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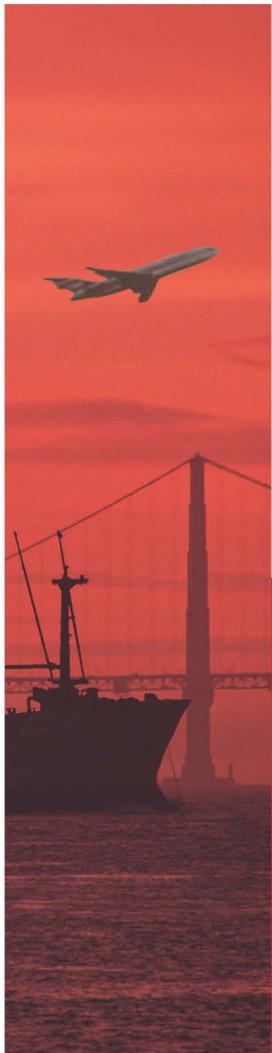
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**TECHNICAL DEVELOPMENT  
AND DEPLOYMENT OF  
ALCOHOL INTERLOCKS  
IN ROAD SAFETY POLICY**

STUDY







**DIRECTORATE-GENERAL FOR INTERNAL POLICIES**  
**POLICY DEPARTMENT B: STRUCTURAL AND COHESION POLICIES**

**TRANSPORT AND TOURISM**

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**STUDY**

This document was requested by the European Parliament's Committee on Transport and Tourism.

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**DIRECTORATE-GENERAL FOR INTERNAL POLICIES**  
**POLICY DEPARTMENT B: STRUCTURAL AND COHESION POLICIES**

**TRANSPORT AND TOURISM**

# **TECHNICAL DEVELOPMENT AND DEPLOYMENT OF ALCOHOL INTERLOCKS IN ROAD SAFETY POLICY**

**STUDY**

## **Abstract**

This study presents a discussion on alcohol interlocks in terms of their use, effectiveness and contribution to road safety. While summarising the most recent road safety developments and providing an account of the drink-driving phenomenon, the study outlines the technical requirements for the use of these devices and the various methods of use currently established in EU Member States. The study concludes with an analysis of their cost-effectiveness in relation to their deployment in the commercial road transport sector and specific users categories.

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## LIST OF ABBREVIATIONS

<b>ACEA</b>	European Automobile Manufacturers' Association
<b>ATC</b>	Australian Transport Council
<b>BAC</b>	Blood-alcohol concentration
<b>BAST</b>	Bundesanstalt für Straßenwesen (Federal Highway Research Institute)
<b>CAD</b>	Canadian dollars
<b>CARE</b>	EU road accidents database
<b>CENELEC</b>	European Committee for Electrotechnical Standardisation
<b>DG MOVE</b>	European Commission, Directorate-General for Mobility and Transport
<b>DMV</b>	Department of Motor Vehicles (Colorado, USA)
<b>DRUID</b>	Driving under the Influence of Drugs, Alcohol and Medicines project
<b>EC</b>	European Commission
<b>ECU</b>	European Currency Unit
<b>EP</b>	European Parliament
<b>ERTICO</b>	European Road Transport Telematics Implementation Co-ordination Organisation
<b>ETAC</b>	European Truck Accident Causation project
<b>ETSC</b>	European Transport Safety Council
<b>EU</b>	European Union
<b>EU-28</b>	The 28 Member States of the European Union
<b>EUR</b>	Euro
<b>g/l</b>	Grams per litre
<b>g/ml</b>	Grams per millilitre
<b>GDP</b>	Gross domestic product
<b>HEATCO</b>	Developing Harmonised European Approaches for Transport Costing and Project Assessment
<b>HGV</b>	Heavy goods vehicle
<b>IBSR</b>	Institut Belge de Sécurité Routière (Belgian Road Safety Institute)
<b>ICADTS</b>	International Council on Alcohol, Drugs and Traffic Safety

<b>IMMORTAL</b>	Impaired Motorists, Methods of Roadside Testing and Assessment for Licensing
<b>IRU</b>	International Road Transport Union
<b>ITS</b>	Intelligent Transport Systems
<b>KfV</b>	Kuratorium für Versicherung (Austrian Road Safety Board)
<b>LGV</b>	Light goods vehicle
<b>Mg/l</b>	Milligrams per litre
<b>NHTSA</b>	US Department of Transportation, National Highway Traffic Safety Administration
<b>OIS</b>	Online Interlock System (Colorado, USA)
<b>RDW</b>	Rijksdienst voor het Wegverkeer (Dutch National Road Traffic Agency)
<b>RMV</b>	Registry of Motor Vehicles (Nova Scotia, Canada)
<b>RSAP</b>	European Road Safety Programme (2003-2008 and 2011-2020)
<b>SAAQ</b>	Société de l'assurance automobile du Québec (Quebec, Canada)
<b>SARTRE</b>	Social Attitudes to Road Traffic Risks in Europe
<b>SEK</b>	Swedish Crowns
<b>SGI</b>	Saskatchewan Government Insurance
<b>SRA</b>	Swedish Road Administration
<b>STA</b>	Swedish Transport Authority
<b>SWOV</b>	Wetenschappelijk Onderzoek Verkeersveiligheid (Dutch Institute for Road Safety Research)
<b>TIRF</b>	Traffic Injury Research Foundation
<b>TISPOL</b>	European Traffic Police Network
<b>TRAFI</b>	Finnish Transport Safety Agency
<b>USD</b>	US Dollars
<b>WHO</b>	World Health Organisation

## LIST OF COUNTRY ABBREVIATIONS

### EU Member States

<b>AT</b> Austria	<b>IE</b> Ireland
<b>BE</b> Belgium	<b>IT</b> Italy
<b>BG</b> Bulgaria	<b>LT</b> Lithuania
<b>CY</b> Cyprus	<b>LU</b> Luxembourg
<b>CZ</b> Czech Republic	<b>LV</b> Latvia
<b>DE</b> Germany	<b>MT</b> Malta
<b>DK</b> Denmark	<b>NL</b> Netherlands
<b>EE</b> Estonia	<b>PL</b> Poland
<b>EL</b> Greece	<b>PT</b> Portugal
<b>ES</b> Spain	<b>RO</b> Romania
<b>FI</b> Finland	<b>SE</b> Sweden
<b>FR</b> France	<b>SI</b> Slovenia
<b>HR</b> Croatia	<b>SK</b> Slovakia
<b>HU</b> Hungary	<b>UK</b> United Kingdom

### Other countries

<b>AUS</b> Australia
<b>CA</b> Canada
<b>CH</b> Switzerland
<b>IL</b> Israel
<b>NO</b> Norway
<b>USA</b> United States of America



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## EXECUTIVE SUMMARY

The purpose of this note is to inform parliamentary debate on the advisability of making it compulsory at EU level to fit alcohol interlocks to all new commercial passenger and goods transport vehicles, or to certain categories of vehicles according to their use or, finally, to specific target groups of users.

As well as reflecting the current state of play, the analysis set out below examines the role and effectiveness of alcohol interlocks as a preventive countermeasure against the problem of drink-driving and summarises the findings of the cost-benefit assessment of two possible mandatory uses of alcohol interlocks. The first focuses on the potential impact of a rehabilitation programme for drink-drivers operating private vehicles, while the second estimates the potential benefits of implementing a preventive programme tailored to commercial vehicles - Heavy Goods Vehicles (HGVs), Light Goods Vehicles (LGVs), buses and coaches.

In addition, the note estimates the potential contribution of alcohol interlocks in achieving the road safety target set by the European Union (EU), which aims to reduce by half the number of road fatalities by 2020, in both areas.

### **Drink-driving as a major road safety issue**

Driving under the influence of alcohol is one of the principal factors contributing to road accidents, particularly those with severe or deadly consequences. It is estimated that 25 % of all road casualties in the European Union (EU) every year (approximately 7 000) may be attributed to drink-driving, while 75 % of all alcohol-related fatalities involve drivers with a blood-alcohol concentration (BAC) higher than 1.5 g/l.

Drink-driving is a major issue for drivers aged between 16 and 20, for whom alcohol-related collisions are the leading cause of death. This age group is three times more likely to crash in comparison to experienced drivers (aged 30 or older). The likelihood of this occurring is increased because alcohol is often mixed with other psychoactive substances (illegal and medicinal drugs). In regard to commercial vehicles, drink-driving is estimated to cause approximately 2.5%-3.3% of road accidents, although data for this category is usually reported to be sparse or not officially available.

The lack of reliable data is an issue that negatively impacts the overall quantification of the drink-driving phenomenon, as confirmed by the stakeholders interviewed, owing to significant disparities in analysis of alcohol-related road fatalities at a national level, mostly due to differing definitions of drink-driving, underreporting and varying levels of enforcement.

### **Use of alcohol interlocks to tackle drink-driving**

Three different practices for the use of alcohol interlocks are currently in operation:

- a mandatory use as part of a rehabilitation programme for certain categories of drink-drivers (hard-core drink-drivers, recidivists and first-time offending drink-drivers);
- a mandatory preventive use; or

- a voluntary preventive use.

Currently, approximately 430 500 alcohol interlocks are installed worldwide (the majority in North America), out of which 110 000 are in use in EU Member States. The use of alcohol interlocks as driver impairment detection devices was initially recommended within the EU by the Road Safety Action Programme (RSAP) 2003-2010 with the Commission subsequently placing greater emphasis on their potential role when it adopted the policy orientations on road safety for 2011-2020. It should be noted that the rationale for such action is not merely to achieve the overall road safety target of halving the number of road fatalities by 2020, but also to support Member States in their health policy efforts to reduce alcohol-related harm, as specified in the 2006 EU alcohol strategy

Sweden was the first EU country to launch a pilot trial in 1999 which subsequently evolved into a permanent alcohol interlock rehabilitation programme. Regulatory frameworks in this field of application have also been adopted in Belgium, Finland, the Netherlands, Denmark and the United Kingdom, although practical implementation has yet to happen in the last two Member States. Austria, Germany and Slovenia have carried out, or are currently enacting, pilot projects to assess the feasibility of introducing alcohol interlock programmes. France and Finland provide two relevant examples where alcohol interlocks are fitted following legislative mandatory preventive use whereby alcohol interlocks must be installed in all commercial vehicles performing school and day-care transport.

Finally, in Sweden, Finland and Germany, alcohol interlocks are also in use on a voluntary basis as a preventive mechanism in commercial vehicles as they are primarily considered to be tools of quality assurance and corporate social responsibility.

### **Effectiveness of alcohol interlocks in preventing alcohol-impaired driving**

Analysis of a potential rehabilitation programme for private vehicle drivers yielded an overall **benefit-cost** ratio of 1.9 for a baseline EU wide application of an alcohol interlock programme that targeted persistent drink-drivers. This corresponds to a remarkably positive socioeconomic result. A sensitivity analysis of the results found that the minimum acceptability threshold of the programme would be reached even if its effectiveness was halved in comparison to the initial value assumed. The **cost-benefit** analysis also demonstrated that, over a ten-year period, this would contribute 7.3 % (approximately 1 100 lives saved) towards the reduction of road fatalities as part of overall efforts that could be established to achieve the EU road safety target by 2020.

Analysis of a potential prevention programme for commercial vehicles yielded a negative result (0.2) for the installation of alcohol interlocks in all commercial vehicles. However, the ratio equals or approaches the break-even point for the installation of alcohol interlocks in buses and coaches (1.0) and HGVs (0.9). One factor that influences the outcome of the **cost-benefit** analysis is the cost of installation. If this annual cost was reduced from EUR 1 200 to EUR 1 000, the **benefit-cost** ratio would increase by 10 % for buses and coaches (1.1) and HGVs (1.0), while it would remain almost unchanged for LGVs and the commercial vehicle fleet as a whole.

Finally, the analysis also demonstrated that a mandatory fitting in all commercial vehicles (LGVs, HGVs and passenger vehicles) could contribute 1.3 % (approximately 200 lives saved) towards the reduction of road fatalities as part of overall efforts that could be established to achieve the EU road safety target by 2020.

## Summary of recommendations

As a result, the authors recommend that the opportunity to legislate with a view to extending the mandatory use of alcohol interlocks be considered:

- as part of rehabilitation programmes targeting certain categories of users, and
- as a preventive measure in specific categories of commercial vehicles, either because of the safety-sensitivity of the transport services they operate, or because of their size and mass.

To this end, a five-year timescale is proposed to legislate in this field, followed by an additional two-year period to enable Member States to adopt the relevant piece of EU legislation. This timeframe should also allow for further investigation as to whether vehicles' technological developments might lead to a reduction in costs and, subsequently, whether larger number of alcohol interlocks might be installed.

In addition to the suggestions above, it is also recommended that:

- The qualitative and quantitative knowledge base in relation to drink-driving should be improved, particularly in relation to the scale of the problem among professional drivers. More detailed and harmonised figures across all Member States, in combination with legislation to reconcile both BAC levels and reporting procedures, as well as the definition of drink-driving, would make it possible to clarify various aspects of the problem and thus establish more effective monitoring and enforcement mechanisms.
- Harmonisation of technical standards and quality requirements for alcohol interlocks should be promoted. Harmonisation should specifically address functional specifications, technical requirements for retrofitting and a common code for alcohol interlocks for driving licences.
- Pilot trials specifically targeting commercial vehicles should be encouraged and incentives provided, for example through financial support or the prospect for transport companies to gain a positive risk rating as part of the risk rating system set up under EU social legislation. This would make it possible not only to compile a more comprehensive statistical base but also to test the effectiveness of alcohol interlocks more promptly. It will be crucial to engage with both alcohol interlock and vehicle manufacturers as partners in this development process. Further consideration could also be given to possibly combining the functionalities of the digital tachograph with those of the alcohol interlock.
- Cooperation, exchange of information and best practices between Member States should also be encouraged.



## 1. INTRODUCTION

### 1.1. Premise

Driving under the influence of alcohol is one of the principal contributing factors to road traffic accidents and, in particular, to severe or fatal accidents. It is estimated that approximately 7 000 victims (25 % of all road casualties) in the European Union (EU) are a consequence of drink-driving every year.

Drink-driving is regarded as a highly problematic social and health issue. Therefore, a large variety of countermeasures have been established by national road authorities to tackle this phenomenon. These measures include alcohol interlocks, which prevent the start of vehicle's engine unless the driver passes a breathalyser test.

To date, three differentiated practices for the use of alcohol interlocks are established in a number of EU Member States: (i) a statutory use as part of a rehabilitation programme for certain groups of drink-drivers, (ii) a statutory preventive use and, finally, (iii) a voluntary preventive use.

Debate has been raised, however, regarding the opportunity to make the fitting of alcohol interlocks compulsory as a preventive measure for specific categories of commercial vehicles, either because of the safety-sensitivity of the transport services they operate, or because of their size and mass and therefore the consequential severity of road collisions.

### 1.2. Objectives of the note

The purpose of this note is to provide information about the opportunity to make the fitting of alcohol interlocks compulsory at EU level in respect of (i) all new types of commercial passenger and goods transport vehicles, (ii) certain vehicles according to their use or, finally, (iii) specific target groups of users.

In this respect, the note aims to carry out a **cost-benefit** analysis of the alcohol interlocks, in order to assess their possible mandatory fitting. In carrying out such an assessment, the note considers the most recent global statistical evidence on the drink-driving phenomenon together with the main uses of alcohol interlocks that are currently established in EU Member States.

### 1.3. Structure of the note

Following this introduction, the note is divided into four consecutive chapters. **Chapter Two** offers a concise introduction to the subject of alcohol-impaired driving, including a statistical overview of alcohol-related road fatalities. **Chapter Three** looks in more detail at the role and features of alcohol interlocks. Having explained their technical requirements, this chapter goes on to review the main uses of alcohol interlocks that are currently established in the EU Member States. **Chapter Four** engages the cost-benefit analysis of the alcohol interlocks, while **Chapter Five** draws final conclusions and makes recommendations.



## 2. DRINK-DRIVING AS A MAJOR ROAD SAFETY ISSUE

### KEY FINDINGS

- Drink-driving is one of the **principal factors** contributing to road accidents in the EU. It is estimated that **25 %** of road casualties each year (approximately 7 000) are a consequence of drink-driving, although a downward trend may be observed between 2001 and 2010. Research further estimates that **75 %** of alcohol-related fatalities that occur involve drivers who have a **Blood Alcohol Concentration (BAC) higher than 1.5 g/l**.
- Drivers aged 16 to 20 driving under the influence of alcohol are **three times more** likely to crash in comparison to experienced drivers (aged 30 or older). One of the main explanations for this is the mixed use of alcohol with other psychoactive substances (illegal and medicinal drugs).
- Drink-driving is also estimated to cause **approximately 2.5-3.3 %** of road accidents involving **commercial vehicles**, although data is usually reported to be sparse or not officially available. It is, however, worth noting that the distribution of road fatalities for this category of vehicles is more concentrated outside urban areas.
- There are **significant disparities** in the quantification of alcohol-related road fatalities at national level, mostly due to differing definitions of drink-driving, underreporting and varying levels of enforcement.

### 2.1. Overview of road safety patterns in the EU

#### 2.1.1. Most recent road safety developments in the EU

In 2012 an estimated 27 700 people died, and nearly 313 000 were seriously injured<sup>1</sup>, as a result of road accidents in the Member States.

Given the target of halving the total number of road deaths in the European Union (EU) between 2010 and 2020, statistics collected by the European Commission (EC) and released in March 2013 indicate a downward trend: there was a 9 % decrease in road deaths (equivalent to 2 661 deaths) between 2011 and 2012, compared with a reduction of just 2 % (equivalent to 763 deaths) between 2010 and 2011 (see Figure 1).

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<sup>1</sup> People kept in hospital as in-patients or injuries requiring medical treatment, regardless of whether or not the victim was kept in hospital. At present, serious injury is not defined in a uniform manner across the Member States.

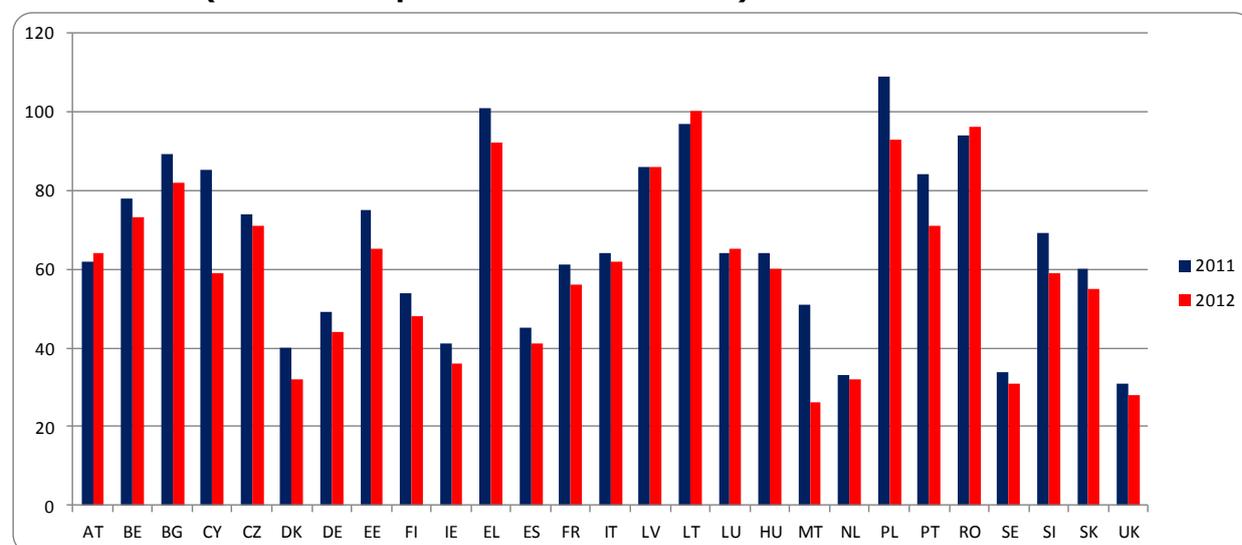
**Figure 1: Trend in road fatalities in the EU since 2001**



Source: CARE (EU road accidents database).

Figure 2 shows the difference in the number of fatalities per million inhabitants between 2011 and 2012. Malta and Cyprus recorded the sharpest decreases (-48% and -28% respectively), while there were also major reductions in Denmark (-20%), Poland and Portugal (both -15%). In contrast, the decreases are especially low in the Czech Republic (-4.5%), and the Netherlands (-1%), while a reverse trend was observed in Austria, Lithuania, Luxembourg and Romania, where the number of road deaths increased by 4%, 3%, 1% and 1%, respectively. Latvia is the only country where values have remained substantially unchanged. According to the European Transport Safety Council (ETSC), the 9% decrease in road deaths reported in the EU in 2012 brings the Member States back on track to reach the 2020 road safety target. Assuming constant progress, however, an average annual reduction of 6.7% will be necessary over the 2010-2020 period (ETSC, 2013a).

**Figure 2: Change in number of road deaths in the EU between 2011 and 2012 (in fatalities per million inhabitants)**



Note: Data for Croatia not included.

Source: Compiled by the authors on the basis of Eurostat figures, 2013.

### 2.1.2. Driving under the influence of alcohol

Narrowing the focus to the principal causes of road accidents, it is generally accepted that alcohol, together with speeding, drugs and unfastened seatbelts, is one of the main factors leading to fatalities.

The SafetyNet project (ETSC, 2013b) defines driving under the influence of alcohol as '*any death occurring as a result of road accident in which any active participant was found with blood alcohol level above the legal limit*'.

#### Box 1: Definition of BAC and major associated effects

Blood Alcohol Concentration (BAC, also termed Blood Alcohol Content) refers to the amount of alcohol contained in a person's blood, measured as weight per unit of volume. Typically this measurement is converted to a percentage such as 0.10%, which indicates that one-tenth of a percent of a person's blood is alcohol. Because alcohol in the blood travels directly to the brain, cognitive functioning is affected, resulting in increased risk of many kinds of injuries. Effects on the body and on cognitive performance are evident already with low BAC levels (0.1-0.5 g/l), while they become severe at 1.0-1.5 g/l and potentially lethal from 3.0 g/l upwards.

**Source:** Compiled by the authors on the basis of WHO (2007) and Lang, A. (1992).

As a considerable amount of research has increasingly illustrated, alcohol is a major risk factor for road accidents (WHO, 2012a), not only because drink-drivers are at much greater risk of being involved in a road accident when compared to drivers who have not consumed alcohol, but also because this risk increases exponentially as BAC levels rise (WHO, 2007)<sup>2</sup>.

Research has also demonstrated that even minor doses of alcohol can adversely affect a person's overall fitness to drive. In particular certain psychomotor skills as well as behavioural and cognitive capabilities, considered to be most important for driving, are impaired (Moskowitz and Fiorentino, 2000; Chamberlain and Solomon, 2002).

In general, all the functions that are important for the safe operation of a motor vehicle can be affected by alcohol levels well below the current legal limits in EU countries (WHO, 2007), as illustrated in Table 1 below.

**Table 1: Legal BAC limits in the EU-28 (g/l)**

MEMBER STATE	GENERAL POPULATION	COMMERCIAL DRIVERS	NOVICE DRIVERS
CZ, HU, RO, SK	0.0	0.0	0.0
SI	0.2	0.0	0.0
DE, HR, IT	0.5	0.0	0.0

<sup>2</sup> A number of studies (McLean and Holubowycz, 1980; Hurst et al, 1994; Crompton et al, 2002) have concluded that a driver with a BAC of 0.8 g/l has an injury risk rate 2.7 times higher than that of a sober driver (zero BAC), and that the risk may be up to 22 times higher where the driver has a BAC of 1.5g/l. These studies have also demonstrated that an increased BAC is associated not only with a higher risk of involvement in a collision, but also with crashes of greater severity (WHO, 2007).

MEMBER STATE	GENERAL POPULATION	COMMERCIAL DRIVERS	NOVICE DRIVERS
AT, LU	0.5	0.1	0.1
EE, PL, SE	0.2	0.2	0.2
LT	0.4	0.2	0.2
EL, IE, NL	0.5	0.2	0.2
ES	0.5	0.3	0.3
LV	0.5	0.5	0.2
BE, BG, CY, DK, FI, PT	0.5	0.5	0.5
FR	0.5	0.5 (*)	0.5
MT, UK	0.8	0.8	0.8

**Note:** (\*) 0.2 for bus drivers.

**Source:** Compiled by the authors.

In addition to its direct impact on collisions, alcohol also has an indirect impact on road safety, as it can either decrease motivation to comply with safety standards such as wearing seatbelt and driving speed, or result in an active search for dangerous situations (such as competitive behaviour and excessive speed).

It can also be argued that the effects of alcohol impairment are magnified when combined with fatigue. Alcohol is consequently considered to be a particular risk for commercial drivers, who spend long hours on the road and have a legal responsibility for the passengers or cargo they carry (ETSC, 2011).

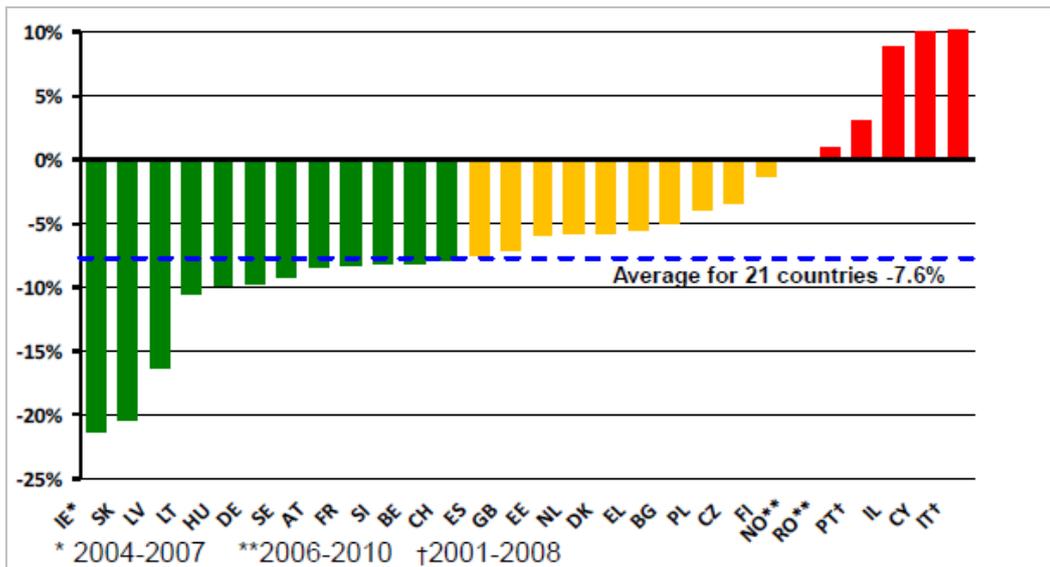
Lastly, as shown by the research conducted by the DRUID project (Driving under the Influence of Drugs, Alcohol and Medicines)<sup>3</sup> (2012), alcohol is considerably more prevalent among male drivers than female drivers. Specifically, the DRUID project found that the incidence of alcohol-positive drivers was highest in the oldest age groups studied (35-49 and ≥ 50). These findings applied to both male and female drivers. More generally, in the sample of seriously injured drivers alcohol was detected mostly in younger males, whereas in the sample of killed drivers it was also present in mature drivers.

## 2.2. Quantifying the problem of drink-driving

Although drink-driving is declining, with the number of alcohol-related traffic accidents having decreased on average by 7.6% across Europe between 2001 and 2010 as shown in Figure 3 below), with Ireland showing the most significant reduction (approximately -22%, but data is confined to the 2004-2007 period), it is still a statistically significant problem.

<sup>3</sup> The DRUID project has investigated the scourge of drink-driving and provided new insights into the degree of impairment caused and the actual impact on road safety.

**Figure 3: Average annual percentage change in number of alcohol-related road deaths (2001-2010)**



**Note:** "GB" refers to UK. The chart also includes the following non-EU Member States: Israel (IL), Norway (NO) and Switzerland (CH). Data for MT and HR were not available. **Source:** ETSC, 2013c.

The EC estimates that 25%<sup>4</sup> of all road fatalities across the Member States every year (approximately 7000) may be a consequence of driving under the influence of alcohol (ETSC, 2013b)<sup>5</sup>, while up to 2% of the total number of kilometres driven within the EU are associated with a BAC in excess of the legal limit (ETSC, 2013b). Recent research in this area (Mathijssen, 2012; Hels et al, 2011) estimates that 75% of alcohol-related fatalities occur where drivers have a BAC higher than 1.5 g/l<sup>6</sup>. These figures are supported by the stakeholders interviewed for this note (the Belgian Road Safety Institute-IBSR, ADV Consulting, the German Federal Highway Research Institute-BAST,).

**Box 2: Alcohol-related road deaths and commercial transport**

The figures are quite different as far as alcohol-related incidents involving professional drivers are concerned. The accident risk resulting from alcohol-impaired driving appears to be very low, and the responses received from the stakeholders consulted are consistent with the findings of epidemiological studies in this area (Gjerde et al, 2008; Vehmas et al, 2012; Isalberti et al, 2011). These studies confirm that data is usually reported to be sparse or not officially available.

<sup>4</sup> A similar view is shared by the World Health Organisation (WHO), which argues that in most high-income countries drink-driving is a major determinant of fatal crashes, with about 20% of fatally injured drivers presenting a BAC in excess of the legal limit (WHO, 2007). The WHO also estimates that the cost to EU countries arising from alcohol-related road fatalities corresponds to 2-3% of their Gross Domestic Product (GDP) (WHO, 2012b).

<sup>5</sup> For the EU, the lower estimate for the alcohol-related road toll is set at 19.1% of annual fatalities, with an upper estimate of 26.2%. On account of underreporting, however, the upper estimate is considered to be more likely to represent the actual proportion, thereby confirming the validity and reliability of the 25% estimate. This estimate is close to the proportion of people killed in alcohol-impaired driving crashes in other Western countries. For example, in the United States nearly 31% of all traffic-related deaths reported in 2010 were alcohol-related (NHTSA, 2012), while in Australia the proportion of killed drivers over the BAC limit increased from 24% to 28% between 2000 and 2008 (ATC, 2011). In Canada, it is estimated that the number of alcohol-related road fatalities hovers between 850 and 900 each year (TIRF, 2011).

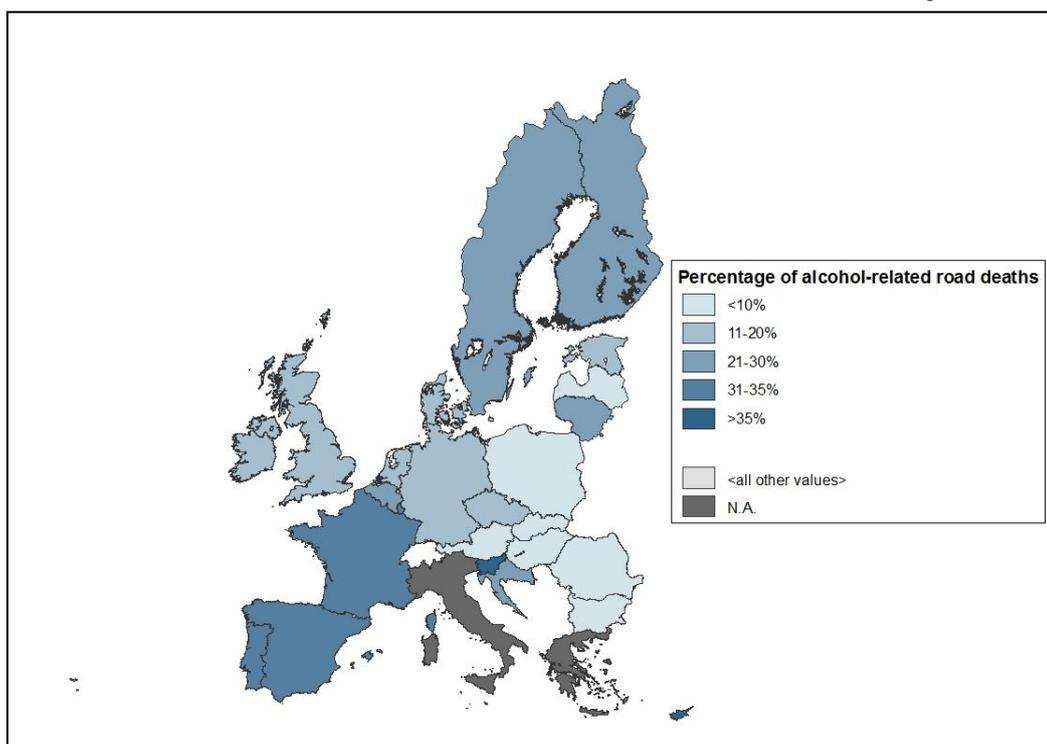
Evidence collected for three countries (Germany, the Netherlands and Finland) also confirms the estimates, with approximately 2.5-3.3% of road accidents involving commercial vehicles being alcohol-related.

Similar conclusions were reached in 2006 by the European Truck Accident Causation project (ETAC) managed by the International Road Transport Union (IRU), which conclude that truck accidents caused by drink-driving were considered to be responsible for a relatively low proportion (2.2%) of road accidents (IRU, 2006). This was confirmed in 2009 when separate enforcement campaigns, run by national police forces under the coordination of the European Traffic Police Network (TISPOL), focusing on drink-driving among heavy goods vehicles' drivers found that only 1 in 600 drivers was above the legal BAC limit (compared with 1 in 250 drivers in 2008) (ETSC, 2009).

In this respect it is, however, worth underlining that the importance of the suggested actions in Chapter 5 should consider this proportion ( $\approx 3\%$ ) of alcohol-related road victims involving commercial vehicles whilst also taking into account the distribution of road fatalities. For this category of vehicles, road fatalities are more concentrated outside urban areas - 74% of fatalities attributable to HGVs occur on non-urban roads while the majority of accidents and one-third of fatalities occur in urban areas due to the global volume of traffic (Pace, et al. 2012).

Further insight into the problem of drink-driving is provided by the latest edition of the WHO Global Status Report on Road Safety 2013. Figure 4 shows the proportion of road deaths associates with alcohol-impaired driving, which varies significantly between countries, ranging from 4% in Bulgaria to 43% in Cyprus. Details on the proportion of alcohol-related road fatalities in the Member States are provided at Annex B.1.

**Figure 4: Estimates of alcohol-related road deaths in the EU-28 (2010-2011)**



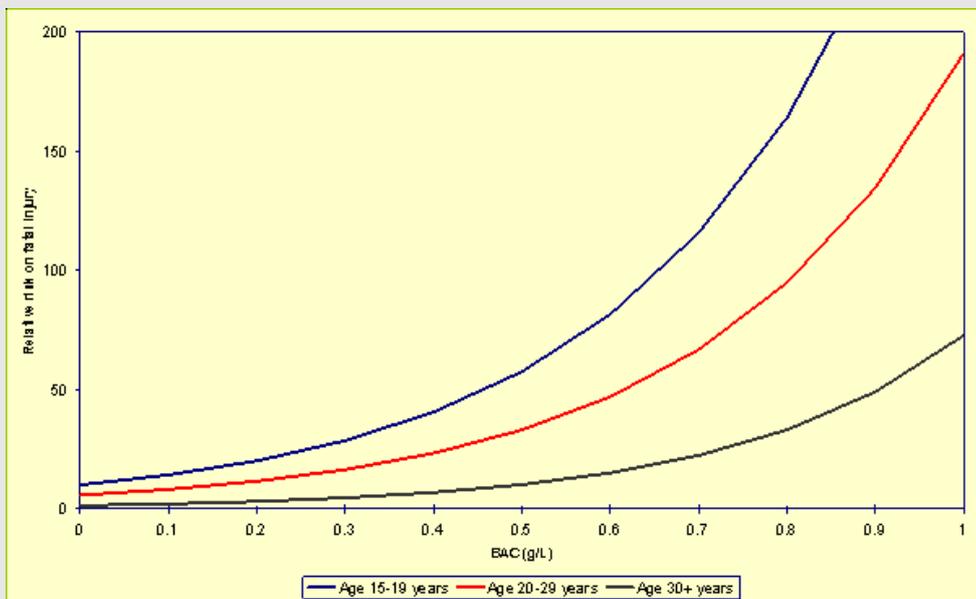
Source: WHO, 2013.

It therefore comes as no surprise that, as reported by *Eurobarometer*, a large majority of EU citizens consider driving under the influence of alcohol to be the major road safety problem in their respective countries so are of the opinion that this issue should receive more attention from national governments (*Eurobarometer*, 2010; see Annex B.2 for more details).

**Box 3: Drink-driving and young and novice drivers**

Youth is usually cited as one of the most important variables in relation to road traffic accident risk. One of the main explanations for this is the use of psychoactive substances (alcohol and illegal and medicinal drugs), which are known to be major risk factors for road accidents. Drivers aged 16 to 20 driving under the influence of alcohol are three times more likely to crash in comparison to experienced drivers (aged 30 or older).

Data on alcohol-related traffic accidents involving young and novice drivers are sparse and not always updated. However, according to the ETSC, alcohol-related road traffic accidents are the leading cause of death in the 16-25 age group. For example, recent statistics from the French Safety Agency show that alcohol is, in France, the cause of 26 % of all accidents involving drivers aged 18 to 26.



Source: Keall et al, 2004.

Source: WHO, 2007.

More problematic is the quantification at national level of the actual number of fatalities brought about by drink-driving. This is due primarily to the fact that there is not a standard definition of drink-driving adopted by all the Member States. Only 12 Member States<sup>7</sup> make reference to the definition recommended by the SafetyNet project; even these Member States still make some adjustments. As a result, the extent to which road users who have been involved in fatal collisions are BAC-tested varies considerably between countries<sup>8</sup>. In addition, underreporting of alcohol-related collisions and differing BAC limits (see Table 1) also make it difficult to compare national drink-driving statistics and trends.

<sup>7</sup> Austria, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Ireland, Poland, Portugal, Slovenia.

<sup>8</sup> As reported by the ETSC (ETSC, 2013b), in 2010 seven countries attributed fewer than 6 % of road fatalities to alcohol-impaired driving, while five countries attributed more than 30 % of road fatalities to this cause.

There are also differences across the Member States in enforcement measures such as roadside police checks, widely acknowledged as a principal deterrent to drink-driving. According to research, however, drivers generally have the perception that the chance of being caught and tested remains fairly small (SARTRE 3 project, 2004).

Data collected by the ETSC (ETSC, 2013c) in 13 Member States for the number of roadside checks performed by the police in 2010 – the latest available data - shows that Finland, Sweden, Cyprus, Slovenia and France took the strongest action against drink-drivers, checking 429, 287, 217, 198 and 173 drivers respectively per 1000 inhabitants in 2010<sup>9</sup>. In addition, Cyprus, Slovenia, France and Belgium had the highest proportion of drivers returning positive BAC tests, at 11.6%, 9.3%, 6% and 5%, respectively (a detailed breakdown of the number of police checks conducted in 2010 is provided at Annex B.3).

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<sup>9</sup> It should be noted that Belgium, Latvia, Lithuania, Slovakia and Romania only collect data on the number of checks in which drivers were found to have a BAC above the legal limit ('positive tests'), but not on the total number of police checks.

### 3. USE OF ALCOHOL INTERLOCKS TO TACKLE DRINK-DRIVING

#### KEY FINDINGS

- At present, **alcohol interlocks** are most commonly used in **North America, Europe and Australia**; it is estimated that **approximately 430 500** devices have been **installed worldwide**.
- When implementing alcohol interlocks, **three differentiated uses are possible**: a statutory use as part of a rehabilitation programme, a statutory preventive use, or a voluntary preventive use.
- Rehabilitation programmes are the **most significant and widespread field of application** for alcohol interlocks both inside and outside the EU. To date, in Europe **four Member States** (Belgium, Finland, the Netherlands and Sweden) have full-scale programmes established, while in two countries (Denmark and the United Kingdom) legislation has been adopted but not yet implemented. Instead, **pilot projects** have been carried out, or are currently on-going in Austria, Germany and Slovenia.
- **Finland** and **France** are the Member States providing the relevant examples of statutory use of alcohol interlocks for school and day-care transport.
- The voluntary introduction of alcohol interlocks by private commercial vehicle operators is seen as a **corporate responsibility measure**. This encourages its dissemination as seen in **Sweden** and **Finland**.
- Stakeholders interviewed **generally commented positively** about the effectiveness of alcohol interlocks. **Action at EU level** favours a higher degree of technical harmonization, while opinions differ as to whether the mandatory fitting of alcohol interlocks in commercial vehicles should be introduced. Some stakeholders argue a statutory preventive use could be introduced for vehicles operating **road safety-sensitive categories** of transport services.

#### 3.1. Alcohol interlocks as a tool to prevent drink-driving

A wide range of countermeasures have been introduced over the last decade in an attempt to tackle drink-driving. In spite of more traditional measures - introduction of legal BAC limits, random breath testing, licence suspension and public education efforts aimed at raising driver awareness of the risks of drink-driving - increased interest has been shown in the deployment of **alcohol interlocks**.

Alcohol interlocks (also known as “breath-alcohol ignition interlocks”) are devices that prevent a vehicle’s engine from being started unless the driver passes a breathalyser test. The driver must exhale into the mouthpiece attached to the handset. The device will then confirm whether or not the driver’s BAC level is below the pre-set legal limit.

Alcohol interlocks have been in use since the 1980s in North America (USA and Canada). Their deployment in Europe is more recent; with Sweden was the first EU country to introduce alcohol interlocks in 1999 (see Table 2 below).

**Table 2: History of alcohol interlocks in the EU**

<b>YEAR</b>	<b>KEY ADVANCES</b>
<b>1999</b>	First trial alcohol interlock programme adopted in Sweden for people convicted of driving while intoxicated and for commercial transport (until 2011)
<b>2004</b>	First experimental trials in Belgium (until 2006), France and the United Kingdom
<b>2005</b>	First experimental trial in Finland (until 2008)
<b>2006</b>	Legislation passed in the United Kingdom allowing courts to impose alcohol interlocks on drink-drivers
<b>2007</b>	Swedish strategy for use of alcohol interlocks
<b>2008</b>	Finland's alcohol interlock programme made permanent
<b>2009</b>	Legislation on alcohol interlock installation and monitoring in Belgium
<b>2010</b>	Use of alcohol interlocks in school buses made mandatory in France
	Adoption of legislation in Denmark introducing alcohol interlocks for first-time high-level offenders and recidivist drink-drivers
	First alcohol interlock trial in the Netherlands
<b>2011</b>	Permanent, full-scale alcohol interlock programme launched in the Netherlands
	Use of alcohol interlocks made mandatory in school and day care transport in Finland
	Alcohol interlock trial in Austria (until 2012) to evaluate acceptance of alcohol interlocks among professional drivers of heavy vehicles
	New two-year pilot project launched in Austria to evaluate feasibility of alcohol interlocks for repeat alcohol offenders
	Alcohol interlock project launched in Germany (until 2013)
<b>2012</b>	Sweden's alcohol interlock programme made permanent
<b>2013</b>	Reformulation of Ireland's national road safety policy to force repeat drink-driving offenders to install alcohol interlocks on board their vehicles

**Source:** Compiled by the authors.

At EU policy level, the Road Safety Action Programme (RSAP) 2003-2010 (EC, 2003) recommended that the possibility of using these driver-impairment detection devices, as part of the range of measures applicable to drink-driving offenders, be examined. The rationale for such action was achieving the overall road safety target of reducing by half the number of road fatalities by 2020 and supporting Member States in their health policy efforts to reduce alcohol-related harm, as specified in the 2006 EU alcohol strategy (EC, 2006).

#### **Box 4: Stakeholders' comments on the role of alcohol interlocks**

In general, all stakeholders consulted commented positively on the role of alcohol interlocks in tackling drink-driving, in particular as a means to suspend sentence and driving license revocation on probation. In this respect, feedback from the Belgian Road Safety Institute (IBSR) and from ERTICO – Europe's Intelligent Transportation organisation - reveals that the convincing results identified by international research and evaluation studies in the use of alcohol interlocks have represented the main evidence-informed basis that has encouraged EU countries to introduce them.

However, as highlighted by the European Association of Automobiles Manufactures (ACEA), alcohol is not solely a road safety issue, but first and foremost a public health policy issue. Therefore, integration with other programmes should be emphasised at the end of an alcohol interlock programme, where educational and rehabilitation follow-up measures could be established to consolidate the positive effects of using alcohol interlocks. In this respect, the Belgian IBSR reports that in Belgium rehabilitation courses are an essential component of the national alcohol interlock programme with the purpose of preventing a relapse post-interlock removal.

The case for the possible introduction of alcohol interlocks was also explored in the Action plan for the deployment of Intelligent Transport Systems (ITS) in Europe (EC, 2008a). Alcohol interlocks were listed among the driver assistance systems that could be employed to improve road safety, one of the six priority areas for action<sup>10</sup> to be identified. Alcohol interlocks were not included in the ITS Directive (2010/40/EU) but, in 2010, the EC showed renewed interest in alcohol interlock deployment on a large scale when it adopted the new policy orientations on road safety for 2011-2020 (EC, 2010)<sup>11</sup>.

As far as enforcement is concerned, the EC has undertaken to examine the extent to which legislative measures may be appropriate with a view to making it mandatory to install alcohol interlocks in certain types of passenger or goods vehicle or as part of rehabilitation programmes for drink-driving offenders.

More recently, the European Parliament (EP) has also taken action in relation to alcohol interlocks by adopting a resolution (EP, 2011)<sup>12</sup> in which it:

- recommended the compulsory fitting of alcohol interlocks (with a small, scientifically based range of tolerance for measurement) to all new commercial passenger and goods transport vehicles;
- recommended, as a rehabilitation measure, fitting alcohol interlocks to the vehicles of road users who already have more than one drink-driving conviction; and
- asked the EC to initiate by 2013 a legislative proposal for a directive requiring the fitting of alcohol interlocks, including the relevant specifications for their technical implementation<sup>13</sup>.

<sup>10</sup> The Action Plan identifies six priority areas for action: Optimal use of road, traffic and travel data, Continuity of traffic and freight management ITS services on European transport corridors and in conurbations, Road safety and security, Integration of the vehicle into the transport infrastructure, Data security and protection, and liability issues, European ITS cooperation and coordination.

<sup>11</sup> A debate is currently under way about the nature of this device which, according to ACEA and ERTICO, would not strictly speaking be an ITS instrument. No lead has been taken in this respect as yet.

<sup>12</sup> European Parliament resolution of 27 September 2011 on European road safety 2011-2020 P7\_TA(2011)0408, OJ C 56 E, 26.2.2013, p. 54, points 36 and 73.

### 3.2. Technical features of alcohol interlocks

Alcohol interlocks are automatic monitoring devices that are connected to a vehicle's ignition circuit. They are designed to prevent driving where the consumption of alcoholic substances exceeds a pre-set BAC level. To switch on the engine, the driver must first blow into a breathalyser before he/she can start the ignition, provided the BAC level is below the set level.

As shown in Figure 5, an alcohol interlock device consists of two main interlinked components:

- the **handset**, which contains the breath-alcohol measuring system, is kept in the passenger compartment and is designed to fit easily into a person's hand, and
- the **control box**, which is usually mounted under the dashboard, allows the engine to start and data to be stored. A data logger is also embedded within the control box, serving to store all relevant events recorded by the device, such as breath test results, date and time, whether the driver submitted a breath sample or refused to do so, alcohol concentration, engine start and stop times, electrical bypassing of the alcohol interlock and any other attempt to tamper with the device or start the vehicle without using the ignition switch.

Following a short warm-up period<sup>14</sup>, the driver must blow into a mouthpiece attached to the handset; if the BAC value is validated as being below the pre-set limit, the engine can be started. If the driver does not provide a breath sample or the BAC value is in excess of the pre-set limit, the control box issues a warning and enters a short lock-out period.

The lock-out period lasts a few minutes for the first failed BAC test, and longer for any subsequent failed test. This allows the alcohol to dissipate from the mouth and gives the driver a chance to think about the reason for the failed test. The control box then activates an alarm until an acceptable breath sample is provided.

The alcohol interlock never stops the vehicle's engine while it is running. However, the device is programmed to require a retest at random intervals<sup>15</sup>. The driver usually has 10 minutes to find a safe location to stop and provide another breath sample. If this test detects a BAC value higher than the pre-set limit, an alarm will sound and the driver is instructed to park the vehicle and turn off the engine.

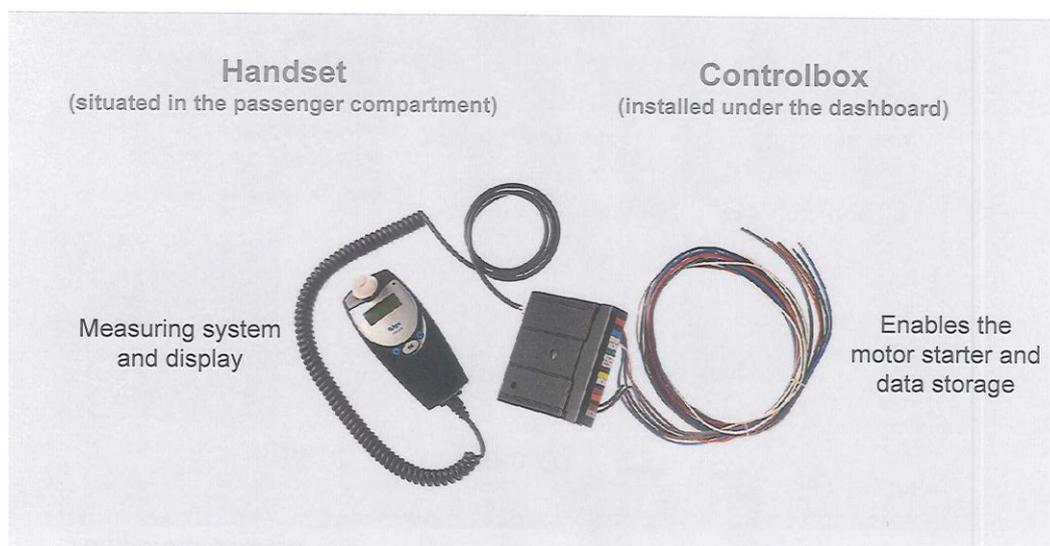
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<sup>13</sup> A study on the prevention of drink-driving through the use of alcohol interlocks was commissioned by the European Commission, DG Mobility and Transport (DG MOVE) in 2013. It was intended to provide relevant information to decide whether or not to propose EU legislation requiring the installation of alcohol interlocks as a means to prevent drink-driving.

<sup>14</sup> Warm-up times vary according to the external temperature ( $\geq 20$  °C: 10 seconds; 0 °C: 50 seconds; -20 °C: 2 minutes; -40 °C: 3 minutes (Dräger, 2013)).

<sup>15</sup> A running retest reduces the likelihood of an "alcohol-free" bystander providing the breath test that allows the vehicle to start, and detects drivers whose BACs rise once the vehicle is in motion. If a driver fails to provide a running retest or registers a BAC in excess of the pre-set limit, the device will give an auditory or visual warning or activate an alarm, alerting the authorities (NHTSA, 2009).

**Figure 5: Main components of an alcohol interlock**



Source: Dräger Safety, 2013.

In Europe, alcohol interlocks must comply with standards established under Directive 72/245/EC on electromagnetic compatibility<sup>16</sup>, which lays down criteria for the installation of electrical devices on motor vehicles. Specific requirements for alcohol interlocks in Europe are set out by the European Committee for Electrotechnical Standardisation (CENELEC); two European Standards - EN 50436-1 and EN 50436-2 - stipulate testing methods and performance requirements for interlocks including:

- complete detection of breath samples not delivered directly by the driver, for example manipulation through injection of pressurised artificial air, use of a tube cooled down to -10 °C or a water bottle;
- recording of all events in a data memory within the control unit;
- random retests after the initial test.

European Standard EN 50436-6, which specifies data security requirements, is equally important. Its main features are summarised as follows (ACS-Corp, 2013):

- the alcohol interlock must be able to detect and store events (such as starting the vehicle engine or a failed breath test);
- authorised service technicians must be able to use the device to read the records of events and send them on;
- all parts of the alcohol interlock must protect the record of events from unauthorised modification, deletion, insertion and disclosure.

Standards can then be tailored at national level in accordance with national regulations relating to: (i) the minimum air volume to be blown into the breathalyser, (ii) the BAC limit, (iii) the free start period, (iv) the possibility of retesting (while the vehicle is in use), and even (iv) the data security and protection profile. Annex B.4 contains a summary of the

<sup>16</sup> Directive 72/245/EEC of 20 June 1972 on the approximation of the laws of the Member States relating to the suppression of radio interference produced by spark-ignition engines fitted to motor vehicles.

main specifications for alcohol interlocks, either as part of an offender rehabilitation programme or for general preventive use.

**Box 5: Stakeholders' perspective on technological developments of alcohol interlocks**

Stakeholders are in agreement that **technological developments** have an important role to play in parallel with the development of automotive industry safety applications. The Swedish Road Transport Administration (SRA) and the Swedish Transport Agency (STA) consider that current alcohol interlocks working with a fuel cell-based technology are of a high quality. In the future through, alcohol interlocks will need to operate as a passive safety solution so that, for example, they are integrated into all new vehicles so can provide a less intrusive method to meet the demands for continuous monitoring of a driver's sobriety. Similarly, a retrofitted user-friendly, non-intrusive solution is also required. The Swedish STA proposes that integrated solutions (possibly supported by free calibration or maintenance) would more likely to have a higher acceptance for mass-implementation.

The Swedish STA, Belgian IBSR and the German BAST argue that this is the area that the **EU is likely to have a role** in promoting a higher degree of harmonisation, of both functional specifications and type approval requirements for alcohol interlocks, as well as on the unification of the restriction codes on drivers' licences.

### 3.3. Deployment of alcohol interlocks

There are **three different options** for the use of alcohol interlocks (Dräger, 2013):

- a statutory use as part of a rehabilitation programme for certain categories of drink-drivers (hard-core drink-drivers, recidivists and first-time offending drink-drivers);
- a statutory preventive use, or
- a voluntary preventive use.

The installation of alcohol interlocks following, or as an alternative to, driving licence suspension prescribed by legislation represents the most important and extensive field of application for these devices. Where drink-drivers have been stopped on the road, installation is ordered by a court or an authority as part of a rehabilitation programme under a probation order. Such orders have been applied in Sweden, Finland, Belgium and the Netherlands.

**The details of rehabilitation programmes vary across countries and legislative jurisdictions**, although they **commonly share a number of key characteristics** (Elder et al, 2011):

- they apply to offenders with a high risk of recidivism, either on account of multiple offences or because they are first-time offenders with a BAC level above 0.15 g/l;
- they are offered as an alternative allowing the duration of licence suspension to be reduced;

- they require the installation of an alcohol interlock for a period of 5 to 36 months (an average of 7.5 months for first-time offenders and 18 months for repeat offenders);
- they consist of: (i) a legal framework, (ii) installation centres to install the devices and issue quality certificates, (iii) procedures for installing, calibrating and removing the devices, and (iv) reporting, monitoring and evaluation processes.

Once the period during which an alcohol interlock must be installed in a driver's vehicle has expired, the device is removed and the driver's normal licence reinstated. It is, however, possible for the driver to keep the alcohol interlock in the vehicle, with voluntary use settings.

**Box 6: Integrity and confidentiality of alcohol interlock data**

There are obvious challenges associated with data collection on account of privacy issues; The first being the protection of personal data, where integrity and confidentiality must be ensured.

The Dutch Privacy Act provides an example of best practice in this respect, where access to personal data is regulated and requires government supervision. Vendors of alcohol interlocks are approved only if they meet the requirements relating to data processing and transfer. The Dutch National Road Traffic Agency (RDW) oversees the certification of manufacturers/installers and supervises their compliance with national requirements and with the CENELEC standard EN-50436-6 (TIRF, 2011).

In Sweden, vendors are required to sign agreements with the Swedish STA with regard to the data transmission systems (Technology Agreement) and the processing of personal data (Privacy Notice Agreement).

The second field of application concerns the **statutory installation** of alcohol interlocks for certain categories of commercial vehicles as a preventive measure. This mandatory installation involves bus or taxi services taking children to or from school or carrying people with specific mobility needs, such as the elderly or disabled (also referred to as 'day care transport'). this has been done in Finland and France.

The third and final field of application embraces the **preventive installation on a voluntary basis**, which usually involves the transport industry and vehicles carrying hazardous goods and commercial trucks or vehicles engaged in passenger transportation (buses, coaches and taxis). Acting in this way, commercial transport companies wish:

- to project a positive company message;
- to demonstrate a high-level of commitment to road safety, and therefore
- to emphasise the superior quality of the transport services they provide in comparison to their competitors.

This application is used in Sweden, Finland, Germany and the United Kingdom.

### 3.4. Current implementation of alcohol interlock programmes

The use of alcohol interlocks to prevent drink-driving has expanded rapidly in recent years (Kaisdotter Andersson et al, 2011). There is growing agreement that alcohol interlocks can be an element of a road safety strategy to deal with alcohol-impaired drivers, as it can be assumed that help to eliminate a significant proportion of drink-driving where they are installed in the vehicles of convicted drivers (Chamberlain and Salomon, 2012; Assum, 2010). However, a number of studies also show that once the alcohol interlock has been removed from the vehicle, drivers typically return to their drink-driving habit (Radun et al, 2013).

**Table 3: Number of alcohol interlocks currently deployed in Europe and worldwide**

COUNTRY	NO OF ALCOHOL INTERLOCKS INSTALLED
EU Member States	110 000
Sweden	80 000
Finland	13 000
France	10 000
Netherlands	5 000
Rest of EU <sup>(*)</sup>	2 000
Norway	5 000
Australia	8 000
Canada	27 500
United States of America	280 000
<b>OVERALL TOTAL</b>	<b>430 500</b>

(\*) Global, non-disaggregated data for the rest of Europe were provided by Dräger Safety. It may be assumed that these alcohol interlocks are being used in pilot trials and/or by transport companies on a voluntary basis.

(\*\*): NHTSA, 2013.

**Source:** Compiled by the authors on the basis of personal communication from Dräger Safety combined with literature review. Data for Sweden, Norway and the Netherlands are based on questionnaire responses.

Approximately 430 500<sup>17</sup> alcohol interlock devices have now been installed worldwide, although their deployment is largely confined to North America (the USA and Canada), Europe and Australia. The USA accounts for most of the devices installed (280 000 units), followed by EU Member States (approximately 110 000 units), followed by Australia (8 000 units).

<sup>17</sup> In its response to the stakeholder survey, Germany's DEKRA reported that alcohol interlocks had also been installed in Japan, New Zealand and Malaysia. No quantitative information was provided, but it may be assumed that the number of devices installed is relatively small.

The reason for their predominance in North America is chiefly historical: the USA and Canada started investigating and implementing alcohol interlock programmes back in the 1980s. As far as Europe is concerned, the figures collected for the number of alcohol interlocks currently in use clearly show the Nordic countries are leading the field (first, Sweden and second Finland), with considerably lower numbers deployed in France and the Netherlands.

**Table 4: National legislative frameworks for alcohol interlocks in the Member States**

MEMBER STATE	LEGISLATION			REHABILITATION SCHEME (PRIVATE DRIVERS)	LEGALLY MANDATED PREVENTIVE USE (COMMERCIAL VEHICLES)	VOLUNTARY PREVENTIVE USE (COMMERCIAL VEHICLES)
	PILOT	IN PREPARATION	ADOPTED			
AT	✓					
BE			✓	✓		
DE	✓					✓
DK			✓ (not yet implemented)			
FI			✓	✓ (trial 2005-2008; full-scale implementation since 2008)	✓ (school and day-care transport) (*)	✓
FR			✓		✓ (school transport)	
IE		✓				
NL			✓	✓ (trial in 2010; full-scale implementation since 2011)		
SE			✓	✓ (trial 1999-2011; full-scale implementation since 2012)	✓ (**)	✓
SI	✓					
UK			✓ (not yet implemented)			✓

**The other Member States have neither legislated nor started pilot projects with a view to introducing alcohol interlocks as a countermeasure against drink-driving.**

(\*) Day-care transport includes the transportation of children, the elderly and disabled people.

(\*\*) A general framework for legally mandating the use of alcohol interlocks is not in place but local authorities can insist that vehicles are fitted with these devices when purchasing particular types of transports, such as school transport.

**Source:** Compiled by the authors, based on TRAFI, 2012 and ETSC, 2013d and updated with stakeholders' responses.

### 3.4.1. Rehabilitation programmes in EU Member States

Regulatory frameworks for the use of alcohol interlocks as part of rehabilitation programmes have been adopted in six Member States (Belgium, Denmark, Finland, France, the Netherlands, Sweden and the United Kingdom) and implemented in all with the exception of Denmark and the United Kingdom.

**Sweden** is the Member State with the longest standing alcohol interlock offender programme, having been operational since the first national alcohol interlock demonstration trial in 1999. Building on the strategic policy agenda adopted in 2007 to further enhance and improve the use of alcohol interlocks the programme became permanent in 2012, the objective being to involve a higher percentage of offenders than the preceding trial. Equally important, the alcohol interlock programme is a part of, and directly linked to, the broader “Zero-Vision” strategy which sets a national target of 99.9% of sober drivers by 2020. There is close cooperation with health care authorities for rehabilitation and prevention purposes.

According to current legislation, the programme targets high-level offenders and recidivists and permits the installation of alcohol interlocks as an alternative to revoking their driving licences. The purpose of the rehabilitation programme is twofold: firstly to encourage drivers to abstain from alcohol during the programme and secondly to adopt a sober way of life which is necessary in order to obtain normal BAC values in the medical examinations and blood tests conducted during the second year of the programme.

The programme period varies according to how much the tested BAC level is above the legal limit:

- one year for drivers convicted of drink-driving with a BAC level between 0.2-0.9 g/l;
- two years for convicted repeated drink-driving offenders, persons convicted for drink driving with a BAC level higher than 0.1 g/l, and persons convicted for drink driving who have an alcohol abuse or dependency diagnosis.
- Another year can be added to the programme period to anyone who is diagnosed as being alcohol abuse dependent during the one year period.

Participants are required to bear all the costs incurred - application fee, medical certificate, hiring or purchasing the alcohol interlock, intermediate medical examinations, alcohol interlock driving licence – which amount to approximately SEK 50 000 (EUR 6 000) per participant.

**Finland** also has a full-scale permanent alcohol interlock offender programmes in force (since 2008) as well as specific legislation making the use of alcohol interlocks compulsory for specified day-care commercial passenger services.

Following immediately after a three year pilot trial, a full implementation of the alcohol interlock programme commenced in July 2008. A total of 1 687 convicted drivers entered the programme between 2008 and 2012 (TRAFI, 2012).

Finland’s alcohol interlock programme is part of 2011-2020 national strategy for road safety which targets people found guilty of driving while intoxicated, offering them the option of alcohol interlock controlled driving rights instead of a driving ban. The duration of

the programme lasts from one to three years and drivers can once a programme comes to an end, request that the device remains in their vehicle on a voluntary basis<sup>18</sup>.

In the **Netherlands**, alcohol interlocks are regarded as a key component of the overall Alcohol Road Safety Policy being implemented by the Dutch Government until 2020. The introduction of rehabilitation programmes based on their use was motivated by the need to strengthen the effectiveness of traditional measures to reduce drink-driving which, despite all efforts made, only slightly reduced the proportion of alcohol-related road casualties between 2002 and 2010 (SWOV, 2011), while the recidivism rate continued to be significant (13 % in 2009)

A pilot trial set up in 2010 in the region of Fryslan involving, approximately 80 drivers selected from 1100 volunteers, was followed by a full-scale permanent alcohol interlock offender programme in December 2011. The programme is mandatory for first offenders with a BAC higher than 1.3 g/l, novice drivers with a BAC higher than 1.0 g/l and recidivists (Jongman, 2013).

The duration is set at two years, although this may be extended for drivers who continue to drink and drive during the programme. In the event of non-participation, the driver's licence is revoked for five years. Participation costs (approximately EUR 4000, including rental of the alcohol interlock) are borne entirely by the participants who are also required to download their use data every six weeks.

In **Belgium**, after an initial pilot trial from 2004 to 2006, the alcohol interlock programme was introduced in 2009, although its practical implementation only started in 2013 (IBSR, 2013; Silverans, 2013). The programme, which can last up to five years, is available as one of several sanctions that judges can apply in order to prevent further recidivism. It is envisaged that it will be awarded to those convicted of drink-driving with a BAC level above 0.8 g/l, driving whilst impaired by alcohol or repeat offences involving driving under the influence of alcohol (Heeren, 2013). If convicted drivers fail to comply with the programme conditions, they may have their licence withdrawn or be sent to prison. It is worth noting that, in Belgium, rehabilitation courses are an essential part of the national alcohol interlock programme with the aim to prevent reoffending once the interlock has been removed.

Legislation introducing an alcohol interlock rehabilitation programme for first time high-level offenders and recidivist drink-drivers was also passed in 2010 in **Denmark**. However, the rules have not yet come into force and the alcohol interlock programme has yet to start.

Similarly, in the **United Kingdom** a trial targeting drink-drivers was carried out in 2004, and in 2006 a legislative act allowing courts to impose alcohol interlocks on drink-drivers was promulgated, although this has not yet been followed up by practical implementation.

On a lower degree of implementation, three Member States (Austria, Germany and Slovenia) have conducted, or are currently conducting, pilot projects to evaluate the feasibility and applicability of alcohol interlocks.

- In **Austria** the **Austrian Road Safety Board** (*Kuratorium für Versicherung, KfV*) conducted a pilot project aimed at evaluating the potential level of acceptance of

<sup>18</sup> According to the Finnish authority, approximately 30% of participating drivers are reported to have kept the device in their vehicle after the end of the programme (Pylväs, 2013).

alcohol interlocks among professional drivers and commercial transport companies from 2011 to 2012. In view of the relatively positive results, it was recommended that it be made mandatory to install such devices on board vehicles used in professional transport activities requiring a high level of driving responsibility (Kaltenegger and Oburger, 2012).

- A second two-year pilot project is currently under way to evaluate the feasibility of using alcohol interlocks for repeat alcohol offenders. Participation is voluntary, with alcohol interlocks being installed in private cars for 12 months. The project's conclusions will support analysis of necessary changes to the current regulatory framework, along with an assessment of the level of acceptance among health workers and offenders (Kaltenegger and Oburger, 2012; TIRF, 2011).
- In **Germany**, a three-year pilot project assessing the full-scale applicability of alcohol interlocks as part of a comprehensive road safety programme was launched in July 2011 by the Federal Highway Research Institute (BAST). Its purpose is to examine the possibility of setting up a comprehensive road safety programme specifically targeting drink-driving, in which alcohol interlocks would be viewed not only as a means of facilitating the psychological rehabilitation of drink-driving offenders, but also as a preventive measure to combat the problem of drink-driving, particularly among novice or young drivers.
- A pilot alcohol interlock programme is also currently under way in **Slovenia**. It is expected that, in the future, alcohol interlocks will probably be part of the rehabilitation programme for people convicted of driving while intoxicated (TRAFI, 2013).

Lastly, it is also of interest to highlight that in 2013, **Ireland** reformulated its national road safety strategy to force repeat drink-driving offenders to install alcohol interlocks on board their vehicles.

### 3.4.2. Statutory preventive use in EU Member States

In **Finland**, the Act on the Use of Alcohol Interlocks in School and Day-Care Transport was adopted in August 2011 (Act 1110/2010, Decree 405/2011). The act legislates that all vehicles operated by a public institution (e.g. a municipality or a school) or by a publicly supported organisation (e.g. a federation or a chartered transport institute) that are used to transport children (in pre-primary, primary or secondary education) or are involved in day-care transportation must be equipped with alcohol interlock devices. It is also worth noting that a debate is currently underway regarding the possibility to extend the introduction of alcohol interlocks in all publicly funded transport services by statute. Lastly, particular attention is paid to the importance of carefully protecting and processing personal data of professional drivers using alcohol interlocks (TRAFI, 2012).

A similar approach has been adopted by **France**, where the use of alcohol interlocks on board commercial vehicles providing school transport services has been compulsory since January 2010.

Finally, in **Sweden**, although a general framework for statutory use of alcohol interlocks is not in place, local authorities are entitled to require that vehicles are fitted with these devices when purchased for different types of transports such as school transport.

### 3.4.4. Voluntary preventive use in EU Member States

Alcohol interlocks are also used on a voluntary basis as a preventive mechanism in commercial vehicles in Sweden, Finland and Germany. In this respect, they are viewed as a tool of quality assurance and their installation is often seen as a measure that can guarantee employees' safety and improve a company's corporate social responsibility profile.

In **Sweden**, the discretionary use of alcohol interlocks in the commercial transport sector (both freight and passenger segments) is quite wide and publicly well accepted. Companies report positive feedback from customers and passengers about a general feeling of increased safety and improved quality of the services provided. Estimates provided by STA also show that almost 70 % of all taxis have already installed alcohol interlocks, while nearly 90 % of all buses driving for The Swedish Public Transport Association are fitted with these devices.

In **Finland**, the use of alcohol interlocks is also voluntary in the commercial road transport sector. However, since 2012, Finnish authorities have been discussing measures to increase the voluntary use of alcohol interlocks such as drafting legislation to make the use of alcohol interlocks obligatory in all transportation that requires professional qualifications. It is also proposed that transport services chartered by the government and municipalities should use alcohol interlocks.

Although alcohol interlocks are used as a preventive countermeasure in the commercial transport sector in **Germany**, the number of companies having recourse to such devices is reported to be small. The possibility of making their use mandatory by law has raised criticism because of their weak **benefit-cost** ratio.

#### **Box 7: Stakeholders' opinion on the use of alcohol interlocks in the commercial transport sector**

When considering the commercial transport sector, the Swedish STA and SRA agree that **current evidence** based on voluntarily installations shows that alcohol interlocks can have a positive effect on a company's sustainability and social corporate image, and that (voluntary) installations should be encouraged and incentives aimed at reducing their cost. Stakeholders also stress the importance of alcohol interlock in vehicles that operate child and day-care transport, as occurs in Finland and France.

**Opinions differ** about the mandatory fitting of alcohol interlocks in commercial vehicles. According to ACEA the mandatory installation should remain voluntary, given the low number of accidents where professional drivers are involved. A similar perspective is shared by the IRU, which advocates that the cost of alcohol interlock technology makes their compulsory use for commercial users problematic.

Conversely, ERTICO, ETSC and the German BAST<sup>19</sup> argue that, primarily because of the increased severity resulting from alcohol-related road accidents in which they are involved, commercial vehicles such as passenger and dangerous goods vehicles should have to be fitted with alcohol interlocks.

<sup>19</sup> Personal opinion of the respondent.

In particular, there should be harmonisation of functional specifications for alcohol interlock devices, cross-border enforcement, restriction-codes on drivers' licenses and the technical requirements for retrofitting devices, together with the development of a common code for alcohol interlocks for all European driving licences, the principal areas where the EU could take legislative action.

Finally, it is also worth noting the opinion provided by the Swedish STA, which argues that the technical development of more unobtrusive and user friendly systems rather than legislation will be key to any future deployment of alcohol interlocks. In their view, it is important that the vehicle manufacturers of today make a start in defining solutions for sobriety as one of the main features that will remove drink driving as a cause of road traffic accidents.

### 3.4.5. Programmes outside EU: Norway, USA, Canada and Australia

Outside the EU, alcohol interlocks are primarily used as part of rehabilitation programmes.

In **Norway**, a national alcohol interlock working group investigated the feasibility of adopting new legislation, in 2011, to introduce the use of this countermeasure as an alternative to driving licence suspension, as part of the general drink-driving prevention programme currently in force in the country. In its conclusions published in 2012, the working group recommended that alcohol interlocks be used to target high-risk drink-drivers and recidivists and that they should undergo a medical examination every six months whilst they participate in the programme. During the final year of participation, medical examinations would be required every three months. Participants would regain their normal driving licence at the end of the programme, once they had met all the standard requirements for a driving licence and had had their sobriety confirmed by a medical examination. The voluntary use of alcohol interlocks in commercial transport has also increased in Norway, and there is growing interest in introducing these devices for school transport as well.

In the **USA**, the first alcohol interlock scheme was established in the State of California, then quickly emulated by other states. To date **more than half of all US jurisdictions** require some drink-driving offenders to install alcohol interlocks in their vehicles in order to drive during licence suspension, and/or require interlocks for specified time periods before full relicensing.

In **Canada**, the installation and use of alcohol interlocks is governed by the federal Criminal Code, which sets out specific rules allowing a driving ban to be reduced if a convicted driver agrees to take part in an alcohol interlock programme, usually delivered through a driver licensing agency. Historically, the Province of Alberta was the first jurisdiction to introduce an alcohol interlock programme in 1990 (Beirness et al, 1997; Voas et al, 1999). Over the last decade there has been a significant increase in such programmes, which are now applied in all Canadian provinces<sup>20</sup> and in one territory (Yukon).

Lastly, in **Australia**, the use of alcohol interlock schemes was first introduced in South Australia in 2001 following a court-based implementation trial that commenced in 1998

<sup>20</sup> Alberta, British Columbia, Manitoba, New Brunswick, Newfoundland and Labrador, Nova Scotia, Ontario, Prince Edward Island, Quebec and Saskatchewan.

(Shanks, 2009). Since then the 2009-2010 Road Safety Action Plan recommended stepping up the use of alcohol interlock schemes. At present, alcohol interlock programmes are in operation in five Australian states: South Australia, New South Wales, Victoria <sup>21</sup>, Queensland and the Northern Territory. An interlock trial has recently been implemented in Tasmania, while discussions are still in progress in Western Australia (TIRF, 2010).

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<sup>21</sup> Victoria's current system is based on a multi-pronged approach which aims to separate drinking from driving, while also tackling the underlying behavioural component. As well as being targeted with court and administrative sanctions, drink-drivers have to attend a Drink-Driver Education Program involving harm minimisation, relapse prevention, social skills training, cognitive-behavioural therapy, detoxification and pharmacotherapy.



## 4. EFFECTIVENESS OF ALCOHOL INTERLOCKS IN PREVENTING ALCOHOL-IMPAIRED DRIVING

### KEY FINDINGS

- While in use, alcohol interlocks can be an **effective tool in reducing drink-driving and tackling recidivism**. In particular, the average reduction in recidivism rates is estimated at **between 64 % to 70 %**, although **lasting benefits** can be achieved only if the use of alcohol interlocks is part of an **effective follow-up programme linked to educational measures**.
- **Costs** for participating in an alcohol interlock rehabilitation programme are **twofold**: purchase or rent of the device (typically around EUR 2 000, not including calibration and maintenance costs) and enrolment to the programme (on average EUR 2 500 per year). Because these are borne by eligible participants, the **high level of these costs** is reported to be the factor that can most negatively affect participation rates.
- The simplified **cost-benefit** analysis demonstrates a **benefit-cost ratio of 1.9 for a rehabilitation programme** and estimates that the minimum acceptability threshold can be reached even if the device's effectiveness is halved.
- Results also show that a general, EU-28 application of alcohol interlock programmes targeting hard-core drink-drivers could contribute to **7.3 % (approximately 1 100 lives saved)** towards the total reduction by 2020 of road fatalities as set by the EU road safety target.
- As far as **prevention programmes for buses and coaches and HGVs** are concerned, the ratios are equal or close to the break-even point, at **1.0 and 0.9 respectively**, although it has been suggested that a sensible reduction in the price of the device is likely to increase the **benefit-cost** ratios.
- Results demonstrate that the compulsory fitting of alcohol interlocks in all commercial vehicles (HGVs, LGVs and passenger vehicles) could contribute up to **1.3 % (approximately 200 lives saved)** to the total reduction, by 2020, of road fatalities as set by the EU road safety target.

### 4.1. Introduction

The examples described in the previous sections have consistently highlighted a significant expectation that the deployment of alcohol interlocks is an effective tool in reducing the incidence of drinking under the influence of alcohol and tackling recidivism among convicted drivers.

This expectation is supported, to a certain extent, by the findings of various studies, which appear to confirm the effectiveness of alcohol interlocks in reducing re-arrest rates where they are installed on board offenders' vehicles.

However, there is evidence that these devices have a positive effect among alcohol offenders following removal only if they are installed as part of an effective follow-up programme linked to educational measures.

Social acceptance, in particular, is a key factor in the successful implementation of alcohol interlock programmes, and is dependent on the degree of awareness among policymakers, practitioners and the general public regarding the use and effectiveness of alcohol interlocks.

Similarly, compliance with programme rules should be guaranteed through frequent monitoring (including regular medical checks), while the programme's duration should be flexible and should reflect monitoring results.

## **4.2. Main features of alcohol interlock rehabilitation programmes**

### **4.2.1. Costs**

The costs borne by eligible driving offenders for participation in alcohol interlock rehabilitation programmes are quite high and are usually reported as the factor that can most negatively influence participation rates. This last point is corroborated by responses provided by the Swedish STA and the Belgian IBSR for the consultation. From their perspective, costs are relatively high; therefore, a reduction (for example through options such as larger production volumes, tax or insurance benefits) would support a wider acceptance. On the contrary, their mandatory application should remain restricted to a specified high-risk offender group and not by definition to all offenders.

There are two principal types of cost - purchase or hiring/maintenance costs and participation costs. The purchase cost of an alcohol interlock is typically around EUR 2 000, while installation and calibration costs are EUR 100-200 and EUR 20-60 respectively (depending on the model). It is also important to repeat the calibration procedure at regular intervals (usually every three months). Costs for participation in the rehabilitation programme vary by country but range, on average, from EUR 2 000 to EUR 2 500 per year<sup>22</sup>.

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<sup>22</sup> A review of the available literature suggests that alcohol interlock costs are lower in North America than in Europe (TIRF, 2011). In the USA and Canada, costs usually consist of an installation fee (approximately EUR 120), a servicing fee (approximately EUR 75 per month), a removal fee (EUR 40) and a monitoring fee (EUR 40). In Australia, the cost of participating in an alcohol interlock programme ranges between approximately EUR 1 250 and EUR 1 700 depending on the legislation of the state concerned. However, many Australian states offer subsidy schemes for low-income participants or specific groups of drivers (e.g. drivers with disabilities).

**Box 8: Legally mandating alcohol interlocks in commercial vehicles: estimates on the costs for the transport industry**

An overview of the costs that would be incurred by transport companies for the installation of alcohol interlocks has been supplied by the Finnish Road Safety Institute (TRAFI), which estimates that the total cost for the Finnish transport industry to install alcohol interlocks would amount to EUR 121.5 million: EUR 108 million to purchase the devices and EUR 13.5 million for calibration. In addition, maintenance costs per annum are estimated at EUR 20.7 million (TRAFI, 2012). Further possible overheads might include costs arising from day-to-day use, such as the management of confidential breath sample data and monitoring.

**4.2.2. Participation rates**

The strongest incentive for drink-driving offenders to participate in an alcohol interlock rehabilitation programme is probably that of keeping their licence, albeit with restrictions<sup>23</sup>. That said, participation rates depend on a series of factors including cost, awareness and acceptance among public prosecutors and judges, and compliance with the programme conditions.

According to the preliminary findings of the ECORYS-led study commissioned by the EC<sup>24</sup>, currently in progress, only a minority of offenders (30-40%) offered an alcohol interlock programme choose the opportunity to continue driving with an alcohol interlock. The majority apparently prefer to have their driving licence withdrawn (ECORYS, 2013).

Research carried out in Sweden has found that only 11-13% of all eligible drivers participated in the programme during the trial period (1999-2011), with 40-50% of those failing to complete it. The main reasons for this low success rate include the high cost of participation, the strict demands of an intoxicant-free life and the length of the programme duration. In contrast, those participants who successfully completed the programme considered it to be a positive experience, showing a reduction in recidivism and a positive, permanent behavioural change involving decreased alcohol consumption.

Table 5 shows participation rates of drink-drivers that, out of all drink-driving offenders eligible for participation, have entered an alcohol interlock rehabilitation programme in a selection of Member States for which statistical data are currently available.

**Table 5: Participation of eligible drink-drivers that have entered alcohol interlock rehabilitation programmes in a selection of EU Member States**

EU MEMBER STATE	PARTICIPATION RATE	NO OF PARTICIPANTS	PERIOD	TYPE OF PROGRAMME
NL	37 %	≈2 200 in total	Dec 2011-Apr 2013	Current full-scale programme
FI	N.A.	1 687 in total	2005-2008	Current full-scale

<sup>23</sup> In a questionnaire-based survey conducted by the Finnish TRAFI on the use of alcohol interlocks, 95 % of respondents said that they regarded retaining the right to drive as the greatest benefit (Pylväs, 2013).

<sup>24</sup> For details, please refer to footnote 13 on page 30.

EU MEMBER STATE	PARTICIPATION RATE	NO OF PARTICIPANTS	PERIOD	TYPE OF PROGRAMME
	N.A.	≈600 annually	Since 2012	programme
SE	11-13 %	4 000 to 5 000 in total	1999-2011	Trial
	41 %	≈2 470 annually	June 2013	Current full-scale programme

**Source:** Compiled by the authors on the basis of Mathijssen (2013) for Finland and the Netherlands, and Mathijssen (2013), Magnusson et al (2011) and STA (2013) for Sweden.

In addition to the cost of installing and maintaining alcohol interlocks, research (Silverans et al, 2006) has shown that the exasperation and potential embarrassment of having to provide repeated breath samples also appears to be a disincentive. Although this aspect does not always emerge clearly, participants have often reported that they feel embarrassed when outsiders observed them using the alcohol interlock.

#### 4.2.3. Effectiveness

The effectiveness of alcohol interlocks should be measured in terms of a reduction in recidivism rates in drink-drivers participating in rehabilitation programmes.

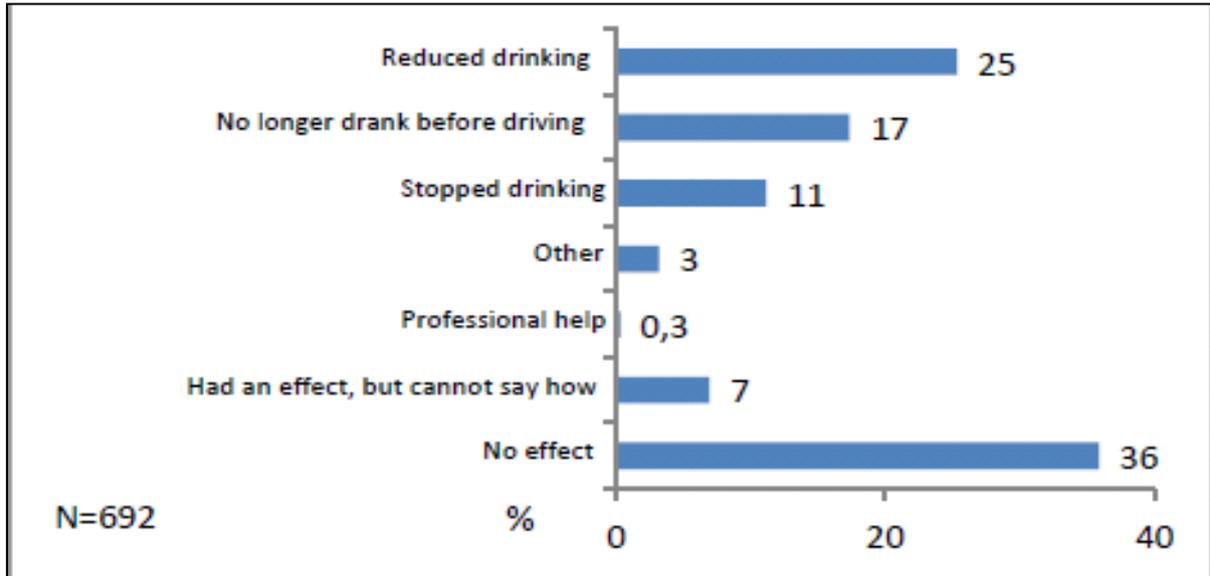
As explained above, alcohol interlocks are used as an alternative to revoking a driver's licence with the twofold purpose of, in the immediate future, encouraging the convicted driver to abstain from consuming alcohol during the programme and, in the longer term, supporting a behavioural change with respect to alcohol consumption.

With regard to recidivism rates, evidence gathered to date by more than 10 significant studies evaluating alcohol interlock programmes in the USA, Canada, Australia and Sweden has shown that reductions in recidivism rates range from 35-40 % to 90 %, with an average global reduction of 64 % to 70 % (Robertson, 2010; Willis et al, 2009)<sup>25</sup>.

In Finland an evaluation study conducted in 2013 investigating the effectiveness and impact of alcohol interlock-controlled driving rights (TRAFI, 2013) has estimated that, since the alcohol interlock programme became permanent, alcohol interlocks have prevented at least 12 000 participants from driving while under the influence of alcohol (i.e. with a BAC higher than the legal limit). On a global scale, there have been more than 40 000 occasions where alcohol interlocks have prevented a driver who has 'had a few' (i.e. BAC ≥ 0.2 g/l) from starting a vehicle with the intention of driving (this number also includes the cases involving a BAC ≥ 0.5 g/l). Figure 6 below summarises the main effects that alcohol interlocks have had on alcohol use, as reported by the Finnish authorities.

<sup>25</sup> Some studies estimate the effectiveness of alcohol interlocks in reducing recidivism at up to 70 %.

**Figure 6: Effects of alcohol interlocks on alcohol use in Finland**



Source: TRAFI, 2013.

Further insights into the effectiveness of alcohol interlocks have been found for the Netherlands where national authorities estimate that 75% of convicted drivers who have participated in an alcohol interlock programme have shown a significant change in behaviour (Jongman, 2013).

Other studies (ICADTS, 2001; Elder et al, 2011; Bax et al, 2001; Beirness and Robertson, 2002<sup>26</sup>) have demonstrated that alcohol interlocks seem to significantly reduce the recidivism rate for as long as they are installed<sup>27</sup>. However, following their removal, the recidivism rate rises again unless there are additional psychological measures in place after the alcohol interlock programme to support drivers in consolidating the benefits gained during the rehabilitation process<sup>28</sup>.

In other words, alcohol interlocks are capable of generating lasting benefits in terms of reduced recidivism only if effectively integrated with other rehabilitation measures (such as periodic medical examinations) and not as a stand-alone drink-driving countermeasure.

### 4.3. Cost-benefit analysis of alcohol interlock programmes

#### 4.3.1. Review of relevant literature

Elvik (2008) estimates that, assuming a reduction of 50% and 25% in the number of road accidents caused by first-time and recidivist offenders respectively, the **benefit-cost**

<sup>26</sup> Limited to the Netherlands. Cited in SWOV, 2011.

<sup>27</sup> Various international studies have estimated a reduction in repeat offences of 65-90% among users of an alcohol interlock compared with drivers who have their licence withdrawn (cited in SWOV, 2011). Evidence compiled for the USA and Canada points to a 40-95% reduction in recidivism rates while the alcohol interlock is in operation (ICADTS, 2001).

<sup>28</sup> According to the International Council on Alcohol, Drugs and Traffic Safety (ICADTS) (2001), repeat offence rates after the interlock has been removed are similar to the rates among drivers who have never had an alcohol interlock or their licence suspended.

ratio<sup>29</sup> for the use of alcohol interlocks in Norway would be 5.5 and 4.9, respectively. According to his findings, these values would decrease to 2.3 and 0.8 in Sweden. He concludes that alcohol interlocks are a cost-effective measure for drivers convicted of drink-driving, but are too expensive at present to be cost-effective as standard equipment in all cars. The Norwegian findings have also been examined by Vaa et al (2012), who estimated that 34 lives would be saved each year by installing alcohol interlocks on board all vehicles<sup>30</sup>.

In the Netherlands, the Institute for Road Safety Research (SWOV) (2009) has advocated that 8 to 10 road casualties could be saved each year if drink-driving offenders with a BAC higher than 2.1 g/l participated in an alcohol interlock programme. This value could be substantially higher (between 30 and 35 lives saved each year) if other judicial and administrative measures were combined with alcohol interlock use in an optimal manner. According to SWOV, if the programme had a permanent number of participants set at 6 000, the annual benefits could total EUR 110 million (EUR 11 million per life saved), while the cost would be less than EUR 10 million.

An examination of the cost-effectiveness of installing alcohol interlocks in all newly registered cars in Australia was carried out by Lahaussé and Fildes (2009), who estimated that the device would save between 97 (23.8 %) and 388 (or 95 %) lives each year.

Lastly, the research carried out as part of the EU-funded IMMORTAL project<sup>31</sup> (Vlakveld et al, 2005) offers a valuable perspective. This project undertook a detailed **cost-benefit** analysis of alcohol interlocks as a potential impairment countermeasure in four European countries: three EU Member States (the Czech Republic, the Netherlands and Spain) and Norway. Based on a set of parameters<sup>32</sup>, the project estimated the potential benefits in terms of the number of lives that could be saved (also expressed in monetary terms) by installing alcohol interlocks in the countries in question, as summarised in Table 6.

**Table 6: Results of cost-benefit analysis for CZ, ES, NL and NO (in € million)**

COUNTRY	NO OF LIVES SAVED	VALUE PER FATALITY AVOIDED (€ million)	BENEFIT (€ million)	COST (€ million)	BENEFIT-COST RATIO
CZ	8	1.1	9	-6	1.6
ES	86.5	0.8	69	-99	-0.7

<sup>29</sup> The **benefit-cost** ratio is a performance indicator used in economic analysis (EC, 2008b). It is the ratio of the total present value of social benefits to the total present value of social costs, considered over the timespan of the analysis.

<sup>30</sup> This value is estimated on the basis of the number of road fatalities (208) in Norway in 2010.

<sup>31</sup> The IMMORTAL (Impaired Motorists, Methods of Roadside Testing and Assessment for Licensing) project was funded by the EC under the Transport RTD-Programme of the 5<sup>th</sup> Framework Programme with the purpose of investigating the influence of chronic and acute impairment in order to make a more accurate risk assessment and provide key information to support EU policy on licensing and roadside testing.

<sup>32</sup> The parameters selected included the number of drink-drivers caught by police, broken down by BAC, the number of alcohol-related road deaths, the probability of being caught, the recidivism rate, the potential reduction of recidivism rates following the installation of alcohol interlocks and the cost of alcohol interlock implementation.

COUNTRY	NO OF LIVES SAVED	VALUE PER FATALITY AVOIDED (€ million)	BENEFIT (€ million)	COST (€ million)	BENEFIT-COST RATIO
NL	35	4.8	168	-41	4.1
NO	5.5	5.9	32.5	-7.2	4.5

**Source:** Compiled by the authors on the basis of Vlakveld et al, 2005.

The case study in the Netherlands, as described in Box 9, provided the methodological assumptions and approach for the research that were replicated in the other three countries. It should be noted that the assumed value, for each fatality avoided, influences the results significantly. This is clearly demonstrated by the case study in Spain, for which Table 6 shows a negative **benefit-cost** ratio even though the deployment of alcohol interlocks would save more lives in Spain than in the other countries studied.

**Box 9: Cost-benefit analysis of alcohol interlocks: an explanatory example based on the Dutch case study**

In the Netherlands, it has been estimated that approximately 17 950 offenders would be eligible to participate in an alcohol interlock programme each year. This is based on the assumption that drivers with a BAC greater than 1.3 g/l would have a 25 % probability of being caught, for drivers with a BAC between 0.5 and 1.3 g/l the probability drops to 6.25%.

The recidivism rate was estimated at 70 % for drivers with a BAC higher than 0.5 g/l. This rate was hypothetically reduced to 49 % by applying the assumption that the installation of an alcohol interlock could potentially lower the risk of recidivism.

Implementation costs were calculated on the basis of the total cost (approximately EUR4 500 over a two-year programme) borne by a participating driver multiplied by the estimated 17 950 offenders giving a total of EUR 41 million per year.

This cost was then divided by the total benefit in terms of lives saved, which amounts to a figure of approximately EUR 168 million. This was arrived at by multiplying the number of lives saved (35) by a value derived from the EC's One Million Euro Test<sup>33</sup>) yielding a positive **benefit-cost** ratio of 4.1.

**Source:** Vlakveld et al, 2005.

Relying on the range of empirical sources and methodologies described above, a simplified cost-benefit analysis has been carried out using data from two European-wide alcohol interlock programmes. The first focuses on the potential impact of a rehabilitation programme for drink-drivers operating private vehicles, while the second estimates the potential benefits of implementing a preventive programme tailored to drink-drivers operating commercial vehicles (HGVs, LGVs, buses and coaches). Sections 4.3.2 and 4.3.3 provide an account of the analysis and its principal findings.

<sup>33</sup> First introduced in 1997, the "One Million Euro Test" is a computation method to evaluate the safety effects on the basis of the social costs of accidents in a country divided by the annual traffic. Based on 1990 figures for all Member States, the total costs per fatality turned out to be one million ECU, hence the method has been known ever since as the One Million Euro Test (Vlakveld et al., 2005).

#### **4.3.2. Simplified cost-benefit analysis for a private drivers rehabilitation programme**

On the basis of the data presented in previous chapters, the following methodological assumptions were initially made:

- hard-core drink-drivers<sup>34</sup> (eligible to participate in an alcohol interlock programme) represent 1 % of the EU-28 driving population (20-74 years of age);
- identified hard-core drink-drivers (the proportion of hard-core drink-drivers tested positive by the police) account for 15 % of the total number of hard-core drink-drivers and are considered responsible for 75 % of all alcohol-related deaths;
- alcohol-related road fatalities account for 25 % of all road deaths (taking 2011 as the reference year), with the same proportion being applied to the number of serious injuries to determine the proportion of such injuries that may be attributed to alcohol-impaired driving;
- the estimated participation rate in a two-year alcohol interlock programme (i.e. the proportion of hard-core drink-drivers affected by the measure) is estimated at 35 %;
- the effectiveness of alcohol interlocks in reducing alcohol-related deaths is assumed at 70 %, in line with the average estimated effectiveness reported in Section 4.2.3;
- the cost (on a flat-rate basis) of a two-year alcohol interlock programme is estimated at EUR 5 332<sup>35</sup> per eligible driver;
- the values per fatality or serious injury avoided were derived from the HEATCO (Developing Harmonised European Approaches for Transport Costing and Project Assessment ) project (HEATCO, 2006); having originally been calculated for 2002, they were updated for 2012.

In addition to these assumptions, the number of eligible participants in the rehabilitation programme was calculated, using the coefficients given for hard-core drink-drivers as a proportion of the total EU-28 driving population (1 %), identified drink-drivers as a proportion of the hard-core group (15 %) and the estimated participation rate (35 %).

The values for fatalities and severe injuries caused by hard-core drink-drivers were based on EU road accident figures, using coefficients for alcohol-related casualties (25 %) and casualties caused by hard-core drink-drivers (75 %).

By combining the proportion of eligible participants within the hard-core drink-driver group with the proportion of deaths and serious injuries caused by hard-core drink-drivers, and a suitable effectiveness coefficient for alcohol interlocks (70 %), one obtains the number of lives and injuries that could be saved by implementing such a programme. The benefits are determined by multiplying these outcomes by their corresponding economic values.

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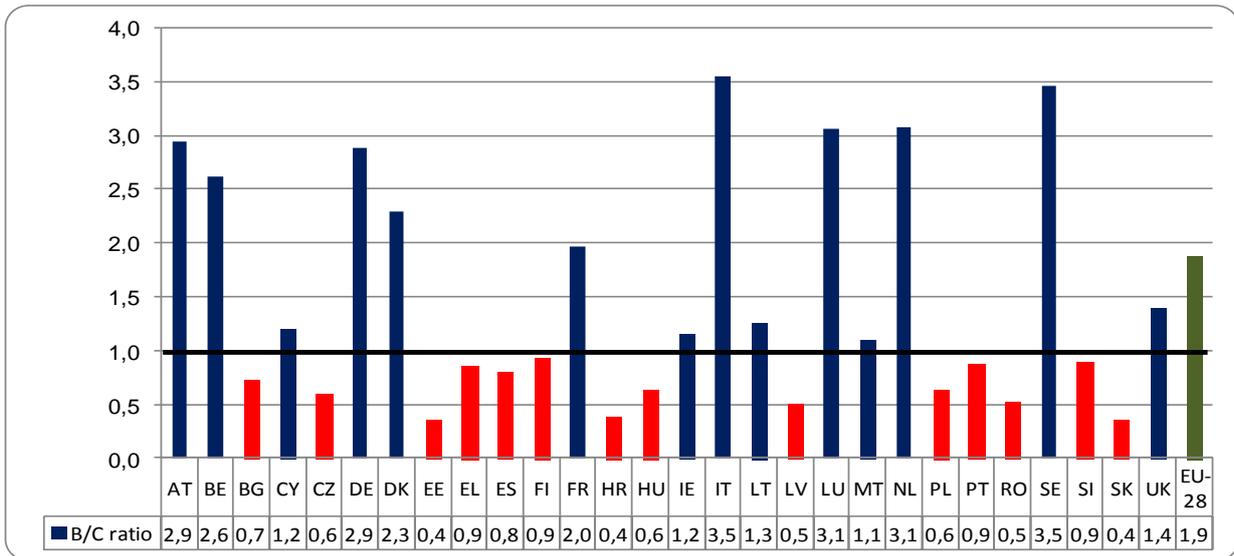
<sup>34</sup> As a general definition, the term hard-core drink drivers includes repeat offender drink-drivers (that is, offenders with prior convictions or arrests for drink-driving) as well as offenders with a high BAC level (that is, offenders with a BAC of usually 1.0 g/l or greater).

<sup>35</sup> This input cost was obtained by transferring the value of EUR 4 500 used in Vlakveld et al (2005) to the present day. Annual inflation rates were applied using figures for the EU-28 over the 2005-2012 period (see <http://epp.eurostat.ec.europa.eu>).

Based on the methodological approach outlined above, the **cost-benefit** analysis yields an **overall benefit-cost ratio of 1.9**. If a full-scale drink-driver rehabilitation programme was introduced across all 28 Member States, the overall benefits would therefore exceed the implementation costs, yielding a **strikingly positive socioeconomic outcome**<sup>36</sup>.

These findings show that in the baseline scenario, 50 % of the 28 Member States are already above the minimum **benefit-cost** ratio for acceptability (1.0), with four being on the borderline (0.9). Figure 7 summarises the estimates for each Member State.

**Figure 7: Estimated benefit-cost ratio for the installation of alcohol interlocks in passenger vehicles in the EU within private drivers rehabilitation programmes**



**Source:** Compiled by the authors.

**Notes:** data for serious injuries not available for EE, FI or HR.

For the sake of completeness, the result obtained was tested by carrying out a sensitivity analysis of the tool’s effectiveness. Even if its effectiveness was reduced from 70 % to 37 %, the outcome would still remain within the feasibility ratio (**benefit-cost** ratio = 1). Any improvement in enforcement involving better identification of drink-drivers would increase the benefits to society.

The last stage of the analysis has involved calculating the extent to which alcohol interlocks could contribute towards the achievement of the general road safety target which, as set by the EC, aims to half the number of road victims by 2020.

2011 has been treated as the baseline year, with an estimated decrease in the number of road casualties amounting to 15 000 by 2020. This value has been calculated by assuming that, on the basis of the latest Eurostat data (Eurostat 2013), reducing the number of road deaths that occurred in 2011 by half (30 268 victims, rounded down to 30 000) is achievable. For calculation purposes the value has not taken into consideration the natural downward trend in the number of road fatalities brought about by the implementation of

<sup>36</sup> The Netherlands may be taken as a benchmark, since the result obtained (3.1) approximates the one given in Vlakveld et al (2005) (4.1), where the value per fatality avoided was twice.

specific national road safety strategies. It is comparable to 1 100 lives saved over a ten year period thanks to the use of alcohol interlocks<sup>37</sup>.

Results show that a widespread implementation of alcohol interlock programmes targeting hard-core drink-drivers could bring about a **7.3 %** reduction in road fatalities therefore contributing to the overall efforts that could be established to achieve the EU road safety target by 2020.

#### **4.3.3. Simplified cost-benefit analysis for a preventive programme for commercial vehicles**

Unlike the previous estimates, the calculation of the **benefit-cost** ratio for commercial vehicles was based not on the number of professional drink-driving offenders but on the size of the new or retrofitted commercial fleet in which alcohol interlocks would be installed. The rationale for this approach is that, if mandatory, alcohol interlocks would be used by all professional drivers, regardless of whether they drive sober or under the influence of alcohol. Another difference in comparison to the previous estimate is this assessment covers a timeframe of 10 years which is considered to be the operational life of an alcohol interlock.

The basic data used in the assessment is as follows:

- commercial fleet: average size from 2007 to 2010 (based on ACEA and Eurostat data), disaggregated for goods vehicles (LGVs < 3.5 tonnes and HGVs > 3.5 tonnes) and passenger vehicles (buses and coaches);
- number of road deaths caused by commercial vehicles: ETSC data for 2011, disaggregated for LGVs, HGVs and passenger vehicles (ETSC, 2013e);
- number of serious injuries: calculated by multiplying the number of road fatalities by 10 for LGVs, by 15 for HGVs and by 25 for buses and coaches<sup>38</sup>.

Based on data collected for this note, the following assumptions were made:

- alcohol-related road fatalities account for 3 % of total road deaths (2011 figures) involving commercial vehicles, even though it should be anticipated that this estimate still remains uncertain as data in this area is usually reported to be sparse or not officially available;
- the effectiveness of alcohol interlocks in reducing alcohol-related deaths is assumed to be 70 %; this percentage is in line with the average estimated effectiveness reported in Section 4.2.3.
- the values per fatality or serious injury avoided were derived from the HEATCO project (HEATCO, 2006); having originally been calculated for 2002, they were updated for 2012.

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<sup>37</sup> This value has been calculated (and later rounded) by multiplying by five the number of lives that can be saved in each EU Member States as a result of the participation to a biannual alcohol interlock rehabilitation programme.

<sup>38</sup> According to statistics, the average number of serious injuries in the case of passenger vehicles equals 10 times the number of road fatalities. The same coefficient was applied to LGVs, while it was increased to 15 for HGVs and to 25 for buses and coaches so as to take into account the higher number of fatalities caused by accidents involving these types of vehicle.

Lastly, a specific assessment was undertaken of the costs that transport companies would incur to install alcohol interlocks. Based on values provided by TRAFI (2012), the following costs were used to calculate the estimates:

- purchase of the device (EUR 1 200);
- installation (EUR 150);
- calibration and maintenance (EUR 40 each per year).

The feasibility of a preventive programme was evaluated as follows: firstly, the implementation costs for alcohol interlocks were estimated over a 10-year deployment period for both new and retrofitted vehicles; secondly, the number of fatalities and injuries that could be avoided was calculated on the basis of the change in the proportion of equipped vehicles, the proportion of alcohol-related road fatalities (3 %) and the effectiveness of alcohol interlocks (70 %).

The benefits were calculated by introducing economic values per casualty or severe injury avoided, and a social discount rate of 3.5 % was applied in order to consider present values alongside implementation costs<sup>39</sup>. Based on all these assumptions, the benefit-cost ratios are as follows:

- 0.2 if alcohol interlocks are installed in the entire fleet of commercial vehicles;
- 0.1 if alcohol interlocks are installed in LGVs only;
- at the break-even point (1.0) if alcohol interlocks are installed in commercial passenger vehicles only;
- slightly below the break-even point (0.9) if alcohol interlocks are installed in HGVs only.

The overall result is heavily influenced by the large proportion of LGVs in the whole commercial fleet. Alcohol interlocks generate more benefits when they are installed in HGVs, buses and coaches - which have the highest risk factors in the event of accidents - in comparison to LGVs (reflected by the different risk factors for serious injuries arising from accidents involving various categories of commercial vehicle).

A factor that influences the outcome of the **cost-benefit** analysis is the cost of installing an alcohol interlock. If the annual cost were to be reduced from EUR 1 200 down to EUR 1 000, the **benefit-cost** ratio would increase by 10 % for installation in buses and coaches (1.1) and HGVs (1.0) but it would remain almost unchanged for LGVs and for the whole commercial fleet.

Given the uncertainty surrounding the estimate that 3 % of accidents involving commercial vehicles are alcohol-related, a further assessment was carried out in which this value was increased to 5 %. This would significantly raise the **benefit-cost** ratio for alcohol interlocks in HGVs (from 0.9 to 1.5) and in buses and coaches (from 1.0 to 1.7), while the value for LGVs would remain largely unchanged.

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<sup>39</sup> A residual value was applied at the end of the device's useful life. The social discount rate reflects society's view of how future benefits and costs should be valued against present values (EC, 2008b).

Finally, similar to the analysis done in section 4.3.2, an estimate of the contribution to the achievement of the EU road safety targets has been calculated presupposing that all commercial vehicles will be fitted with alcohol interlocks.

2011 has again been taken as the baseline year for calculating the number of victims (30 268 victims, rounded down to 30 000) to be reduced by half by 2020 in line with the EU road safety target. The planned target by 2020 of 15 000 road fatalities has been compared to 200 lives being saved over a ten year period thanks to the use of alcohol interlocks.

Results show that a mandatory fitting of alcohol interlocks in all commercial vehicles (LGVs, HGVs and passenger vehicles) could bring about a **1.3 %** reduction in road fatalities thus contributing to the overall efforts that could be established to achieve the EU road safety target by 2020.

## 5. CONCLUSIONS AND RECOMMENDATIONS

### 5.1. Conclusions

The purpose of this note was to investigate the role and effectiveness of alcohol interlocks in view of their possible, mandatory application to (i) all new types of commercial passenger and goods transport vehicles, (ii) certain vehicles according to their use or, finally, (iii) specific target groups of users.

The problem of driving under the influence of alcohol has been put into context within the broader issue of road safety. Available estimates attribute 25% of all road casualties to alcohol, although the figures are different across EU countries and amongst the different categories of drivers. Drivers aged 16 to 20 driving under the influence of alcohol are three times more likely to crash in comparison to experienced drivers and it is estimated that drink-driving is the cause of approximately 2.5%-3.3% of road accidents involving commercial vehicles. As confirmed by stakeholders, data is reported to be sparse or not 100% reliable, not least because of significant disparities in the quantification of alcohol-related road fatalities at national level, mostly as a result of differing definitions of drink-driving, underreporting and different levels of enforcement.

The main technical features of alcohol interlocks have been discussed. In Europe, Sweden was the first EU country to introduce an alcohol interlock programme in 1999. The installation of alcohol interlocks as driver impairment detection devices has been recommended at EU policy level since the adoption of the RSAP 2003-2010. The EC has long since paid attention to developments, demonstrating its support in 2010 with the adoption of the new policy orientations on road safety for 2011-2020 in coordination with the overall health policy efforts to reduce alcohol-related harm, as established by the 2006 EU alcohol strategy.

Three differentiated practices for the use of alcohol interlocks are currently established: (i) a mandatory use as part of a rehabilitation programme for drink-drivers (novice drivers, hard-core drink drivers and recidivists), (ii) a mandatory preventive use and, finally, (iii) a voluntary preventive use. The first practice is the most significant and widespread both in and outside the EU. To date, in Europe, four Member States (Belgium, Finland, the Netherlands and Sweden) have set up full-scale programmes while two more (Denmark and the United Kingdom) have adopted legislation although practical implementation has yet to follow. In other EU countries (Austria, Germany and Slovenia) pilot projects have been carried out, or are currently on-going, to test the feasibility of introducing alcohol interlock programmes. Remarkable examples of a mandatory preventive use are to be found in France and Finland, where alcohol interlocks are required by law for school and day-care transport. Finally, the voluntary preventive use of alcohol interlocks by private commercial vehicle operators is regarded as a corporate responsibility measure which has encouraged its dissemination, as seen in Sweden and Finland.

Following presentation of the main features applicable to alcohol interlock rehabilitation programmes (costs, participation rates, effectiveness in reducing recidivism), the **benefit-cost** ratio for the potential introduction of alcohol interlocks in both private vehicles (as part of a rehabilitation programme) and commercial vehicles (as part of a prevention programme) has been estimated. In both cases, the potential contribution to the overall

road safety target set by the EU that alcohol interlocks could bring about has been assessed.

The simplified **cost-benefit** analysis calculated a **benefit-cost** ratio of 1.9 should an alcohol interlock programme targeting hard-core drink-drivers be established across all 28 Member States. Over a ten-year period this would equate to 7.3% (approximately 1 100 lives saved) in the total reduction of road fatalities as part of the overall efforts that could be established to achieve the EU road safety target by 2020.

As far as the use of alcohol interlocks in commercial vehicles, results showed a negative **benefit-cost** ratio when considering both the entire fleet of commercial vehicles (0.2) and just LGVs (0.1). The analysis showed ratios to be equal or close to the break-even point when applied to commercial passenger vehicles (1.0) and HGVs (0.9). Results also demonstrated that a reduction in the price of the alcohol interlock would increase the **benefit-cost** ratio by 10% for installation in buses and coaches (1.1) and HGVs (1.0), while it would remain almost unchanged for LGVs and the commercial vehicle fleet as a whole. Finally, the contribution towards achieving the global road safety target was estimated at 1.3% (200 lives saved) over a ten-year period.

## 5.2. Recommendations

The recommendation sets out in this note take into consideration the opportunity to legislate with a view to extending the statutory use of alcohol interlocks:

- as part of rehabilitation programmes targeting certain types of users (e.g. hard-core drink-drivers, recidivists or first-time drink-driving offenders), and
- as a preventive measure in specific categories of commercial vehicles i.e. those vehicles that either perform safety-sensitive types of transport services (transporting passengers or dangerous goods) or have a large mass and size that could lead to severe consequences for other road users in road traffic accidents.

On the first, calculations made for this note demonstrated a **benefit-cost** ratio and that there could be a relatively important contribution to the achievement of the general road safety target set by the EU to reduce by half the number of road victims by 2020. On the second, a universal obligation to fit the devices in all commercial vehicles would not be recommended because of the high implementation costs relative to the current and low estimated number of alcohol-related deaths that occur in accidents involving these types of vehicles.

To this end, a five-year timescale is proposed to legislate in this field, to be followed by an additional two-year period in which Member States can adopt the relevant piece of EU legislation. This timeframe should also allow for further investigation as to whether vehicles' technological developments could lead to a reduction in the devices' costs.

In addition to the suggestions above, further action should be taken to improve the qualitative and quantitative knowledge base in respect of drink-driving, in particular the scale of the problem among professional drivers. More detailed and harmonised statistics across all Member States, in combination with legislation aimed at harmonising BAC levels, reporting procedures and the definition of drink-driving, would allow for improved analysis of the drink-driving phenomenon and, consequently, the establishment of more effective

monitoring and enforcement measures. Cooperation, exchange of information and best practices between Member States should also be encouraged.

Harmonisation of technical standards and quality requirements for alcohol interlocks should also be promoted, particularly functional specifications, technical requirements for retrofitting and a common code for alcohol interlocks for driving licences. Simultaneously, pilot trials specifically targeting commercial vehicles should be encouraged. This would make it possible not only to compile a more comprehensive statistical base, but also to test the effectiveness of alcohol interlocks more promptly. It will be crucial to engage with both alcohol interlock and vehicle manufacturers as partners in this process. Further consideration could also be given to possibly combining the functionalities of the digital tachograph with those of the alcohol interlock. This could be supported by incentives such as financial support or the prospect for transport companies to gain a positive risk rating as part of the risk rating system under EU social legislation.



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## ANNEX A: LIST OF EXPERTS CONSULTED

COUNTRY	ORGANISATION	ACRONYM	CONSULTATION METHOD
BE	European Automobile Manufacturers Association	ACEA	Questionnaire
BE	European Transport Safety Council	ETSC	Interview
BE	ERTICO	-	Questionnaire
BE	Institut Belge pour la Sécurité Routière	IBSR	Questionnaire
BE	Insurance Europe	-	Questionnaire
BE	International Road Transport Union	IRU	Interview
DE	Bundesanstalt für Straßenwesen	BAST	Questionnaire
DE	DEKRA	-	Questionnaire
IT	Dräger Safety	-	Interview
NL	ADV Consulting & Research	-	Interview
NL	Dutch Institute for Road Safety Research	SWOV	Questionnaire
NO	Norwegian Public Roads Administration	NPRA	Questionnaire
SE	Swedish Transport Agency	STA	Questionnaire
SE	Swedish Transport Administration	SRA	Questionnaire

## ANNEX B: DRINK-DRIVING AS A ROAD SAFETY ISSUE

### B.1. Proportion of alcohol-related road deaths in the Member States

Table B.1 summarises the most recent available data for the proportion of road fatalities attributed to alcohol-impaired driving in the individual Member States.

**Table B.1: Proportion of alcohol-related road fatalities in the Member States**

EU MS	PROPORTION OF ROAD DEATHS INVOLVING ALCOHOL	YEAR
AT	6 %	2010
BE	25 %	2009
BG	4 %	2010
CY	43 %	2010
CZ	14 %	2010
DE	11 %	2009
DK	20 %	2010
EE	15 %	2010
EL	N.A.	N.A.
ES	31 %	2010
FI	24 %	2010
FR	31 %	2010
HR	30 %	2010
HU	8.3 %	2010
IE	11 %	2006
IT	N.A.	N.A.
LT	21 %	2010
LV	10 %	N.A.
LU	35 %	2010
MT	N.A.	N.A.
NL	20 %	2010
PL	9 %	2010
PT	31 %	2010
RO	8 %	2010
SE	22 %	2010

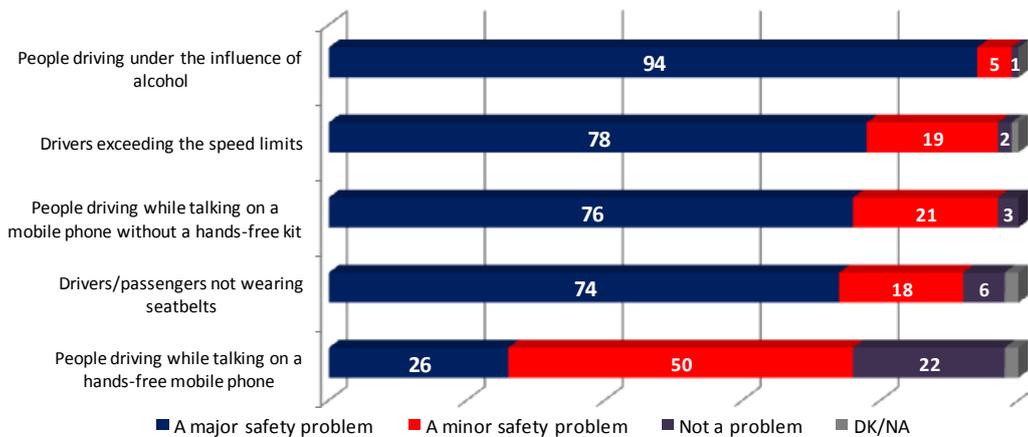
EU MS	PROPORTION OF ROAD DEATHS INVOLVING ALCOHOL	YEAR
SI	36 %	2010
SK	8 %	2010
UK	(Great Britain) 14 % (Northern Ireland) 24 %	2010

Source: WHO, 2013.

## B.2. Public awareness of drink-driving

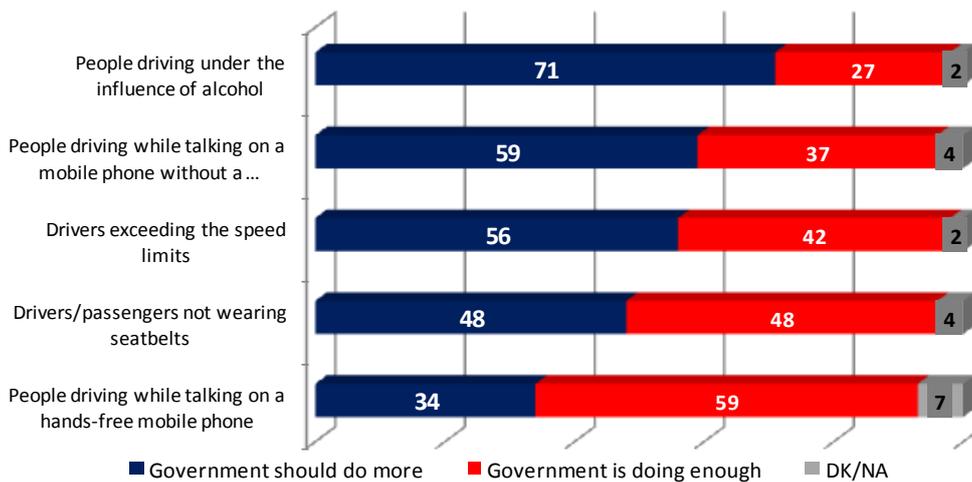
According to the analytical report on road safety published by *Eurobarometer* in 2010, there is a clear perception among EU citizens that **driving under the influence of alcohol is the major road safety problem in their respective countries**. This is reflected by the information displayed in Figure B.1; it can be read in combination with Figure B.2 which identifies drink-driving as **an area in which national governments should make greater efforts**.

**Figure B.1: EU citizens’ perceptions of the seriousness of road safety problems**



Source: Compilation by the authors based on Eurobarometer, 2010.

**Figure B.2: Road safety problems that should receive more attention from national governments**



Source: Compiled by the authors on the basis of Eurobarometer, 2010.

### B.3. Drink-driving and enforcement efforts

Consistent and effective enforcement is a major deterrent to drink-driving. Making use of ETSC data (ETSC, 2013c), Table B.2 summarises the number of police checks and positive tests per 1 000 inhabitants in 2010 (the most recent year for which data is available), illustrating the trend since 2007.

**Table B.2: Number of police checks and positive tests per 1 000 inhabitants**

EU MEMBER STATE	NO OF POLICE CHECKS PER 1 000 INHABITANTS (2010)	NO OF POSITIVE CHECKS PER 1 000 INHABITANTS			
		2010	2009	2008	2007
CY	217	11.6	12.2	10.8	10.2
SI	198	9.3	10.0	11.8	13.9
FR	173	6.0	6.0	6.1	6.1
BE	N.A.	5.0	4.9	4.8	4.3
PL	88	4.3	4.5	4.4	4.2
HU	120	4.3	4.1	4.1	4.5
PT	106	4.1	3.5	3.7	3.2
FI	429	3.9	4.4	4.9	5.2
EL	161	3.4	4.1	4.2	4.2
IE	126	2.4	3.0	4.1	4.6
ES	114	2.2	2.0	2.1	2.1
LV	N.A.	1.8	2.2	3.0	2.9
SE	287	1.8	1.9	2.1	2.0
DK	36 (**)	1.8	1.8	2.0	N.A.
RO	N.A.	1.7	1.7	1.7	1.7
UK	14 (*)	N.A.	1.6	1.5	1.7
SK	N.A.	1.2	1.3	0.9	0.8
LT	40 (**)	1.1	1.1	0.7	0.5
EE	105	0.7	0.7	1.0	0.7
IT	27	0.7	0.8	0.8	0.8
BG	N.A.	N.A.	N.A.	3.0	3.0
CZ	N.A.	N.A.	N.A.	0.8	0.7

EU MEMBER STATE	NO OF POLICE CHECKS PER 1 000 INHABITANTS (2010)	NO OF POSITIVE CHECKS PER 1 000 INHABITANTS			
		2010	2009	2008	2007
NL	N.A.	N.A.	N.A.	0.0	0.1
HR	N.A.	N.A.	N.A.	N.A.	N.A.

(\*) Data for 2009.

(\*\*) Data for 2008.

Source: ETSC, 2013c.

#### B.4. Main European specifications for alcohol interlocks

Table B.3 briefly summarises the main specifications for alcohol interlocks, depending on whether they are used as part of an offender programme or for general preventive purposes.

**Table B.3: Main European specifications for alcohol interlock devices**

FEATURE	EN 50436-1 OFFENDER PROGRAMME	EN 50436-2 GENERAL PREVENTIVE USE
<b>Retests, data memory, service reminder</b>	Required	Optional
<b>Temperature range</b>	-45 °C to 85 °C	Permanently fitted: -40 °C to 85 °C Removable part: -5 °C to 65 °C
<b>Calibration curve</b>	0.75 mg/l: +15 %	0.40 mg/l: +15 % 0.75 mg/l and 1.50 mg/l: not unblocking
<b>Analytical specifications</b>	14 substances to be tested	
<b>Manipulation</b>	Filter, condensation, water, pressurised air	
<b>Long-term test</b>	At least 60 days	
<b>Concentration limit</b>	Not applicable	> 0.09 mg/l
<b>Breath volume</b>	Not applicable	> 0.7 l

Source: Compiled by the authors on the basis of Dräger, 2013.





**Table C.1: US states in which alcohol interlocks are used, by BAC level**

BAC (g/ml)	STATES REQUIRING ALCOHOL INTERLOCKS
$\geq 0.08$	Alaska, Arizona, Arkansas, California (four-county pilot programme), Colorado, Connecticut, Hawaii, Illinois, Kansas, Louisiana, Nebraska, New Mexico, New York, Oregon, Utah, Washington <i>These states require interlocks for all (including first-time) convicted drunk-drivers.</i>
$\geq 0.15$	Alabama, Delaware, Florida, Maryland, New Jersey, North Carolina, Oklahoma, Tennessee, Texas, Virginia, West Virginia, Wisconsin, Wyoming. <i>These states require ignition interlocks for first-time convicted drunk-drivers.</i>
$\geq 0.16$	Minnesota, New Hampshire <i>These states require ignition interlocks for first-time convicted drunk-drivers.</i>
$\geq 0.17$	Michigan <i>This state requires ignition interlocks for first-time convicted drunk-drivers.</i>
<b>Repeat offenders</b>	Georgia, Massachusetts, Missouri, Montana, Pennsylvania, South Carolina

**Source:** Compiled by the authors on the basis of NHTSA, 2013.

As summarised in Table C.2, a number of main elements characterise the deployment of alcohol interlocks in the USA (TIRF, 2010). A specific issue which is currently being debated concerns the possible shift from voluntary to mandatory participation for all offenders. Historically, participation in these programmes has always been mandatory for repeat and high-BAC offenders, while for first-time offenders participation has remained voluntary. Recently, a shift from voluntary to compulsory participation for all offenders has been moving ahead, despite challenges.

Concerns relating to the possible mandatory extension of the alcohol interlock programme to first-time offenders include the following:

- given that repeat and high-BAC offenders are responsible for the majority of alcohol-related deaths and injuries, they are viewed as a priority target group for participation and the use of programme resources;
- gaps at the implementation stage potentially enable offenders to avoid interlock supervision. As a result, many of them fail to install alcohol interlocks even though they are required to do so by the authority responsible for the programme. Extending mandatory installation to first-time offenders could worsen this problem and enable a much larger population of offenders to avoid installation, thereby eroding deterrent effects;
- extending mandatory participation to first-time offenders would require an increase in resources with a view to tighter supervision of interlock deployment, without any assurance that interlocks would be actually installed;
- in many jurisdictions, first-time offenders are not subject to monitoring by the criminal justice system. In court-based interlock programmes, this represents a substantial gap in the authorities' ability to monitor and ensure participation by first-time offenders and to follow up violations.

**Table C.2: Main characteristics of alcohol interlock programmes implemented in the USA**

JURISDICTION	DESCRIPTION
<b>Objectives</b>	Goals of an interlock programme can include incapacitation, deterrence, punishment and rehabilitation. Punishment is more often emphasised over rehabilitation.
<b>Vendor certification</b>	An increasing number of national jurisdictions use a 'request for certification' to approve vendors. The frequency of certification varies and there are differing requirements for the approval process. Few jurisdictions employ vendor oversight or auditing procedures, owing to resource/budgetary issues.
<b>Indigence provisions</b>	20 US states currently employ strategies to address the issue of indigent offenders, although there has been no uniform approach to date and there is a lack of consensus on how to manage this population.
<b>Employer exemptions</b>	Many jurisdictions have some form of employer exemption and have found employers to be generally amenable to interlock use.
<b>Graduated sanctions</b>	More jurisdictions apply graduated sanctions to increase offender accountability. However, these sanctions are often too rigidly enforced and/or programme officials lack flexibility in their application. Some jurisdictions are beginning to see the benefits of using graduated reinforcements to encourage compliant behaviour.
<b>Removal from programme</b>	Offenders who are unable to demonstrate compliance are often removed from interlock programmes. There appear to be strong political objections to retaining non-compliant offenders in interlock programmes.
<b>Low participation rates</b>	While interlock programmes have grown significantly in the past five years, low participation is still an issue. The reasons for this lack of participation include the possibility for offenders to 'opt out', lack of follow-up or communication, inconvenience/embarrassment, eligibility barriers, cost, lengthy periods of hard suspension, agencies' inability to impose sanctions, and loss of offenders to other jurisdictions.

**Source:** Compiled by the authors on the basis of TIRF, 2011.

Details are given below of two alcohol interlock programmes currently in use in the states of Colorado and Florida.

### C.1.2. Colorado

Colorado's alcohol interlock programme has been subject to different adjustments, mostly related to the implementation of first-offender legislation. The most relevant change concerns the introduction of the Online Interlock System (OIS), an automated system which reduces the potential for error when inputting driver information and which can be used to manage indigence requests.

Alcohol interlock installation costs nearly USD 75, although offenders can receive a subsidy of USD 50, which is withdrawn if they infringe the programme's rules.

Regarding data management, the introduction of the OIS has significantly improved data integrity, in particular because it checks the Department of Motor Vehicles (DMV) mainframe using the driver's licence number, date of birth and licence plate in order to verify the interlock requirement.

Real-time reporting also enhances the communication between service providers and the DMV, as installers are made aware of potential issues and can ask offenders to contact Driver Services while still at the service centre, thus making it easier to resolve issues and/or discrepancies in a timely fashion.

Although the OIS system is more efficient, the implementation process has faced a number of challenges, including the following:

- high programme complexity;
- the involvement of interlock providers at the development stage was limited owing to active contract negotiations;
- a significant increase in the number of participants (which more than doubled over a two-year period, from 8 000 to 15 000);
- the OIS requires alcohol interlock providers to complete updates on their proprietary system, and the timeliness of these updates varies among vendors;
- failure to develop adequate reporting mechanisms to manage service centre compliance, along with an audit trail for users of financial assistance;
- the statute failed to define criteria for indigence.

### **C.1.3. Florida**

In Florida, the participation of first-time offenders (with a high BAC) in alcohol interlock programmes is ordered by the courts, with a minimum duration of six months.

The programme, managed by the national Department of Highway Safety and Motor Vehicles, currently has 8 500 active participants. In total, 43 000 eligible offenders have participated since the programme was launched in 2004, with an average participation rate of 75 %.

In the case of second offences, participation in the programmes lasts one year (or two years for those with a high BAC) and convicted drivers are required to report on a monthly basis. A third offence leads to a three-year programme, while a fourth or subsequent offence results in a five-year duration. Employer exemptions and medical waivers are available in Florida.

Of the 21 377 eligible offenders required to install an alcohol interlock in June 2008, 19 914 did so and 12 466 completed the requirements.

With regard to the effects of alcohol interlocks on recidivism rates, a difference was observed between the reduction achieved while the devices were installed and that achieved following removal. In the first case, the recidivism rate was estimated at 1.15 %, increasing to 5.2 % in the second case.

This decrease in recidivism can be attributed to:

- revisions to the standardised driving under the influence curriculum;
- enhanced training for driving under the influence programme professional staff;
- quality assurance for driving under the influence programmes;
- increased quality expectations and corresponding audits to ensure quality.

## **C.2. Use of alcohol interlocks in Canada**

### **C.2.1 Nova Scotia**

In Nova Scotia, the alcohol interlock programme is managed by the Registry of Motor Vehicles (RMV), which is responsible for granting, suspending and revoking alcohol interlock licences and approving entry to the programme.

Participation is voluntary for first-time offenders classified as low- or medium-risk, but mandatory for first or repeat offenders classified as high-risk. Participation in the alcohol interlock programme is further combined with rehabilitation activities such as counselling sessions, which are required throughout the programme period according to assessment outcomes.

### **C.2.2. Ontario**

In Ontario, a person convicted of drink-driving is subject to a heavy suspension period accompanied by a request to participate in the alcohol interlock programme and complete 'Back on Track' rehabilitation treatment before being eligible for relicensing. The alternative is that drink-driving offenders are forbidden to drive until the end of the licence suspension period.

The duration of participation in the alcohol interlock programme depends on the number of impaired-driving offences of which the offender has been convicted:

- a minimum of one year in the case of a first offence;
- a minimum of three years in the case of a second offence;
- variable duration in the case of a third offence.

If a driver is found guilty of a fourth offence, his or her licence will no longer be reinstated.

The Reduced Suspension with Ignition Interlock Conduct Review Program was introduced in 2010, specifically targeting first impaired-driving offenders. The programme comprises two streams, subject to the following conditions:

- a licence suspension period reduced to a minimum of three months, followed by a minimum nine-month interlock period, or
- a minimum licence suspension period of 6 months and a minimum interlock period of 12 months.

Violations can result in penalties, the extension of the programme or removal from the programme.

As at 2010, 4 314 offenders had been deemed eligible for reduced suspension.

### **C.2.3. Quebec**

The Province of Quebec's alcohol interlock programme was established in 1997.

It is managed by the Société de l'assurance automobile du Québec (SAAQ) through 25 service centres located throughout the province. The cost of participating in the programme includes installation of the device (CAD 160), servicing fees (CAD 100 per month) and removal (CAD 50). The alcohol interlock is calibrated at a BAC level of 0.2 g/l.

Eligible offenders convicted of driving under the influence of alcohol can be subject to three different types of licence restriction:

- in the case of a first offence, alcohol interlocks are installed for one year (two years for a high BAC);
- in the case of a second offence, alcohol interlocks are installed for two years (three years for a high BAC),
- in the case of a third offence, alcohol interlocks are installed for three years (two convictions with a BAC over 0.16 g/l will result in a lifetime requirement).

Since December 2009, offenders who are under no formal obligation to participate in the alcohol interlock programme have been able to have an SAAQ-certified alcohol interlock installed in their vehicles. In order to leave the programme, offenders must prove their ability to separate drinking from driving, through an assessment.

A study was conducted in 2002 to evaluate the programme's effectiveness in changing offenders' behaviour during the restricted licence period and identify possible improvements.

Its findings show that the programme had a 25 % participation rate, with an 80 % reduction in the number of repeat offences during the first year for first-time drink-driving offenders. The reduction was slightly lower (74 %) for repeat offenders during the first two years.

### **C.2.4. Saskatchewan**

Saskatchewan implemented a voluntary alcohol interlock programme in 2001. Initially restricted to first offenders, in 2007 it was extended to all repeat offenders. Overall, 330 drink-driving offenders participate in the programme every year (9 % of all eligible offenders).

Offenders usually enter the programme at the end of their driving prohibition period and participation can last 3, 6 or 12 months depending on the number of convictions for driving offences. In the event of a violation during the last three months of the programme, the use of the alcohol interlock is extended for an additional three months. In the event of serious violations, the alcohol interlock licence can be revoked and the device removed.

The cost of participating in the programme includes installation of the device (CAD 150), administrative fees (CAD 30), monitoring fees (CAD 3.45 per day) and removal (CAD 50). The data collected by the alcohol interlock are downloaded every 30 to 60 days at an officially authorised service centre.

Detected violations are reported to Saskatchewan Government Insurance (SGI) (e.g. start violation, high BAC (over 0.4 g/l), extended missed retest, failed retest, emergency override, lockout or BAC fail).

A programme evaluation was carried out, comparing a target group of 681 offenders having installed the devices in 2002 and 2003 with a second group comprising a sample of 2 796 similar offenders who had not installed interlocks. The results show that the average time between conviction and installation of the alcohol interlock was 4.8 months, and that the average time between installation and removal of the interlock was 7 months.

The evaluation also concluded that alcohol interlocks had a very positive influence in reducing recidivism rates, although there was a great difference between the effects during the alcohol interlock period and the period subsequent to the removal of the device. While the alcohol interlock was in use, the recidivism risk among offenders having installed the device in their vehicles was 81 % lower than among drink-drivers who had not installed the device.

Further positive effects were observed in respect of alcohol-related collisions. Three years after the removal of the device, offenders having used interlocks were involved in 84 % fewer alcohol-related collisions than had been the case three years before their installation, against a 74 % reduction in the comparison group.

### **C.3. Use of alcohol interlocks in Australia**

#### **C.3.1 Victoria**

A total of 7800 alcohol interlocks are currently deployed in the Australian state of Victoria.

The alcohol interlock programme embraces a multi-faceted approach, aimed not only at separating drinking from driving but also at monitoring rehabilitation efforts while addressing the underlying cause of the behaviour by reducing the offender's level of alcohol consumption.

As well as receiving court and administrative sanctions, offenders in Victoria are required to take part in a Drink Driver Education Program in which their alcohol dependency is continuously assessed for a minimum of six months before they are declared fit for relicensing.

The Drink Driver Education Program for recidivists includes harm minimisation, relapse prevention, social skills training, cognitive-behavioural therapy, detoxification and pharmacotherapy. The measures having proven to be most successful include targeted intervention, deferred sentencing, court oversight, screening, counselling, assessment, extended small group education programmes (over 12 weeks) and case management.

**Table C.3 Ongoing and prospective alcohol interlock programmes in other Australian states**

JURISDICTION	DESCRIPTION
<b>Queensland</b>	A mandatory interlock programme is awaiting implementation in Queensland. Its duration can vary between one and four years, while an education and rehabilitation programme (11 weeks) must also be attended. The programme also includes a medical intervention component to address alcohol dependency issues.
<b>South Australia</b>	In South Australia, the alcohol interlock programme comprises both mandatory and voluntary schemes. It also includes a requirement for education/rehabilitation and mandatory counselling. More than 2 700 offenders are eligible to participate every year.
<b>New South Wales The</b>	The Drink-Less Program in New South Wales advocates the use of an alcohol interlock device, although installation is voluntary. Participating offenders have a reduced disqualification period. The most important part of the programme is the treatment component, involving a brief intervention in which all offenders must attend a consultation with a medical doctor no earlier than 28 days before the end of the disqualification period.
<b>Western Australia</b>	There is no specific education and/or rehabilitation programme in place in Western Australia at present, although there is support for the introduction of an alcohol interlock programme. The devices will be installed for a minimum of six months and offenders can apply for relicensing following the disqualification period. A medical report on the offender's alcohol dependency will be submitted by a medical doctor.
<b>Tasmania and the Northern Territory</b>	A interlock trial commenced in Tasmania in 2008 with voluntary participants. The Northern Territory also has a voluntary alcohol interlock programme in place that is available to repeat offenders.

**Source:** Compiled by the authors on the basis of TIRF, 2011.



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