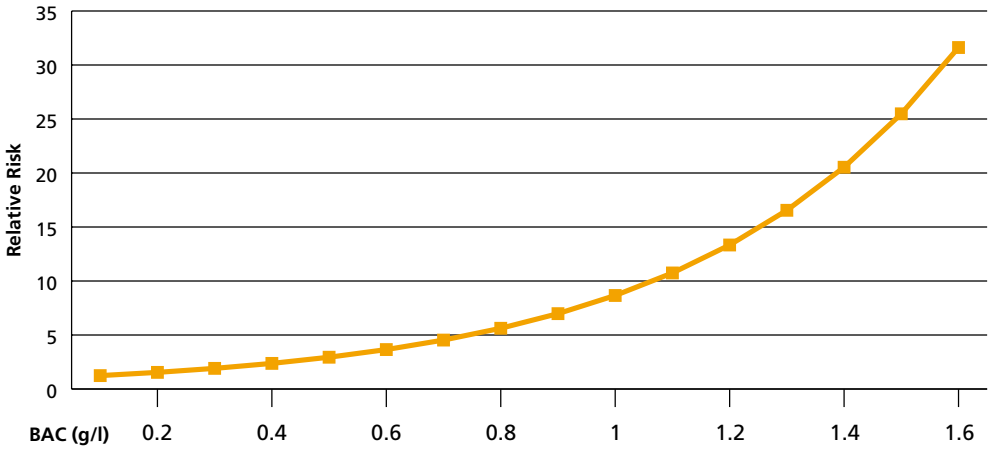


Alcohol impairment has a significant effect on the crash risk of drivers, riders and pedestrians. It is routinely reported as one of the most serious contributing factors to road crashes. Drivers who have been drinking have a much higher risk of involvement in crashes than those with no alcohol in their blood (GRSP 2007).

The probability of a crash rises exponentially with the BAC. The steepness of the curve then depends on the seriousness of the crash considered. For injury crashes, the probability of an injury crash for a driver with BAC of 0.5 is 3 times higher than for a sober driver (Fig. 2), while for fatal crashes, the relative risk is as high as 5.

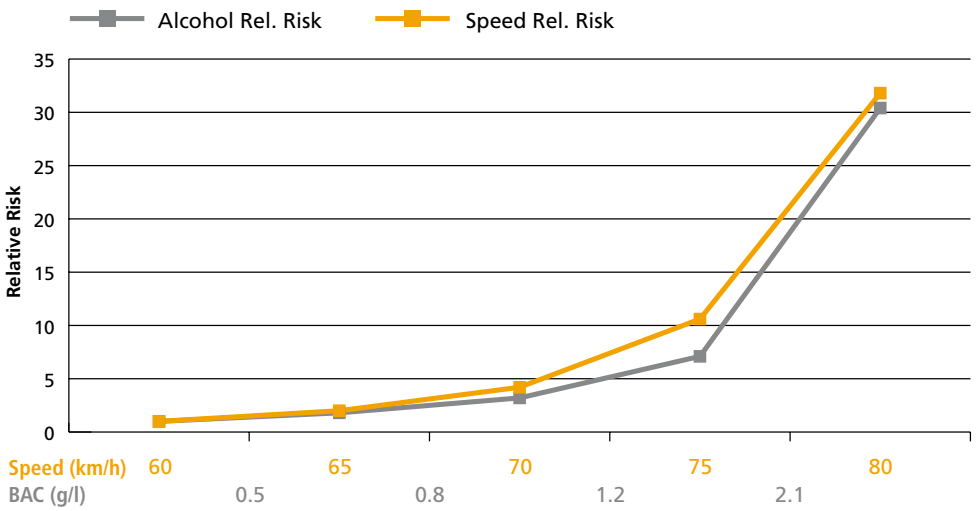
Even more dangerous, a combination of alcohol and drugs represents a powerfully impairing combination further raising accident injury risk.

Fig.2: Relative risk of serious injury crash for different levels of BAC (source: Maycock 1997)



Alcohol is just one of different risk factors, increasing the likelihood of a road crash, yet it is one of the best understood but most widespread risk factors among European drivers. In South Australia, Kloeden et al. (1997) compared the risk of increased speed on accident occurrence on urban roads with a 60 km/h speed limit to the risk associated with higher levels of blood alcohol content (BAC). As Figure 2 shows, the relative risk of road crash rises significantly when driving with blood alcohol levels of 0.8 g/l and is similar to that associated with speeds above 70 km/h (Fig.2). A similar parallel can be drawn with the use of mobile phones, which increases a crash risk by 1.3 times when talking, 3-6 times when dialling, and up to 23 times when texting (Hanowski et al. 2009).

Fig. 3: Crash Risk of Alcohol Impaired Driving (adapted from Patterson et al. 2000, based on Kloeden et al. 1997)

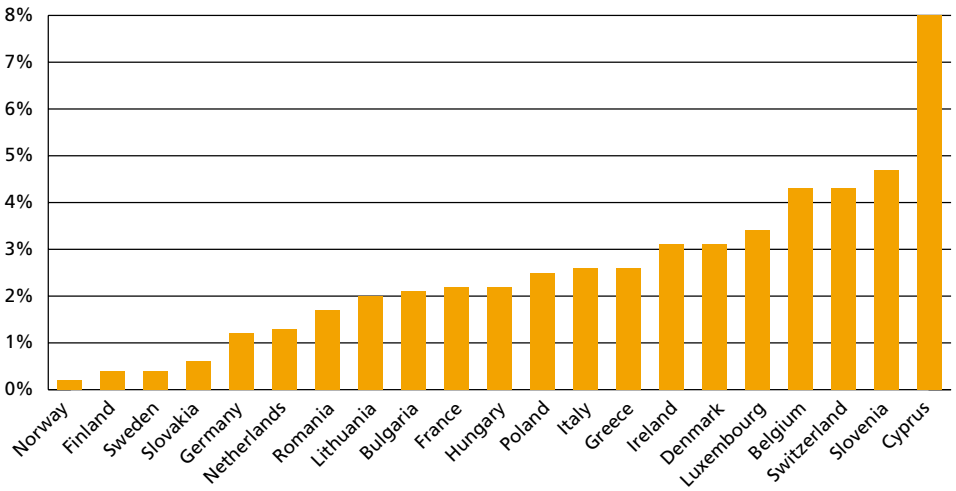


Median BAC by drivers and riders involved in a fatal crash is typically 2-3 times above the national legal limit. In the U.S. the median BAC found in killed drivers driving under the influence is 1.6 g/l (NHTSA 2008) and the evidence from various EU countries points to a similar level of alcohol impairment by killed drivers. In terms of demographic characteristics, a consistent picture of characteristics over-represented among drink-drivers emerges across a number of studies. These drivers are more often than average (GRSP 2007, Bernhoft et al. 2008) male, aged 18-24 years old, coming from a low socio-economic grouping, single or divorced, in a blue collar occupation, of low education and limited literacy and of low self-esteem. But neither of these characteristics should be taken for granted. Recent data from the UK show that more and more women get drunk behind the wheel and the number of women convicted of drink-driving has risen significantly over the last decade.

Given these characteristics of drink-drivers, it can be argued that drivers of commercial vehicles tend to have a profile corresponding to a typical drink-driver. Many of them are relatively young, male, single, or divorced, with a low self-esteem and coming from low socio-economic grouping. On the other hand, they drive as a profession and risk much more than private car drivers if stopped while drink-driving.

The prevalence of drink-driving amongst commercial transport drivers is lower than for drivers of private cars, but it can be expected that they follow a similar pattern when it comes to differences between countries. According to national police data, the percentage of journeys associated with alcohol level above the legal limit ranges between 0.2% Norway to 8% in Cyprus (Fig.4).

Fig.4: Prevalence of drink-driving in road traffic as registered during the TISPOL enforcement operation in June 2009



Studies from different countries and road side surveys indicate that the prevalence of alcohol among drivers of HGVs is low and lower than among drivers of light vehicles. Surveys from US, Canada and Europe have shown low prevalence of alcohol among drivers of heavy vehicles, less than one percent, 0.29% and 0.19% respectively (Assum 2009).

During a similar enforcement campaign focusing on buses and carried out in July 2009, over 38,000 coaches were checked out by police forces in 17 countries: 55 bus and coach drivers were found to be above the legal limit, five were found under the effect of drugs and 106 did not hold a driving license, having previously been disqualified for offences. Drink-driving by coach drivers is thus as high as 0.15% only, far less than in the general driving population.

Separated enforcement campaigns were run by national Police forces focusing on drink driving among HGV drivers. In 2008, only one out of 250 drivers was found positive, while in 2009 even less (one out of 600).

Tab.2: Prevalence of drink driving among HGV drivers in TISPOL enforcement campaigns

Campaign	March 2008	October 2008	March 2009	October 2009
Truck drivers checked	115,364	170,940	183,024	171,567
Drivers with illegal BAC	556	646	301	348
% with illegal BAC	0.44%	0.39%	0.15%	0.19%

Driving under the influence is thus less prevalent in commercial transport compared to individual transport. Yet, alcohol related road crashes in commercial transport result in more serious outcomes due to the vehicle crash incompatibility caused by increased size and mass of commercial vehicles. Besides, the number of people injured in such a crash may be high in case of vehicles operated by public transport companies. Moreover, crashes of commercial vehicles have additional negative side effects, which are sensitively perceived by society, such as material damage to road infrastructure, congestion, pollution etc.. Last but not least, the public image of a company involved in a serious crash can be damaged if the event is covered by the media.

It can be concluded that it is of great interest to society and to individual companies to minimise the occurrence of alcohol-related crashes in commercial transport. Moreover, the high level of interest of the media to such crashes is another good reason for operators to take the issue seriously and prevent alcohol related crashes from occurring.

It most often makes sound business sense to draw up and implement a road safety action plan. For businesses, there is a clear link between safety, quality and customer service, efficiency and the environment. Road safety has a massive impact on society, and for this reason can play a major role in improving - or damaging - corporate social responsibility.

2.1. CATEGORIZATION OF COMMERCIAL VEHICLES

In a general sense, a commercial vehicle is a type of vehicle that is used for carrying goods or passengers, such as a truck, semi-truck, van, coach, bus, taxi cab, box truck, trailer, tram, etc. But in respect to drink-driving, we may distinguish three groups of vehicles:

- Light commercial vehicles under 3,500 kg (characterised by relatively high rates of drink-driving, prevalence of single vehicle accidents and lower seriousness of injuries).
- Heavy commercial vehicles above 3,500 kg (characterised by relatively low rates of drink-driving, higher seriousness of injuries and number of victims involved). They are typically used to carry goods, but also passengers (coaches).
- Public transport vehicles (trams, buses, trolley buses, buses, characterised by higher rate of drink-driving and higher number of victims).

Light Commercial Vehicles (LCV) are all goods vehicles with a Gross Vehicle Mass (GVM) of up to 3.5 tones. There has been a rise in LCVs use in Europe. A large part of this is a consequence of the home delivery sector, which has seen phenomenal growth recently due to internet shopping. An easy access to these vehicles (B category driving license) together with their easy operability makes them accessible to drivers who may be lacking necessary experience. Drink-driving in these vehicles is believed to be widespread and comparable to the level of drink-driving for passenger car drivers.

Heavy Commercial (or Goods) Vehicles (HGV) are those with a Gross Vehicle Mass (GVM) above 3.5 tones. Despite their crash rate being lower compared to other vehicles, heavy goods vehicles (HGV) are over-represented in fatal crashes, since their high mass leads to severe consequences for other road users in crashes. In view of this and the growth in heavy goods vehicle traffic internationally over the last twenty years, the safety of heavy goods vehicles continues to be strictly regulated in the EU and supplemented by stricter standards in the best performing countries in road safety, and action by HGV companies continues to be encouraged. Mandatory regulation at EU level has been limited to date and tough technical standards exist but tend to be optional. However, discussion is underway to bring trucks and buses into the EU Whole Vehicle Type Approval System alongside cars and motorcycles.

Public transport vehicles are typically operating in an urban environment and carry a large number of passengers. The compliance with drink-driving policies by their drivers is indeed essential for the passengers to trust using such transport. As the experience from several countries shows, public transport is the mode which is most amenable to strict regulations, as proven by the broad acceptance of alcohol interlocks by their drivers (Assum et al. 2006).

2.2. COMMERCIAL VEHICLE CRASHES IN THE EU

Assuming that all vehicles with a gross vehicle mass above 3.5 tons are commercial, it can be derived from the accident statistics that commercial vehicles are less likely to be involved in a road crash with injury compared to passenger cars. But commercial vehicles are more likely, per vehicle-km travelled, to be involved in a crash that results in death than cars, partly, and obviously, because of their size and weight. One is less likely to survive a crash if hit by a truck rather than a car. So the casualties in crashes with HGVs or delivery vans are much more frequent among the crash opponents than among the occupants of the HGVs and delivery vans themselves. Compared to a passenger car, the death rate for the crash opponent of a delivery van is almost a factor 2 higher, and a factor 7.5 higher for the crash opponent of a lorry (SWOV 2006a).

In the United Kingdom, per 100 million vehicle-miles travelled, HGVs are involved in 1.6 fatal crashes and buses and coaches are involved in 2.3 fatal crashes, compared to 0.9 for cars (DfT 2005). It is not known precisely how many deaths and injuries involving trucks, buses and coaches are caused by violations of traffic rules, such as breaches of driving hours rules or unroadworthy brakes or tyres, because the Government has not collected data about causes of crashes.

In Germany in 2007, for 1 billion kilometre travelled, 703 passenger cars, 518 light commercial vehicles and trucks (all weight categories) and 442 heavy articulated trucks were involved in accidents causing personal injury. In 2007, therefore, the mileage-related risk of a passenger car being involved in accidents causing personal injury was one and a half times greater than that of a goods road motor vehicle (Dekra 2009).

Over the last decade the number of commercial vehicles travelling on European roads has increased substantially. Freight transport is growing at a faster pace than the economy: road freight sector witnessed an increase of 38% between 1995 and 2005 (GDP increased by 24.5% over the same period). Its share (in tonne-kilometre) in the total EU-25 freight market is now of 44% (EEA 2008). This increases the number and severity accidents since one of the requirements of a safe road transport system network is to avoid potential collisions of vehicles with large differences in mass (SWOV 2006b).

Nevertheless, the trend in deaths from crashes involving commercial vehicles (above 3.5t) has been analogous to the trend in all road traffic deaths. This is the result of the analysis made for 10 EU countries (France, Germany, United Kingdom, Netherlands, Portugal, Spain, Greece, Austria, Belgium and Finland).

After passing an important package of regulations on HGV drivers in the EU, the focus is nowadays shifting towards Light Commercial Vehicles (LCV), whose number has increased substantially alongside the development of tolling schemes for HGV across Europe and the introduction of speed limiters for them. This increase was also the result of the growing use of vans by courier, express and package services. Short delivery times, the mail order business and orders via the internet have contributed to this trend. Consequently, vans have become accident-prone. The total number of involvements of vans in accidents has increased for all road categories over the past decade.

Reversing the trend in the number of accidents involving heavy duty vehicles is a challenge both for society and more directly for the road haulage sector. Truck driving is one of the most dangerous professions, and drivers therefore have a right to a safe working environment in line with the most recent standards concerning working conditions.

Commercial transport also includes the transport of persons (buses, taxis etc.). This sector has a duty to offer services that guarantee an optimum level of safety, both for the drivers and for the customers who purchase such services. Buses and coaches are normally relatively large too, and single accidents involving such vehicles typically cause many casualties.

Safety standards should therefore be at the forefront of fleet operators' work, be it for the transportation of goods or persons. Such companies also represent an ideal target group for the introduction of ground-breaking policies or technologies (such as alcohol interlock devices to prevent drink-driving).

There are few data available in terms of accident causation in commercial transport. One study on truck accidents causation conducted by the International Road Transport Union (IRU) mentions alcohol as one accident cause and lists it together with 'drugs' in one category (IRU 2007). This study differentiates between different accident types and concludes that:

- For accidents happening during an overtaking manoeuvre drugs and alcohol are responsible for 2.2% of accidents.
- For accidents involving a single truck (e.g.: vehicle departing from the carriageway) drugs and alcohol are responsible for 3.4% of accidents.
- For all other accidents (for example collision with other vehicles at junctions) drugs and alcohol are not listed as having a role.

The study indicates that truck accidents caused by drink-driving are rather rare.

According to German national data, about 8% of drivers of goods road transport vehicles (all weight classes) were under the influence of alcohol in accidents causing personal injury in 2007 (Dekra 2009).

2.3. PUBLIC PERCEPTION

Public opinion in respect to drink-driving has always been very strict and the media have played an important role in this. Since commercial vehicles are usually large and their crashes result in noticeable material damage and harm to health, they attract a great media attention. High media coverage of commercial vehicle crashes may be one of the reasons why people believe crash rates of those vehicles are well above the crash rates of passenger cars. The media coverage of commercial vehicle crashes does not contribute to the good image of the companies involved and this is particularly the case for passenger transport companies. As regards public transport companies, there has been a shift of attention in passengers' concerns from safety to security issues such as counterterrorism, while safety is now taken as granted.

While commercial vehicle drivers show up better in regard to alcohol than the average motorist involved in alcohol-related crashes, there is considerably less tolerance for drink driving among drivers whilst working. The victims of crashes involving heavy trucks, regardless of which driver is at fault, are most often the occupants of the smaller vehicles.

Although the social acceptance of drink-driving has become very low, society is even less forgiving towards professional drivers causing a crash resulting in injury while driving under the influence of alcohol. Therefore it is of crucial importance that the companies do their utmost to avoid alcohol related crashes of their vehicles.

3 Hindering drink-driving in commercial transport

Under Vision Zero, the most popular modern philosophical concept of road safety management, the designer of the road system has a key responsibility for the safety of its users, while the user is responsible for complying with law. The responsibility of the road transport system designer is thus to eliminate drink-driving. This could be achieved through actions in three main areas:

- Regulations
- Awareness raising and education
- Enforcement of law

To achieve the objective of eliminating drink-driving, all the measures in the three groups must be combined and implemented in parallel. But even after implementing them thoroughly, the problem may still persist on a reduced scale.

In commercial transport, a double responsibility principle could be applied in two directions. First, the driver is himself accountable to authorities and to his employer. Second, the authority may make the employer accountable for actions undertaken by the employee, the driver. A great safety benefit could be reached especially in areas related to social provisions and to roadworthiness of vehicles.

Convicted offenders represent a particular risk to themselves and others, therefore even more stringent provisions are needed for them. These include driving bans, conditional driving, mandatory participation on rehabilitation courses, and the installation of alcohol interlocks.

3.1. GENERAL REGULATIONS

Commercial transport has traditionally been more regulated compared to individual road transport. It can be claimed that tight provisions in any area of driving regulations are beneficial for safe non-impaired driving. In this context, the European Union introduced a number of Directives and Regulations to improve safety levels in commercial transport.

- Directive requiring speed-limiting devices on vehicles over 7.5 tones and on M2, M3, N2 and N3 vehicle categories (92/6/EC).
- Directive requiring seat belts to be worn by all drivers and passengers sitting in seats equipped with them; and a requirement to have all seats in coaches fitted with seat belts (2003/20/EC).
- Directive on driving rest periods (561/2006/EC) and the introduction of digital tachographs (3821/85).
- Directive on the technical roadside inspection of the roadworthiness of commercial vehicles (2000/30/EC).
- Directive on driving licences (2000/56/EC and 91/439/EC).
- Directive on the initial and continuous training of commercial drivers (2003/59/EC).

In addition to this, the EC produced in 2001 the Recommendation on the maximum authorised level of alcohol in the blood of motor vehicle drivers. While the maximum authorised BAC level for passenger car drivers was set up as 0.5 g/l, the second reduced level of 0.2 g/l was recommended for drivers of heavy commercial vehicles (above 3.5 tons) and for novice drivers. However, Member States were left free to set their own levels and as a result, many Member States did not follow this recommendation (see Table 3). Besides, the Recommendation states that all of the Member States should adopt a system of random detection by analysing expelled air in order to dissuade drivers from drinking. In addition, the Commission expressed its view that Member States should work towards acceptance of the draft Directive on measuring instruments in order to harmonize breathalyser accuracy.

Alcohol is also mentioned within the Directive on the initial and continuous training of commercial drivers transporting goods and passengers. According to this Directive, commercial drivers shall be subject to a compulsory initial qualification and compulsory periodic training through which they must reach the level of knowledge and practical competence necessary to drive in all safety vehicles of the relevant license category. Alcohol is briefly mentioned among the numerous themes required to be covered throughout this training: 'principles of healthy, balanced eating, effects of alcohol, drugs or any other substance likely to affect behaviour, symptoms, causes, effects of fatigue and stress, fundamental role of the basic work/rest cycle.'

3.2. LEGISLATIVE PROVISIONS ON DRINK-DRIVING

Legislative provisions in the area of drink-driving include regulatory provisions provided by the Highway Code and other provisions for treating the offenders. These include penalties for drink-driving, court process specifications, penalty point system provisions, random breath-alcohol test legislation, but also provisions with respect to personal liability.

All these provisions are usually severe to provide deterrence to drivers. Since the second half of the 20th century, all European countries have introduced a legal BAC limit for drivers of motorised vehicles. While in some countries (e.g. Czech Republic, Hungary), the limit was set at zero from the very beginning, in some others, the limit set originally was later lowered to the current level. The standard limit applied for the general public is often lowered for novice and professional drivers. While in the case of novice drivers, this provision is justified by a greater impact on driving of a given BAC, in case of commercial vehicle drivers, higher severity as well as higher expectation of the compliance with the law provides the ground. National legal BAC limits vary between countries, despite the EU Recommendation on setting a maximum level at 0.5 g/l for general public and 0.2 g/l for novice drivers and drivers of commercial vehicles (Tab.3).

The standard BAC for all motor vehicle drivers which should be adopted by all of the Member States is one not exceeding 0.5 g/l. At the moment most of the Member States have already adopted that BAC limit. In Ireland and UK, the limit is likely to be lowered in a close future. In addition a second BAC of 0.2 g/l is recommended for certain types of driver and vehicle, namely: inexperienced drivers, motorcyclists, drivers of large vehicles and drivers of vehicles carrying dangerous goods. In the Commission Communication on an EU alcohol strategy the Commission invites the Member States to even consider a zero BAC limit for young and novice drivers and drivers of public transports and dangerous goods. There is widespread support for reducing the permitted BAC for young and novice drivers to 0.2 g/l in all EU member states. Seventy-three per cent of all Europeans favour this change. The attitude towards the limit for professional drivers is, however, not known (TNS 2007).

Despite the BAC Recommendation and the fact that alcohol is briefly mentioned in the Commercial Driver's training Directive, there is rather little in terms of legislation on drink-driving for commercial drivers. This means that fleet operators should be strongly encouraged to set up their own initiatives and internal policies to tackle the risk of drink-driving. In Germany, Austria, Greece, France, Spain and Slovenia, the legal BAC limit for the drivers of HGV is actually lowered compared to the standard legal limit valid for the drivers of light vehicles.

Call for an EU-wide zero alcohol limit for professional commercial drivers

The European Commission has adopted, in January 2001, the Recommendation on the maximum permitted blood alcohol content (BAC) for drivers of motorised vehicles (2001/116/EC). Maximum permitted BAC limit should be 0.5 g/l for all drivers and 0.2 g/l for inexperienced drivers and drivers of heavy good vehicles.

In the Commission Communication on an EU alcohol strategy the Commission invites the Member States to even consider a zero BAC limit for young and novice drivers and drivers of public transports and dangerous goods (COM(2006)625).

The European Transport Safety Council calls for a common maximum BAC limit valid in all Member States, which should be lower for novice and professional drivers.

Tab.3. Legal BAC limits for car and professional drivers in EU-27 countries by 1.1.2009 (source: DG TREN)

Legal BAC limit (g/l)	Standard	Professional
Belgium	0.50	0.50
Bulgaria	0.50	0.50
Czech Republic	0.00	0.00
Denmark	0.50	0.50
Germany	0.50	0.00
Estonia	0.20	0.20
Greece	0.50	0.20
Spain	0.50	0.30
France	0.50	0.50 (0.20)
Ireland	0.80	0.80
Italy	0.50	0.50 (0.20)
Cyprus	0.50	0.50
Latvia	0.50	0.50
Lithuania	0.20	0.20
Luxembourg	0.50	0.20 (0.50)
Hungary	0.00	0.00
Malta	0.80	0.80
Netherlands	0.50	0.50
Austria	0.50	0.10
Poland	0.20	0.20
Portugal	0.50	0.50
Romania	0.00	0.00
Slovenia	0.20	0.00
Slovakia	0.00	0.00
Finland	0.50	0.50
Sweden	0.20	0.20
United Kingdom	0.80	0.80

Note: Numbers in parentheses valid for public transport drivers

Those drivers caught driving with a BAC over the legal limit may face heavy fines, demerit points and the loss of their driving licence, depending on the country where the offence occurred and on the country where the driving licence was issued. In some serious cases, the driver may appear in court and see their licence temporarily withdrawn. The absence of a European legislative framework allowing all drivers to be treated equally in the EU regardless of their nationality is nowadays a major obstacle for the effectiveness of enforcement practices in Member States.

Drink-driving offences are in general punished very severely by courts of all Member States. The sanctions may involve temporary withdrawal of driving licences, conditional driving bans, obligations to participate in dedicated awareness raising programmes, and others. Commercial drivers are usually treated even more severely as they are even more strongly expected to obey the law, and in respect to their higher exposure.

An overwhelming majority of Member States has introduced a penalty point system in their efforts to restrain repeated offenders from driving. Penalty points systems contribute to deter offenders, as for many of them the driving ban is indeed perceived as a more serious punishment than any financial fines. In some countries, it is also an efficient tool for banning repeat drink-driving offenders from the road traffic, as the number of points attributed for drink-driving is relatively high. However, the enforcement must be kept at sufficiently high levels to deter any driver banned from driving by the court.

3.3. EDUCATION AND AWARENESS RAISING

Research suggests that factors such as public education about BAC limits and the dangers of driving while impaired can play a key role in enhancing the effectiveness of legislation which targets drink-driving (Bartl et al. 2000).

Driving schools play a primary role in providing necessary information on the risk of drink-driving, but the education activities do not stop here, as the driving licence is not a life-time permit to operate commercial vehicles. Four core education activities could be distinguished:

- Education programs on alcohol in schools and in driver training
- Programs and initiatives run by employers and insurance companies
- Driver improvement courses (rehabilitation courses)
- Promotion of safety culture and awareness-raising campaigns

Research also shows that individuals may not always have sound awareness of their individual level of impairment - and hence may mistakenly believe they are not intoxicated when in fact they have a BAC level above the legal limit.

While the public administration plays a basic role in assuring the awareness of drivers, the employers of commercial drivers have an important role to play as well. They may motivate drivers to comply with road traffic legislation by attributing premiums to those drivers respecting regulations and applying measures against those breaking the rules. The existence of safety culture and motivation programmes can also bring about a difference.

Public authorities also have a role to play when it comes to steering employers to provide adequate information and supporting material to employers. In Ireland, for example, two state agencies the Road Safety Authority supported by the Health and Safety Authority have cooperated together to inform employers of their responsibilities for driving for work and that specific information is provided on alcohol and drugs.

3.4. ENFORCEMENT

Consistent and visible enforcement has been shown to be a powerful deterrent to drink-driving. Enforcement methods which have proven effective include breath testing (random or where drink-driving is suspected), sobriety checkpoints, police patrols, and officer training (Stewart & Sweedler 1997).

Frequent and highly publicised enforcement should be continued and can be effective in reducing drinking and driving if people perceive there is a credible threat of being caught. Sobriety checkpoints can reduce alcohol-related crashes by 20 percent (CDC 2002). Enforcement is resource-intensive and may not be maintained at effective levels in the longer term.

A time series of roadside surveys in the Netherlands covering a 30-year period showed a high correlation between enforcement and drink-driving levels. During the whole period, each doubling of the enforcement level resulted in a substantial reduction (by approximately 25%) of drink-driving (Mathijssen 2004).

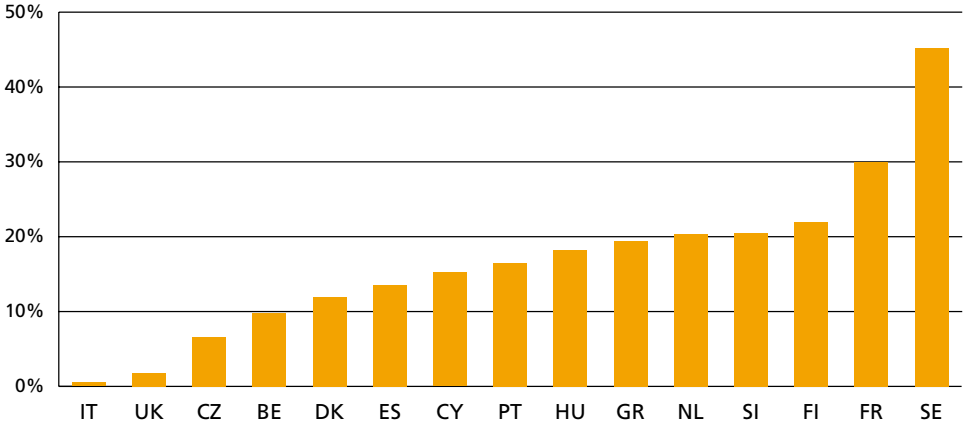
A study by Mathijssen (2001) showed that the effects of enforcement are more likely to be achieved if there is publicity about it. Publicity about intensified enforcement results in an increase in the subjective chance of being caught and to a more rapid decrease in the number of offenders. Random and targeted breath testing (RBT) is an effective technique to tackle drink-driving. In this method drivers are selected purely on the basis of chance and during periods and at locations where high alcohol use is expected (e.g. night times). RBT increases subjective perception of the possibility of being caught, which affects their drinking and/or driving behaviour.

In its Recommendation on the maximum authorised BAC level, the EC further urged Member States to adopt a system of random detection by analysing expelled air in order to dissuade drivers from drinking. Moreover, each driver should be exposed to a statistically real probability of being checked at least once every three years.

ETSC has recently tried to evaluate the levels of enforcement in several EU Member States (ETSC 2006, ETSC 2007b). The number of random checks performed over the period of one year was divided by the estimated number of drivers within the country. High levels of drink-driving checks were found in Finland, Sweden and France, while the level of enforcement by random checks was found very low in the UK and Italy (Fig.5). Only in Sweden, the probability of being checked for the presence of alcohol was sufficiently high to provide desired deterrence effect.

Random checks are indeed the most efficient way how to deter drivers from drink driving. It is broadly supported by public. Eighty per cent of EU citizens believe that random police alcohol checks would reduce alcohol consumption prior to driving (Mongan & Deirdre 2007). In the UK, random checks are still not allowed by law, while in the Ireland, random roadside checks on alcohol have been performed since 2006.

Fig. 5: Estimated percentage of drivers checked during the given year (all vehicles)



In all these countries the police have been empowered to stop and breath test drivers at random. Some forerunner countries such as Sweden, the Netherlands, Finland and Estonia also insist on an alcohol test every time a driver is stopped (for whatever reason). Moreover, Finland introduced the so-called blanket testing in 1977. In these road checks a whole road is blocked off and everyone is tested. Today, some other countries like Estonia and Slovenia undertake similar large-scale testing. The aim is to vary time and place and ensure that drivers are aware that they may be tested anytime or anywhere. If random breath testing is applied, drivers will not only feel that they run a high risk of being tested. They will also understand that all blood alcohol levels over the legal limit will be detected in these tests.

Punishment for convicted drink drivers also varies a great deal from country to country, and is linked to the extent to which an offender's BAC level exceeds the legal limit. Generally speaking, the consequences for exceeding legally imposed BAC limits range from mandatory educational programs and monetary fines to more severe measures such as automatic licence suspension and prison sentences.

In case of hardcore drink-driving, the relevant courts are engaged and provide long-term accountability and rehabilitation in addition to the conviction. Usually, a cooperative approach is chosen involving all criminal justice stakeholders (prosecutors, defence attorneys, judges, probation officers, law enforcement). In addition to being convicted, offenders typically enter into court ordered treatment, undergo frequent alcohol testing, and are under close community supervision.

Rehabilitation courses in England and Wales

The Road Traffic Act 1991 allowed certain Courts to offer drink drive offenders the opportunity of attending a rehabilitation course and in the light of the success of courses, this power has since been extended to all courts. If offenders successfully complete the course, the period of disqualification from driving is reduced by up to a quarter. The effect of the courses was monitored and evaluated by TRL. Rehabilitation training is found to have a positive effect on offender attitudes and knowledge. The reconviction rate of the rehabilitated drivers 36 months after the initial conviction was less than half of the rate for other drink-driving offenders (Davies et al. 1999).

Enforcement by random breath testing cannot eliminate the problem to a satisfactory extent. The chance of drink-drivers being identified and stopped always remains rather marginal and the probability of convicted drivers to continue drinking and driving is too high. New in-car integrated technologies could however provide a solution here by rationalising the way of checking and focusing on drink-driving prone drivers.

The costs of the integration of these measures are often considered an obstacle for their broader implementation. But while benefit-cost ratio could be relatively small for a privately owned car, it may be substantially higher for commercial vehicles. The purchase and maintenance costs are relatively small for the average commercial vehicle, which is also much more exposed to traffic, often involving different drivers.

3.4.1. Current in-car enforcement technologies (Alcohol interlocks)

Alcohol interlocks can form part of a strategy targeting drink-driving as they prevent impaired drivers from operating a vehicle. Alcohol interlocks (also called 'alcohol interlocks') are devices that require the driver to take a breath test before starting the car. If the driver fails the test, the device locks the start of the engine. Internationally the alcohol interlock is considered a promising measure for reducing drink-driving. In the U.S. and Canada alcohol ignition interlock programmes have been implemented for more then two decades now. It is estimated that about 200,000 interlocks are currently in use throughout North America, of which 180,000 in USA and up to 20,000 in Canada (situation in 2009). These figures are in sharp contrast with the application of alcohol interlocks in Europe.

History of alcohol interlocks

1917: Detecting alcohol in breath samples (dr. Erik M.P. Widmark, Sweden)

1931: The Drunkometer (Rolla Neil Harger) – the first successful breath test-machine for testing alcohol

1954: The Breathalyzer 900 (Borkenstein) – a Smith & Wesson product

1950-1965: Increased use of breath testing instruments by police around the world after passing first legislation on alcohol use in road traffic

1970: The use of alcohol ignition interlocks is proposed by Robert B. Voas, cars that drunks can´t drive

1985, 1990: The first Alcohol interlock programs for drink-driving offenders in USA, Canada

1999: The first Alcohol interlock program in Sweden for drink-driving offenders and for commercial transport

2000: The first Alcohol interlock program in Australia

2004: The first Alcohol interlock programs in Belgium and France as trials

2004-2005: EU-funded field trial with alcohol interlocks in commercial vehicles: Germany, Norway, Spain

2005: The first compulsory alcohol interlock program in Finland, The first truck manufacturer introduces a factory Alcolocks, Volvo Trucks

2007: Alcohol interlocks in new vehicles owned by Swedish Road Administration since September, in all vehicles since 2009, the First Car manufacturer introduces a factory Alcolock, Volvo Cars

2009: Bus-adapted alcohol interlock by Volvo Bus

2010: Mandatory interlocks in school buses in France, Programme for offenders to be started in the Netherlands end 2010

Alcohol interlock technology is still under development. Different alcohol interlock systems have different functions, for example the following:

- The result of the breath analysis is stored for a certain amount of time after the engine is turned off, so that the driver does not need to repeat the procedure after a short stop. In the respective European standards and approval processes, this requirement is set as of 1 minute for safety reasons.
- The engine can be started, e.g. to warm up, but the accelerator pedal is inactivated and the parking brake activated, so that the vehicle cannot be driven.
- A bypass function can be activated for emergency situations. The bypass function can e.g. be limited for use once, for use several times or be used during a certain amount of time.
- A service function can be activated, so that the vehicle can be driven with limited speed, e.g. in work shop areas.

Many professionals feel a need for an UNECE Regulation on the installation of alcohol interlocks in vehicles of categories N1, N2, N3, M2 and M3. Today there is an European legislation (EN 50436-1 and EN 50436-2), which describe the requirements for the performance of alcohol interlocks, assuring the consumer protection (both user and customer. At the same time, there are no requirements on the installation in vehicles. It could be desirable to have a standardised interface between the alcohol interlock system and the vehicle. Alcohol interlocks should be installed in the vehicle electronic system so that only authorised personnel can disconnect the system. Compliance with a Regulation would assure that the alcolock system is installed in a reliable and safe manner and that it does not interfere with other vehicle systems.

Alcohol interlocks: Basic facts

- Alcohol interlocks eliminate drink-driving virtually to zero once installed, but the positive effect on recidivism usually disappears completely after the lock is removed from the vehicle.
- Alcohol interlocks are well-accepted by individuals and appreciated by the general public, particularly in public transport. As such, they can have positive secondary benefits such as increased use of public transport. But the general public often perceive the performance of the test before each start of the vehicle irritating.
- The price for an alcohol interlock used in rehabilitation programmes is about 1,200-1,500€.
- Purchase costs of an alcohol interlock device including installation for a general use vary between 700 to 1,500€. Maintenance costs involving once a year calibration are about 100€. With mass production, this price could drop to between 300 and 500€.
- Benefit-cost ratio could vary significantly for different application purposes. It is very high if used for repeated offenders under designated rehabilitation programmes, but it can be lower when considered for a nation-wide application on all commercial vehicles.

Alcohol interlock programmes were adopted as part of the drink-driving control strategy in the USA and Canada, almost exclusively to prevent repeat drink-driving offences by convicted offenders (Marques et al. 2001). Various studies show 65-90% less repeated offences for users of an alcohol interlock than for drivers with a suspended driving licence or a revocation (Bax et al. 2001). In the initial years, not one of the participants in the Swedish alcohol interlock programme was caught drink-driving again (Bjerre & Bergman 2004).

Alcohol programmes have generally high cost benefits with a benefit-cost ratio of about 10. On average, the costs of an alcohol interlock programme are €1,500 per person per year, costs easily recovered by users by drinking less alcohol (Beirness & Robertson 2002). One weak point is that the positive effect on recidivism usually disappears completely as soon as the lock is removed from the car (Bax et al. 2001; Beirness & Robertson 2002). Therefore measures to counter this should be introduced.

Various assessments have shown that an alcohol interlock is more effective than driving licence suspension in preventing recidivism. US and Canadian research also shows that those who have had their licence suspended offend two to three times as often as drivers who are allowed to drive with an in-car alcohol interlock after a comparable alcohol offence (Bax et al. 2001). Based on these results, forcing an alcohol interlock on heavy drinkers is preferable to excluding this group.

Alcohol interlocks are currently used in several European countries either on voluntary basis or on a mandatory one in the case of repeat offenders. A great number of transport companies throughout Europe have equipped their vehicles with alcohol interlocks in recent years. The Swedish Road Administration has been particularly instrumental in this. But the typical use remains in the area of conditional licence period for repeat offenders (Belgium, Finland, France, Netherlands, Denmark and Sweden). Legislation has been recently approved in Belgium, while it has been in place since a longer time in Sweden and Finland. In the Netherlands, the legislation could be approved by the end of 2009. In France, all buses to be used for transport of children will have to be equipped with alcohol interlocks as of 2010.

From an administrative point of view, the driver licensing authority can issue a conditional licence with an interlock restriction. The restriction would have to be indicated on the licence. In practice, this will have to be done according to European regulations, i.e., following the Commission Directive 2000/56/EC which refers to the list of harmonised Community codes in Annexes I and Ia of Directive 91/439/EEC. According to these regulations, the harmonised Community code 51 provides the option to issue driving licences restricted to a specific vehicle using its registration plate. Thus, the vehicle registration number (VRN) of the interlock-equipped car can be marked on the licence. This ensures circumvention by using another vehicle would be detected. Any use of a different vehicle would be a criminal offence and liable to prosecution. The use a new harmonized code for alcohol interlocks used on vehicle licences would be even more effective as it will help to assure that the repeated offender cannot legally drive other vehicle which is non-equipped with alcohol interlock.

Tab.4: National wide initiatives on alcohol interlocks in EU countries by the end of 2009

Stage / Country	AT	BE	DK	FI	FR	NL	SI	SE	UK
Pilot ongoing		X		X		X		X	X
Legislation in preparation		X RP		X School buses	X RP	X RP		X RP	X CP
Legislation adopted		X	X	X					
Legislation in implementation									
Rehabilitation		X		X	X	X		X	
Commercial Transport				X	X		X		
Voluntary use in commercial transport	X	X		X				X	
Children transport					X				

* RP=Rehabilitation programme, CP=Consultation process

With regard to the use of alcohol interlocks in preventative programmes, Sweden is unique in the world. It has been running its program on a large scale. However, since 2004 several small scale experiments with such programmes have been carried out in Norway, Germany, Belgium, and Spain within the framework of an EU research project (Silverans et al. 2006). The Swedish programme for offenders is also unique because it is the only one that allows alcohol dependant drivers to take part. They must, however, after several months prove that they abstain from using alcohol. The programme was introduced in late 1999 and aimed at increasing the quality assurance in commercial transport. The implementation started with a small-scale demonstration project in partnership with a bus, taxi and truck company and was funded by the Swedish National Road Administration. One hundred vehicles of each company were alcohol interlock-equipped. To minimise discomfort to the drivers and the risk of economic loss to the fleet owners, all alcohol interlocks were programmed for 30 minutes restart period, allowing to restart the vehicle motor without providing a breath test. Moreover, the alcohol interlocks had a function that allowed the ignition to be on without the motor being running (for heating purposes, among other things), as well as a reset function for driver changes within the aforementioned 30-minute grace period. Various facilities and regular control make fraud very difficult (Beirness 2001). Finally, the commercial alcohol interlocks did not have a running retest function. A first evaluation of attitudes among drivers, employers, customers and passengers showed that the alcohol interlock was widely accepted as the best alternative to reduce drink-driving (Lönegren 2003). However, it was also reported that there was a lot of mistrust in the beginning regarding the alcohol interlocks due to technical problems with the devices and mistakes with regard to the servicing infrastructure.

From the interviews with the professional drivers, summarized in Tab. 5 below, it appeared that the drivers experienced no hindrance from using the devices and in general evaluated the alcohol interlocks positively. Both companies and drivers took positive attitudes towards the system. At the end of the one year field trial, none of the participating companies decided however to keep the devices installed. All companies evaluated the costs as too high in comparison to the possible competitive advantage the alcohol interlocks may imply.

When interviewing bus passengers, it appeared that bus passengers evaluated the introduction of alcohol interlocks on buses almost unanimously as a good idea. From the interview in Norway it appeared that 69 percent of the passengers would even be prepared to accept delays due to technical problems with the devices. But only a minority of 34 percent would be prepared to pay more for riding an alcohol interlock-equipped bus.

Tab.5: Summary interview results for professional drivers (% of agreeing participants). Source: Assum et al. (2006).

Area	Statement	Norway	Spain	Germany
Interference with driving	Alcohol interlocks hinders my daily work	8%	3%	14%
	Difficult to handle the alcohol interlocks in addition to other services and duties	4%	0%	3%
	The use of alcohol interlock is time consuming	54%	53%	51%
Acceptance	All buses/trucks in my country should have alcohol interlocks	94%	73%	79%
	Alcohol interlocks in buses/trucks contribute to road safety	79%	70%	82%
Social aspects	Passengers/customers may suspect the drivers to have alcohol problems	33%	10%	43%
	Alcohol interlocks are good for the image of the drivers	63%	57%	64%

Insurers' initiatives on alcohol interlocks

Some insurers view alcohol interlocks as an effective tool for reducing drink-driving.

In the UK, **Privilege Insurance** has pledged its support for the introduction of alcohol interlocks for convicted drink drivers. Privilege, which specialises in insuring safe drivers, urged the Government to strengthen the measures contained in a recent Road Safety Bill to make the fitting of an AIL (or 'alcohol interlock') compulsory for a minimum of six months, following the completion of a ban for drink-driving. This is based on the evidence that one fifth of all motorists convicted for drink-driving every year are re-offenders.

Duck2Water insurance company has joined Privilege on the call on the Government to make alcohol interlocks, if trials prove successful, compulsory to all drink drivers once they complete their ban and return to the road.

There have been proposals to make alcohol interlocks mandatory in all (commercial) vehicles at national level, ultimately solving the drink-driving problem. But these proposals have all been rejected by governments on different grounds so far.

Germany is one of the countries which does not consider general introduction of alcohol interlocks to commercial vehicles. The main reason is a low benefit-cost ratio and different legislative obstacles. According to the study by DAV (2007), the total costs of alcohol-related accidents of heavy vehicles (>3.5 tonnes) in 2005 were €18.2 million. With a vehicle park of 871,000 registered heavy vehicles, the annual costs per vehicle should not exceed approximately 20€ (BASt 2006). Furthermore, it warrants mentioning that there is less to gain with heavy vehicles as only 600 accidents happened where a heavy vehicle was involved. Moreover, as an alcohol interlock obligation for all heavy vehicles would mainly affect professional drivers, these drivers would be illegally restrained from working in case of a false positive breath tests, because the freedom of exercise of profession is considered a basic personal right, defined in Article 12 of the Basic Constitutional Law. Another economic issue that needs to be considered is the potential loss of economic activities due to higher costs of services as a result of the obligation to have interlocks in all heavy vehicles.

Also in Norway, the costs of large scale implementation of alcohol interlocks have been evaluated as equal to potential benefits. The cost of purchasing and installing alcohol interlocks is 1,880€ and annual maintenance including mouthpieces is 111€. The discount rate is 4.5%. The present value of the costs of an alcohol interlock for 10 years is 2,768€. The annual accident costs to be saved by alcohol interlocks are 350€ per alcohol interlock, equivalent to 0.0007 injury accident per HGV. If alcohol interlocks would prevent 16.6% of all injury accidents involving heavy vehicles (except busses) the benefits will equal the costs. (Assum & Erke 2009).

Alcohol interlock deployment can be driven not only by governments through legislative provisions, but also by public authorities and civil entities. For example, the Swedish Road Administration now equips its fleet with alcohol interlocks and many private companies do so as well.

Use of alcohol interlocks by a French haulage company

Brittany-based transport company **TECL** was the first in France to equip its entire fleet with alcohol interlocks.

Back in July 2005, three of Transport Express Conseil Logistique's 49 drivers who were driving in convoy were routinely stopped, breathalysed and found to be over the limit with a reading of 1.5g alcohol per litre of blood. Adding to this, 75% of students in the training centre providing truck driver training to TECL were found over the limit. These events have triggered an action by the founder of the company to prevent repeating that situation.

All 35 vehicles were equipped by alcohol interlocks at the total price of 35,000€. Later on, the Caisse Régionale d'Assurance Maladie (CRAM), social security authority in the Nord region of France signed an agreement with Volvo Trucks and is paying a grant of 700€ per unit installed, and there are potential grants available from other bodies both on a national and European level.

TECL's alcohol interlocks are set to prevent the engine from starting if the driver registers over 0.2 g/l, despite the French limit being slightly higher at 0.5 g/l at that time.

The acceptance among the employees is very high and alcohol interlocks have become completely integrated into company practices and the drivers no longer even think about it. The proof is that not even a single driver has left the company since the system was installed and not one single alcohol interlock has ever recorded a positive alcohol test result.

Trial on alcohol interlocks by a taxi company in Belgium

In Belgium a taxi firm started a small alcohol interlock trial in April 2008 supported by the alcohol interlock supplier Alcohol Countermeasures Systems (ACS) Belgium. This is within the context of the development of new legislation. "**N Taxi**" is based in Mechelen and has a zero tolerance policy towards alcohol and drugs. All taxi drivers have to sign the house rules and commit to this policy on alcohol and drugs. Alongside its zero tolerance policy the firm had a problem with a driver who lost his job due to an alcohol problem. Preventing a repeat of this was a further motivation for them to take up alcohol interlocks. If a drink-driving offence is detected by the alcohol interlock the company director talks to the driver and gives them a warning. There has been a 20% increase in the company´s business since the introduction of alcohol interlocks. The biggest customers of N Taxi have supported the project and have commissioned more work for the small taxi firm. The taxi firm owners will extend the trial by keeping the current locks in the cars and introducing more alcohol interlocks to other taxis (ETSC 2008).

A nation-wide general implementation of alcohol interlocks may not be a popular measure in contemporary society perceiving them as intrusive and irritating. But in the future more friendly technologies together with even higher expectations of transport safety could change the public perception.

3.4.2. Future alcohol interlock technologies

New alcohol interlock technologies are seeing the light of day nowadays. They are in general less disruptive and more convenient, but their current reliability is questionable. Four leading technologies under development can be identified.

1. Tissue Spectrometry -TS subsystems allow estimation of BAC by measuring how much light has been absorbed at particular wavelength from a beam of Near-Infrared (NIR) reflected from the subject skin. They further include touch-based systems that require skin contact.

2. Distant Spectrometry - Infrared or laser light is transmitted to the subject from a source that receives and analyses the reflected and absorbed spectrum, to assess chemical content of tissue or liquid in vapour, while not requiring skin contact. It is now being developed in Sweden as a part of Intelligent Vehicle Safety Systems initiative benefiting from the grant from SRA. A big advantage is an ease of operation through the sensors around the driver.

3. Electrochemical – transdermal - Measures alcohol in perspiration through contact with the skin. The technology is currently used to continuously monitor alcohol offenders to ensure they are not drinking.

4. Behavior oriented - Detects impaired driving through objective behavioural measures. Includes ocular, gaze, eye movement, and driving performance measures

Dashboard integrated breathalyzers may represent the final technical solution for eliminating drink-driving as they could resolve all the weakness which current alcohol interlocks devices have.

4 The case of Sweden

In the past decade Sweden has been a pioneer in rolling out the use of alcohol interlocks in Europe. This arises from its national culture and historical background. Sweden has a long tradition of using different means and restrictions in order to achieve a sober way of living among its citizens. The process started already in the 19th century when the alcohol consumption became extremely high in the industrialised regions. The reaction took shape among the rapidly growing non-governmental movements with political, religious, educational or cultural aims. Thus a national referendum in 1922 nearly resulted in a total ban of alcohol. A period of restrictive rationing of all alcohol purchase followed and did not end until 1955. Still today there is a state monopoly for the sale of all beverages containing more than 3.5% alcohol. All drinks are very expensive due to high taxation. The drink-driving limits and sanctions are very strict by tradition. Since the beginning of the nineties the legal BAC has been 0.2 g/l. The criminal sanction is either high fines at the lower levels or prison. The administrative sanction is always withdrawal of the driving licence for a certain period up to three years depending on alcohol concentration and recidivism. Most drink-driving offenders have to prove a sober way of living before a new license will be issued (Hultman 2007).

In Sweden, not only an offender program has been implemented, but also a commercial one. The program was introduced late 1999, as an aspect of quality assurance in commercial transport. Implementation started with a small-scale demonstration project in partnership with a bus, taxi and truck company and was funded by the Swedish Road Administration (SRA). At an early stage, the companies involved started discussions with the employee representatives of the Swedish Transport Workers Union.

The current Swedish government adopted a new Alcohol interlock Strategy in 2007. The previous government had considered proposing legislation to install obligatory alcohol interlocks in all new trucks and buses from 2010 and in all new cars from 2012. The new strategy, though not as ambitious as the commitments of the previous government, nevertheless identifies a number of milestones for action and is meant to be realistic and enforceable. In the commercial area the government strategy recommends that alcohol interlocks be fitted to all new commercial busses and HGVs. Compulsory rules for the use of alcohol interlocks in all vehicles to be used by government authorities are planned. The idea will be that when authorities buy cars they must comply with mandatory criteria for environment and safety. Alcohol interlocks are already being used by the SNRA, and eight government agencies. Finally the strategy stresses the need to continue to develop alcohol interlock technology. It is investing in research through its Intelligent Vehicle Safety System (IVSS) which brings together the public sector, motor industry and universities.

In Sweden, 20% of all road deaths occur in collisions with heavy good vehicles and more than a quarter of all fatal work accidents in Sweden are road accidents (Working Environment Authority). According to the government drink-driving is just as common among commercial drivers as among other drivers. Moreover an accident involving a heavy vehicle will often have serious consequences; it is thus doubly important to increase the use of alcohol interlocks in this sector.

Between 1999 and 2002 the SRA began a national large scale trial with three companies and almost 300 alcohol interlocks: a taxi firm, a bus company and a truck company. There were some important lessons learnt. It is crucial to get early information to employees and to union representatives to inform them about the alcohol interlocks. Secondly, it is important to use alcohol interlocks of high quality. An action plan is need for their implementation and also to ensure proper follow-up procedures. Moreover, the company must also plan for rehabilitation, if a drink driver is identified. Sweden can indeed be singled out in Europe as the country where dealing with drink-driving is really seen as a health issue. Drinking is recognised as an illness that needs to be treated and not merely punished.

Several manufacturers are now offering the installation of alcohol interlocks in trucks as a dealership option. From 2007, all trucks of 2.5 tons and over which are contracted by the SRA for more than 100 hours per year have to be fitted with alcohol interlocks and this requirement is already part of the procurement criteria. Additionally, all cars rented for more than six months must be equipped with an alcohol interlock.

There are now an estimated 60,000 alcohol interlocks in use in the commercial context in Sweden. This is in a total fleet number of approximately 200,000 commercial vehicles (heavy good vehicles, buses, taxis and some light trucks and company cars). This number has been growing rapidly year on year and suppliers have been hard pressed to keep up with the demand.

Communication with the customers or clients is also crucial in generating support for the alcohol interlock use. The results of this first trial were positive, in particular passengers were amongst the most positive group. In the end of the project the transport purchasers were clearly more supportive of alcohol interlocks then at the start and also said that they even could even be asking for them to be included in their future transport contracts.

Local authority transport providers are another target to encourage the use of alcohol interlocks in their procurement work. According to a survey of 2006 about one third of the 290 local authorities had begun to demand that their transport providers include alcohol interlocks in their transport. This development is escalating as the local authorities review their purchase agreements. Some of them want to include the demand for alcohol interlocks in all cars, HGVs and buses and alcohol interlock key lockers for emergency vehicles.

Alcohol interlocks is one tool in the work with Quality Assured Transport Services. Since many years the SRA is conducting a long range work in Sweden along with far-sighted players who can influence transports in a positive direction. It applies both to organisations that procure transports and to those who carry them out. The work with quality assured transports are based on voluntary commitments. Experiences from this systematic work show us that alcohol interlocks are an effective instrument in work for sober traffic. Demands for alcohol interlocks in transports as a prevention are increasing. Using alcohol interlocks also tells the world around that a company has made a choice and takes care.

Some single evaluation studies concluded that nearly everyone was convinced that alcohol interlocks are the best way to avoid drink-driving. The drivers no longer felt that alcohol interlocks interfered in a negative way with their role as a driver, notwithstanding the long warming-up period in wintertime. The authors emphasise that the government should not interfere with the implementation of commercial alcohol interlock programmes, except by providing information and apparently in the beginning financial incentives as well. Although commercial alcohol interlock use was introduced in Sweden as an aspect of quality assurance, the accident-reducing potential was subject to evaluation, too. Among a sample of 538 alcohol interlock-installed taxis, buses, and passenger cars, Bjerre (2005) found 848 positive breath tests (BAC above 0.2 g/l) in more than 250,000 starts. Assumed that each positive test result belonged to a different start, the alcohol interlock prevented 0.34% of all trips from being conducted by an alcohol-positive driver; and 0.04% by a driver with a BAC above 1.0 g/l. Bjerre does not explicitly state, whether he was able to filter out the failed re-tests.

It is likely that all cars will eventually be equipped by alcohol interlocks in Sweden in the future. How far away this future is depends above all on the further development of alcohol interlock technologies.

5 Recommendations

EU decision makers

- Provide for minimum requirements for enforcement activities
- Facilitate cross-border enforcement
- Provide for technical standards on alcohol interlocks in vehicles and examine impairment detection devices
- Provide for legislation for the use of alcohol interlocks for commercial transport and recidivist offenders
- Introduce harmonized Community codes for drivers under repeated offender programme under the driving license Directive

Member States

- Increase enforcement specifically regarding drink-driving
- Assure that the risk related to drink-driving is well understood by learning drivers
- Have random breath tests for all drivers and not only for 'suspected' drivers and systematically allow for the testing of drink driving in all Police checks relating to driver behaviour
- Assure obligatory testing for alcohol in all collisions dealt with by the Police
- Raise the chance of getting caught by carrying out more random roadside breath tests (especially at times and on spots where drink-driving is expected)
- Run better public campaigns and education programmes (for all age groups) based on scientific research and linked to enforcement
- Have alcohol ignition interlocks installed in the vehicles of severe first time drink driving offenders and all recidivists in combination with a driver improvement course

Operators

- Install alcohol ignition interlocks in commercial vehicles being type tested according to the European Standards EN 50436-1 or EN 50436-2
- Develop clear internal policies on control of alcohol and other substance abuse: these could be an integrated part of general company health polices
- Apply procedures and run programmes motivating drivers to comply with regulations

Manufacturers

- Integrate alcohol ignition interlocks into vehicle design
- Work on less disruptive, more reliable and cost-effective devices

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Photographs: Volvo, ACS • Design: www.beelzepub.com

ISBN-NUMBER: 9789081467513

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