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Emission factors 2009: Report 6 – deterioration factors and other modelling assumptions for road vehicles

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TRL Limited

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Contents

Executive Summary

TRL Limited was commissioned by the Department for Transport to review the methodology used in the National Atmospheric Emissions Inventory (NAEI) for estimating emissions from road vehicles. Various aspects of the methodology were addressed.

In the NAEI, scaling factors are applied to the basic emission factors to enable the modelling of emissions in different years. These scaling factors cover to the following:

- The changes in emissions associated with vehicle age (‘degradation’ or ‘deterioration’).
- The effects of the penetration of improved fuels and other technologies.

The current assumptions concerning vehicle age are rather simplistic, and do not take into account the characteristics of the vehicle samples used to derive emission factors. Similarly, the fuel and technology scaling factors were devised several years ago, and many were assumed to stabilise after 2005. There are some doubts as to their relevance to emission factors now being derived from more recent test programmes.

The Report describes the emission factors currently used in the NAEI, including the deterioration functions and the fuel and technology scaling factors. It also provides a brief review of the mileage, fuel and technology effects given in the literature.

The derivation of new emission factors for UK road vehicles is described in a separate Report. This Report describes how the scaling factors to be applied to the new emission factors were derived. Scaling factors for different years were developed to account for the following:

- Mileage effects relating to vehicle samples.
- Fuel composition effects.
- Increased market penetration of biofuels for use in existing petrol and diesel-engined vehicles.
- Effects of future technologies.

In the case of the mileage scaling factors, some examples of values are presented in the Report. However, these are not definitive. Users of the emission factors must calculate their own mileage scaling factors based on appropriate vehicle age and mileage distributions for each vehicle category and year.

1 Introduction

1.1 Background

Emissions of air pollutants in the United Kingdom are reported in the National Atmospheric Emissions Inventory (NAEI)[1]. Estimates of emissions are made for the full range of sectors, including agriculture, domestic activity, industry and transport. The results are submitted by the UK under various international Conventions and Protocols, and are used to assess the need for, and effectiveness of, policy measures to reduce UK emissions. Projections from the road transport model in the NAEI are used to assess the potential benefits of policies and future emission standards for new vehicles. It is therefore essential that the model is as robust as possible and based on sound data.

TRL Limited has been commissioned by the Department for Transport (DfT) to review the methodology currently used in the NAEI to estimate emissions from road vehicles. The overall purpose of the project is to propose complete methodologies for modelling UK road transport emissions. The project includes an extensive and detailed review of the current methodology. It will identify where approaches could improve the quality of the emission estimates, and will show where existing methodologies give good quality estimates and should be retained.

The specific objectives of the project take the form of a list of Tasks. These Tasks, which are self-explanatory, are:

- Task 1: Review of the methods used to measure hot exhaust emission factors, including test cycles and data collection methods (Boulter *et al.*, 2009a).
- Task 2: Review of the use of average vehicle speed to characterise hot exhaust emissions (Barlow and Boulter, 2009).
- Task 3: Development of new emission factors for regulated and non-regulated pollutants (Boulter *et al.*, 2009b).
- Task 4: Review of cold-start emissions modelling (Boulter and Latham, 2009a).
- Task 5: Reviewing the effects of fuel quality on vehicle emissions (Boulter and Latham, 2009b).
- Task 6: Review of deterioration factors and other modelling assumptions (this Report).
- Task 7: Review of evaporative emissions modelling (Latham and Boulter, 2009).
- Task 8: Demonstration of new modelling methodologies (Boulter *et al.*, 2009c).
- Task 9: Final report (Boulter *et al.*, 2009c).

Task 1 also included the compilation of a Reference Book of driving cycles (Barlow *et al*., 2009).

This Report presents the findings of Task 6, the overall aim of which was to review the deterioration factors for road vehicle emissions and other modelling assumptions in the NAEI.

In the measurement and modelling of vehicle emissions, various abbreviations and terms are used to describe the concepts and activities involved. Appendix A provides a list of abbreviations and a glossary which explains how specific terms are used in the context of this series of Reports.

It should also be noted that, in accordance with the legislation, a slightly different notation is used in the Report to refer to the emission standards for light-duty vehicles (LDVs)[2], heavy-duty vehicles (HDVs)[3] and two-wheel vehicles. For LDVs and two-wheel vehicles, Arabic numerals are used (*e.g.* Euro 1, Euro 2…*etc.*), whereas for HDVs Roman numerals are used (*e.g.* Euro I, Euro II…*etc.*).

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[1] http://www.naei.org.uk/

[2] Light-duty vehicles are vehicles weighing less than or equal to 3.5 tonnes, including cars and light goods vehicles (LGVs). LGVs are sometimes also referred to as ‘light commercial vehicles’, ‘light trucks’ or ‘vans’ in the literature. The term LGV is used in this Report.

[3] Heavy-duty vehicles are all vehicles heavier than 3.5 tonnes, including heavy goods vehicles (HGVs), buses and coaches.

1.2 The current NAEI approach for hot exhaust emissions

During 2002, an updated database of vehicle emission functions for CO, HC, NO_x, PM_{10}, benzene, 1,3-butadiene, CO_2 and fuel consumption was prepared by TRL and NETCEN for use in the NAEI. These algorithms expressed emission factors (in g km^{-1}) as a function of average vehicle speed. The database included existing measurements from an earlier 1998 TRL database, data from the EC MEET[4] project, and a new set of measurements reported by TRL (Barlow *et al.*, 2001). The new TRL measurements were drawn from programmes conducted on behalf of DfT between 1997 and 2000.

After a period of public consultation on the new emission data and functions, discussions were held between TRL and NETCEN, during which a more complete set of functions were agreed. These agreed functions are still used in the NAEI, as well as in a number of other models and applications in the UK.

The vehicle classification system used in the NAEI is shown in Table 1. This is a modified version of the system of classification used in legislation. An emission function is assigned to each of the classes of vehicle in Table 1.

Table 1: The road vehicle classification used in the NAEI.

Vehicle category	Regulation
Petrol car by engine size: <1.4 litres 1.4-2.0 litres >2.0 litres	ECE 15.01
	ECE 15.02
	ECE 15.03
	ECE 15.04 + failed
	Euro 1
	Euro 2
	Euro 3
	Euro 4
Diesel car by engine size: <2.0 litres >2.0 litres	Pre-Euro 1
	Euro 1
	Euro 2
	Euro 3
	Euro 3 + particulate
	Euro 4
	Euro 4 + particulate
Petrol LGV	Pre-Euro 1
	Euro 1 (93/59/EEC)
	Euro 2
	Euro 3
	Euro 4
Diesel LGV	Pre-Euro 1
	Euro 1 (93/59/EEC)
	Euro 2
	Euro 3
	Euro 4

Vehicle category	Regulation
Rigid HGV	Pre-1988
	Pre-Euro I (88/77EEC)
	Euro I (91/542/EEC)
	Euro II
	Euro III
	Euro IV
	Euro IV+
Articulated HGV	Pre-1988
	Pre-Euro I (88/77EEC)
	Euro I (91/542/EEC)
	Euro II
	Euro III
	Euro IV
	Euro IV+
Bus	Pre-1988
	Pre-Euro I (88/77EEC)
	Euro I (91/542/EEC)
	Euro II
	Euro III
	Euro IV
	Euro IV+
2-wheel vehicle: Moped (2-stroke) <250cc 2-stroke <250cc 4-stroke 250-750cc 4-stroke >750cc 4-stroke	Pre-2000
	97/24/EC

† No separate emission functions are provided for failed catalyst vehicles.

In Table 1 LGVs are defined as any light-duty vehicle less than 3.5 tonnes GVW, capable of carrying goods. HGVs are defined as goods vehicles with a GVW in excess of 3.5 tonnes.

With the exception of CO_2, the emission functions for the pollutants covered in the NAEI are identical to those used in the Design Manual for Roads and Bridges (DMRB) procedure for air pollution estimation (Highways Agency *et al.*, 2003). Prior to 2002, the road transport emission functions contained within the DMRB and the

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[4] MEET = Methodologies for estimating emissions from transport.

NAEI were different, but as part of the development of the supporting material and guidance for the DEFRA Air Quality Review and Assessment process, these databases were standardised.

In addition to the emission functions, in the NAEI a number of assumptions are made to enable the modelling of emissions in different years. These assumptions relate to the following:

- The changes in emissions associated with vehicle age (‘degradation’ or ‘deterioration’).
- The effects of the penetration of improved fuels and other technologies.

The current assumptions concerning vehicle mileage are rather simplistic, and do not take into account the characteristics of the vehicle samples used to derive emission factors. Similarly, the fuel and technology scaling factors were devised several years ago, and many were assumed to stabilise after 2005. There are some doubts as to their relevance to emission factors now being derived from more recent test programmes.

This Report examines the validity of the current assumption in the light of recent test data. The analysis is limited to the assumptions which relate directly to the emission factors, and do not extend to the UK vehicle fleet model.

1.3 Report structure

The derivation of ‘basic’ 2009 emission factors for UK road vehicles was described in Task Report 3 (Boulter and Barlow, 2009). The term ‘basic’ is used here to indicate that the emission factors are either normalised for mileage or reflect current vehicle and fuel technologies, and should be used in conjunction with scaling factors when estimating actual emissions. Scaling factors for different years were therefore required to account for the following:

- Mileage effects relating to vehicle samples.
- Fuel composition effects.
- Increased market penetration of biofuels for use in existing petrol and diesel-engined vehicles.
- Effects of future technologies.

Chapter 2 of this Report describes the emission factors currently used in the NAEI, including the deterioration functions and the fuel and technology scaling factors. Chapter 3 provides a brief review of mileage, fuel and technology effects in the literature, and in Chapter 4 scaling factors to be applied to the 2009 emission factors are presented. In the case of the mileage scaling factors, some examples of values are presented in the Report. However, these are not definitive, and users must calculate their own values based on appropriate vehicle age and mileage distributions.

2 NAEI emission functions and assumptions

This Chapter of the Report describes the basic emission functions currently used in the NAEI, including the deterioration functions and the fuel and technology scaling factors. The full NAEI methodology does not appear to be publicly available. However, a methodology is available for the UK Greenhouse Gas Inventory for submission under the Framework Convention on Climate Change (Choudrie *et al.*, 2008). It is assumed that this methodology is, in fact, the same as that used in the NAEI.

2.1 Emission functions for CO, HC, NO_x and PM

2.1.1 Petrol cars

Pre-Euro 1 cars

The emission factors for CO, HC and NO_x for pre-Euro 1 petrol cars were based on data from the 1998 TRL database (unpublished) and the COPERT II model produced by the European Topic Centre on Air Emissions for the European Environment Agency (Ahlvik *et al.*, 1997). Both these sources provided emission functions and coefficients relating emission factors (in g/km) to average speed for each vehicle type and emission standard. These functions were derived by fitting polynomial functions to experimental measurements. No PM data were available for pre-Euro 1 petrol cars. An average value (independent of speed) of 0.02 g/km was assumed, and the relative speed dependence around this value was taken to be the same as that for CO.

Euro 1 and Euro 2 cars

The emission factors for Euro 1 and Euro 2 cars were based on speed-emission factor relationships derived by TRL (Barlow *et al*., 2001). The tests were carried out on in-service vehicles on dynamometer facilities using real-world driving cycles.

Euro 3 and Euro 4 cars

Due to the lack of measurements, the emission factors for Euro 3 and Euro 4 cars were estimated by applying emission-reduction factors to the equations for Euro 2 vehicles. These scaling factors were based partly on factors given in MEET (European Commission, 1999) and partly on a judgement of the extent that emissions from Euro 2 vehicles would need to be reduced to meet the Euro 3 and 4 limit values, calculated from the coefficients at the average speed of the regulatory Extra Urban Drive Cycle (EUDC) used for type-approval. Some limited data from TRL on Euro 3 vehicles also aided the judgement. Since PM emissions from petrol vehicles are not regulated, and are much lower than those from diesel cars, it was assumed that PM emissions from Euro 3 and Euro 4 vehicles would remain at Euro 2 levels.

2.1.2 Diesel cars

The emission functions for pre-Euro 1, Euro 1, and Euro 2 vehicles were all derived from TRL measurements. The pre-Euro 1 emission functions were taken from the 1998 TRL database, and the Euro 1 and Euro 2 functions were taken from Barlow *et al.* (2001). The Euro 3 and 4 emission functions (including PM) were based on emission reduction scaling factors applied to the equations for Euro 2 vehicles.

2.1.3 Petrol LGVs

The emission functions for pre-Euro 1 LGVs were drawn from the 1998 TRL database for small and medium sized LGVs, with the Euro 1 functions being taken from Barlow *et al.* (2001). Emission functions for Euro 2 petrol LGVs were not available, and so they were assumed to be the same as for medium-sized petrol cars. The emission functions for Euro 3 and 4 vehicles were based on emission-reduction factors applied to the equations for Euro 2 vehicles. The same scaling factors as those applied to petrol cars were used. No emission factors for PM emissions were available for petrol LGVs. For pre-Euro 1 vehicles, a bulk estimate of 0.04

g/km, agreed some years ago for use in the NAEI, was retained, but the relative speed dependence around this value was assumed to be the same as that for CO. PM emission functions for Euro 1 and 2 vehicles were assumed to be the same as for medium sized petrol cars. Since PM emissions from petrol vehicles are not regulated, it was assumed that PM emissions from Euro 3 and Euro 4 vehicles would remain at Euro 2 levels.

2.1.4 Diesel LGVs

The emission functions for pre-Euro 1 vehicles were obtained from the 1998 TRL database for medium and large sized LGVs, and the Euro 1 emission functions were taken from Barlow *et al.* (2001). Emission factors for Euro 2 diesel LGVs were not available. For all pollutants except NO_X, the emission levels of Euro 1 vehicles appeared to be within the limits for Euro 2. Hence, the emission coefficients for Euro 2 diesel LGVs were assumed to be the same as those for Euro 1 on the basis that no further reduction in emissions was necessary. For NO_x, a slight reduction in emissions was required from Euro 1 to meet the Euro 2 limits. Therefore, the Euro 1 coefficients were adopted, with a 0.95 scaling factor for Euro 2 vehicles. The Euro 3 and Euro 4 emission functions (including PM) were derived by applying emission-reduction factors to the functions for Euro 2. These scaling factors were estimated following much the same principles as for petrol and diesel cars (*i.e.* based on the extent emissions needed to be reduced to meet the limit values), with information from MEET and some limited data from TRL on Euro 3 vehicles aiding the judgement.

2.1.5 HGVs and buses

The emission functions for pre-Euro I, Euro I, and Euro II vehicles were all drawn from TRL measurements. The pre-Euro I functions were from the 1998 TRL database, and the Euro I and Euro II functions were taken from the 2001 TRL Report. Drive-cycle factors for pre-1988 HGVs, of which some remain in the fleet, have been used in the NAEI; these have corresponded to earlier measurements over the Warren Spring Laboratory (WSL) drive cycles. Speed-dependent emission equations were derived for this old category of HGVs from these existing WSL road-type factors, either assuming the relationship with speed was flat or had the same relative speed-dependence as the later pre-Euro I vehicles on the basis of the variation in the road-type factors with average cycle speed. In the latter case, the emission functions for old HGVs were used, based on emission scaling factors applied to the factors for pre-Euro I vehicles. Euro III and IV emission functions were based on emission reduction scaling factors applied to the equations for Euro II. The scaling factors were drawn from COPERT III (Ntziachristos and Samaras, 2000a).

2.1.6 Motorcycles

Speed-dependent functions provided by TRL were used for different sizes of motorcycle. Prior to 2000, all motorcycles were assumed to be uncontrolled. It was also assumed that mopeds (<50cc) operated only in urban areas, while motorcycles outside urban areas (motorways) would be dominated by 4-stroke engines with a capacity greater than 50cc. Otherwise, the numbers of vehicle kilometres driven on each road type were disaggregated by motorcycle type according to the proportions in the fleet. Motorcycles sold since the beginning of 2000 were assumed to meet the Directive 97/24/EC, and their emission functions were reduced according to the factors given in COPERT III (Choudrie *et al.*, 2008).

2.2 Emission functions for benzene and 1,3-butadiene

The emission coefficients for benzene and 1,3-butadiene were the same as those for total hydrocarbons, except for the use of a scaling coefficient reflecting the mass fraction of these two species in the total hydrocarbon emissions from different vehicle types. The mass fractions were based on the NMVOC emission speciation fractions for benzene and 1,3-butadiene in COPERT III. In deriving species fractions of the total hydrocarbon emission functions given by TRL, it was necessary to account for the amount of methane in the HC emissions, as the COPERT figures refer to fractions of non-methane volatile organic compounds. The methane components of the total HC emissions from each vehicle type were calculated from the COPERT III emission factors for methane.

2.3 Emissions of CO_2

Carbon dioxide emissions are not regulated under the EU emission standards. Nevertheless, for convenience, the vehicle classification used for the definition of CO_2 emission functions is the same as that for the regulated emissions, but in this case there are not significant, stepwise changes between the legislation classes. Emissions of carbon dioxide (and sulphur dioxide) from road transport are calculated from the consumption of petrol and diesel fuel. Data on petrol and diesel fuels consumed by road transport in the UK are taken from the Digest of UK Energy Statistics published by the Department of Trade and Industry (DTI), and corrected for the fuel consumption of off-road vehicles. Emissions of CO_2, expressed as kg carbon per tonne of fuel, are based on the carbon content (by mass) of the fuel. Values of the fuel-based emission factors for CO_2 from consumption of petrol and diesel fuels are shown in Table 2.

Table 2: Fuel-based emission factors for carbon (Choudrie *et al*., 2008).

Fuel	C (kg per tonne of fuel)
Petrol	855
Diesel	863

Average-speed functions for (exhaust) CO_2 were developed by TRL (Barlow *et al.*, 2001). For cars, average fuel consumption factors were calculated from UK fleet-averaged CO_2 emission factors for different car vintages (years of production) provided by DfT following consultation with the Society of Motor Manufacturers and Traders (SMMT). The dependence on speed was based upon the TRL speed functions for different Euro standards. For LGVs, HGVs, buses and motorcycles, the inventory used fuel consumption factors (expressed in grammes of fuel per kilometre) for each vehicle type and road type, calculated directly from the TRL equations. A normalisation procedure was used to ensure that the breakdown of petrol and diesel consumption by each vehicle type, calculated on the basis of the fuel consumption factors, added up to the DTI figures for total fuel consumption in the UK (adjusted for off-road consumption).

Total CO_2 emissions from vehicles running on LPG are estimated in the NAEI on the basis of national figures (from DTI) on the consumption of this fuel by road transport. The CO_2 emissions from LPG consumption cannot be broken down by vehicle type because there are no figures available on the total number of vehicles or types of vehicles running on this fuel. It is believed that many vehicles running on LPG are cars and vans converted by their owners and that these conversions are not necessarily reported to vehicle licensing agencies. It is for this same reason that LPG vehicle emission estimates are not possible for other pollutant types, because these would need to be based on traffic data and emission factors for different vehicle types rather than on fuel consumption (Choudrie *et al*., 2008). Emissions from vehicles running on natural gas are not estimated at present, although the number of such vehicles in the UK is very small. Estimates are not made as there are no separate figures from DTI on the amount of natural gas used by road transport, nor are there useable data on the total numbers and types of vehicles equipped to run on natural gas.

At present, there are no definitive centralised statistics from the DTI on the amount of biofuels consumed by road transport in the UK. The total amount is still relatively small, although it is growing each year. DTI has indicated that biofuels are not combined with fossil fuels in their transport fuel statistics, and are currently investigating the separate provision of national statistics on biofuel consumption by road transport. At present, emissions from road transport consumption of biofuels are not included in the inventory. Carbon emissions from road transport consumption of biofuels would not be included in the national totals. Other pollutant emissions would be included in the inventory on the basis of emission factors and usage rates (amount of fuel consumed or traffic data) although the differences in emission factors for vehicles running on biofuels and those running on fossil fuels are likely to be small for these pollutants (Choudrie *et al*., 2008).

2.4 Emission degradation functions

An emission factor calculated for a particular vehicle type and emission standard is effectively an average value for in-service vehicles at the time of testing. These vehicles have various ages and mileages, and thus any degradation in emissions with vehicle age is included in the sample. However, as time passes the average accumulated mileage of vehicles conforming to a given emission standard increases. For example, the accumulated mileage of Euro 2 cars would generally be very different in 1998 and 2005. In the case of the more recent LDV emission standards included in the 2002 database (*i.e.* Euro 1 and 2 at the time the database was compiled), the vehicles would have been fairly new when the emissions were measured, but Euro 1 and Euro 2 vehicles in the current fleet will be rather old. Therefore, adjustment factors are required to account for the deterioration in emissions with age or mileage.

2.4.1 Cars and LGVs

Based on data from the European Auto-Oil study, the deterioration in emissions with age or mileage was taken into account for Euro 1 and Euro 2 vehicles in the NAEI. It was assumed that emissions of CO and NO_x would increase by 60% over 80,000 km, whist emissions of NMVOCs would increase by 30% over the same accumulated distance (Choudrie *et al*., 2008). Based on the average annual mileage of cars, 80,000 km corresponded to a time period of 6.15 years.

For Euro 3 and Euro 4 petrol cars the scaling factors took into consideration the requirement for new vehicles to meet certain durability standards. It was assumed that emissions from new vehicles would be a certain percentage lower than the limit value-derived figure when new, so that the vehicle would not have emissions that degrade to levels higher than the limit value over the durability period of the vehicle. The emission degradation rates permitted for Euro 3 and 4 light duty petrol vehicles by Directive 98/69/EC are given in Table 3. Account was taken of the fact that the regulatory cycle for the Euro 3 and 4 tests applies the moment the vehicle is switched on, and therefore includes a period of ‘cold start’ emissions. The degradation factors for diesel cars estimated following much the same principles as for petrol cars (Table 4).

Table 3: Emission degradation rates for petrol cars (from Choudrie *et al*., 2008).

Pollutant(s)	Emission standard	Degradation rate
NO_x, HC and CO	Euro 3	x1.2 over 80,000km
	Euro 4	x1.2 over 100,000km

Table 4: Emission degradation rates for diesel cars (from Choudrie *et al*., 2008).

Pollutant(s)	Emission standard	Degradation rate
PM	Euro 3	x1.2 over 80,000km
	Euro 4	x1.2 over 100,000km
CO	Euro 3	x1.1 over 80,000km
	Euro 4	x1.1 over 100,000km

Note: Although the referenced report gives durability for Euro 4 cars over 100,000km, Directive 98/69/EC actually specifies 80,000 km.

2.4.2 HGVs and buses

According to Choudrie *et al.* (2008), the degradation factors for heavy-duty vehicles are taken from COPERT III. However, this is a source of some confusion, as COPERT III does not contain degradation factors for HDVs.

2.5 Fuel and technology scaling factors

Emissions from existing vehicles in the fleet can be reduced if improved fuels (*e.g.* lower sulphur content) are used or if the vehicles are retrofitted with emission-control devices (*e.g.* particulate traps). In the NAEI, scaling factors are applied to the basic emission factors for each year of the inventory. These scaling factors are designed to reflect the penetration of improved fuels and other technologies which ought to influence the emission levels in future years. The NAEI takes account of the early introduction of certain emission and fuel quality standards and additional voluntary measures to reduce emissions from road vehicles in the UK fleet. In addition the use of engine developments and exhaust abatement technologies, while designed to limit the emissions of specific pollutants such as PM, can have significant impacts on other non-regulated pollutants. The fuel and technology scaling factors currently in use are given in Appendix B. The fuel and technology scaling factors were devised several years ago, and many were assumed to stabilise after 2005. Clearly there are some doubts as to their relevance to emission factors now being derived from more recent test programmes.

2.5.1 Early introduction of ultra-low sulphur petrol and diesel – HGVs and buses

The early introduction of ultra-low sulphur petrol and diesel (100% by 2001) into the national fleet was taken into account. Many bus fleets had converted to ultra-low sulphur diesel (ULSD) as early as 1997, and this was also accounted for. The impact these fuels would have on emissions from existing vehicles in the fleet was based on empirical formulae from EPEFE[5] on the relationship between emissions and fuel quality, combined with information drawn from MEET, the World-Wide Fuel Charter reports and various reports prepared by Millbrook and LT Buses on the effects of fuel quality on emissions from heavy duty vehicles (Murrells, 2000).

Emissions from HGVs and buses were scaled down according to the proportions running on ULSD fuel in each year, the proportions fitted with oxidation catalysts or particulate traps (CRTs), and the effectiveness of these measures in reducing emissions. Choudrie *et al.* (2008) state that (the small number of) HGVs equipped with CRTs have their emissions reduced by the amounts shown in Table 5. It is assumed that a HDV fitted with a CRT is also running on ultra-low sulphur diesel. The effectiveness of measures in reducing emissions from a Euro II bus is shown in Table 6. Again, it is assumed that a bus fitted with an oxidation catalyst or CRT is also running on ULSD. These scaling factors are relative to emissions from a bus running on 500 ppm sulphur diesel and are based on analysis of fuel quality effects by Murrells (2000) and data on the effectiveness of oxidation catalysts on bus emissions by LT Buses (1998).

Table 5: Scaling factors for emissions from a Euro II HGV running on ultra-low sulphur diesel and fitted with an oxidation catalyst or CRT (Choudrie *et al.*, 2008).

		CO	NMVOCs	NO_x
ULSD only	Urban	0.96	0.97	0.94
	Rural	1.01	1.02	0.99
ULSD + CRT	Urban	0.10	0.12	0.81
	Rural	0.10	0.12	0.85

Table 6: Scaling factors for emissions from a Euro II bus running on ultra-low sulphur diesel and fitted with an oxidation catalyst or CRT (Choudrie *et al.*, 2008).

		CO	NMVOCs	NO_x
ULSD only	Urban	0.91	0.72	1.01
	Rural	1.01	1.02	0.99
ULSD + oxidation catalyst	Urban	0.20	0.39	0.97
	Rural	0.22	0.55	0.95
ULSD + CRT	Urban	0.17	0.19	0.90
	Rural	0.19	0.27	0.88

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[5] EPEFE = European Programme on Emissions, Fuels and Engine Technologies.

2.5.2 The effect of benzene content of petrol on exhaust emissions of benzene

The effect of the benzene content of petrol on exhaust emissions of benzene was included in the 2002 revision to the UK emission factors. According to the UK Petroleum Industries Association (UKPIA), a substantial decrease (76 %) in the benzene content of UK petrol occurred in 2000 in order to meet the lower EU limit of 1% introduced that year. Equations from EPEFE and MEET were used to derive factors reflecting the effect of reduced benzene content on benzene emissions from catalyst cars. No such information was available for non-catalyst cars. However, on the basis of fundamental combustion chemistry and the significant reductions in ambient benzene concentrations observed in early 2000 at a number of air pollution monitoring sites, it was concluded that the reductions in benzene content of petrol led to a proportional reduction in benzene emissions from non-catalyst cars. This was represented with an emission reduction scaling factor for this class of vehicle. For all vehicle categories except buses, benzene emissions were assumed to stabilise at 2001 levels. For buses, emissions were assumed to stabilise at 2006 levels.

2.5.3 Retrofitting of PM traps and oxidation catalysts on heavy-duty diesel vehicles

The retrofitting of particulate traps and oxidation catalyst on some heavy duty diesel vehicles is accounted for, on the basis of information on their likely uptake. The assumptions on their effects on emissions and their fleet uptake are described in the Technical Annex of the Air Quality Strategy consultation document (DEFRA *et al.*, 2001).

2.5.4 CO_2 emissions

The basic CO_2 emission factors will be influenced by the general improvements in technology introduced to improve fuel economy and, for cars in particular, by voluntary agreements between the European Automobile Manufacturers Association (ACEA) and the EU to reduce emissions.

The TRL emission databases were the sources used for pre-Euro 1, Euro 1, and Euro 2 cars, pre-Euro 1 and Euro 1 LGVs, and pre-Euro I, Euro I, and Euro II HGVs and buses, in the same way as for the CO, HC, NO_x and PM functions described above. For cars and LGVs it was assumed that the basic emissions of Euro 3 vehicles would be reduced from the Euro 2 levels by the same proportion that Euro 2 emissions were reduced from Euro 1 levels. The same proportional reduction was applied to Euro 3 emission levels to derive Euro 4 levels. For petrol cars, diesel cars and petrol LGVs, an additional adjustment was made in order to take into account the voluntary agreement: emissions were reduced linearly to 140 g/km between 2000 and 2008, with no further improvement thereafter. Euro III and Euro IV buses and HGVs were assumed to have emission levels equivalent to those of Euro II vehicles.

2.6 Other assumptions

In the NAEI, assumptions are currently made about the proportion of failing catalysts in the petrol car fleet. For first-generation catalyst cars (Euro 1), it is assumed that the catalysts fail in 5% of cars fitted with them each year (for example due to mechanical damage of the catalyst unit) and that 95% of failed catalysts are repaired each year, but only for cars more than three years in age, when they first reach the age for MOT testing. Lower failure rates are assigned to Euro 2 (1.5%), Euro 3 (0.5%) and Euro 4 (0.5%) cars manufactured since 1996.

3 Review of mileage, fuel and technology effects

3.1 Overview

This Chapter of the report provides a brief review of the mileage, fuel and technology effects on emissions reported in the literature, and in particular the use of scaling factors.

3.2 Mileage effects

3.2.1 Light-duty vehicles

In the ARTEMIS project (Joumard *et al.*, 2006), the influence of the mileage M_1 or M_2 (km) for LDVs is expressed by the formula:

$$\frac{emission(M_1)}{emission(M_2)} = \frac{y(M_1)}{y(M_2)} \qquad \text{(Equation 1)}$$

Values of ***y*** are given for Euro 1 and 2 petrol cars in Table 7, and for Euro 3 and 4 petrol cars in Table 8**,** in both cases for urban and rural situations (average speeds lower than 19 km/h and higher than 63 km/h respectively). For an intermediate speed, ***V***, the following formula is used:

$$y(V) = y(urban) + \frac{(V - 19) \cdot (y(rural) - y(urban))}{44} \qquad \text{(Equation 2)}$$

Table 7: Emission degradation correction factor $y = a \times Mileage + b$, for Euro 1 and Euro 2 petrol vehicles. Mileage expressed in km, y normalised for the corresponding average mileage.

Petrol Euro 1 and 2		Engine capacity (l)	Average mileage (km)	***a***	***b***	Value at ≥ 120,000 km
y (urban) for ***V***≤19 km/h	CO	≤1.4	29,057	1.523E-05	0.557	2.39
		1.4-2.0	39,837	1.148E-05	0.543	1.92
		>2.0	47,028	9.243E-06	0.565	1.67
	HC	≤1.4	29,057	1.215E-05	0.647	2.10
		1.4-2.0	39,837	1.232E-05	0.509	1.99
		>2.0	47,028	1.208E-05	0.432	1.88
	NO_x	All	44,931	1.598E-05	0.282	2.20
y (rural) for ***V***≥63 km/h	CO	≤1.4	29,057	1.689E-05	0.509	2.54
		1.4-2.0	39,837	9.607E-06	0.617	1.77
		>2.0	47,028	2.704E-06	0.873	1.20
	HC	≤1.4	29,057	6.570E-06	0.809	1.60
		1.4-2.0	39,837	9.815E-06	0.609	1.79
		>2.0	47,028	6.224E-06	0.707	1.45
	NO_x	all	47,186	1.220E-05	0.424	1.89

Table 8*:* Emission degradation correction factor $y = a \times Mileage + b$, for Euro 3 and Euro 4 petrol vehicles. Mileage expressed in km, *y* normalised for the corresponding average mileage.

Petrol Euro 3 and 4		Engine capacity (l)	Average mileage (km)	***a***	***b***	Value at ≥ 160,000 km
y (urban) for ***V***≤19 km/h	CO	≤1.4	32,407	7.129E-06	0.769	1.91
		>1.4	16,993	2.670E-06	0.955	1.38
	HC	≤1.4	31,972	3.419E-06	0.891	1.44
		>1.4	17,913	0	1	1
	NO_x	≤1.4	31,313	0	1	1
		>1.4	16,993	3.986E-06	0.932	1.57
y (rural) for ***V***≥63 km/h	CO	≤1.4	30,123	1.502E-06	0.955	1.20
		>1.4	26,150	0	1	1
	HC	all	28,042	0	1	1
	NO_x	all	26,150	0	1	1

The literature suggests that CO_2 emissions are not affected by vehicle mileage (Samaras and Ntziachristos, 1998; Ntziachristos and Samaras, 2000b; Geivanidis and Samaras, 2004).

3.2.2 Heavy-duty vehicles

In order to determine whether a vehicle mileage effect had to be taken into account for HDVs in the ARTEMIS emission model, the effects of engine deterioration and maintenance on emissions were assessed by Rexeis *et al.* (2005). Data from the Dutch and German in-use compliance programmes were used for this purpose. The assessment focused only on Euro I, II and III vehicles (200 vehicles in total).

The results for Euro I and II vehicles were surprising. Where an increase in emissions with increasing mileage was anticipated, an improvement was observed for most pollutants. A clear increase in emissions was only evident for HC from Euro III vehicles, and to a lesser extent for Euro III PM emissions. One explanation for the lower emissions of vehicles with higher mileage could be that the fuel consumption was, on average, lower for vehicles with a high mileage. Another explanation is that vehicles in the database with a high mileage were probably used for long -distance transport activities. The general conclusion for the ARTEMIS model was that no mileage scaling factors were needed for Euro I to Euro III vehicles.

Rexeis *et al.* (2005) noted that there are currently several different emission-control devices which are considered relevant to the Euro IV emission standards and beyond, including:

- Exhaust gas recirculation (EGR).
- Diesel oxidation catalyst.
- Selective catalytic reduction of NO_x (SCR).
- Diesel particulate filter (DPF).

The conclusions in relation to the deterioration of Euro IV and Euro V technologies were as follows:

- There is no reason to assume that the deterioration pattern of engine-out emissions would differ much from engines of earlier Euro classes.
- Emission-control devices can contribute to the deterioration of specific pollutants as a result of ageing, malfunctioning and even tampering.
- Some of the anticipated effects of component deterioration (including the effects of malfunctioning and tampering) can be prevented by the installation of an OBD system, which will be mandatory from Euro IV onwards.
- Emission-control devices featuring catalysts will show some emission deterioration over the life of the vehicle due to ageing. At present it is not possible to give exact values since the technology is not fully developed and few data are available.

3.3 Fuel effects

Fuel effects were reviewed in some detail in Task Report 5 (Boulter and Latham, 2008). This work is not repeated here.

3.4 Technology effects

3.4.1 Cars and LGVs

Within the ARTEMIS project Samaras and Geivanidis (2005) provided emission factors for Euro 4 petrol cars. However, there are relatively few measurements for Euro 4 cars, and none for Euro 5 cars. It was proposed that the Euro 4 equations for petrol vehicles are also used for Euro 5 petrol vehicles. In the case of direct injection petrol vehicles, the literature and the limited available data indicated a reduction in fuel consumption of around 10%. Samaras and Geivanidis (2005) also presented the reduction of emissions expected in Euro 4 and 5 diesel vehicles using as basis the emissions of Euro 3 vehicles. These factors where derived from the ratios of the established Euro 4 or expected Euro 5 emission standards (Table 7) over the emission standards of Euro 3:

Table 7: Reduction factors for future diesel vehicle technologies.

	CO	HC	NO_x	PM	
Euro 4	0.781	0.833	0.5	0.5	x Euro 3
Euro 5	0.781	0.833	0.35	0.1	x Euro 3

Table 8 presents the PM mass reduction potential of the installation of a DPF on a vehicle. The factors were derived under the assumption that the application of a DPF leads to PM levels comparable to the expected Euro 5 limit.

Table 8: Reduction of PM mass emissions due to the addition of a DPF.

	PM	
Euro 3 + DPF	0.1	x Euro 3
Euro 4 + DPF	0.1	x Euro 4

3.4.2 Heavy-duty vehicles

In the ARTEMIS model for heavy-duty vehicles, the option of ‘DPF-technology’ can be chosen, which assumes a reduction in PM mass of approximately 90%, and an increase in fuel consumption of 3%, compared with the relevant basic engine emission map (Rexeis *et al*. (2005).

4 Scaling factors applicable to the 2009 emission factors

The development of the basic emission factors for road vehicles was described by Boulter and Barlow (2009). These basic emission factors are complemented by scaling factors to take account of (i) mileage effects associated with vehicle samples and (ii) future improvements in fuels and vehicle technologies.

4.1 Vehicle mileage scaling factors

An emission factor for a particular vehicle type and emission standard is usually an average value for vehicles of different ages and mileages which inherently takes account of possible changes in emissions with vehicle age, relative to new vehicle emissions performance. However, vehicles which are now rather old would have been relatively new when tested, with a relatively low mileage. For example, the accumulated mileage of Euro 2 vehicles would generally be very different in 1998 and 2005. Therefore, it is possible to refine the basic emission factors using scaling factors for the deterioration in emissions with age or mileage. This is not an altogether straightforward process, as different scaling factors are required for different years, and information is required on the average accumulated mileage of different types of vehicle by year.

4.1.1 Cars and light good vehicles

Rather than using existing mileage scaling factors, examples of new scaling factors for cars and LGVs were determined from the database of emission measurements compiled within the project. The following steps were taken to adjust the measured emission factors to take account of the wide range of vehicle mileage during tests:

(i) To generate the basic emission functions for cars, the emission test data were normalised to an accumulated mileage of 50,000 km for each vehicle type and pollutant. This process was described by Boulter and Barlow (2009). Only the emission factors for CO, HC and NO_x were normalised for mileage. Too few PM measurements were available to obtain deterioration functions, and literature suggests that CO_2 emissions are not affected by vehicle mileage.

(ii) For each vehicle category, the average age was calculated for the range of reference years of interest (1995-2030).

(iii) Relationships between vehicle age and mileage were established, and the average mileage was then calculated for each vehicle category and reference year.

(iv) For each vehicle category, reference year and pollutant, the emission factor associated with the actual average mileage and the emission factor for 50,000 km were calculated. The scaling factors were calculated by dividing the emission factor for the actual mileage by the emission factor for 50,000 km.

Normalisation of measured emission factors

As noted above, the basic CO, HC and NO_x emission factors for all LDVs were normalised to an accumulated mileage of 50,000 km for each vehicle type and pollutant. Due to a lack of data, no mileage correction was applied to test data relating to fuels other than conventional petrol or diesel. The mileage adjustment was applied for urban, rural and motorway driving using the formula:

$$\boldsymbol{E_{50,000} = E_{test} \times y_{50,000} / y_{test}} \qquad \text{(Equation 3)}$$

Where :

$E_{50,000}$ = emission factor at 50,000 km.
E_{test} = emission factor recorded during the test
$y_{50,000}$ = mileage adjustment factor for 50,000 km
y_{test} = mileage during test

The coefficients which are used to calculate the values of ***y*** for urban, rural and motorway driving are given in Table 9. Values for all the data are also shown.

Table 9: Coefficients of the regression fits to the CO, HC and NO_x emission factors and accumulated mileage data for cars. In each case, the function is of the form $y = ax + b$, where y is the emission factor in g/km, and x is the accumulated mileage.

Pollutant	Fuel	Emission standard	Urban		Rural		Motorway		All	
			a	b	a	b	a	b	a	b
CO	Petrol	Pre-Euro 1	2.570E-05	14.714	4.094E-05	4.621	5.339E-05	3.227	3.974E-05	8.661
		Euro 1	5.197E-05	0.243	3.053E-05	0.409	1.831E-05	2.086	4.303E-05	0.382
		Euro 2	1.428E-05	0.827	1.994E-06	0.552	4.284E-06	1.104	8.418E-06	0.785
		Euro 3	4.650E-06	0.617	1.866E-06	0.483	-1.318E-05	2.752	1.669E-06	0.954
		Euro 4	6.071E-06	0.462	9.622E-06	0.158	1.349E-05	0.430	1.021E-05	0.358
	Diesel	Pre-Euro 1	5.410E-07	0.965	1.025E-06	0.341	2.819E-07	0.375	1.054E-06	0.666
		Euro 1	4.277E-07	0.560	-6.683E-07	0.384	3.094E-07	0.183	-4.836E-07	0.504
		Euro 2	6.379E-06	0.230	2.620E-06	0.118	5.584E-07	0.038	3.749E-06	0.164
		Euro 3	8.183E-07	0.201	5.816E-07	0.038	1.333E-07	0.019	8.146E-07	0.097
		Euro 4	1.803E-06	0.074	1.509E-07	0.008	1.253E-07	0.009	1.166E-06	0.027
HC	Petrol	Pre-Euro 1	4.713E-06	1.804	3.525E-06	0.891	2.896E-06	0.461	4.459E-06	1.192
		Euro 1	4.749E-06	0.034	2.439E-06	0.040	7.092E-07	0.079	3.475E-06	0.042
		Euro 2	9.570E-07	0.122	2.879E-07	0.029	4.140E-07	0.024	6.376E-07	0.070
		Euro 3	2.943E-07	0.051	7.621E-08	0.024	-2.902E-07	0.060	1.256E-07	0.042
		Euro 4	1.214E-06	0.025	-3.931E-08	0.008	-1.340E-07	0.019	3.233E-07	0.022
	Diesel	Pre-Euro 1	5.121E-07	0.162	3.681E-08	0.086	4.510E-08	0.071	4.294E-07	0.120
		Euro 1	1.104E-07	0.089	-1.466E-07	0.063	-6.353E-08	0.036	-7.471E-08	0.082
		Euro 2	1.077E-06	0.036	1.704E-07	0.035	8.807E-08	0.019	5.253E-07	0.035
		Euro 3	3.863E-07	0.035	1.803E-07	0.015	4.645E-08	0.007	2.944E-07	0.021
		Euro 4	1.012E-06	0.010	3.015E-07	0.010	1.480E-06	0.010	1.024E-06	0.010
NO_x	Petrol	Pre-Euro 1	2.548E-06	1.378	-1.157E-06	2.688	6.518E-06	1.802	1.250E-06	1.985
		Euro 1	3.368E-06	0.155	3.779E-06	0.181	4.077E-06	0.274	3.761E-06	0.165
		Euro 2	-2.191E-06	0.334	-7.720E-07	0.170	1.301E-06	0.140	-9.811E-07	0.240
		Euro 3	-1.127E-06	0.152	-4.612E-07	0.080	-1.590E-07	0.092	-6.759E-07	0.113
		Euro 4	3.273E-07	0.059	4.379E-07	0.040	7.694E-07	0.010	4.315E-07	0.046
	Diesel	Pre-Euro 1	-2.036E-08	0.828	3.628E-07	0.583	1.731E-06	0.581	3.577E-07	0.714
		Euro 1	3.231E-06	0.588	8.112E-07	0.498	2.880E-07	0.740	1.764E-06	0.618
		Euro 2	9.963E-07	1.078	-1.541E-07	0.708	5.192E-07	0.998	1.611E-07	0.960
		Euro 3	-4.603E-06	1.194	-7.567E-06	0.826	-5.952E-06	1.026	-4.849E-06	1.010
		Euro 4	-3.819E-06	0.913	3.300E-07	0.319	3.411E-07	0.567	-1.312E-06	0.660

Estimation of average vehicle age

NB: The age and mileage values presented here, and the resulting mileage scaling factors, should be viewed as indicative, and are provided to illustrate the recommended approach. These indicative scaling factors are available on the DfT web site. Users of the emission factors must calculate their own mileage scaling factors based on appropriate vehicle age and mileage distributions for each vehicle category and year.

For each car category, the average age was calculated for each reference year from 1995 to 2030 inclusive. UK vehicle licensing statistics[6] were used for this purpose. The licensing statistics are stated in terms of the numbers of cars licensed by propulsion (fuel), engine capacity, and year of first registration. Similar data are available for LGVs, although there is no distinction according to fuel type. However, this process was not straightforward for a number of reasons.

Firstly, the licensing statistics relate to model years and not specific emission standards. Assumptions were therefore required to align the two. The assumed correspondence between emission standard and model year is given in Table 10.

Table 10: Assumed correspondence between emission standard and model year for LDVs.

Emission standard	Model years (inclusive)			
	Car <2.5 t, taxi	Car 2.5-3.5 t	LGV N1(I)	LGV N1(II/III)
Pre-Euro 1	Up to 1992	Up to 1994	Up to 1994	Up to 1994
Euro 1	1993 to 1996	1995 to 1998	1995 to 1997	1995 to 1998
Euro 2	1997 to 2000	1999 to 2001	1998 to 2000	1999 to 2001
Euro 3	2001 to 2005	2002 to 2006	2001 to 2005	2002 to 2006
Euro 4	2006 to 2010	2007 to 2011	2006 to 2010	2007 to 2011
Euro 5	2011 to 2015	2012 to 2016	2011 to 2015	2012 to 2016
Euro 6	2016 to 2020	2017 to 2020	2016 to 2020	2017 to 2020

Secondly, actual statistics were available for reference years up to and including 2006. The statistics for a particular year were used to define the age distribution in the following year. For example, the 2006 statistics were used to define the age distribution in 2007. Assumptions were therefore required to estimate vehicle age distributions in future years. For this purpose, it was assumed that the vehicle age distributions in 2007 could be applied to each year in the future.

The 2007 distributions for petrol and diesel cars, and for the three engine size ranges (<1400 cc, 1400-2000 cc and >2000 cc) were normalised to give the percentage of vehicles by age, and the normalised distributions were applied to future years. The 2007 distributions are shown for petrol cars and diesel cars in Figure 1 and Figure 2 and for LGVs in Figure 3.

A problem associated with future projections was the treatment of the oldest vehicles in the fleet, as these are combined in the statistics (*e.g.* 'Pre-1988'). For such vehicles, it was assumed that the oldest vehicles were evenly distributed in terms of model years. This is a relatively crude assumption which would benefit from further refinement, although the number of vehicles in the oldest age band was generally rather small compared with the total (an exception being petrol cars >2000 cc).

The resulting average ages are shown in Table 11 to Table 15.

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[6] Vehicle licensing statistics for recent years are available from DfT at http://www.dft.gov.uk/pgr/statistics/datatablespublications/vehicles/licensing/

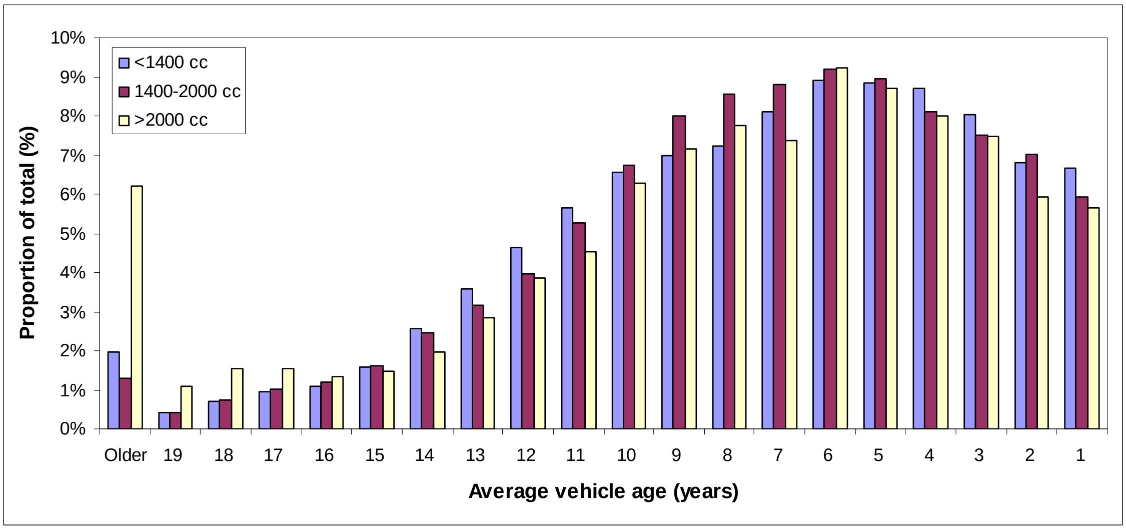

Figure 1: Normalised age distribution for petrol cars in 2007, based on licensing statistics for 2006.

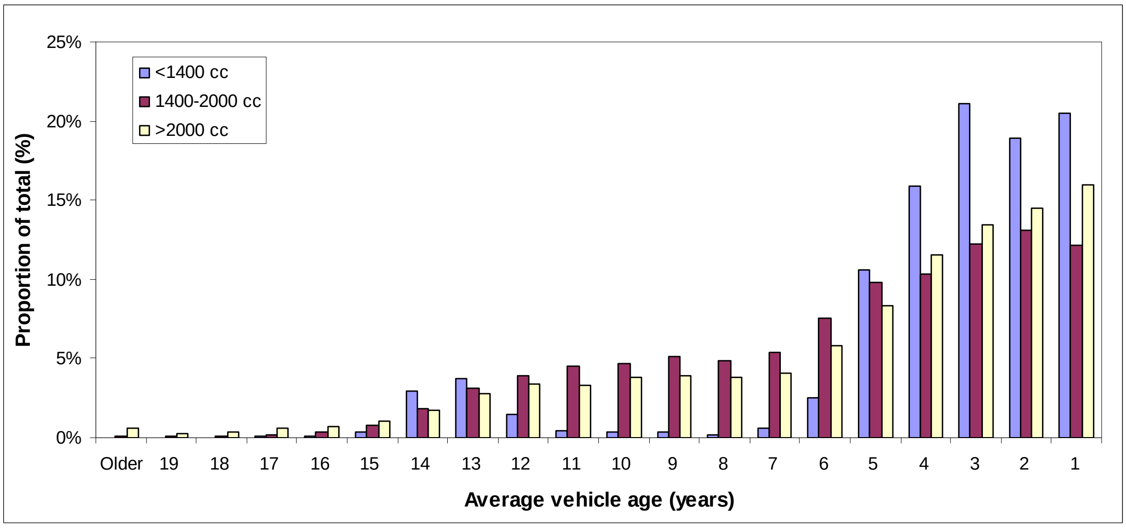

Figure 2: Normalised age distribution for diesel cars in 2007, based on licensing statistics for 2006.

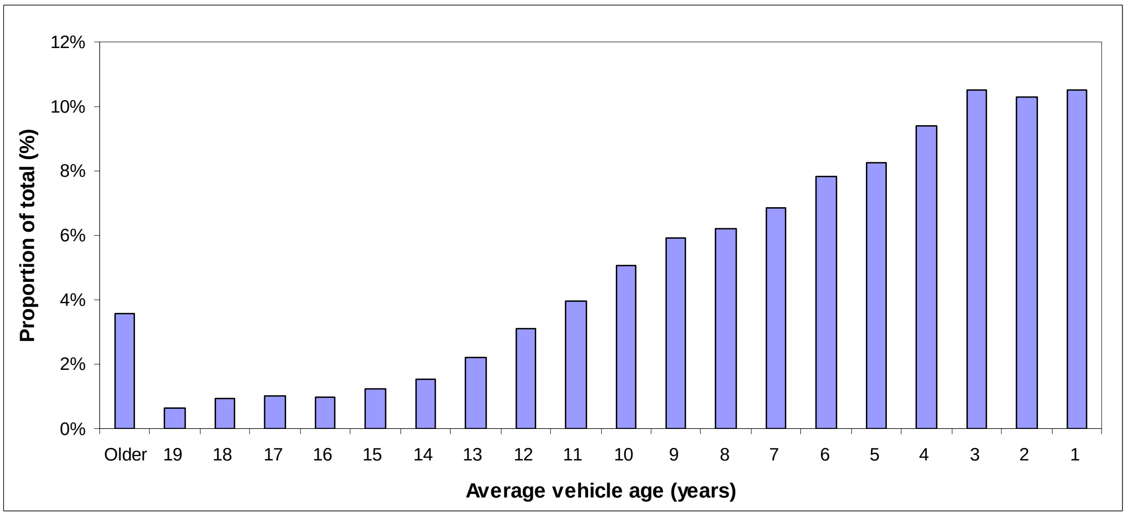

Figure 3: Normalised age distribution for all LGVs in 2007, based on licensing statistics for 2006.

Table 11: Average age by vehicle category and model year (cars <2.5 tonnes).

Code	Vehicle type	Fuel type	Engine capacity (cc)	Emission standard	Average age by reference year																																			
					1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
R001	Car <2.5 t	Petrol	<1400 cc	Pre-Euro 1	8.4	9.1	9.8	10.5	11.1	11.7	12.4	13.0	13.7	14.5	15.3	16.1	17.5	18.4	19.3	20.4	21.5	22.5	23.5	24.5	25.5	26.5	27.5	28.5	29.5	30.5	31.5	32.5	33.5	34.5	35.5	36.5	37.5	38.5	39.5	40.5
R002	Car <2.5 t	Petrol	<1400 cc	Euro 1	1.5	2.0	2.5	3.5	4.5	5.5	6.4	7.4	8.4	9.4	10.3	11.3	12.2	13.1	14.0	15.1	16.2	17.1	18.0	19.0	20.2	21.5	22.5	23.5	24.5	25.5	26.5	27.5	28.5	29.5	30.5	31.5	32.5	33.5	34.5	35.5
R003	Car <2.5 t	Petrol	<1400 cc	Euro 2				1.0	1.5	2.0	2.5	3.5	4.5	5.5	6.4	7.4	8.4	9.4	10.3	11.3	12.2	13.1	14.0	15.1	16.2	17.1	17.9	18.9	20.0	21.5	22.5	23.5	24.5	25.5	26.5	27.5	28.5	29.5	30.5	31.5
R004	Car <2.5 t	Petrol	<1400 cc	Euro 3								1.0	1.5	2.0	2.5	3.1	4.1	5.0	5.9	6.9	7.8	8.8	9.8	10.7	11.6	12.4	13.3	14.3	15.4	16.4	17.3	18.0	19.0	20.3	22.0	23.0	24.0	25.0	26.0	27.0
R005	Car <2.5 t	Petrol	<1400 cc	Euro 4													1.0	1.5	2.1	2.6	3.2	4.1	5.0	5.9	6.9	7.8	8.8	9.8	10.7	11.6	12.4	13.3	14.3	15.4	16.4	17.2	18.0	18.9	20.1	22.0
R006	Car <2.5 t	Petrol	<1400 cc	Euro 5																		1.0	1.5	2.1	2.6	3.2	4.1	5.0	5.9	6.9	7.8	8.8	9.8	10.7	11.6	12.4	13.3	14.3	15.4	16.4
R007	Car <2.5 t	Petrol	<1400 cc	Euro 6																							1.0	1.5	2.1	2.6	3.2	4.1	5.0	5.9	6.9	7.8	8.8	9.8	10.7	11.6
R008	Car <2.5 t	Petrol	1400-2000 cc	Pre-Euro 1	7.8	8.4	9.0	9.9	10.6	11.3	12.0	12.7	13.5	14.3	15.1	15.9	17.2	18.1	18.9	20.0	21.3	22.5	23.5	24.5	25.5	26.5	27.5	28.5	29.5	30.5	31.5	32.5	33.5	34.5	35.5	36.5	37.5	38.5	39.5	40.5
R009	Car <2.5 t	Petrol	1400-2000 cc	Euro 1	1.6	2.0	2.4	3.4	4.4	5.4	6.4	7.4	8.4	9.4	10.3	11.3	12.2	13.2	14.1	15.1	16.2	17.1	17.9	18.8	20.0	21.5	22.5	23.5	24.5	25.5	26.5	27.5	28.5	29.5	30.5	31.5	32.5	33.5	34.5	35.5
R010	Car <2.5 t	Petrol	1400-2000 cc	Euro 2				1.0	1.5	2.0	2.5	3.4	4.4	5.4	6.4	7.4	8.4	9.3	10.2	11.2	12.2	13.2	14.1	15.1	16.2	17.1	17.8	18.7	19.8	21.5	22.5	23.5	24.5	25.5	26.5	27.5	28.5	29.5	30.5	31.5
R011	Car <2.5 t	Petrol	1400-2000 cc	Euro 3								1.0	1.5	2.0	2.6	3.2	4.1	5.1	6.0	6.9	7.9	8.8	9.6	10.5	11.5	12.5	13.4	14.4	15.4	16.4	17.2	17.9	18.8	20.0	22.0	23.0	24.0	25.0	26.0	27.0
R012	Car <2.5 t	Petrol	1400-2000 cc	Euro 4													1.0	1.5	2.1	2.6	3.2	4.1	5.1	6.0	6.9	7.9	8.8	9.6	10.5	11.5	12.5	13.4	14.4	15.4	16.4	17.2	17.9	18.7	19.9	22.0
R013	Car <2.5 t	Petrol	1400-2000 cc	Euro 5																		1.0	1.5	2.1	2.6	3.2	4.1	5.1	6.0	6.9	7.9	8.8	9.6	10.5	11.5	12.5	13.4	14.4	15.4	16.4
R014	Car <2.5 t	Petrol	1400-2000 cc	Euro 6																							1.0	1.5	2.1	2.6	3.2	4.1	5.1	6.0	6.9	7.9	8.8	9.6	10.5	11.5
R015	Car <2.5 t	Petrol	>2000 cc	Pre-Euro 1	9.5	10.0	10.6	11.6	12.3	13.0	13.7	14.3	15.0	15.7	16.3	16.9	18.4	19.1	19.7	20.6	21.6	22.5	23.5	24.5	25.5	26.5	27.5	28.5	29.5	30.5	31.5	32.5	33.5	34.5	35.5	36.5	37.5	38.5	39.5	40.5
R016	Car <2.5 t	Petrol	>2000 cc	Euro 1	1.4	1.8	2.3	3.3	4.3	5.3	6.3	7.3	8.2	9.2	10.2	11.2	12.2	13.1	14.2	15.4	16.5	17.4	18.3	19.2	20.3	21.5	22.5	23.5	24.5	25.5	26.5	27.5	28.5	29.5	30.5	31.5	32.5	33.5	34.5	35.5
R017	Car <2.5 t	Petrol	>2000 cc	Euro 2				1.0	1.5	1.9	2.5	3.5	4.5	5.5	6.5	7.4	8.4	9.3	10.2	11.2	12.2	13.1	14.2	15.4	16.5	17.4	18.1	19.0	20.1	21.5	22.5	23.5	24.5	25.5	26.5	27.5	28.5	29.5	30.5	31.5
R018	Car <2.5 t	Petrol	>2000 cc	Euro 3								1.0	1.5	2.0	2.6	3.2	4.2	5.0	6.0	6.9	7.8	8.8	9.6	10.5	11.5	12.5	13.4	14.7	15.9	16.9	17.6	18.3	19.2	20.4	22.0	23.0	24.0	25.0	26.0	27.0
R019	Car <2.5 t	Petrol	>2000 cc	Euro 4													1.0	1.5	2.1	2.7	3.2	4.2	5.0	6.0	6.9	7.8	8.8	9.6	10.5	11.5	12.5	13.4	14.7	15.9	16.9	17.6	18.2	19.0	20.3	22.0
R020	Car <2.5 t	Petrol	>2000 cc	Euro 5																		1.0	1.5	2.1	2.7	3.2	4.2	5.0	6.0	6.9	7.8	8.8	9.6	10.5	11.5	12.5	13.4	14.7	15.9	16.9
R021	Car <2.5 t	Petrol	>2000 cc	Euro 6																							1.0	1.5	2.1	2.7	3.2	4.2	5.0	6.0	6.9	7.8	8.8	9.6	10.5	11.5
R022	Car <2.5 t	Diesel	<1400 cc	Pre-Euro 1	5.4	6.3	7.2	8.0	8.8	9.5	10.4	11.2	12.1	12.9	13.7	14.7	15.8	17.3	18.2	19.6	21.6	22.5	23.5	24.5	25.5	26.5	27.5	28.5	29.5	30.5	31.5	32.5	33.5	34.5	35.5	36.5	37.5	38.5	39.5	40.5
R023	Car <2.5 t	Diesel	<1400 cc	Euro 1	1.4	2.3	3.2	4.2	5.2	6.2	7.2	8.2	9.2	10.2	11.2	12.1	13.1	13.3	13.5	14.2	15.6	16.7	17.5	18.5	20.4	21.5	22.5	23.5	24.5	25.5	26.5	27.5	28.5	29.5	30.5	31.5	32.5	33.5	34.5	35.5
R024	Car <2.5 t	Diesel	<1400 cc	Euro 2				1.0	1.5	2.1	2.3	3.3	4.3	5.3	6.3	7.3	8.3	9.7	11.2	12.4	13.1	13.3	13.5	14.2	15.6	16.7	17.5	18.4	20.2	21.5	22.5	23.5	24.5	25.5	26.5	27.5	28.5	29.5	30.5	31.5
R025	Car <2.5 t	Diesel	<1400 cc	Euro 3								1.0	1.2	1.5	1.9	2.4	3.4	3.9	4.6	5.4	6.8	8.8	11.0	12.3	13.0	13.2	13.3	13.6	14.2	15.6	16.8	17.5	18.5	20.5	22.0	23.0	24.0	25.0	26.0	27.0
R026	Car <2.5 t	Diesel	<1400 cc	Euro 4													1.0	1.5	2.0	2.4	2.7	3.4	3.9	4.6	5.4	6.8	8.8	11.0	12.3	13.0	13.2	13.3	13.6	14.2	15.6	16.8	17.5	18.4	20.3	22.0
R027	Car <2.5 t	Diesel	<1400 cc	Euro 5																		1.0	1.5	2.0	2.4	2.7	3.4	3.9	4.6	5.4	6.8	8.8	11.0	12.3	13.0	13.2	13.3	13.6	14.2	15.6
R028	Car <2.5 t	Diesel	<1400 cc	Euro 6																							1.0	1.5	2.0	2.4	2.7	3.4	3.9	4.6	5.4	6.8	8.8	11.0	12.3	13.0
R029	Car <2.5 t	Diesel	1400-2000 cc	Pre-Euro 1	5.9	6.8	7.7	8.6	9.5	9.9	11.1	11.8	12.6	13.4	14.2	15.1	16.1	17.3	18.3	19.3	20.7	22.5	23.5	24.5	25.5	26.5	27.5	28.5	29.5	30.5	31.5	32.5	33.5	34.5	35.5	36.5	37.5	38.5	39.5	40.5
R030	Car <2.5 t	Diesel	1400-2000 cc	Euro 1	1.4	1.9	2.4	3.4	4.4	5.5	6.4	7.4	8.4	9.4	10.3	11.3	12.2	12.9	13.7	14.6	15.8	16.9	17.8	18.6	19.6	21.5	22.5	23.5	24.5	25.5	26.5	27.5	28.5	29.5	30.5	31.5	32.5	33.5	34.5	35.5
R031	Car <2.5 t	Diesel	1400-2000 cc	Euro 2				1.0	1.5	2.1	2.5	3.5	4.5	5.5	6.5	7.5	8.5	9.5	10.4	11.3	12.2	12.9	13.7	14.6	15.8	16.9	17.7	18.5	19.5	21.5	22.5	23.5	24.5	25.5	26.5	27.5	28.5	29.5	30.5	31.5
R032	Car <2.5 t	Diesel	1400-2000 cc	Euro 3								1.0	1.4	1.9	2.3	2.8	3.7	4.6	5.6	6.6	7.8	8.9	9.9	10.8	11.6	12.3	13.0	13.8	14.8	15.9	16.9	17.8	18.6	19.6	22.0	23.0	24.0	25.0	26.0	27.0
R033	Car <2.5 t	Diesel	1400-2000 cc	Euro 4													1.0	1.5	2.0	2.4	2.9	3.7	4.6	5.6	6.6	7.8	8.9	9.9	10.8	11.6	12.3	13.0	13.8	14.8	15.9	16.9	17.7	18.5	19.5	22.0
R034	Car <2.5 t	Diesel	1400-2000 cc	Euro 5																		1.0	1.5	2.0	2.4	2.9	3.7	4.6	5.6	6.6	7.8	8.9	9.9	10.8	11.6	12.3	13.0	13.8	14.8	15.9
R035	Car <2.5 t	Diesel	1400-2000 cc	Euro 6																							1.0	1.5	2.0	2.4	2.9	3.7	4.6	5.6	6.6	7.8	8.9	9.9	10.8	11.6
R036	Car <2.5 t	Diesel	>2000 cc	Pre-Euro 1	7.0	7.9	8.8	9.7	10.5	9.8	12.1	12.8	13.6	14.4	15.1	15.9	17.0	17.9	18.8	19.8	21.0	22.5	23.5	24.5	25.5	26.5	27.5	28.5	29.5	30.5	31.5	32.5	33.5	34.5	35.5	36.5	37.5	38.5	39.5	40.5
R037	Car <2.5 t	Diesel	>2000 cc	Euro 1	1.3	1.8	2.3	3.3	4.3	5.4	6.3	7.3	8.3	9.3	10.3	11.3	12.3	13.0	13.9	15.0	16.1	17.1	17.9	18.8	19.8	21.5	22.5	23.5	24.5	25.5	26.5	27.5	28.5	29.5	30.5	31.5	32.5	33.5	34.5	35.5
R038	Car <2.5 t	Diesel	>2000 cc	Euro 2				1.0	1.5	2.0	2.5	3.5	4.5	5.5	6.5	7.5	8.5	9.4	10.4	11.4	12.3	13.0	13.9	15.0	16.1	17.1	17.9	18.7	19.6	21.5	22.5	23.5	24.5	25.5	26.5	27.5	28.5	29.5	30.5	31.5
R039	Car <2.5 t	Diesel	>2000 cc	Euro 3								1.0	1.4	1.8	2.2	2.6	3.6	4.4	5.4	6.6	7.8	8.9	9.9	10.8	11.7	12.5	13.3	14.2	15.3	16.4	17.2	17.9	18.8	19.8	22.0	23.0	24.0	25.0	26.0	27.0
R040	Car <2.5 t	Diesel	>2000 cc	Euro 4													1.0	1.5	1.9	2.4	2.7	3.6	4.4	5.4	6.6	7.8	8.9	9.9	10.8	11.7	12.5	13.3	14.2	15.3	16.4	17.2	17.9	18.7	19.7	22.0
R041	Car <2.5 t	Diesel	>2000 cc	Euro 5																		1.0	1.5	1.9	2.4	2.7	3.6	4.4	5.4	6.6	7.8	8.9	9.9	10.8	11.7	12.5	13.3	14.2	15.3	16.4
R042	Car <2.5 t	Diesel	>2000 cc	Euro 6																							1.0	1.5	1.9	2.4	2.7	3.6	4.4	5.4	6.6	7.8	8.9	9.9	10.8	11.7
R043	Car <2.5 t	LPG	All	Euro 1	1.7	2.0	2.3	3.4	4.4	5.4	6.4	7.4	8.4	9.4	10.3	11.3	12.2	13.2	14.1	15.1	16.2	17.1	17.9	18.8	20.0	21.5	22.5	23.5	24.5	25.5	26.5	27.5	28.5	29.5	30.5	31.5	32.5	33.5	34.5	35.5
R044	Car <2.5 t	LPG	All	Euro 2				1.0	1.5	2.0	2.5	3.4	4.4	5.4	6.4	7.4	8.4	9.3	10.2	11.2	12.2	13.2	14.1	15.1	16.2	17.1	17.8	18.7	19.8	21.5	22.5	23.5	24.5	25.5	26.5	27.5	28.5	29.5	30.5	31.5
R045	Car <2.5 t	LPG	All	Euro 3								1.0	1.5	2.0	2.6	3.2	4.1	5.1	6.0	6.9	7.9	8.8	9.6	10.5	11.5	12.5	13.4	14.4	15.4	16.4	17.2	17.9	18.8	20.0	22.0	23.0	24.0	25.0	26.0	27.0
R046	Car <2.5 t	LPG	All	Euro 4													1.0	1.5	2.1	2.6	3.2	4.1	5.1	6.0	6.9	7.9	8.8	9.6	10.5	11.5	12.5	13.4	14.4	15.4	16.4	17.2	17.9	18.7	19.9	22.0
R047	Car <2.5 t	LPG	All	Euro 5																		1.0	1.5	2.1	2.6	3.2	4.1	5.1	6.0	6.9	7.9	8.8	9.6	10.5	11.5	12.5	13.4	14.4	15.4	16.4
R048	Car <2.5 t	LPG	All	Euro 6																							1.0	1.5	2.1	2.6	3.2	4.1	5.1	6.0	6.9	7.9	8.8	9.6	10.5	11.5

Table 12: Average age by vehicle category and model year (cars >2.5 tonnes).

Code	Vehicle type	Fuel type	Engine capacity (cc)	Emission standard	Average age by reference year																																			
					1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
R049	Car 2.5-3.5 t	Petrol	All	Pre-Euro 1	8.8	9.0	9.2	10.6	11.3	11.9	12.5	13.1	13.8	14.4	15.1	15.7	17.0	18.0	18.8	19.6	20.3	21.3	22.4	23.5	24.5	25.5	26.5	27.5	28.5	29.5	30.5	31.5	32.5	33.5	34.5	35.5	36.5	37.5	38.5	39.5
R050	Car 2.5-3.5 t	Petrol	All	Euro 1		1.0	1.5	1.9	2.3	3.3	4.3	5.3	6.3	7.3	8.3	9.3	10.2	11.2	12.2	13.1	14.2	15.4	16.5	17.4	18.2	19.1	20.2	21.5	22.5	23.5	24.5	25.5	26.5	27.5	28.5	29.5	30.5	31.5	32.5	33.5
R051	Car 2.5-3.5 t	Petrol	All	Euro 2						1.0	1.5	2.0	2.9	3.9	5.0	5.9	6.9	8.0	8.9	9.9	10.8	11.8	12.8	13.8	14.9	16.0	17.0	17.9	18.7	19.7	21.0	22.0	23.0	24.0	25.0	26.0	27.0	28.0	29.0	30.0
R052	Car 2.5-3.5 t	Petrol	All	Euro 3									1.0	1.5	2.1	2.6	3.2	4.2	5.0	6.0	6.9	7.8	8.8	9.6	10.5	11.5	12.5	13.4	14.7	15.9	16.9	17.6	18.3	19.1	20.4	22.0	23.0	24.0	25.0	26.0
R053	Car 2.5-3.5 t	Petrol	All	Euro 4														1.0	1.5	2.1	2.7	3.2	4.2	5.0	6.0	6.9	7.8	8.8	9.6	10.5	11.5	12.5	13.4	14.7	15.9	16.9	17.6	18.2	19.0	20.2
R054	Car 2.5-3.5 t	Petrol	All	Euro 5																			1.0	1.5	2.1	2.7	3.2	4.2	5.0	6.0	6.9	7.8	8.8	9.6	10.5	11.5	12.5	13.4	14.7	15.9
R055	Car 2.5-3.5 t	Petrol	All	Euro 6																								1.0	1.5	2.1	2.7	3.6	4.6	5.5	6.4	7.4	8.4	9.3	10.2	11.2
R056	Car 2.5-3.5 t	Diesel	All	Pre-Euro 1	4.9	5.8	6.8	7.6	8.4	7.8	10.0	10.8	11.6	12.4	13.2	14.0	15.0	16.1	17.2	18.1	19.1	20.3	21.7	23.5	24.5	25.5	26.5	27.5	28.5	29.5	30.5	31.5	32.5	33.5	34.5	35.5	36.5	37.5	38.5	39.5
R057	Car 2.5-3.5 t	Diesel	All	Euro 1		1.0	1.5	2.0	2.5	3.4	4.5	5.5	6.5	7.5	8.4	9.4	10.4	11.4	12.3	13.0	13.9	15.0	16.1	17.1	17.9	18.7	19.7	21.5	22.5	23.5	24.5	25.5	26.5	27.5	28.5	29.5	30.5	31.5	32.5	33.5
R058	Car 2.5-3.5 t	Diesel	All	Euro 2						1.0	1.5	1.9	2.9	3.9	4.9	5.9	6.9	8.0	9.0	9.9	11.0	11.9	12.8	13.7	14.7	15.8	16.8	17.8	18.5	19.3	21.0	22.0	23.0	24.0	25.0	26.0	27.0	28.0	29.0	30.0
R059	Car 2.5-3.5 t	Diesel	All	Euro 3									1.0	1.4	1.9	2.3	2.7	3.6	4.4	5.4	6.6	7.8	8.9	9.9	10.8	11.7	12.5	13.3	14.2	15.3	16.4	17.2	17.9	18.7	19.8	22.0	23.0	24.0	25.0	26.0
R060	Car 2.5-3.5 t	Diesel	All	Euro 4														1.0	1.5	1.9	2.4	2.7	3.6	4.4	5.4	6.6	7.8	8.9	9.9	10.8	11.7	12.5	13.3	14.2	15.3	16.4	17.2	17.9	18.7	19.6
R061	Car 2.5-3.5 t	Diesel	All	Euro 5																			1.0	1.5	1.9	2.4	2.7	3.6	4.4	5.4	6.6	7.8	8.9	9.9	10.8	11.7	12.5	13.3	14.2	15.3
R062	Car 2.5-3.5 t	Diesel	All	Euro 6																								1.0	1.5	1.9	2.4	3.3	4.2	5.1	6.2	7.3	8.5	9.4	10.4	11.4

Table 13: Average age by vehicle category and model year (taxis).

Code	Vehicle type	Fuel type	Engine capacity (cc)	Emission standard	Average age by reference year																																			
					1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
R063	Car (taxi)	Diesel	All	Pre-Euro 1	7.0	7.9	8.8	9.7	10.5	9.8	12.1	12.8	13.6	14.4	15.1	15.9	17.0	17.9	18.8	19.8	21.0	22.5	23.5	24.5	25.5	26.5	27.5	28.5	29.5	30.5	31.5	32.5	33.5	34.5	35.5	36.5	37.5	38.5	39.5	40.5
R064	Car (taxi)	Diesel	All	Euro 1	1.3	1.8	2.3	3.3	4.3	5.4	6.3	7.3	8.3	9.3	10.3	11.3	12.3	13.0	13.9	15.0	16.1	17.1	17.9	18.8	19.8	21.5	22.5	23.5	24.5	25.5	26.5	27.5	28.5	29.5	30.5	31.5	32.5	33.5	34.5	35.5
R065	Car (taxi)	Diesel	All	Euro 2				1.0	1.5	2.0	2.5	3.5	4.5	5.5	6.5	7.5	8.5	9.4	10.4	11.4	12.3	13.0	13.9	15.0	16.1	17.1	17.9	18.7	19.6	21.5	22.5	23.5	24.5	25.5	26.5	27.5	28.5	29.5	30.5	31.5
R066	Car (taxi)	Diesel	All	Euro 3								1.0	1.4	1.8	2.2	2.6	3.6	4.4	5.4	6.6	7.8	8.9	9.9	10.8	11.7	12.5	13.3	14.2	15.3	16.4	17.2	17.9	18.8	19.8	22.0	23.0	24.0	25.0	26.0	27.0
R067	Car (taxi)	Diesel	All	Euro 4													1.0	1.5	1.9	2.4	2.7	3.6	4.4	5.4	6.6	7.8	8.9	9.9	10.8	11.7	12.5	13.3	14.2	15.3	16.4	17.2	17.9	18.7	19.7	22.0
R068	Car (taxi)	Diesel	All	Euro 5																		1.0	1.5	1.9	2.4	2.7	3.6	4.4	5.4	6.6	7.8	8.9	9.9	10.8	11.7	12.5	13.3	14.2	15.3	16.4
R069	Car (taxi)	Diesel	All	Euro 6																							1.0	1.5	1.9	2.4	2.7	3.6	4.4	5.4	6.6	7.8	8.9	9.9	10.8	11.7

Table 14: Average age by vehicle category and model year (LGV N1(I)).

Code	Vehicle type	Fuel type	Engine capacity (cc)	Emission standard	Average age by reference year																																			
					1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
R070	LGV N1(I)	Petrol	All	Pre-Euro 1	3.8	4.8	5.8	6.7	7.5	8.0	9.1	9.9	10.7	11.4	12.2	13.1	14.0	15.0	16.2	17.4	18.5	19.7	21.3	23.5	24.5	25.5	26.5	27.5	28.5	29.5	30.5	31.5	32.5	33.5	34.5	35.5	36.5	37.5	38.5	39.5
R071	LGV N1(I)	Petrol	All	Euro 1		1.0	1.5	2.0	3.0	4.1	5.0	6.0	7.0	8.0	9.0	10.0	10.9	11.9	12.8	13.6	14.5	15.5	16.7	17.7	18.4	19.3	21.0	22.0	23.0	24.0	25.0	26.0	27.0	28.0	29.0	30.0	31.0	32.0	33.0	34.0
R072	LGV N1(I)	Petrol	All	Euro 2					1.0	1.5	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	10.9	11.9	12.8	13.6	14.5	15.5	16.7	17.7	18.4	19.3	21.0	22.0	23.0	24.0	25.0	26.0	27.0	28.0	29.0	30.0	31.0
R073	LGV N1(I)	Petrol	All	Euro 3								1.0	1.4	1.9	2.3	2.8	3.7	4.6	5.6	6.6	7.8	8.9	9.9	10.8	11.6	12.3	13.0	13.8	14.8	15.9	16.9	17.8	18.6	19.6	22.0	23.0	24.0	25.0	26.0	27.0
R074	LGV N1(I)	Petrol	All	Euro 4													1.0	1.5	2.0	2.4	2.9	3.7	4.6	5.6	6.6	7.8	8.9	9.9	10.8	11.6	12.3	13.0	13.8	14.8	15.9	16.9	17.7	18.5	19.5	22.0
R075	LGV N1(I)	Petrol	All	Euro 5																		1.0	1.5	2.0	2.4	2.9	3.7	4.6	5.6	6.6	7.8	8.9	9.9	10.8	11.6	12.3	13.0	13.8	14.8	15.9
R076	LGV N1(I)	Petrol	All	Euro 6																							1.0	1.5	2.0	2.4	2.9	3.7	4.6	5.6	6.6	7.8	8.9	9.9	10.8	11.6
R077	LGV N1(I)	Diesel	All	Pre-Euro 1	3.8	4.8	5.8	6.7	7.5	8.0	9.1	9.9	10.7	11.4	12.2	13.1	14.0	15.0	16.2	17.4	18.5	19.7	21.3	23.5	24.5	25.5	26.5	27.5	28.5	29.5	30.5	31.5	32.5	33.5	34.5	35.5	36.5	37.5	38.5	39.5
R078	LGV N1(I)	Diesel	All	Euro 1		1.0	1.5	2.0	3.0	4.1	5.0	6.0	7.0	8.0	9.0	10.0	10.9	11.9	12.8	13.6	14.5	15.5	16.7	17.7	18.4	19.3	21.0	22.0	23.0	24.0	25.0	26.0	27.0	28.0	29.0	30.0	31.0	32.0	33.0	34.0
R079	LGV N1(I)	Diesel	All	Euro 2					1.0	1.5	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	10.9	11.9	12.8	13.6	14.5	15.5	16.7	17.7	18.4	19.3	21.0	22.0	23.0	24.0	25.0	26.0	27.0	28.0	29.0	30.0	31.0
R080	LGV N1(I)	Diesel	All	Euro 3								1.0	1.4	1.9	2.3	2.8	3.7	4.6	5.6	6.6	7.8	8.9	9.9	10.8	11.6	12.3	13.0	13.8	14.8	15.9	16.9	17.8	18.6	19.6	22.0	23.0	24.0	25.0	26.0	27.0
R081	LGV N1(I)	Diesel	All	Euro 4													1.0	1.5	2.0	2.4	2.9	3.7	4.6	5.6	6.6	7.8	8.9	9.9	10.8	11.6	12.3	13.0	13.8	14.8	15.9	16.9	17.7	18.5	19.5	22.0
R082	LGV N1(I)	Diesel	All	Euro 5																		1.0	1.5	2.0	2.4	2.9	3.7	4.6	5.6	6.6	7.8	8.9	9.9	10.8	11.6	12.3	13.0	13.8	14.8	15.9
R083	LGV N1(I)	Diesel	All	Euro 6																							1.0	1.5	2.0	2.4	2.9	3.7	4.6	5.6	6.6	7.8	8.9	9.9	10.8	11.6

Table 15: Average age by vehicle category and model year (LGV N1(II/III)).

Code	Vehicle type	Fuel type	Engine capacity (cc)	Emission standard	Average age by reference year																																			
					1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
R084	LGV N1(II)	Petrol	All	Pre-Euro 1	3.8	4.8	5.8	6.7	7.5	8.0	9.1	9.9	10.7	11.4	12.2	13.1	14.0	15.0	16.2	17.4	18.5	19.7	21.3	23.5	24.5	25.5	26.5	27.5	28.5	29.5	30.5	31.5	32.5	33.5	34.5	35.5	36.5	37.5	38.5	39.5
R085	LGV N1(II)	Petrol	All	Euro 1		1.0	1.5	2.0	2.5	3.6	4.5	5.6	6.5	7.5	8.5	9.5	10.4	11.3	12.2	12.9	13.7	14.6	15.8	16.9	17.7	18.5	19.5	21.5	22.5	23.5	24.5	25.5	26.5	27.5	28.5	29.5	30.5	31.5	32.5	33.5
R086	LGV N1(II)	Petrol	All	Euro 2						1.0	1.5	1.9	2.9	3.9	4.9	5.9	6.8	8.0	9.0	10.0	10.9	11.9	12.8	13.6	14.5	15.5	16.7	17.7	18.4	19.2	21.0	22.0	23.0	24.0	25.0	26.0	27.0	28.0	29.0	30.0
R087	LGV N1(II)	Petrol	All	Euro 3									1.0	1.5	1.9	2.4	2.9	3.7	4.6	5.6	6.6	7.8	8.9	9.9	10.8	11.6	12.3	13.0	13.8	14.8	15.9	16.9	17.8	18.5	19.5	22.0	23.0	24.0	25.0	26.0
R088	LGV N1(II)	Petrol	All	Euro 4														1.0	1.5	2.0	2.4	2.9	3.7	4.6	5.6	6.6	7.8	8.9	9.9	10.8	11.6	12.3	13.0	13.8	14.8	15.9	16.9	17.7	18.5	19.5
R089	LGV N1(II)	Petrol	All	Euro 5																			1.0	1.5	2.0	2.4	2.9	3.7	4.6	5.6	6.6	7.8	8.9	9.9	10.8	11.6	12.3	13.0	13.8	14.8
R090	LGV N1(II)	Petrol	All	Euro 6																								1.0	1.5	2.0	2.4	3.4	4.3	5.2	6.2	7.3	8.5	9.5	10.4	11.3
R091	LGV N1(II)	Diesel	All	Pre-Euro 1	3.8	4.8	5.8	6.7	7.5	8.0	9.1	9.9	10.7	11.4	12.2	13.1	14.0	15.0	16.2	17.4	18.5	19.7	21.3	23.5	24.5	25.5	26.5	27.5	28.5	29.5	30.5	31.5	32.5	33.5	34.5	35.5	36.5	37.5	38.5	39.5
R092	LGV N1(II)	Diesel	All	Euro 1		1.0	1.5	2.0	2.5	3.6	4.5	5.6	6.5	7.5	8.5	9.5	10.4	11.3	12.2	12.9	13.7	14.6	15.8	16.9	17.7	18.5	19.5	21.5	22.5	23.5	24.5	25.5	26.5	27.5	28.5	29.5	30.5	31.5	32.5	33.5
R093	LGV N1(II)	Diesel	All	Euro 2						1.0	1.5	1.9	2.9	3.9	4.9	5.9	6.8	8.0	9.0	10.0	10.9	11.9	12.8	13.6	14.5	15.5	16.7	17.7	18.4	19.2	21.0	22.0	23.0	24.0	25.0	26.0	27.0	28.0	29.0	30.0
R094	LGV N1(II)	Diesel	All	Euro 3									1.0	1.5	1.9	2.4	2.9	3.7	4.6	5.6	6.6	7.8	8.9	9.9	10.8	11.6	12.3	13.0	13.8	14.8	15.9	16.9	17.8	18.5	19.5	22.0	23.0	24.0	25.0	26.0
R095	LGV N1(II)	Diesel	All	Euro 4														1.0	1.5	2.0	2.4	2.9	3.7	4.6	5.6	6.6	7.8	8.9	9.9	10.8	11.6	12.3	13.0	13.8	14.8	15.9	16.9	17.7	18.5	19.5
R096	LGV N1(II)	Diesel	All	Euro 5																			1.0	1.5	2.0	2.4	2.9	3.7	4.6	5.6	6.6	7.8	8.9	9.9	10.8	11.6	12.3	13.0	13.8	14.8
R097	LGV N1(II)	Diesel	All	Euro 6																								1.0	1.5	2.0	2.4	3.4	4.3	5.2	6.2	7.3	8.5	9.5	10.4	11.3
R098	LGV N1(III)	Petrol	All	Pre-Euro 1	3.8	4.8	5.8	6.7	7.5	8.0	9.1	9.9	10.7	11.4	12.2	13.1	14.0	15.0	16.2	17.4	18.5	19.7	21.3	23.5	24.5	25.5	26.5	27.5	28.5	29.5	30.5	31.5	32.5	33.5	34.5	35.5	36.5	37.5	38.5	39.5
R099	LGV N1(III)	Petrol	All	Euro 1		1.0	1.5	2.0	2.5	3.6	4.5	5.6	6.5	7.5	8.5	9.5	10.4	11.3	12.2	12.9	13.7	14.6	15.8	16.9	17.7	18.5	19.5	21.5	22.5	23.5	24.5	25.5	26.5	27.5	28.5	29.5	30.5	31.5	32.5	33.5
R100	LGV N1(III)	Petrol	All	Euro 2						1.0	1.5	1.9	2.9	3.9	4.9	5.9	6.8	8.0	9.0	10.0	10.9	11.9	12.8	13.6	14.5	15.5	16.7	17.7	18.4	19.2	21.0	22.0	23.0	24.0	25.0	26.0	27.0	28.0	29.0	30.0
R101	LGV N1(III)	Petrol	All	Euro 3									1.0	1.5	1.9	2.4	2.9	3.7	4.6	5.6	6.6	7.8	8.9	9.9	10.8	11.6	12.3	13.0	13.8	14.8	15.9	16.9	17.8	18.5	19.5	22.0	23.0	24.0	25.0	26.0
R102	LGV N1(III)	Petrol	All	Euro 4														1.0	1.5	2.0	2.4	2.9	3.7	4.6	5.6	6.6	7.8	8.9	9.9	10.8	11.6	12.3	13.0	13.8	14.8	15.9	16.9	17.7	18.5	19.5
R103	LGV N1(III)	Petrol	All	Euro 5																			1.0	1.5	2.0	2.4	2.9	3.7	4.6	5.6	6.6	7.8	8.9	9.9	10.8	11.6	12.3	13.0	13.8	14.8
R104	LGV N1(III)	Petrol	All	Euro 6																								1.0	1.5	2.0	2.4	3.4	4.3	5.2	6.2	7.3	8.5	9.5	10.4	11.3
R105	LGV N1(III)	Diesel	All	Pre-Euro 1	3.8	4.8	5.8	6.7	7.5	8.0	9.1	9.9	10.7	11.4	12.2	13.1	14.0	15.0	16.2	17.4	18.5	19.7	21.3	23.5	24.5	25.5	26.5	27.5	28.5	29.5	30.5	31.5	32.5	33.5	34.5	35.5	36.5	37.5	38.5	39.5
R106	LGV N1(III)	Diesel	All	Euro 1		1.0	1.5	2.0	2.5	3.6	4.5	5.6	6.5	7.5	8.5	9.5	10.4	11.3	12.2	12.9	13.7	14.6	15.8	16.9	17.7	18.5	19.5	21.5	22.5	23.5	24.5	25.5	26.5	27.5	28.5	29.5	30.5	31.5	32.5	33.5
R107	LGV N1(III)	Diesel	All	Euro 2						1.0	1.5	1.9	2.9	3.9	4.9	5.9	6.8	8.0	9.0	10.0	10.9	11.9	12.8	13.6	14.5	15.5	16.7	17.7	18.4	19.2	21.0	22.0	23.0	24.0	25.0	26.0	27.0	28.0	29.0	30.0
R108	LGV N1(III)	Diesel	All	Euro 3									1.0	1.5	1.9	2.4	2.9	3.7	4.6	5.6	6.6	7.8	8.9	9.9	10.8	11.6	12.3	13.0	13.8	14.8	15.9	16.9	17.8	18.5	19.5	22.0	23.0	24.0	25.0	26.0
R109	LGV N1(III)	Diesel	All	Euro 4														1.0	1.5	2.0	2.4	2.9	3.7	4.6	5.6	6.6	7.8	8.9	9.9	10.8	11.6	12.3	13.0	13.8	14.8	15.9	16.9	17.7	18.5	19.5
R110	LGV N1(III)	Diesel	All	Euro 5																			1.0	1.5	2.0	2.4	2.9	3.7	4.6	5.6	6.6	7.8	8.9	9.9	10.8	11.6	12.3	13.0	13.8	14.8
R111	LGV N1(III)	Diesel	All	Euro 6																								1.0	1.5	2.0	2.4	3.4	4.3	5.2	6.2	7.3	8.5	9.5	10.4	11.3

Estimation of average mileage

Relationships between vehicle age and mileage were established using data supplied by VOSA from in-service emission tests (MOT) conducted between November 2006 and November 2007 (VOSA, 2007). The data from VOSA described the average mileage by model year for around 33 million cars and 730,000 LGVs. Model years period to 1993 were stated as bands (1978-1982, 1983-1987 and 1988-1992). As in-service tests are conducted primarily on vehicles which are at least three years old, the most recent mileage data, with some exceptions, were for 2004.

For the vehicle categories listed in the VOSA data, the average accumulated mileage was plotted as a function of vehicle age relative to 2007 (*i.e.* 2006 models were assumed to be one year old, 2005 models two years old, and so on). The results are shown in Figure 4 (cars) and Figure 5 (LGVs).

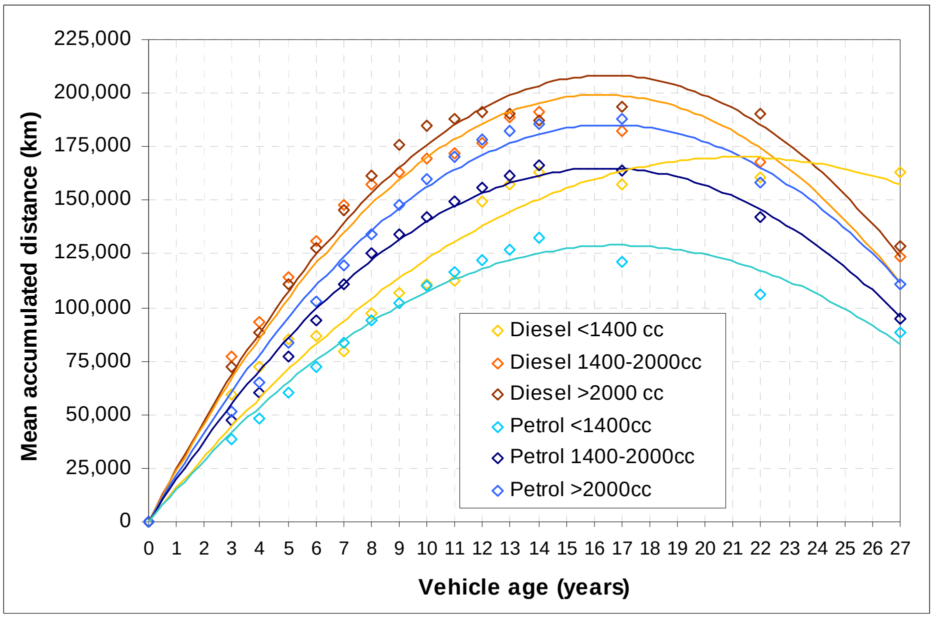

Figure 4: Vehicle mileage as a function of age, based on in-service test data (cars).

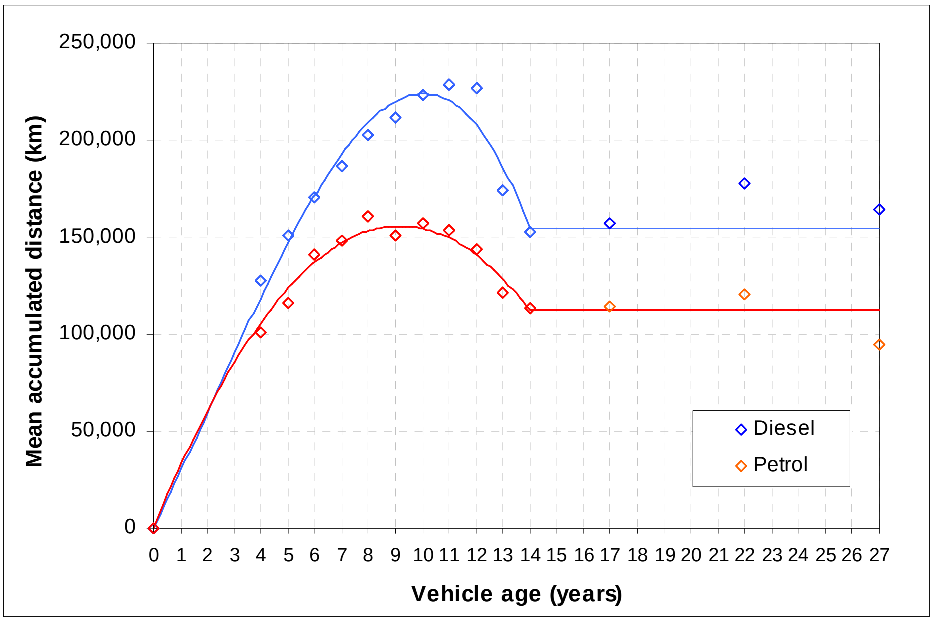

Figure 5: Vehicle mileage as a function of age, based on in-service test data (LGVs).

The plots for cars indicate that the average accumulated mileage for vehicles typically increases with age for vehicles up to around 16 or 17 years old, and then appears to decrease for older vehicles. Presumably the decrease in the average mileage is due to high-mileage vehicles being removed from the fleet. The average mileage of small diesel cars appears to have a slightly different relationship with age compared with other types of car, with a peak in accumulated mileage occurring for vehicles which are around 21 or 22 years old, but the numbers of old vehicles of this type were relatively small. In the case of LGVs, the peak accumulated mileage occurred for vehicles between around 9 and 10 years old.

For cars, second-order polynomial functions (forced through zero) were fitted to the data. For LGVs no simple function could be fitted to the data, and a polynomial function was used for vehicles less than or equal to 14 years old. It was assumed that there was no further change in mileage for vehicles with an age greater than14 years. The coefficients for the regression fits are shown in Table 16. In all cases, it was assumed that there was no further change in mileage for vehicles older than 27 years.

Table 16: Equations describing accumulated vehicle mileage as a function of age.

Vehicle type	Fuel	Engine capacity (cc)	Vehicle age (years)	Equation[a]	Coefficients		
					a	b	c
Car	Petrol	<1400	0-27	$y = ax^2 + bx$	-452.02	15,274	
		1400-2000	0-27	$y = ax^2 + bx$	-616.25	20,172	
		>2000	0-27	$y = ax^2 + bx$	-675.25	22,366	
		All	0-27	$y = ax^2 + bx$	-537.38	18,172	
	Diesel	<1400	0-27	$y = ax^2 + bx$	-378.22	16,938	
		1400-2000	0-27	$y = ax^2 + bx$	-757.02	24,568	
		>2000	0-27	$y = ax^2 + bx$	-766.48	25,276	
		All	0-27	$y = ax^2 + bx$	-746.21	24,658	
LGV	Petrol	All	<=14	$y = ax^2 + bx$	-1,855.1	33,997	
			>14	$y = a$	112,358.4		
	Diesel	All	<=14	$y = ax^3 + bx^2 + cx$	-160.27	1002.6	28,386
			>14	$y = a$	154,132.7		

[a] where y is the accumulated mileage in km, and x is the vehicle age in years.

For each vehicle category and reference year, the functions in Table 16 were used to calculate the average vehicle mileage. In the case of cars the functions for the different engine size bands were used. For LPG cars the functions for 1400-2000 cc petrol cars were used. For cars >2.5 tonnes the functions for large petrol and diesel cars were used. The functions for large diesel cars were also used for taxis. In the case of LGVs only the functions for all engine sizes were used (the division between petrol and diesel was retained).

Calculation of mileage scaling factors

For each vehicle category, reference year and pollutant, the emission factor associated with the actual average mileage, and the emission factor for 50,000 km, were calculated using Equation 2 and the coefficients in Table 9 (‘all’ driving conditions). These coefficients were applied to all LDVs. For LPG cars the functions for petrol cars were used. Where a function had a negative gradient (*i.e.* emissions decreased with increased mileage), it was assumed that there was no further reduction in emissions above 100,000 km.

The mileage scaling factors were then calculated by dividing the emission factor for the actual mileage by the emission factor for 50,000 km. The final scaling factors are given in Appendix C.

4.1.2 Heavy-duty vehicles

The general conclusion from the ARTEMIS work on HDVs was that no emission deterioration factors were needed for Euro I to Euro III vehicles. It was also concluded that there is no reason to assume that the deterioration pattern of engine-out emissions from Euro IV and Euro V vehicles would differ much from engines of earlier Euro classes. However, the ageing, malfunctioning and tampering of emission-control devices on Euro IV and Euro V vehicles could lead to increased emissions. At present, it is not possible to give exact values since the technology is not fully developed and few data are available (Rexeis *et al*., 2005).

The database of heavy-duty emission factors compiled in this project was considered to be too small to allow deterioration effects to be examined. As a consequence of this, and taking into account the findings of ARTEMIS, no mileage scaling factors were developed for heavy-duty vehicles.

4.1.3 Two-wheel vehicles

For the UK, Boulter and Barlow (2009) recommended the use ARTEMIS emission factors for two-wheel vehicles. However, emission degradation was not studied in ARTEMIS and no degradation functions were available. This was identified as an area for further research (Elst *et al*., 2006).

4.2 Fuel composition scaling factors

The scaling factors for fuel composition (sulphur content), taken from Boulter and Latham (2008), are given in Appendix D. In order to the derive fuel composition scaling factors, an adapted version of the method presented in COPERT III (and retained in COPERT 4) was used. The baseline fuels which were used were identical to those used in COPERT, except for the addition of a ‘Fuel 2009’ having a maximum sulphur content of 10 ppm. The correspondence between fuels and emission standards, for all vehicle types, was also taken from COPERT, with the addition of a 2009 fuel. It was assumed that there would be no further improvements in fuels beyond 2009. The correspondence between fuel and emission standards was applied to all light-duty and heavy-duty vehicles. No fuel scaling factors were determined for two-wheel vehicles.

4.3 Scaling factors for biofuels

Based upon the available evidence, Boulter and Latham (2008) concluded that emission scaling factors for biodiesel are not required in the UK, given that the blending of petroleum diesel with biodiesel in a proportion of less than 10% is expected to have no effect on emissions, and the biofuel content of diesel is not predicted to exceed 5% by volume

A similar argument appears to be justifiable for bioethanol blends, although there appear to be few recommendations for specific adjustment factors. Consequently, no scaling factors are provided here. The effects of bioethanol blends are currently being reviewed for inclusion in COPERT 4. When this information becomes available, the need for scaling factors in the UK should be reconsidered.

4.4 Technology scaling factors

For future LDV technologies, such as Euro 5 and Euro 6 cars, assumptions were made to derive the basic emission factors, based upon the limit values in legislation (Boulter and Barlow, 2009). No further assumptions are required, as technological improvements are accounted for implicitly. For example, for LDVs the use of a DPF will be required to meet the Euro 5 and Euro 6 PM standards and this is taken into account in the basic emission factors. However, an important consideration is the fitting (or retro-fitting) of a DPF to pre-Euro 5 diesel vehicles. Where this is the case, based on the values presented by Samaras and Geivanidis (2005) it is assumed that the basic PM emission factor is multiplied by 0.1 (*i.e.* the DPF leads to a 90% reduction in PM mass emissions).

For heavy-duty vehicles, the majority of Euro VI vehicles are expected to be fitted with DPFs, whereas Euro V vehicles are not expected to need them to meet the limits. Again, this is taken into account in the basic emission factors for Euro V and Euro VI vehicles. For pre-Euro V heavy-duty vehicles retro-fitted with a DPF, a scaling factor of 0.1 is again recommended, based on Rexeis *et al*. (2005).

5 Acknowledgements

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Appendix A: Abbreviations and terms used in the Task Reports

ACEA	European Automobile Manufacturers Association.
ADMS	Atmospheric Dispersion Modelling System.
ARTEMIS	Assessment and Reliability of Transport Emission Models and Inventory Systems. An EC 5th Framework project, funded by DG TREN and coordinated by TRL. http://www.trl.co.uk/artemis/introduction.htm
AURN	Automatic Urban and Rural Network. Automatic monitoring sites for air quality that are or have been operated on behalf of the Department for Environment, Food and Rural Affairs in the UK.
AVERT	Adaptation of Vehicle Environmental Response by Telematics. Project funded by the Foresight Vehicle programme. http://www.foresightvehicle.org.uk/dispproj1.asp?wg_id=1003
BP	British Petroleum.
CEN	European Standards Organisation.
CERC	Cambridge Environmental Research Consultants, the developers of the ADMS model suite.
Cetane number (CN)	Cetane number is a measure of the combustion quality of diesel fuel. Cetane is an alkane molecule that ignites very easily under compression. All other hydrocarbons in diesel fuel are indexed to cetane (index = 100) as to how well they ignite under compression. Since there are hundreds of components in diesel fuel, the overall CN of the diesel is the average of all the components. There is very little actual cetane in diesel fuel. Generally, diesel engines run well with a CN between 40 and 55.
CITA	International Motor Vehicle Inspection Committee, based in Brussels.
CNG	Compressed natural gas (primarily methane).
CH_4	Methane.
CO	Carbon monoxide.
CO_2	Carbon dioxide.
uCO_2	'Ultimate' CO_2.
COLDSTART	A model for cold-start emissions developed by VTI in Sweden.
CONCAWE	The Oil Companies' European Association for Environment, Health and Safety in Refining and Distribution.
COST	European Cooperation in Science and Technology.
CRT	Continuously Regenerating Trap – a trademark of Johnson Matthey.
CVS	Constant-volume sampler.
COPERT	COmputer Program to calculate Emissions from Road Transport. http://lat.eng.auth.gr/copert/
CORINAIR	CO-oRdinated INformation on the Environment in the European Community - AIR
DEFRA	Department for Environment, Food and Rural Affairs.

DfT	Department for Transport, UK.
DI	Direct injection.
DMRB	Design Manual for Roads and Bridges. http://www.standardsforhighways.co.uk/dmrb/
DPF	Diesel particulate filter.
DTI	Department of Trade and Industry (now the Department for Business, Enterprise and Regulatory Reform – BERR).
Driving cycle	The term 'driving cycle' (or sometimes 'duty cycle' is used to describe how a vehicle is to be operated during a laboratory emission test. A driving cycle is designed to reflect some aspect of real-world driving, and usually describes vehicle speed as a function of time.
Driving pattern	The term 'driving pattern' is used to describe how a vehicle is operated under real-world conditions, based on direct measurement, or the time history of vehicle operation specified by a model user. In the literature, this is also often referred to as a driving cycle. However, in this work it has been assumed that a driving pattern only becomes a driving cycle once it has been used to measure emissions.
Dynamics	Variables which emission modellers use to describe the extent of transient operation (see entry below for 'transient') in a driving cycle (*e.g.* maximum and minimum speed, average positive acceleration). Can be viewed as being similar to the concept of the 'aggressiveness' of driving.
DVPE	Dry vapour pressure equivalent. The difference between DVPR and (the older) RVP is the measurement method. DVPE is measured 'dry' after removing all moisture from the test chamber prior to injection of the sample. This overcomes the unpredictability of results experienced when testing samples containing oxygenates by the conventional RVP method. DVPE is measured at a temperature of 37.8°C.
EC	European Commission.
ECE	Economic Commission for Europe.
EGR	Exhaust gas recirculation.
EIA	Environmental Impact Assessment
EMEP	Cooperative Programme for Monitoring and Evaluation of the Long-Range Transmission of Air Pollutants in Europe.
EMFAC	EMission FACtors model, developed by the California Air Resources Board. EMFAC 2007 is the most recent version.
EMPA	One of the research institutes of the Swiss ETH organisation.
EPEFE	European Programme on Emissions, Fuels and Engine Technologies
ETC	European Transient Cycle.
EU	European Union.
EUDC	Extra Urban Driving Cycle.
EXEMPT	EXcess Emissions Planning Tool.
FAME	Fatty acid methyl ester.
FHB	Fachhochschule Biel (FHB): Biel University of applied science, Switzerland.
FID	Flame ionisation detector.
FIGE (or FiGE)	Forschungsinstitut Gerausche und Erschutterungen (FIGE Institute), Aachen, Germany. Now TUV Automotive GmbH.

Fischer-Tropsch diesel (FTD)	Fischer-Tropsch diesel is a premium diesel product with a very high cetane number (75) and zero sulphur content. It is generally produced from natural gas.
FTP	Federal Test Procedure – the driving cycle used in US emission tests.
FTIR	Fourier-transform infrared spectroscopy.
GC/MS	Gas chromatography/mass spectrometry.
GDI	Gasoline Direct Injection.
GHG	Greenhouse gas.
GVW	Gross vehicle weight.
HBEFA/Handbook	Handbook Emission Factors for Road Transport (Handbuch Emissionsfaktoren des Strassenverkehrs). An emission model used in Switzerland, Germany and Austria. http://www.hbefa.net/
HDV	Heavy-duty vehicles. Road vehicles greater than 3.5 tonnes (GVW), where GVW is the gross weight of the vehicle, *i.e.* the combined weight of the vehicle and goods.
HGV	Heavy goods vehicles. Goods vehicles greater than 3.5 tonnes GVW.
HOV	High-occupancy vehicle.
HyZem	HYbrid technology approaching efficient Zero Emission Mobility.
IDI	Indirect injection.
IM	Inspection and Maintenance: in-service vehicle road worthiness testing.
INFRAS	A private and independent consulting group based in Switzerland.
INRETS	Institut National de Recherche sur les Transports et leur Sécurité, France.
IUFC-15	INRETS urbain fluide court. Short, urban free-flow driving cycle.
IRC-15	INRETS route courte. Short rural driving cycle.
JCS	A European Joint Commission funded project: *The inspection of in-use cars in order to attain minimum emissions of pollutants and optimum energy efficiency*, carried out on behalf of EC DGs for Environment (DG XI) Transport (DG VII) and Energy (DG XVII). Project coordinated by LAT, University of Thessaloniki.
LDV	Light-duty vehicles. Road vehicles less than 3.5 tonnes GVW, including cars and light goods vehicles.
LGV	Goods/commercial vehicles less than 3.5 tonnes GVW.
LPG	Liquefied petroleum gas.
M25	London orbital motorway.
MEET	Methodologies for Estimating air pollutant Emissions from Transport. European Commission 4th Framework project coordinated by INRETS.
MHDT	Millbrook Heavy-Duty Truck (driving cycle).
MLTB	Millbrook London Transport Bus (driving cycle).
MOBILE	USEPA vehicle emission modelling software.
MODEM	Modelling of Emissions and Fuel Consumption in Urban Areas. A research project within the EU DRIVE programme coordinated by INRETS.
MOUDI	Micro-orifice uniform deposit impactor.
MPI	Multi-point injection.

MTC	AVL MTC Motortestcenter AB, Sweden.
MVEG	Motor Vehicle Emission Group.
NAEI	National Atmospheric Emissions Inventory (UK). http://www.naei.org.uk/
NEDC	New European Driving Cycle.
NETCEN	National Environmental Technology Centre.
N_2O	Nitrous oxide.
NH_3	Ammonia.
NMVOC	Non-methane volatile organic compounds.
NO	Nitric oxide.
NO_2	Nitrogen dioxide.
NO_x	Total oxides of nitrogen.
OBD	On-board diagnostics.
OSCAR	Optimised Expert System for Conducting Environmental Assessment of Urban Road Traffic. A European Fifth Framework research project, funded by DG Research. Project and coordinated by the University of Hertfordshire.
PAHs	Polycyclic aromatic hydrocarbons.
PARTICULATES	An EC Fifth Framework research project, funded by DG TREN and coordinated by LAT, Thessaloniki. http://lat.eng.auth.gr/particulates/
PHEM	Passenger car and Heavy-duty Emission Model. One of the emission models developed in COST Action 346 and the ARTEMIS project.
PM	Particulate matter.
PM_{10}	Airborne particulate matter with an aerodynamic diameter of less than 10 µm.
$PM_{2.5}$	Airborne particulate matter with an aerodynamic diameter of less than 2.5 µm.
PMP	Particle Measurement Programme.
POPs	Persistent organic pollutants.
ppm	Parts per million.
PSV	Public Service Vehicle.
Road characteristics	Information relating to the road, such as the geographical location (*e.g.* urban, rural), the functional type (*e.g.* distributor, local access), the speed limit, the number of lanes and the presence or otherwise of traffic management measures.
RME	Rapeseed methyl ester.
RTC	Reference test cycles.
RTD	Real-time diurnal (evaporative emissions).
RTFO	Renewable Transport Fuel Obligation.
RVP	Reid vapour pressure.
SCR	Selective catalytic reduction.
SEA	Strategic Environmental Assessment.
SHED	Sealed Housing for Evaporative Determination.
SMMT	Society of Motor Manufacturers and Traders.

SO_2	Sulphur dioxide.
TEE	Traffic Energy and Emissions (model).
THC/HC	Total hydrocarbons.
TNO	TNO Automotive, The Netherlands. The power train and emissions research institute of the holding company, TNO Companies BV.
Traffic characteristics/ conditions	Information relating to the bulk properties of the traffic stream – principally its speed, composition and volume/flow or density.
TRAMAQ	Traffic Management and Air Quality Research Programme. A research programme funded by the UK Department for Transport. http://www.dft.gov.uk/pgr/roads/network/research/tmairqualityresearch/trafficmanagementandairquali3927
Transient	Relates to when the operation of a vehicle is continuously varying, as opposed to being in a steady state.
TRL	TRL Limited (Transport Research Laboratory), UK.
TRRL	Transport and Road Research Laboratory - former name of TRL.
TUG	Technical University of Graz, Austria.
TUV	TÜV Rheinland, Germany. Exhaust emission testing used to be undertaken at this institute based in Cologne. These activities were transferred to another institute in the TUV group, based in Essen, in 1999.
TWC	Three-way catalyst.
UG214	A project within DfT's TRAMAQ programme which involved the development of realistic driving cycles for traffic management schemes.
UKEFD	United Kingdom Emission Factor Database (for road vehicles).
UKPIA	UK Petroleum Industries Association
ULSD	Ultra-low-sulphur diesel.
UROPOL	Urban ROad POLlution model.
USEPA	United States Environmental Protection Agency.
UTM/UTMC	Urban Traffic Management / Urban Traffic Management and Control.
Vehicle operation	The way in which a vehicle is operated (*e.g*. vehicle speed, throttle position, engine speed, gear selection).
VeTESS	Vehicle Transient Emissions Simulation Software.
VOCs	Volatile organic compounds.
VOSA	Vehicle and Operator Services Agency
WMTC	World Motorcycle Test Cycle. A common motorcycle emissions certification Procedure. The cycle is divided into urban, rural, and highway driving.
WSL	Warren Spring Laboratory.
WVU	West Virginia University, US.
WWFC	World-Wide Fuel Charter. The World Wide Fuel Charter is a joint effort by European, American and Japanese automobile manufacturers and other related associations, and recommends global standards for fuel quality, taking into account the status of emission technologies.

Appendix B: Fuel and technology scaling factors currently used in NAEI

Table B1: Current fuel and technology scaling factors for carbon monoxide.

CO		1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Petrol cars	Euro 1	1.000	1.000	1.000	1.000	0.763	0.676	0.676	0.676	0.676	0.676	0.676	0.676	0.676	0.676	0.676	0.676	0.676	0.676	0.676	0.676	0.676	0.676	0.676	0.676	0.676	0.676	0.676	0.676	0.676	0.676
	Euro 2	1.000	1.000	1.000	1.000	0.763	0.676	0.676	0.676	0.676	0.676	0.676	0.676	0.676	0.676	0.676	0.676	0.676	0.676	0.676	0.676	0.676	0.676	0.676	0.676	0.676	0.676	0.676	0.676	0.676	0.676
	Euro 3	1.000	1.000	1.000	1.000	0.947	0.839	0.839	0.839	0.839	0.839	0.839	0.839	0.839	0.839	0.839	0.839	0.839	0.839	0.839	0.839	0.839	0.839	0.839	0.839	0.839	0.839	0.839	0.839	0.839	0.839
	Euro 4	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Diesel cars	Pre-Euro 1	1.000	1.000	1.000	1.000	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943
	Euro 1	1.000	1.000	1.000	1.000	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943
	Euro 2	1.000	1.000	1.000	1.000	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943
	Euro 3	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	Euro 4	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Petrol LGVs	Euro 1	1.000	1.000	1.000	1.000	0.763	0.676	0.676	0.676	0.676	0.676	0.676	0.676	0.676	0.676	0.676	0.676	0.676	0.676	0.676	0.676	0.676	0.676	0.676	0.676	0.676	0.676	0.676	0.676	0.676	0.676
	Euro 2	1.000	1.000	1.000	1.000	0.763	0.676	0.676	0.676	0.676	0.676	0.676	0.676	0.676	0.676	0.676	0.676	0.676	0.676	0.676	0.676	0.676	0.676	0.676	0.676	0.676	0.676	0.676	0.676	0.676	0.676
	Euro 3	1.000	1.000	1.000	1.000	0.947	0.839	0.839	0.839	0.839	0.839	0.839	0.839	0.839	0.839	0.839	0.839	0.839	0.839	0.839	0.839	0.839	0.839	0.839	0.839	0.839	0.839	0.839	0.839	0.839	0.839
	Euro 4	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Diesel LGVs	Pre-Euro 1	1.000	1.000	1.000	1.000	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943
	Euro 1	1.000	1.000	1.000	1.000	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943
	Euro 2	1.000	1.000	1.000	1.000	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943
	Euro 3	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	Euro 4	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Rigid HGVs	Old	1.000	1.000	1.000	1.000	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956
	Pre-Euro I	1.000	1.000	1.000	1.000	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956
	Euro I	1.000	1.000	1.000	1.000	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956
	Euro II	1.000	1.000	1.000	1.000	0.949	0.947	0.946	0.946	0.946	0.948	0.948	0.948	0.948	0.948	0.948	0.948	0.948	0.948	0.948	0.948	0.948	0.948	0.948	0.948	0.948	0.948	0.948	0.948	0.948	0.948
	Euro III	1.000	1.000	1.000	1.000	0.947	0.929	0.936	0.934	0.932	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930
	Euro IV	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	Euro IV+	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Artic HGVs	Old	1.000	1.000	1.000	1.000	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956
	Pre-Euro I	1.000	1.000	1.000	1.000	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956
	Euro I	1.000	1.000	1.000	1.000	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956	0.956
	Euro II	1.000	1.000	1.000	1.000	0.943	0.941	0.939	0.937	0.937	0.939	0.939	0.939	0.939	0.939	0.939	0.939	0.939	0.939	0.939	0.939	0.939	0.939	0.939	0.939	0.939	0.939	0.939	0.939	0.939	0.939
	Euro III	1.000	1.000	1.000	1.000	0.947	0.919	0.929	0.927	0.923	0.920	0.920	0.920	0.920	0.920	0.920	0.920	0.920	0.920	0.920	0.920	0.920	0.920	0.920	0.920	0.920	0.920	0.920	0.920	0.920	0.920
	Euro IV	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	Euro IV+	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Buses	Old	1.000	0.991	0.958	0.926	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907
	Pre-Euro I	1.000	0.991	0.958	0.926	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907
	Euro I	1.000	0.991	0.958	0.926	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907
	Euro II	1.000	0.729	0.692	0.656	0.596	0.589	0.583	0.582	0.588	0.600	0.600	0.600	0.600	0.600	0.600	0.600	0.600	0.600	0.600	0.600	0.600	0.600	0.600	0.600	0.600	0.600	0.600	0.600	0.600	0.600
	Euro III	1.000	1.000	1.000	1.000	0.899	0.785	0.824	0.818	0.806	0.793	0.793	0.793	0.793	0.793	0.793	0.793	0.793	0.793	0.793	0.793	0.793	0.793	0.793	0.793	0.793	0.793	0.793	0.793	0.793	0.793
	Euro IV	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	Euro IV+	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Table B2: Current fuel and technology scaling factors for total hydrocarbons.

HC		1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Petrol cars	Euro 1	1.000	1.000	1.000	1.000	0.704	0.595	0.595	0.595	0.595	0.595	0.595	0.595	0.595	0.595	0.595	0.595	0.595	0.595	0.595	0.595	0.595	0.595	0.595	0.595	0.595	0.595	0.595	0.595	0.595	0.595
	Euro 2	1.000	1.000	1.000	1.000	0.704	0.595	0.595	0.595	0.595	0.595	0.595	0.595	0.595	0.595	0.595	0.595	0.595	0.595	0.595	0.595	0.595	0.595	0.595	0.595	0.595	0.595	0.595	0.595	0.595	0.595
	Euro 3	1.000	1.000	1.000	1.000	0.929	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786
	Euro 4	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Diesel cars	Pre-Euro 1	1.000	1.000	1.000	1.000	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955
	Euro 1	1.000	1.000	1.000	1.000	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955
	Euro 2	1.000	1.000	1.000	1.000	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955
	Euro 3	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	Euro 4	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Petrol LGVs	Euro 1	1.000	1.000	1.000	1.000	0.704	0.595	0.595	0.595	0.595	0.595	0.595	0.595	0.595	0.595	0.595	0.595	0.595	0.595	0.595	0.595	0.595	0.595	0.595	0.595	0.595	0.595	0.595	0.595	0.595	0.595
	Euro 2	1.000	1.000	1.000	1.000	0.704	0.595	0.595	0.595	0.595	0.595	0.595	0.595	0.595	0.595	0.595	0.595	0.595	0.595	0.595	0.595	0.595	0.595	0.595	0.595	0.595	0.595	0.595	0.595	0.595	0.595
	Euro 3	1.000	1.000	1.000	1.000	0.929	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786
	Euro 4	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Diesel LGVs	Pre-Euro 1	1.000	1.000	1.000	1.000	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955
	Euro 1	1.000	1.000	1.000	1.000	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955
	Euro 2	1.000	1.000	1.000	1.000	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955
	Euro 3	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	Euro 4	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Rigid HGVs	Old	1.000	1.000	1.000	1.000	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970
	Pre-Euro I	1.000	1.000	1.000	1.000	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970
	Euro I	1.000	1.000	1.000	1.000	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970
	Euro II	1.000	1.000	1.000	1.000	0.963	0.962	0.960	0.960	0.960	0.962	0.962	0.962	0.962	0.962	0.962	0.962	0.962	0.962	0.962	0.962	0.962	0.962	0.962	0.962	0.962	0.962	0.962	0.962	0.962	0.962
	Euro III	1.000	1.000	1.000	1.000	0.947	0.930	0.936	0.934	0.932	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930
	Euro IV	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	Euro IV+	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Artic HGVs	Old	1.000	1.000	1.000	1.000	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970
	Pre-Euro I	1.000	1.000	1.000	1.000	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970
	Euro I	1.000	1.000	1.000	1.000	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970
	Euro II	1.000	1.000	1.000	1.000	0.957	0.955	0.953	0.952	0.952	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953
	Euro III	1.000	1.000	1.000	1.000	0.947	0.920	0.929	0.927	0.924	0.920	0.920	0.920	0.920	0.920	0.920	0.920	0.920	0.920	0.920	0.920	0.920	0.920	0.920	0.920	0.920	0.920	0.920	0.920	0.920	0.920
	Euro IV	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	Euro IV+	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Buses	Old	1.000	0.972	0.875	0.778	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723
	Pre-Euro I	1.000	0.972	0.875	0.778	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723
	Euro I	1.000	0.972	0.875	0.778	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723
	Euro II	1.000	0.821	0.732	0.645	0.565	0.560	0.555	0.555	0.559	0.567	0.567	0.567	0.567	0.567	0.567	0.567	0.567	0.567	0.567	0.567	0.567	0.567	0.567	0.567	0.567	0.567	0.567	0.567	0.567	0.567
	Euro III	1.000	1.000	1.000	1.000	0.706	0.625	0.653	0.648	0.640	0.630	0.630	0.630	0.630	0.630	0.630	0.630	0.630	0.630	0.630	0.630	0.630	0.630	0.630	0.630	0.630	0.630	0.630	0.630	0.630	0.630
	Euro IV	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	Euro IV+	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Table B3: Current fuel and technology scaling factors for benzene.

Benzene		**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
Petrol cars	Pre-Euro 1	1.000	1.000	1.000	1.000	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270
	Euro 1	1.000	1.000	1.000	1.000	0.585	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495
	Euro 2	1.000	1.000	1.000	1.000	0.585	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495
	Euro 3	1.000	1.000	1.000	1.000	0.929	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786
	Euro 4	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Diesel cars	Pre-Euro 1	1.000	1.000	1.000	1.000	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955
	Euro 1	1.000	1.000	1.000	1.000	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955
	Euro 2	1.000	1.000	1.000	1.000	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955
	Euro 3	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	Euro 4	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Petrol LGVs	Pre-Euro 1	1.000	1.000	1.000	1.000	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270
	Euro 1	1.000	1.000	1.000	1.000	0.585	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495
	Euro 2	1.000	1.000	1.000	1.000	0.585	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495	0.495
	Euro 3	1.000	1.000	1.000	1.000	0.929	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786
	Euro 4	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Diesel LGVs	Pre-Euro 1	1.000	1.000	1.000	1.000	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955
	Euro 1	1.000	1.000	1.000	1.000	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955
	Euro 2	1.000	1.000	1.000	1.000	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955
	Euro 3	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	Euro 4	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Rigid HGVs	Old	1.000	1.000	1.000	1.000	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970
	Pre-Euro I	1.000	1.000	1.000	1.000	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970
	Euro I	1.000	1.000	1.000	1.000	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970
	Euro II	1.000	1.000	1.000	1.000	0.963	0.962	0.960	0.960	0.960	0.962	0.962	0.962	0.962	0.962	0.962	0.962	0.962	0.962	0.962	0.962	0.962	0.962	0.962	0.962	0.962	0.962	0.962	0.962	0.962	0.962
	Euro III	1.000	1.000	1.000	1.000	0.947	0.930	0.936	0.934	0.932	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930
	Euro IV	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	Euro IV+	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Artic HGVs	Old	1.000	1.000	1.000	1.000	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970
	Pre-Euro I	1.000	1.000	1.000	1.000	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970
	Euro I	1.000	1.000	1.000	1.000	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970
	Euro II	1.000	1.000	1.000	1.000	0.957	0.955	0.953	0.952	0.952	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953
	Euro III	1.000	1.000	1.000	1.000	0.947	0.920	0.929	0.927	0.924	0.920	0.920	0.920	0.920	0.920	0.920	0.920	0.920	0.920	0.920	0.920	0.920	0.920	0.920	0.920	0.920	0.920	0.920	0.920	0.920	0.920
	Euro IV	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	Euro IV+	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Buses	Old	1.000	0.972	0.875	0.778	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723
	Pre-Euro I	1.000	0.972	0.875	0.778	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723
	Euro I	1.000	0.972	0.875	0.778	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723
	Euro II	1.000	0.821	0.732	0.645	0.565	0.560	0.555	0.555	0.559	0.567	0.567	0.567	0.567	0.567	0.567	0.567	0.567	0.567	0.567	0.567	0.567	0.567	0.567	0.567	0.567	0.567	0.567	0.567	0.567	0.567
	Euro III	1.000	1.000	1.000	1.000	0.706	0.625	0.653	0.648	0.640	0.630	0.630	0.630	0.630	0.630	0.630	0.630	0.630	0.630	0.630	0.630	0.630	0.630	0.630	0.630	0.630	0.630	0.630	0.630	0.630	0.630
	Euro IV	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	Euro IV+	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Table B4: Current fuel and technology scaling factors for 1,3-butadiene.

1,3-butadiene		**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
Petrol cars	Euro 1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	Euro 2	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	Euro 3	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	Euro 4	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Diesel cars	Pre-Euro 1	1.000	1.000	1.000	1.000	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955
	Euro 1	1.000	1.000	1.000	1.000	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955
	Euro 2	1.000	1.000	1.000	1.000	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955
	Euro 3	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	Euro 4	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Petrol LGVs	Euro 1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	Euro 2	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	Euro 3	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	Euro 4	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Diesel LGVs	Pre-Euro 1	1.000	1.000	1.000	1.000	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955
	Euro 1	1.000	1.000	1.000	1.000	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955
	Euro 2	1.000	1.000	1.000	1.000	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955	0.955
	Euro 3	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	Euro 4	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Rigid HGVs	Old	1.000	1.000	1.000	1.000	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970
	Pre-Euro I	1.000	1.000	1.000	1.000	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970
	Euro I	1.000	1.000	1.000	1.000	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970
	Euro II	1.000	1.000	1.000	1.000	0.963	0.962	0.960	0.960	0.960	0.962	0.962	0.962	0.962	0.962	0.962	0.962	0.962	0.962	0.962	0.962	0.962	0.962	0.962	0.962	0.962	0.962	0.962	0.962	0.962	0.962
	Euro III	1.000	1.000	1.000	1.000	0.947	0.930	0.936	0.934	0.932	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930
	Euro IV	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	Euro IV+	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Artic HGVs	Old	1.000	1.000	1.000	1.000	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970
	Pre-Euro I	1.000	1.000	1.000	1.000	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970
	Euro I	1.000	1.000	1.000	1.000	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970
	Euro II	1.000	1.000	1.000	1.000	0.957	0.955	0.953	0.952	0.952	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953	0.953
	Euro III	1.000	1.000	1.000	1.000	0.947	0.920	0.929	0.927	0.924	0.920	0.920	0.920	0.920	0.920	0.920	0.920	0.920	0.920	0.920	0.920	0.920	0.920	0.920	0.920	0.920	0.920	0.920	0.920	0.920	0.920
	Euro IV	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	Euro IV+	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Buses	Old	1.000	0.972	0.875	0.778	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723
	Pre-Euro I	1.000	0.972	0.875	0.778	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723
	Euro I	1.000	0.972	0.875	0.778	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723
	Euro II	1.000	0.821	0.732	0.645	0.565	0.560	0.555	0.555	0.559	0.567	0.567	0.567	0.567	0.567	0.567	0.567	0.567	0.567	0.567	0.567	0.567	0.567	0.567	0.567	0.567	0.567	0.567	0.567	0.567	0.567
	Euro III	1.000	1.000	1.000	1.000	0.706	0.625	0.653	0.648	0.640	0.630	0.630	0.630	0.630	0.630	0.630	0.630	0.630	0.630	0.630	0.630	0.630	0.630	0.630	0.630	0.630	0.630	0.630	0.630	0.630	0.630
	Euro IV	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	Euro IV+	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Table B5: Current fuel and technology scaling factors for NO_x.

NOx		1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Petrol cars	Euro 1	1.000	1.000	1.000	1.000	0.893	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854
	Euro 2	1.000	1.000	1.000	1.000	0.893	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854
	Euro 3	1.000	1.000	1.000	1.000	0.917	0.747	0.747	0.747	0.747	0.747	0.747	0.747	0.747	0.747	0.747	0.747	0.747	0.747	0.747	0.747	0.747	0.747	0.747	0.747	0.747	0.747	0.747	0.747	0.747	0.747
	Euro 4	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Diesel cars	Pre-Euro 1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	Euro 1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	Euro 2	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	Euro 3	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	Euro 4	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Petrol LGVs	Euro 1	1.000	1.000	1.000	1.000	0.893	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854
	Euro 2	1.000	1.000	1.000	1.000	0.893	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854
	Euro 3	1.000	1.000	1.000	1.000	0.917	0.747	0.747	0.747	0.747	0.747	0.747	0.747	0.747	0.747	0.747	0.747	0.747	0.747	0.747	0.747	0.747	0.747	0.747	0.747	0.747	0.747	0.747	0.747	0.747	0.747
	Euro 4	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Diesel LGVs	Pre-Euro 1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	Euro 1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	Euro 2	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	Euro 3	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	Euro 4	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Rigid HGVs	Old	1.000	1.000	1.000	1.000	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941
	Pre-Euro I	1.000	1.000	1.000	1.000	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941
	Euro I	1.000	1.000	1.000	1.000	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941
	Euro II	1.000	1.000	1.000	1.000	0.940	0.940	0.939	0.939	0.939	0.940	0.940	0.940	0.940	0.940	0.940	0.940	0.940	0.940	0.940	0.940	0.940	0.940	0.940	0.940	0.940	0.940	0.940	0.940	0.940	0.940
	Euro III	1.000	1.000	1.000	1.000	0.948	0.945	0.946	0.945	0.945	0.945	0.945	0.945	0.945	0.945	0.945	0.945	0.945	0.945	0.945	0.945	0.945	0.945	0.945	0.945	0.945	0.945	0.945	0.945	0.945	0.945
	Euro IV	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	Euro IV+	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Artic HGVs	Old	1.000	1.000	1.000	1.000	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941
	Pre-Euro I	1.000	1.000	1.000	1.000	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941
	Euro I	1.000	1.000	1.000	1.000	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941	0.941
	Euro II	1.000	1.000	1.000	1.000	0.939	0.939	0.938	0.938	0.938	0.938	0.938	0.938	0.938	0.938	0.938	0.938	0.938	0.938	0.938	0.938	0.938	0.938	0.938	0.938	0.938	0.938	0.938	0.938	0.938	0.938
	Euro III	1.000	1.000	1.000	1.000	0.948	0.943	0.945	0.944	0.944	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943	0.943
	Euro IV	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	Euro IV+	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Buses	Old	1.000	1.001	1.006	1.011	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014
	Pre-Euro I	1.000	1.001	1.006	1.011	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014
	Euro I	1.000	1.001	1.006	1.011	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014
	Euro II	1.000	0.988	0.992	0.996	0.992	0.991	0.990	0.990	0.991	0.992	0.992	0.992	0.992	0.992	0.992	0.992	0.992	0.992	0.992	0.992	0.992	0.992	0.992	0.992	0.992	0.992	0.992	0.992	0.992	0.992
	Euro III	1.000	1.000	1.000	1.000	1.021	1.004	1.010	1.009	1.007	1.005	1.005	1.005	1.005	1.005	1.005	1.005	1.005	1.005	1.005	1.005	1.005	1.005	1.005	1.005	1.005	1.005	1.005	1.005	1.005	1.005
	Euro IV	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	Euro IV+	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Table B6: Current fuel and technology scaling factors for PM.

PM		1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Petrol cars	Euro 1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	Euro 2	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	Euro 3	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	Euro 4	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Diesel cars	Pre-Euro 1	0.994	0.976	0.976	0.976	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883
	Euro 1	0.994	0.976	0.976	0.976	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883
	Euro 2	1.000	1.000	1.000	1.000	0.905	0.905	0.905	0.905	0.905	0.905	0.905	0.905	0.905	0.905	0.905	0.905	0.905	0.905	0.905	0.905	0.905	0.905	0.905	0.905	0.905	0.905	0.905	0.905	0.905	0.905
	Euro 3	1.000	1.000	1.000	1.000	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952
	Euro 4	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Petrol LGVs	Euro 1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	Euro 2	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	Euro 3	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	Euro 4	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Diesel LGVs	Pre-Euro 1	0.994	0.976	0.976	0.976	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883
	Euro 1	0.994	0.976	0.976	0.976	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.883
	Euro 2	1.000	1.000	1.000	1.000	0.905	0.905	0.905	0.905	0.905	0.905	0.905	0.905	0.905	0.905	0.905	0.905	0.905	0.905	0.905	0.905	0.905	0.905	0.905	0.905	0.905	0.905	0.905	0.905	0.905	0.905
	Euro 3	1.000	1.000	1.000	1.000	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952
	Euro 4	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Rigid HGVs	Old	0.970	0.870	0.870	0.870	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797
	Pre-Euro I	0.970	0.870	0.870	0.870	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797
	Euro I	0.970	0.870	0.870	0.870	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797
	Euro II	1.000	1.000	1.000	1.000	0.909	0.908	0.907	0.907	0.907	0.909	0.909	0.909	0.909	0.909	0.909	0.909	0.909	0.909	0.909	0.909	0.909	0.909	0.909	0.909	0.909	0.909	0.909	0.909	0.909	0.909
	Euro III	1.000	1.000	1.000	1.000	0.922	0.906	0.912	0.910	0.909	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907
	Euro IV	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	Euro IV+	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Artic HGVs	Old	0.970	0.870	0.870	0.870	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797
	Pre-Euro I	0.970	0.870	0.870	0.870	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797
	Euro I	0.970	0.870	0.870	0.870	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797	0.797
	Euro II	1.000	1.000	1.000	1.000	0.905	0.903	0.901	0.899	0.899	0.901	0.901	0.901	0.901	0.901	0.901	0.901	0.901	0.901	0.901	0.901	0.901	0.901	0.901	0.901	0.901	0.901	0.901	0.901	0.901	0.901
	Euro III	1.000	1.000	1.000	1.000	0.922	0.897	0.905	0.903	0.900	0.897	0.897	0.897	0.897	0.897	0.897	0.897	0.897	0.897	0.897	0.897	0.897	0.897	0.897	0.897	0.897	0.897	0.897	0.897	0.897	0.897
	Euro IV	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	Euro IV+	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Buses	Old	0.968	0.842	0.744	0.645	0.589	0.589	0.589	0.589	0.589	0.589	0.589	0.589	0.589	0.589	0.589	0.589	0.589	0.589	0.589	0.589	0.589	0.589	0.589	0.589	0.589	0.589	0.589	0.589	0.589	0.589
	Pre-Euro I	0.968	0.842	0.744	0.645	0.589	0.589	0.589	0.589	0.589	0.589	0.589	0.589	0.589	0.589	0.589	0.589	0.589	0.589	0.589	0.589	0.589	0.589	0.589	0.589	0.589	0.589	0.589	0.589	0.589	0.589
	Euro I	0.968	0.842	0.744	0.645	0.589	0.589	0.589	0.589	0.589	0.589	0.589	0.589	0.589	0.589	0.589	0.589	0.589	0.589	0.589	0.589	0.589	0.589	0.589	0.589	0.589	0.589	0.589	0.589	0.589	0.589
	Euro II	1.000	0.811	0.709	0.609	0.521	0.516	0.511	0.511	0.515	0.523	0.523	0.523	0.523	0.523	0.523	0.523	0.523	0.523	0.523	0.523	0.523	0.523	0.523	0.523	0.523	0.523	0.523	0.523	0.523	0.523
	Euro III	1.000	1.000	1.000	1.000	0.682	0.596	0.625	0.620	0.612	0.602	0.602	0.602	0.602	0.602	0.602	0.602	0.602	0.602	0.602	0.602	0.602	0.602	0.602	0.602	0.602	0.602	0.602	0.602	0.602	0.602
	Euro IV	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	Euro IV+	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Appendix C: Examples of mileage scaling factors applicable to 2009 emission factors

Table C1: Mileage scaling factors for CO by vehicle category and reference year (cars <2.5 tonnes).

Code	Vehicle type	Fuel type	Engine capacity (cc)	Emission standard	Mileage scaling factor by reference year																																			
					1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
R001	Car <2.5 t	Petrol	<1400 cc	Pre-Euro 1	1.172	1.192	1.210	1.226	1.239	1.250	1.261	1.270	1.278	1.285	1.290	1.294	1.294	1.291	1.285	1.275	1.260	1.242	1.221	1.197	1.170	1.139	1.123	1.123	1.123	1.123	1.123	1.123	1.123	1.123	1.123	1.123	1.123	1.123	1.123	1.123
R002	Car <2.5 t	Petrol	<1400 cc	Euro 1	0.522	0.637	0.747	0.956	1.154	1.337	1.503	1.655	1.790	1.909	2.012	2.099	2.172	2.231	2.279	2.316	2.338	2.342	2.332	2.308	2.258	2.179	2.101	2.007	1.898	1.774	1.634	1.558	1.558	1.558	1.558	1.558	1.558	1.558	1.558	1.558
R003	Car <2.5 t	Petrol	<1400 cc	Euro 2				0.754	0.804	0.851	0.893	0.982	1.064	1.139	1.207	1.269	1.325	1.375	1.416	1.452	1.482	1.506	1.526	1.541	1.550	1.552	1.549	1.540	1.521	1.485	1.453	1.414	1.369	1.318	1.261	1.230	1.230	1.230	1.230	1.230
R004	Car <2.5 t	Petrol	<1400 cc	Euro 3								0.943	0.955	0.966	0.977	0.989	1.009	1.024	1.039	1.054	1.068	1.080	1.090	1.099	1.107	1.113	1.118	1.122	1.125	1.127	1.127	1.126	1.124	1.119	1.108	1.100	1.090	1.079	1.067	1.053
R005	Car <2.5 t	Petrol	<1400 cc	Euro 4													0.587	0.671	0.760	0.847	0.927	1.062	1.178	1.288	1.394	1.494	1.584	1.661	1.724	1.778	1.823	1.861	1.893	1.916	1.928	1.928	1.922	1.908	1.874	1.790
R006	Car <2.5 t	Petrol	<1400 cc	Euro 5																		0.587	0.671	0.760	0.847	0.927	1.062	1.178	1.288	1.394	1.494	1.584	1.661	1.724	1.778	1.823	1.861	1.893	1.916	1.928
R007	Car <2.5 t	Petrol	<1400 cc	Euro 6																							0.587	0.671	0.760	0.847	0.927	1.062	1.178	1.288	1.394	1.494	1.584	1.661	1.724	1.778
R008	Car <2.5 t	Petrol	1400-2000 cc	Pre-Euro 1	1.259	1.283	1.304	1.334	1.353	1.371	1.386	1.399	1.410	1.419	1.426	1.429	1.428	1.423	1.414	1.399	1.375	1.343	1.312	1.277	1.238	1.193	1.169	1.169	1.169	1.169	1.169	1.169	1.169	1.169	1.169	1.169	1.169	1.169	1.169	1.169
R009	Car <2.5 t	Petrol	1400-2000 cc	Euro 1	0.660	0.795	0.926	1.205	1.465	1.704	1.919	2.115	2.289	2.441	2.572	2.681	2.772	2.846	2.901	2.938	2.954	2.948	2.929	2.891	2.816	2.679	2.561	2.422	2.262	2.081	1.880	1.771	1.771	1.771	1.771	1.771	1.771	1.771	1.771	1.771
R010	Car <2.5 t	Petrol	1400-2000 cc	Euro 2				0.787	0.849	0.911	0.970	1.085	1.192	1.290	1.379	1.459	1.530	1.589	1.641	1.688	1.728	1.759	1.782	1.797	1.804	1.801	1.794	1.780	1.752	1.690	1.642	1.585	1.519	1.445	1.362	1.317	1.317	1.317	1.317	1.317
R011	Car <2.5 t	Petrol	1400-2000 cc	Euro 3								0.951	0.966	0.982	0.997	1.012	1.037	1.059	1.079	1.097	1.113	1.128	1.140	1.152	1.162	1.170	1.177	1.181	1.184	1.185	1.185	1.183	1.179	1.172	1.154	1.142	1.127	1.111	1.093	1.073
R012	Car <2.5 t	Petrol	1400-2000 cc	Euro 4													0.642	0.761	0.874	0.984	1.095	1.270	1.431	1.577	1.709	1.828	1.934	2.024	2.107	2.181	2.242	2.290	2.325	2.346	2.352	2.348	2.336	2.312	2.264	2.123
R013	Car <2.5 t	Petrol	1400-2000 cc	Euro 5																		0.642	0.761	0.874	0.984	1.095	1.270	1.431	1.577	1.709	1.828	1.934	2.024	2.107	2.181	2.242	2.290	2.325	2.346	2.352
R014	Car <2.5 t	Petrol	1400-2000 cc	Euro 6																							0.642	0.761	0.874	0.984	1.095	1.270	1.431	1.577	1.709	1.828	1.934	2.024	2.107	2.181
R015	Car <2.5 t	Petrol	>2000 cc	Pre-Euro 1	1.380	1.397	1.414	1.443	1.460	1.473	1.484	1.492	1.499	1.503	1.504	1.504	1.496	1.489	1.479	1.464	1.442	1.416	1.383	1.346	1.303	1.256	1.230	1.230	1.230	1.230	1.230	1.230	1.230	1.230	1.230	1.230	1.230	1.230	1.230	1.230
R016	Car <2.5 t	Petrol	>2000 cc	Euro 1	0.664	0.813	0.958	1.269	1.563	1.835	2.080	2.303	2.503	2.681	2.835	2.966	3.075	3.160	3.231	3.280	3.296	3.288	3.263	3.217	3.135	3.017	2.892	2.744	2.573	2.380	2.163	2.047	2.047	2.047	2.047	2.047	2.047	2.047	2.047	2.047
R017	Car <2.5 t	Petrol	>2000 cc	Euro 2				0.802	0.871	0.937	1.006	1.134	1.253	1.363	1.463	1.552	1.633	1.695	1.755	1.808	1.853	1.888	1.917	1.938	1.944	1.941	1.933	1.916	1.884	1.829	1.778	1.717	1.647	1.567	1.478	1.430	1.430	1.430	1.430	1.430
R018	Car <2.5 t	Petrol	>2000 cc	Euro 3								0.954	0.972	0.989	1.006	1.024	1.051	1.073	1.095	1.116	1.135	1.152	1.166	1.178	1.189	1.199	1.207	1.214	1.217	1.217	1.216	1.214	1.210	1.202	1.185	1.173	1.157	1.140	1.121	1.099
R019	Car <2.5 t	Petrol	>2000 cc	Euro 4													0.667	0.792	0.928	1.055	1.178	1.376	1.533	1.696	1.846	1.985	2.109	2.209	2.302	2.383	2.455	2.512	2.560	2.585	2.588	2.581	2.567	2.540	2.481	2.354
R020	Car <2.5 t	Petrol	>2000 cc	Euro 5																		0.667	0.792	0.928	1.055	1.178	1.376	1.533	1.696	1.846	1.985	2.109	2.209	2.302	2.383	2.455	2.512	2.560	2.585	2.588
R021	Car <2.5 t	Petrol	>2000 cc	Euro 6																							0.667	0.792	0.928	1.055	1.178	1.376	1.533	1.696	1.846	1.985	2.109	2.209	2.302	2.383
R022	Car <2.5 t	Diesel	<1400 cc	Pre-Euro 1	1.045	1.061	1.076	1.090	1.102	1.113	1.125	1.135	1.146	1.155	1.163	1.172	1.181	1.190	1.195	1.200	1.204	1.205	1.204	1.202	1.199	1.195	1.193	1.193	1.193	1.193	1.193	1.193	1.193	1.193	1.193	1.193	1.193	1.193	1.193	1.193
R023	Car <2.5 t	Diesel	<1400 cc	Euro 1	1.027	1.013	1.000	0.985	0.972	0.959	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950
R024	Car <2.5 t	Diesel	<1400 cc	Euro 2				0.643	0.730	0.830	0.861	1.020	1.168	1.315	1.444	1.569	1.684	1.846	1.986	2.092	2.141	2.154	2.176	2.221	2.304	2.363	2.394	2.428	2.472	2.489	2.492	2.487	2.474	2.453	2.424	2.406	2.406	2.406	2.406	2.406
R025	Car <2.5 t	Diesel	<1400 cc	Euro 3								0.802	0.821	0.854	0.887	0.930	1.017	1.063	1.119	1.179	1.283	1.414	1.533	1.596	1.626	1.634	1.639	1.651	1.676	1.722	1.754	1.772	1.791	1.816	1.824	1.824	1.819	1.810	1.796	1.777
R026	Car <2.5 t	Diesel	<1400 cc	Euro 4													0.545	0.650	0.763	0.848	0.912	1.038	1.146	1.273	1.413	1.652	1.954	2.227	2.372	2.441	2.459	2.471	2.498	2.556	2.661	2.736	2.775	2.817	2.876	2.897
R027	Car <2.5 t	Diesel	<1400 cc	Euro 5																		0.545	0.650	0.763	0.848	0.912	1.038	1.146	1.273	1.413	1.652	1.954	2.227	2.372	2.441	2.459	2.471	2.498	2.556	2.661
R028	Car <2.5 t	Diesel	<1400 cc	Euro 6																							0.545	0.650	0.763	0.848	0.912	1.038	1.146	1.273	1.413	1.652	1.954	2.227	2.372	2.441
R029	Car <2.5 t	Diesel	1400-2000 cc	Pre-Euro 1	1.101	1.121	1.139	1.155	1.168	1.174	1.189	1.198	1.204	1.210	1.214	1.217	1.219	1.218	1.214	1.208	1.197	1.175	1.160	1.143	1.123	1.102	1.090	1.090	1.090	1.090	1.090	1.090	1.090	1.090	1.090	1.090	1.090	1.090	1.090	1.090
R030	Car <2.5 t	Diesel	1400-2000 cc	Euro 1	1.017	1.005	0.994	0.974	0.955	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950
R031	Car <2.5 t	Diesel	1400-2000 cc	Euro 2				0.720	0.847	0.970	1.072	1.286	1.484	1.667	1.830	1.977	2.107	2.225	2.321	2.402	2.462	2.508	2.544	2.575	2.594	2.592	2.577	2.553	2.510	2.371	2.277	2.168	2.042	1.900	1.742	1.657	1.657	1.657	1.657	1.657
R032	Car <2.5 t	Diesel	1400-2000 cc	Euro 3								0.845	0.904	0.965	1.018	1.070	1.185	1.281	1.377	1.470	1.563	1.643	1.703	1.749	1.787	1.814	1.837	1.856	1.872	1.882	1.880	1.871	1.858	1.832	1.733	1.677	1.612	1.538	1.455	1.363
R033	Car <2.5 t	Diesel	1400-2000 cc	Euro 4													0.644	0.804	0.948	1.072	1.194	1.426	1.647	1.867	2.082	2.296	2.481	2.617	2.725	2.810	2.873	2.925	2.970	3.008	3.029	3.025	3.006	2.977	2.922	2.687
R034	Car <2.5 t	Diesel	1400-2000 cc	Euro 5																		0.644	0.804	0.948	1.072	1.194	1.426	1.647	1.867	2.082	2.296	2.481	2.617	2.725	2.810	2.873	2.925	2.970	3.008	3.029
R035	Car <2.5 t	Diesel	1400-2000 cc	Euro 6																							0.644	0.804	0.948	1.072	1.194	1.426	1.647	1.867	2.082	2.296	2.481	2.617	2.725	2.810
R036	Car <2.5 t	Diesel	>2000 cc	Pre-Euro 1	1.131	1.150	1.166	1.180	1.192	1.182	1.210	1.217	1.223	1.227	1.230	1.232	1.232	1.230	1.226	1.219	1.209	1.192	1.177	1.160	1.141	1.120	1.108	1.108	1.108	1.108	1.108	1.108	1.108	1.108	1.108	1.108	1.108	1.108	1.108	1.108
R037	Car <2.5 t	Diesel	>2000 cc	Euro 1	1.018	1.007	0.996	0.975	0.955	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950
R038	Car <2.5 t	Diesel	>2000 cc	Euro 2				0.728	0.851	0.970	1.087	1.308	1.513	1.703	1.874	2.028	2.167	2.286	2.391	2.479	2.546	2.595	2.639	2.675	2.691	2.689	2.677	2.653	2.611	2.486	2.396	2.290	2.166	2.027	1.871	1.787	1.787	1.787	1.787	1.787
R039	Car <2.5 t	Diesel	>2000 cc	Euro 3								0.849	0.907	0.956	1.008	1.061	1.181	1.278	1.381	1.492	1.594	1.676	1.740	1.791	1.831	1.863	1.888	1.912	1.929	1.935	1.933	1.926	1.912	1.886	1.798	1.743	1.680	1.607	1.526	1.435
R040	Car <2.5 t	Diesel	>2000 cc	Euro 4													0.653	0.805	0.948	1.076	1.175	1.417	1.639	1.876	2.132	2.368	2.556	2.703	2.821	2.913	2.986	3.045	3.099	3.138	3.153	3.148	3.133	3.102	3.049	2.837
R041	Car <2.5 t	Diesel	>2000 cc	Euro 5																		0.653	0.805	0.948	1.076	1.175	1.417	1.639	1.876	2.132	2.368	2.556	2.703	2.821	2.913	2.986	3.045	3.099	3.138	3.153
R042	Car <2.5 t	Diesel	>2000 cc	Euro 6																							0.653	0.805	0.948	1.076	1.175	1.417	1.639	1.876	2.132	2.368	2.556	2.703	2.821	2.913
R043	Car <2.5 t	LPG	All	Euro 1	0.710	0.795	0.878	1.205	1.465	1.704	1.919	2.115	2.289	2.441	2.572	2.681	2.772	2.846	2.901	2.938	2.954	2.948	2.929	2.891	2.816	2.679	2.561	2.422	2.262	2.081	1.880	1.771	1.771	1.771	1.771	1.771	1.771	1.771	1.771	1.771
R044	Car <2.5 t	LPG	All	Euro 2				0.787	0.849	0.911	0.970	1.085	1.192	1.290	1.379	1.459	1.530	1.589	1.641	1.688	1.728	1.759	1.782	1.797	1.804	1.801	1.794	1.780	1.752	1.690	1.642	1.585	1.519	1.445	1.362	1.317	1.317	1.317	1.317	1.317
R045	Car <2.5 t	LPG	All	Euro 3								0.951	0.966	0.982	0.997	1.012	1.037	1.059	1.079	1.097	1.113	1.128	1.140	1.152	1.162	1.170	1.177	1.181	1.184	1.185	1.185	1.183	1.179	1.172	1.154	1.142	1.127	1.111	1.093	1.073
R046	Car <2.5 t	LPG	All	Euro 4													0.642	0.761	0.874	0.984	1.095	1.270	1.431	1.577	1.709	1.828	1.934	2.024	2.107	2.181	2.242	2.290	2.325	2.346	2.352	2.348	2.336	2.312	2.264	2.123
R047	Car <2.5 t	LPG	All	Euro 5																		0.642	0.761	0.874	0.984	1.095	1.270	1.431	1.577	1.709	1.828	1.934	2.024	2.107	2.181	2.242	2.290	2.325	2.346	2.352
R048	Car <2.5 t	LPG	All	Euro 6																							0.642	0.761	0.874	0.984	1.095	1.270	1.431	1.577	1.709	1.828	1.934	2.024	2.107	2.181

Table C2: Mileage scaling factors for CO by vehicle category and reference year (cars >2.5 tonnes).

Code	Vehicle type	Fuel type	Engine capacity (cc)	Emission standard	Mileage scaling factor by reference year																																		
					1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
R049	Car 2.5-3.5 t	Petrol	All	Pre-Euro 1	1.351	1.360	1.369	1.415	1.434	1.450	1.463	1.475	1.485	1.493	1.499	1.503	1.504	1.499	1.492	1.482	1.469	1.448	1.418	1.383	1.346	1.303	1.256	1.230	1.230	1.230	1.230	1.230	1.230	1.230	1.230	1.230	1.230	1.230	1.230	1.230
R050	Car 2.5-3.5 t	Petrol	All	Euro 1		0.519	0.691	0.822	0.959	1.275	1.568	1.840	2.085	2.308	2.508	2.684	2.837	2.965	3.075	3.160	3.231	3.280	3.296	3.288	3.266	3.224	3.143	3.017	2.892	2.744	2.573	2.380	2.163	2.047	2.047	2.047	2.047	2.047	2.047	2.047
R051	Car 2.5-3.5 t	Petrol	All	Euro 2						0.802	0.876	0.938	1.070	1.194	1.309	1.413	1.508	1.598	1.670	1.732	1.790	1.839	1.877	1.908	1.931	1.943	1.943	1.936	1.924	1.898	1.851	1.805	1.749	1.683	1.608	1.524	1.430	1.430	1.430	1.430
R052	Car 2.5-3.5 t	Petrol	All	Euro 3									0.954	0.972	0.989	1.007	1.024	1.051	1.073	1.095	1.116	1.135	1.152	1.166	1.178	1.189	1.199	1.207	1.214	1.217	1.217	1.216	1.214	1.210	1.202	1.185	1.173	1.157	1.140	1.121
R053	Car 2.5-3.5 t	Petrol	All	Euro 4														0.667	0.792	0.928	1.055	1.178	1.376	1.533	1.696	1.846	1.985	2.109	2.209	2.302	2.383	2.455	2.512	2.560	2.585	2.588	2.581	2.568	2.541	2.482
R054	Car 2.5-3.5 t	Petrol	All	Euro 5																			0.667	0.792	0.928	1.055	1.178	1.376	1.533	1.696	1.846	1.985	2.109	2.209	2.302	2.383	2.455	2.512	2.560	2.585
R055	Car 2.5-3.5 t	Petrol	All	Euro 6																								0.667	0.792	0.928	1.055	1.265	1.451	1.614	1.774	1.924	2.065	2.170	2.271	2.359
R056	Car 2.5-3.5 t	Diesel	All	Pre-Euro 1	1.082	1.105	1.126	1.144	1.159	1.148	1.185	1.196	1.205	1.214	1.220	1.225	1.230	1.232	1.232	1.229	1.224	1.216	1.202	1.177	1.160	1.141	1.120	1.108	1.108	1.108	1.108	1.108	1.108	1.108	1.108	1.108	1.108	1.108	1.108	1.108
R057	Car 2.5-3.5 t	Diesel	All	Euro 1		1.026	1.014	1.003	0.992	0.973	0.952	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950
R058	Car 2.5-3.5 t	Diesel	All	Euro 2						0.728	0.849	0.940	1.171	1.387	1.586	1.767	1.932	2.100	2.233	2.341	2.442	2.523	2.580	2.627	2.666	2.688	2.691	2.679	2.658	2.626	2.525	2.443	2.345	2.230	2.099	1.951	1.787	1.787	1.787	1.787
R059	Car 2.5-3.5 t	Diesel	All	Euro 3									0.849	0.907	0.966	1.023	1.076	1.181	1.278	1.381	1.492	1.594	1.676	1.740	1.791	1.831	1.863	1.888	1.912	1.929	1.935	1.933	1.926	1.912	1.887	1.798	1.743	1.680	1.607	1.526
R060	Car 2.5-3.5 t	Diesel	All	Euro 4														0.653	0.805	0.948	1.076	1.175	1.417	1.639	1.876	2.132	2.368	2.556	2.703	2.821	2.913	2.986	3.045	3.099	3.138	3.153	3.148	3.133	3.103	3.050
R061	Car 2.5-3.5 t	Diesel	All	Euro 5																			0.653	0.805	0.948	1.076	1.175	1.417	1.639	1.876	2.132	2.368	2.556	2.703	2.821	2.913	2.986	3.045	3.099	3.138
R062	Car 2.5-3.5 t	Diesel	All	Euro 6																								0.653	0.805	0.948	1.076	1.336	1.571	1.798	2.041	2.280	2.484	2.636	2.770	2.882

Table C3: Mileage scaling factors for CO by vehicle category and reference year (taxis).

Code	Vehicle type	Fuel type	Engine capacity (cc)	Emission standard	Mileage scaling factor by reference year																																		
					1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
R063	Car (taxi)	Diesel	All	Pre-Euro 1	1.131	1.150	1.166	1.180	1.192	1.182	1.210	1.217	1.223	1.227	1.230	1.232	1.232	1.230	1.226	1.219	1.209	1.192	1.177	1.160	1.141	1.120	1.108	1.108	1.108	1.108	1.108	1.108	1.108	1.108	1.108	1.108	1.108	1.108	1.108	1.108
R064	Car (taxi)	Diesel	All	Euro 1	1.018	1.007	0.996	0.975	0.955	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950
R065	Car (taxi)	Diesel	All	Euro 2				0.728	0.851	0.970	1.087	1.308	1.513	1.703	1.874	2.028	2.167	2.286	2.391	2.479	2.546	2.595	2.639	2.675	2.691	2.689	2.677	2.653	2.611	2.486	2.396	2.290	2.166	2.027	1.871	1.787	1.787	1.787	1.787	1.787
R066	Car (taxi)	Diesel	All	Euro 3								0.849	0.907	0.956	1.008	1.061	1.181	1.278	1.381	1.492	1.594	1.676	1.740	1.791	1.831	1.863	1.888	1.912	1.929	1.935	1.933	1.926	1.912	1.886	1.798	1.743	1.680	1.607	1.526	1.435
R067	Car (taxi)	Diesel	All	Euro 4													0.653	0.805	0.948	1.076	1.175	1.417	1.639	1.876	2.132	2.368	2.556	2.703	2.821	2.913	2.986	3.045	3.099	3.138	3.153	3.148	3.133	3.102	3.049	2.837
R068	Car (taxi)	Diesel	All	Euro 5																		0.653	0.805	0.948	1.076	1.175	1.417	1.639	1.876	2.132	2.368	2.556	2.703	2.821	2.913	2.986	3.045	3.099	3.138	3.153
R069	Car (taxi)	Diesel	All	Euro 6																							0.653	0.805	0.948	1.076	1.175	1.417	1.639	1.876	2.132	2.368	2.556	2.703	2.821	2.913

Table C4: Mileage scaling factors for CO by vehicle category and reference year (LGV N1(I)).

Code	Vehicle type	Fuel type	Engine capacity (cc)	Emission standard	Mileage scaling factor by reference year																																		
					1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
R070	LGV N1(I)	Petrol	All	Pre-Euro 1	1.199	1.263	1.314	1.351	1.376	1.386	1.395	1.391	1.379	1.359	1.330	1.289	1.233	1.233	1.233	1.233	1.233	1.233	1.233	1.233	1.233	1.233	1.233	1.233	1.233	1.233	1.233	1.233	1.233	1.233	1.233	1.233	1.233	1.233	1.233	1.233
R071	LGV N1(I)	Petrol	All	Euro 1		0.697	0.954	1.201	1.600	1.986	2.262	2.489	2.653	2.755	2.795	2.775	2.697	2.563	2.388	2.182	2.059	2.059	2.059	2.059	2.059	2.059	2.059	2.059	2.059	2.059	2.059	2.059	2.059	2.059	2.059	2.059	2.059	2.059	2.059	2.059
R072	LGV N1(I)	Petrol	All	Euro 2					0.875	0.983	1.075	1.245	1.393	1.515	1.609	1.678	1.721	1.738	1.730	1.698	1.643	1.571	1.486	1.436	1.436	1.436	1.436	1.436	1.436	1.436	1.436	1.436	1.436	1.436	1.436	1.436	1.436	1.436	1.436	1.436
R073	LGV N1(I)	Petrol	All	Euro 3								0.971	0.992	1.013	1.031	1.048	1.083	1.109	1.132	1.151	1.165	1.170	1.169	1.162	1.152	1.140	1.125	1.106	1.100	1.100	1.100	1.100	1.100	1.100	1.100	1.100	1.100	1.100	1.100	1.100
R074	LGV N1(I)	Petrol	All	Euro 4													0.790	0.969	1.125	1.255	1.380	1.603	1.796	1.965	2.103	2.201	2.242	2.231	2.186	2.113	2.026	1.916	1.773	1.733	1.733	1.733	1.733	1.733	1.733	1.733
R075	LGV N1(I)	Petrol	All	Euro 5																		0.790	0.969	1.125	1.255	1.380	1.603	1.796	1.965	2.103	2.201	2.242	2.231	2.186	2.113	2.026	1.916	1.773	1.733	1.733
R076	LGV N1(I)	Petrol	All	Euro 6																							0.790	0.969	1.125	1.255	1.380	1.603	1.796	1.965	2.103	2.201	2.242	2.231	2.186	2.113
R077	LGV N1(I)	Diesel	All	Pre-Euro 1	1.095	1.134	1.170	1.200	1.222	1.234	1.250	1.255	1.253	1.243	1.226	1.197	1.153	1.153	1.153	1.153	1.153	1.153	1.153	1.153	1.153	1.153	1.153	1.153	1.153	1.153	1.153	1.153	1.153	1.153	1.153	1.153	1.153	1.153	1.153	1.153
R078	LGV N1(I)	Diesel	All	Euro 1		1.021	1.005	0.989	0.960	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950
R079	LGV N1(I)	Diesel	All	Euro 2					0.778	0.948	1.103	1.423	1.740	2.039	2.301	2.525	2.698	2.814	2.857	2.824	2.709	2.521	2.272	2.113	2.113	2.113	2.113	2.113	2.113	2.113	2.113	2.113	2.113	2.113	2.113	2.113	2.113	2.113	2.113	2.113
R080	LGV N1(I)	Diesel	All	Euro 3								0.877	0.955	1.039	1.115	1.191	1.366	1.515	1.662	1.800	1.922	2.000	2.026	2.014	1.968	1.899	1.799	1.657	1.615	1.615	1.615	1.615	1.615	1.615	1.615	1.615	1.615	1.615	1.615	1.615
R081	LGV N1(I)	Diesel	All	Euro 4													0.718	0.931	1.130	1.308	1.489	1.842	2.185	2.524	2.842	3.122	3.301	3.362	3.335	3.228	3.069	2.840	2.513	2.416	2.416	2.416	2.416	2.416	2.416	2.416
R082	LGV N1(I)	Diesel	All	Euro 5																		0.718	0.931	1.130	1.308	1.489	1.842	2.185	2.524	2.842	3.122	3.301	3.362	3.335	3.228	3.069	2.840	2.513	2.416	2.416
R083	LGV N1(I)	Diesel	All	Euro 6																							0.718	0.931	1.130	1.308	1.489	1.842	2.185	2.524	2.842	3.122	3.301	3.362	3.335	3.228

Table C5: Mileage scaling factors for CO by vehicle category and reference year (LGV N1(II/III)).

Code	Vehicle type	Fuel type	Engine capacity (cc)	Emission standard	Mileage scaling factor by reference year																																			
					1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
R084	LGV N1(II)	Petrol	All	Pre-Euro 1	1.199	1.263	1.314	1.351	1.376	1.386	1.395	1.391	1.379	1.359	1.330	1.289	1.233	1.233	1.233	1.233	1.233	1.233	1.233	1.233	1.233	1.233	1.233	1.233	1.233	1.233	1.233	1.233	1.233	1.233	1.233	1.233	1.233	1.233	1.233	1.233
R085	LGV N1(II)	Petrol	All	Euro 1		0.697	0.954	1.201	1.409	1.834	2.124	2.386	2.579	2.712	2.782	2.793	2.748	2.647	2.511	2.347	2.145	2.059	2.059	2.059	2.059	2.059	2.059	2.059	2.059	2.059	2.059	2.059	2.059	2.059	2.059	2.059	2.059	2.059	2.059	2.059
R086	LGV N1(II)	Petrol	All	Euro 2						0.875	0.974	1.048	1.223	1.374	1.499	1.597	1.669	1.721	1.738	1.730	1.698	1.643	1.571	1.486	1.436	1.436	1.436	1.436	1.436	1.436	1.436	1.436	1.436	1.436	1.436	1.436	1.436	1.436	1.436	1.436
R087	LGV N1(II)	Petrol	All	Euro 3									0.971	0.994	1.015	1.033	1.052	1.083	1.109	1.132	1.151	1.165	1.170	1.169	1.162	1.152	1.140	1.125	1.106	1.100	1.100	1.100	1.100	1.100	1.100	1.100	1.100	1.100	1.100	1.100
R088	LGV N1(II)	Petrol	All	Euro 4														0.790	0.969	1.125	1.255	1.380	1.603	1.796	1.965	2.103	2.201	2.242	2.231	2.186	2.113	2.026	1.916	1.773	1.733	1.733	1.733	1.733	1.733	1.733
R089	LGV N1(II)	Petrol	All	Euro 5																			0.790	0.969	1.125	1.255	1.380	1.603	1.796	1.965	2.103	2.201	2.242	2.231	2.186	2.113	2.026	1.916	1.773	1.733
R090	LGV N1(II)	Petrol	All	Euro 6																								0.790	0.969	1.125	1.255	1.511	1.731	1.908	2.050	2.169	2.232	2.241	2.210	2.140
R091	LGV N1(II)	Diesel	All	Pre-Euro 1	1.095	1.134	1.170	1.200	1.222	1.234	1.250	1.255	1.253	1.243	1.226	1.197	1.153	1.153	1.153	1.153	1.153	1.153	1.153	1.153	1.153	1.153	1.153	1.153	1.153	1.153	1.153	1.153	1.153	1.153	1.153	1.153	1.153	1.153	1.153	1.153
R092	LGV N1(II)	Diesel	All	Euro 1		1.021	1.005	0.989	0.974	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950
R093	LGV N1(II)	Diesel	All	Euro 2						0.778	0.932	1.057	1.379	1.696	1.998	2.266	2.495	2.698	2.814	2.857	2.824	2.709	2.521	2.272	2.113	2.113	2.113	2.113	2.113	2.113	2.113	2.113	2.113	2.113	2.113	2.113	2.113	2.113	2.113	2.113
R094	LGV N1(II)	Diesel	All	Euro 3									0.877	0.965	1.046	1.125	1.212	1.366	1.515	1.662	1.800	1.922	2.000	2.026	2.014	1.968	1.899	1.799	1.657	1.615	1.615	1.615	1.615	1.615	1.615	1.615	1.615	1.615	1.615	1.615
R095	LGV N1(II)	Diesel	All	Euro 4														0.718	0.931	1.130	1.308	1.489	1.842	2.185	2.524	2.842	3.122	3.301	3.362	3.335	3.228	3.069	2.840	2.513	2.416	2.416	2.416	2.416	2.416	2.416
R096	LGV N1(II)	Diesel	All	Euro 5																			0.718	0.931	1.130	1.308	1.489	1.842	2.185	2.524	2.842	3.122	3.301	3.362	3.335	3.228	3.069	2.840	2.513	2.416
R097	LGV N1(II)	Diesel	All	Euro 6																								0.718	0.931	1.130	1.308	1.692	2.065	2.404	2.714	3.023	3.240	3.346	3.357	3.272
R098	LGV N1(III)	Petrol	All	Pre-Euro 1	1.199	1.263	1.314	1.351	1.376	1.386	1.395	1.391	1.379	1.359	1.330	1.289	1.233	1.233	1.233	1.233	1.233	1.233	1.233	1.233	1.233	1.233	1.233	1.233	1.233	1.233	1.233	1.233	1.233	1.233	1.233	1.233	1.233	1.233	1.233	1.233
R099	LGV N1(III)	Petrol	All	Euro 1		0.697	0.954	1.201	1.409	1.834	2.124	2.386	2.579	2.712	2.782	2.793	2.748	2.647	2.511	2.347	2.145	2.059	2.059	2.059	2.059	2.059	2.059	2.059	2.059	2.059	2.059	2.059	2.059	2.059	2.059	2.059	2.059	2.059	2.059	2.059
R100	LGV N1(III)	Petrol	All	Euro 2						0.875	0.974	1.048	1.223	1.374	1.499	1.597	1.669	1.721	1.738	1.730	1.698	1.643	1.571	1.486	1.436	1.436	1.436	1.436	1.436	1.436	1.436	1.436	1.436	1.436	1.436	1.436	1.436	1.436	1.436	1.436
R101	LGV N1(III)	Petrol	All	Euro 3									0.971	0.994	1.015	1.033	1.052	1.083	1.109	1.132	1.151	1.165	1.170	1.169	1.162	1.152	1.140	1.125	1.106	1.100	1.100	1.100	1.100	1.100	1.100	1.100	1.100	1.100	1.100	1.100
R102	LGV N1(III)	Petrol	All	Euro 4														0.790	0.969	1.125	1.255	1.380	1.603	1.796	1.965	2.103	2.201	2.242	2.231	2.186	2.113	2.026	1.916	1.773	1.733	1.733	1.733	1.733	1.733	1.733
R103	LGV N1(III)	Petrol	All	Euro 5																			0.790	0.969	1.125	1.255	1.380	1.603	1.796	1.965	2.103	2.201	2.242	2.231	2.186	2.113	2.026	1.916	1.773	1.733
R104	LGV N1(III)	Petrol	All	Euro 6																								0.790	0.969	1.125	1.255	1.511	1.731	1.908	2.050	2.169	2.232	2.241	2.210	2.140
R105	LGV N1(III)	Diesel	All	Pre-Euro 1	1.095	1.134	1.170	1.200	1.222	1.234	1.250	1.255	1.253	1.243	1.226	1.197	1.153	1.153	1.153	1.153	1.153	1.153	1.153	1.153	1.153	1.153	1.153	1.153	1.153	1.153	1.153	1.153	1.153	1.153	1.153	1.153	1.153	1.153	1.153	1.153
R106	LGV N1(III)	Diesel	All	Euro 1		1.021	1.005	0.989	0.974	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950
R107	LGV N1(III)	Diesel	All	Euro 2						0.778	0.932	1.057	1.379	1.696	1.998	2.266	2.495	2.698	2.814	2.857	2.824	2.709	2.521	2.272	2.113	2.113	2.113	2.113	2.113	2.113	2.113	2.113	2.113	2.113	2.113	2.113	2.113	2.113	2.113	2.113
R108	LGV N1(III)	Diesel	All	Euro 3									0.877	0.965	1.046	1.125	1.212	1.366	1.515	1.662	1.800	1.922	2.000	2.026	2.014	1.968	1.899	1.799	1.657	1.615	1.615	1.615	1.615	1.615	1.615	1.615	1.615	1.615	1.615	1.615
R109	LGV N1(III)	Diesel	All	Euro 4														0.718	0.931	1.130	1.308	1.489	1.842	2.185	2.524	2.842	3.122	3.301	3.362	3.335	3.228	3.069	2.840	2.513	2.416	2.416	2.416	2.416	2.416	2.416
R110	LGV N1(III)	Diesel	All	Euro 5																			0.718	0.931	1.130	1.308	1.489	1.842	2.185	2.524	2.842	3.122	3.301	3.362	3.335	3.228	3.069	2.840	2.513	2.416
R111	LGV N1(III)	Diesel	All	Euro 6																								0.718	0.931	1.130	1.308	1.692	2.065	2.404	2.714	3.023	3.240	3.346	3.357	3.272

Table C6: Mileage scaling factors for HC by vehicle category and reference year (cars <2.5 tonnes).

Code	Vehicle type	Fuel type	Engine capacity (cc)	Emission standard	Mileage scaling factor by reference year																																			
					1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
R001	Car <2.5 t	Petrol	<1400 cc	Pre-Euro 1	1.145	1.162	1.178	1.191	1.201	1.211	1.220	1.228	1.235	1.241	1.245	1.248	1.249	1.246	1.241	1.232	1.219	1.204	1.187	1.167	1.144	1.118	1.104	1.104	1.104	1.104	1.104	1.104	1.104	1.104	1.104	1.104	1.104	1.104	1.104	1.104
R002	Car <2.5 t	Petrol	<1400 cc	Euro 1	0.548	0.656	0.761	0.958	1.146	1.319	1.476	1.620	1.749	1.861	1.958	2.041	2.110	2.166	2.212	2.247	2.268	2.271	2.262	2.239	2.192	2.117	2.043	1.954	1.851	1.733	1.601	1.529	1.529	1.529	1.529	1.529	1.529	1.529	1.529	1.529
R003	Car <2.5 t	Petrol	<1400 cc	Euro 2				0.780	0.824	0.867	0.905	0.984	1.057	1.124	1.185	1.241	1.291	1.335	1.372	1.404	1.431	1.453	1.470	1.484	1.492	1.494	1.491	1.483	1.466	1.434	1.405	1.371	1.330	1.285	1.233	1.205	1.205	1.205	1.205	1.205
R004	Car <2.5 t	Petrol	<1400 cc	Euro 3								0.908	0.927	0.945	0.963	0.983	1.014	1.040	1.064	1.088	1.110	1.130	1.147	1.161	1.173	1.183	1.191	1.199	1.204	1.206	1.206	1.205	1.201	1.193	1.176	1.162	1.147	1.129	1.109	1.086
R005	Car <2.5 t	Petrol	<1400 cc	Euro 4													0.701	0.762	0.827	0.889	0.947	1.045	1.129	1.208	1.285	1.357	1.422	1.478	1.523	1.562	1.595	1.623	1.646	1.663	1.671	1.671	1.667	1.657	1.632	1.571
R006	Car <2.5 t	Petrol	<1400 cc	Euro 5																		0.701	0.762	0.827	0.889	0.947	1.045	1.129	1.208	1.285	1.357	1.422	1.478	1.523	1.562	1.595	1.623	1.646	1.663	1.671
R007	Car <2.5 t	Petrol	<1400 cc	Euro 6																							0.701	0.762	0.827	0.889	0.947	1.045	1.129	1.208	1.285	1.357	1.422	1.478	1.523	1.562
R008	Car <2.5 t	Petrol	1400-2000 cc	Pre-Euro 1	1.219	1.239	1.257	1.282	1.298	1.313	1.326	1.337	1.346	1.354	1.359	1.362	1.361	1.357	1.350	1.337	1.316	1.290	1.264	1.234	1.201	1.163	1.143	1.143	1.143	1.143	1.143	1.143	1.143	1.143	1.143	1.143	1.143	1.143	1.143	1.143
R009	Car <2.5 t	Petrol	1400-2000 cc	Euro 1	0.678	0.806	0.930	1.194	1.440	1.666	1.871	2.056	2.221	2.365	2.489	2.592	2.678	2.749	2.800	2.836	2.851	2.846	2.828	2.791	2.720	2.590	2.478	2.347	2.195	2.024	1.833	1.730	1.730	1.730	1.730	1.730	1.730	1.730	1.730	1.730
R010	Car <2.5 t	Petrol	1400-2000 cc	Euro 2				0.810	0.865	0.920	0.973	1.076	1.171	1.260	1.339	1.411	1.474	1.527	1.573	1.615	1.652	1.679	1.699	1.713	1.719	1.717	1.710	1.698	1.673	1.617	1.574	1.523	1.464	1.398	1.324	1.284	1.284	1.284	1.284	1.284
R011	Car <2.5 t	Petrol	1400-2000 cc	Euro 3								0.920	0.945	0.971	0.995	1.020	1.060	1.096	1.128	1.158	1.184	1.208	1.228	1.246	1.263	1.276	1.287	1.295	1.299	1.301	1.300	1.297	1.291	1.279	1.250	1.230	1.207	1.181	1.151	1.119
R012	Car <2.5 t	Petrol	1400-2000 cc	Euro 4													0.741	0.827	0.909	0.989	1.069	1.195	1.312	1.417	1.513	1.599	1.675	1.741	1.800	1.854	1.898	1.933	1.958	1.973	1.978	1.974	1.966	1.949	1.914	1.812
R013	Car <2.5 t	Petrol	1400-2000 cc	Euro 5																		0.741	0.827	0.909	0.989	1.069	1.195	1.312	1.417	1.513	1.599	1.675	1.741	1.800	1.854	1.898	1.933	1.958	1.973	1.978
R014	Car <2.5 t	Petrol	1400-2000 cc	Euro 6																							0.741	0.827	0.909	0.989	1.069	1.195	1.312	1.417	1.513	1.599	1.675	1.741	1.800	1.854
R015	Car <2.5 t	Petrol	>2000 cc	Pre-Euro 1	1.321	1.335	1.349	1.374	1.388	1.399	1.408	1.415	1.421	1.424	1.426	1.426	1.419	1.413	1.404	1.392	1.373	1.351	1.324	1.292	1.256	1.216	1.194	1.194	1.194	1.194	1.194	1.194	1.194	1.194	1.194	1.194	1.194	1.194	1.194	1.194
R016	Car <2.5 t	Petrol	>2000 cc	Euro 1	0.682	0.823	0.960	1.255	1.533	1.791	2.023	2.235	2.424	2.592	2.738	2.863	2.966	3.046	3.113	3.160	3.175	3.167	3.144	3.100	3.022	2.910	2.792	2.652	2.491	2.307	2.102	1.991	1.991	1.991	1.991	1.991	1.991	1.991	1.991	1.991
R017	Car <2.5 t	Petrol	>2000 cc	Euro 2				0.823	0.884	0.944	1.005	1.120	1.227	1.325	1.414	1.494	1.566	1.622	1.676	1.723	1.763	1.794	1.821	1.839	1.845	1.841	1.834	1.820	1.791	1.742	1.696	1.642	1.579	1.508	1.428	1.385	1.385	1.385	1.385	1.385
R018	Car <2.5 t	Petrol	>2000 cc	Euro 3								0.926	0.954	0.982	1.009	1.038	1.084	1.118	1.155	1.188	1.219	1.247	1.269	1.289	1.308	1.324	1.336	1.347	1.352	1.353	1.351	1.348	1.341	1.327	1.301	1.280	1.256	1.228	1.196	1.161
R019	Car <2.5 t	Petrol	>2000 cc	Euro 4													0.759	0.849	0.948	1.040	1.129	1.272	1.385	1.504	1.612	1.712	1.802	1.875	1.942	2.000	2.052	2.093	2.128	2.146	2.148	2.143	2.133	2.114	2.071	1.979
R020	Car <2.5 t	Petrol	>2000 cc	Euro 5																		0.759	0.849	0.948	1.040	1.129	1.272	1.385	1.504	1.612	1.712	1.802	1.875	1.942	2.000	2.052	2.093	2.128	2.146	2.148
R021	Car <2.5 t	Petrol	>2000 cc	Euro 6																							0.759	0.849	0.948	1.040	1.129	1.272	1.385	1.504	1.612	1.712	1.802	1.875	1.942	2.000
R022	Car <2.5 t	Diesel	<1400 cc	Pre-Euro 1	1.092	1.126	1.157	1.186	1.211	1.233	1.258	1.280	1.302	1.320	1.337	1.357	1.375	1.394	1.404	1.415	1.423	1.424	1.423	1.419	1.413	1.405	1.400	1.400	1.400	1.400	1.400	1.400	1.400	1.400	1.400	1.400	1.400	1.400	1.400	1.400
R023	Car <2.5 t	Diesel	<1400 cc	Euro 1	1.026	1.013	1.000	0.986	0.973	0.961	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952
R024	Car <2.5 t	Diesel	<1400 cc	Euro 2				0.714	0.784	0.864	0.889	1.016	1.134	1.251	1.355	1.455	1.546	1.676	1.788	1.873	1.912	1.922	1.939	1.976	2.042	2.089	2.114	2.141	2.177	2.190	2.192	2.188	2.178	2.161	2.138	2.124	2.124	2.124	2.124	2.124
R025	Car <2.5 t	Diesel	<1400 cc	Euro 3								0.723	0.749	0.795	0.841	0.902	1.023	1.089	1.166	1.251	1.397	1.581	1.747	1.836	1.877	1.889	1.896	1.912	1.948	2.012	2.057	2.082	2.108	2.144	2.155	2.155	2.148	2.135	2.115	2.089
R026	Car <2.5 t	Diesel	<1400 cc	Euro 4													0.124	0.325	0.542	0.708	0.831	1.074	1.281	1.527	1.795	2.256	2.838	3.365	3.644	3.777	3.812	3.835	3.887	3.998	4.201	4.345	4.420	4.501	4.615	4.656
R027	Car <2.5 t	Diesel	<1400 cc	Euro 5																		0.124	0.325	0.542	0.708	0.831	1.074	1.281	1.527	1.795	2.256	2.838	3.365	3.644	3.777	3.812	3.835	3.887	3.998	4.201
R028	Car <2.5 t	Diesel	<1400 cc	Euro 6																							0.124	0.325	0.542	0.708	0.831	1.074	1.281	1.527	1.795	2.256	2.838	3.365	3.644	3.777
R029	Car <2.5 t	Diesel	1400-2000 cc	Pre-Euro 1	1.208	1.250	1.288	1.321	1.349	1.361	1.393	1.410	1.423	1.435	1.444	1.451	1.454	1.451	1.444	1.431	1.407	1.363	1.332	1.296	1.256	1.211	1.187	1.187	1.187	1.187	1.187	1.187	1.187	1.187	1.187	1.187	1.187	1.187	1.187	1.187
R030	Car <2.5 t	Diesel	1400-2000 cc	Euro 1	1.016	1.005	0.995	0.975	0.958	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952
R031	Car <2.5 t	Diesel	1400-2000 cc	Euro 2				0.776	0.878	0.976	1.057	1.228	1.387	1.533	1.663	1.781	1.884	1.979	2.055	2.121	2.169	2.205	2.234	2.259	2.274	2.272	2.260	2.241	2.207	2.095	2.021	1.933	1.833	1.719	1.593	1.525	1.525	1.525	1.525	1.525
R032	Car <2.5 t	Diesel	1400-2000 cc	Euro 3								0.783	0.865	0.950	1.026	1.099	1.260	1.394	1.528	1.659	1.789	1.902	1.985	2.050	2.102	2.141	2.172	2.199	2.223	2.236	2.233	2.221	2.202	2.166	2.027	1.949	1.858	1.754	1.638	1.509
R033	Car <2.5 t	Diesel	1400-2000 cc	Euro 4													0.314	0.623	0.900	1.139	1.374	1.822	2.247	2.670	3.084	3.498	3.853	4.116	4.324	4.488	4.609	4.710	4.795	4.869	4.909	4.903	4.866	4.808	4.703	4.251
R034	Car <2.5 t	Diesel	1400-2000 cc	Euro 5																		0.314	0.623	0.900	1.139	1.374	1.822	2.247	2.670	3.084	3.498	3.853	4.116	4.324	4.488	4.609	4.710	4.795	4.869	4.909
R035	Car <2.5 t	Diesel	1400-2000 cc	Euro 6																							0.314	0.623	0.900	1.139	1.374	1.822	2.247	2.670	3.084	3.498	3.853	4.116	4.324	4.488
R036	Car <2.5 t	Diesel	>2000 cc	Pre-Euro 1	1.272	1.310	1.344	1.373	1.397	1.378	1.435	1.450	1.462	1.471	1.477	1.480	1.481	1.477	1.469	1.455	1.433	1.397	1.367	1.332	1.292	1.248	1.224	1.224	1.224	1.224	1.224	1.224	1.224	1.224	1.224	1.224	1.224	1.224	1.224	1.224
R037	Car <2.5 t	Diesel	>2000 cc	Euro 1	1.017	1.006	0.996	0.976	0.957	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952
R038	Car <2.5 t	Diesel	>2000 cc	Euro 2				0.782	0.881	0.976	1.069	1.246	1.410	1.562	1.698	1.822	1.932	2.027	2.111	2.182	2.235	2.275	2.310	2.338	2.351	2.350	2.340	2.321	2.287	2.188	2.116	2.031	1.932	1.821	1.696	1.629	1.629	1.629	1.629	1.629
R039	Car <2.5 t	Diesel	>2000 cc	Euro 3								0.789	0.869	0.938	1.011	1.085	1.254	1.389	1.533	1.689	1.833	1.947	2.037	2.109	2.165	2.210	2.245	2.278	2.302	2.311	2.308	2.298	2.278	2.242	2.118	2.042	1.953	1.851	1.737	1.610
R040	Car <2.5 t	Diesel	>2000 cc	Euro 4													0.332	0.624	0.900	1.146	1.338	1.803	2.232	2.688	3.181	3.636	3.998	4.281	4.508	4.686	4.827	4.940	5.044	5.120	5.148	5.140	5.109	5.051	4.947	4.539
R041	Car <2.5 t	Diesel	>2000 cc	Euro 5																		0.332	0.624	0.900	1.146	1.338	1.803	2.232	2.688	3.181	3.636	3.998	4.281	4.508	4.686	4.827	4.940	5.044	5.120	5.148
R042	Car <2.5 t	Diesel	>2000 cc	Euro 6																							0.332	0.624	0.900	1.146	1.338	1.803	2.232	2.688	3.181	3.636	3.998	4.281	4.508	4.686
R043	Car <2.5 t	LPG	All	Euro 1	0.726	0.806	0.885	1.194	1.440	1.666	1.871	2.056	2.221	2.365	2.489	2.592	2.678	2.749	2.800	2.836	2.851	2.846	2.828	2.791	2.720	2.590	2.478	2.347	2.195	2.024	1.833	1.730	1.730	1.730	1.730	1.730	1.730	1.730	1.730	1.730
R044	Car <2.5 t	LPG	All	Euro 2				0.810	0.865	0.920	0.973	1.076	1.171	1.260	1.339	1.411	1.474	1.527	1.573	1.615	1.652	1.679	1.699	1.713	1.719	1.717	1.710	1.698	1.673	1.617	1.574	1.523	1.464	1.398	1.324	1.284	1.284	1.284	1.284	1.284
R045	Car <2.5 t	LPG	All	Euro 3								0.920	0.945	0.971	0.995	1.020	1.060	1.096	1.128	1.158	1.184	1.208	1.228	1.246	1.263	1.276	1.287	1.295	1.299	1.301	1.300	1.297	1.291	1.279	1.250	1.230	1.207	1.181	1.151	1.119
R046	Car <2.5 t	LPG	All	Euro 4													0.741	0.827	0.909	0.989	1.069	1.195	1.312	1.417	1.513	1.599	1.675	1.741	1.800	1.854	1.898	1.933	1.958	1.973	1.978	1.974	1.966	1.949	1.914	1.812
R047	Car <2.5 t	LPG	All	Euro 5																		0.741	0.827	0.909	0.989	1.069	1.195	1.312	1.417	1.513	1.599	1.675	1.741	1.800	1.854	1.898	1.933	1.958	1.973	1.978
R048	Car <2.5 t	LPG	All	Euro 6																							0.741	0.827	0.909	0.989	1.069	1.195	1.312	1.417	1.513	1.599	1.675	1.741	1.800	1.854

Table C7: Mileage scaling factors for HC by vehicle category and reference year (cars >2.5 tonnes).

Code	Vehicle type	Fuel type	Engine capacity (cc)	Emission standard	Mileage scaling factor by reference year																																			
					1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
R049	Car 2.5-3.5 t	Petrol	All	Pre-Euro 1	1.297	1.304	1.311	1.350	1.366	1.380	1.391	1.401	1.410	1.416	1.421	1.424	1.426	1.422	1.415	1.407	1.396	1.379	1.353	1.324	1.292	1.256	1.216	1.194	1.194	1.194	1.194	1.194	1.194	1.194	1.194	1.194	1.194	1.194	1.194	1.194
R050	Car 2.5-3.5 t	Petrol	All	Euro 1		0.545	0.707	0.832	0.961	1.261	1.538	1.796	2.028	2.239	2.428	2.595	2.740	2.861	2.966	3.046	3.113	3.160	3.175	3.167	3.147	3.106	3.030	2.910	2.792	2.652	2.491	2.307	2.102	1.991	1.991	1.991	1.991	1.991	1.991	1.991
R051	Car 2.5-3.5 t	Petrol	All	Euro 2						0.823	0.889	0.945	1.063	1.174	1.276	1.369	1.454	1.535	1.599	1.655	1.706	1.751	1.784	1.812	1.833	1.843	1.844	1.837	1.826	1.804	1.762	1.720	1.670	1.611	1.544	1.469	1.385	1.385	1.385	1.385
R052	Car 2.5-3.5 t	Petrol	All	Euro 3									0.926	0.954	0.982	1.012	1.040	1.084	1.118	1.155	1.188	1.219	1.247	1.269	1.289	1.308	1.324	1.336	1.347	1.352	1.353	1.351	1.348	1.341	1.328	1.301	1.280	1.256	1.228	1.196
R053	Car 2.5-3.5 t	Petrol	All	Euro 4														0.759	0.849	0.948	1.040	1.129	1.272	1.385	1.504	1.612	1.712	1.802	1.875	1.942	2.000	2.052	2.093	2.128	2.146	2.148	2.143	2.134	2.114	2.072
R054	Car 2.5-3.5 t	Petrol	All	Euro 5																			0.759	0.849	0.948	1.040	1.129	1.272	1.385	1.504	1.612	1.712	1.802	1.875	1.942	2.000	2.052	2.093	2.128	2.146
R055	Car 2.5-3.5 t	Petrol	All	Euro 6																								0.759	0.849	0.948	1.040	1.192	1.326	1.444	1.560	1.668	1.770	1.846	1.919	1.983
R056	Car 2.5-3.5 t	Diesel	All	Pre-Euro 1	1.171	1.218	1.261	1.298	1.330	1.306	1.384	1.407	1.426	1.443	1.456	1.467	1.476	1.481	1.480	1.475	1.465	1.447	1.418	1.367	1.332	1.292	1.248	1.224	1.224	1.224	1.224	1.224	1.224	1.224	1.224	1.224	1.224	1.224	1.224	1.224
R057	Car 2.5-3.5 t	Diesel	All	Euro 1		1.024	1.013	1.003	0.993	0.974	0.955	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952
R058	Car 2.5-3.5 t	Diesel	All	Euro 2						0.782	0.879	0.952	1.137	1.309	1.468	1.613	1.745	1.879	1.985	2.072	2.152	2.217	2.263	2.301	2.331	2.349	2.352	2.341	2.325	2.299	2.219	2.153	2.075	1.983	1.878	1.760	1.629	1.629	1.629	1.629
R059	Car 2.5-3.5 t	Diesel	All	Euro 3									0.789	0.870	0.953	1.032	1.107	1.254	1.389	1.533	1.689	1.833	1.947	2.037	2.109	2.165	2.210	2.245	2.278	2.302	2.311	2.308	2.298	2.279	2.244	2.118	2.042	1.953	1.851	1.737
R060	Car 2.5-3.5 t	Diesel	All	Euro 4														0.332	0.624	0.900	1.146	1.338	1.803	2.232	2.688	3.181	3.636	3.998	4.281	4.508	4.686	4.827	4.940	5.044	5.120	5.148	5.140	5.109	5.052	4.950
R061	Car 2.5-3.5 t	Diesel	All	Euro 5																			0.332	0.624	0.900	1.146	1.338	1.803	2.232	2.688	3.181	3.636	3.998	4.281	4.508	4.686	4.827	4.940	5.044	5.120
R062	Car 2.5-3.5 t	Diesel	All	Euro 6																								0.332	0.624	0.900	1.146	1.648	2.101	2.537	3.006	3.466	3.860	4.152	4.410	4.626

Table C8: Mileage scaling factors for HC by vehicle category and reference year (taxis).

Code	Vehicle type	Fuel type	Engine capacity (cc)	Emission standard	Mileage scaling factor by reference year																																			
					1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
R063	Car (taxi)	Diesel	All	Pre-Euro 1	1.272	1.310	1.344	1.373	1.397	1.378	1.435	1.450	1.462	1.471	1.477	1.480	1.481	1.477	1.469	1.455	1.433	1.397	1.367	1.332	1.292	1.248	1.224	1.224	1.224	1.224	1.224	1.224	1.224	1.224	1.224	1.224	1.224	1.224	1.224	1.224
R064	Car (taxi)	Diesel	All	Euro 1	1.017	1.006	0.996	0.976	0.957	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952
R065	Car (taxi)	Diesel	All	Euro 2				0.782	0.881	0.976	1.069	1.246	1.410	1.562	1.698	1.822	1.932	2.027	2.111	2.182	2.235	2.275	2.310	2.338	2.351	2.350	2.340	2.321	2.287	2.188	2.116	2.031	1.932	1.821	1.696	1.629	1.629	1.629	1.629	1.629
R066	Car (taxi)	Diesel	All	Euro 3								0.789	0.869	0.938	1.011	1.085	1.254	1.389	1.533	1.689	1.833	1.947	2.037	2.109	2.165	2.210	2.245	2.278	2.302	2.311	2.308	2.298	2.278	2.242	2.118	2.042	1.953	1.851	1.737	1.610
R067	Car (taxi)	Diesel	All	Euro 4													0.332	0.624	0.900	1.146	1.338	1.803	2.232	2.688	3.181	3.636	3.998	4.281	4.508	4.686	4.827	4.940	5.044	5.120	5.148	5.140	5.109	5.051	4.947	4.539
R068	Car (taxi)	Diesel	All	Euro 5																		0.332	0.624	0.900	1.146	1.338	1.803	2.232	2.688	3.181	3.636	3.998	4.281	4.508	4.686	4.827	4.940	5.044	5.120	5.148
R069	Car (taxi)	Diesel	All	Euro 6																							0.332	0.624	0.900	1.146	1.338	1.803	2.232	2.688	3.181	3.636	3.998	4.281	4.508	4.686

Table C9: Mileage scaling factors for HC by vehicle category and reference year (LGV N1(I)).

Code	Vehicle type	Fuel type	Engine capacity (cc)	Emission standard	Mileage scaling factor by reference year																																			
					1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
R070	LGV N1(I)	Petrol	All	Pre-Euro 1	1.168	1.222	1.265	1.297	1.317	1.325	1.333	1.330	1.320	1.303	1.278	1.244	1.196	1.196	1.196	1.196	1.196	1.196	1.196	1.196	1.196	1.196	1.196	1.196	1.196	1.196	1.196	1.196	1.196	1.196	1.196	1.196	1.196	1.196	1.196	1.196
R071	LGV N1(I)	Petrol	All	Euro 1		0.713	0.956	1.191	1.568	1.934	2.195	2.410	2.566	2.663	2.701	2.682	2.607	2.481	2.315	2.119	2.003	2.003	2.003	2.003	2.003	2.003	2.003	2.003	2.003	2.003	2.003	2.003	2.003	2.003	2.003	2.003	2.003	2.003	2.003	2.003
R072	LGV N1(I)	Petrol	All	Euro 2					0.888	0.985	1.067	1.219	1.351	1.461	1.545	1.606	1.645	1.660	1.653	1.624	1.575	1.510	1.435	1.390	1.390	1.390	1.390	1.390	1.390	1.390	1.390	1.390	1.390	1.390	1.390	1.390	1.390	1.390	1.390	1.390
R073	LGV N1(I)	Petrol	All	Euro 3								0.953	0.987	1.021	1.050	1.077	1.134	1.177	1.215	1.245	1.267	1.276	1.274	1.264	1.247	1.228	1.204	1.172	1.163	1.163	1.163	1.163	1.163	1.163	1.163	1.163	1.163	1.163	1.163	1.163
R074	LGV N1(I)	Petrol	All	Euro 4													0.848	0.978	1.091	1.185	1.275	1.436	1.576	1.698	1.797	1.869	1.898	1.890	1.857	1.805	1.742	1.662	1.559	1.530	1.530	1.530	1.530	1.530	1.530	1.530
R075	LGV N1(I)	Petrol	All	Euro 5																		0.848	0.978	1.091	1.185	1.275	1.436	1.576	1.698	1.797	1.869	1.898	1.890	1.857	1.805	1.742	1.662	1.559	1.530	1.530
R076	LGV N1(I)	Petrol	All	Euro 6																							0.848	0.978	1.091	1.185	1.275	1.436	1.576	1.698	1.797	1.869	1.898	1.890	1.857	1.805
R077	LGV N1(I)	Diesel	All	Pre-Euro 1	1.197	1.278	1.352	1.414	1.461	1.484	1.519	1.528	1.524	1.505	1.468	1.408	1.316	1.316	1.316	1.316	1.316	1.316	1.316	1.316	1.316	1.316	1.316	1.316	1.316	1.316	1.316	1.316	1.316	1.316	1.316	1.316	1.316	1.316	1.316	1.316
R078	LGV N1(I)	Diesel	All	Euro 1		1.020	1.005	0.990	0.962	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952
R079	LGV N1(I)	Diesel	All	Euro 2					0.823	0.958	1.082	1.338	1.591	1.830	2.040	2.219	2.357	2.449	2.484	2.457	2.366	2.216	2.016	1.889	1.889	1.889	1.889	1.889	1.889	1.889	1.889	1.889	1.889	1.889	1.889	1.889	1.889	1.889	1.889	1.889
R080	LGV N1(I)	Diesel	All	Euro 3								0.828	0.937	1.054	1.162	1.268	1.513	1.722	1.928	2.122	2.292	2.401	2.438	2.422	2.357	2.260	2.120	1.921	1.862	1.862	1.862	1.862	1.862	1.862	1.862	1.862	1.862	1.862	1.862	1.862
R081	LGV N1(I)	Diesel	All	Euro 4													0.456	0.866	1.251	1.594	1.942	2.622	3.283	3.937	4.550	5.089	5.433	5.552	5.498	5.294	4.987	4.545	3.914	3.728	3.728	3.728	3.728	3.728	3.728	3.728
R082	LGV N1(I)	Diesel	All	Euro 5																		0.456	0.866	1.251	1.594	1.942	2.622	3.283	3.937	4.550	5.089	5.433	5.552	5.498	5.294	4.987	4.545	3.914	3.728	3.728
R083	LGV N1(I)	Diesel	All	Euro 6																							0.456	0.866	1.251	1.594	1.942	2.622	3.283	3.937	4.550	5.089	5.433	5.552	5.498	5.294

Table C10: Mileage scaling factors for HC by vehicle category and reference year (LGV N1(II/III)).

Code	Vehicle type	Fuel type	Engine capacity (cc)	Emission standard	Mileage scaling factor by reference year																																			
					1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
R084	LGV N1(II)	Petrol	All	Pre-Euro 1	1.168	1.222	1.265	1.297	1.317	1.325	1.333	1.330	1.320	1.303	1.278	1.244	1.196	1.196	1.196	1.196	1.196	1.196	1.196	1.196	1.196	1.196	1.196	1.196	1.196	1.196	1.196	1.196	1.196	1.196	1.196	1.196	1.196	1.196	1.196	1.196
R085	LGV N1(II)	Petrol	All	Euro 1		0.713	0.956	1.191	1.387	1.790	2.065	2.313	2.496	2.621	2.688	2.699	2.656	2.560	2.431	2.276	2.084	2.003	2.003	2.003	2.003	2.003	2.003	2.003	2.003	2.003	2.003	2.003	2.003	2.003	2.003	2.003	2.003	2.003	2.003	2.003
R086	LGV N1(II)	Petrol	All	Euro 2						0.888	0.977	1.043	1.199	1.334	1.447	1.534	1.599	1.645	1.660	1.653	1.624	1.575	1.510	1.435	1.390	1.390	1.390	1.390	1.390	1.390	1.390	1.390	1.390	1.390	1.390	1.390	1.390	1.390	1.390	1.390
R087	LGV N1(II)	Petrol	All	Euro 3									0.953	0.991	1.024	1.053	1.084	1.134	1.177	1.215	1.245	1.267	1.276	1.274	1.264	1.247	1.228	1.204	1.172	1.163	1.163	1.163	1.163	1.163	1.163	1.163	1.163	1.163	1.163	1.163
R088	LGV N1(II)	Petrol	All	Euro 4														0.848	0.978	1.091	1.185	1.275	1.436	1.576	1.698	1.797	1.869	1.898	1.890	1.857	1.805	1.742	1.662	1.559	1.530	1.530	1.530	1.530	1.530	1.530
R089	LGV N1(II)	Petrol	All	Euro 5																			0.848	0.978	1.091	1.185	1.275	1.436	1.576	1.698	1.797	1.869	1.898	1.890	1.857	1.805	1.742	1.662	1.559	1.530
R090	LGV N1(II)	Petrol	All	Euro 6																								0.848	0.978	1.091	1.185	1.370	1.529	1.656	1.759	1.846	1.891	1.897	1.875	1.824
R091	LGV N1(II)	Diesel	All	Pre-Euro 1	1.197	1.278	1.352	1.414	1.461	1.484	1.519	1.528	1.524	1.505	1.468	1.408	1.316	1.316	1.316	1.316	1.316	1.316	1.316	1.316	1.316	1.316	1.316	1.316	1.316	1.316	1.316	1.316	1.316	1.316	1.316	1.316	1.316	1.316	1.316	1.316
R092	LGV N1(II)	Diesel	All	Euro 1		1.020	1.005	0.990	0.976	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952
R093	LGV N1(II)	Diesel	All	Euro 2						0.823	0.946	1.045	1.303	1.556	1.797	2.012	2.195	2.357	2.449	2.484	2.457	2.366	2.216	2.016	1.889	1.889	1.889	1.889	1.889	1.889	1.889	1.889	1.889	1.889	1.889	1.889	1.889	1.889	1.889	1.889
R094	LGV N1(II)	Diesel	All	Euro 3									0.828	0.951	1.064	1.175	1.298	1.513	1.722	1.928	2.122	2.292	2.401	2.438	2.422	2.357	2.260	2.120	1.921	1.862	1.862	1.862	1.862	1.862	1.862	1.862	1.862	1.862	1.862	1.862
R095	LGV N1(II)	Diesel	All	Euro 4														0.456	0.866	1.251	1.594	1.942	2.622	3.283	3.937	4.550	5.089	5.433	5.552	5.498	5.294	4.987	4.545	3.914	3.728	3.728	3.728	3.728	3.728	3.728
R096	LGV N1(II)	Diesel	All	Euro 5																			0.456	0.866	1.251	1.594	1.942	2.622	3.283	3.937	4.550	5.089	5.433	5.552	5.498	5.294	4.987	4.545	3.914	3.728
R097	LGV N1(II)	Diesel	All	Euro 6																								0.456	0.866	1.251	1.594	2.334	3.052	3.705	4.303	4.897	5.317	5.520	5.541	5.377
R098	LGV N1(III)	Petrol	All	Pre-Euro 1	1.168	1.222	1.265	1.297	1.317	1.325	1.333	1.330	1.320	1.303	1.278	1.244	1.196	1.196	1.196	1.196	1.196	1.196	1.196	1.196	1.196	1.196	1.196	1.196	1.196	1.196	1.196	1.196	1.196	1.196	1.196	1.196	1.196	1.196	1.196	1.196
R099	LGV N1(III)	Petrol	All	Euro 1		0.713	0.956	1.191	1.387	1.790	2.065	2.313	2.496	2.621	2.688	2.699	2.656	2.560	2.431	2.276	2.084	2.003	2.003	2.003	2.003	2.003	2.003	2.003	2.003	2.003	2.003	2.003	2.003	2.003	2.003	2.003	2.003	2.003	2.003	2.003
R100	LGV N1(III)	Petrol	All	Euro 2						0.888	0.977	1.043	1.199	1.334	1.447	1.534	1.599	1.645	1.660	1.653	1.624	1.575	1.510	1.435	1.390	1.390	1.390	1.390	1.390	1.390	1.390	1.390	1.390	1.390	1.390	1.390	1.390	1.390	1.390	1.390
R101	LGV N1(III)	Petrol	All	Euro 3									0.953	0.991	1.024	1.053	1.084	1.134	1.177	1.215	1.245	1.267	1.276	1.274	1.264	1.247	1.228	1.204	1.172	1.163	1.163	1.163	1.163	1.163	1.163	1.163	1.163	1.163	1.163	1.163
R102	LGV N1(III)	Petrol	All	Euro 4														0.848	0.978	1.091	1.185	1.275	1.436	1.576	1.698	1.797	1.869	1.898	1.890	1.857	1.805	1.742	1.662	1.559	1.530	1.530	1.530	1.530	1.530	1.530
R103	LGV N1(III)	Petrol	All	Euro 5																			0.848	0.978	1.091	1.185	1.275	1.436	1.576	1.698	1.797	1.869	1.898	1.890	1.857	1.805	1.742	1.662	1.559	1.530
R104	LGV N1(III)	Petrol	All	Euro 6																								0.848	0.978	1.091	1.185	1.370	1.529	1.656	1.759	1.846	1.891	1.897	1.875	1.824
R105	LGV N1(III)	Diesel	All	Pre-Euro 1	1.197	1.278	1.352	1.414	1.461	1.484	1.519	1.528	1.524	1.505	1.468	1.408	1.316	1.316	1.316	1.316	1.316	1.316	1.316	1.316	1.316	1.316	1.316	1.316	1.316	1.316	1.316	1.316	1.316	1.316	1.316	1.316	1.316	1.316	1.316	1.316
R106	LGV N1(III)	Diesel	All	Euro 1		1.020	1.005	0.990	0.976	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952	0.952
R107	LGV N1(III)	Diesel	All	Euro 2						0.823	0.946	1.045	1.303	1.556	1.797	2.012	2.195	2.357	2.449	2.484	2.457	2.366	2.216	2.016	1.889	1.889	1.889	1.889	1.889	1.889	1.889	1.889	1.889	1.889	1.889	1.889	1.889	1.889	1.889	1.889
R108	LGV N1(III)	Diesel	All	Euro 3									0.828	0.951	1.064	1.175	1.298	1.513	1.722	1.928	2.122	2.292	2.401	2.438	2.422	2.357	2.260	2.120	1.921	1.862	1.862	1.862	1.862	1.862	1.862	1.862	1.862	1.862	1.862	1.862
R109	LGV N1(III)	Diesel	All	Euro 4														0.456	0.866	1.251	1.594	1.942	2.622	3.283	3.937	4.550	5.089	5.433	5.552	5.498	5.294	4.987	4.545	3.914	3.728	3.728	3.728	3.728	3.728	3.728
R110	LGV N1(III)	Diesel	All	Euro 5																			0.456	0.866	1.251	1.594	1.942	2.622	3.283	3.937	4.550	5.089	5.433	5.552	5.498	5.294	4.987	4.545	3.914	3.728
R111	LGV N1(III)	Diesel	All	Euro 6																								0.456	0.866	1.251	1.594	2.334	3.052	3.705	4.303	4.897	5.317	5.520	5.541	5.377

Table C11: Mileage scaling factors for NO_x by vehicle category and reference year (cars <2.5 tonnes).

Code	Vehicle type	Fuel type	Engine capacity (cc)	Emission standard	Mileage scaling factor by reference year																																			
					1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
R001	Car <2.5 t	Petrol	<1400 cc	Pre-Euro 1	1.028	1.031	1.034	1.037	1.039	1.041	1.043	1.044	1.045	1.047	1.048	1.048	1.048	1.048	1.047	1.045	1.043	1.040	1.036	1.032	1.028	1.023	1.020	1.020	1.020	1.020	1.020	1.020	1.020	1.020	1.020	1.020	1.020	1.020	1.020	1.020
R002	Car <2.5 t	Petrol	<1400 cc	Euro 1	0.700	0.772	0.841	0.972	1.097	1.212	1.316	1.411	1.496	1.571	1.635	1.690	1.736	1.773	1.803	1.827	1.840	1.843	1.837	1.821	1.790	1.741	1.691	1.633	1.564	1.486	1.398	1.351	1.351	1.351	1.351	1.351	1.351	1.351	1.351	1.351
R003	Car <2.5 t	Petrol	<1400 cc	Euro 2				1.181	1.144	1.110	1.078	1.013	0.953	0.898	0.847	0.802	0.761	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.766	0.808	0.831	0.831	0.831	0.831	0.831
R004	Car <2.5 t	Petrol	<1400 cc	Euro 3								1.299	1.238	1.179	1.122	1.056	0.955	0.871	0.792	0.715	0.644	0.578	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.581	0.647	0.721
R005	Car <2.5 t	Petrol	<1400 cc	Euro 4													0.776	0.821	0.870	0.917	0.960	1.034	1.097	1.156	1.214	1.268	1.316	1.358	1.392	1.421	1.446	1.467	1.484	1.497	1.503	1.503	1.500	1.492	1.474	1.428
R006	Car <2.5 t	Petrol	<1400 cc	Euro 5																		0.776	0.821	0.870	0.917	0.960	1.034	1.097	1.156	1.214	1.268	1.316	1.358	1.392	1.421	1.446	1.467	1.484	1.497	1.503
R007	Car <2.5 t	Petrol	<1400 cc	Euro 6																							0.776	0.821	0.870	0.917	0.960	1.034	1.097	1.156	1.214	1.268	1.316	1.358	1.392	1.421
R008	Car <2.5 t	Petrol	1400-2000 cc	Pre-Euro 1	1.042	1.046	1.050	1.055	1.058	1.061	1.063	1.065	1.067	1.069	1.070	1.070	1.070	1.069	1.068	1.065	1.061	1.056	1.051	1.045	1.039	1.032	1.028	1.028	1.028	1.028	1.028	1.028	1.028	1.028	1.028	1.028	1.028	1.028	1.028	1.028
R009	Car <2.5 t	Petrol	1400-2000 cc	Euro 1	0.786	0.871	0.954	1.129	1.292	1.442	1.577	1.700	1.810	1.905	1.987	2.056	2.113	2.159	2.194	2.217	2.227	2.224	2.212	2.187	2.140	2.054	1.980	1.893	1.793	1.679	1.552	1.484	1.484	1.484	1.484	1.484	1.484	1.484	1.484	1.484
R010	Car <2.5 t	Petrol	1400-2000 cc	Euro 2				1.156	1.111	1.066	1.022	0.938	0.859	0.786	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.767	0.767	0.767	0.767	0.767
R011	Car <2.5 t	Petrol	1400-2000 cc	Euro 3								1.258	1.177	1.095	1.015	0.936	0.805	0.689	0.584	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.615
R012	Car <2.5 t	Petrol	1400-2000 cc	Euro 4													0.806	0.870	0.932	0.991	1.051	1.146	1.234	1.313	1.384	1.449	1.506	1.555	1.600	1.640	1.673	1.699	1.718	1.730	1.733	1.730	1.724	1.711	1.685	1.608
R013	Car <2.5 t	Petrol	1400-2000 cc	Euro 5																		0.806	0.870	0.932	0.991	1.051	1.146	1.234	1.313	1.384	1.449	1.506	1.555	1.600	1.640	1.673	1.699	1.718	1.730	1.733
R014	Car <2.5 t	Petrol	1400-2000 cc	Euro 6																							0.806	0.870	0.932	0.991	1.051	1.146	1.234	1.313	1.384	1.449	1.506	1.555	1.600	1.640
R015	Car <2.5 t	Petrol	>2000 cc	Pre-Euro 1	1.062	1.065	1.068	1.073	1.075	1.077	1.079	1.080	1.082	1.082	1.083	1.083	1.081	1.080	1.078	1.076	1.072	1.068	1.063	1.057	1.050	1.042	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038
R016	Car <2.5 t	Petrol	>2000 cc	Euro 1	0.789	0.883	0.974	1.169	1.354	1.524	1.678	1.818	1.944	2.055	2.152	2.235	2.303	2.356	2.401	2.432	2.442	2.437	2.421	2.392	2.341	2.266	2.188	2.095	1.988	1.867	1.731	1.657	1.657	1.657	1.657	1.657	1.657	1.657	1.657	1.657
R017	Car <2.5 t	Petrol	>2000 cc	Euro 2				1.146	1.095	1.046	0.996	0.901	0.814	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743
R018	Car <2.5 t	Petrol	>2000 cc	Euro 3								1.240	1.150	1.060	0.971	0.876	0.729	0.615	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576
R019	Car <2.5 t	Petrol	>2000 cc	Euro 4													0.820	0.887	0.961	1.030	1.097	1.204	1.289	1.377	1.459	1.534	1.601	1.656	1.706	1.750	1.789	1.819	1.846	1.859	1.861	1.857	1.850	1.835	1.803	1.734
R020	Car <2.5 t	Petrol	>2000 cc	Euro 5																		0.820	0.887	0.961	1.030	1.097	1.204	1.289	1.377	1.459	1.534	1.601	1.656	1.706	1.750	1.789	1.819	1.846	1.859	1.861
R021	Car <2.5 t	Petrol	>2000 cc	Euro 6																							0.820	0.887	0.961	1.030	1.097	1.204	1.289	1.377	1.459	1.534	1.601	1.656	1.706	1.750
R022	Car <2.5 t	Diesel	<1400 cc	Pre-Euro 1	1.015	1.020	1.025	1.030	1.034	1.038	1.042	1.045	1.049	1.052	1.054	1.057	1.060	1.063	1.065	1.067	1.068	1.068	1.068	1.067	1.066	1.065	1.064	1.064	1.064	1.064	1.064	1.064	1.064	1.064	1.064	1.064	1.064	1.064	1.064	1.064
R023	Car <2.5 t	Diesel	<1400 cc	Euro 1	0.932	0.967	1.000	1.036	1.070	1.102	1.131	1.159	1.185	1.208	1.230	1.249	1.267	1.270	1.275	1.286	1.305	1.319	1.327	1.335	1.345	1.348	1.349	1.348	1.345	1.340	1.333	1.329	1.329	1.329	1.329	1.329	1.329	1.329	1.329	1.329
R024	Car <2.5 t	Diesel	<1400 cc	Euro 2				0.994	0.996	0.997	0.998	1.000	1.003	1.005	1.007	1.009	1.011	1.013	1.015	1.017	1.018	1.018	1.018	1.019	1.020	1.021	1.022	1.022	1.023	1.023	1.023	1.023	1.023	1.023	1.022	1.022	1.022	1.022	1.022	1.022
R025	Car <2.5 t	Diesel	<1400 cc	Euro 3								1.211	1.191	1.156	1.121	1.075	0.982	0.932	0.873	0.808	0.697	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684
R026	Car <2.5 t	Diesel	<1400 cc	Euro 4													1.074	1.057	1.039	1.025	1.014	0.994	0.976	0.956	0.933	0.894	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890
R027	Car <2.5 t	Diesel	<1400 cc	Euro 5																		1.074	1.057	1.039	1.025	1.014	0.994	0.976	0.956	0.933	0.894	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890
R028	Car <2.5 t	Diesel	<1400 cc	Euro 6																							1.074	1.057	1.039	1.025	1.014	0.994	0.976	0.956	0.933	0.894	0.890	0.890	0.890	0.890
R029	Car <2.5 t	Diesel	1400-2000 cc	Pre-Euro 1	1.033	1.040	1.046	1.052	1.056	1.058	1.063	1.066	1.068	1.070	1.071	1.072	1.073	1.073	1.071	1.069	1.065	1.058	1.053	1.048	1.041	1.034	1.030	1.030	1.030	1.030	1.030	1.030	1.030	1.030	1.030	1.030	1.030	1.030	1.030	1.030
R030	Car <2.5 t	Diesel	1400-2000 cc	Euro 1	0.959	0.987	1.014	1.064	1.111	1.155	1.192	1.227	1.258	1.284	1.307	1.326	1.342	1.353	1.361	1.368	1.373	1.372	1.369	1.363	1.352	1.321	1.299	1.273	1.244	1.211	1.174	1.154	1.154	1.154	1.154	1.154	1.154	1.154	1.154	1.154
R031	Car <2.5 t	Diesel	1400-2000 cc	Euro 2				0.996	0.998	1.000	1.001	1.004	1.008	1.010	1.013	1.015	1.017	1.019	1.021	1.022	1.023	1.024	1.024	1.025	1.025	1.025	1.025	1.024	1.024	1.021	1.020	1.018	1.016	1.014	1.012	1.010	1.010	1.010	1.010	1.010
R032	Car <2.5 t	Diesel	1400-2000 cc	Euro 3								1.166	1.103	1.038	0.980	0.925	0.802	0.699	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684
R033	Car <2.5 t	Diesel	1400-2000 cc	Euro 4													1.058	1.032	1.008	0.988	0.968	0.931	0.895	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890
R034	Car <2.5 t	Diesel	1400-2000 cc	Euro 5																		1.058	1.032	1.008	0.988	0.968	0.931	0.895	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890
R035	Car <2.5 t	Diesel	1400-2000 cc	Euro 6																							1.058	1.032	1.008	0.988	0.968	0.931	0.895	0.890	0.890	0.890	0.890	0.890	0.890	0.890
R036	Car <2.5 t	Diesel	>2000 cc	Pre-Euro 1	1.044	1.050	1.055	1.060	1.064	1.061	1.070	1.072	1.074	1.076	1.077	1.077	1.077	1.077	1.075	1.073	1.070	1.064	1.059	1.053	1.047	1.040	1.036	1.036	1.036	1.036	1.036	1.036	1.036	1.036	1.036	1.036	1.036	1.036	1.036	1.036
R037	Car <2.5 t	Diesel	>2000 cc	Euro 1	0.956	0.984	1.011	1.063	1.112	1.159	1.197	1.234	1.267	1.297	1.322	1.344	1.362	1.373	1.384	1.392	1.396	1.395	1.392	1.386	1.375	1.348	1.327	1.302	1.273	1.240	1.204	1.184	1.184	1.184	1.184	1.184	1.184	1.184	1.184	1.184
R038	Car <2.5 t	Diesel	>2000 cc	Euro 2				0.996	0.998	1.000	1.001	1.005	1.008	1.011	1.014	1.016	1.018	1.020	1.022	1.023	1.024	1.025	1.026	1.026	1.026	1.026	1.026	1.026	1.025	1.023	1.022	1.020	1.018	1.016	1.014	1.012	1.012	1.012	1.012	1.012
R039	Car <2.5 t	Diesel	>2000 cc	Euro 3								1.161	1.100	1.047	0.992	0.935	0.806	0.703	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684
R040	Car <2.5 t	Diesel	>2000 cc	Euro 4													1.056	1.032	1.008	0.988	0.971	0.932	0.896	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890
R041	Car <2.5 t	Diesel	>2000 cc	Euro 5																		1.056	1.032	1.008	0.988	0.971	0.932	0.896	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890
R042	Car <2.5 t	Diesel	>2000 cc	Euro 6																							1.056	1.032	1.008	0.988	0.971	0.932	0.896	0.890	0.890	0.890	0.890	0.890	0.890	0.890
R043	Car <2.5 t	LPG	All	Euro 1	0.818	0.871	0.923	1.129	1.292	1.442	1.577	1.700	1.810	1.905	1.987	2.056	2.113	2.159	2.194	2.217	2.227	2.224	2.212	2.187	2.140	2.054	1.980	1.893	1.793	1.679	1.552	1.484	1.484	1.484	1.484	1.484	1.484	1.484	1.484	1.484
R044	Car <2.5 t	LPG	All	Euro 2				1.156	1.111	1.066	1.022	0.938	0.859	0.786	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.767	0.767	0.767	0.767	0.767
R045	Car <2.5 t	LPG	All	Euro 3								1.258	1.177	1.095	1.015	0.936	0.805	0.689	0.584	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.615
R046	Car <2.5 t	LPG	All	Euro 4													0.806	0.870	0.932	0.991	1.051	1.146	1.234	1.313	1.384	1.449	1.506	1.555	1.600	1.640	1.673	1.699	1.718	1.730	1.733	1.730	1.724	1.711	1.685	1.608
R047	Car <2.5 t	LPG	All	Euro 5																		0.806	0.870	0.932	0.991	1.051	1.146	1.234	1.313	1.384	1.449	1.506	1.555	1.600	1.640	1.673	1.699	1.718	1.730	1.733
R048	Car <2.5 t	LPG	All	Euro 6																							0.806	0.870	0.932	0.991	1.051	1.146	1.234	1.313	1.384	1.449	1.506	1.555	1.600	1.640

Table C12: Mileage scaling factors for NO_x by vehicle category and reference year (cars >2.5 tonnes).

Code	Vehicle type	Fuel type	Engine capacity (cc)	Emission standard	Mileage scaling factor by reference year																																			
					1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
R049	Car 2.5-3.5 t	Petrol	All	Pre-Euro 1	1.057	1.059	1.060	1.068	1.071	1.074	1.076	1.078	1.079	1.081	1.082	1.082	1.082	1.082	1.080	1.079	1.077	1.073	1.068	1.063	1.057	1.050	1.042	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038
R050	Car 2.5-3.5 t	Petrol	All	Euro 1		0.698	0.806	0.888	0.974	1.173	1.357	1.528	1.682	1.821	1.947	2.057	2.154	2.234	2.303	2.356	2.401	2.432	2.442	2.437	2.423	2.396	2.346	2.266	2.188	2.095	1.988	1.867	1.731	1.657	1.657	1.657	1.657	1.657	1.657	1.657
R051	Car 2.5-3.5 t	Petrol	All	Euro 2						1.146	1.091	1.046	0.948	0.857	0.773	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743
R052	Car 2.5-3.5 t	Petrol	All	Euro 3									1.240	1.149	1.058	0.962	0.871	0.729	0.615	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576
R053	Car 2.5-3.5 t	Petrol	All	Euro 4														0.820	0.887	0.961	1.030	1.097	1.204	1.289	1.377	1.459	1.534	1.601	1.656	1.706	1.750	1.789	1.819	1.846	1.859	1.861	1.857	1.850	1.835	1.803
R054	Car 2.5-3.5 t	Petrol	All	Euro 5																			0.820	0.887	0.961	1.030	1.097	1.204	1.289	1.377	1.459	1.534	1.601	1.656	1.706	1.750	1.789	1.819	1.846	1.859
R055	Car 2.5-3.5 t	Petrol	All	Euro 6																								0.820	0.887	0.961	1.030	1.144	1.245	1.333	1.420	1.501	1.577	1.634	1.689	1.737
R056	Car 2.5-3.5 t	Diesel	All	Pre-Euro 1	1.027	1.035	1.042	1.048	1.053	1.049	1.062	1.065	1.068	1.071	1.073	1.075	1.076	1.077	1.077	1.076	1.075	1.072	1.067	1.059	1.053	1.047	1.040	1.036	1.036	1.036	1.036	1.036	1.036	1.036	1.036	1.036	1.036	1.036	1.036	1.036
R057	Car 2.5-3.5 t	Diesel	All	Euro 1		0.936	0.966	0.993	1.019	1.068	1.119	1.163	1.203	1.240	1.272	1.301	1.325	1.346	1.362	1.373	1.384	1.392	1.396	1.395	1.392	1.386	1.376	1.348	1.327	1.302	1.273	1.240	1.204	1.184	1.184	1.184	1.184	1.184	1.184	1.184
R058	Car 2.5-3.5 t	Diesel	All	Euro 2						0.996	0.998	0.999	1.003	1.006	1.009	1.012	1.015	1.017	1.019	1.021	1.022	1.024	1.025	1.025	1.026	1.026	1.026	1.026	1.026	1.025	1.024	1.022	1.021	1.019	1.017	1.015	1.012	1.012	1.012	1.012
R059	Car 2.5-3.5 t	Diesel	All	Euro 3									1.161	1.099	1.036	0.975	0.918	0.806	0.703	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684
R060	Car 2.5-3.5 t	Diesel	All	Euro 4														1.056	1.032	1.008	0.988	0.971	0.932	0.896	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890
R061	Car 2.5-3.5 t	Diesel	All	Euro 5																			1.056	1.032	1.008	0.988	0.971	0.932	0.896	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890
R062	Car 2.5-3.5 t	Diesel	All	Euro 6																								1.056	1.032	1.008	0.988	0.945	0.907	0.890	0.890	0.890	0.890	0.890	0.890	0.890

Table C13: Mileage scaling factors for NO_x by vehicle category and reference year (taxis).

Code	Vehicle type	Fuel type	Engine capacity (cc)	Emission standard	Mileage scaling factor by reference year																																			
					1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
R063	Car (taxi)	Diesel	All	Pre-Euro 1	1.044	1.050	1.055	1.060	1.064	1.061	1.070	1.072	1.074	1.076	1.077	1.077	1.077	1.077	1.075	1.073	1.070	1.064	1.059	1.053	1.047	1.040	1.036	1.036	1.036	1.036	1.036	1.036	1.036	1.036	1.036	1.036	1.036	1.036	1.036	1.036
R064	Car (taxi)	Diesel	All	Euro 1	0.956	0.984	1.011	1.063	1.112	1.159	1.197	1.234	1.267	1.297	1.322	1.344	1.362	1.373	1.384	1.392	1.396	1.395	1.392	1.386	1.375	1.348	1.327	1.302	1.273	1.240	1.204	1.184	1.184	1.184	1.184	1.184	1.184	1.184	1.184	1.184
R065	Car (taxi)	Diesel	All	Euro 2				0.996	0.998	1.000	1.001	1.005	1.008	1.011	1.014	1.016	1.018	1.020	1.022	1.023	1.024	1.025	1.026	1.026	1.026	1.026	1.026	1.026	1.025	1.023	1.022	1.020	1.018	1.016	1.014	1.012	1.012	1.012	1.012	1.012
R066	Car (taxi)	Diesel	All	Euro 3								1.161	1.100	1.047	0.992	0.935	0.806	0.703	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684
R067	Car (taxi)	Diesel	All	Euro 4													1.056	1.032	1.008	0.988	0.971	0.932	0.896	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890
R068	Car (taxi)	Diesel	All	Euro 5																		1.056	1.032	1.008	0.988	0.971	0.932	0.896	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890
R069	Car (taxi)	Diesel	All	Euro 6																							1.056	1.032	1.008	0.988	0.971	0.932	0.896	0.890	0.890	0.890	0.890	0.890	0.890	0.890

Table C14: Mileage scaling factors for NO_x by vehicle category and reference year (LGV N1(I)).

Code	Vehicle type	Fuel type	Engine capacity (cc)	Emission standard	Mileage scaling factor by reference year																																			
					1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
R070	LGV N1(I)	Petrol	All	Pre-Euro 1	1.033	1.043	1.051	1.057	1.061	1.063	1.065	1.064	1.062	1.059	1.054	1.047	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038
R071	LGV N1(I)	Petrol	All	Euro 1		0.810	0.971	1.126	1.376	1.619	1.792	1.935	2.038	2.102	2.128	2.115	2.065	1.982	1.871	1.742	1.665	1.665	1.665	1.665	1.665	1.665	1.665	1.665	1.665	1.665	1.665	1.665	1.665	1.665	1.665	1.665	1.665	1.665	1.665	1.665
R072	LGV N1(I)	Petrol	All	Euro 2					1.092	1.012	0.945	0.819	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743
R073	LGV N1(I)	Petrol	All	Euro 3								1.152	1.042	0.932	0.838	0.749	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576
R074	LGV N1(I)	Petrol	All	Euro 4													0.886	0.983	1.068	1.138	1.206	1.327	1.431	1.523	1.598	1.651	1.673	1.667	1.643	1.603	1.556	1.496	1.419	1.397	1.397	1.397	1.397	1.397	1.397	1.397
R075	LGV N1(I)	Petrol	All	Euro 5																		0.886	0.983	1.068	1.138	1.206	1.327	1.431	1.523	1.598	1.651	1.673	1.667	1.643	1.603	1.556	1.496	1.419	1.397	1.397
R076	LGV N1(I)	Petrol	All	Euro 6																							0.886	0.983	1.068	1.138	1.206	1.327	1.431	1.523	1.598	1.651	1.673	1.667	1.643	1.603
R077	LGV N1(I)	Diesel	All	Pre-Euro 1	1.032	1.045	1.057	1.067	1.074	1.078	1.083	1.085	1.084	1.081	1.075	1.066	1.051	1.051	1.051	1.051	1.051	1.051	1.051	1.051	1.051	1.051	1.051	1.051	1.051	1.051	1.051	1.051	1.051	1.051	1.051	1.051	1.051	1.051	1.051	1.051
R078	LGV N1(I)	Diesel	All	Euro 1		0.948	0.987	1.027	1.100	1.180	1.245	1.307	1.359	1.399	1.425	1.435	1.427	1.400	1.356	1.298	1.260	1.260	1.260	1.260	1.260	1.260	1.260	1.260	1.260	1.260	1.260	1.260	1.260	1.260	1.260	1.260	1.260	1.260	1.260	1.260
R079	LGV N1(I)	Diesel	All	Euro 2					0.997	0.999	1.002	1.007	1.012	1.016	1.020	1.024	1.026	1.028	1.029	1.028	1.027	1.024	1.020	1.017	1.017	1.017	1.017	1.017	1.017	1.017	1.017	1.017	1.017	1.017	1.017	1.017	1.017	1.017	1.017	1.017
R080	LGV N1(I)	Diesel	All	Euro 3								1.131	1.048	0.959	0.877	0.795	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684
R081	LGV N1(I)	Diesel	All	Euro 4													1.046	1.011	0.979	0.950	0.921	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890
R082	LGV N1(I)	Diesel	All	Euro 5																		1.046	1.011	0.979	0.950	0.921	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890
R083	LGV N1(I)	Diesel	All	Euro 6																							1.046	1.011	0.979	0.950	0.921	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890

Table C15: Mileage scaling factors for NO_x by vehicle category and reference year (LGV N1(II/III)).

Code	Vehicle type	Fuel type	Engine capacity (cc)	Emission standard	Mileage scaling factor by reference year																																			
					1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
R084	LGV N1(II)	Petrol	All	Pre-Euro 1	1.033	1.043	1.051	1.057	1.061	1.063	1.065	1.064	1.062	1.059	1.054	1.047	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038
R085	LGV N1(II)	Petrol	All	Euro 1		0.810	0.971	1.126	1.257	1.524	1.706	1.870	1.992	2.075	2.119	2.126	2.098	2.034	1.949	1.846	1.719	1.665	1.665	1.665	1.665	1.665	1.665	1.665	1.665	1.665	1.665	1.665	1.665	1.665	1.665	1.665	1.665	1.665	1.665	1.665
R086	LGV N1(II)	Petrol	All	Euro 2						1.092	1.019	0.965	0.836	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743
R087	LGV N1(II)	Petrol	All	Euro 3									1.152	1.029	0.923	0.827	0.726	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576
R088	LGV N1(II)	Petrol	All	Euro 4														0.886	0.983	1.068	1.138	1.206	1.327	1.431	1.523	1.598	1.651	1.673	1.667	1.643	1.603	1.556	1.496	1.419	1.397	1.397	1.397	1.397	1.397	1.397
R089	LGV N1(II)	Petrol	All	Euro 5																			0.886	0.983	1.068	1.138	1.206	1.327	1.431	1.523	1.598	1.651	1.673	1.667	1.643	1.603	1.556	1.496	1.419	1.397
R090	LGV N1(II)	Petrol	All	Euro 6																								0.886	0.983	1.068	1.138	1.277	1.396	1.492	1.569	1.634	1.668	1.673	1.656	1.618
R091	LGV N1(II)	Diesel	All	Pre-Euro 1	1.032	1.045	1.057	1.067	1.074	1.078	1.083	1.085	1.084	1.081	1.075	1.066	1.051	1.051	1.051	1.051	1.051	1.051	1.051	1.051	1.051	1.051	1.051	1.051	1.051	1.051	1.051	1.051	1.051	1.051	1.051	1.051	1.051	1.051	1.051	1.051
R092	LGV N1(II)	Diesel	All	Euro 1		0.948	0.987	1.027	1.064	1.147	1.212	1.278	1.334	1.380	1.413	1.431	1.433	1.418	1.388	1.345	1.286	1.260	1.260	1.260	1.260	1.260	1.260	1.260	1.260	1.260	1.260	1.260	1.260	1.260	1.260	1.260	1.260	1.260	1.260	1.260
R093	LGV N1(II)	Diesel	All	Euro 2						0.997	0.999	1.001	1.006	1.011	1.016	1.020	1.023	1.026	1.028	1.029	1.028	1.027	1.024	1.020	1.017	1.017	1.017	1.017	1.017	1.017	1.017	1.017	1.017	1.017	1.017	1.017	1.017	1.017	1.017	1.017
R094	LGV N1(II)	Diesel	All	Euro 3									1.131	1.038	0.951	0.867	0.773	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684
R095	LGV N1(II)	Diesel	All	Euro 4														1.046	1.011	0.979	0.950	0.921	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890
R096	LGV N1(II)	Diesel	All	Euro 5																			1.046	1.011	0.979	0.950	0.921	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890
R097	LGV N1(II)	Diesel	All	Euro 6																								1.046	1.011	0.979	0.950	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890
R098	LGV N1(III)	Petrol	All	Pre-Euro 1	1.033	1.043	1.051	1.057	1.061	1.063	1.065	1.064	1.062	1.059	1.054	1.047	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038
R099	LGV N1(III)	Petrol	All	Euro 1		0.810	0.971	1.126	1.257	1.524	1.706	1.870	1.992	2.075	2.119	2.126	2.098	2.034	1.949	1.846	1.719	1.665	1.665	1.665	1.665	1.665	1.665	1.665	1.665	1.665	1.665	1.665	1.665	1.665	1.665	1.665	1.665	1.665	1.665	1.665
R100	LGV N1(III)	Petrol	All	Euro 2						1.092	1.019	0.965	0.836	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743	0.743
R101	LGV N1(III)	Petrol	All	Euro 3									1.152	1.029	0.923	0.827	0.726	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576
R102	LGV N1(III)	Petrol	All	Euro 4														0.886	0.983	1.068	1.138	1.206	1.327	1.431	1.523	1.598	1.651	1.673	1.667	1.643	1.603	1.556	1.496	1.419	1.397	1.397	1.397	1.397	1.397	1.397
R103	LGV N1(III)	Petrol	All	Euro 5																			0.886	0.983	1.068	1.138	1.206	1.327	1.431	1.523	1.598	1.651	1.673	1.667	1.643	1.603	1.556	1.496	1.419	1.397
R104	LGV N1(III)	Petrol	All	Euro 6																								0.886	0.983	1.068	1.138	1.277	1.396	1.492	1.569	1.634	1.668	1.673	1.656	1.618
R105	LGV N1(III)	Diesel	All	Pre-Euro 1	1.032	1.045	1.057	1.067	1.074	1.078	1.083	1.085	1.084	1.081	1.075	1.066	1.051	1.051	1.051	1.051	1.051	1.051	1.051	1.051	1.051	1.051	1.051	1.051	1.051	1.051	1.051	1.051	1.051	1.051	1.051	1.051	1.051	1.051	1.051	1.051
R106	LGV N1(III)	Diesel	All	Euro 1		0.948	0.987	1.027	1.064	1.147	1.212	1.278	1.334	1.380	1.413	1.431	1.433	1.418	1.388	1.345	1.286	1.260	1.260	1.260	1.260	1.260	1.260	1.260	1.260	1.260	1.260	1.260	1.260	1.260	1.260	1.260	1.260	1.260	1.260	1.260
R107	LGV N1(III)	Diesel	All	Euro 2						0.997	0.999	1.001	1.006	1.011	1.016	1.020	1.023	1.026	1.028	1.029	1.028	1.027	1.024	1.020	1.017	1.017	1.017	1.017	1.017	1.017	1.017	1.017	1.017	1.017	1.017	1.017	1.017	1.017	1.017	1.017
R108	LGV N1(III)	Diesel	All	Euro 3									1.131	1.038	0.951	0.867	0.773	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684	0.684
R109	LGV N1(III)	Diesel	All	Euro 4														1.046	1.011	0.979	0.950	0.921	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890
R110	LGV N1(III)	Diesel	All	Euro 5																			1.046	1.011	0.979	0.950	0.921	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890
R111	LGV N1(III)	Diesel	All	Euro 6																								1.046	1.011	0.979	0.950	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890

Appendix D: Fuel composition scaling factors applicable to 2009 emission factors

Table D1: Fuel composition scaling factors for CO.

Vehicle type	Fuel type	Emission standard	Baseline fuel	Scaling factor by year																																			
				1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Car, taxi, LGV	Petrol	Pre-Euro 1	1996	1.000	1.000	1.000	1.000	1.000	0.959	0.959	0.959	0.959	0.959	0.897	0.897	0.897	0.897	0.891	0.891	0.891	0.891	0.891	0.891	0.891	0.891	0.891	0.891	0.891	0.891	0.891	0.891	0.891	0.891	0.891	0.891	0.891	0.891	0.891	0.891
		Euro 1	1996	1.000	1.000	1.000	1.000	1.000	0.959	0.959	0.959	0.959	0.959	0.897	0.897	0.897	0.897	0.891	0.891	0.891	0.891	0.891	0.891	0.891	0.891	0.891	0.891	0.891	0.891	0.891	0.891	0.891	0.891	0.891	0.891	0.891	0.891	0.891	0.891
		Euro 2	1996	1.000	1.000	1.000	1.000	1.000	0.959	0.959	0.959	0.959	0.959	0.897	0.897	0.897	0.897	0.891	0.891	0.891	0.891	0.891	0.891	0.891	0.891	0.891	0.891	0.891	0.891	0.891	0.891	0.891	0.891	0.891	0.891	0.891	0.891	0.891	0.891
		Euro 3	2000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.936	0.936	0.936	0.936	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930
		Euro 4	2005	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993
		Euro 5	2009	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
		Euro 6	2009	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	Diesel	Pre-Euro 1	1996	1.000	1.000	1.000	1.000	1.000	0.933	0.933	0.933	0.933	0.933	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907
		Euro 1	1996	1.000	1.000	1.000	1.000	1.000	0.933	0.933	0.933	0.933	0.933	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907
		Euro 2	1996	1.000	1.000	1.000	1.000	1.000	0.933	0.933	0.933	0.933	0.933	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907	0.907
		Euro 3	2000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.973	0.973	0.973	0.973	0.973	0.973	0.973	0.973	0.973	0.973	0.973	0.973	0.973	0.973	0.973	0.973	0.973	0.973	0.973	0.973	0.973	0.973	0.973	0.973	0.973	0.973
		Euro 4	2005	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
		Euro 5	2009	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
		Euro 6	2009	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
HDV	Diesel	Pre-Euro I	1996	1.000	1.000	1.000	1.000	1.000	1.003	1.003	1.003	1.003	1.003	1.026	1.026	1.026	1.026	1.026	1.026	1.026	1.026	1.026	1.026	1.026	1.026	1.026	1.026	1.026	1.026	1.026	1.026	1.026	1.026	1.026	1.026	1.026	1.026	1.026	1.026
		Euro I	1996	1.000	1.000	1.000	1.000	1.000	1.003	1.003	1.003	1.003	1.003	1.026	1.026	1.026	1.026	1.026	1.026	1.026	1.026	1.026	1.026	1.026	1.026	1.026	1.026	1.026	1.026	1.026	1.026	1.026	1.026	1.026	1.026	1.026	1.026	1.026	1.026
		Euro II	1996	1.000	1.000	1.000	1.000	1.000	1.003	1.003	1.003	1.003	1.003	1.026	1.026	1.026	1.026	1.026	1.026	1.026	1.026	1.026	1.026	1.026	1.026	1.026	1.026	1.026	1.026	1.026	1.026	1.026	1.026	1.026	1.026	1.026	1.026	1.026	1.026
		Euro III	2000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.022	1.022	1.022	1.022	1.022	1.022	1.022	1.022	1.022	1.022	1.022	1.022	1.022	1.022	1.022	1.022	1.022	1.022	1.022	1.022	1.022	1.022	1.022	1.022	1.022	1.022
		Euro IV	2005	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
		Euro V	2009	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
		Euro VI	2009	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Table D2: Fuel composition scaling factors for HC.

Vehicle type	Fuel type	Emission standard	Baseline fuel	Scaling factor by year																																			
				1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Car, taxi, LGV	Petrol	Pre-Euro 1	1996	1.000	1.000	1.000	1.000	1.000	0.971	0.971	0.971	0.971	0.971	0.924	0.924	0.924	0.924	0.917	0.917	0.917	0.917	0.917	0.917	0.917	0.917	0.917	0.917	0.917	0.917	0.917	0.917	0.917	0.917	0.917	0.917	0.917	0.917	0.917	0.917
		Euro 1	1996	1.000	1.000	1.000	1.000	1.000	0.971	0.971	0.971	0.971	0.971	0.924	0.924	0.924	0.924	0.917	0.917	0.917	0.917	0.917	0.917	0.917	0.917	0.917	0.917	0.917	0.917	0.917	0.917	0.917	0.917	0.917	0.917	0.917	0.917	0.917	0.917
		Euro 2	1996	1.000	1.000	1.000	1.000	1.000	0.971	0.971	0.971	0.971	0.971	0.924	0.924	0.924	0.924	0.917	0.917	0.917	0.917	0.917	0.917	0.917	0.917	0.917	0.917	0.917	0.917	0.917	0.917	0.917	0.917	0.917	0.917	0.917	0.917	0.917	0.917
		Euro 3	2000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.952	0.952	0.952	0.952	0.944	0.944	0.944	0.944	0.944	0.944	0.944	0.944	0.944	0.944	0.944	0.944	0.944	0.944	0.944	0.944	0.944	0.944	0.944	0.944	0.944	0.944
		Euro 4	2005	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.992	0.992	0.992	0.992	0.992	0.992	0.992	0.992	0.992	0.992	0.992	0.992	0.992	0.992	0.992	0.992	0.992	0.992	0.992	0.992	0.992	0.992
		Euro 5	2009	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
		Euro 6	2009	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	Diesel	Pre-Euro 1	1996	1.000	1.000	1.000	1.000	1.000	0.951	0.951	0.951	0.951	0.951	0.933	0.933	0.933	0.933	0.933	0.933	0.933	0.933	0.933	0.933	0.933	0.933	0.933	0.933	0.933	0.933	0.933	0.933	0.933	0.933	0.933	0.933	0.933	0.933	0.933	0.933
		Euro 1	1996	1.000	1.000	1.000	1.000	1.000	0.951	0.951	0.951	0.951	0.951	0.933	0.933	0.933	0.933	0.933	0.933	0.933	0.933	0.933	0.933	0.933	0.933	0.933	0.933	0.933	0.933	0.933	0.933	0.933	0.933	0.933	0.933	0.933	0.933	0.933	0.933
		Euro 2	1996	1.000	1.000	1.000	1.000	1.000	0.951	0.951	0.951	0.951	0.951	0.933	0.933	0.933	0.933	0.933	0.933	0.933	0.933	0.933	0.933	0.933	0.933	0.933	0.933	0.933	0.933	0.933	0.933	0.933	0.933	0.933	0.933	0.933	0.933	0.933	0.933
		Euro 3	2000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.982	0.982	0.982	0.982	0.982	0.982	0.982	0.982	0.982	0.982	0.982	0.982	0.982	0.982	0.982	0.982	0.982	0.982	0.982	0.982	0.982	0.982	0.982	0.982	0.982	0.982
		Euro 4	2005	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
		Euro 5	2009	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
		Euro 6	2009	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
HDV	Diesel	Pre-Euro I	1996	1.000	1.000	1.000	1.000	1.000	1.028	1.028	1.028	1.028	1.028	1.067	1.067	1.067	1.067	1.067	1.067	1.067	1.067	1.067	1.067	1.067	1.067	1.067	1.067	1.067	1.067	1.067	1.067	1.067	1.067	1.067	1.067	1.067	1.067	1.067	1.067
		Euro I	1996	1.000	1.000	1.000	1.000	1.000	1.028	1.028	1.028	1.028	1.028	1.067	1.067	1.067	1.067	1.067	1.067	1.067	1.067	1.067	1.067	1.067	1.067	1.067	1.067	1.067	1.067	1.067	1.067	1.067	1.067	1.067	1.067	1.067	1.067	1.067	1.067
		Euro II	1996	1.000	1.000	1.000	1.000	1.000	1.028	1.028	1.028	1.028	1.028	1.067	1.067	1.067	1.067	1.067	1.067	1.067	1.067	1.067	1.067	1.067	1.067	1.067	1.067	1.067	1.067	1.067	1.067	1.067	1.067	1.067	1.067	1.067	1.067	1.067	1.067
		Euro III	2000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038	1.038
		Euro IV	2005	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
		Euro V	2009	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
		Euro VI	2009	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Table D3: Fuel composition scaling factors for NO_x.

Vehicle type	Fuel type	Emission standard	Baseline fuel	Scaling factor by year																																			
				1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Car, taxi, LGV	Petrol	Pre-Euro 1	1996	1.000	1.000	1.000	1.000	1.000	0.995	0.995	0.995	0.995	0.995	0.978	0.978	0.978	0.978	0.969	0.969	0.969	0.969	0.969	0.969	0.969	0.969	0.969	0.969	0.969	0.969	0.969	0.969	0.969	0.969	0.969	0.969	0.969	0.969	0.969	0.969
		Euro 1	1996	1.000	1.000	1.000	1.000	1.000	0.995	0.995	0.995	0.995	0.995	0.978	0.978	0.978	0.978	0.969	0.969	0.969	0.969	0.969	0.969	0.969	0.969	0.969	0.969	0.969	0.969	0.969	0.969	0.969	0.969	0.969	0.969	0.969	0.969	0.969	0.969
		Euro 2	1996	1.000	1.000	1.000	1.000	1.000	0.995	0.995	0.995	0.995	0.995	0.978	0.978	0.978	0.978	0.969	0.969	0.969	0.969	0.969	0.969	0.969	0.969	0.969	0.969	0.969	0.969	0.969	0.969	0.969	0.969	0.969	0.969	0.969	0.969	0.969	0.969
		Euro 3	2000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.983	0.983	0.983	0.983	0.974	0.974	0.974	0.974	0.974	0.974	0.974	0.974	0.974	0.974	0.974	0.974	0.974	0.974	0.974	0.974	0.974	0.974	0.974	0.974	0.974	0.974
		Euro 4	2005	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991	0.991
		Euro 5	2009	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
		Euro 6	2009	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	Diesel	Pre-Euro 1	1996	1.000	1.000	1.000	1.000	1.000	1.011	1.011	1.011	1.011	1.011	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014
		Euro 1	1996	1.000	1.000	1.000	1.000	1.000	1.011	1.011	1.011	1.011	1.011	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014
		Euro 2	1996	1.000	1.000	1.000	1.000	1.000	1.011	1.011	1.011	1.011	1.011	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014	1.014
		Euro 3	2000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.003	1.003	1.003	1.003	1.003	1.003	1.003	1.003	1.003	1.003	1.003	1.003	1.003	1.003	1.003	1.003	1.003	1.003	1.003	1.003	1.003	1.003	1.003	1.003	1.003	1.003
		Euro 4	2005	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
		Euro 5	2009	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
		Euro 6	2009	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
HDV	Diesel	Pre-Euro I	1996	1.000	1.000	1.000	1.000	1.000	0.998	0.998	0.998	0.998	0.998	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993
		Euro I	1996	1.000	1.000	1.000	1.000	1.000	0.998	0.998	0.998	0.998	0.998	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993
		Euro II	1996	1.000	1.000	1.000	1.000	1.000	0.998	0.998	0.998	0.998	0.998	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993
		Euro III	2000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.994	0.994	0.994	0.994	0.994	0.994	0.994	0.994	0.994	0.994	0.994	0.994	0.994	0.994	0.994	0.994	0.994	0.994	0.994	0.994	0.994	0.994	0.994	0.994	0.994	0.994
		Euro IV	2005	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
		Euro V	2009	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
		Euro VI	2009	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Table D4: Fuel composition scaling factors for PM.

Vehicle type	Fuel type	Emission standard	Baseline fuel	Scaling factor by year																																			
				1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Car, taxi, LGV	Diesel	Pre-Euro 1	1996	1.000	1.000	1.000	1.000	1.000	0.957	0.957	0.957	0.957	0.957	0.852	0.852	0.852	0.852	0.848	0.848	0.848	0.848	0.848	0.848	0.848	0.848	0.848	0.848	0.848	0.848	0.848	0.848	0.848	0.848	0.848	0.848	0.848	0.848	0.848	0.848
		Euro 1	1996	1.000	1.000	1.000	1.000	1.000	0.957	0.957	0.957	0.957	0.957	0.852	0.852	0.852	0.852	0.848	0.848	0.848	0.848	0.848	0.848	0.848	0.848	0.848	0.848	0.848	0.848	0.848	0.848	0.848	0.848	0.848	0.848	0.848	0.848	0.848	0.848
		Euro 2	1996	1.000	1.000	1.000	1.000	1.000	0.957	0.957	0.957	0.957	0.957	0.852	0.852	0.852	0.852	0.848	0.848	0.848	0.848	0.848	0.848	0.848	0.848	0.848	0.848	0.848	0.848	0.848	0.848	0.848	0.848	0.848	0.848	0.848	0.848	0.848	0.848
		Euro 3	2000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.891	0.891	0.891	0.891	0.887	0.887	0.887	0.887	0.887	0.887	0.887	0.887	0.887	0.887	0.887	0.887	0.887	0.887	0.887	0.887	0.887	0.887	0.887	0.887	0.887	0.887
		Euro 4	2005	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.995	0.995	0.995	0.995	0.995	0.995	0.995	0.995	0.995	0.995	0.995	0.995	0.995	0.995	0.995	0.995	0.995	0.995	0.995	0.995	0.995	0.995
		Euro 5	2009	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
		Euro 6	2009	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
HDV	Diesel	Pre-Euro I	1996	1.000	1.000	1.000	1.000	1.000	0.981	0.981	0.981	0.981	0.981	0.946	0.946	0.946	0.946	0.944	0.944	0.944	0.944	0.944	0.944	0.944	0.944	0.944	0.944	0.944	0.944	0.944	0.944	0.944	0.944	0.944	0.944	0.944	0.944	0.944	0.944
		Euro I	1996	1.000	1.000	1.000	1.000	1.000	0.981	0.981	0.981	0.981	0.981	0.946	0.946	0.946	0.946	0.944	0.944	0.944	0.944	0.944	0.944	0.944	0.944	0.944	0.944	0.944	0.944	0.944	0.944	0.944	0.944	0.944	0.944	0.944	0.944	0.944	0.944
		Euro II	1996	1.000	1.000	1.000	1.000	1.000	0.981	0.981	0.981	0.981	0.981	0.946	0.946	0.946	0.946	0.944	0.944	0.944	0.944	0.944	0.944	0.944	0.944	0.944	0.944	0.944	0.944	0.944	0.944	0.944	0.944	0.944	0.944	0.944	0.944	0.944	0.944
		Euro III	2000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.965	0.965	0.965	0.965	0.962	0.962	0.962	0.962	0.962	0.962	0.962	0.962	0.962	0.962	0.962	0.962	0.962	0.962	0.962	0.962	0.962	0.962	0.962	0.962	0.962	0.962
		Euro IV	2005	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.997	0.997	0.997	0.997	0.997	0.997	0.997	0.997	0.997	0.997	0.997	0.997	0.997	0.997	0.997	0.997	0.997	0.997	0.997	0.997	0.997	0.997
		Euro V	2009	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
		Euro VI	2009	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

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TRL was commissioned by the Department for Transport to review the approach used in the National Atmospheric Emissions Inventory (NAEI) for estimating emissions from road vehicles, and to propose new methodologies. This Report addresses the emission deterioration functions and fuel/technology scaling factors currently used in the NAEI. Scaling factors are applied to the basic emission factors to enable the modelling of emissions in different years. These scaling factors cover to the changes in emissions associated with vehicle age (“degradation” or “deterioration”), and the effects of the penetration of improved fuels and vehicle technologies. The current assumptions concerning vehicle age are rather simplistic, and do not take into account the characteristics of the vehicle samples used to derive emission factors. Similarly, the fuel and technology scaling factors were devised several years ago, and many were assumed to stabilise after 2005. The Report provides a brief review of the mileage, fuel and technology effects given in the literature, and describes how new scaling factors (to be applied to the new emission factors) were derived. Scaling factors for different years were developed to account for the following: (i) mileage effects relating to vehicle samples; (ii) fuel composition effects; (iii) increased market penetration of biofuels; and (iv) the effects of future technologies.

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