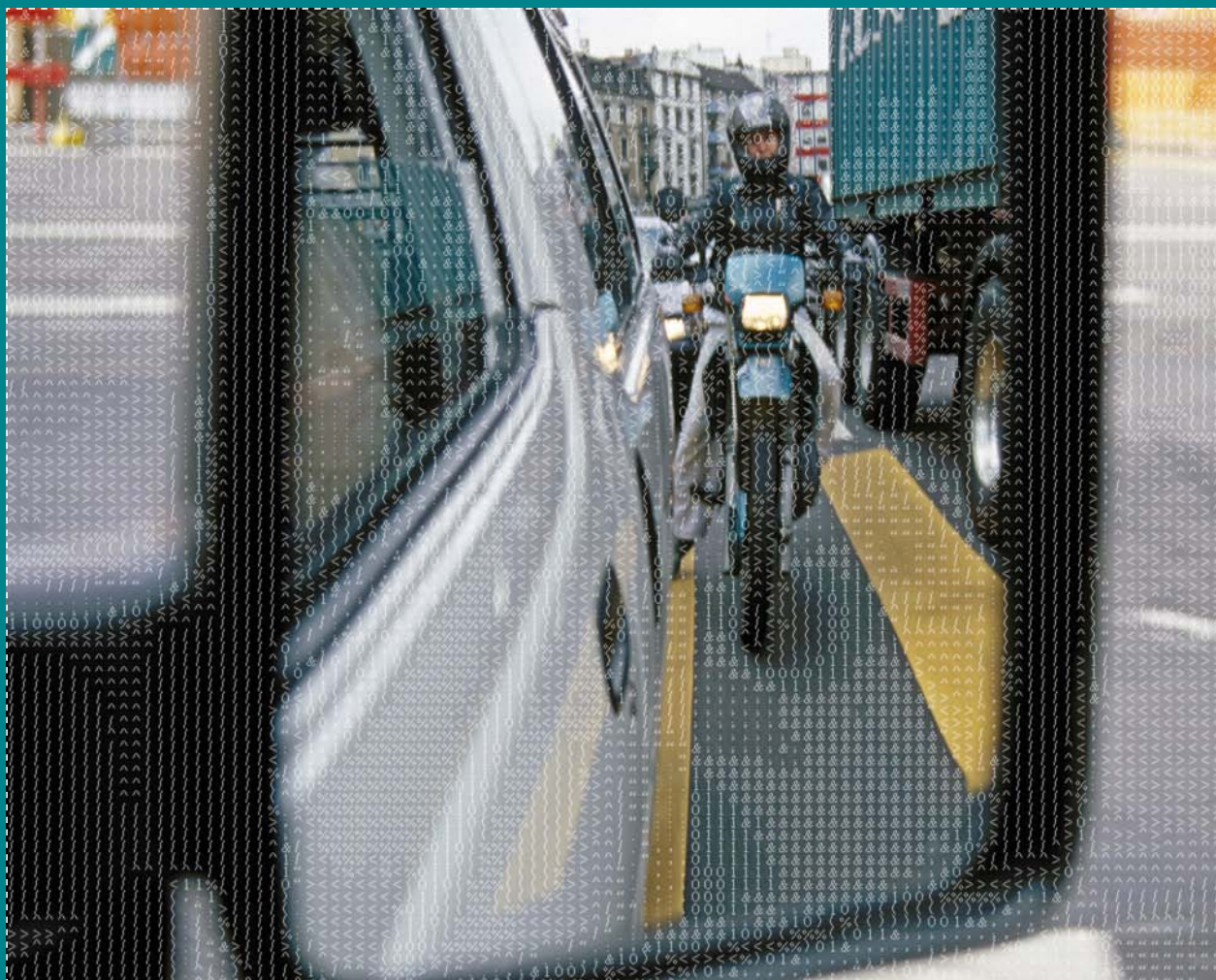


> Pollutant Emissions from Road Transport, 1990 to 2035

Updated in 2010



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> Abstracts

This report is an update and extension of the previously published reports on pollutant emissions from road transport in Switzerland. It now covers the period from 1990 to 2035 and presents detailed emission factors that have been obtained from internationally co-ordinated studies for all road vehicles and for various regulated and non-regulated air pollutants and greenhouse gases. Total emissions have been projected on the basis of traffic data recorded in Switzerland. Generally speaking, the findings confirm previous forecasts. New findings have been obtained, primarily relating to particle and nitrogen oxide emissions, as well as cold-start emissions, and these mainly result from new measurements carried out on older vehicles. Thanks to the inclusion of new exhaust regulations that have been introduced since the publication of the previous report (SAEFL Report 355 2004), the forecasts in this report now assume a more pronounced reduction of pollutant emissions than was previously anticipated. The significant differences between standard and real data are a problem that has yet to be resolved.

This report serves as a useful tool for all groups focusing on the development of air pollutant emissions from road transport, and the findings will flow into evaluations of future measures and projects, as well as into national and international statistics.

Der Bericht stellt eine Aktualisierung und Fortführung der bisher erschienen Unterlagen zu den Luftschadstoffemissionen des Strassenverkehrs in der Schweiz dar. Er deckt neu den Zeithorizont von 1990 bis 2035 ab. Aus den international abgestimmten Emissionsuntersuchungen wurden detaillierte Emissionsfaktoren für alle Strassenfahrzeuge und für diverse reglementierte und nicht limitierte Luftschadstoffe und Klimagase ermittelt. Gestützt auf die in der Schweiz erhobenen Verkehrsdaten wurden die Gesamtemissionen berechnet. Die Ergebnisse bestätigen die bisherigen Prognosen mehrheitlich. Neue Erkenntnisse ergaben sich hauptsächlich bei den Partikel- und den Stickoxid-Emissionen sowie bei den Kaltstart-Emissionen. Diese Erkenntnisse sind vor allem neuen Messungen auch an älteren Fahrzeugen zu verdanken. Der Einbezug der seit der letzten Berichterstattung (Schriftenreihe Umwelt Nr. 355, BUWAL 2004) beschlossenen zukünftigen Abgasvorschriften trägt dazu bei, dass die neuen Prognosen von einer noch stärkeren Absenkung der Schadstoffemissionen ausgehen als bisher angenommen. Ein nach wie vor ungelöstes Problem stellen die grossen Abweichungen zwischen Standard- und Realdaten dar.

Der Bericht ist eine gute Grundlage für alle an der Entwicklung der Luftschadstoffemissionen interessierten Kreise. Die Resultate werden in die Beurteilung zukünftiger Massnahmen und Projekte sowie in nationale und internationale Statistiken einfließen.

Keywords:

Exhaust emissions,
motorised road vehicles,
air pollutant emissions,
road transport

Stichwörter:

Abgase,
Strassenfahrzeuge,
Luftschadstoffemissionen,
Strassenverkehr

Ce rapport actualise et développe les documents publiés à ce jour sur les émissions de polluants atmosphériques produites par le trafic routier en Suisse. Il couvre maintenant la période 1990 à 2035. S'appuyant sur des études d'émissions, coordonnées à l'échelon international, les auteurs ont élaboré des coefficients d'émission détaillés pour l'ensemble des véhicules routiers, de même que pour divers polluants atmosphériques et gaz à effet de serre réglementés ou non limités. Toutes les émissions ont été extrapolées sur la base des données des transports relevées en Suisse. Les résultats confirment largement les prévisions faites jusqu'à présent. On a cependant acquis de nouvelles connaissances, notamment en ce qui concerne les émissions de particules et d'oxydes d'azote, de même que les émissions à froid, grâce, surtout, aux nouvelles mesures également effectuées sur des véhicules anciens. Comme le présent rapport intègre les futures prescriptions sur les gaz d'échappement entérinées depuis le dernier rapport (Cahier de l'environnement n° 355, OFEFP 2004), les nouvelles prévisions qu'il contient tablent sur une baisse des émissions polluantes encore plus forte que supposée jusqu'ici. Les écarts importants entre données normalisées et données réelles restent toutefois un problème.

Le rapport est une bonne base pour tous les milieux intéressés par l'évolution des émissions de polluants atmosphériques. Ses résultats trouveront des applications dans l'évaluation de mesures et de projets futurs, ainsi que dans les statistiques nationales et internationales.

Il rapporto costituisce un aggiornamento e sviluppo delle pubblicazioni esistenti in materia di emissioni di inquinanti atmosferici provocate dal traffico stradale in Svizzera. Rispetto alle pubblicazioni precedenti copre un periodo compreso tra il 1990 e il 2035. A partire dagli studi sulle emissioni, coordinati a livello internazionale, sono stati rilevati fattori di emissione dettagliati per tutti i veicoli stradali e per diversi inquinanti atmosferici e gas serra, regolamentati e non. Sulla base dei dati sul traffico raccolti in Svizzera sono in seguito state estrapolate le emissioni totali. I risultati hanno per lo più confermato le previsioni, fornendo tuttavia anche elementi nuovi, soprattutto per quanto riguarda le emissioni di particolato e di ossidi d'azoto, così come per le emissioni dell'avviamento a freddo. Questo stato delle conoscenze è frutto in particolare delle nuove misurazioni effettuate anche su veicoli vecchi. L'integrazione delle future prescrizioni concernenti i gas di scarico, elaborate dopo la pubblicazione dell'ultimo rapporto (Scritti sull'ambiente n. 355, UFAFP 2004), consente alle nuove previsioni di considerare una riduzione delle emissioni di sostanze nocive ancora più importante di quanto previsto fino ad ora. La significativa differenza fra dati normativi e dati reali costituisce tuttora un problema irrisolto.

Il rapporto rappresenta un riferimento utile per tutti gli ambienti interessati all'andamento delle emissioni degli inquinanti atmosferici. I risultati confluiranno nella valutazione di provvedimenti e progetti futuri, così come nelle statistiche nazionali e internazionali.

Mots-clés:

Gaz d'échappement,
véhicules routiers,
émissions de polluants
atmosphériques,
trafic routier

Parole chiave:

Gas di scarico,
veicoli stradali,
emissioni di inquinanti
atmosferici,
traffico stradale

> Foreword

Road transport is a major source of air pollution and a significant factor in climate change. In order to reduce traffic-related air pollutants and CO₂, we need to gain precise information about the emission behaviour of motor vehicles. To keep the findings up to date in an environment of constantly developing technologies and regulations, hundreds of vehicles were measured in the framework of internationally co-ordinated programmes. This made it possible to reliably calculate emission factors for air pollutants and CO₂, incorporate new vehicle technologies and exhaust emission levels into the calculations, and make projections and forecasts regarding air pollutant emissions from road transport. The resulting data are integrated into national and international inventories of pollutants and climate gases.

This study shows that the introduction of new exhaust regulations has resulted in a significant decrease in the emissions of CO, HC, NO_x and particles, and will continue to do so in the future. However, additional measures are still required in order to secure compliance with ambient limit values for human health and environmental quality, and with internationally defined critical pollution levels for sensitive ecological systems. Another problem that has to be overcome concerns the high level of CO₂ emissions, which are a significant factor in the process of climate change.

Most of the findings in this report confirm the figures in earlier studies for present-day emissions and predicted future reductions. However, discrepancies were identified, mainly for older vehicles, and in connection with hydrocarbons and nitrogen emissions from motorcycles and passenger cars. The predictions regarding traffic volumes have been somewhat adjusted compared to earlier forecasts.

This study was supported by the Federal Roads Office (FEDRO). Thanks to its comprehensive data on emissions from road transport, it will serve as an important tool for evaluating specific projects and assessing measures aimed at reducing emissions of air pollutants and greenhouse gases from motorised road traffic.

Gérard Poffet
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Federal Office for the Environment (FOEN)

> Summary

Measuring pollutant emissions from road transport has a lengthy tradition in Switzerland. The first SAEFL report on this topic (no. 55) dates back to the mid-1980s, and this was followed up by comprehensive and internationally co-ordinated research activities that were concluded in 1995 with the publication of “Report 255” and version 1 of the emission factors handbook (HBEFA 1.1). A supplement was then published in 2000, and this was followed by “Report 355” in 2004. The present report is a further update of the emission forecasts. In parallel, the emission factors handbook has also been revised and updated, and is now available on the Internet as version 3.1. Here, various aspects have been standardised in line with the increasingly international focus, and a variety of criteria for the calculation of emission factors have been added. New emission measurements have been included, and the official new Euro categories of emission standards (Euro-5 and Euro-6 for light duty vehicles, and Euro-V and Euro-VI for heavy duty vehicles) have been taken into account.

The traffic composition data have also been updated. As before, traffic volume is expected to increase, though probably with growth rates slower than in the past. For both passenger cars and goods vehicles, the anticipated increase as of 2035 is estimated at around 20 per cent versus 2010. The estimated mileage figures for passenger cars are only slightly higher compared to Report 355. The figures for light duty vehicles were re-estimated – also retroactively – by the Federal Statistical Office (FSO) following the introduction of the heavy goods vehicle fee, and have been significantly adjusted downwards. By contrast, the data relating to heavy duty vehicles are practically unchanged compared with the previous report. Viewed in absolute terms, the mileage of buses is comparatively low. According to the FSO, the mileage figures for coaches have increased, and higher growth is assumed for buses than was predicted by the previous study (plus 27 per cent in 2035 versus 2010). As far as motorcycles are concerned, mileage figures have increased at a slightly slower pace than was previously anticipated. In view of this, the growth rate in this category has been correspondingly reduced, but at 25 per cent it is slightly higher than those for passenger cars and heavy duty vehicles.

Figure A shows the pollutant emissions by vehicle category over a time series ranging from 1990 to 2035. As we can see, the pollutant emissions fall continuously and sharply thanks to the introduction of a succession of more stringent limit values. However, there are differences in the extent and pattern of the decrease, depending on the pollutant: the reductions of carbon monoxide (CO) and hydrocarbons (HC) have been pronounced up till now. These emissions primarily result from passenger cars: they are largely attributable to cold-starts, and will be even more so in the future. Furthermore, the proportions of CO and HC emissions from motorcycles are high compared with the mileage figures. Over the long term, CO and HC emissions can be expected to fall again by around 50 per cent with respect to the present-day levels, despite a higher traffic volume.

In the case of nitrogen oxide (NO_x) and particle emissions, the previous reduction rate has slowed down. This is due on the one hand to lower specific reductions for passenger cars (in grams per kilometre), and on the other hand to the contribution of heavy duty vehicles which are also relevant sources of NO_x and PM emissions. Furthermore, the limits values were introduced in the legislation later for this group than for light duty vehicles. However, further significant reductions are to be expected thanks to the introduction of more stringent limit values (Euro-VI). The trend in particle emissions is worthy of note: it has been influenced by the increasing proportion of diesel passenger cars over the past ten years (currently amounting to about 30 per cent in the new cars segment). However, the progressive spread of diesel particle filters should result in a sharp reduction in PM exhaust emissions.

The trend of CO₂ emissions differs greatly from that of NO_x and PM exhaust emissions: in the road transport sector, CO₂ emissions reached their peak between 2000 and 2010. The trend depicted represents a “business as usual” scenario, which assumes that, in the passenger cars segment, the previously determined reduction in fuel consumption by new vehicles (approximately minus 1.5 per cent annually on average between 2000 and 2008) remains constant all the way up to 2035. No significant specific reductions are assumed for the other vehicle categories. Based on these assumptions, after reaching a peak of 14.4 million tonnes in 2010, the level of CO₂ emissions from road transport will fall to around 12.8 million tonnes in 2030, which more or less corresponds to the level recorded in 1990. This means that a downward trend is also assumed for CO₂ emissions, but to a lower extent than that for NO_x and PM emissions.

Figure B shows the updated emission trends compared with the 2004 Report 355. Generally speaking, these do not differ greatly from the previous calculations. The most notable change concerns particle emissions, and this is attributable to the use of different methods to determine emission factors (in Report 355, the estimates of particulate matter emissions of older and not yet regulated heavy duty vehicles were higher). Furthermore, there is now a sharper decline after 2020 than was anticipated in 2004 by Report 355. This is attributable to the inclusion of the new emission standard categories (Euro-5/V and Euro-6/VI). Another notable trend is that the actual reductions have occurred more slowly than was anticipated a few years ago. This applies especially to NO_x emissions, which have now been raised by approximately 20 per cent for 2010, primarily due to an upward adjustment of the emission factors for passenger cars (diesel Euro-3 and Euro-4). Up to 2020, CO₂ emissions are forecast as more or less constant. The difference from 2020 onwards, despite assuming the same reduction rate, is due to a stabilisation having been anticipated after 2020 in Report 355. The updated prognosis results from new technologies and recently adopted measures to reduce CO₂ emissions due to traffic.

Finally, the trend of air pollutant emissions from road transport correlates well with that of ambient loads from all sources, as exemplified by the data for nitrogen oxides from 1991 onwards: for the period up to 2009, both the modelled emissions from road transport and the ambient levels have gone down by almost 50 per cent. Nonetheless, additional measures are still required in order to meet the ambient limit values for human health and environmental quality.

Fig. A > Emission trends by vehicle category, 1990 to 2035

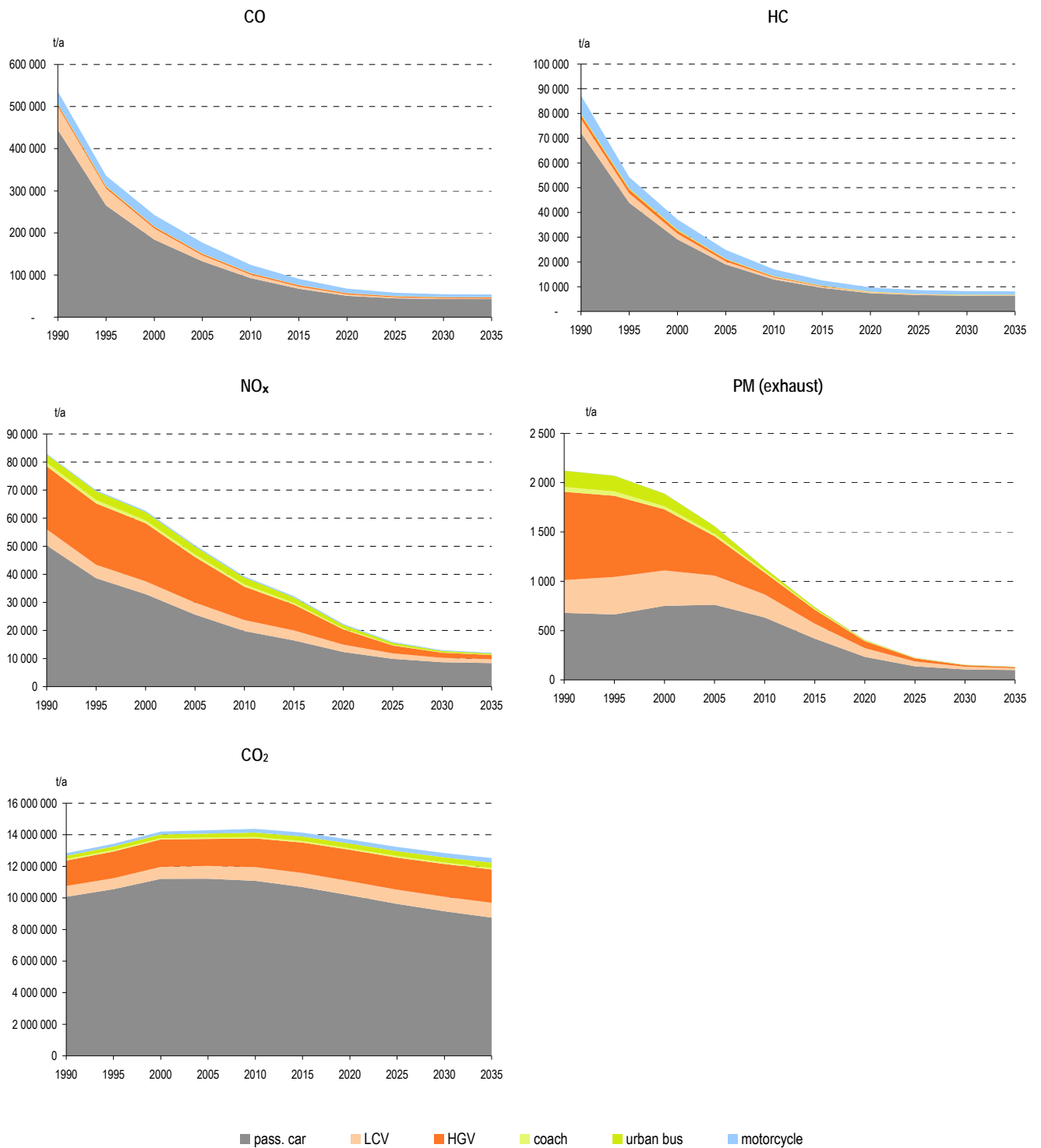
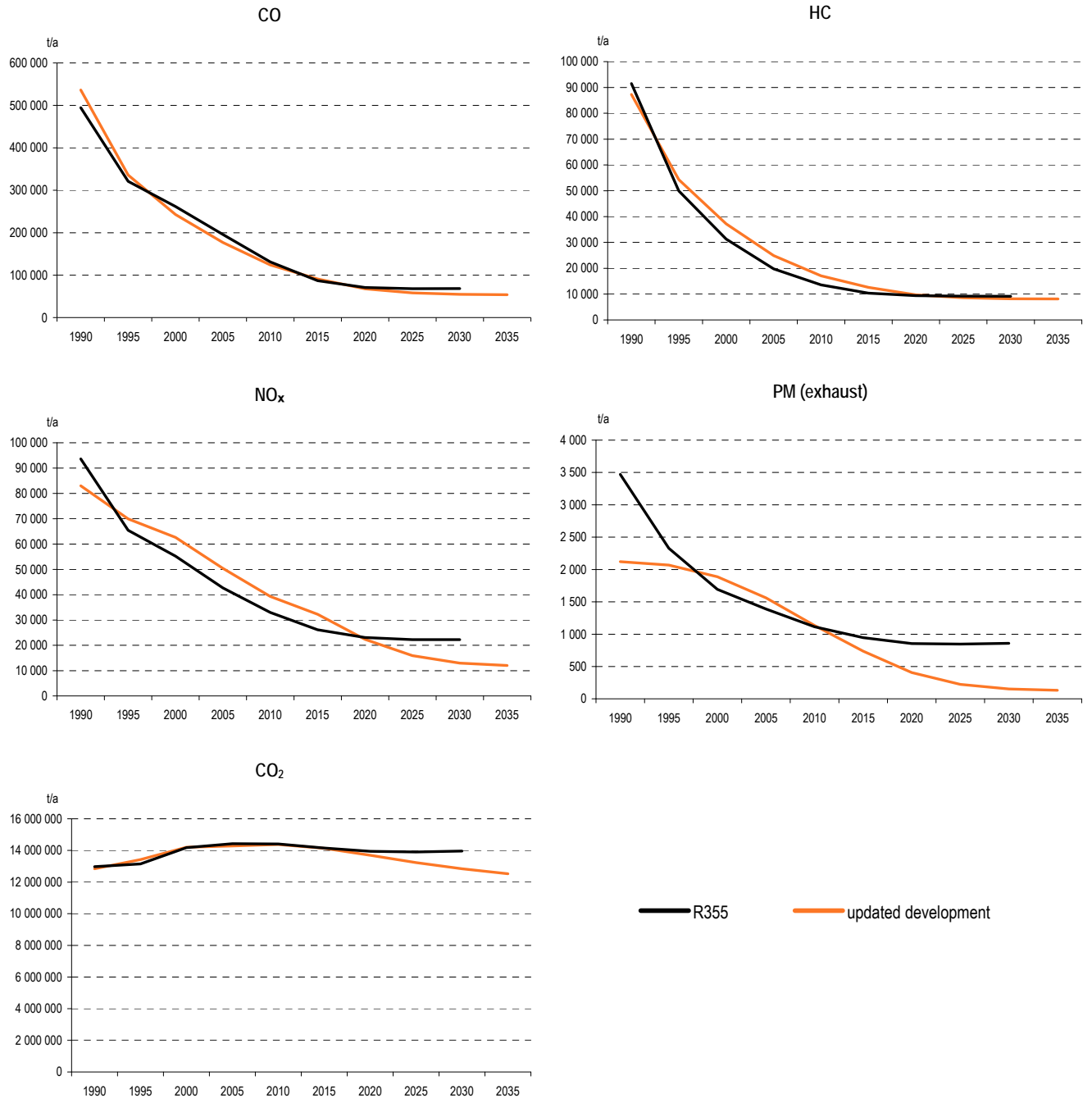


Fig. B > Comparison of updated emission trends with figures from the previous SAEFL Report 355



1 > Introduction

Measuring and documenting air pollutant emissions from road transport has become something of a tradition in Switzerland: the first SAEFL report (no. 55) on this topic dates back to the mid-1980s (SAEFL 1986), and relied largely on specialised literature. However, a variety of gaps in knowledge were subsequently identified, and for this reason the exhaust behaviour of motorised road vehicles was studied in greater depth in a comprehensive research project that was initiated in the first half of the 1990s together with Germany and Austria. At the same time, pollutant emissions from road traffic in Switzerland were calculated for the period from 1950 to 2010. The findings from this project were documented at the end of 1995 in SAEFL report no. 255 (“Pollutant emissions from road transport, 1950–2010”) (SAEFL 1995). In addition, the emission factors were summarised and published as a special electronic handbook (INFRAS 1995, HBEFA Version 1.1) intended to serve as a tool for a variety of applications such as emission inventories, environmental impact assessments, etc. In the meantime, various background conditions have changed. In particular, European (and subsequently Swiss) legislation governing exhaust emissions has undergone further development and new emission standards have been set. The emission factors handbook (HBEFA) has therefore been constantly updated. Version 1.2 was published in spring 1999 (CD-ROM, INFRAS 1999), and SAEFL Report 355 was updated at the same time (SAEFL 2000, Supplement). Version 2.1. of the handbook was published in 2004, together with an update of the emission calculations for road transport in Switzerland (SAEFL Report 355 2004). Since that time, activities have been internationally co-ordinated to an increasing extent. The co-operation under the title “D-A-CH” underwent constant expansion and was subsequently renamed “D-A-CH+NL+S+” after representatives from the Netherlands, Sweden, Norway and France became involved in the various activities. At the same time, two international projects (COST 346 and ARTEMIS, an EU project within the scope of the Fifth Framework Programme) were brought to completion. The former “D-A-CH-NL-S+” group was renamed “ERMES” (European Research on Mobile Emission Sources) and as of 2010 is being co-ordinated by the Joint Research Centre of the EU Commission.

In February 2010, Version 3.1 of the emission factors handbook was published on the Internet (www.hbefa.net). This version contains emission factors based on new measurements. The programme was fundamentally reviewed, even though from the point of view of users the functionalities of the handbook itself remained essentially the same. In view of the increasingly international orientation, the “traffic situations” were redefined and standardised. A variety of new approaches were also added, e.g. for measuring cold-start influences and evaporation emissions. In addition to emission-related data for Germany, Austria and Switzerland, HBEFA Version 3.1 now includes data for Sweden and Norway, and data for France will be added in the near future.

This report explains the updated calculation methodology, documents the emission trends in the area of road transport in Switzerland, and reflects changes in both emis-

sion levels and traffic data. The adjustments of emission factors are only reiterated briefly here, since they are explained in detail in the above-cited handbook HBEFA 3.1 (INFRAS 2010). Since the various changes also have retrospective effects, the time frame has been completely recalculated from 1990 onwards, and has also been extended to 2035 (in line with the time frame of the energy perspectives of the federal government).

The structure of this report is similar to that of Report 355. Where no notable changes have been made, sections have been directly adopted from the previous report.

The structure of the report is as follows:

- > Chapter 2 deals briefly with the main changes in emission factors.
- > Chapter 3 deals with the traffic data on which the emission calculations are based.
- > Chapter 4 presents the emission trends and compares these findings with the emission estimates dating from 2004.

2 > Emission fundamentals

2.1 Methodology

The calculations of emissions from road transport are largely based on two data sets: traffic activity (description of traffic volume) and emission factors (specific pollutant emissions, for example in grams per vehicle kilometre). There are different types of emissions in the road transport sector:

- > *Emissions from vehicles with engines in hot operating condition*: these depend on driving behaviour (e.g. speed, dynamics), but also on various other factors such as the gradient. The corresponding emission factors are expressed in grams per vehicle kilometre.
- > *Cold-start emissions*: the level of emissions when a (cold) engine is started up is higher than when it is in hot operating condition. For the purpose of calculating emissions, the difference between the total emission level upon start-up (cold engine) and the emission level in operating condition is taken into account in the form of a cold-start excess.¹ The corresponding emission factors are expressed in grams per start-up (g/start).
- > *Evaporation emissions*: petrol-driven vehicles lose a certain amount of fuel through evaporation. This process only results in HC emissions. In the case of diesel vehicles, evaporation losses are negligible, since diesel fuel has a higher evaporation temperature than petrol. A distinction is made between three types of evaporation according to their source:
 - *Emissions due to diurnal emissions*: evaporation losses from a vehicle with its engine switched off, caused by changing ambient temperatures (fluctuations between daytime and nighttime temperatures), expressed in grams per vehicle and day.
 - *Evaporation after switching off a warm/hot soak*: emissions that result due to the temperature fluctuations when a hot or warm (after being driven for a short stretch) engine cools down, expressed in grams per journey.
 - *Running losses*: evaporation losses while the vehicle is in motion, relevant at high ambient temperatures, expressed in grams per vehicle kilometre.

Thus for the calculation of emissions, two data sets are required, both of which have to be processed according to the degree of differentiation outlined above: on the one hand, the emission factors (in grams per vehicle kilometre, grams per start, grams per stop, grams per vehicle and day), and on the other hand the traffic activities in the form of mileage figures (vehicle kilometres per annum) for calculating the emissions from vehicles with engines in hot operating condition, plus traffic activities in the form of

¹ HBEFA3.1 provides such figures only for passenger cars and light commercial vehicles

the number of starts (for cold-start excess emissions) and stops (for evaporation emissions after switching off when warm/hot), and vehicle stock (for diurnal evaporation emissions).

The vehicles are divided into six categories for emissions calculation purposes, with the following designations:²

- | | | |
|-----------------------------------|---------------------------------------|---------|
| > Passenger cars (PC) | – Cars, including heavy models | < 3.5 t |
| > Light commercial vehicles (LCV) | – Light commercial veh. and minibuses | < 3.5 t |
| Heavy goods vehicles (HGV) | – Rigid trucks | > 3.5 t |
| | – Trucks and trailers | > 3.5 t |
| | – Articulated trucks | > 3.5 t |
| > Coaches | – Coaches | > 3.5 t |
| > Urban buses | – Urban buses | > 3.5 t |
| > Motorcycles (MC) | – Motorcycles, including mopeds | |

Combustion engines produce a large number of pollutants. In this report, those pollutants and components have been calculated wherever acceptable data sources exist, either from reliable and in many cases specific measurement programmes (group 1), or from supplementary measurement programmes and/or literature (group 2):

- | | |
|--------------------|--|
| > Group 1: | |
| – CO | carbon monoxide |
| – HC | hydrocarbons (total HC) |
| – NO _x | nitrogen oxides |
| – PM | particulate matter (exhaust) |
| – MF | Fuel consumption |
| – CO ₂ | carbon dioxide (calculated on the basis of fuel consumption) |
| > Group 2: | |
| – Pb | lead |
| – SO ₂ | sulphur dioxide |
| – CH ₄ | methane, derived from total HC |
| – NMHC | non-methane HC, derived from total HC |
| – Benzene | derived from total HC |
| – Toluol | derived from total HC |
| – Xylol | derived from total HC |
| – NH ₃ | ammonia |
| – N ₂ O | nitrous oxide |
| – NO ₂ | nitrogen dioxide |

² The term «light duty vehicle» encompasses passenger cars and light commercial vehicles, while «heavy duty vehicle» refers to heavy goods vehicles, coaches and urban buses.

2.2 Emission factors

The methodology for calculating emissions has remained essentially unchanged compared with Report 355 (FOEN 2004). The emission factors that have been used in this report are based on HBEFA Version 3.1 (2010), which is similar in outline to the previous version (2.1) which was used for Report 355. Nonetheless, the new HBEFA version may be regarded as a remake rather than an update. The main reason for this is that, in view of the increasing international orientation of the handbook, the traffic situations for which the most important emission factors are presented have been redefined. In practice, this means that all emission factors had to be recalculated, including retroactively. Previously, individual measurements for certain driving patterns were directly adopted as emission factors, but now these figures initially had to be transferred via appropriate calculation models to the redefined traffic situations. This resulted in certain deviations, even if the emission level does not change to any notable extent. This also applies to emission data for the past. In addition, the results of new measurements have also been taken into account. As before, wherever measurements are lacking – in particular for future vehicle concepts – the emission factors have been estimated on the basis of reduction rates according to the current legislation on the development of emission standards (cf. Annex A1). The following changes were taken into account for calculating emission levels (cf. report HBEFA 3.1, INFRAS 2010, and www.hbefa.net):

- > New emission factors are now also available for emission categories Euro-5/V and Euro-6/VI³. In addition, some vehicle groups have been differentiated in greater detail (e.g. with/without particle filter, SCR/EGR).⁴ Otherwise the definitions of vehicle segments (size categories, Euro categories of emission standards, etc.) are largely unchanged.
- > The new depiction of traffic situations groups these on the basis of 4 dimensions: type of region (rural/urban), 5 road categories, speed limit and 4 traffic conditions. This means that the number of emission factors is significantly higher (276). Each traffic situation is associated with a typical driving pattern in the form of a speed progression per second.
- > Emission factors of passenger cars (PC):
 - The emission factors for passenger cars have been fully revised. The new data are based on the emission model (PHEM) developed by the Technical University of Graz, which was already used for calculating the emission factors of the heavy duty vehicles in HBEFA Version 2.1. For the calibration of this model, modal emission measurements were used (in seconds) up to Euro-4. For HBEFA 3.1, the compilation of emission recordings of a large number of European laboratories initiated in the ARTEMIS project was continued.

³ Explanation of usage: Arabic numerals are used for emission categories for light motor vehicles (cars, utility vehicles), while Roman numerals are used for designating emission categories for heavy motor vehicles.

⁴ SCR = selective catalytic reduction; EGR = exhaust gas recirculation.

-
- The emission factors for future vehicle concepts (Euro-5, Euro-6) were estimated on the basis of future legislation.
 - The cold-start emission factors (as before, defined as cold-start excess emissions) were fully revised and are based on a new proposal by EMPA.
 - A new concept was developed for evaporation emissions. The approach was adopted from COPERT IV, and calculations are now based on country-specific input parameters.
- > Emission factors of light commercial vehicles (LCV)
- Here, too, the emission factors were completely revised, and the PHEM model of TU Graz was again used. However, the empirical data base is somewhat limited for the purpose of very detailed differentiation, since in general only very few vehicles are measured in real operation.
- > Emission factors of heavy goods vehicles (HGV)
- As was the case with HBEFA 2.1, the emission factors for heavy goods vehicles and buses were calculated using the PHEM model of TU Graz. However, the number of measurements was significantly increased thanks to measurement campaigns and activities within the scope of international projects such as COST Action 349, ARTEMIS and PARTICULATES.
 - For the purpose of emission calculations, practically the same range of vehicle segments was available (i.e. same weight categories) as before. However, the concepts were extended to Euro VI, and assumptions had to be made for Euro-V and Euro-VI since only very few empirical recordings were available. In two categories (Euro-IV and Euro-V), a differentiation was also made between technology concepts (i.e. SCR and EGR).
- > Emission factors of motorcycles (MC)
- The model for producing emission factors was adapted in line with the model for passenger cars in order to additionally take into account acceleration effects. The database was also expanded, and emission measurements from Germany (ARTEMIS project) were included.
- > New pollutants
- Emissions are now also calculated for NO₂ (“direct emissions”) and particle number. PM (particle mass) emissions for petrol passenger cars (particle mass) are now based on results from the PHEM model.
- > Other changes
- Forecasts regarding fuel consumption and CO₂ emissions now take account of the fact that vehicles are generally becoming more efficient. In addition, country-specific reduction rates are defined on the basis of CO₂ monitoring data for new vehicles (in Switzerland, in line with the evaluations of fuel consumption of new vehicles carried out by “auto-schweiz” on behalf of the Swiss Federal Office of Energy (SFOE), e.g. auto-schweiz 2010).
 - CO₂ emission factors are now shown in a differentiated manner, with a distinction being made between “CO₂ total” and “CO₂ reported” (i.e. in the “CO₂ reported”

figure only the fossil-related CO₂ component is taken into account; additives of biofuels are not included in the calculation).

- For air-conditioning systems, a new calculation method was applied that is based on measurements and a proposal by EMPA.
- Emission factors of N₂O and NH₃ are based on new data from COPERT IV.
- Emissions from vehicles (passenger cars, buses) powered by compressed natural gas (CNG) are now taken into account in a differentiated manner.

3 > Traffic fundamentals

3.1 Methodology

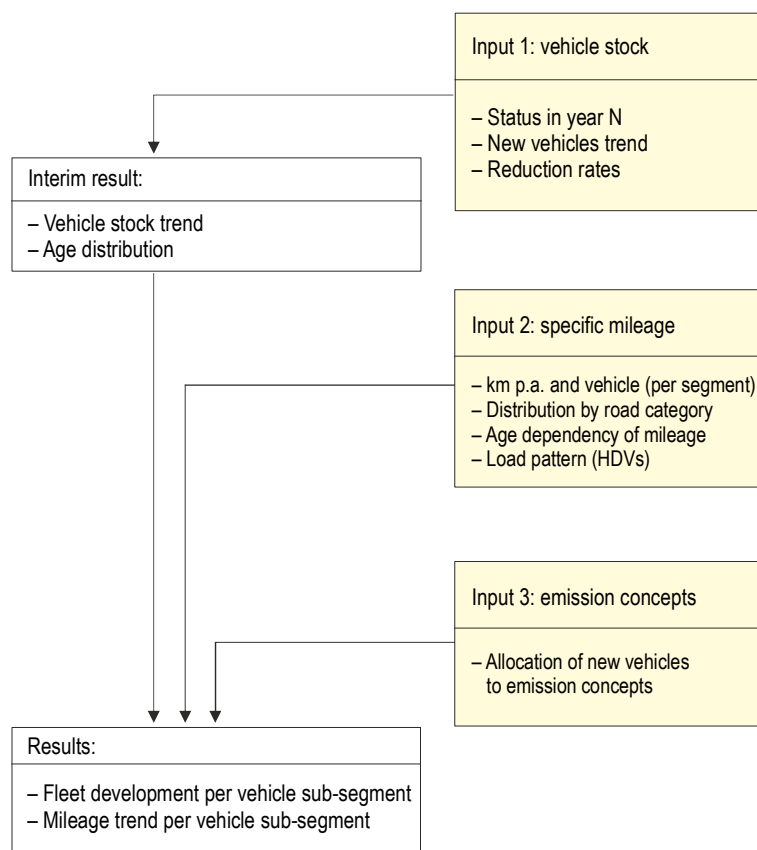
As already explained in chapter 2.1, traffic volumes have to be processed in various forms in order to be able to calculate the different emission types, i.e. mileages (vehicle kilometres) have to be calculated, as well as start-up and stop processes (for calculating cold-start and evaporation emissions), and vehicle stock (for evaporation emissions). These have to be differentiated by vehicle category (cf. chapter 2.1). But emission factors inevitably also take account of other technological differences, e.g. type of fuel (petrol/diesel, alternative fuels), different size categories (weight or cubic capacity) and especially emission levels, i.e. the different emission standards that vehicles have to meet depending on their year of manufacture. It is therefore necessary to split up all traffic volumes according to these differentiations, in order to correctly calculate the respective emissions.

The data from various sources have to be combined. Most of the necessary model components for this purpose were adopted from earlier studies (SAEFL 1995, SAEFL 2000, SAEFL 2004) and adapted to the latest criteria (e.g. statistical data where available up to reference year 2008). The overall traffic volume is calculated on a bottom-up basis, in accordance with the following formula:

$$\text{Mileage (per annum)} = \text{vehicle stock} * \text{specific mileage (per annum and vehicle)}$$

On the one hand the statistics concerning vehicle-km driven covered in the past years can thus be reproduced (and calibrated to the data of the Swiss Federal Statistical Office), while on the other hand it is possible to calculate the future trend with respect to total mileage using assumptions concerning the vehicle stock and specific mileage in a consistent manner. In addition, it is possible to comprehensibly model the distribution of new technologies in the vehicle stock and mileage components. Thus traffic composition and mileage trend can be determined in the same model and with the same procedure (cf. Fig. 1). In the context of the handbook of emission factors, this model was used in order to determine the fleet compositions of all involved countries (Germany, Austria, Switzerland, Sweden, Norway, France).

Fig. 1 > Modelling of fleet and mileage trends and fleet composition



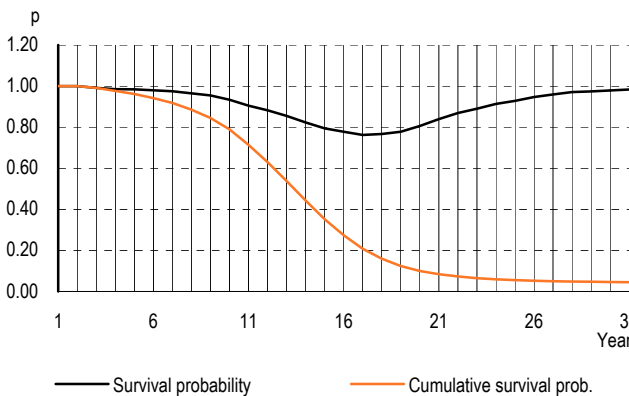
The calculation procedure is essentially divided into three steps:

> The first step is to model the vehicle stock trend. The past trend is depicted on the basis of statistics of the Federal Vehicle Inspection Office concerning fleet and age distribution. Age distribution is required in order to allocate the vehicles to the corresponding emission concepts in step 3. The future trend is estimated by taking a reference year, i.e. the last year for which statistics exist (in the present case 2008) and making assumptions concerning new registrations and survival probabilities (or equivalent fall-off rates). In this way, the vehicle stock for each future reference year can be depicted as the total of anticipated new registrations and the remaining vehicles from each year of registration – a model that closely corresponds to reality. Here the relatively stable fall-off rates over the course of time form a sound basis for projection. On the other hand, the comparatively uncertain trend concerning new registrations only has a minor influence since the annual volume of new registrations is less than 10 percent of the overall vehicle stock. This procedure is carried out separately for each vehicle category, though additional differentiation is made within these categories, e.g. for passenger cars by diesel/petrol vehicles and three engine capacities (< 1.4 l, 1.4 to 2 l and > 2 l), and now also by CNG-powered vehicles. The illustration below shows an example of a survival probability curve (left) and the trend of the passenger car fleet including age distribution (right).

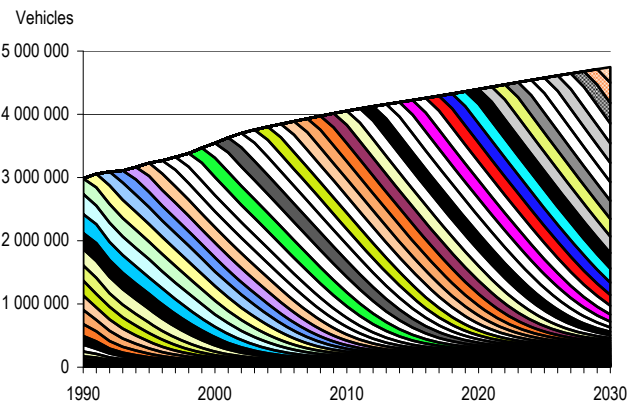
Step 1:
Stock input

Fig. 2 > Depiction of fleet trend (example for passenger cars)

The graph on the left depicts the survival probability curve for passenger cars (status, 2001/2002). The black line shows the probability that a vehicle will still be in circulation in the following year; the orange curve shows the accumulated values (= lifetime function) and indicates the probability that a vehicle will remain in circulation for x years.



The vehicle stock (passenger cars) is shown on the right, including new registrations and gradual elimination of vehicles. With a vertical line in a given reference year it is possible to read off the corresponding age distribution.



The mileage characteristics of the various vehicle categories are entered in the form of a second data set. Firstly the specific mileage for each vehicle category has to be defined (in kilometres per annum and vehicle). The mileage combined with the vehicle stock figure results in the total mileage for each year. At the same time, the mileage is distributed over the three road categories (motorways, rural roads, urban roads).⁵ The various segments⁶ now have different mileage characteristics; for example, diesel passenger cars have a higher mileage than petrol passenger cars, heavy duty vehicles have a higher mileage than light duty vehicles, etc. For this reason, the same inputs are processed segment-specifically (specific mileage p.a., distribution over road categories) in a second step. Since this dual procedure (same inputs at vehicle category level as at segment level) can give rise to inconsistencies, a mathematical adjustment is made in order to ensure that the total figures over all segments are consistent with the mileage figures per vehicle category. Here it is the key figures per vehicle category that are of relevance, since the empirical basis is more reliable than the basis per segment. At the same time it is also possible to reflect segment-specific differences. In addition, the age dependency (per segment) is taken into consideration since as a rule newer vehicles have a higher mileage than older ones. With heavy duty vehicles, two additional inputs are taken into account: figures recorded in the motor vehicle statistics refer to traction vehicles (trucks and tractors). For emission purposes, however, it is overall weights that are relevant, so in addition to rigid trucks, trucks and trailers and articulated trucks have to be included. It is therefore necessary to separate mileage figures for HGVs into solo and articulated vehicles, which is now possible on the basis of empirical data

Step 2:

Depiction of mileage

⁵ In addition, driving behaviour is also specified, i.e. the distribution of traffic volumes over various traffic situations that are characterised by different speed and acceleration patterns. These were fundamentally redefined in HBEFA 3.1, from which they can therefore be directly adopted (cf. INFRAS 2010).

⁶ Here, «segment» refers to a vehicle group (within a vehicle category) with the same fuel type (petrol/diesel) and size (dimensions, cubic capacity) of engine.

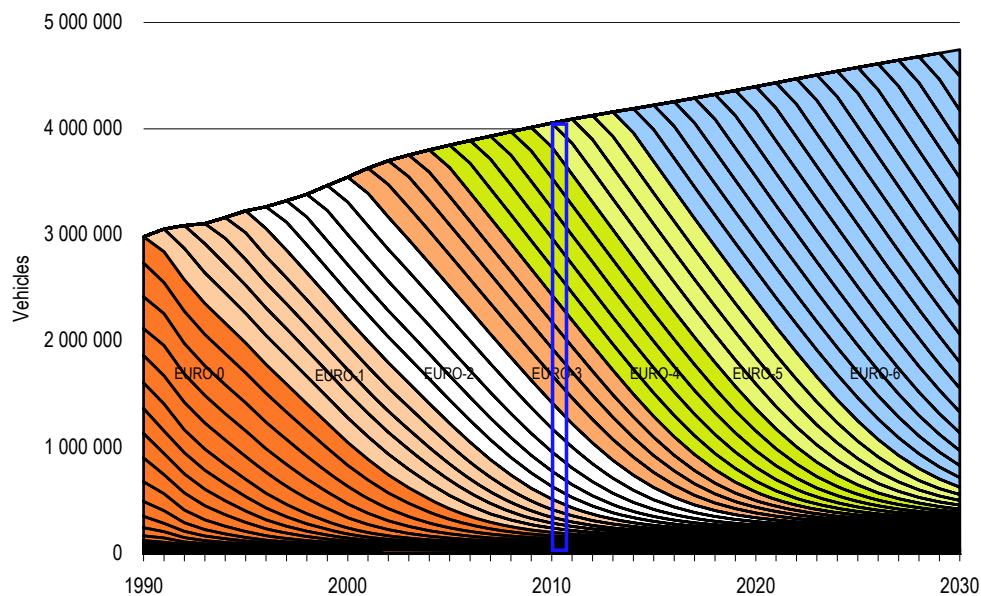
relating to the Swiss distance-related heavy vehicle fee (HVF). For the same reason, the load rate – which is another necessary input for characterising the mileage of heavy goods vehicles – is also relevant.

- > The third input data set establishes the link to the emissions side. Here the emission category to which new vehicles from a given year of manufacture are to be allocated is defined for each year. In this way it is possible to estimate the proportions of the various emission categories for all reference years from the combination with the fleet development differentiated by age (cf. Fig. 3). This procedure is carried out at the segment level. At the same time, the corresponding mileage figures per segment are also known, and from these the proportions of the various vehicle sub-segments can be calculated – weighted once by fleet and once by mileage, as required for the calculation of emission factors.

Step 3:
Depiction of emission concepts

Fig. 3 > Development of vehicle stock by emission category (example: passenger cars)

This graph shows the development of the fleet by year of construction. Each segment framed in black represents a group of vehicles with the corresponding year of manufacture, and these are coloured in accordance with their main emission category. The blue rectangle indicates the status as of 2010. The coloured sections inside the rectangle reflect the vehicle stock composition by emission category in 2010.



3.2 Trend in traffic volumes

3.2.1 Mileage

It is not possible to simply measure how the mileage figures develops in Switzerland.⁷ Instead we have to rely on a variety of indicators and surveys. The applied models have to be constantly adapted on the basis of ongoing developments. The figures in this report relating to total mileage are primarily based on publications of the Swiss Federal Statistical Office (FSO 2009); 2008 was taken as reference year. The figures relating to the future trend are based on the transport perspectives of DETEC (ARE 2004, ARE 2006). The respective trends are described briefly below. Please refer to Fig. 4 for an overview in graphic form, and to Annex A2 for a summary of the respective figures.

Until 2008, the data published in FSO 2009 were used.⁸ The mileage figures for passenger cars are only marginally higher versus Report 355 (FOEN 2004). A similar trend to that recorded around five years ago is anticipated for the future. Compared with 2008, the anticipated growth for 2020 and 2035 are 13 percent and 21 percent respectively, i.e. significantly slower than in the past.

Passenger cars

The FSO recalculated the mileage figures for light commercial vehicles (including retroactively) following the introduction of the heavy vehicle fee, and adjusted them sharply downwards. For the future, the applicable growth rates are based on the goods transport perspectives and adapted to the lower figures.

Light commercial vehicles

For the period since the introduction of the heavy vehicle fee (2001), reliable mileage figures are available in Switzerland for heavy goods vehicles. The FSO retroactively adjusted the figures slightly for the period from 1990 to 2000 versus the data that were available in the previous report. The figures for the current period largely match those that were used at that time. In the same way as for light commercial vehicles, the growth rates are based on the goods transport perspectives and have been adapted to the level for 2008, which means that the mileage figures for heavy goods vehicles are practically identical to those in Report 355.

Heavy goods vehicles

In absolute terms, the mileage figures for buses are relatively low. According to the FSO, the figures for coaches have increased, and in view of this the initial level on which previous growth rates were based has been adjusted slightly.

Buses and coaches

In the case of public transport buses, contrary to the predictions in the earlier study a higher growth rate has been assumed in line with the current sharp increase in demand in the area of rail travel, which is expected to persist in the future.

⁷ With the exception of mileage for HGVs: here it is possible to collect practically complete statistics thanks to the introduction of the Swiss distance-related heavy vehicle fee.

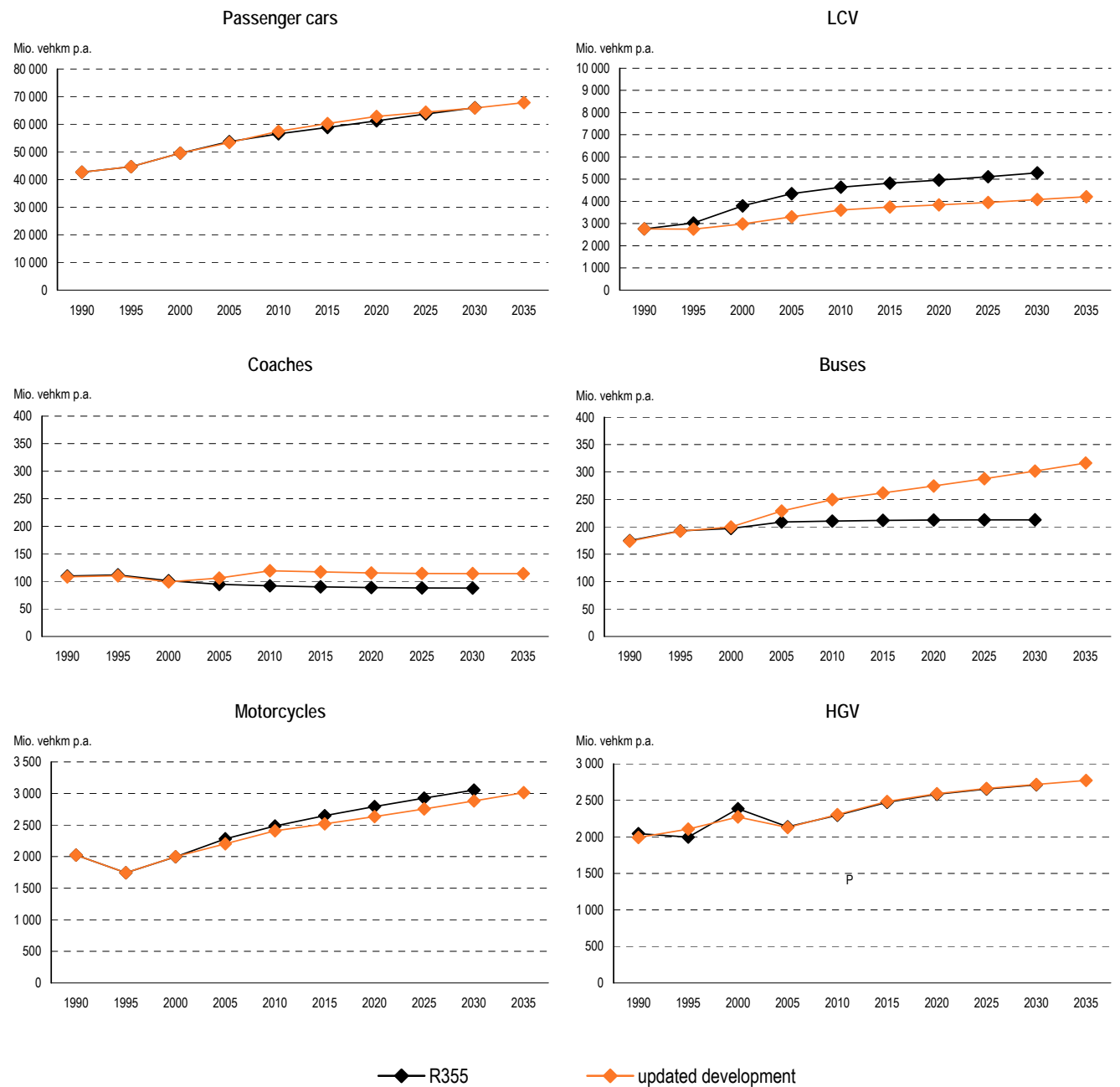
⁸ In 2009, the FSO adjusted the mileage figures for foreign vehicles (and subsequently the total mileage for cars) downwards. This adjustment has not been reflected in the figures in this report since validation with fuel sales was not regarded as sufficient justification for such an adjustment (cf. chapter 4.2).

The mileage figures of motor cycles have increased to a slightly lower extent than was assumed in Report 355. In view of this, the growth rate in this category has been adjusted slightly downwards, and for 2030 is now around 6 percent below the level cited in Report 355.

Motorcycles, scooters, mopeds

Fig. 4 > Mileage trend, 1990 to 2035 (million vehicle kilometres per annum)

Comparison of updated trend (in orange) with results of previous SAEFL "Report 355" (in black).



3.2.2 Vehicle stock, starts and stops

Excess emissions from starts, as well as evaporation emissions, are calculated for passenger cars and light commercial vehicles in addition to hot emissions, and evaporation emissions are also shown for motorcycles. This means that, in addition to the mileage trend, forecasts concerning the development of vehicle stocks as well as the number of start and stop procedures have to be made for the above mentioned vehicle categories.

As we can see from Fig. 1, the fleet development is an integral component of the methodology. This ensures that the fleet trend is consistent with the mileage scenarios. The corresponding data are shown in Annex A2.

The factors relating to the number of starts and stops per day have been redefined on the basis of the 2005 micro traffic census. Here the “stages concept” used in the census was adopted, i.e. each stage is associated with a start. At the same time, the required parameters for cold-start calculations (distribution of mileages and parking times, differentiated by time of day) were calculated in order to place the cold-start model on a firmer footing. It was found that the number of starts per car is around 10 percent lower than previously assumed. For the other vehicle categories (light duty vehicles and motorcycles) the previous bases were used since no newer figures were available.

3.3

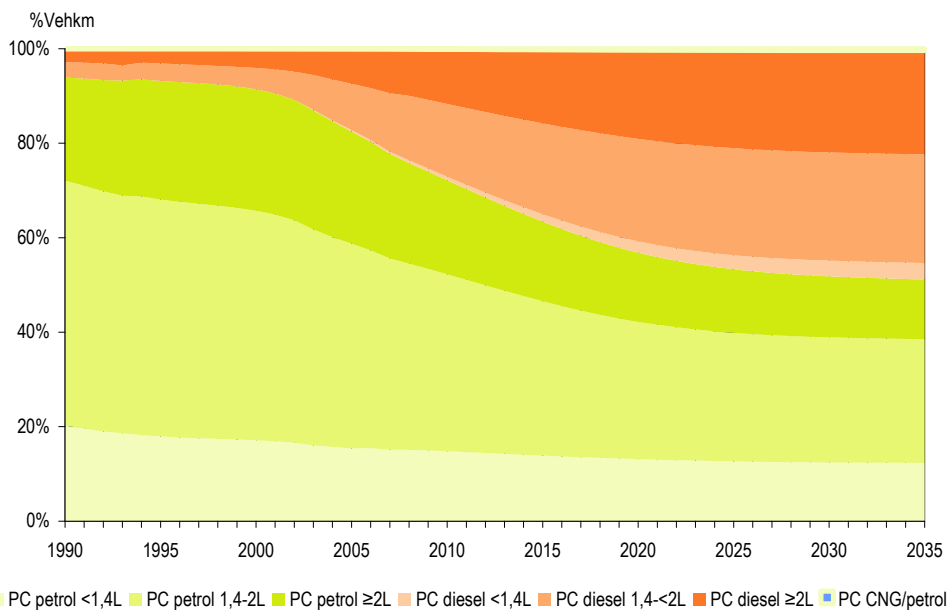
Traffic compositions

This term refers to the composition of the vehicle stock within a given vehicle category, not to the composition of traffic on the road by vehicle category. Data concerning this composition are essential for making emission calculations. Fleet trend and fleet compositions are now integrated components of the model for calculating traffic volumes. The most important assumptions for each vehicle category are outlined below.

The most pronounced change in composition is the sharp increase in the proportion of diesel passenger cars since the end of the 1990s (cf. Fig. 5). In 2009 the proportion of diesel passenger cars among new vehicle registrations was 30 percent (auto-schweiz 2010). A further increase in the proportion of new vehicles to 40 percent is assumed, after which it is expected to stabilise at this level. Since diesel vehicles tend to indicate a high specific mileage, their proportion to the overall mileage is expected to rise more sharply, even if this effect tends to be lessened as the proportion of diesel vehicles increases. In consideration of the fact that the fleet of foreign vehicles that use Switzerland's roads will include a higher number of diesel-powered passenger cars, the proportion of the latter is expected to increase to 48 percent by 2030. This is the basic scenario in which vehicles using alternative fuels are of little significance. The anticipated proportion of CNG-powered passenger cars is 1 percent, while electric cars do not play a role in this scenario.

Passenger cars

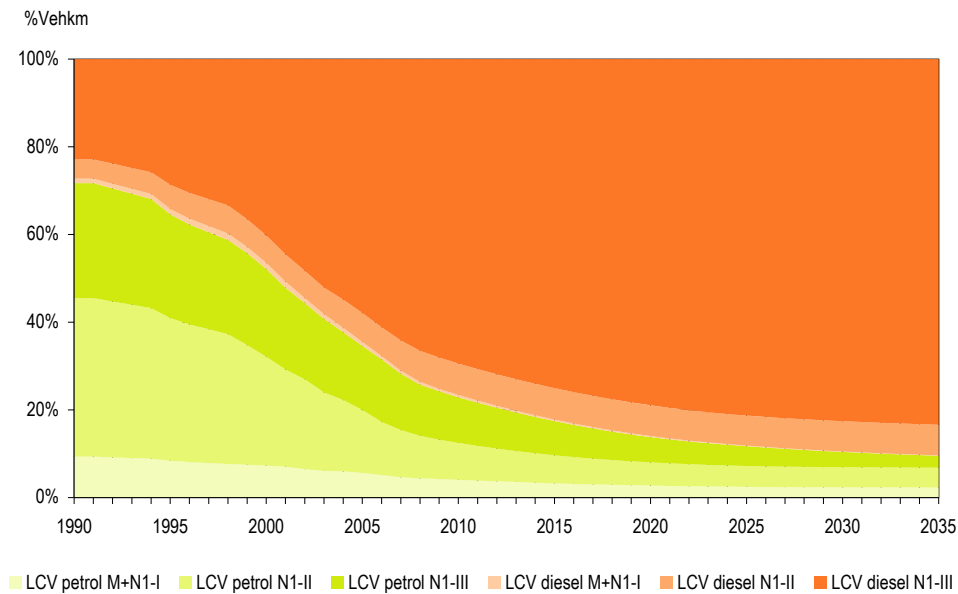
Fig. 5 > Mileage proportions of the various passenger car segments in the period from 1990 to 2035



For light commercial vehicles, a distinction is made by size category as well as by type of fuel. The three categories as defined in legislation on exhaust emissions are M+N1_I/N1_II/N1_III; definition, see Annex A2. The trend towards large diesel-fuelled vehicles also becomes apparent from the mileage proportions (cf. Fig. 6). According to the current assumptions, diesel-fuelled light duty vehicles (category N1-III) will account for approximately 85 percent of the mileage in 2030.

Light commercial vehicles

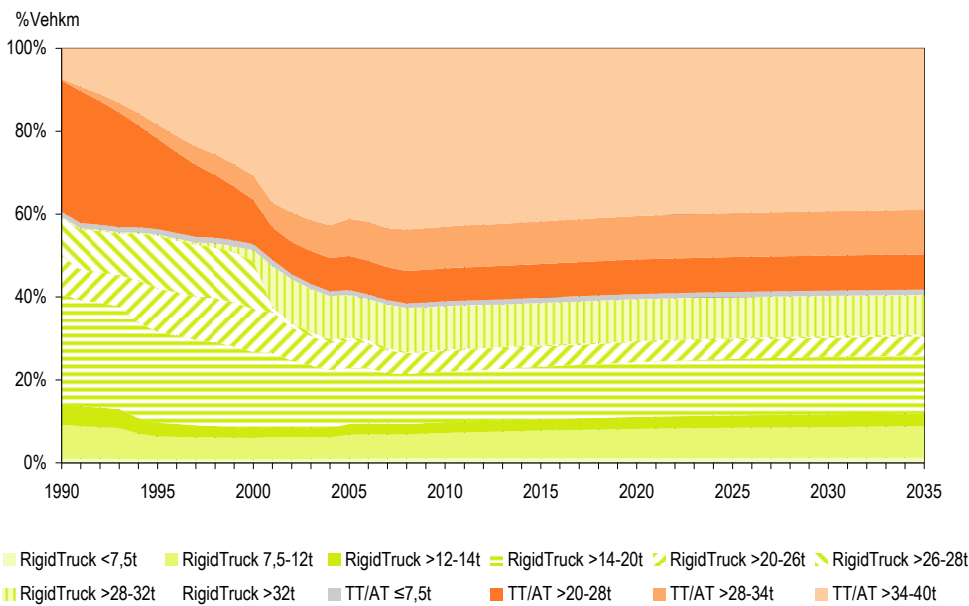
Fig. 6 > Mileage proportions of the various light commercial vehicle segments in the period from 1990 to 2035



The increase in the weight limit for HGVs from 28 to 40 tonnes, and the introduction of the Swiss heavy vehicle fee in 2001, have significantly changed the composition of the HGV fleet. As far as the emission trends are concerned, it is not so much the legally permissible weight as the real vehicle weight that is of relevance. Although a weight limit of 28 tonnes was in effect in Switzerland until 2000, it may be assumed that vehicles with a technical total weight of 40 tonnes were already on Switzerland's roads before that date, but they were usually operated with a correspondingly reduced load. The increase of the weight limit and simultaneous introduction of the HVF in 2001 therefore had impacts at different levels: capacity utilisation rose drastically, and there was an added incentive to buy (large) new vehicles that meet the newest emission standards, since these would be subject to a lower HVF.

Heavy goods vehicles

Fig. 7 > Development of mileage proportions of heavy goods vehicles in the period from 1990 to 2035

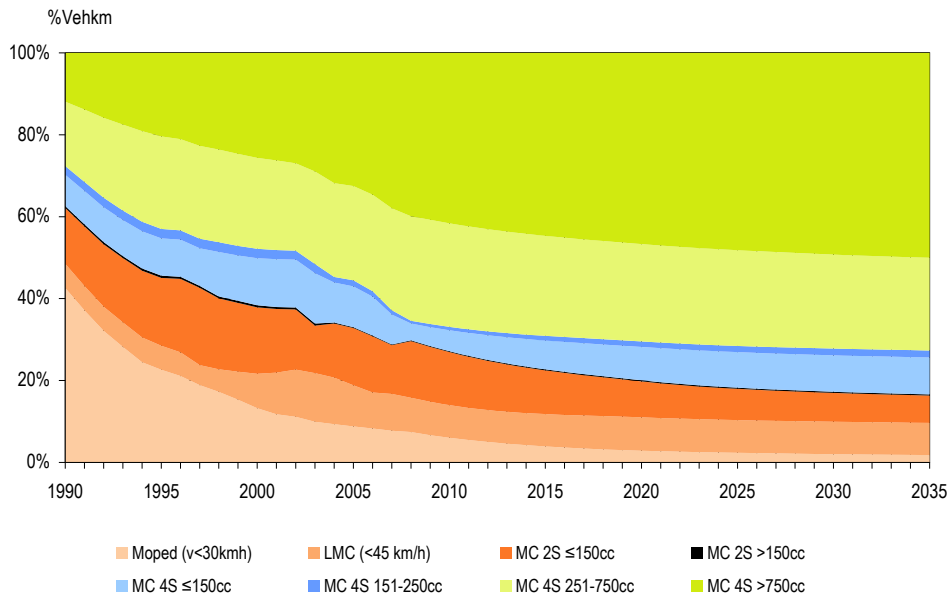


As before, there are two main trends with respect to motorcycles that influence their development (cf. Fig. 8):

Motorcycles, scooters, mopeds

- > The proportion of mopeds falls sharply and is to some extent offset by small motorcycles or 2-stroke or 4-stroke motorcycles < 150 cc. Since the service life of these vehicles is relatively short, the fleet stabilises itself comparatively quickly, assuming that new registrations remain constant.
- > There is also a high number of new registrations of large motorcycles. Since their average service life is much longer, the overall fleet is expected to grow over the long term, assuming a constant level of new registrations.

Fig. 8 > Development of mileage proportions of motor cycles in the period from 1990 to 2035



Moped; LMC: light motorcycle; MC 2S: 2-stroke motorcycle; MC 4S: 4-stroke motorcycle

3.4

Emission concepts

The allocation of emission concepts for specific years of manufacture has been adjusted since Report 355 in that new emission categories (Euro-5/V and Euro-6/VI) have been decided. At the same time, the evaluation of motor vehicle stocks has been updated until 2008 in combination with type approvals.

Fig. 9 > Emission concepts by registration (petrol-driven passenger cars)

Depiction of the introduction of new technological concepts in the area of petrol-driven passenger cars: Euro 4 came onto the market earlier than previously anticipated as the result of promotion measures by some cantons. However, it is also apparent here that this introduction took place on a step-by-step basis, i.e. some new vehicles still meet older standards.

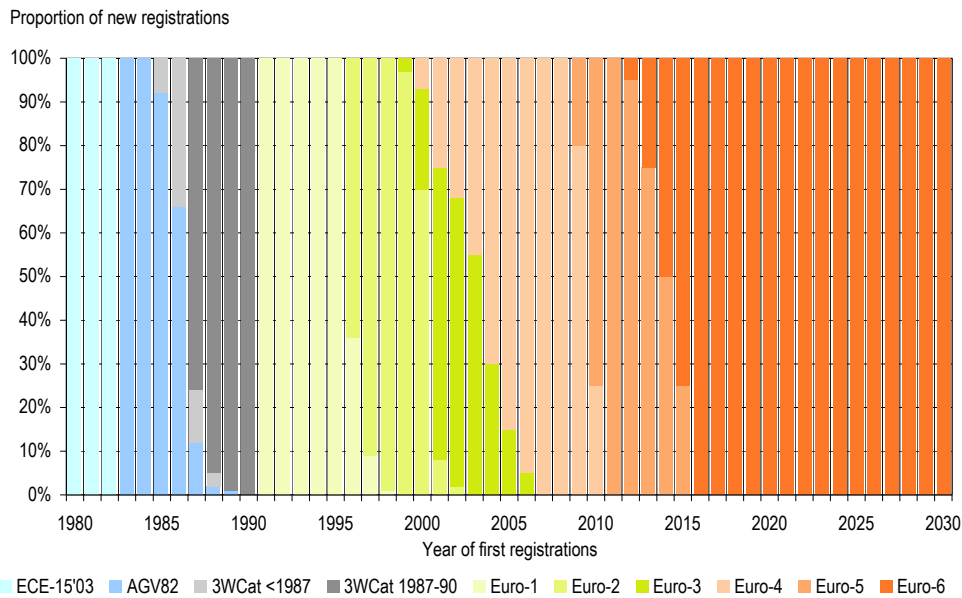
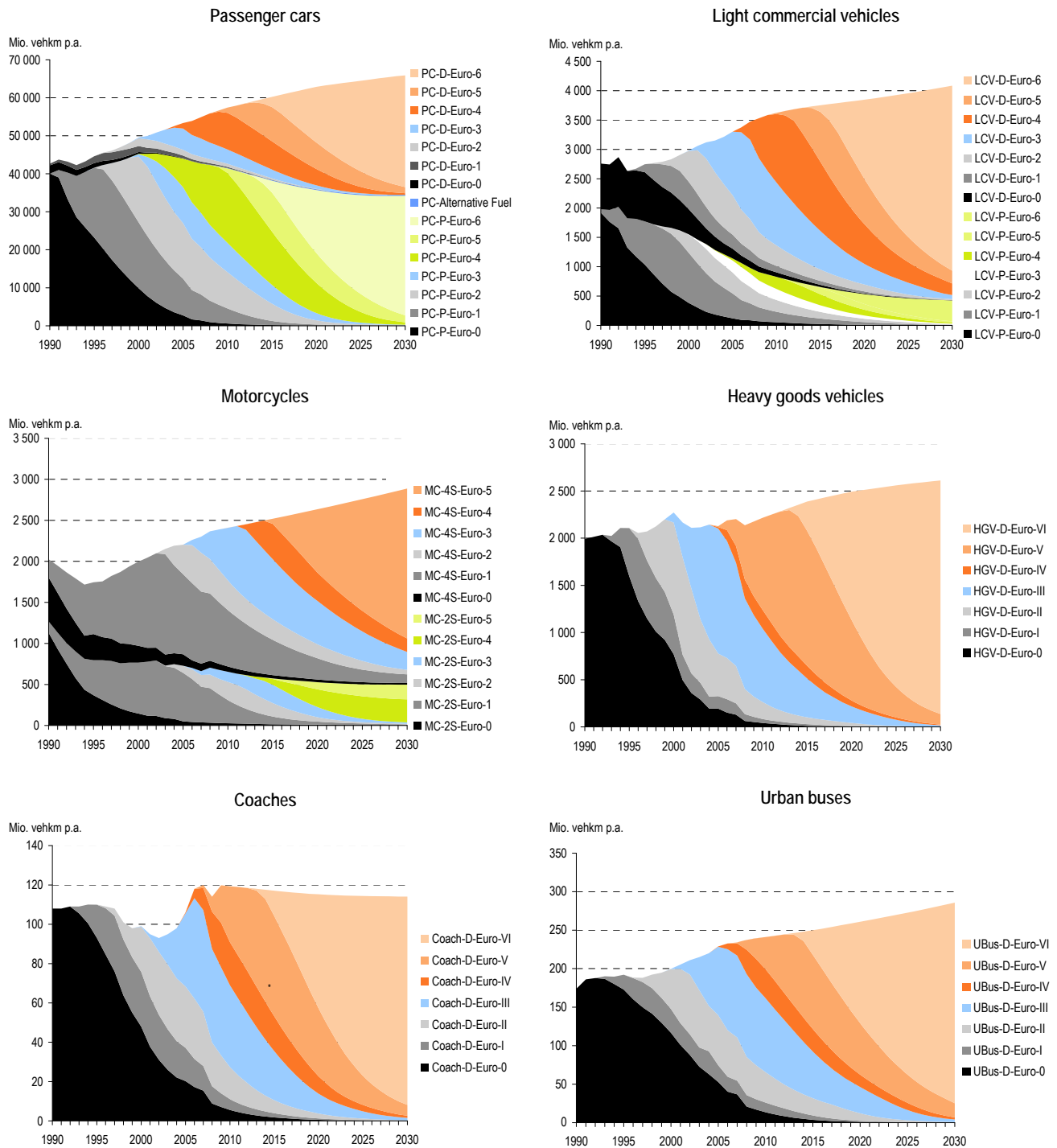


Fig. 10 shows the penetration of emission concepts in the various vehicle categories.

Fig. 10 > Mileage composition by emission concept (in million vehicle kilometres p.a.)

Continual substitution of older technologies by new ones constantly alters the fleet composition or mileage by emission concepts in all vehicle categories.



Figures are reproduced in Annex A3, but are also available in the handbook of emission factors in road transport, version 3.1. (INFRAS 2010)

4 > Emission trends, 1990 to 2035

4.1 Overview

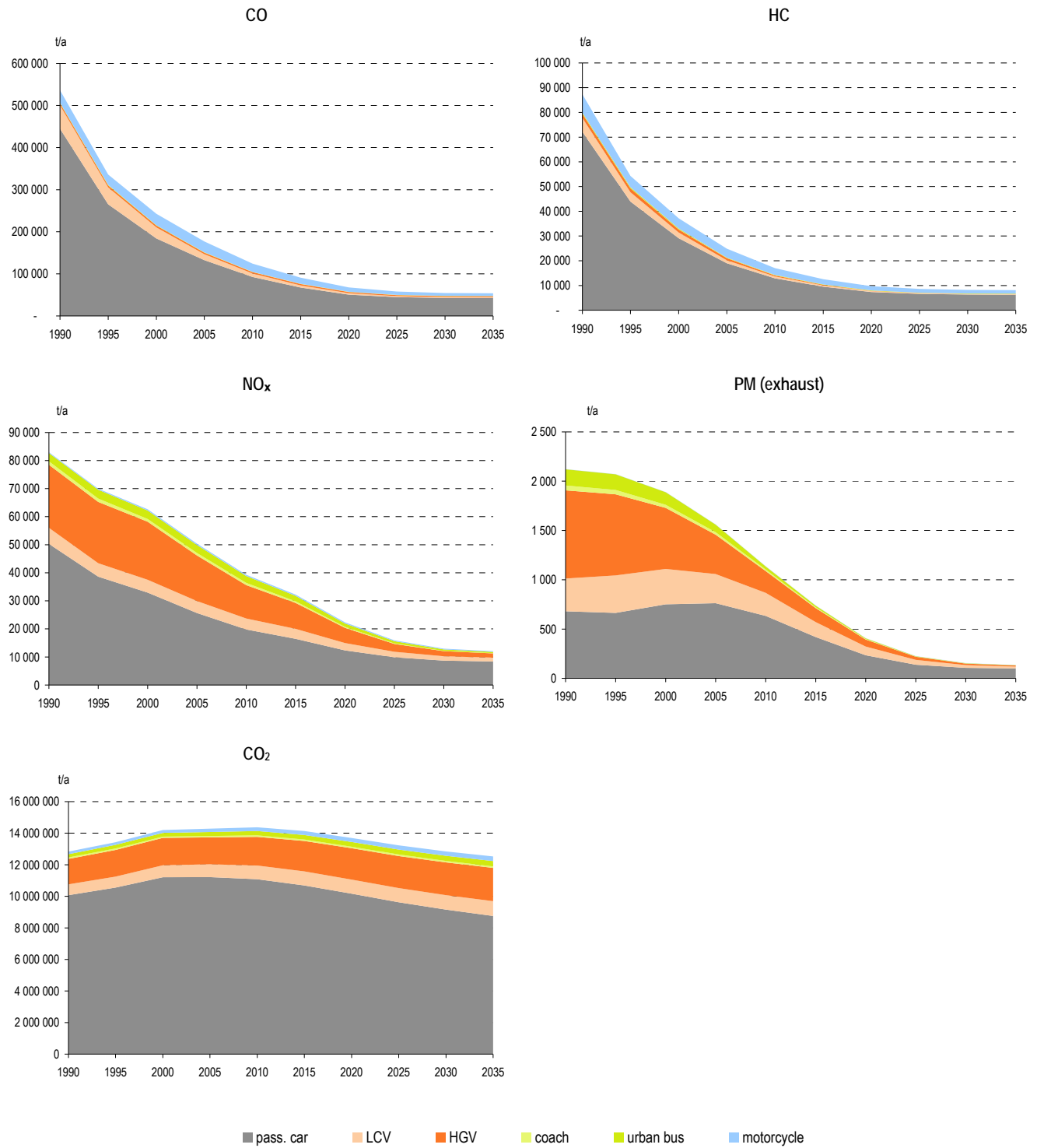
4.1.1 Pollutant trends

The following illustrations show the findings for selected pollutants. The figures pertaining to the pollutants shown in the illustrations and other calculated pollutants can be found in Annex A5, and the corresponding emission factors are summarised in Annex A6. The illustration depicts the 1990–2035 time series; the pre-1990 figures are no longer shown (cf. SAEFL 2004). The trend reflects all emission concepts that are currently binding or foreseeable, including Euro-5 and Euro-6 (for light duty vehicles) and Euro-V and Euro-VI (for heavy duty vehicles). For 2-stroke and 4-stroke motorcycles, emission levels Euro-4 (from 2012) and Euro-5 (from 2015), and for motor scooters and mopeds, emission levels Euro-3 (from 2012) and Euro-4 (from 2015) have been assumed.

Fig. 11 shows the emission trends for the period from 1990 to 2035 by vehicle category. The curves confirm the general trends that were stated in Report 355, namely that the “major” reductions have already taken place. The emission level will decline further, but the extent of the reduction will lessen. The reductions in CO and HC, of which passenger cars are the main sources, were especially pronounced. SO₂ and lead are not shown in Fig. 11, but the data in Annex A5 document the direct impacts of improvements in fuel quality. The reductions in NO_x emissions are also clearly visible, but the reduction curve is delayed, primarily due to the increasing proportion of diesel passenger cars. The situation with respect to particle emissions is of particular note in that the increase in diesel passenger cars has partly offset the reduction in HDVs to some extent. PM emissions only reduce significantly with the step-by-step introduction of diesel particle filters. The graph only depicts the trend for exhaust particles; non-exhaust particles are dealt with in chapter 4.2.1.

We can anticipate a noticeable reduction of pollutants despite traffic growth, since technical measures have not yet been exhausted and Euro-5 and Euro-6, respectively Euro-V and Euro-VI, should give rise to further significant reductions.

Fig. 11 > Emission trends by vehicle category



4.1.2 Development of CO₂ emissions

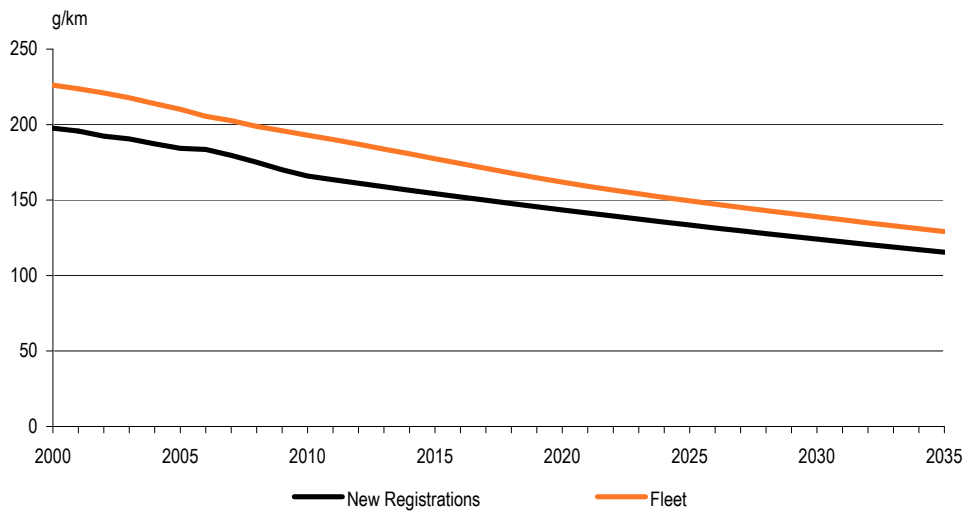
The relatively positive forecast concerning the further reductions of pollutant emissions cannot be equally applied to fuel consumption, and consequently to CO₂ emissions, even if, for example in comparison with Report 355 (issued in 2004), slightly more optimistic predictions apply. While in Report 355 it was still assumed that vehicle-related efficiency gains and traffic growth would more or less offset one another, a more optimistic efficiency trend is now assumed for passenger cars in that the previous average reduction of fuel consumption by around 1.5 percent per annum (i.e. average for the period from 2000 to 2008) will continue for the entire period up to 2035. This reflects a case of “business as usual”. With these assumptions, the mean level of CO₂ emissions (standard consumption) from new vehicles of 175 g CO₂/km in 2008 is projected to fall to 147 g CO₂/km in 2020, and to 127 g CO₂/km in 2030. In terms of mean fleet consumption (g CO₂/km), this represents a reduction by 14 percent in 2020 versus 2010, with 9 percent traffic growth (passenger car kilometres), so that on balance the CO₂ emissions from passenger cars fall by 5 percent. The respective figures for 2030 are minus 25 percent (mean fleet consumption) with 15 percent traffic growth versus 2010 (on balance, minus 10 percent CO₂), and for 2035 are minus 30 percent (mean fleet consumption) with 18 percent traffic growth versus 2010 (on balance, minus 12 percent CO₂). For the other vehicle categories, in this “business as usual” case it is assumed that reduction rates will remain largely unchanged versus the previous report. With these assumptions, after reaching a peak of 14.4 million tonnes in 2010, CO₂ emissions from road traffic fall to around 12.8 million tonnes in 2030, which is roughly equivalent to the level recorded in 1990. This means that CO₂ emissions will decline.

Efforts are now being made to sharply reduce the specific fuel consumption of new vehicles. The EU, for example, is targeting a level of 130 g CO₂/km for passenger cars in 2015 (for the average for all new vehicles), and a level of 95 g CO₂/km as of 2020. The EU is also considering the possibility of introducing target levels for goods vehicles. In October 2009, for example, the EU Commission proposed a target level of 175 g CO₂/km as of 2016, and a long-term target (2020) of 135 g CO₂/km. Switzerland is also making similar efforts. In its message concerning the people’s initiative calling for more “people-friendly” vehicles, and regarding a proposed amendment to the Swiss Federal CO₂ Act (20 January 2010), the Federal Council proposed the introduction of emission regulations for passenger cars with effect from 2012, along the lines of the EU regulations. This would inevitably require continual sharp reductions for new vehicles (i.e. efficiency gains of around 4 percent per annum).⁹ This would mean that the level of emissions would also fall considerably more sharply than depicted in Fig. 11. However, calculations for other scenarios were not made within the scope of this study.

⁹ The average reduction of fuel consumption of new vehicles was around 1.5 percent p.a. in the period from 2000 to 2008, though in the last 2 years in that period (i.e. 2007/2008 and 2008/2009), the reduction was around 4 % in each case.

Fig. 12 > Specific CO₂ emissions (passenger cars)

This graph shows the development of specific CO₂ emissions for new passenger cars (up to 2008 according to “auto-schweiz” based on type approval data) and for a “business as usual” case from 2009. Also depicted is the development of the mean CO₂ emissions level of the fleet, which includes real traffic conditions.



4.1.3 CO₂ emissions by territorial and sales principle

In this report, CO₂ emissions have been calculated on the basis of the territorial principle. In other words, the data refer to emissions resulting from vehicles travelling on Switzerland's road network. But for the CO₂ Act, as well as for the greenhouse gas inventory in accordance with the Kyoto Protocol, emissions have to be shown in accordance with the "sales" principle. Here the volume has to be indicated that corresponds to the quantity of fuel that is sold in Switzerland within a year. This is a clearly verifiable figure. The corresponding energy volumes are reported in the overall statistics of the Swiss Federal Office of Energy. In the table below, CO₂ emissions are shown in accordance with both principles. Sales figures have been reduced by the proportion attributable to off-road machines (construction, agricultural and forestry machinery, ships and boats, railway shunting locomotives, etc.) in order to record the sales of fuel for use on the road network. Apart from statistical uncertainties during calculation, the difference is largely attributable to the practice of fuel tourism. This occurs because there is a significant difference between the prices of fuels in Switzerland and those in its neighbouring countries. Petrol has been cheaper in Switzerland for many years, and there is thus an incentive to buy fuel here, even if most of it is used for travelling on roads abroad. In the case of diesel, the reverse situation applied for many years. Due to exchange rate trends, however, diesel too has been cheaper at times. A recently published study (INFRAS/CEPE 2010) estimates the proportions of fuel tourism as approximately 10 percent for petrol and 3 percent for diesel. This means that CO₂ emissions recorded on the basis of the sales principle are higher than those recorded on the basis of the territorial principle. Tab. 1 below presents a comparison between the two sets of figures.

Tab. 1 > Comparison of CO₂ emissions by territorial and sales principle in 2008
[million tonnes per annum]

Year	Territorial principle	Sales principle (excluding off-road proportion)
2008	14.32	16.19

4.2 Comparison with the previous report SAEFL 355

4.2.1 Emission trends

The updated emission trends are only slightly different from the previously published calculations (cf. Fig. 13). The most striking change concerns particles. But this difference is mainly attributable to the use of a different calculation methodology. In Report 355, the estimated PM emissions from older heavy duty vehicles that were not yet regulated were considerably higher. Furthermore, it is apparent that, after 2020, the curves fall more sharply than anticipated in 2004 in Report 355. This is attributable to the inclusion of the new Euro-5/V and Euro-6/VI concepts. It is also apparent that the reduction of pollutants was considerably slower than originally estimated a few years ago. This especially applies to NO_x emissions, for which the estimated 2010 level has been adjusted upwards by approximately 20 percent. This is partly attributable to the increase in the proportion of diesel-powered passenger cars, but also to the fact that the estimate of emission factors for passenger cars has been increased. This applies to older petrol cars (Euro-1, Euro-2), but above all to Euro-3 and Euro-4 diesel cars. While Report 355 based its (optimistic) expectations on the trend in limit values, measurements now show that NO_x emissions from Euro-3 and Euro-4 diesel passenger cars in real operation are significantly higher than originally anticipated.

The differences with respect to HC and CO emissions are only slight, since compensatory effects were observed: in particular, cold-start emission factors have increased, but recent traffic censuses (e.g. 2005 micro traffic census) have shown that the number of start procedures has fallen (by around 10 percent from 2.68 to 2.4 starts per day and vehicle).

With respect to particles (cf. Fig. 14), PM non-exhaust emission factors are unchanged versus Report 355. Since the relevant traffic volumes are the same or very similar, changes in PM non-exhaust emissions are fairly insignificant. The changes relating to PM exhaust emissions are greater, however. PM emissions from older vehicles (light duty vehicles and motorcycles in addition to heavy duty vehicles) have been reduced, so that levels for the 1990s are correspondingly lower. The current level of emissions is very similar to that depicted in Report 355. Exhaust particle emissions are projected to decline more sharply over the long term than previously forecast, since the level of specific emissions (in g/km or g/kWh) should be significantly reduced following the introduction of Euro-5/V and Euro-6/VI.

Fig. 13 > Comparison between updated emission trends and the figures in the previous report SAEFL 355

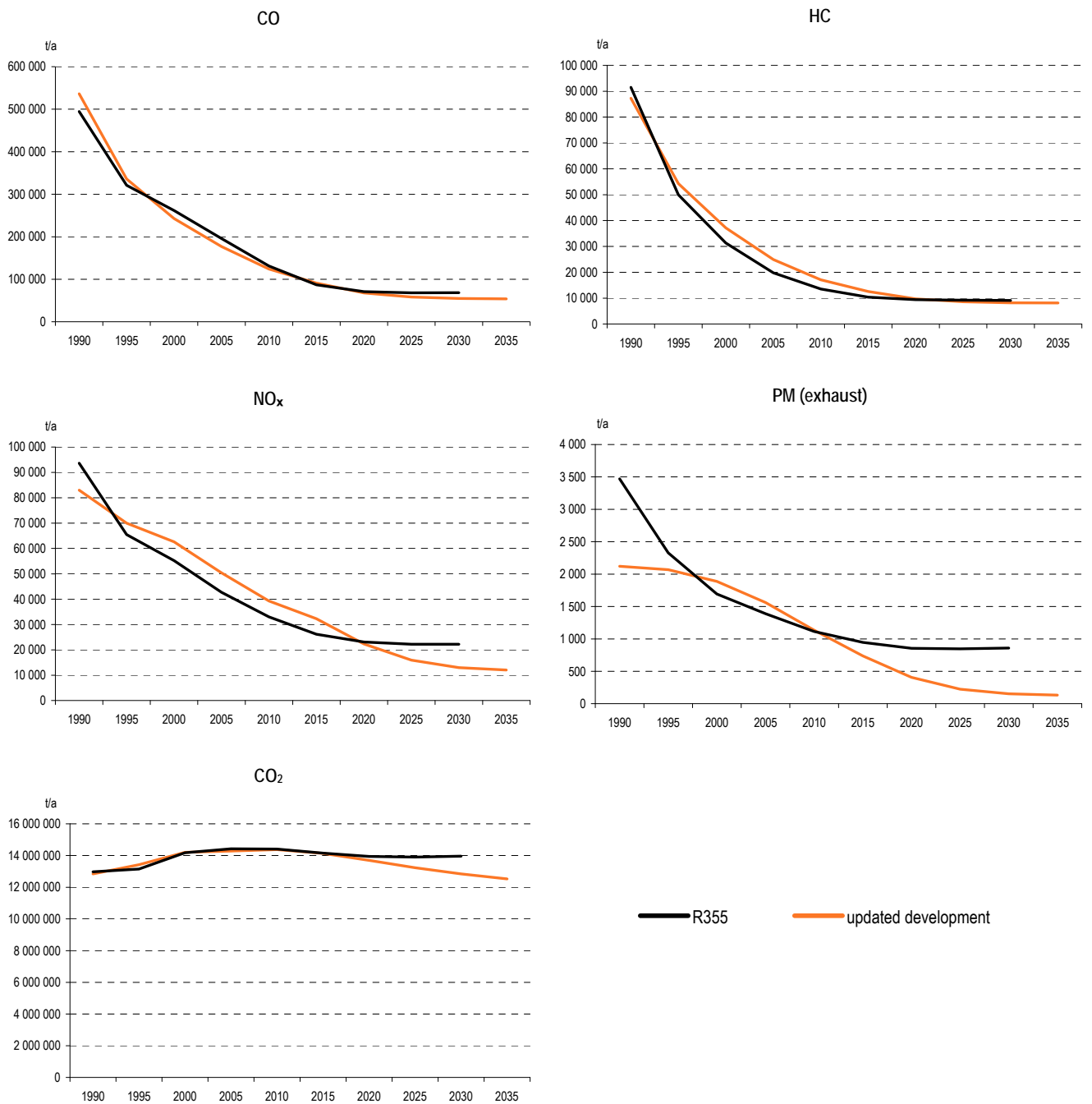
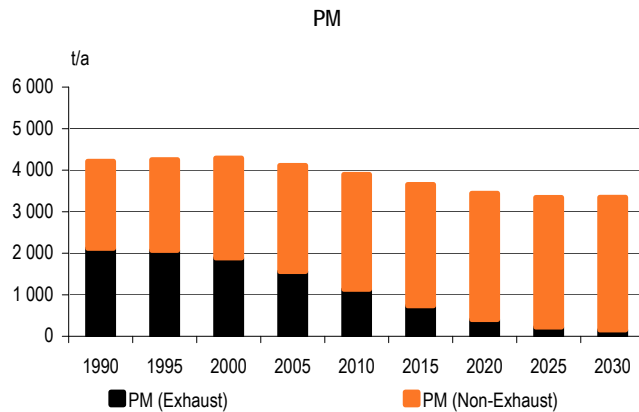
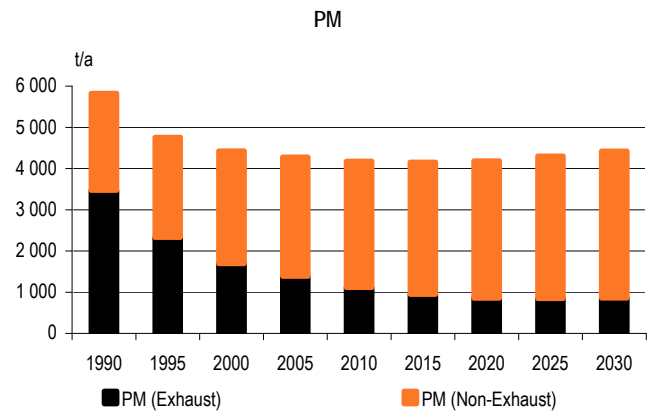


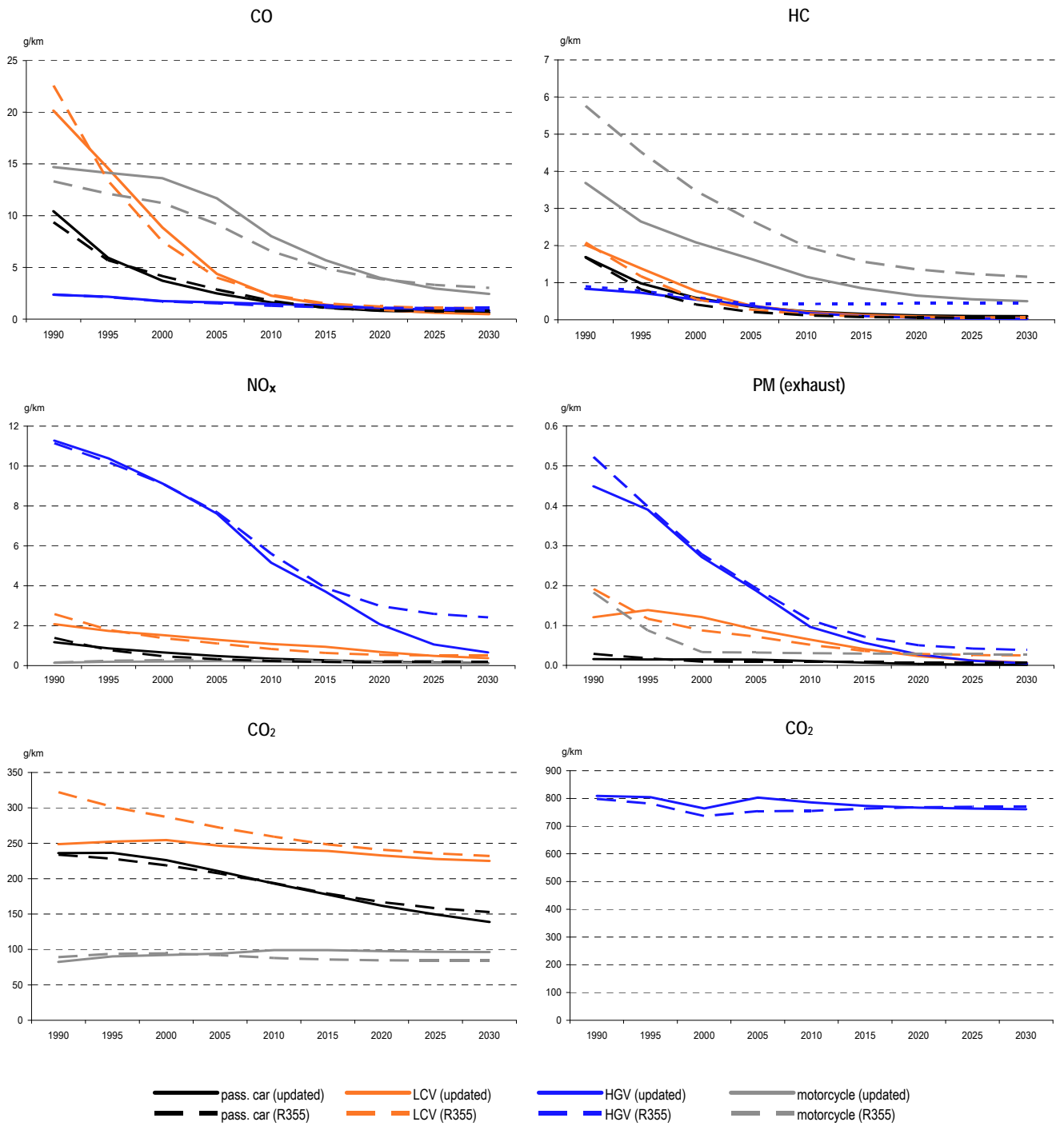
Fig. 14 > Comparison between updated PM emissions and figures in the previous report SAEFL 355*Trend as per Report 355.**Updated trend.*

4.2.2 Emission factors trend

The updated emission factors do not vary greatly from the earlier calculations (cf. Fig. 15). The most striking change concerns motorcycles, for which the level of HC emissions has been lowered. However, it is still well above that of all other vehicle categories. Another notable change concerns the sharp reduction of NO_x emission factors for heavy duty vehicles from 2014 onwards, which is attributable to the introduction of Euro-VI limit values.

With respect to CO₂ emission factors, the efficiency gain for passenger cars now also takes effect. For light commercial vehicles, the CO₂ emission factors for older models have been adjusted sharply downwards, and at the same time the reduction rates have also been reduced, so that the emission levels for future vehicles are similar to those indicated in Report 355. The fact that the CO₂ level increases slightly for motorcycles is primarily due to the shift in favour of heavier models.

Fig. 15 > Development of emission factors compared with the figures in the previous report SAEFL 355

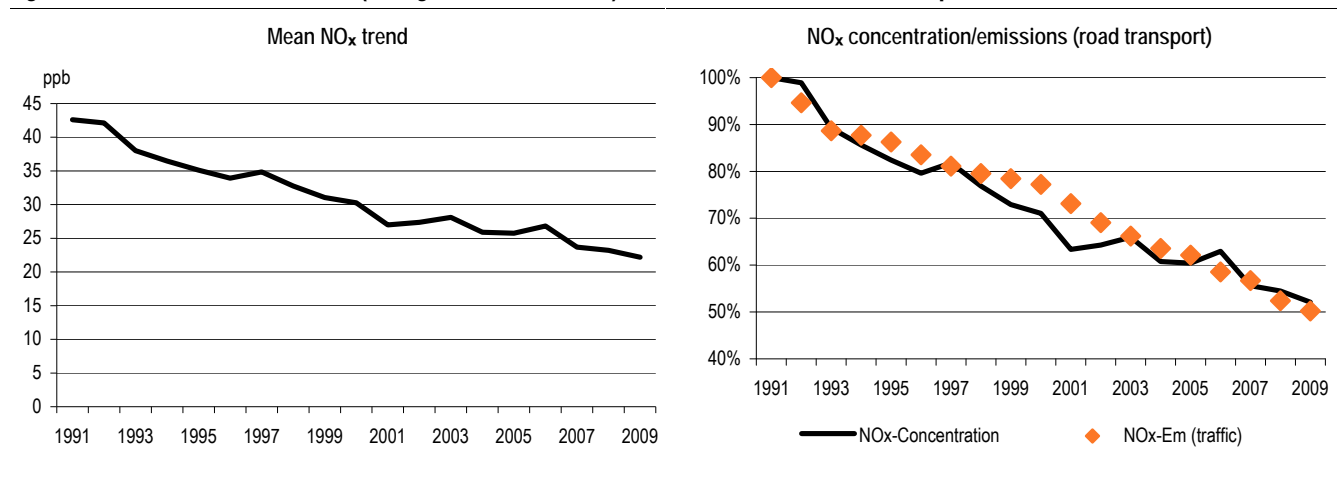


4.3 Comparison with air quality trends

Emission calculations have to be based on models that in their turn are based on measurements (namely of the emission behaviour of the vehicles in the laboratory), but also on other source data (e.g. traffic volumes) and a variety of additional assumptions of an empirical nature. The question nonetheless arises as to how reliable the results are. We can obtain an indicative validation by comparing the trends of emissions and air pollution levels over extensive time frames. Shorter periods cannot be used for such a comparison because weather conditions fluctuate considerably from year to year and thus have an influence on air pollution levels.

Fig. 16 shows the progress of air quality and overall emissions of nitrogen oxides (NO_x) from road transport in Switzerland since 1991 (the year in which the expanded air quality measurement network was put into operation). For the air pollution level, the figures represent the average for all stations on the National Air Pollution Monitoring Network (NABEL) except Jungfrauoch. 1991 has been designated as 100 percent. As we can see, the air pollution levels trend and the development of road transport emissions are very similar. (Road transport is the main source of NO_x emissions). In the period up to 2009, both air pollution levels and emissions fell by almost 50 percent in accordance with the model calculations.

Fig. 16 > Trend in NO_x concentration (average for NABEL stations) and NO_x emissions from road transport



> Annexes

A1 Emission limit values

The emission calculations presented in this report are based on measurements carried out on vehicles, and not on emission limit values. Although the measurements were carried out on chassis dynamometers, they were obtained on the basis of real-world driving patterns (and not type approval cycles).

However, emission limit values nonetheless provide an indicator of the trend. The tables below depict the development of the emission limit values for the various vehicle categories (based on FOEN 2008). For further details, please refer to the cited source.

Tab. 2 > Emission limit values for petrol-driven passenger cars (induced ignition)

Standard	Stage	Entry into effect ¹	Measurement cycle	Emission limit values						
				CO [g/km]	NMHC [g/km]	THC [g/km]	NO _x [g/km]	THC+NO _x [g/km]	PM [mg/km]	PN [# /km]
ECE 15	ECE 15.00	01.1974	ECE 15	30–65	-	5.1–8.2	-	-	-	-
	ECE 15.01	09.1975	ECE 15	24–52	-	4.3–7.0	-	-	-	-
	ECE 15.02	10.1977	ECE 15	24–52	-	4.3–7.0	3.0–4.7	-	-	-
	ECE 15.03	10.1980	ECE 15	19–42	-	3.8–6.2	2.5–4.0	-	-	-
AGV	AGV 82	10.1982	FTP 72	24.20	-	2.10	1.90	-	-	-
	AGV 86	10.1986	FTP 72	9.30	-	0.90	1.20	-	-	-
FAV 1	FAV 1–1	10.1987	FTP 75	2.10	-	0.25	0.62	-	-	-
TAFV 1	EURO 2	10.1995/96	NEDC	2.20	-	-	-	0.50	-	-
	EURO 3	01.2000/01	NEDCm	2.30	-	0.20	0.15	-	-	-
	EURO 4	01.2005/06	NEDCm	1.00	-	0.10	0.08	-	-	-
	EURO 5	09.2009/10	NEDCm	1.00	0.068	0.10	0.06	-	5.0/4.5 ^{2,3}	-
	EURO 6	09.2014/15	NEDCm	1.00	0.068	0.10	0.06	-	5.0/4.5 ^{2,3}	4.5

¹ First date: valid for the homologation of new vehicle types. Second date: valid for initial entry into circulation of new vehicles.

² Limits for particle mass for induced ignition engines only apply to vehicles with direct injection.

³ Revised measurement procedure to be introduced before the limit of 4.5 mg/km is implemented.

⁴ New measurement procedure to be introduced before the limit is implemented.

⁵ For vehicles with induced ignition engines with direct injection, a limit value for particle number is to be specified before 1 September 2014.

Tab. 3 > Emission limit values for diesel passenger cars (compression ignition)

Standard	Stage	Entry into effect ³	Measurement cycle	Emission limit values					
				CO [g/km]	THC [g/km]	NO _x [g/km]	THC+NO _x [g/km]	PM [mg/km]	PN ⁵ [# /km]
FAV 1	FAV 1–1	1.10.1987	FTP 75	2.10	0.25	0.62	-	370	-
	FAV 1–2	1.10.1988	FTP 75	2.10	0.25	0.62	-	124	-
TAFV 1	EURO 2	10.1995/96	NEDC	1.00	-	-	0.70 ¹	80 ²	-
	EURO 3	01.2000/01	NEDCm	0.64	-	0.50	0.56	50	-
	EURO 4	01.2005/06	NEDCm	0.50	-	0.25	0.30	25	-
	EURO 5	09.2009/10	NEDCm	0.50	-	0.18	0.23	5.0/4.5 ⁴	6.0x10 ¹¹
	EURO 6	09.2014/15	NEDCm	0.50	-	0.08	0.17	5.0/4.5 ⁴	6.0x10 ¹¹

¹ 0.90 g/km for compression ignition engines with direct injection

² 100 mg/km for compression ignition engines with direct injection

³ First date: valid for the homologation of new vehicle types. Second date: valid for initial entry into circulation of new vehicles.

⁴ Revised measurement procedure to be introduced before the limit of 4.5 mg/km is implemented.

⁵ New measurement procedure to be introduced before the limit is implemented.

Tab. 4 > Emission limit values for petrol-driven light commercial vehicles¹⁰

Standard	Stage	Entry into effect ¹	Measurement cycle	Fuel	Emission limit values							
					CO [g/km]	NMHC [g/km]	THC [g/km]	NO _x [g/km]	THC+NO _x [g/km]	PM [mg/km]	PN [# /km]	
ECE 15	ECE 15.00	01.1974	ECE 15	P	30–65	-	5.1–8.2	-	-	-	-	
	ECE 15.01	09.1975	ECE 15	P	24–52	-	4.3–7.0	-	-	-	-	
	ECE 15.02	10.1977	ECE 15	P	24–52	-	4.3–7.0	3.8–5.9	-	-	-	
	ECE 15.03	10.1980	ECE 15	P	19–42	-	3.8–6.2	3.8–5.9	-	-	-	
AGV	AGV 82	10.1982	FTP 72	P	24.20	-	2.10	1.90	-	-	-	
	AGV 86	10.1986	FTP 72	P	9.30	-	0.90	1.20	-	-	-	
FAV 1												
Group I	FAV 1–1	10.1987	FTP 75	P	2.10	-	0.25	0.62	-	-	-	
Group II	FAV 1–1	10.1988	FTP 75	P	6.20	-	0.50	1.40	-	-	-	
	FAV 1–2	10.1990	FTP 75	P	6.20	-	0.50	1.10	-	-	-	
TAFV 1												
Class 1	EURO 2	10.1996/97	NEDC	P	2.20	-	-	-	0.50	-	-	
Class 2	EURO 2	10.1997/98	NEDC	P	4.00	-	-	-	0.60	-	-	
Class 3	EURO 2	10.1997/98	NEDC	P	5.00	-	-	-	0.70	-	-	
Class 1	EURO 3	01.2000/01	NEDCm	P	2.30	-	0.20	0.15	-	-	-	
Class 2	EURO 3	01.2001/02	NEDCm	P	4.17	-	0.25	0.18	-	-	-	
Class 3	EURO 3	01.2001/02	NEDCm	P	5.22	-	0.29	0.21	-	-	-	
Class 1	EURO 4	01.2005/06	NEDCm	P	1.00	-	0.10	0.08	-	-	-	
Class 2	EURO 4	01.2006/07	NEDCm	P	1.81	-	0.13	0.10	-	-	-	
Class 3	EURO 4	01.2006/07	NEDCm	P	2.27	-	0.16	0.11	-	-	-	
Class 1	EURO 5	09.2009/10	NEDCm	P	1.00	0.068	0.10	0.060	-	5.0/4.5 ^{2,3}	-	
Class 2	EURO 5	09.2010/11	NEDCm	P	1.81	0.090	0.13	0.075	-	5.0/4.5 ^{2,3}	-	
Class 3	EURO 5	09.2010/11	NEDCm	P	2.27	0.108	0.16	0.082	-	5.0/4.5 ^{2,3}	-	
Class 1	EURO 6	09.2014/15	NEDCm	P	1.00	0.068	0.10	0.060	-	5.0/4.5 ^{2,3}	4,5	
Class 2	EURO 6	09.2015/16	NEDCm	P	1.81	0.090	0.13	0.075	-	5.0/4.5 ^{2,3}	4,5	
Class 3	EURO 6	09.2015/16	NEDCm	P	2.27	0.108	0.16	0.082	-	5.0/4.5 ^{2,3}	4,5	

¹ First date: valid for the homologation of new vehicle types. Second date: valid for initial entry into circulation of new vehicles.

² Limits for particle mass for induced ignition engines only apply to vehicles with direct injection.

³ Revised measurement procedure to be introduced before the limit of 4.5 mg/km is implemented.

⁴ New measurement procedure to be introduced before the limit is implemented.

⁵ For vehicles with induced ignition engines with direct injection, a limit value is implemented for particle number is to be specified before 1 September 2014.

¹⁰ Definition of classes 1 to 3, cf. end of Annex A1

Tab. 5 > Emission limit values for light commercial vehicles (diesel engine)¹¹

Standard	Stage	Entry into effect ¹	Measurement cycle	Fuel	Emission limit values					
					CO [g/km]	THC [g/km]	NO _x [g/km]	THC+NO _x [g/km]	PM [mg/km]	PN ³ [# /km]
FAV 1										
Group I	FAV 1-1	10.1987	FTP 75	D	2.10	0.25	0.62	-	370	
Group I	FAV 1-2	10.1988	FTP 75	D	2.10	0.25	0.62	-	124	
Group II	FAV 1-1	10.1988	FTP 75	D	6.20	0.50	1.40	-	370	
Group II	FAV 1-2	10.1990	FTP 75	D	6.20	0.50	1.10		370	
Group II	FAV 1-3	10.1992	FTP 75	D	6.20	0.50	1.10	-	162	
TAFV 1										
Class 1	EURO 2	10.1996/97	NEDC	D	1.00	-	-	0.70	80	
Class 2	EURO 2	10.1997/98	NEDC	D	1.25	-	-	1.00	120	
Class 3	EURO 2	10.1997/98	NEDC	D	1.50	-	-	1.20	170	
Class 1	EURO 3	01.2000/01	NEDCm	D	0.64	-	0.50	0.56	50	
Class 2	EURO 3	01.2001/02	NEDCm	D	0.80	-	0.65	0.72	70	
Class 3	EURO 3	01.2001/02	NEDCm	D	0.95	-	0.78	0.86	100	
Class 1	EURO 4	01.2005/06	NEDCm	D	0.50	-	0.25	0.30	25	
Class 2	EURO 4	01.2006/07	NEDCm	D	0.63	-	0.33	0.39	40	
Class 3	EURO 4	01.2006/07	NEDCm	D	0.74	-	0.39	0.46	60	
Class 1	EURO 5	09.2009/10	NEDCm	D	0.50	-	0.180	0.230	5.0/4.5 ²	6.0x10 ¹¹
Class 2	EURO 5	09.2010/11	NEDCm	D	0.63	-	0.235	0.295	5.0/4.5 ²	6.0x10 ¹¹
Class 3	EURO 5	09.2010/11	NEDCm	D	0.74	-	0.280	0.350	5.0/4.5 ²	6.0x10 ¹¹
Class 1	EURO 6	09.2014/15	NEDCm	D	0.50	-	0.080	0.170	5.0/4.5 ²	6.0x10 ¹¹
Class 2	EURO 6	09.2015/16	NEDCm	D	0.63	-	0.105	0.195	5.0/4.5 ²	6.0x10 ¹¹
Class 3	EURO 6	09.2015/16	NEDCm	D	0.74	-	0.125	0.215	5.0/4.5 ²	6.0x10 ¹¹

¹ First date: valid for the homologation of new vehicle types. Second date: valid for initial entry into circulation of new vehicles.

² Revised measurement procedure to be introduced before the limit of 4.5 mg/km is implemented.

³ New measurement procedure to be introduced before the limit is implemented.

¹¹ Definition of Classes 1 to 3, cf. end of Annex A1

Tab. 6 > Emission limit values for heavy duty vehicles (diesel engine)

Standard/ stage	Entry into effect ³	Measure- ment cycle	Emission limit values							
			CO [g/kWh]	THC [g/kWh]	NMHC [g/kWh]	CH ₄ [g/kWh]	NO _x [g/kWh]	NH ₃ [ppm]	PM [g/kWh]	PN [#/kWh]
FAV 2										
FAV 2-1	10.1987	ECE 49	8.40	2.10	-	-	14.4	-	-	-
FAV 2-2	10.1991	ECE 49	4.90	1.23	-	-	9.0	-	0.70	-
FAV 2-3	10.1992/93	ECE 49	4.90	1.23	-	-	9.0	-	0.40	-
TAFV 1										
EURO II	10.1995/96	ECE 49	4.00	1.10	-	-	7.0	-	0.15	-
Compression ignition (diesel) engines:										
EURO III	10.2000/01	ESC/ETC ²	2.1/5.45	0.66 / -	- / 0.78	- / -	5.0 / 5.0	- / -	0.10/0.16	- / -
EURO IV	10.2005/06	ESC/ETC	1.5/4.00	0.46 / -	- / 0.55	- / -	3.5 / 3.5	- / -	0.02/0.03	- / -
EURO V	10.2008/09	ESC/ETC	1.5/4.00	0.46 / -	- / 0.55	- / -	2.0 / 2.0	- / -	0.02/0.03	- / -
EEV ¹	-	ESC/ETC	1.5/3.00	0.25 / -	- / 0.40	- / -	2.0 / 2.0	- / -	0.02/0.02	- / -
EURO VI	2013/2014	ESC/ETC ⁴	1.5/4.00	0.13/0.16	- / -	- / -	0.4 / 0.4	10/10	0.01/0.01	⁵
Induced ignition (gas) engines:										
EURO III	10.2000/01	ETC	5.45	-	0.78	1.60	5.0	-	-	-
EURO IV	10.2005/06	ETC	4.00	-	0.55	1.10	3.5	-	-	-
EURO V	10.2008/09	ETC	4.00	-	0.55	1.10	2.0	-	-	-
EEV ¹	-	ETC	3.00	-	0.40	0.65	2.0	-	0.02	-
EURO VI	2013/2014	ETC ⁴	4.00	-	0.16	0.50	0.4	10	0, 01	⁵

¹ Environmental enhanced vehicle

² Only for compression ignition engines with particle filter and/or Denox catalytic converter

³ First date: valid for the homologation of new vehicle types. Second date: valid for initial entry into circulation of new vehicles.

⁴ Limit values for WHSC and WHTC cycles to be introduced at a later stage, once correlation factors have been defined for the applicable cycles (ESC and ETC).

⁵ A PN limit value will be defined later

Tab. 7 > Emission limit values for motorcycles

Standard	Stage	Entry into effect ¹	Measurement cycle	Motor	Emission limit values				
					CO [g/km]	HC [g/km]	NMHC [g/km]	NO _x [g/km]	HC+NO _x [mg/km]
ECE 40	ECE 40	1.10.1983	ECE 40	2 S	20–50	13–21	-	-	-
	ECE 40	1.10.1983	ECE 40	4 S	30–60	10–14	-	-	-
FAV 3	FAV 3-1	1.10.1987	ECE 40	2 S	8.0	7.5	-	0.10	-
	FAV 3-1	1.10.1987	ECE 40	4 S	13.0	3.0	-	0.30	-
	FAV 3-2	1.10.1990	ECE 40	2 S	8.0	3.0	-	0.10	-
	FAV 3-2	1.10.1990	ECE 40	4 S	13.0	3.0	-	0.30	-
TAFV 3									
Motorcycles	EURO 1	10.1998/99	ECE 40	2 S	8.0	4.0	-	0.10	-
	EURO 1	10.1998/99	ECE 40	4 S	13.0	3.0	-	0.30	-
	EURO 2	04.2002/03	ECE 40m	2 S / 4 S	5.5	1.0 ^a	-	0.30	-
	EURO 3	01.2005/06	NEDC+	2 S / 4 S	2.0	0.30 ^b	-	0.15	-
	EURO 4 ²	01.2014/15	WMTC, Phase 2 ³	2 S / 4 S	1.97	0.56 ^c	-	0.13 ^e	-
	EURO 5 ²	01.2017/18	WMTC, Phase 2 ³	2 S / 4 S	1.14	0.38 ^d	-	0.07 ^f	-
	EURO 6 ²	01.2020/21	Revised WMTC	2 S / 4 S	1.0	0.10	0.068	0.06	-
Light motorcycles*	Phase 1	10.1998/99	ECE 47	2 S / 4 S	6.0	-	-	-	3.0
	Phase 2	10.2001/02	ECE 47	2 S / 4 S	1.0	-	-	-	1.2
	EURO 3 ²	01.2014/15	ECE 47	2 S / 4 S	1.0	-	-	-	1.2
	EURO 4 ²	01.2017/18	ECE 47	2 S / 4 S	1.0	0.63	-	0.17	-
	EURO 5 ²	01.2020/21	Revised WMTC	2 S / 4 S	1.0	0.10	0.068	0.06	-

For motorcycles <150cc: ^a 1.2 g/km und ^b 0.8 g/km.

For motorcycles $v_{max} \geq 130$ km/h: ^c 0.25 g/km; ^e 0.17 g/km; ^d 0.17 g/km und ^f 0.09 g/km

* Light motorcycles ≤ 50 cc designed for a maximum speed of 45 km/h.

ECE 40m: performed without 40 seconds idling prior to cycle.

¹ First date: valid for the homologation of new vehicle types. Second date: valid for initial entry into circulation of new vehicles.

² EURO 4-6 MC und EURO 3-5 LMC; according to a proposal of the EU-Commission of 2010.10. 4 (2010/0271 (COD)).

³ Worldwide Motorcycle Emissions Test Cycle, Phase 2 of the Cycle.

⁴ For petrol driven vehicles with direct injection.

Tab. 8 > Emission limit values for mopeds

Standard	Stage	Entry into effect ¹	Measurement cycle	Motor	Emission limit values [g/km]				
					CO	HC ²	NO _x	HC+NO _x	PM
ECE 47	ECE 47	1.10.1983	ECE 47	2 T	9.6	6.5	-	-	-
FAV 4	FAV 4	1.10.1988	ECE 47	2 T	0.5	0.5	0.10	-	-

Explanations regarding the definition of light duty vehicles

In accordance with FAV 1¹²:

Group I

- a) Vehicles for carrying passengers. Maximum no. of seats, 9 (including driver); maximum load, 760 kilograms

Classification of light duty vehicles in accordance with FAV 1 (prior to 1996)

¹² Article 1.3, Ordinance on Exhaust Emissions from Light duty Vehicles, dated 22 October 1986 (status, 4 August 1988)

- b) Vehicles for carrying goods, maximum load 760 kilograms
- c) Vehicles as per a) and b), for the transport of both passengers and goods

Group II

- a) Vehicles for passenger transport with a load of more than 760 kilograms, and those with more than 9 seats (including the driver)
- b) Vehicles for carrying goods, with a capacity of more than 760 kilograms
- c) Vehicles for carrying passengers, with a maximum of 9 seats (including driver) and a maximum load of 760 kilograms, clearly differentiable from vehicles in a) and b) above

In accordance with TAFV 1 (from Euro-2)¹³:

Class M

Motor vehicles intended for passenger transport, with at least 4 wheels:

- > Class 1: vehicles with a maximum of 9 seats (including driver)
- > Class 2: vehicles with more than 9 seats (including driver) and with a certified maximum weight of 5 tonnes
- > Class 3: vehicles with more than 9 seats (including driver) and with a certified weight of more than 5 tonnes

Class N

Motor vehicles intended for goods transport, with at least 4 wheels:

- > Class 1: vehicles with a certified maximum weight of 3.5 tonnes
- > Class 2: vehicles with a certified weight of more than 3.5 tonnes, up to a maximum of 12 tonnes
- > Class 3: vehicles with a certified weight of more than 12 tonnes

Class O

Trailers (including semi-trailers and central axle trailers)

Class "M"

Vehicles for passenger transport, with a total weight of ≤ 2.5 tonnes and a maximum of ≤ 6 seats

Class "N1"

Vehicles with a total weight > 2.5 tonnes or > 6 seats. These are sub-divided into 3 unladen weight categories (defined as vehicle + full tank + 75 kilograms for driver):

- > Euro-1/2: unladen weight N1-I < 1.250 kg, N1-II 1.250–1.700 kg, N1-III > 1.700 kg
- > Euro-3: unladen weight N1-I < 1.305 kg, N1-II 1.305–1.760 kg, N1-III > 1.760 kg

Classification of light duty vehicles in accordance with TAFV 1 (with effect from 1996)

Classification of light duty vehicles (classes M and N1) in accordance with Directives 1994/12/EC (Euro-1/2) and 1998/68/EC (Euro-3)

¹³ Ordinance on the technical requirements of transport duty vehicles and their trailers (TAFV), dated 19 June 1995 (status, 15 October 2002)

A2 Key traffic trend data

Tab. 9 > Mileage, 1990 to 2035 [million vehicle kilometres per annum]

Year	Passenger cars	Light commercial vehicles	Heavy goods vehicles	Coaches	Buses	Motorcycles
1990	42 650	2 758	1 992	108	174	2 025
1995	44 639	2 746	2 107	110	192	1 744
2000	49 552	2 978	2 273	99	200	1 999
2005	53 354	3 300	2 127	106	229	2 204
2008	55 848	3 528	2 223	114	245	2 366
2010	57 419	3 607	2 304	119	250	2 409
2015	60 247	3 740	2 484	117	262	2 519
2020	62 815	3 838	2 592	115	274	2 635
2025	64 365	3 950	2 662	114	288	2 755
2030	65 896	4 080	2 717	114	302	2 882
2035	67 799	4 206	2 772	114	316	3 014

Definition of vehicle categories, see page 15

Tab. 10 > Vehicle stock and start procedures

Trend in passenger car, light duty vehicle and motorcycle fleets, and estimated start procedures for each category (required for estimating cold-start excess). The number of stop procedures is required for calculating evaporation emissions after the engine has been turned off. These are equated with the number of start procedures.

The fleet data for heavy duty vehicles (trucks and semi-trailers), coaches and buses are not required for emission calculations, but form the basis for processing traffic quantity data.

Year	Fleets (in thousands)						Starts per vehicle and day			Million starts p.a.		
	Passenger cars	Light commercial vehicles	Heavy goods vehicles	Coaches	Buses	Motorcycles	Passenger cars	Light commercial vehicles	Motorcycles	Passenger cars	Light commercial vehicles	Motorcycles
1990	2 985	221	55.9	2.34	4.13	764	2.61	1.97	1.59	2 840	159	443
1995	3 229	238	53.9	2.38	4.26	704	2.53	1.97	1.54	2 987	171	396
2000	3 545	260	52.3	2.23	4.23	732	2.46	1.96	1.50	3 187	186	401
2005	3 862	291	54.5	2.30	4.72	770	2.40	1.96	1.54	3 383	208	433
2008	3 990	312	55.1	2.37	4.87	806	2.37	1.96	1.56	3 456	224	459
2010	4 102	321	58.7	2.47	4.94	812	2.34	1.96	1.57	3 499	229	466
2015	4 304	332	65.2	2.40	5.11	829	2.32	1.96	1.58	3 649	238	478
2020	4 493	341	68.6	2.33	5.29	846	2.28	1.96	1.59	3 746	244	491
2025	4 607	350	70.0	2.28	5.48	863	2.30	1.96	1.59	3 859	251	501
2030	4 708	362	70.6	2.25	5.67	881	2.28	1.96	1.59	3 918	259	511
2035	4 841	373	70.9	2.22	5.88	900	2.25	1.96	1.59	3 976	267	522

A3 Mileage-weighted fleet compositions

Tab. 11 > Traffic composition by emission concepts (mileage-weighted)

These figures show the proportions of the various emission concepts to the mileage per vehicle category and reference year.

Vehicle category	Emission level	1990	1995	2000	2005	2010	2015	2020	2025	2030	2035
PC	PC-P-Euro-0	94 %	52 %	20 %	5 %	1 %	0 %	0 %	0 %	0 %	0 %
PC	PC-P-Euro-1		41 %	35 %	18 %	7 %	2 %	0 %	0 %	0 %	0 %
PC	PC-P-Euro-2			35 %	27 %	17 %	8 %	2 %	0 %	0 %	0 %
PC	PC-P-Euro-3			1 %	18 %	13 %	8 %	3 %	1 %	0 %	0 %
PC	PC-P-Euro-4			0 %	14 %	32 %	23 %	13 %	4 %	1 %	0 %
PC	PC-P-Euro-5					2 %	17 %	13 %	7 %	3 %	1 %
PC	PC-P-Euro-6						5 %	26 %	40 %	48 %	50 %
PC	PC alternative					0 %	0 %	0 %	0 %	0 %	0 %
PC	PC-D-Euro-0	5 %	3 %	1 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %
PC	PC-D-Euro-1	1 %	4 %	3 %	1 %	0 %	0 %	0 %	0 %	0 %	0 %
PC	PC-D-Euro-2		0 %	4 %	3 %	1 %	1 %	0 %	0 %	0 %	0 %
PC	PC-D-Euro-3			0 %	10 %	7 %	4 %	1 %	0 %	0 %	0 %
PC	PC-D-Euro-4				3 %	17 %	12 %	7 %	3 %	1 %	0 %
PC	PC-D-Euro-5					2 %	15 %	11 %	6 %	2 %	1 %
PC	PC-D-Euro-6						4 %	23 %	37 %	45 %	48 %
LCV	LCV-P-Euro-0	70 %	38 %	13 %	4 %	2 %	1 %	0 %	0 %	0 %	0 %
LCV	LCV-P-Euro-1	2 %	27 %	29 %	13 %	5 %	2 %	1 %	1 %	0 %	0 %
LCV	LCV-P-Euro-2			10 %	11 %	6 %	3 %	2 %	1 %	0 %	0 %
LCV	LCV-P-Euro-3			0 %	6 %	5 %	3 %	1 %	1 %	0 %	0 %
LCV	LCV-P-Euro-4				1 %	6 %	5 %	3 %	1 %	0 %	0 %
LCV	LCV-P-Euro-5					0 %	3 %	3 %	1 %	1 %	0 %
LCV	LCV-P-Euro-6						0 %	4 %	7 %	9 %	9 %
LCV	LCV-D-Euro-0	28 %	30 %	14 %	5 %	2 %	1 %	0 %	0 %	0 %	0 %
LCV	LCV-D-Euro-1		5 %	16 %	7 %	3 %	2 %	1 %	0 %	0 %	0 %
LCV	LCV-D-Euro-2			18 %	20 %	10 %	5 %	3 %	1 %	0 %	0 %
LCV	LCV-D-Euro-3			0 %	33 %	30 %	18 %	9 %	5 %	2 %	1 %
LCV	LCV-D-Euro-4					32 %	31 %	18 %	9 %	5 %	2 %
LCV	LCV-D-Euro-5					1 %	23 %	20 %	11 %	5 %	3 %
LCV	LCV-D-Euro-6						3 %	35 %	62 %	77 %	85 %
HGV	HGV-D-Euro-0	100 %	76 %	34 %	9 %	2 %	0 %	0 %	0 %	0 %	0 %
HGV	HGV-D-Euro-I		24 %	19 %	6 %	2 %	1 %	0 %	0 %	0 %	0 %
HGV	HGV-D-Euro-II			43 %	21 %	8 %	3 %	1 %	0 %	0 %	0 %
HGV	HGV-D-Euro-III			5 %	62 %	35 %	17 %	7 %	3 %	1 %	0 %
HGV	HGV-D-Euro-IV				1 %	9 %	6 %	3 %	1 %	0 %	0 %
HGV	HGV-D-Euro-V				0 %	44 %	60 %	34 %	13 %	4 %	1 %
HGV	HGV-D-Euro-VI						13 %	55 %	83 %	95 %	99 %
Coach	Coach-D-Euro-0	100 %	85 %	48 %	19 %	5 %	2 %	0 %	0 %	0 %	0 %
Coach	Coach-D-Euro-I		15 %	28 %	16 %	5 %	2 %	1 %	0 %	0 %	0 %
Coach	Coach-D-Euro-II		0 %	23 %	29 %	14 %	6 %	2 %	1 %	0 %	0 %

Vehicle category	Emission level	1990	1995	2000	2005	2010	2015	2020	2025	2030	2035
Coach	Coach-D-Euro-III			0 %	35 %	35 %	21 %	9 %	3 %	1 %	0 %
Coach	Coach-D-Euro-IV				0 %	18 %	15 %	8 %	3 %	1 %	0 %
Coach	Coach-D-Euro-V					24 %	44 %	30 %	13 %	5 %	2 %
Coach	Coach-D-Euro-VI						11 %	50 %	80 %	93 %	98 %
UBus	UBus-D-Euro-0	100 %	90 %	58 %	23 %	5 %	1 %	0 %	0 %	0 %	0 %
UBus	UBus-D-Euro-I		10 %	16 %	10 %	5 %	2 %	1 %	0 %	0 %	0 %
UBus	UBus-D-Euro-II		0 %	26 %	28 %	16 %	9 %	4 %	1 %	0 %	0 %
UBus	UBus-D-Euro-III			0 %	39 %	38 %	23 %	12 %	5 %	1 %	0 %
UBus	UBus-D-Euro-IV				0 %	15 %	11 %	6 %	3 %	1 %	0 %
UBus	UBus-D-Euro-V					17 %	37 %	24 %	13 %	6 %	2 %
UBus	UBus-D-Euro-VI						12 %	48 %	73 %	86 %	93 %
UBus	UBus alternative					3 %	5 %	5 %	5 %	5 %	5 %
MC	Moped-EU0	41 %	12 %	3 %	2 %	1 %	0 %	0 %	0 %	0 %	0 %
MC	Moped-EU1	2 %	11 %	10 %	7 %	3 %	1 %	0 %	0 %	0 %	0 %
MC	Moped-EU2					2 %	1 %	0 %	0 %	0 %	0 %
MC	Moped-EU3						1 %	0 %	0 %	0 %	0 %
MC	Moped-EU4						0 %	1 %	2 %	2 %	2 %
MC	LMC-Euro-0	4 %	2 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %
MC	LMC-Euro-1	2 %	4 %	8 %	10 %	4 %	1 %	0 %	0 %	0 %	0 %
MC	LMC-Euro-2					4 %	3 %	1 %	0 %	0 %	0 %
MC	LMC-Euro-3						3 %	2 %	0 %	0 %	0 %
MC	LMC-Euro-4						1 %	5 %	7 %	8 %	8 %
MC	MC-2S-Euro-0	11 %	8 %	4 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %
MC	MC-2S-Euro-1	3 %	10 %	13 %	10 %	4 %	2 %	1 %	0 %	0 %	0 %
MC	MC-2S-Euro-2				4 %	3 %	2 %	1 %	0 %	0 %	0 %
MC	MC-2S-Euro-3					5 %	5 %	3 %	1 %	0 %	0 %
MC	MC-2S-Euro-4						2 %	1 %	1 %	0 %	0 %
MC	MC-2S-Euro-5						0 %	3 %	5 %	6 %	6 %
MC	MC-4S-Euro-0	26 %	18 %	10 %	6 %	3 %	2 %	1 %	1 %	1 %	0 %
MC	MC-4S-Euro-1	11 %	36 %	51 %	44 %	29 %	17 %	10 %	5 %	4 %	3 %
MC	MC-4S-Euro-2				16 %	15 %	10 %	6 %	4 %	2 %	1 %
MC	MC-4S-Euro-3					27 %	29 %	20 %	13 %	8 %	4 %
MC	MC-4S-Euro-4						17 %	13 %	9 %	6 %	3 %
MC	MC-4S-Euro-5						3 %	29 %	49 %	63 %	72 %

A4 PM10 emissions**A4-1 PM non-exhaust emission factors (abrasion and resuspension)****Tab. 12 > PM 10 non-exhaust emission factors (abrasion and resuspension) [grams per vehicle kilometre]**

	Motorway	Rural	Urban
LDV	0.047	0.022	0.054
HDV	0.074	0.144	0.54
MC	0.01175	0.0055	0.0135

SAEFL 2003, summary pp 33/34, adapted

A4-2 PM10 emissions**Tab. 13 > PM 10 emissions in tonnes per annum, differentiated by vehicle category, fuel (petrol/diesel) and type of emission (exhaust/non-exhaust) [tonnes per annum]**

Vehicle category	Fuel	Type	1990	1995	2000	2005	2010	2015	2020	2025	2030	2035
PC	CNG	Exhaust					0	0	0	0	0	0
PC	CNG	Non-exhaust					3	5	7	9	9	10
PC	D	Exhaust	369	393	436	519	463	309	170	89	62	57
PC	D	Non-exhaust	98	114	161	353	602	833	1024	1134	1198	1249
PC	P	Exhaust	311	271	315	243	170	108	64	48	44	43
PC	P	Non-exhaust	1491	1553	1696	1653	1563	1445	1350	1297	1291	1311
LCV	D	Exhaust	303	357	339	282	225	147	85	47	27	18
LCV	D	Non-exhaust	29	37	54	82	106	118	126	133	139	145
LCV	P	Exhaust	30	24	21	14	8	5	4	2	2	1
LCV	P	Non-exhaust	74	67	59	43	31	25	20	18	16	15
Coach	D	Exhaust	49	44	33	25	15	9	4	2	1	1
Coach	D	Non-exhaust	18	18	16	17	19	18	18	18	18	18
UBus	CNG	Exhaust					1	1	1	1	1	1
UBus	CNG	Non-exhaust					2	3	3	4	4	4
UBus	D	Exhaust	165	159	127	78	31	15	6	3	2	2
UBus	D	Non-exhaust	43	47	49	56	59	62	64	67	70	74
MC	P	Exhaust	0	0	0	0	0	0	0	0	0	0
MC	P	Non-exhaust	18	16	18	20	22	23	24	25	26	27
HGV	D	Exhaust	894	822	618	399	222	141	71	31	15	11
HGV	D	Non-exhaust	319	328	349	327	355	383	401	412	421	429
Total	P		1924	1930	2108	1974	1794	1607	1461	1390	1378	1398
Total	D		2287	2318	2181	2137	2096	2035	1970	1936	1953	2003
Total	CNG		0	0	0	0	6	9	12	13	14	15
Total		Exhaust	2121	2070	1888	1560	1135	737	406	224	153	134
Total		Non-exhaust	2090	2179	2401	2551	2761	2915	3037	3116	3192	3282
Total			4211	4249	4289	4111	3896	3651	3443	3340	3345	3416

A5 Pollutant emissions Switzerland

A5-1 Emissions per vehicle category

Tab. 14 > Emissions in tonnes per annum

Emission	Year	PC	LCV	HGV	Coach	UBus	MC	Total
Benzene	1990	2821	190	28	1	6	358	3405
Benzene	1995	2340	154	26	1	6	215	2743
Benzene	2000	1981	122	21	1	5	191	2321
Benzene	2005	1377	74	14	1	3	174	1642
Benzene	2010	919	43	7	1	1	140	1110
Benzene	2015	640	28	4	0	1	112	785
Benzene	2020	470	18	2	0	0	90	581
Benzene	2025	409	13	2	0	0	79	503
Benzene	2030	389	10	1	0	0	74	474
Benzene	2035	385	9	1	0	0	72	467
CH ₄	1990	3600	248	40	2	9	477	4377
CH ₄	1995	2358	180	37	2	9	277	2863
CH ₄	2000	1655	117	30	1	7	240	2050
CH ₄	2005	1083	65	19	1	4	227	1399
CH ₄	2010	719	37	10	1	2	227	995
CH ₄	2015	509	24	6	0	1	210	750
CH ₄	2020	380	16	3	0	0	175	574
CH ₄	2025	334	11	2	0	0	156	504
CH ₄	2030	318	9	2	0	0	150	479
CH ₄	2035	315	8	2	0	0	151	476
CO	1990	444 787	55 596	4 716	226	1 042	29 767	536 134
CO	1995	265 198	40 108	4 559	221	1 091	24 666	335 844
CO	2000	184 147	26 394	3 971	182	928	27 226	242 847
CO	2005	132 519	14 479	3 464	183	669	25 742	177 056
CO	2010	92 769	8 199	3 381	203	370	19 317	124 238
CO	2015	67 424	5 237	3 329	190	303	14 317	90 800
CO	2020	50 661	3 441	2 797	154	322	10 507	67 883
CO	2025	44 618	2 450	2 405	130	358	8 166	58 127
CO	2030	42 872	1 964	2 264	119	392	7 025	54 637
CO	2035	42 750	1 752	2 243	115	421	6 490	53 772
CO ₂ (rep.)	1990	10 069 756	685 870	1 611 716	94 089	207 692	166 782	12 835 904
CO ₂ (rep.)	1995	10 550 881	692 392	1 695 104	94 648	230 355	157 230	13 420 611
CO ₂ (rep.)	2000	11 203 856	757 578	1 734 322	82 454	232 022	184 134	14 194 366
CO ₂ (rep.)	2005	11 201 022	810 893	1 702 633	87 241	257 895	207 651	14 267 334
CO ₂ (rep.)	2010	10 858 584	859 548	1 789 021	96 833	271 341	233 168	14 108 496
CO ₂ (rep.)	2015	10 053 038	862 715	1 866 322	93 347	276 224	230 997	13 382 643
CO ₂ (rep.)	2020	9 596 103	863 434	1 931 520	92 136	287 900	238 050	13 009 143
CO ₂ (rep.)	2025	9 098 736	870 104	1 976 189	91 868	300 904	246 830	12 584 630
CO ₂ (rep.)	2030	8 666 641	888 786	2 011 202	91 802	315 039	256 718	12 230 189

Emission	Year	PC	LCV	HGV	Coach	UBus	MC	Total
CO ₂ (rep.)	2035	8 287 091	910 577	2 047 807	91 801	330 155	267 721	11 935 152
CO ₂ (total)	1990	10 069 601	685 861	1 611 705	94 088	207 690	166 779	12 835 725
CO ₂ (total)	1995	10 550 719	692 384	1 695 093	94 648	230 354	157 227	13 420 425
CO ₂ (total)	2000	11 204 819	758 082	1 736 571	82 561	232 323	184 131	14 198 487
CO ₂ (total)	2005	11 209 574	812 835	1 708 479	87 541	258 781	207 713	14 284 923
CO ₂ (total)	2010	11 079 469	871 741	1 809 924	97 964	275 463	238 526	14 373 088
CO ₂ (total)	2015	10 687 911	894 555	1 919 443	96 004	285 159	249 580	14 132 652
CO ₂ (total)	2020	10 167 283	893 712	1 986 497	94 759	297 312	257 200	13 696 762
CO ₂ (total)	2025	9 621 869	899 666	2 032 437	94 482	310 821	266 687	13 225 962
CO ₂ (total)	2030	9 157 296	918 326	2 068 447	94 415	325 421	277 371	12 841 275
CO ₂ (total)	2035	8 752 891	940 391	2 106 094	94 414	341 029	289 258	12 524 077
HC	1990	72 147	5 571	1 662	75	383	7 465	87 305
HC	1995	43 919	3 803	1 536	72	370	4 618	54 319
HC	2000	29 135	2 306	1 239	59	283	4 166	37 189
HC	2005	18 994	1 258	811	50	167	3 616	24 896
HC	2010	12 943	738	417	32	143	2 787	17 059
HC	2015	9 546	487	246	19	139	2 141	12 578
HC	2020	7 383	334	141	9	136	1 724	9 727
HC	2025	6 603	250	90	5	143	1 518	8 610
HC	2030	6 331	214	71	4	147	1 442	8 209
HC	2035	6 292	199	67	3	153	1 424	8 139
N ₂ O	1990	380	14	16	1	1	3	415
N ₂ O	1995	548	19	19	1	1	3	590
N ₂ O	2000	538	26	21	1	1	4	590
N ₂ O	2005	254	24	17	1	1	4	300
N ₂ O	2010	191	21	61	2	0	4	279
N ₂ O	2015	163	20	90	3	1	5	281
N ₂ O	2020	159	19	106	3	1	5	293
N ₂ O	2025	165	18	113	4	2	5	308
N ₂ O	2030	172	18	117	4	3	5	320
N ₂ O	2035	178	19	120	4	3	6	329
NH ₃	1990	1 131	9	6	0	1	3	1 149
NH ₃	1995	2 468	61	6	0	1	3	2 539
NH ₃	2000	4 500	123	7	0	1	4	4 634
NH ₃	2005	3 634	97	6	0	1	4	3 742
NH ₃	2010	2 728	60	7	0	1	4	2 801
NH ₃	2015	2 002	42	7	0	1	5	2 058
NH ₃	2020	1 547	31	8	0	1	5	1 592
NH ₃	2025	1 404	25	8	0	1	5	1 444
NH ₃	2030	1 381	21	8	0	1	5	1 417
NH ₃	2035	1 398	19	8	0	1	6	1 433
NMHC	1990	68 547	5 323	1 622	74	374	6 988	82 928
NMHC	1995	41 561	3 624	1 499	70	361	4 340	51 456
NMHC	2000	27 480	2 190	1 209	58	276	3 926	35 139
NMHC	2005	17 912	1 193	792	49	163	3 389	23 498

Emission	Year	PC	LCV	HGV	Coach	UBus	MC	Total
NMHC	2010	12225	701	407	31	66	2560	15989
NMHC	2015	9037	464	240	18	35	1931	11725
NMHC	2020	7003	318	138	9	19	1549	9035
NMHC	2025	6269	239	88	5	12	1363	7976
NMHC	2030	6013	205	69	4	10	1292	7592
NMHC	2035	5977	191	65	3	10	1273	7520
NO ₂	1990	1918	330	1572	87	206	15	4128
NO ₂	1995	1760	295	1531	83	221	17	3908
NO ₂	2000	1841	330	1450	69	210	21	3922
NO ₂	2005	2878	724	1138	64	336	24	5164
NO ₂	2010	3894	1058	965	62	511	24	6514
NO ₂	2015	4127	1089	845	52	449	23	6584
NO ₂	2020	3198	783	622	37	306	19	4965
NO ₂	2025	2376	539	469	27	197	16	3623
NO ₂	2030	1912	395	410	23	137	14	2892
NO ₂	2035	1776	321	396	22	115	14	2644
NO _x	1990	50284	5747	22459	1238	2948	297	82973
NO _x	1995	38609	4785	21877	1191	3155	342	69958
NO _x	2000	32927	4566	20721	987	2996	423	62620
NO _x	2005	25664	4282	16201	920	2826	490	50383
NO _x	2010	19783	3914	11886	792	2434	481	39290
NO _x	2015	16496	3533	9220	595	1942	455	32242
NO _x	2020	12344	2630	5396	335	1248	377	22328
NO _x	2025	9914	1927	2821	176	774	322	15934
NO _x	2030	8706	1542	1800	110	533	289	12980
NO _x	2035	8395	1375	1493	86	441	274	12064
Pb	1990	214	10	0	0	0	4	228
Pb	1995	76	3	0	0	0	1	81
Pb	2000	3	0	0	0	0	0	4
Pb	2005	3	0	0	0	0	0	3
Pb	2010	3	0	0	0	0	0	3
Pb	2015	2	0	0	0	0	0	2
Pb	2020	2	0	0	0	0	0	2
Pb	2025	2	0	0	0	0	0	2
Pb	2030	2	0	0	0	0	0	2
Pb	2035	2	0	0	0	0	0	2
PM exhaust	1990	680	333	894	49	165		2121
PM exhaust	1995	664	381	822	44	159		2070
PM exhaust	2000	750	360	618	33	127		1888
PM exhaust	2005	762	296	399	25	78		1560
PM exhaust	2010	633	233	222	15	31		1135
PM exhaust	2015	418	153	141	9	16		737
PM exhaust	2020	234	88	71	4	7		406
PM exhaust	2025	138	49	31	2	4		224
PM exhaust	2030	106	29	15	1	3		153

Emission	Year	PC	LCV	HGV	Coach	UBus	MC	Total
PM exhaust	2035	100	19	11	1	3		134
PM non-exhaust	1990	1589	104	319	18	43	18	2090
PM non-exhaust	1995	1667	104	328	18	47	16	2179
PM non-exhaust	2000	1857	113	349	16	49	18	2401
PM non-exhaust	2005	2006	125	327	17	56	20	2551
PM non-exhaust	2010	2167	137	355	19	61	22	2761
PM non-exhaust	2015	2283	142	383	18	64	23	2915
PM non-exhaust	2020	2381	146	401	18	68	24	3037
PM non-exhaust	2025	2440	150	412	18	71	25	3116
PM non-exhaust	2030	2498	155	421	18	74	26	3192
PM non-exhaust	2035	2570	160	429	18	78	27	3282
PN	1990	2.2E+17	1.7E+17	2.1E+17	1.3E+16	2.4E+16		6.4E+17
PN	1995	2.4E+17	2.1E+17	2.3E+17	1.3E+16	2.7E+16		7.2E+17
PN	2000	3.1E+17	2.4E+17	2.6E+17	1.2E+16	2.9E+16		8.5E+17
PN	2005	5.7E+17	2.7E+17	3.3E+17	1.7E+16	3.0E+16		1.2E+18
PN	2010	5.6E+17	2.5E+17	2.3E+17	1.5E+16	1.5E+16		1.1E+18
PN	2015	3.8E+17	1.6E+17	1.6E+17	1.0E+16	8.6E+15		7.2E+17
PN	2020	2.0E+17	8.8E+16	8.2E+16	5.0E+15	4.2E+15		3.8E+17
PN	2025	9.2E+16	4.5E+16	3.2E+16	2.0E+15	1.7E+15		1.7E+17
PN	2030	5.3E+16	2.0E+16	1.1E+16	7.8E+14	8.0E+14		8.6E+16
PN	2035	4.5E+16	8.4E+15	4.6E+15	3.3E+14	5.3E+14		5.9E+16
SO ₂	1990	1708	256	1433	84	185	21	3687
SO ₂	1995	1402	113	367	20	50	20	1972
SO ₂	2000	1082	101	300	14	40	17	1553
SO ₂	2005	59	5	11	1	2	1	78
SO ₂	2010	60	5	11	1	2	1	80
SO ₂	2015	59	5	12	1	2	1	80
SO ₂	2020	57	6	13	1	2	1	79
SO ₂	2025	54	6	13	1	2	1	76
SO ₂	2030	52	6	13	1	2	1	74
SO ₂	2035	49	6	13	1	2	1	73
Toluol	1990	6620	487	5	0	1	783	7897
Toluol	1995	4136	328	5	0	1	437	4907
Toluol	2000	2827	195	4	0	1	365	3393
Toluol	2005	1853	104	3	0	1	292	2252
Toluol	2010	1255	59	1	0	0	204	1519
Toluol	2015	908	38	1	0	0	139	1086
Toluol	2020	684	24	0	0	0	102	811
Toluol	2025	601	17	0	0	0	86	704
Toluol	2030	571	14	0	0	0	80	665
Toluol	2035	565	12	0	0	0	79	656
Xylol	1990	5584	404	13	1	3	710	6714
Xylol	1995	3601	277	12	1	3	395	4289
Xylol	2000	2538	170	10	0	2	330	3051
Xylol	2005	1692	93	6	0	1	263	2056

Emission	Year	PC	LCV	HGV	Coach	UBus	MC	Total
Xylol	2010	1 158	54	3	0	1	183	1 399
Xylol	2015	844	34	2	0	0	125	1 005
Xylol	2020	638	23	1	0	0	92	754
Xylol	2025	562	16	1	0	0	77	656
Xylol	2030	534	13	1	0	0	72	620
Xylol	2035	529	12	1	0	0	70	612

A5-2 Emissions by emission type

Tab. 15 > Emissions in tonnes per annum – differentiated by emission type

This differentiation is only relevant for passenger cars, light commercial vehicles and motorcycles, since the other vehicle categories only produce hot emissions.

Emission	Year	Emission type	PC	LCV	MC
CO	1990	Warm	289 333	43 123	29 767
CO	1990	Start	155 454	12 473	
CO	1995	Warm	148 528	29 729	24 666
CO	1995	Start	116 670	10 379	
CO	2000	Warm	92 866	18 894	27 226
CO	2000	Start	91 281	7 499	
CO	2005	Warm	64 717	9 715	25 742
CO	2005	Start	67 802	4 764	
CO	2010	Warm	42 950	5 198	19 317
CO	2010	Start	49 819	3 001	
CO	2015	Warm	28 099	3 132	14 317
CO	2015	Start	39 325	2 106	
CO	2020	Warm	17 939	1 876	10 507
CO	2020	Start	32 723	1 565	
CO	2025	Warm	13 866	1 162	8 166
CO	2025	Start	30 752	1 288	
CO	2030	Warm	12 639	804	7 025
CO	2030	Start	30 232	1 160	
CO	2035	Warm	12 456	644	6 490
CO	2035	Start	30 294	1 108	
CO ₂ (rep.)	1990	Warm	9 760 410	663 555	166 782
CO ₂ (rep.)	1990	Start	309 346	22 314	
CO ₂ (rep.)	1995	Warm	10 244 663	669 373	157 230
CO ₂ (rep.)	1995	Start	306 218	23 019	
CO ₂ (rep.)	2000	Warm	10 887 071	733 964	184 134
CO ₂ (rep.)	2000	Start	316 785	23 614	
CO ₂ (rep.)	2005	Warm	10 859 780	786 720	207 651
CO ₂ (rep.)	2005	Start	341 242	24 174	
CO ₂ (rep.)	2010	Warm	10 500 035	835 082	233 168

Emission	Year	Emission type	PC	LCV	MC
CO ₂ (rep.)	2010	Start	358 549	24 466	
CO ₂ (rep.)	2015	Warm	9 690 871	838 876	230 997
CO ₂ (rep.)	2015	Start	362 168	23 838	
CO ₂ (rep.)	2020	Warm	9 223 187	839 551	238 050
CO ₂ (rep.)	2020	Start	372 916	23 884	
CO ₂ (rep.)	2025	Warm	8 717 120	845 949	246 830
CO ₂ (rep.)	2025	Start	381 616	24 155	
CO ₂ (rep.)	2030	Warm	8 281 430	864 088	256 718
CO ₂ (rep.)	2030	Start	385 211	24 698	
CO ₂ (rep.)	2035	Warm	7 897 336	885 278	267 721
CO ₂ (rep.)	2035	Start	389 755	25 299	
CO ₂ (total)	1990	Warm	9 760 260	663 547	166 779
CO ₂ (total)	1990	Start	309 341	22 314	
CO ₂ (total)	1995	Warm	10 244 506	669 365	157 227
CO ₂ (total)	1995	Start	306 213	23 019	
CO ₂ (total)	2000	Warm	10 888 008	734 455	184 131
CO ₂ (total)	2000	Start	316 812	23 627	
CO ₂ (total)	2005	Warm	10 868 090	788 611	207 713
CO ₂ (total)	2005	Start	341 484	24 224	
CO ₂ (total)	2010	Warm	10 713 427	846 898	238 526
CO ₂ (total)	2010	Start	366 042	24 843	
CO ₂ (total)	2015	Warm	10 301 092	869 695	249 580
CO ₂ (total)	2015	Start	386 819	24 860	
CO ₂ (total)	2020	Warm	9 769 713	868 847	257 200
CO ₂ (total)	2020	Start	397 570	24 864	
CO ₂ (total)	2025	Warm	9 215 472	874 545	266 687
CO ₂ (total)	2025	Start	406 397	25 121	
CO ₂ (total)	2030	Warm	8 747 282	892 658	277 371
CO ₂ (total)	2030	Start	410 014	25 667	
CO ₂ (total)	2035	Warm	8 338 138	914 113	289 258
CO ₂ (total)	2035	Start	414 753	26 278	
HC	1990	Warm	32 840	3 129	7 228
HC	1990	Start	25 919	1 361	
HC	1990	Hot/warm soak	6 496	496	109
HC	1990	Diurnal	866	80	78
HC	1990	Running losses	6 026	506	50
HC	1995	Warm	16 309	1 980	4 376
HC	1995	Start	21 885	1 202	
HC	1995	Hot/warm soak	2 755	296	115
HC	1995	Diurnal	486	52	78
HC	1995	RL	2 485	274	48
HC	2000	Warm	8 446	1 093	3 903
HC	2000	Start	18 741	967	
HC	2000	Hot/warm soak	875	116	123
HC	2000	Diurnal	297	26	83

Emission	Year	Emission type	PC	LCV	MC
HC	2000	Running losses	776	104	57
HC	2005	Warm	4 270	508	3 318
HC	2005	Start	13 968	662	
HC	2005	Hot/warm soak	300	41	142
HC	2005	Diurnal	229	13	90
HC	2005	Running losses	228	34	65
HC	2010	Warm	2 100	262	2 425
HC	2010	Start	10 394	432	
HC	2010	Hot/warm soak	155	19	179
HC	2010	Diurnal	199	8	103
HC	2010	Running losses	95	16	79
HC	2015	Warm	1 116	154	1 756
HC	2015	Start	8 060	310	
HC	2015	Hot/warm soak	123	10	192
HC	2015	Diurnal	181	6	108
HC	2015	Running losses	66	8	85
HC	2020	Warm	670	92	1 321
HC	2020	Start	6 386	229	
HC	2020	Hot/warm soak	106	5	202
HC	2020	Diurnal	167	4	111
HC	2020	Running losses	53	4	90
HC	2025	Warm	545	57	1 097
HC	2025	Start	5 749	185	
HC	2025	Hot/warm soak	100	3	211
HC	2025	Diurnal	161	3	115
HC	2025	Running losses	48	2	95
HC	2030	Warm	514	44	1 005
HC	2030	Start	5 514	164	
HC	2030	Hot/warm soak	97	2	219
HC	2030	Diurnal	160	3	118
HC	2030	Running losses	46	1	101
HC	2035	Warm	510	39	971
HC	2035	Start	5 478	155	
HC	2035	Hot/warm soak	96	2	225
HC	2035	Diurnal	162	3	122
HC	2035	Running losses	45	1	106
NO ₂	1990	Warm	1 770	330	15
NO ₂	1990	Start	147	0	
NO ₂	1995	Warm	1 412	286	17
NO ₂	1995	Start	348	9	
NO ₂	2000	Warm	1 463	317	21
NO ₂	2000	Start	378	13	
NO ₂	2005	Warm	2 675	715	24
NO ₂	2005	Start	202	9	
NO ₂	2010	Warm	3 941	1 084	24

Emission	Year	Emission type	PC	LCV	MC
NO ₂	2010	Start	-47	-27	
NO ₂	2015	Warm	4 326	1 145	23
NO ₂	2015	Start	-200	-56	
NO ₂	2020	Warm	3 401	860	19
NO ₂	2020	Start	-203	-77	
NO ₂	2025	Warm	2 548	629	16
NO ₂	2025	Start	-172	-91	
NO ₂	2030	Warm	2 055	496	14
NO ₂	2030	Start	-143	-101	
NO ₂	2035	Warm	1 909	428	14
NO ₂	2035	Start	-133	-107	
NO _x	1990	Warm	48 448	5 742	297
NO _x	1990	Start	1 837	4	
NO _x	1995	Warm	34 058	4 664	342
NO _x	1995	Start	4 551	121	
NO _x	2000	Warm	27 941	4 423	423
NO _x	2000	Start	4 986	144	
NO _x	2005	Warm	22 337	4 211	490
NO _x	2005	Start	3 327	71	
NO _x	2010	Warm	17 874	3 895	481
NO _x	2010	Start	1 909	19	
NO _x	2015	Warm	15 463	3 549	455
NO _x	2015	Start	1 033	-16	
NO _x	2020	Warm	11 696	2 654	377
NO _x	2020	Start	648	-25	
NO _x	2025	Warm	9 354	1 949	322
NO _x	2025	Start	560	-23	
NO _x	2030	Warm	8 152	1 565	289
NO _x	2030	Start	554	-23	
NO _x	2035	Warm	7 837	1 398	274
NO _x	2035	Start	558	-23	
PM exhaust	1990	Warm	664	317	
PM exhaust	1990	Start	16	16	
PM exhaust	1995	Warm	645	360	
PM exhaust	1995	Start	19	20	
PM exhaust	2000	Warm	725	339	
PM exhaust	2000	Start	26	21	
PM exhaust	2005	Warm	707	269	
PM exhaust	2005	Start	55	27	
PM exhaust	2010	Warm	578	200	
PM exhaust	2010	Start	55	33	
PM exhaust	2015	Warm	378	127	
PM exhaust	2015	Start	40	25	
PM exhaust	2020	Warm	211	73	
PM exhaust	2020	Start	24	15	

Emission	Year	Emission type	PC	LCV	MC
PM exhaust	2025	Warm	124	40	
PM exhaust	2025	Start	14	9	
PM exhaust	2030	Warm	95	23	
PM exhaust	2030	Start	11	6	
PM exhaust	2035	Warm	90	16	
PM exhaust	2035	Start	10	4	
PN	1990	Warm	2.1E + 17	1.7E + 17	
PN	1990	Start	9.2E + 15	2.3E + 15	
PN	1995	Warm	2.3E + 17	2.1E + 17	
PN	1995	Start	1.1E + 16	3.1E + 15	
PN	2000	Warm	2.9E + 17	2.4E + 17	
PN	2000	Start	1.4E + 16	4.4E + 15	
PN	2005	Warm	5.4E + 17	2.7E + 17	
PN	2005	Start	2.6E + 16	6.3E + 15	
PN	2010	Warm	5.3E + 17	2.4E + 17	
PN	2010	Start	2.4E + 16	7.3E + 15	
PN	2015	Warm	3.6E + 17	1.5E + 17	
PN	2015	Start	1.6E + 16	5.5E + 15	
PN	2020	Warm	1.9E + 17	8.5E + 16	
PN	2020	Start	8.7E + 15	3.2E + 15	
PN	2025	Warm	8.7E + 16	4.3E + 16	
PN	2025	Start	4.3E + 15	1.8E + 15	
PN	2030	Warm	5.0E + 16	1.9E + 16	
PN	2030	Start	2.7E + 15	9.7E + 14	
PN	2035	Warm	4.3E + 16	7.9E + 15	
PN	2035	Start	2.4E + 15	5.3E + 14	

A5-3 Emissions by road category

Tab. 16 > Emissions in tonnes per annum, differentiated by road category (motorway/rural/urban)

Emission	Year	Road category	PC	LCV	HGV	Coach	UBus	MC	Total
CO	1990	Motorway	80 674	13 337	1 758	73		6 708	102 551
CO	1990	Rural	87 707	12 148	1 472	69	228	10 270	111 893
CO	1990	Urban	276 406	30 112	1 486	84	814	12 789	321 690
CO	1995	Motorway	46 003	10 892	1 816	76		7 641	66 429
CO	1995	Rural	44 382	7 983	1 409	67	240	8 889	62 970
CO	1995	Urban	174 813	21 232	1 334	78	851	8 137	206 445
CO	2000	Motorway	35 733	8 384	1 681	65		9 689	55 552
CO	2000	Rural	27 232	4 683	1 187	55	202	9 795	43 153
CO	2000	Urban	121 182	13 326	1 103	62	726	7 743	144 143
CO	2005	Motorway	30 220	4 720	1 454	64		9 770	46 229
CO	2005	Rural	17 760	2 247	1 010	58	142	8 887	30 104
CO	2005	Urban	84 538	7 512	1 001	61	527	7 084	100 723
CO	2010	Motorway	22 477	2 650	1 431	73		7 623	34 255
CO	2010	Rural	10 746	1 167	987	63	77	6 157	19 198
CO	2010	Urban	59 546	4 381	962	67	292	5 536	70 784
CO	2015	Motorway	15 411	1 696	1 412	70		5 854	24 443
CO	2015	Rural	6 503	679	976	56	63	4 359	12 637
CO	2015	Urban	45 510	2 862	941	64	240	4 105	53 721
CO	2020	Motorway	9 602	1 063	1 177	57		4 258	16 157
CO	2020	Rural	4 109	395	819	45	69	3 141	8 576
CO	2020	Urban	36 951	1 982	801	53	254	3 108	43 149
CO	2025	Motorway	7 121	688	1 008	48		3 212	12 078
CO	2025	Rural	3 244	233	698	37	77	2 382	6 672
CO	2025	Urban	34 253	1 528	699	45	281	2 572	39 377
CO	2030	Motorway	6 323	484	950	44		2 676	10 476
CO	2030	Rural	3 005	155	653	34	85	2 012	5 944
CO	2030	Urban	33 544	1 325	662	41	307	2 336	38 217
CO	2035	Motorway	6 174	390	941	42		2 410	9 958
CO	2035	Rural	2 973	120	645	33	91	1 830	5 692
CO	2035	Urban	33 603	1 242	658	40	330	2 249	38 122
CO ₂ (rep.)	1990	Motorway	3 289 507	240 466	687 659	37 818		33 172	4 288 621
CO ₂ (rep.)	1990	Rural	3 006 369	200 083	501 183	28 640	54 560	59 306	3 850 140
CO ₂ (rep.)	1990	Urban	3 773 880	245 321	422 875	27 631	153 131	74 305	4 697 142
CO ₂ (rep.)	1995	Motorway	3 543 247	255 601	763 964	39 985		39 576	4 642 373
CO ₂ (rep.)	1995	Rural	3 118 897	199 679	519 986	28 035	60 903	61 852	3 989 353
CO ₂ (rep.)	1995	Urban	3 888 737	237 112	411 154	26 628	169 452	55 802	4 788 885
CO ₂ (rep.)	2000	Motorway	3 871 107	294 397	818 431	35 333		51 634	5 070 902
CO ₂ (rep.)	2000	Rural	3 265 284	214 607	512 786	24 248	62 178	74 614	4 153 717
CO ₂ (rep.)	2000	Urban	4 067 465	248 574	403 106	22 874	169 844	57 885	4 969 747
CO ₂ (rep.)	2005	Motorway	3 975 154	319 150	809 296	37 392		61 947	5 202 939
CO ₂ (rep.)	2005	Rural	3 211 504	225 915	498 354	25 893	70 299	85 371	4 117 336
CO ₂ (rep.)	2005	Urban	4 014 364	265 828	394 983	23 957	187 596	60 332	4 947 059
CO ₂ (rep.)	2010	Motorway	3 945 559	340 109	851 735	42 054		69 510	5 248 967

Emission	Year	Road category	PC	LCV	HGV	Coach	UBus	MC	Total
CO ₂ (rep.)	2010	Rural	3 052 333	236 028	527 092	28 616	75 893	95 727	4 015 689
CO ₂ (rep.)	2010	Urban	3 860 692	283 411	410 194	26 163	195 448	67 931	4 843 840
CO ₂ (rep.)	2015	Motorway	3 735 133	347 660	888 032	41 090		70 282	5 082 197
CO ₂ (rep.)	2015	Rural	2 760 454	233 478	552 778	26 958	78 582	93 911	3 746 162
CO ₂ (rep.)	2015	Urban	3 557 452	281 576	425 511	25 299	197 642	66 804	4 554 284
CO ₂ (rep.)	2020	Motorway	3 528 389	347 339	914 240	40 717		71 642	4 902 326
CO ₂ (rep.)	2020	Rural	2 631 304	233 663	576 582	26 624	82 620	97 512	3 648 305
CO ₂ (rep.)	2020	Urban	3 436 409	282 432	440 698	24 795	205 280	68 896	4 458 511
CO ₂ (rep.)	2025	Motorway	3 320 192	349 230	932 551	40 598		73 245	4 715 816
CO ₂ (rep.)	2025	Rural	2 489 139	235 487	592 420	26 548	86 780	101 382	3 531 756
CO ₂ (rep.)	2025	Urban	3 289 405	285 387	451 218	24 721	214 124	72 203	4 337 058
CO ₂ (rep.)	2030	Motorway	3 146 655	356 537	948 532	40 566		75 517	4 567 808
CO ₂ (rep.)	2030	Rural	2 365 594	240 590	603 268	26 530	91 019	105 553	3 432 554
CO ₂ (rep.)	2030	Urban	3 154 392	291 659	459 401	24 706	224 020	75 649	4 229 827
CO ₂ (rep.)	2035	Motorway	2 995 245	365 311	965 476	40 564		78 300	4 444 895
CO ₂ (rep.)	2035	Rural	2 256 112	246 488	614 520	26 530	95 414	110 098	3 349 161
CO ₂ (rep.)	2035	Urban	3 035 735	298 779	467 812	24 707	234 741	79 323	4 141 096
CO ₂ (total)	1990	Motorway	3 289 456	240 463	687 654	37 818		33 171	4 288 563
CO ₂ (total)	1990	Rural	3 006 323	200 080	501 179	28 639	54 560	59 305	3 850 087
CO ₂ (total)	1990	Urban	3 773 822	245 317	422 872	27 631	153 130	74 303	4 697 076
CO ₂ (total)	1995	Motorway	3 543 193	255 599	763 959	39 984		39 575	4 642 310
CO ₂ (total)	1995	Rural	3 118 849	199 677	519 983	28 035	60 903	61 851	3 989 298
CO ₂ (total)	1995	Urban	3 888 677	237 109	411 151	26 628	169 451	55 801	4 788 817
CO ₂ (total)	2000	Motorway	3 871 442	294 613	819 492	35 378		51 634	5 072 560
CO ₂ (total)	2000	Rural	3 265 571	214 756	513 451	24 279	62 259	74 613	4 154 929
CO ₂ (total)	2000	Urban	4 067 806	248 712	403 628	22 903	170 064	57 884	4 970 998
CO ₂ (total)	2005	Motorway	3 978 145	319 952	812 075	37 520		61 966	5 209 659
CO ₂ (total)	2005	Rural	3 213 978	226 472	500 065	25 981	70 541	85 397	4 122 434
CO ₂ (total)	2005	Urban	4 017 450	266 412	396 339	24 039	188 240	60 350	4 952 830
CO ₂ (total)	2010	Motorway	4 025 996	344 836	861 686	42 546		71 107	5 346 171
CO ₂ (total)	2010	Rural	3 114 285	239 327	533 251	28 950	77 043	97 927	4 090 783
CO ₂ (total)	2010	Urban	3 939 188	287 578	414 987	26 468	198 420	69 492	4 936 134
CO ₂ (total)	2015	Motorway	3 971 415	360 119	913 308	42 260		75 936	5 363 038
CO ₂ (total)	2015	Rural	2 933 833	241 904	568 512	27 725	81 115	101 466	3 954 556
CO ₂ (total)	2015	Urban	3 782 662	292 532	437 623	26 019	204 044	72 178	4 815 058
CO ₂ (total)	2020	Motorway	3 738 049	359 192	940 262	41 876		77 405	5 156 784
CO ₂ (total)	2020	Rural	2 786 752	241 682	592 993	27 382	85 308	105 357	3 839 473
CO ₂ (total)	2020	Urban	3 642 482	292 838	453 242	25 501	212 004	74 438	4 700 505
CO ₂ (total)	2025	Motorway	3 510 145	360 790	959 094	41 753		79 137	4 950 920
CO ₂ (total)	2025	Rural	2 630 968	243 320	609 282	27 304	89 624	109 537	3 710 035
CO ₂ (total)	2025	Urban	3 480 756	295 556	464 061	25 425	221 197	78 012	4 565 007
CO ₂ (total)	2030	Motorway	3 323 560	368 085	975 530	41 721		81 592	4 790 489
CO ₂ (total)	2030	Rural	2 498 206	248 417	620 439	27 285	94 000	114 044	3 602 391
CO ₂ (total)	2030	Urban	3 335 530	301 824	472 477	25 409	231 421	81 734	4 448 396
CO ₂ (total)	2035	Motorway	3 162 210	376 969	992 956	41 719		84 599	4 658 454
CO ₂ (total)	2035	Rural	2 381 598	254 384	632 011	27 285	98 537	118 955	3 512 771
CO ₂ (total)	2035	Urban	3 209 082	309 038	481 127	25 410	242 491	85 704	4 352 852

Emission	Year	Road category	PC	LCV	HGV	Coach	UBus	MC	Total
HC	1990	Motorway	8 030	894	563	23		361	9 870
HC	1990	Rural	11 643	988	479	22	71	2 150	15 353
HC	1990	Urban	52 474	3 689	621	31	312	4 955	62 082
HC	1995	Motorway	4 061	604	563	23		320	5 571
HC	1995	Rural	5 653	608	442	20	69	1 375	8 167
HC	1995	Urban	34 206	2 591	531	29	301	2 923	40 581
HC	2000	Motorway	2 218	372	483	20		358	3 451
HC	2000	Rural	2 793	319	344	17	53	1 301	4 826
HC	2000	Urban	24 124	1 615	412	23	230	2 507	28 911
HC	2005	Motorway	1 236	184	321	17		345	2 102
HC	2005	Rural	1 351	140	222	14	32	1 112	2 872
HC	2005	Urban	16 408	934	269	19	135	2 159	19 923
HC	2010	Motorway	685	99	166	11		285	1 246
HC	2010	Rural	643	72	114	9	29	745	1 612
HC	2010	Urban	11 615	568	136	12	114	1 757	14 202
HC	2015	Motorway	406	61	100	7		244	817
HC	2015	Rural	333	42	68	5	29	538	1 014
HC	2015	Urban	8 807	385	79	7	110	1 359	10 747
HC	2020	Motorway	251	37	58	3		198	547
HC	2020	Rural	201	25	39	3	29	410	706
HC	2020	Urban	6 930	272	44	3	108	1 116	8 473
HC	2025	Motorway	202	23	37	2		167	432
HC	2025	Rural	165	15	26	1	30	339	577
HC	2025	Urban	6 235	212	27	2	113	1 012	7 601
HC	2030	Motorway	189	17	30	1		151	388
HC	2030	Rural	156	12	20	1	31	308	529
HC	2030	Urban	5 986	185	20	1	116	983	7 292
HC	2035	Motorway	187	15	29	1		144	376
HC	2035	Rural	155	10	19	1	32	296	514
HC	2035	Urban	5 950	174	19	1	121	984	7 249
NO ₂	1990	Motorway	727	150	691	36		7	1 612
NO ₂	1990	Rural	555	98	499	27	58	5	1 242
NO ₂	1990	Urban	635	82	382	24	149	3	1 274
NO ₂	1995	Motorway	580	133	708	37		8	1 465
NO ₂	1995	Rural	420	83	477	25	62	6	1 073
NO ₂	1995	Urban	760	80	347	22	159	3	1 370
NO ₂	2000	Motorway	592	150	691	30		10	1 474
NO ₂	2000	Rural	417	87	432	20	58	7	1 022
NO ₂	2000	Urban	832	93	328	18	151	3	1 426
NO ₂	2005	Motorway	1 087	350	526	27		13	2 003
NO ₂	2005	Rural	744	198	340	19	86	8	1 394
NO ₂	2005	Urban	1 047	177	272	18	250	3	1 767
NO ₂	2010	Motorway	1 601	550	413	24		14	2 602
NO ₂	2010	Rural	1 077	290	281	18	120	7	1 793
NO ₂	2010	Urban	1 216	217	270	20	392	3	2 119
NO ₂	2015	Motorway	1 797	596	341	19		13	2 767
NO ₂	2015	Rural	1 159	298	242	15	98	6	1 818

Emission	Year	Road category	PC	LCV	HGV	Coach	UBus	MC	Total
NO ₂	2015	Urban	1 170	195	262	18	350	3	1 999
NO ₂	2020	Motorway	1 404	449	233	13		11	2 109
NO ₂	2020	Rural	915	223	175	10	66	5	1 394
NO ₂	2020	Urban	879	112	214	14	240	3	1 462
NO ₂	2025	Motorway	1 048	328	162	9		10	1 556
NO ₂	2025	Rural	687	163	129	7	42	4	1 032
NO ₂	2025	Urban	641	47	178	11	155	2	1 035
NO ₂	2030	Motorway	843	259	135	7		9	1 253
NO ₂	2030	Rural	555	128	110	6	30	3	833
NO ₂	2030	Urban	514	7	165	10	108	2	807
NO ₂	2035	Motorway	781	224	128	6		8	1 148
NO ₂	2035	Rural	516	111	106	6	25	3	766
NO ₂	2035	Urban	480	-14	163	10	89	2	730
NO _x	1990	Motorway	20 522	2 564	9 877	521		141	33 626
NO _x	1990	Rural	15 064	1 711	7 125	382	825	94	25 201
NO _x	1990	Urban	14 698	1 471	5 456	336	2 123	62	24 146
NO _x	1995	Motorway	14 338	2 115	10 110	523		164	27 249
NO _x	1995	Rural	10 149	1 339	6 816	356	885	119	19 666
NO _x	1995	Urban	14 122	1 330	4 951	311	2 270	58	23 043
NO _x	2000	Motorway	11 434	2 026	9 864	432		206	23 962
NO _x	2000	Rural	7 967	1 197	6 168	292	835	149	16 608
NO _x	2000	Urban	13 525	1 344	4 689	263	2 161	68	22 050
NO _x	2005	Motorway	8 858	1 992	7 486	389		253	18 978
NO _x	2005	Rural	6 167	1 124	4 837	273	752	168	13 320
NO _x	2005	Urban	10 639	1 166	3 879	258	2 075	69	18 085
NO _x	2010	Motorway	7 075	1 923	5 016	307		271	14 593
NO _x	2010	Rural	4 846	1 026	3 454	230	592	148	10 296
NO _x	2010	Urban	7 862	965	3 415	255	1 843	62	14 402
NO _x	2015	Motorway	6 263	1 814	3 633	216		270	12 197
NO _x	2015	Rural	4 132	917	2 610	167	438	125	8 388
NO _x	2015	Urban	6 101	802	2 977	212	1 504	60	11 657
NO _x	2020	Motorway	4 728	1 366	2 014	116		228	8 452
NO _x	2020	Rural	3 156	685	1 522	93	274	98	5 827
NO _x	2020	Urban	4 460	578	1 860	127	974	50	8 049
NO _x	2025	Motorway	3 769	1 006	993	58		197	6 024
NO _x	2025	Rural	2 537	504	789	48	167	79	4 124
NO _x	2025	Urban	3 608	417	1 040	70	607	45	5 786
NO _x	2030	Motorway	3 272	812	598	34		178	4 894
NO _x	2030	Rural	2 216	404	490	29	116	69	3 324
NO _x	2030	Urban	3 217	326	713	47	417	42	4 762
NO _x	2035	Motorway	3 137	727	483	26		169	4 541
NO _x	2035	Rural	2 132	361	400	23	98	64	3 078
NO _x	2035	Urban	3 126	287	610	38	343	42	4 445
PM exhaust	1990	Motorway	320	130	347	17			814
PM exhaust	1990	Rural	172	102	276	15	35		601
PM exhaust	1990	Urban	188	101	271	17	130		707
PM exhaust	1995	Motorway	306	148	339	16			810

Emission	Year	Road category	PC	LCV	HGV	Coach	UBus	MC	Total
PM exhaust	1995	Rural	170	115	250	13	34		582
PM exhaust	1995	Urban	187	118	234	14	125		678
PM exhaust	2000	Motorway	350	143	270	12			775
PM exhaust	2000	Rural	191	104	182	10	28		515
PM exhaust	2000	Urban	210	113	165	11	99		598
PM exhaust	2005	Motorway	326	116	173	9			625
PM exhaust	2005	Rural	188	79	115	7	18		408
PM exhaust	2005	Urban	247	101	111	8	60		527
PM exhaust	2010	Motorway	262	87	94	6			449
PM exhaust	2010	Rural	154	57	63	5	7		286
PM exhaust	2010	Urban	218	89	64	5	24		400
PM exhaust	2015	Motorway	173	56	59	4			291
PM exhaust	2015	Rural	99	35	40	3	4		180
PM exhaust	2015	Urban	146	61	42	3	12		265
PM exhaust	2020	Motorway	95	32	29	2			159
PM exhaust	2020	Rural	55	20	20	1	2		99
PM exhaust	2020	Urban	84	36	21	1	6		149
PM exhaust	2025	Motorway	57	18	13	1			89
PM exhaust	2025	Rural	32	11	9	1	1		53
PM exhaust	2025	Urban	48	21	9	1	3		82
PM exhaust	2030	Motorway	45	10	6	0			62
PM exhaust	2030	Rural	24	6	4	0	1		36
PM exhaust	2030	Urban	37	12	4	0	2		56
PM exhaust	2035	Motorway	43	7	5	0			55
PM exhaust	2035	Rural	23	4	3	0	1		31
PM exhaust	2035	Urban	35	8	3	0	2		48
PN	1990	Motorway	7.7E + 16	5.7E + 16	8.0E + 16	4.3E + 15			2.2E + 17
PN	1990	Rural	6.5E + 16	5.7E + 16	6.0E + 16	3.8E + 15	5.5E + 15		1.9E + 17
PN	1990	Urban	7.9E + 16	6.1E + 16	6.5E + 16	4.4E + 15	1.8E + 16		2.3E + 17
PN	1995	Motorway	8.3E + 16	6.8E + 16	9.4E + 16	4.7E + 15			2.5E + 17
PN	1995	Rural	7.0E + 16	6.8E + 16	6.5E + 16	3.8E + 15	6.1E + 15		2.1E + 17
PN	1995	Urban	8.9E + 16	7.4E + 16	6.7E + 16	4.4E + 15	2.0E + 16		2.6E + 17
PN	2000	Motorway	1.0E + 17	8.0E + 16	1.1E + 17	4.5E + 15			3.0E + 17
PN	2000	Rural	8.7E + 16	7.6E + 16	7.3E + 16	3.6E + 15	6.7E + 15		2.5E + 17
PN	2000	Urban	1.1E + 17	8.9E + 16	7.6E + 16	4.1E + 15	2.2E + 16		3.1E + 17
PN	2005	Motorway	1.8E + 17	8.9E + 16	1.4E + 17	6.1E + 15			4.2E + 17
PN	2005	Rural	1.6E + 17	8.3E + 16	9.0E + 16	4.9E + 15	7.1E + 15		3.4E + 17
PN	2005	Urban	2.3E + 17	1.0E + 17	9.8E + 16	5.5E + 15	2.3E + 16		4.6E + 17
PN	2010	Motorway	1.9E + 17	8.0E + 16	9.9E + 16	5.6E + 15			3.7E + 17
PN	2010	Rural	1.5E + 17	7.2E + 16	6.3E + 16	4.4E + 15	3.4E + 15		3.0E + 17
PN	2010	Urban	2.1E + 17	9.6E + 16	6.8E + 16	5.0E + 15	1.1E + 16		3.9E + 17
PN	2015	Motorway	1.3E + 17	5.2E + 16	6.9E + 16	3.9E + 15			2.6E + 17
PN	2015	Rural	1.0E + 17	4.5E + 16	4.5E + 16	3.0E + 15	2.0E + 15		2.0E + 17
PN	2015	Urban	1.4E + 17	6.2E + 16	4.8E + 16	3.5E + 15	6.6E + 15		2.6E + 17
PN	2020	Motorway	7.4E + 16	2.9E + 16	3.5E + 16	1.9E + 15			1.4E + 17
PN	2020	Rural	5.4E + 16	2.5E + 16	2.3E + 16	1.4E + 15	9.9E + 14		1.0E + 17
PN	2020	Urban	7.3E + 16	3.5E + 16	2.5E + 16	1.7E + 15	3.2E + 15		1.4E + 17

Emission	Year	Road category	PC	LCV	HGV	Coach	UBus	MC	Total
PN	2025	Motorway	3.6E + 16	1.5E + 16	1.3E + 16	7.6E + 14			6.5E + 16
PN	2025	Rural	2.4E + 16	1.3E + 16	9.0E + 15	5.8E + 14	4.0E + 14		4.7E + 16
PN	2025	Urban	3.1E + 16	1.8E + 16	9.6E + 15	6.7E + 14	1.3E + 15		6.1E + 16
PN	2030	Motorway	2.3E + 16	6.6E + 15	4.5E + 15	2.9E + 14			3.4E + 16
PN	2030	Rural	1.3E + 16	5.5E + 15	3.1E + 15	2.2E + 14	1.9E + 14		2.2E + 16
PN	2030	Urban	1.7E + 16	7.9E + 15	3.3E + 15	2.6E + 14	6.1E + 14		2.9E + 16
PN	2035	Motorway	2.0E + 16	2.8E + 15	1.9E + 15	1.2E + 14			2.5E + 16
PN	2035	Rural	1.1E + 16	2.2E + 15	1.3E + 15	9.5E + 13	1.2E + 14		1.5E + 16
PN	2035	Urban	1.4E + 16	3.3E + 15	1.4E + 15	1.1E + 14	4.0E + 14		1.9E + 16

A5-4 Emissions by fuel type

Tab. 17 > Emissions in tonnes per annum, differentiated by fuel type

Emission	Year	Fuel	PC	LCV	HGV	Coach	UBus	Motorcycle	Total
CO	1990	P	442485	54509				29767	526761
CO	1990	D	2302	1087	4716	226	1042		9373
CO	1995	P	263001	38784				24666	326451
CO	1995	D	2197	1324	4559	221	1091		9393
CO	2000	P	182137	25068				27226	234432
CO	2000	D	2009	1325	3971	182	928		8415
CO	2005	P	130234	13439				25742	169414
CO	2005	D	2285	1041	3464	183	669		7642
CO	2010	P	90296	7410				19317	117023
CO	2010	D	2441	789	3381	203	347		7161
CO	2010	CNG	31				23		54
CO	2015	P	64756	4607				14317	83680
CO	2015	D	2619	630	3329	190	272		7040
CO	2015	CNG	49				31		80
CO	2020	P	47750	2916				10507	61173
CO	2020	D	2851	525	2797	154	287		6614
CO	2020	CNG	60				35		95
CO	2025	P	41503	1985				8166	51654
CO	2025	D	3050	465	2405	130	319		6369
CO	2025	CNG	65				39		104
CO	2030	P	39625	1518				7025	48167
CO	2030	D	3180	446	2264	119	352		6361
CO	2030	CNG	67				41		108
CO	2035	P	39398	1304				6490	47192
CO	2035	D	3283	449	2243	115	379		6468
CO	2035	CNG	69				43		112
CO ₂ (rep.)	1990	P	9510324	464070				166782	10141176
CO ₂ (rep.)	1990	D	559432	221800	1611716	94089	207692		2694728
CO ₂ (rep.)	1995	P	9902279	416246				157230	10475755

Emission	Year	Fuel	PC	LCV	HGV	Coach	UBus	Motorcycle	Total
CO ₂ (rep.)	1995	D	648 602	276 146	1 695 104	94 648	230 355		2 944 856
CO ₂ (rep.)	2000	P	10 334 266	364 729				184 134	10 883 129
CO ₂ (rep.)	2000	D	869 590	392 849	1 734 322	82 454	232 022		3 311 237
CO ₂ (rep.)	2005	P	9 552 098	268 969				207 651	10 028 718
CO ₂ (rep.)	2005	D	1 648 924	541 924	1 702 633	87 241	257 895		4 238 616
CO ₂ (rep.)	2010	P	8 230 713	190 330				233 168	8 654 211
CO ₂ (rep.)	2010	D	2 617 330	669 218	1 789 021	96 833	261 770		5 434 173
CO ₂ (rep.)	2010	CNG	10 542				9 571		20 113
CO ₂ (rep.)	2015	P	6 680 759	140 143				230 997	7 051 899
CO ₂ (rep.)	2015	D	3 354 817	722 572	1 866 321	93 347	263 254		6 300 311
CO ₂ (rep.)	2015	CNG	17 462				12 970		30 432
CO ₂ (rep.)	2020	P	5 696 739	109 671				238 050	6 044 460
CO ₂ (rep.)	2020	D	3 876 265	753 763	1 931 520	92 136	273 178		6 926 861
CO ₂ (rep.)	2020	CNG	23 099				14 723		37 822
CO ₂ (rep.)	2025	P	5 041 135	92 259				246 830	5 380 224
CO ₂ (rep.)	2025	D	4 032 203	777 845	1 976 189	91 868	284 533		7 162 637
CO ₂ (rep.)	2025	CNG	25 397				16 371		41 768
CO ₂ (rep.)	2030	P	4 652 757	81 597				256 718	4 991 073
CO ₂ (rep.)	2030	D	3 988 374	807 189	2 011 202	91 802	297 912		7 196 479
CO ₂ (rep.)	2030	CNG	25 510				17 127		42 637
CO ₂ (rep.)	2035	P	4 383 479	74 957				267 721	4 726 157
CO ₂ (rep.)	2035	D	3 878 751	835 620	2 047 807	91 801	312 296		7 166 274
CO ₂ (rep.)	2035	CNG	24 862				17 860		42 721
CO ₂ (total)	1990	P	9 510 173	464 062				166 779	10 141 014
CO ₂ (total)	1990	D	559 428	221 798	1 611 705	94 088	207 690		2 694 711
CO ₂ (total)	1995	P	9 902 121	416 240				157 227	10 475 588
CO ₂ (total)	1995	D	648 598	276 144	1 695 093	94 648	230 354		2 944 837
CO ₂ (total)	2000	P	10 334 101	364 723				184 131	10 882 956
CO ₂ (total)	2000	D	870 718	393 358	1 736 571	82 561	232 323		3 315 531
CO ₂ (total)	2005	P	9 554 988	269 051				207 713	10 031 752
CO ₂ (total)	2005	D	1 654 586	543 785	1 708 479	87 541	258 781		4 253 171
CO ₂ (total)	2010	P	8 419 846	194 703				238 526	8 853 075
CO ₂ (total)	2010	D	2 647 911	677 037	1 809 924	97 964	264 829		5 497 665
CO ₂ (total)	2010	CNG	11 713				10 634		22 347
CO ₂ (total)	2015	P	7 218 203	151 417				249 580	7 619 200
CO ₂ (total)	2015	D	3 450 306	743 138	1 919 443	96 004	270 747		6 479 638
CO ₂ (total)	2015	CNG	19 402				14 411		33 813
CO ₂ (total)	2020	P	6 155 022	118 494				257 200	6 530 716
CO ₂ (total)	2020	D	3 986 595	775 218	1 986 497	94 759	280 953		7 124 022
CO ₂ (total)	2020	CNG	25 666				16 359		42 024
CO ₂ (total)	2025	P	5 446 677	99 681				266 687	5 813 045
CO ₂ (total)	2025	D	4 146 973	799 985	2 032 437	94 482	292 632		7 366 509
CO ₂ (total)	2025	CNG	28 219				18 190		46 409
CO ₂ (total)	2030	P	5 027 055	88 162				277 371	5 392 587
CO ₂ (total)	2030	D	4 101 896	830 164	2 068 447	94 415	306 392		7 401 314

Emission	Year	Fuel	PC	LCV	HGV	Coach	UBus	Motorcycle	Total
CO ₂ (total)	2030	CNG	28345				19029		47374
CO ₂ (total)	2035	P	4736114	80987				289258	5106360
CO ₂ (total)	2035	D	3989152	859404	2106094	94414	321185		7370249
CO ₂ (total)	2035	CNG	27624				19844		47468
HC	1990	P	71673	5353				7465	84492
HC	1990	D	474	218	1662	75	383		2813
HC	1995	P	43495	3541				4618	51653
HC	1995	D	424	263	1536	72	370		2665
HC	2000	P	28744	2047				4166	34957
HC	2000	D	391	259	1239	59	283		2232
HC	2005	P	18523	1064				3616	23204
HC	2005	D	471	194	811	50	167		1693
HC	2010	P	12452	600				2787	15839
HC	2010	D	490	138	417	32	68		1144
HC	2010	CNG	1				75		77
HC	2015	P	8993	377				2141	11511
HC	2015	D	551	110	246	19	36		962
HC	2015	CNG	2				103		105
HC	2020	P	6781	241				1724	8746
HC	2020	D	599	93	141	9	19		862
HC	2020	CNG	2				117		120
HC	2025	P	5964	168				1518	7650
HC	2025	D	636	82	90	5	12		826
HC	2025	CNG	3				131		133
HC	2030	P	5669	134				1442	7246
HC	2030	D	660	80	71	4	10		824
HC	2030	CNG	3				137		140
HC	2035	P	5610	119				1424	7153
HC	2035	D	680	80	67	3	10		840
HC	2035	CNG	3				143		146
MF	1990	P	3027994	147755				53102	3228851
MF	1990	D	177592	70410	511640	29869	65932		855442
MF	1995	P	3152789	132529				50060	3335378
MF	1995	D	205899	87663	538111	30046	73126		934845
MF	2000	P	3290329	116126				58626	3465082
MF	2000	D	276411	124873	551278	26209	73751		1052523
MF	2005	P	3042263	85664				66135	3194063
MF	2005	D	525252	172626	542361	27790	82151		1350179
MF	2010	P	2680839	61993				75946	2818778
MF	2010	D	840585	214927	574564	31099	84070		1745246
MF	2010	CNG	4270				3877		8147
MF	2015	P	2298242	48210				79465	2425917
MF	2015	D	1095307	235911	609331	30477	85949		2056976
MF	2015	CNG	7073				5254		12327
MF	2020	P	1959730	37728				81891	2079349

Emission	Year	Fuel	PC	LCV	HGV	Coach	UBus	Motorcycle	Total
MF	2020	D	1 265 554	246 095	630 618	30 081	89 189		2 261 537
MF	2020	CNG	9 357				5 964		15 321
MF	2025	P	1 734 196	31 738				84 912	1 850 846
MF	2025	D	1 316 466	253 957	645 202	29 994	92 897		2 338 515
MF	2025	CNG	10 288				6 631		16 919
MF	2030	P	1 600 591	28 070				88 313	1 716 974
MF	2030	D	1 302 156	263 537	656 633	29 972	97 265		2 349 564
MF	2030	CNG	10 333				6 937		17 271
MF	2035	P	1 507 956	25 786				92 099	1 625 841
MF	2035	D	1 266 365	272 820	668 584	29 972	101 961		2 339 702
MF	2035	CNG	10 071				7 234		17 305
NO ₂	1990	P	1 762	215				15	1 992
NO ₂	1990	D	155	115	1 572	87	206		2 135
NO ₂	1995	P	1 588	153				17	1 759
NO ₂	1995	D	172	142	1 531	83	221		2 149
NO ₂	2000	P	1 521	116				21	1 658
NO ₂	2000	D	321	214	1 450	69	210		2 264
NO ₂	2005	P	1 014	64				24	1 102
NO ₂	2005	D	1 863	660	1 138	64	336		4 062
NO ₂	2010	P	561	32				24	618
NO ₂	2010	D	3 332	1 025	965	62	479		5 863
NO ₂	2010	CNG	0				33		33
NO ₂	2015	P	298	18				23	338
NO ₂	2015	D	3 828	1 071	845	52	404		6 201
NO ₂	2015	CNG	1				45		45
NO ₂	2020	P	170	10				19	198
NO ₂	2020	D	3 027	774	622	37	256		4 715
NO ₂	2020	CNG	1				51		52
NO ₂	2025	P	134	5				16	156
NO ₂	2025	D	2 240	534	469	27	141		3 410
NO ₂	2025	CNG	1				56		57
NO ₂	2030	P	126	3				14	143
NO ₂	2030	D	1 785	392	410	23	78		2 689
NO ₂	2030	CNG	1				59		60
NO ₂	2035	P	124	2				14	140
NO ₂	2035	D	1 651	319	396	22	53		2 441
NO ₂	2035	CNG	1				61		63
NO _x	1990	P	48 366	4 299				297	52 962
NO _x	1990	D	1 919	1 447	22 459	1 238	2 948		30 011
NO _x	1995	P	36 490	2 997				342	39 829
NO _x	1995	D	2 119	1 788	21 877	1 191	3 155		30 129
NO _x	2000	P	29 940	2 221				423	32 584
NO _x	2000	D	2 987	2 345	20 721	987	2 996		30 036
NO _x	2005	P	19 192	1 198				490	20 879
NO _x	2005	D	6 472	3 085	16 201	920	2 826		29 504

Emission	Year	Fuel	PC	LCV	HGV	Coach	UBus	Motorcycle	Total
NO _x	2010	P	10773	608				481	11862
NO _x	2010	D	9006	3306	11886	792	2303		27293
NO _x	2010	CNG	4				131		136
NO _x	2015	P	5943	343				455	6741
NO _x	2015	D	10546	3190	9220	595	1764		25316
NO _x	2015	CNG	8				178		186
NO _x	2020	P	3578	189				377	4143
NO _x	2020	D	8756	2440	5396	335	1046		17973
NO _x	2020	CNG	10				202		212
NO _x	2025	P	2893	104				322	3319
NO _x	2025	D	7009	1823	2821	176	549		12378
NO _x	2025	CNG	12				225		237
NO _x	2030	P	2710	61				289	3060
NO _x	2030	D	5983	1481	1800	110	298		9672
NO _x	2030	CNG	13				235		248
NO _x	2035	P	2677	43				274	2995
NO _x	2035	D	5705	1331	1493	86	195		8810
NO _x	2035	CNG	13				245		258
PM exhaust	1990	P	311	30					341
PM exhaust	1990	D	369	303	894	49	165		1781
PM exhaust	1995	P	271	24					295
PM exhaust	1995	D	393	357	822	44	159		1775
PM exhaust	2000	P	315	21					336
PM exhaust	2000	D	436	339	618	33	127		1552
PM exhaust	2005	P	243	14					257
PM exhaust	2005	D	519	282	399	25	78		1303
PM exhaust	2010	P	170	8					178
PM exhaust	2010	D	463	225	222	15	31		956
PM exhaust	2010	CNG	0				1		1
PM exhaust	2015	P	108	5					114
PM exhaust	2015	D	309	147	141	9	15		622
PM exhaust	2015	CNG	0				1		1
PM exhaust	2020	P	64	4					68
PM exhaust	2020	D	170	85	71	4	6		337
PM exhaust	2020	CNG	0				1		1
PM exhaust	2025	P	48	2					50
PM exhaust	2025	D	89	47	31	2	3		172
PM exhaust	2025	CNG	0				1		1
PM exhaust	2030	P	44	2					45
PM exhaust	2030	D	62	27	15	1	2		107
PM exhaust	2030	CNG	0				1		1
PM exhaust	2035	P	43	1					44
PM exhaust	2035	D	57	18	11	1	2		88
PM exhaust	2035	CNG	0				1		1
PN	1990	P	5.4E + 16	4.5E + 15					5.9E + 16

Emission	Year	Fuel	PC	LCV	HGV	Coach	UBus	Motorcycle	Total
PN	1990	D	1.7E + 17	1.7E + 17	2.1E + 17	1.3E + 16	2.4E + 16		5.8E + 17
PN	1995	P	5.2E + 16	3.9E + 15					5.6E + 16
PN	1995	D	1.9E + 17	2.1E + 17	2.3E + 17	1.3E + 16	2.7E + 16		6.6E + 17
PN	2000	P	5.4E + 16	3.3E + 15					5.7E + 16
PN	2000	D	2.5E + 17	2.4E + 17	2.6E + 17	1.2E + 16	2.9E + 16		8.0E + 17
PN	2005	P	4.9E + 16	2.3E + 15					5.2E + 16
PN	2005	D	5.2E + 17	2.7E + 17	3.3E + 17	1.7E + 16	3.0E + 16		1.2E + 18
PN	2010	P	4.4E + 16	1.7E + 15					4.6E + 16
PN	2010	D	5.1E + 17	2.5E + 17	2.3E + 17	1.5E + 16	1.5E + 16		1.0E + 18
PN	2010	CNG	7.7E + 13				2.1E + 13		9.9E + 13
PN	2015	P	3.9E + 16	1.3E + 15					4.0E + 16
PN	2015	D	3.4E + 17	1.6E + 17	1.6E + 17	1.0E + 16	8.5E + 15		6.8E + 17
PN	2015	CNG	1.3E + 14				2.9E + 13		1.6E + 14
PN	2020	P	3.3E + 16	1.1E + 15					3.5E + 16
PN	2020	D	1.7E + 17	8.7E + 16	8.2E + 16	5.0E + 15	4.2E + 15		3.4E + 17
PN	2020	CNG	1.8E + 14				3.3E + 13		2.1E + 14
PN	2025	P	3.1E + 16	9.1E + 14					3.2E + 16
PN	2025	D	6.1E + 16	4.4E + 16	3.2E + 16	2.0E + 15	1.7E + 15		1.4E + 17
PN	2025	CNG	2.0E + 14				3.7E + 13		2.4E + 14
PN	2030	P	3.0E + 16	8.1E + 14					3.1E + 16
PN	2030	D	2.3E + 16	1.9E + 16	1.1E + 16	7.8E + 14	7.6E + 14		5.4E + 16
PN	2030	CNG	2.1E + 14				3.9E + 13		2.5E + 14
PN	2035	P	3.0E + 16	7.5E + 14					3.1E + 16
PN	2035	D	1.5E + 16	7.6E + 15	4.6E + 15	3.3E + 14	4.9E + 14		2.8E + 16
PN	2035	CNG	2.2E + 14				4.1E + 13		2.6E + 14

A5-5 Emissions by emission concept

Tab. 18 > Emissions in tonnes per annum, differentiated by emission concept

Emission	Vehicle cat.	Concept	1990	1995	2000	2005	2010	2015	2020	2025	2030	2035
CO	PC	PC-P-Euro-0	442 485	204 004	71 423	18 930	4 359	1 604	728	421	242	128
CO	PC	PC-P-Euro-1		58 997	66 522	38 393	15 579	4 229	970	326	165	83
CO	PC	PC-P-Euro-2			42 714	43 481	29 083	13 858	3 349	753	272	138
CO	PC	PC-P-Euro-3			1 292	19 619	15 919	10 455	3 991	937	221	87
CO	PC	PC-P-Euro-4			186	9 810	23 864	18 635	10 524	3 751	865	217
CO	PC	PC-P-Euro-5					1 492	12 369	9 450	5 732	2 201	508
CO	PC	PC-P-Euro-6						3 605	18 740	29 581	35 659	38 238
CO	PC	PC alternative					31	49	60	65	67	69
CO	PC	PC-D-Euro-0	2 027	1 096	368	97	18	8	4	3	2	1
CO	PC	PC-D-Euro-1	275	1 100	917	387	142	42	10	3	2	1
CO	PC	PC-D-Euro-2		1	688	502	270	125	34	7	3	1
CO	PC	PC-D-Euro-3			36	1 113	731	444	176	45	9	4
CO	PC	PC-D-Euro-4				185	1 151	889	510	194	47	10
CO	PC	PC-D-Euro-5					129	837	642	379	146	35
CO	PC	PC-D-Euro-6						275	1 475	2 419	2 971	3 230
CO	LCV	LCV-P-Euro-0	53 890	29 790	11 250	3 616	1 663	780	319	101	49	23
CO	LCV	LCV-P-Euro-1	619	8 993	11 790	6 233	2 724	1 477	759	337	108	31
CO	LCV	LCV-P-Euro-2			2 015	2 685	1 640	922	500	253	98	27
CO	LCV	LCV-P-Euro-3			13	794	748	464	221	106	45	16
CO	LCV	LCV-P-Euro-4				111	625	578	311	137	58	21
CO	LCV	LCV-P-Euro-5					8	342	301	159	65	26
CO	LCV	LCV-P-Euro-6						44	505	893	1 095	1 159
CO	LCV	LCV-D-Euro-0	1 087	1 189	615	242	111	54	20	7	2	1
CO	LCV	LCV-D-Euro-1		135	473	249	116	69	35	12	5	1
CO	LCV	LCV-D-Euro-2			237	315	167	94	58	22	8	3
CO	LCV	LCV-D-Euro-3			1	235	240	149	80	46	16	6
CO	LCV	LCV-D-Euro-4					154	157	91	47	26	9
CO	LCV	LCV-D-Euro-5					2	94	86	48	24	14
CO	LCV	LCV-D-Euro-6						13	155	284	365	415
CO	HGV	HGV-D-Euro-0	4 716	3 695	1 803	465	106	26	6	1	0	0
CO	HGV	HGV-D-Euro-I		864	680	207	73	33	11	3	1	0
CO	HGV	HGV-D-Euro-II			1 311	610	257	104	50	11	2	1
CO	HGV	HGV-D-Euro-III			176	2 145	1 253	680	290	108	23	4
CO	HGV	HGV-D-Euro-IV				25	274	191	88	35	10	2
CO	HGV	HGV-D-Euro-V				13	1 419	2 040	1 226	460	157	39
CO	HGV	HGV-D-Euro-VI						254	1 127	1 787	2 071	2 198
CO	Coach	Coach-D-Euro-0	226	192	99	41	11	4	1	0	0	0
CO	Coach	Coach-D-Euro-I		30	49	29	9	4	1	0	0	0
CO	Coach	Coach-D-Euro-II		0	34	44	23	10	4	1	0	0
CO	Coach	Coach-D-Euro-III			0	68	76	47	19	7	2	1
CO	Coach	Coach-D-Euro-IV				1	36	29	14	5	2	1

Emission	Vehicle cat.	Concept	1990	1995	2000	2005	2010	2015	2020	2025	2030	2035
CO	Coach	Coach-D-Euro-V					47	85	57	24	9	3
CO	Coach	Coach-D-Euro-VI						13	58	91	106	111
CO	UBus	UBus-D-Euro-0	1042	1037	710	318	84	23	6	2	0	0
CO	UBus	UBus-D-Euro-I		54	86	60	35	16	4	1	0	0
CO	UBus	UBus-D-Euro-II		0	130	162	85	50	21	5	1	0
CO	UBus	UBus-D-Euro-III			1	128	88	56	32	12	3	1
CO	UBus	UBus-D-Euro-IV				0	25	20	11	6	2	0
CO	UBus	UBus-D-Euro-V					29	66	46	25	13	3
CO	UBus	UBus-D-Euro-VI						41	167	268	332	373
CO	UBus	UBus alternative					23	31	35	39	41	43
CO	MC	Moped-EU0	9393	2365	751	411	205	111	63	36	20	11
CO	MC	Moped-EU1	184	933	1002	782	396	123	37	13	6	3
CO	MC	Moped-EU2					130	103	32	7	2	1
CO	MC	Moped-EU3						45	28	7	2	0
CO	MC	Moped-EU4						15	84	117	119	115
CO	MC	LMC-Euro-0	520	184	58	23	18	11	8	6	5	3
CO	MC	LMC-Euro-1	230	456	1002	1359	597	130	52	29	20	15
CO	MC	LMC-Euro-2					257	220	64	15	7	4
CO	MC	LMC-Euro-3						188	93	22	7	3
CO	MC	LMC-Euro-4						28	312	444	487	514
CO	MC	MC-2S-Euro-0	4462	2648	1450	199	107	63	37	21	12	7
CO	MC	MC-2S-Euro-1	1124	2895	4633	3747	1794	815	362	183	102	59
CO	MC	MC-2S-Euro-2				1173	1068	645	273	113	54	31
CO	MC	MC-2S-Euro-3					907	868	500	207	85	43
CO	MC	MC-2S-Euro-4						351	274	156	61	25
CO	MC	MC-2S-Euro-5						41	520	871	1061	1150
CO	MC	MC-4S-Euro-0	10654	6349	4296	2849	1375	900	699	535	409	311
CO	MC	MC-4S-Euro-1	3202	8838	14035	13270	9385	5919	3528	2054	1431	1098
CO	MC	MC-4S-Euro-2				1929	1720	1193	783	485	248	163
CO	MC	MC-4S-Euro-3					1358	1624	1135	732	428	224
CO	MC	MC-4S-Euro-4						846	669	461	281	158
CO	MC	MC-4S-Euro-5						78	951	1652	2179	2552
CO ₂ (rep.)	PC	PC-P-Euro-0	9510324	5566520	2392084	677557	144210	41455	17109	9137	4839	2434
CO ₂ (rep.)	PC	PC-P-Euro-1		4335759	4047728	2227228	887232	230907	54956	18988	9678	4846
CO ₂ (rep.)	PC	PC-P-Euro-2			3729098	3147389	2009427	897564	221690	51135	18848	9610
CO ₂ (rep.)	PC	PC-P-Euro-3			134452	1962808	1545993	940752	357046	84974	20692	8348
CO ₂ (rep.)	PC	PC-P-Euro-4			30905	1537115	3430699	2465816	1369377	477086	112392	29444
CO ₂ (rep.)	PC	PC-P-Euro-5					213151	1618826	1240855	741295	282803	66824
CO ₂ (rep.)	PC	PC-P-Euro-6						485439	2435705	3658522	4203505	4261973
CO ₂ (rep.)	PC	PC alternative					10542	17462	23099	25397	25510	24862
CO ₂ (rep.)	PC	PC-D-Euro-0	461298	263591	94971	24683	4454	1693	887	659	408	226
CO ₂ (rep.)	PC	PC-D-Euro-1	98133	384645	326624	141074	52644	15509	3731	1251	750	451
CO ₂ (rep.)	PC	PC-D-Euro-2		366	415301	297832	163584	74307	20470	4430	1560	925
CO ₂ (rep.)	PC	PC-D-Euro-3			32694	948338	641540	382162	154369	39411	8234	3498
CO ₂ (rep.)	PC	PC-D-Euro-4				236997	1536163	1171657	678846	260685	65069	13719

Emission	Vehicle cat.	Concept	1990	1995	2000	2005	2010	2015	2020	2025	2030	2035
CO ₂ (rep.)	PC	PC-D-Euro-5					218 946	1 325 630	1 024 229	600 901	235 098	57 954
CO ₂ (rep.)	PC	PC-D-Euro-6						383 860	1 993 733	3 124 867	3 677 256	3 801 976
CO ₂ (rep.)	LCV	LCV-P-Euro-0	450 724	244 838	92 188	29 301	13 354	6 015	2 466	775	371	172
CO ₂ (rep.)	LCV	LCV-P-Euro-1	13 345	171 409	199 470	100 547	42 538	21 752	11 185	4 960	1 588	461
CO ₂ (rep.)	LCV	LCV-P-Euro-2			72 276	84 505	48 207	25 907	14 327	7 365	2 870	779
CO ₂ (rep.)	LCV	LCV-P-Euro-3			796	46 521	42 662	25 534	12 615	6 376	2 811	1 001
CO ₂ (rep.)	LCV	LCV-P-Euro-4				8 094	43 025	37 279	20 327	9 208	3 994	1 490
CO ₂ (rep.)	LCV	LCV-P-Euro-5					545	20 999	18 478	9 854	4 115	1 697
CO ₂ (rep.)	LCV	LCV-P-Euro-6						2 656	30 274	53 720	65 849	69 357
CO ₂ (rep.)	LCV	LCV-D-Euro-0	221 800	238 477	121 490	46 965	21 201	10 207	3 748	1 373	426	200
CO ₂ (rep.)	LCV	LCV-D-Euro-1		37 669	129 578	66 701	30 640	18 012	9 135	3 020	1 195	312
CO ₂ (rep.)	LCV	LCV-D-Euro-2			140 752	181 374	93 363	51 646	31 762	11 888	4 200	1 461
CO ₂ (rep.)	LCV	LCV-D-Euro-3			1 028	246 885	241 951	146 561	78 525	45 300	15 745	5 841
CO ₂ (rep.)	LCV	LCV-D-Euro-4					277 375	277 531	159 976	83 440	46 965	15 962
CO ₂ (rep.)	LCV	LCV-D-Euro-5					4 687	193 978	176 909	97 832	50 210	28 599
CO ₂ (rep.)	LCV	LCV-D-Euro-6						24 636	293 708	534 993	688 448	783 246
CO ₂ (rep.)	HGV	HGV-D-Euro-0	1 611 716	1 307 960	628 604	155 115	35 555	8 544	2 014	487	158	50
CO ₂ (rep.)	HGV	HGV-D-Euro-I		387 144	308 436	97 642	33 506	14 499	4 708	1 123	238	71
CO ₂ (rep.)	HGV	HGV-D-Euro-II			713 969	346 824	144 152	56 273	26 665	6 061	1 252	280
CO ₂ (rep.)	HGV	HGV-D-Euro-III			83 313	1 081 454	629 922	329 765	140 776	52 182	10 948	2 156
CO ₂ (rep.)	HGV	HGV-D-Euro-IV				14 391	154 588	105 909	48 975	19 445	5 514	980
CO ₂ (rep.)	HGV	HGV-D-Euro-V				7 206	791 298	1 117 170	670 062	251 271	85 673	21 036
CO ₂ (rep.)	HGV	HGV-D-Euro-VI						234 162	1 038 319	1 645 620	1 907 419	2 023 234
CO ₂ (rep.)	Coach	Coach-D-Euro-0	94 089	81 352	42 164	17 772	4 815	1 528	444	123	38	12
CO ₂ (rep.)	Coach	Coach-D-Euro-I		13 248	21 876	13 246	4 257	1 627	545	153	40	12
CO ₂ (rep.)	Coach	Coach-D-Euro-II		48	18 211	24 544	12 763	5 092	1 952	639	164	46
CO ₂ (rep.)	Coach	Coach-D-Euro-III			204	31 316	34 733	20 481	8 228	3 024	999	253
CO ₂ (rep.)	Coach	Coach-D-Euro-IV				363	17 429	13 800	6 951	2 586	862	304
CO ₂ (rep.)	Coach	Coach-D-Euro-V					22 835	40 422	27 321	11 644	4 338	1 459
CO ₂ (rep.)	Coach	Coach-D-Euro-VI						10 397	46 695	73 699	85 361	89 715
CO ₂ (rep.)	UBus	UBus-D-Euro-0	207 692	209 868	144 339	66 130	17 318	4 549	1 232	316	81	21
CO ₂ (rep.)	UBus	UBus-D-Euro-I		20 414	32 737	23 310	13 411	5 934	1 486	402	103	26
CO ₂ (rep.)	UBus	UBus-D-Euro-II		74	54 469	69 226	41 083	22 898	9 908	2 489	666	171
CO ₂ (rep.)	UBus	UBus-D-Euro-III			477	98 690	105 535	65 437	37 024	14 357	3 547	956
CO ₂ (rep.)	UBus	UBus-D-Euro-IV				539	39 434	30 230	16 584	9 680	2 792	710
CO ₂ (rep.)	UBus	UBus-D-Euro-V					44 989	100 782	70 108	38 561	19 260	5 272
CO ₂ (rep.)	UBus	UBus-D-Euro-VI						33 423	136 835	218 728	271 462	305 139
CO ₂ (rep.)	UBus	UBus alternative					9 571	12 970	14 723	16 371	17 127	17 860
CO ₂ (rep.)	MC	Moped-EU0	51 311	12 918	4 076	2 252	1 098	562	319	181	101	57
CO ₂ (rep.)	MC	Moped-EU1	2 120	10 771	11 497	9 063	4 498	1 317	397	142	63	32
CO ₂ (rep.)	MC	Moped-EU2					2 656	1 971	614	141	41	16
CO ₂ (rep.)	MC	Moped-EU3						1 086	681	169	40	12
CO ₂ (rep.)	MC	Moped-EU4						355	2 020	2 810	2 862	2 774
CO ₂ (rep.)	MC	LMC-Euro-0	4 804	1 697	530	217	160	95	71	53	40	30
CO ₂ (rep.)	MC	LMC-Euro-1	2 122	4 216	9 190	12 601	5 417	1 110	445	244	171	128

Emission	Vehicle cat.	Concept	1990	1995	2000	2005	2010	2015	2020	2025	2030	2035
CO ₂ (rep.)	MC	LMC-Euro-2					5 245	4 245	1 224	288	133	73
CO ₂ (rep.)	MC	LMC-Euro-3						4 507	2 232	527	161	74
CO ₂ (rep.)	MC	LMC-Euro-4						682	7 482	10 656	11 694	12 333
CO ₂ (rep.)	MC	MC-2S-Euro-0	20 167	11 958	6 480	899	482	266	157	90	51	29
CO ₂ (rep.)	MC	MC-2S-Euro-1	5 736	14 774	23 335	19 146	9 148	3 928	1 752	885	497	285
CO ₂ (rep.)	MC	MC-2S-Euro-2				6 619	6 019	3 435	1 461	604	292	166
CO ₂ (rep.)	MC	MC-2S-Euro-3					7 897	7 096	4 098	1 702	703	353
CO ₂ (rep.)	MC	MC-2S-Euro-4						2 862	2 241	1 281	500	207
CO ₂ (rep.)	MC	MC-2S-Euro-5						385	4 907	8 236	10 051	10 909
CO ₂ (rep.)	MC	MC-4S-Euro-0	57 308	34 558	23 262	15 709	7 686	4 741	3 685	2 824	2 162	1 645
CO ₂ (rep.)	MC	MC-4S-Euro-1	23 214	66 339	105 762	104 644	75 767	45 504	27 569	16 209	11 364	8 770
CO ₂ (rep.)	MC	MC-4S-Euro-2				36 500	37 950	25 492	17 461	11 149	5 763	3 829
CO ₂ (rep.)	MC	MC-4S-Euro-3					69 146	74 243	54 158	37 444	22 836	12 105
CO ₂ (rep.)	MC	MC-4S-Euro-4						41 253	33 361	24 520	16 512	9 721
CO ₂ (rep.)	MC	MC-4S-Euro-5						5 864	71 716	126 674	170 681	204 171
CO ₂ (total)	PC	PC-P-Euro-0	9 510 173	5 566 431	2 392 046	677 762	147 524	44 789	18 486	9 872	5 228	2 630
CO ₂ (total)	PC	PC-P-Euro-1		4 335 690	4 047 663	2 227 902	907 620	249 483	59 378	20 515	10 456	5 236
CO ₂ (total)	PC	PC-P-Euro-2			3 729 038	3 148 342	2 055 602	969 770	239 525	55 249	20 365	10 383
CO ₂ (total)	PC	PC-P-Euro-3			134 450	1 963 402	1 581 518	1 016 432	385 769	91 809	22 356	9 020
CO ₂ (total)	PC	PC-P-Euro-4			30 904	1 537 580	3 509 533	2 664 182	1 479 538	515 466	121 434	31 812
CO ₂ (total)	PC	PC-P-Euro-5					218 049	1 749 055	1 340 678	800 929	305 554	72 200
CO ₂ (total)	PC	PC-P-Euro-6						524 491	2 631 648	3 952 837	4 541 662	4 604 834
CO ₂ (total)	PC	PC alternative					11 713	19 402	25 666	28 219	28 345	27 624
CO ₂ (total)	PC	PC-D-Euro-0	461 295	263 589	95 094	24 767	4 506	1 742	912	678	420	233
CO ₂ (total)	PC	PC-D-Euro-1	98 133	384 643	327 047	141 559	53 259	15 950	3 837	1 286	771	464
CO ₂ (total)	PC	PC-D-Euro-2		366	415 840	298 855	165 495	76 422	21 052	4 556	1 604	951
CO ₂ (total)	PC	PC-D-Euro-3			32 736	951 595	649 035	393 039	158 763	40 533	8 468	3 598
CO ₂ (total)	PC	PC-D-Euro-4				237 811	1 554 111	1 205 006	698 168	268 104	66 921	14 110
CO ₂ (total)	PC	PC-D-Euro-5					221 504	1 363 362	1 053 381	618 005	241 790	59 604
CO ₂ (total)	PC	PC-D-Euro-6						394 785	2 050 481	3 213 811	3 781 922	3 910 193
CO ₂ (total)	LCV	LCV-P-Euro-0	450 717	244 834	92 186	29 310	13 661	6 499	2 664	837	400	186
CO ₂ (total)	LCV	LCV-P-Euro-1	13 345	171 406	199 466	100 578	43 515	23 502	12 085	5 360	1 716	498
CO ₂ (total)	LCV	LCV-P-Euro-2			72 275	84 531	49 314	27 991	15 479	7 957	3 101	841
CO ₂ (total)	LCV	LCV-P-Euro-3			796	46 536	43 642	27 588	13 630	6 889	3 037	1 081
CO ₂ (total)	LCV	LCV-P-Euro-4				8 097	44 014	40 278	21 962	9 949	4 315	1 610
CO ₂ (total)	LCV	LCV-P-Euro-5					557	22 688	19 965	10 647	4 446	1 834
CO ₂ (total)	LCV	LCV-P-Euro-6						2 870	32 709	58 042	71 146	74 937
CO ₂ (total)	LCV	LCV-D-Euro-0	221 798	238 475	121 648	47 126	21 448	10 498	3 855	1 412	438	206
CO ₂ (total)	LCV	LCV-D-Euro-1		37 669	129 746	66 930	30 998	18 524	9 395	3 106	1 229	321
CO ₂ (total)	LCV	LCV-D-Euro-2			140 935	181 996	94 454	53 116	32 666	12 227	4 319	1 502
CO ₂ (total)	LCV	LCV-D-Euro-3			1 030	247 733	244 778	150 733	80 760	46 589	16 194	6 007
CO ₂ (total)	LCV	LCV-D-Euro-4					280 616	285 430	164 530	85 815	48 301	16 416
CO ₂ (total)	LCV	LCV-D-Euro-5					4 742	199 499	181 944	100 616	51 639	29 413
CO ₂ (total)	LCV	LCV-D-Euro-6						25 337	302 068	550 220	708 043	805 539
CO ₂ (total)	HGV	HGV-D-Euro-0	1 611 705	1 307 952	629 419	155 648	35 971	8 787	2 072	501	162	51

Emission	Vehicle cat.	Concept	1990	1995	2000	2005	2010	2015	2020	2025	2030	2035
CO ₂ (total)	HGV	HGV-D-Euro-I		387 142	308 836	97 977	33 897	14 911	4 842	1 155	245	73
CO ₂ (total)	HGV	HGV-D-Euro-II			714 895	348 015	145 837	57 875	27 424	6 234	1 287	288
CO ₂ (total)	HGV	HGV-D-Euro-III			83 422	1 085 168	637 282	339 151	144 782	53 667	11 259	2 217
CO ₂ (total)	HGV	HGV-D-Euro-IV				14 441	156 394	108 924	50 369	19 998	5 671	1 008
CO ₂ (total)	HGV	HGV-D-Euro-V				7 231	800 544	1 148 968	689 134	258 423	88 112	21 635
CO ₂ (total)	HGV	HGV-D-Euro-VI						240 827	1 067 873	1 692 459	1 961 710	2 080 822
CO ₂ (total)	Coach	Coach-D-Euro-0	94 088	81 352	42 218	17 833	4 872	1 571	457	126	40	12
CO ₂ (total)	Coach	Coach-D-Euro-I		13 248	21 904	13 292	4 306	1 674	561	157	41	13
CO ₂ (total)	Coach	Coach-D-Euro-II		48	18 235	24 628	12 912	5 237	2 007	657	169	47
CO ₂ (total)	Coach	Coach-D-Euro-III			204	31 423	35 139	21 064	8 463	3 110	1 027	260
CO ₂ (total)	Coach	Coach-D-Euro-IV				365	17 633	14 193	7 149	2 659	887	312
CO ₂ (total)	Coach	Coach-D-Euro-V					23 102	41 572	28 098	11 976	4 462	1 501
CO ₂ (total)	Coach	Coach-D-Euro-VI						10 693	48 024	75 797	87 790	92 269
CO ₂ (total)	UBus	UBus-D-Euro-0	207 690	209 866	144 527	66 357	17 521	4 679	1 267	325	83	21
CO ₂ (total)	UBus	UBus-D-Euro-I		20 414	32 779	23 390	13 567	6 103	1 529	413	106	27
CO ₂ (total)	UBus	UBus-D-Euro-II		74	54 539	69 463	41 564	23 549	10 190	2 560	685	176
CO ₂ (total)	UBus	UBus-D-Euro-III			478	99 029	106 768	67 300	38 078	14 765	3 648	983
CO ₂ (total)	UBus	UBus-D-Euro-IV				541	39 895	31 091	17 056	9 956	2 872	730
CO ₂ (total)	UBus	UBus-D-Euro-V					45 514	103 651	72 104	39 659	19 809	5 423
CO ₂ (total)	UBus	UBus-D-Euro-VI						34 374	140 730	224 954	279 189	313 824
CO ₂ (total)	UBus	UBus alternative					10 634	14 411	16 359	18 190	19 029	19 844
CO ₂ (total)	MC	Moped-EU0	51 310	12 917	4 076	2 253	1 123	607	345	196	109	61
CO ₂ (total)	MC	Moped-EU1	2 120	10 771	11 497	9 066	4 601	1 423	429	153	68	35
CO ₂ (total)	MC	Moped-EU2					2 717	2 130	663	152	44	17
CO ₂ (total)	MC	Moped-EU3						1 173	736	183	43	13
CO ₂ (total)	MC	Moped-EU4						384	2 182	3 036	3 092	2 998
CO ₂ (total)	MC	LMC-Euro-0	4 804	1 697	530	217	164	102	77	57	43	32
CO ₂ (total)	MC	LMC-Euro-1	2 122	4 216	9 190	12 605	5 541	1 200	481	264	185	139
CO ₂ (total)	MC	LMC-Euro-2					5 366	4 587	1 322	311	144	78
CO ₂ (total)	MC	LMC-Euro-3						4 870	2 411	570	174	80
CO ₂ (total)	MC	LMC-Euro-4						737	8 084	11 513	12 634	13 326
CO ₂ (total)	MC	MC-2S-Euro-0	20 166	11 958	6 480	900	493	287	170	98	56	32
CO ₂ (total)	MC	MC-2S-Euro-1	5 736	14 773	23 335	19 152	9 358	4 244	1 893	957	537	308
CO ₂ (total)	MC	MC-2S-Euro-2				6 621	6 157	3 711	1 578	653	316	179
CO ₂ (total)	MC	MC-2S-Euro-3					8 078	7 667	4 427	1 839	760	381
CO ₂ (total)	MC	MC-2S-Euro-4						3 092	2 421	1 384	540	224
CO ₂ (total)	MC	MC-2S-Euro-5						416	5 302	8 898	10 859	11 786
CO ₂ (total)	MC	MC-4S-Euro-0	57 307	34 557	23 262	15 714	7 863	5 122	3 982	3 052	2 336	1 778
CO ₂ (total)	MC	MC-4S-Euro-1	23 214	66 338	105 760	104 675	77 508	49 165	29 787	17 513	12 278	9 476
CO ₂ (total)	MC	MC-4S-Euro-2				36 511	38 822	27 542	18 866	12 046	6 226	4 137
CO ₂ (total)	MC	MC-4S-Euro-3					70 735	80 215	58 515	40 456	24 673	13 079
CO ₂ (total)	MC	MC-4S-Euro-4						44 572	36 045	26 492	17 841	10 503
CO ₂ (total)	MC	MC-4S-Euro-5						6 336	77 485	136 865	184 412	220 596
HC	PC	PC-P-Euro-0	71 673	33 514	11 530	2 998	666	241	109	63	36	19
HC	PC	PC-P-Euro-1		9 981	10 306	5 792	2 318	626	143	48	24	12

Emission	Vehicle cat.	Concept	1990	1995	2000	2005	2010	2015	2020	2025	2030	2035
HC	PC	PC-P-Euro-2			6 729	5 985	3 827	1 811	435	98	35	18
HC	PC	PC-P-Euro-3			148	2 201	1 722	1 114	424	99	23	9
HC	PC	PC-P-Euro-4			30	1 547	3 693	2 824	1 583	567	130	32
HC	PC	PC-P-Euro-5					226	1 862	1 420	866	333	76
HC	PC	PC-P-Euro-6						514	2 668	4 223	5 088	5 443
HC	PC	PC alternative					1	2	2	3	3	3
HC	PC	PC-D-Euro-0	424	225	74	20	4	2	1	1	0	0
HC	PC	PC-D-Euro-1	50	199	166	70	26	8	2	1	0	0
HC	PC	PC-D-Euro-2		0	143	105	57	26	7	2	1	0
HC	PC	PC-D-Euro-3			8	242	161	98	39	10	2	1
HC	PC	PC-D-Euro-4				34	212	164	95	36	9	2
HC	PC	PC-D-Euro-5					30	197	152	89	35	8
HC	PC	PC-D-Euro-6						57	304	498	613	668
HC	LCV	LCV-P-Euro-0	5 317	2 976	1 125	365	165	76	31	10	5	2
HC	LCV	LCV-P-Euro-1	36	564	746	395	167	87	43	19	6	2
HC	LCV	LCV-P-Euro-2			175	221	130	71	37	18	7	2
HC	LCV	LCV-P-Euro-3			1	71	67	40	19	9	4	1
HC	LCV	LCV-P-Euro-4				12	70	64	34	14	6	2
HC	LCV	LCV-P-Euro-5					1	35	31	16	6	2
HC	LCV	LCV-P-Euro-6						4	47	82	101	107
HC	LCV	LCV-D-Euro-0	218	237	123	48	22	11	4	1	0	0
HC	LCV	LCV-D-Euro-1		26	89	47	22	13	7	2	1	0
HC	LCV	LCV-D-Euro-2			47	62	32	18	11	4	2	1
HC	LCV	LCV-D-Euro-3			0	37	38	23	12	7	3	1
HC	LCV	LCV-D-Euro-4					24	25	14	7	4	1
HC	LCV	LCV-D-Euro-5					0	18	17	9	5	3
HC	LCV	LCV-D-Euro-6						2	28	51	65	74
HC	HGV	HGV-D-Euro-0	1 662	1 246	609	153	35	9	2	0	0	0
HC	HGV	HGV-D-Euro-I		290	228	65	23	11	4	1	0	0
HC	HGV	HGV-D-Euro-II			363	156	66	28	13	3	1	0
HC	HGV	HGV-D-Euro-III			39	436	256	141	60	22	5	1
HC	HGV	HGV-D-Euro-IV				1	6	4	2	1	0	0
HC	HGV	HGV-D-Euro-V				0	31	45	27	10	3	1
HC	HGV	HGV-D-Euro-VI						8	33	53	61	65
HC	Coach	Coach-D-Euro-0	75	62	32	13	3	1	0	0	0	0
HC	Coach	Coach-D-Euro-I		11	17	10	3	1	0	0	0	0
HC	Coach	Coach-D-Euro-II		0	10	13	7	3	1	0	0	0
HC	Coach	Coach-D-Euro-III			0	15	17	10	4	2	1	0
HC	Coach	Coach-D-Euro-IV				0	1	1	0	0	0	0
HC	Coach	Coach-D-Euro-V					1	2	1	1	0	0
HC	Coach	Coach-D-Euro-VI						0	2	3	3	3
HC	UBus	UBus-D-Euro-0	383	356	233	98	25	7	2	1	0	0
HC	UBus	UBus-D-Euro-I		14	23	15	9	4	1	0	0	0
HC	UBus	UBus-D-Euro-II		0	27	32	17	11	4	1	0	0
HC	UBus	UBus-D-Euro-III			0	22	15	10	6	2	1	0

Emission	Vehicle cat.	Concept	1990	1995	2000	2005	2010	2015	2020	2025	2030	2035
HC	UBus	UBus-D-Euro-IV				0	1	1	0	0	0	0
HC	UBus	UBus-D-Euro-V					1	2	1	1	0	0
HC	UBus	UBus-D-Euro-VI						1	4	7	9	10
HC	UBus	UBus alternative					75	103	117	131	137	143
HC	MC	Moped-EU0	4 091	1 035	325	178	89	49	28	16	9	5
HC	MC	Moped-EU1	141	723	767	599	305	96	29	10	5	2
HC	MC	Moped-EU2					106	85	26	6	2	1
HC	MC	Moped-EU3						38	24	6	1	0
HC	MC	Moped-EU4						10	58	80	81	79
HC	MC	LMC-Euro-0	306	109	34	14	10	7	5	4	3	2
HC	MC	LMC-Euro-1	135	270	586	797	351	77	31	17	12	9
HC	MC	LMC-Euro-2					210	183	53	12	6	3
HC	MC	LMC-Euro-3						158	78	18	6	3
HC	MC	LMC-Euro-4						19	214	304	333	350
HC	MC	MC-2S-Euro-0	1 715	1 022	547	76	42	25	15	9	5	3
HC	MC	MC-2S-Euro-1	211	550	853	691	343	159	71	36	20	11
HC	MC	MC-2S-Euro-2				152	145	89	38	16	8	4
HC	MC	MC-2S-Euro-3					176	169	98	41	17	8
HC	MC	MC-2S-Euro-4						65	51	29	11	5
HC	MC	MC-2S-Euro-5						8	106	178	217	235
HC	MC	MC-4S-Euro-0	700	424	266	183	88	58	46	35	27	21
HC	MC	MC-4S-Euro-1	166	485	788	738	534	339	204	120	84	65
HC	MC	MC-4S-Euro-2				188	195	138	93	59	30	20
HC	MC	MC-4S-Euro-3					192	227	163	110	66	35
HC	MC	MC-4S-Euro-4						127	102	73	47	27
HC	MC	MC-4S-Euro-5						16	194	341	455	537
MF	PC	PC-P-Euro-0	3 027 994	1 772 325	761 616	215 796	46 971	14 261	5 886	3 143	1 665	837
MF	PC	PC-P-Euro-1		1 380 463	1 288 757	709 354	288 982	79 434	18 906	6 532	3 329	1 667
MF	PC	PC-P-Euro-2			1 187 308	1 002 417	654 494	308 770	76 264	17 591	6 484	3 306
MF	PC	PC-P-Euro-3			42 808	625 138	503 548	323 627	122 827	29 232	7 118	2 872
MF	PC	PC-P-Euro-4			9 840	489 558	1 117 419	848 263	471 078	164 122	38 664	10 129
MF	PC	PC-P-Euro-5					69 426	556 891	426 865	255 012	97 287	22 988
MF	PC	PC-P-Euro-6						166 995	837 904	1 258 565	1 446 044	1 466 158
MF	PC	PC alternative					4 270	7 073	9 357	10 288	10 333	10 071
MF	PC	PC-D-Euro-0	146 439	83 677	30 188	7 862	1 431	553	290	215	133	74
MF	PC	PC-D-Euro-1	31 152	122 106	103 822	44 938	16 907	5 063	1 218	408	245	147
MF	PC	PC-D-Euro-2		116	132 009	94 872	52 537	24 260	6 683	1 446	509	302
MF	PC	PC-D-Euro-3			10 392	302 086	206 038	124 771	50 400	12 867	2 688	1 142
MF	PC	PC-D-Euro-4				75 493	493 356	382 532	221 635	85 110	21 244	4 479
MF	PC	PC-D-Euro-5					70 317	432 802	334 398	196 187	76 757	18 921
MF	PC	PC-D-Euro-6						125 326	650 930	1 020 231	1 200 580	1 241 299
MF	LCV	LCV-P-Euro-0	143 506	77 954	29 352	9 332	4 350	2 069	848	267	127	59
MF	LCV	LCV-P-Euro-1	4 249	54 575	63 509	32 024	13 855	7 483	3 848	1 706	546	159
MF	LCV	LCV-P-Euro-2			23 012	26 914	15 701	8 912	4 929	2 534	987	268
MF	LCV	LCV-P-Euro-3			253	14 817	13 895	8 784	4 340	2 194	967	344

Emission	Vehicle cat.	Concept	1990	1995	2000	2005	2010	2015	2020	2025	2030	2035
MF	LCV	LCV-P-Euro-4				2 578	14 014	12 824	6 993	3 168	1 374	512
MF	LCV	LCV-P-Euro-5					177	7 224	6 357	3 390	1 416	584
MF	LCV	LCV-P-Euro-6						914	10 415	18 480	22 653	23 860
MF	LCV	LCV-D-Euro-0	70 410	75 705	38 617	14 960	6 809	3 333	1 224	448	139	65
MF	LCV	LCV-D-Euro-1		11 958	41 188	21 247	9 840	5 881	2 982	986	390	102
MF	LCV	LCV-D-Euro-2			44 740	57 775	29 985	16 862	10 370	3 881	1 371	477
MF	LCV	LCV-D-Euro-3			327	78 643	77 705	47 851	25 638	14 790	5 141	1 907
MF	LCV	LCV-D-Euro-4					89 082	90 611	52 230	27 242	15 333	5 211
MF	LCV	LCV-D-Euro-5					1 505	63 332	57 759	31 941	16 393	9 337
MF	LCV	LCV-D-Euro-6						8 043	95 892	174 669	224 770	255 720
MF	HGV	HGV-D-Euro-0	511 640	415 212	199 810	49 411	11 419	2 789	658	159	51	16
MF	HGV	HGV-D-Euro-I		122 899	98 041	31 103	10 761	4 734	1 537	367	78	23
MF	HGV	HGV-D-Euro-II			226 945	110 478	46 296	18 372	8 706	1 979	409	91
MF	HGV	HGV-D-Euro-III			26 482	344 489	202 307	107 664	45 962	17 037	3 574	704
MF	HGV	HGV-D-Euro-IV				4 584	49 648	34 578	15 990	6 348	1 800	320
MF	HGV	HGV-D-Euro-V				2 295	254 134	364 743	218 767	82 037	27 971	6 868
MF	HGV	HGV-D-Euro-VI						76 451	338 999	537 275	622 749	660 562
MF	Coach	Coach-D-Euro-0	29 869	25 825	13 402	5 661	1 547	499	145	40	13	4
MF	Coach	Coach-D-Euro-I		4 206	6 954	4 220	1 367	531	178	50	13	4
MF	Coach	Coach-D-Euro-II		15	5 789	7 818	4 099	1 663	637	209	54	15
MF	Coach	Coach-D-Euro-III			65	9 975	11 155	6 687	2 686	987	326	83
MF	Coach	Coach-D-Euro-IV				116	5 598	4 506	2 269	844	282	99
MF	Coach	Coach-D-Euro-V					7 334	13 197	8 920	3 802	1 416	476
MF	Coach	Coach-D-Euro-VI						3 395	15 245	24 062	27 869	29 291
MF	UBus	UBus-D-Euro-0	65 932	66 623	45 880	21 065	5 562	1 485	402	103	26	7
MF	UBus	UBus-D-Euro-I		6 480	10 406	7 425	4 307	1 937	485	131	34	9
MF	UBus	UBus-D-Euro-II		23	17 314	22 051	13 194	7 476	3 235	813	217	56
MF	UBus	UBus-D-Euro-III			152	31 437	33 894	21 365	12 088	4 687	1 158	312
MF	UBus	UBus-D-Euro-IV				172	12 665	9 870	5 415	3 161	912	232
MF	UBus	UBus-D-Euro-V					14 449	32 904	22 889	12 590	6 288	1 721
MF	UBus	UBus-D-Euro-VI						10 912	44 675	71 412	88 629	99 624
MF	UBus	UBus alternative					3 877	5 254	5 964	6 631	6 937	7 234
MF	MC	Moped-EU0	16 337	4 113	1 298	717	358	193	110	62	35	19
MF	MC	Moped-EU1	675	3 429	3 661	2 887	1 465	453	137	49	22	11
MF	MC	Moped-EU2					865	678	211	48	14	5
MF	MC	Moped-EU3						374	234	58	14	4
MF	MC	Moped-EU4						122	695	967	984	954
MF	MC	LMC-Euro-0	1 530	540	169	69	52	33	24	18	14	10
MF	MC	LMC-Euro-1	676	1 342	2 926	4 013	1 764	382	153	84	59	44
MF	MC	LMC-Euro-2					1 708	1 460	421	99	46	25
MF	MC	LMC-Euro-3						1 550	768	181	55	26
MF	MC	LMC-Euro-4						235	2 574	3 666	4 023	4 243
MF	MC	MC-2S-Euro-0	6 421	3 807	2 063	286	157	91	54	31	18	10
MF	MC	MC-2S-Euro-1	1 826	4 704	7 430	6 098	2 980	1 351	603	305	171	98
MF	MC	MC-2S-Euro-2				2 108	1 960	1 182	503	208	100	57

Emission	Vehicle cat.	Concept	1990	1995	2000	2005	2010	2015	2020	2025	2030	2035
MF	MC	MC-2S-Euro-3					2572	2441	1410	586	242	121
MF	MC	MC-2S-Euro-4						985	771	441	172	71
MF	MC	MC-2S-Euro-5						132	1688	2833	3458	3753
MF	MC	MC-4S-Euro-0	18 246	11 003	7 406	5 003	2 504	1 631	1 268	972	744	566
MF	MC	MC-4S-Euro-1	7 391	21 122	33 674	33 328	24 678	15 654	9 484	5 576	3 909	3 017
MF	MC	MC-4S-Euro-2				11 625	12 361	8 769	6 007	3 836	1 982	1 317
MF	MC	MC-4S-Euro-3					22 522	25 540	18 631	12 881	7 856	4 164
MF	MC	MC-4S-Euro-4						14 191	11 477	8 435	5 680	3 344
MF	MC	MC-4S-Euro-5						2 017	24 671	43 577	58 716	70 237
NO ₂	PC	PC-P-Euro-0	1 762	1 045	469	142	32	11	5	3	2	1
NO ₂	PC	PC-P-Euro-1		543	796	470	193	53	12	4	2	1
NO ₂	PC	PC-P-Euro-2			252	332	227	108	26	6	2	1
NO ₂	PC	PC-P-Euro-3			3	42	35	23	9	2	0	0
NO ₂	PC	PC-P-Euro-4			1	28	69	55	31	11	3	1
NO ₂	PC	PC-P-Euro-5					5	37	29	17	7	2
NO ₂	PC	PC-P-Euro-6						11	58	91	110	119
NO ₂	PC	PC alternative					0	1	1	1	1	1
NO ₂	PC	PC-D-Euro-0	130	72	25	7	1	1	0	0	0	0
NO ₂	PC	PC-D-Euro-1	25	100	85	37	14	4	1	0	0	0
NO ₂	PC	PC-D-Euro-2		0	165	121	69	32	9	2	1	0
NO ₂	PC	PC-D-Euro-3			46	1 422	961	586	237	60	12	5
NO ₂	PC	PC-D-Euro-4				277	2 060	1 611	940	363	91	19
NO ₂	PC	PC-D-Euro-5					227	1 465	1 137	668	263	65
NO ₂	PC	PC-D-Euro-6						129	703	1 146	1 418	1 561
NO ₂	LCV	LCV-P-Euro-0	214	116	43	14	7	3	1	0	0	0
NO ₂	LCV	LCV-P-Euro-1	2	38	67	38	16	9	4	2	1	0
NO ₂	LCV	LCV-P-Euro-2			5	10	7	4	2	1	0	0
NO ₂	LCV	LCV-P-Euro-3			0	2	2	1	1	0	0	0
NO ₂	LCV	LCV-P-Euro-4				0	1	1	0	0	0	0
NO ₂	LCV	LCV-P-Euro-5					0	0	0	0	0	0
NO ₂	LCV	LCV-P-Euro-6						0	1	1	1	1
NO ₂	LCV	LCV-D-Euro-0	115	123	63	24	11	5	2	1	0	0
NO ₂	LCV	LCV-D-Euro-1		18	63	32	15	9	5	1	1	0
NO ₂	LCV	LCV-D-Euro-2			86	110	57	32	20	7	3	1
NO ₂	LCV	LCV-D-Euro-3			2	493	485	299	160	93	32	12
NO ₂	LCV	LCV-D-Euro-4					452	473	273	142	80	27
NO ₂	LCV	LCV-D-Euro-5					6	246	224	124	64	36
NO ₂	LCV	LCV-D-Euro-6						8	91	165	213	242
NO ₂	HGV	HGV-D-Euro-0	1 572	1 246	600	148	34	9	2	0	0	0
NO ₂	HGV	HGV-D-Euro-I		285	227	70	24	11	4	1	0	0
NO ₂	HGV	HGV-D-Euro-II			572	270	113	46	22	5	1	0
NO ₂	HGV	HGV-D-Euro-III			50	637	373	202	86	32	7	1
NO ₂	HGV	HGV-D-Euro-IV				9	95	66	31	12	3	1
NO ₂	HGV	HGV-D-Euro-V				3	325	467	281	105	36	9
NO ₂	HGV	HGV-D-Euro-VI						45	197	313	363	385

Emission	Vehicle cat.	Concept	1990	1995	2000	2005	2010	2015	2020	2025	2030	2035
NO ₂	Coach	Coach-D-Euro-0	87	74	38	16	4	1	0	0	0	0
NO ₂	Coach	Coach-D-Euro-I		10	16	10	3	1	0	0	0	0
NO ₂	Coach	Coach-D-Euro-II		0	15	20	10	4	2	1	0	0
NO ₂	Coach	Coach-D-Euro-III			0	19	22	13	5	2	1	0
NO ₂	Coach	Coach-D-Euro-IV				0	12	10	5	2	1	0
NO ₂	Coach	Coach-D-Euro-V					11	20	13	6	2	1
NO ₂	Coach	Coach-D-Euro-VI						2	11	17	20	21
NO ₂	UBus	UBus-D-Euro-0	206	206	143	65	17	5	1	0	0	0
NO ₂	UBus	UBus-D-Euro-I		15	24	17	10	5	1	0	0	0
NO ₂	UBus	UBus-D-Euro-II		0	43	54	46	26	12	3	1	0
NO ₂	UBus	UBus-D-Euro-III			0	200	281	181	102	40	10	3
NO ₂	UBus	UBus-D-Euro-IV				1	67	53	29	17	5	1
NO ₂	UBus	UBus-D-Euro-V					57	131	91	50	25	7
NO ₂	UBus	UBus-D-Euro-VI						5	19	30	38	42
NO ₂	UBus	UBus alternative					33	45	51	56	59	61
NO ₂	MC	Moped-EU0	1	0	0	0	0	0	0	0	0	0
NO ₂	MC	Moped-EU1	0	0	0	0	0	0	0	0	0	0
NO ₂	MC	Moped-EU2					0	0	0	0	0	0
NO ₂	MC	Moped-EU3						0	0	0	0	0
NO ₂	MC	Moped-EU4						0	0	0	0	0
NO ₂	MC	LMC-Euro-0	0	0	0	0	0	0	0	0	0	0
NO ₂	MC	LMC-Euro-1	0	0	1	1	0	0	0	0	0	0
NO ₂	MC	LMC-Euro-2					0	0	0	0	0	0
NO ₂	MC	LMC-Euro-3						0	0	0	0	0
NO ₂	MC	LMC-Euro-4						0	0	0	0	0
NO ₂	MC	MC-2S-Euro-0	0	0	0	0	0	0	0	0	0	0
NO ₂	MC	MC-2S-Euro-1	0	0	0	0	0	0	0	0	0	0
NO ₂	MC	MC-2S-Euro-2				0	0	0	0	0	0	0
NO ₂	MC	MC-2S-Euro-3					0	0	0	0	0	0
NO ₂	MC	MC-2S-Euro-4						0	0	0	0	0
NO ₂	MC	MC-2S-Euro-5						0	0	0	0	0
NO ₂	MC	MC-4S-Euro-0	9	5	4	2	1	1	1	0	0	0
NO ₂	MC	MC-4S-Euro-1	4	10	16	15	11	7	4	2	2	1
NO ₂	MC	MC-4S-Euro-2				5	5	4	3	2	1	1
NO ₂	MC	MC-4S-Euro-3					6	6	5	3	2	1
NO ₂	MC	MC-4S-Euro-4						3	2	2	1	1
NO ₂	MC	MC-4S-Euro-5						0	3	6	8	9
NO _x	PC	PC-P-Euro-0	48 366	27 021	10 907	3 054	690	233	102	57	32	17
NO _x	PC	PC-P-Euro-1		9 469	14 650	8 701	3 575	980	229	78	39	20
NO _x	PC	PC-P-Euro-2			4 322	6 036	4 169	1 974	481	109	40	20
NO _x	PC	PC-P-Euro-3			48	751	631	412	158	37	9	3
NO _x	PC	PC-P-Euro-4			12	651	1 607	1 268	713	253	59	15
NO _x	PC	PC-P-Euro-5					101	836	641	387	149	35
NO _x	PC	PC-P-Euro-6						240	1 254	1 973	2 383	2 568
NO _x	PC	PC alternative					4	8	10	12	13	13

Emission	Vehicle cat.	Concept	1990	1995	2000	2005	2010	2015	2020	2025	2030	2035
NO _x	PC	PC-D-Euro-0	1607	886	309	81	15	6	3	2	2	1
NO _x	PC	PC-D-Euro-1	312	1232	1051	454	171	51	12	4	2	1
NO _x	PC	PC-D-Euro-2		1	1494	1101	613	286	79	17	6	3
NO _x	PC	PC-D-Euro-3			132	4109	2823	1725	699	178	37	16
NO _x	PC	PC-D-Euro-4				727	4708	3666	2126	814	203	43
NO _x	PC	PC-D-Euro-5					676	4359	3383	1989	781	193
NO _x	PC	PC-D-Euro-6						452	2454	4005	4953	5448
NO _x	LCV	LCV-P-Euro-0	4270	2309	869	274	130	63	26	8	4	2
NO _x	LCV	LCV-P-Euro-1	29	687	1258	709	308	165	84	37	12	3
NO _x	LCV	LCV-P-Euro-2			93	189	131	74	40	21	8	2
NO _x	LCV	LCV-P-Euro-3			0	21	21	13	6	3	1	0
NO _x	LCV	LCV-P-Euro-4				3	18	17	9	4	2	1
NO _x	LCV	LCV-P-Euro-5					0	10	9	5	2	1
NO _x	LCV	LCV-P-Euro-6						1	14	26	32	34
NO _x	LCV	LCV-D-Euro-0	1447	1557	796	307	139	68	25	9	3	1
NO _x	LCV	LCV-D-Euro-1		231	794	409	189	113	57	19	8	2
NO _x	LCV	LCV-D-Euro-2			749	960	497	279	172	64	23	8
NO _x	LCV	LCV-D-Euro-3			6	1409	1389	856	459	266	92	34
NO _x	LCV	LCV-D-Euro-4					1075	1090	627	327	184	63
NO _x	LCV	LCV-D-Euro-5					18	749	682	377	194	110
NO _x	LCV	LCV-D-Euro-6						35	418	760	978	1113
NO _x	HGV	HGV-D-Euro-0	22459	17799	8578	2119	488	124	29	7	2	1
NO _x	HGV	HGV-D-Euro-I		4077	3245	1006	349	160	52	12	3	1
NO _x	HGV	HGV-D-Euro-II			8177	3861	1618	654	310	70	15	3
NO _x	HGV	HGV-D-Euro-III			721	9106	5331	2883	1231	457	96	19
NO _x	HGV	HGV-D-Euro-IV				81	884	617	285	114	32	6
NO _x	HGV	HGV-D-Euro-V				28	3215	4624	2783	1044	357	88
NO _x	HGV	HGV-D-Euro-VI						159	705	1118	1296	1376
NO _x	Coach	Coach-D-Euro-0	1238	1051	545	226	62	21	6	2	1	0
NO _x	Coach	Coach-D-Euro-I		139	230	137	44	18	6	2	0	0
NO _x	Coach	Coach-D-Euro-II		1	210	279	146	60	23	8	2	1
NO _x	Coach	Coach-D-Euro-III			2	275	308	187	75	28	9	2
NO _x	Coach	Coach-D-Euro-IV				2	118	95	48	18	6	2
NO _x	Coach	Coach-D-Euro-V					114	205	139	59	22	7
NO _x	Coach	Coach-D-Euro-VI						9	38	61	70	74
NO _x	UBus	UBus-D-Euro-0	2948	2944	2043	926	246	68	18	5	1	0
NO _x	UBus	UBus-D-Euro-I		211	338	237	138	64	16	4	1	0
NO _x	UBus	UBus-D-Euro-II		1	610	763	457	264	114	29	8	2
NO _x	UBus	UBus-D-Euro-III			4	897	964	617	349	135	33	9
NO _x	UBus	UBus-D-Euro-IV				4	270	210	115	67	19	5
NO _x	UBus	UBus-D-Euro-V					228	524	365	200	100	27
NO _x	UBus	UBus-D-Euro-VI						17	68	109	135	152
NO _x	UBus	UBus alternative					131	178	202	225	235	245
NO _x	MC	Moped-EU0	17	4	1	1	0	0	0	0	0	0
NO _x	MC	Moped-EU1	1	4	4	3	2	0	0	0	0	0

Emission	Vehicle cat.	Concept	1990	1995	2000	2005	2010	2015	2020	2025	2030	2035
NO _x	MC	Moped-EU2					3	2	1	0	0	0
NO _x	MC	Moped-EU3						1	1	0	0	0
NO _x	MC	Moped-EU4						0	1	2	2	2
NO _x	MC	LMC-Euro-0	6	2	1	0	0	0	0	0	0	0
NO _x	MC	LMC-Euro-1	3	5	11	15	7	2	1	0	0	0
NO _x	MC	LMC-Euro-2					5	5	1	0	0	0
NO _x	MC	LMC-Euro-3						4	2	0	0	0
NO _x	MC	LMC-Euro-4						0	5	8	8	9
NO _x	MC	MC-2S-Euro-0	9	5	3	0	0	0	0	0	0	0
NO _x	MC	MC-2S-Euro-1	2	6	10	8	4	2	1	0	0	0
NO _x	MC	MC-2S-Euro-2				4	4	2	1	0	0	0
NO _x	MC	MC-2S-Euro-3					6	6	3	1	1	0
NO _x	MC	MC-2S-Euro-4						2	2	1	0	0
NO _x	MC	MC-2S-Euro-5						0	3	6	7	7
NO _x	MC	MC-4S-Euro-0	186	109	70	47	21	15	11	9	7	5
NO _x	MC	MC-4S-Euro-1	74	206	323	307	213	141	85	49	34	26
NO _x	MC	MC-4S-Euro-2				105	105	78	53	33	17	11
NO _x	MC	MC-4S-Euro-3					111	129	93	63	38	20
NO _x	MC	MC-4S-Euro-4						60	48	35	23	13
NO _x	MC	MC-4S-Euro-5						5	64	113	151	179
PM exhaust	PC	PC-P-Euro-0	311	166	67	19	4	1	1	0	0	0
PM exhaust	PC	PC-P-Euro-1		105	100	56	23	7	2	1	0	0
PM exhaust	PC	PC-P-Euro-2			145	125	83	40	10	2	1	0
PM exhaust	PC	PC-P-Euro-3			2	31	25	16	6	1	0	0
PM exhaust	PC	PC-P-Euro-4			0	13	32	25	14	5	1	0
PM exhaust	PC	PC-P-Euro-5					2	15	12	7	3	1
PM exhaust	PC	PC-P-Euro-6						4	20	32	38	41
PM exhaust	PC	PC alternative					0	0	0	0	0	0
PM exhaust	PC	PC-D-Euro-0	313	169	58	16	3	1	1	1	0	0
PM exhaust	PC	PC-D-Euro-1	57	224	190	82	31	9	2	1	0	0
PM exhaust	PC	PC-D-Euro-2		0	180	132	73	34	9	2	1	0
PM exhaust	PC	PC-D-Euro-3			7	227	147	90	36	9	2	1
PM exhaust	PC	PC-D-Euro-4				62	207	156	86	31	7	2
PM exhaust	PC	PC-D-Euro-5					2	15	12	7	3	1
PM exhaust	PC	PC-D-Euro-6						4	24	39	49	53
PM exhaust	LCV	LCV-P-Euro-0	29	16	6	2	1	0	0	0	0	0
PM exhaust	LCV	LCV-P-Euro-1	1	8	10	5	2	1	1	0	0	0
PM exhaust	LCV	LCV-P-Euro-2			5	6	4	2	1	1	0	0
PM exhaust	LCV	LCV-P-Euro-3			0	1	1	1	0	0	0	0
PM exhaust	LCV	LCV-P-Euro-4				0	1	1	0	0	0	0
PM exhaust	LCV	LCV-P-Euro-5					0	0	0	0	0	0
PM exhaust	LCV	LCV-P-Euro-6						0	1	1	1	1
PM exhaust	LCV	LCV-D-Euro-0	303	327	167	65	29	14	5	2	1	0
PM exhaust	LCV	LCV-D-Euro-1		30	104	54	25	15	8	2	1	0
PM exhaust	LCV	LCV-D-Euro-2			68	88	46	26	16	6	2	1

Emission	Vehicle cat.	Concept	1990	1995	2000	2005	2010	2015	2020	2025	2030	2035
PM exhaust	MC	MC-4S-Euro-3										
PM exhaust	MC	MC-4S-Euro-4										
PM exhaust	MC	MC-4S-Euro-5										
PN	PC	PC-P-Euro-0	5.4E + 16	3.0E + 16	1.3E + 16	3.5E + 15	7.8E + 14	2.4E + 14	1.0E + 14	5.5E + 13	2.9E + 13	1.5E + 13
PN	PC	PC-P-Euro-1		2.2E + 16	2.1E + 16	1.2E + 16	4.8E + 15	1.3E + 15	3.1E + 14	1.1E + 14	5.4E + 13	2.7E + 13
PN	PC	PC-P-Euro-2			2.0E + 16	1.7E + 16	1.1E + 16	5.3E + 15	1.3E + 15	3.0E + 14	1.1E + 14	5.5E + 13
PN	PC	PC-P-Euro-3			6.7E + 14	1.0E + 16	8.4E + 15	5.5E + 15	2.1E + 15	5.0E + 14	1.2E + 14	4.8E + 13
PN	PC	PC-P-Euro-4			1.4E + 14	7.3E + 15	1.8E + 16	1.4E + 16	7.7E + 15	2.7E + 15	6.4E + 14	1.6E + 14
PN	PC	PC-P-Euro-5					1.2E + 15	9.8E + 15	7.5E + 15	4.5E + 15	1.7E + 15	4.1E + 14
PN	PC	PC-P-Euro-6						2.7E + 15	1.4E + 16	2.3E + 16	2.7E + 16	3.0E + 16
PN	PC	PC alternative					7.7E + 13	1.3E + 14	1.8E + 14	2.0E + 14	2.1E + 14	2.2E + 14
PN	PC	PC-D-Euro-0	1.4E + 17	7.8E + 16	2.8E + 16	7.1E + 15	1.3E + 15	4.9E + 14	2.6E + 14	1.9E + 14	1.2E + 14	6.6E + 13
PN	PC	PC-D-Euro-1	2.9E + 16	1.1E + 17	9.6E + 16	4.1E + 16	1.5E + 16	4.6E + 15	1.1E + 15	3.6E + 14	2.2E + 14	1.3E + 14
PN	PC	PC-D-Euro-2		1.0E + 14	1.2E + 17	8.6E + 16	4.8E + 16	2.2E + 16	6.1E + 15	1.3E + 15	4.5E + 14	2.7E + 14
PN	PC	PC-D-Euro-3			1.0E + 16	3.1E + 17	2.0E + 17	1.2E + 17	4.9E + 16	1.2E + 16	2.6E + 15	1.1E + 15
PN	PC	PC-D-Euro-4				7.6E + 16	2.5E + 17	1.9E + 17	1.0E + 17	3.7E + 16	8.8E + 15	2.0E + 15
PN	PC	PC-D-Euro-5					4.9E + 14	3.1E + 15	2.4E + 15	1.4E + 15	5.6E + 14	1.4E + 14
PN	PC	PC-D-Euro-6						9.4E + 14	5.1E + 15	8.3E + 15	1.0E + 16	1.1E + 16
PN	LCV	LCV-P-Euro-0	4.3E + 15	2.3E + 15	8.9E + 14	2.8E + 14	1.4E + 14	6.7E + 13	2.8E + 13	8.7E + 12	4.1E + 12	1.9E + 12
PN	LCV	LCV-P-Euro-1	1.3E + 14	1.6E + 15	1.8E + 15	9.2E + 14	4.1E + 14	2.3E + 14	1.2E + 14	5.3E + 13	1.7E + 13	4.9E + 12
PN	LCV	LCV-P-Euro-2			6.2E + 14	7.2E + 14	4.2E + 14	2.4E + 14	1.3E + 14	6.9E + 13	2.7E + 13	7.4E + 12
PN	LCV	LCV-P-Euro-3			5.7E + 12	3.3E + 14	3.1E + 14	1.9E + 14	9.4E + 13	4.7E + 13	2.1E + 13	7.4E + 12
PN	LCV	LCV-P-Euro-4				7.5E + 13	4.0E + 14	3.7E + 14	2.0E + 14	9.2E + 13	4.1E + 13	1.5E + 13
PN	LCV	LCV-P-Euro-5					5.0E + 12	2.1E + 14	1.8E + 14	9.8E + 13	4.1E + 13	1.7E + 13
PN	LCV	LCV-P-Euro-6						2.6E + 13	3.0E + 14	5.4E + 14	6.6E + 14	6.9E + 14
PN	LCV	LCV-D-Euro-0	1.7E + 17	1.8E + 17	9.4E + 16	3.6E + 16	1.6E + 16	8.1E + 15	3.0E + 15	1.1E + 15	3.4E + 14	1.6E + 14
PN	LCV	LCV-D-Euro-1		2.3E + 16	7.9E + 16	4.1E + 16	1.9E + 16	1.1E + 16	5.7E + 15	1.9E + 15	7.6E + 14	2.0E + 14
PN	LCV	LCV-D-Euro-2			6.7E + 16	8.7E + 16	4.5E + 16	2.5E + 16	1.6E + 16	5.9E + 15	2.1E + 15	7.2E + 14
PN	LCV	LCV-D-Euro-3			4.5E + 14	1.1E + 17	1.1E + 17	6.5E + 16	3.5E + 16	2.0E + 16	7.0E + 15	2.6E + 15
PN	LCV	LCV-D-Euro-4					6.0E + 16	4.7E + 16	2.7E + 16	1.4E + 16	7.6E + 15	2.5E + 15
PN	LCV	LCV-D-Euro-5					8.8E + 12	3.7E + 14	3.4E + 14	1.9E + 14	9.6E + 13	5.5E + 13
PN	LCV	LCV-D-Euro-6						4.5E + 13	5.4E + 14	9.8E + 14	1.3E + 15	1.4E + 15
PN	HGV	HGV-D-Euro-0	2.1E + 17	1.7E + 17	8.1E + 16	2.0E + 16	4.5E + 15	1.1E + 15	2.6E + 14	6.3E + 13	2.1E + 13	6.5E + 12
PN	HGV	HGV-D-Euro-I		5.9E + 16	4.7E + 16	1.4E + 16	4.9E + 15	2.2E + 15	7.0E + 14	1.7E + 14	3.5E + 13	1.1E + 13
PN	HGV	HGV-D-Euro-II			1.2E + 17	5.3E + 16	2.2E + 16	8.9E + 15	4.2E + 15	9.6E + 14	2.0E + 14	4.4E + 13
PN	HGV	HGV-D-Euro-III			2.0E + 16	2.4E + 17	1.4E + 17	7.6E + 16	3.2E + 16	1.2E + 16	2.5E + 15	5.0E + 14
PN	HGV	HGV-D-Euro-IV				8.2E + 14	9.0E + 15	6.3E + 15	2.9E + 15	1.2E + 15	3.3E + 14	5.8E + 13
PN	HGV	HGV-D-Euro-V				4.2E + 14	4.7E + 16	6.7E + 16	4.1E + 16	1.5E + 16	5.2E + 15	1.3E + 15
PN	HGV	HGV-D-Euro-VI						3.1E + 14	1.4E + 15	2.2E + 15	2.6E + 15	2.7E + 15
PN	Coach	Coach-D-Euro-0	1.3E + 16	1.1E + 16	5.6E + 15	2.4E + 15	6.4E + 14	2.1E + 14	6.0E + 13	1.7E + 13	5.2E + 12	1.6E + 12
PN	Coach	Coach-D-Euro-I		2.1E + 15	3.4E + 15	2.1E + 15	6.8E + 14	2.6E + 14	8.8E + 13	2.5E + 13	6.4E + 12	2.0E + 12
PN	Coach	Coach-D-Euro-II		8.3E + 12	3.1E + 15	4.2E + 15	2.2E + 15	8.9E + 14	3.4E + 14	1.1E + 14	2.9E + 13	8.0E + 12
PN	Coach	Coach-D-Euro-III			5.1E + 13	7.9E + 15	8.8E + 15	5.3E + 15	2.1E + 15	7.8E + 14	2.6E + 14	6.5E + 13
PN	Coach	Coach-D-Euro-IV				2.4E + 13	1.2E + 15	9.3E + 14	4.7E + 14	1.7E + 14	5.8E + 13	2.0E + 13
PN	Coach	Coach-D-Euro-V					1.5E + 15	2.8E + 15	1.9E + 15	8.0E + 14	3.0E + 14	1.0E + 14

A6 Emission factors

A6-1 Emission factors by vehicle category

Tab. 19 > Emission factors in grams per kilometre, incl. cold starts and evaporation

Emission	Year	PC	LCV	HGV	Coach	UBus	MC
Benzene	1990	0.066	0.069	0.014	0.012	0.037	0.177
Benzene	1995	0.052	0.056	0.012	0.011	0.032	0.124
Benzene	2000	0.040	0.041	0.009	0.010	0.024	0.096
Benzene	2005	0.026	0.022	0.006	0.008	0.012	0.079
Benzene	2010	0.016	0.012	0.003	0.004	0.005	0.058
Benzene	2015	0.011	0.007	0.002	0.003	0.002	0.044
Benzene	2020	0.007	0.005	0.001	0.001	0.001	0.034
Benzene	2025	0.006	0.003	0.001	0.001	0.001	0.029
Benzene	2030	0.006	0.003	0.000	0.001	0.001	0.026
Benzene	2035	0.006	0.002	0.000	0.000	0.001	0.024
CH ₄	1990	0.084	0.090	0.020	0.017	0.053	0.236
CH ₄	1995	0.053	0.065	0.017	0.016	0.046	0.159
CH ₄	2000	0.033	0.039	0.013	0.014	0.034	0.120
CH ₄	2005	0.020	0.020	0.009	0.011	0.018	0.103
CH ₄	2010	0.013	0.010	0.004	0.006	0.007	0.094
CH ₄	2015	0.008	0.006	0.002	0.004	0.003	0.083
CH ₄	2020	0.006	0.004	0.001	0.002	0.002	0.066
CH ₄	2025	0.005	0.003	0.001	0.001	0.001	0.057
CH ₄	2030	0.005	0.002	0.001	0.001	0.001	0.052
CH ₄	2035	0.005	0.002	0.001	0.001	0.001	0.050
CO	1990	10.43	20.16	2.37	2.09	5.99	14.70
CO	1995	5.94	14.60	2.16	2.01	5.68	14.14
CO	2000	3.72	8.86	1.75	1.84	4.64	13.62
CO	2005	2.48	4.39	1.63	1.73	2.92	11.68
CO	2010	1.62	2.27	1.47	1.70	1.48	8.02
CO	2015	1.12	1.40	1.34	1.63	1.16	5.68
CO	2020	0.81	0.90	1.08	1.34	1.17	3.99
CO	2025	0.69	0.62	0.90	1.13	1.25	2.96
CO	2030	0.65	0.48	0.83	1.05	1.30	2.44
CO	2035	0.63	0.42	0.81	1.01	1.33	2.15
CO ₂ (rep.)	1990	236	249	809	871	1194	82
CO ₂ (rep.)	1995	236	252	804	860	1199	90
CO ₂ (rep.)	2000	226	254	763	833	1162	92
CO ₂ (rep.)	2005	210	246	800	823	1127	94
CO ₂ (rep.)	2010	189	238	776	812	1087	97
CO ₂ (rep.)	2015	167	231	751	797	1055	92
CO ₂ (rep.)	2020	153	225	745	800	1049	90
CO ₂ (rep.)	2025	141	220	742	803	1046	90
CO ₂ (rep.)	2030	132	218	740	805	1044	89

Emission	Year	PC	LCV	HGV	Coach	UBus	MC
CO ₂ (rep.)	2035	122	216	739	805	1044	89
CO ₂ (total)	1990	236	249	809	871	1194	82
CO ₂ (total)	1995	236	252	804	860	1199	90
CO ₂ (total)	2000	226	255	764	834	1163	92
CO ₂ (total)	2005	210	246	803	826	1131	94
CO ₂ (total)	2010	193	242	785	821	1103	99
CO ₂ (total)	2015	177	239	773	820	1089	99
CO ₂ (total)	2020	162	233	766	823	1083	98
CO ₂ (total)	2025	149	228	763	826	1080	97
CO ₂ (total)	2030	139	225	761	827	1079	96
CO ₂ (total)	2035	129	224	760	828	1078	96
HC	1990	1.69	2.02	0.83	0.70	2.20	3.69
HC	1995	0.98	1.38	0.73	0.66	1.93	2.65
HC	2000	0.59	0.77	0.55	0.60	1.42	2.08
HC	2005	0.36	0.38	0.38	0.47	0.73	1.64
HC	2010	0.23	0.20	0.18	0.26	0.57	1.16
HC	2015	0.16	0.13	0.10	0.16	0.53	0.85
HC	2020	0.12	0.09	0.05	0.08	0.50	0.65
HC	2025	0.10	0.06	0.03	0.05	0.50	0.55
HC	2030	0.10	0.05	0.03	0.03	0.49	0.50
HC	2035	0.09	0.05	0.02	0.03	0.48	0.47
N ₂ O	1990	0.009	0.005	0.008	0.008	0.003	0.002
N ₂ O	1995	0.012	0.007	0.009	0.008	0.003	0.002
N ₂ O	2000	0.011	0.009	0.009	0.008	0.003	0.002
N ₂ O	2005	0.005	0.007	0.008	0.007	0.002	0.002
N ₂ O	2010	0.003	0.006	0.026	0.014	0.001	0.002
N ₂ O	2015	0.003	0.005	0.036	0.022	0.002	0.002
N ₂ O	2020	0.003	0.005	0.041	0.029	0.005	0.002
N ₂ O	2025	0.003	0.005	0.043	0.032	0.008	0.002
N ₂ O	2030	0.003	0.004	0.043	0.033	0.009	0.002
N ₂ O	2035	0.003	0.004	0.043	0.033	0.010	0.002
NH ₃	1990	0.027	0.003	0.003	0.003	0.003	0.002
NH ₃	1995	0.055	0.022	0.003	0.003	0.003	0.002
NH ₃	2000	0.091	0.041	0.003	0.003	0.003	0.002
NH ₃	2005	0.068	0.029	0.003	0.003	0.003	0.002
NH ₃	2010	0.048	0.017	0.003	0.003	0.003	0.002
NH ₃	2015	0.033	0.011	0.003	0.003	0.003	0.002
NH ₃	2020	0.025	0.008	0.003	0.003	0.003	0.002
NH ₃	2025	0.022	0.006	0.003	0.003	0.003	0.002
NH ₃	2030	0.021	0.005	0.003	0.003	0.003	0.002
NH ₃	2035	0.021	0.005	0.003	0.003	0.003	0.002
NMHC	1990	1.607	1.930	0.814	0.681	2.151	3.451
NMHC	1995	0.931	1.320	0.711	0.640	1.880	2.489
NMHC	2000	0.555	0.735	0.532	0.582	1.383	1.964
NMHC	2005	0.336	0.362	0.372	0.459	0.714	1.538

Emission	Year	PC	LCV	HGV	Coach	UBus	MC
NMHC	2010	0.213	0.194	0.177	0.259	0.265	1.063
NMHC	2015	0.150	0.124	0.097	0.155	0.134	0.767
NMHC	2020	0.111	0.083	0.053	0.078	0.068	0.588
NMHC	2025	0.097	0.060	0.033	0.045	0.040	0.495
NMHC	2030	0.091	0.050	0.025	0.033	0.032	0.448
NMHC	2035	0.088	0.045	0.024	0.029	0.031	0.423
NO ₂	1990	0.045	0.120	0.789	0.803	1.186	0.007
NO ₂	1995	0.039	0.107	0.727	0.758	1.149	0.010
NO ₂	2000	0.037	0.111	0.638	0.698	1.050	0.011
NO ₂	2005	0.054	0.219	0.535	0.608	1.466	0.011
NO ₂	2010	0.068	0.293	0.419	0.522	2.048	0.010
NO ₂	2015	0.068	0.291	0.340	0.443	1.714	0.009
NO ₂	2020	0.051	0.204	0.240	0.318	1.116	0.007
NO ₂	2025	0.037	0.136	0.176	0.237	0.685	0.006
NO ₂	2030	0.029	0.097	0.151	0.203	0.455	0.005
NO ₂	2035	0.026	0.076	0.143	0.191	0.363	0.005
NO _x	1990	1.179	2.084	11.274	11.465	16.948	0.147
NO _x	1995	0.865	1.742	10.382	10.824	16.420	0.196
NO _x	2000	0.664	1.534	9.116	9.969	14.999	0.212
NO _x	2005	0.481	1.297	7.615	8.680	12.351	0.222
NO _x	2010	0.345	1.085	5.158	6.642	9.749	0.200
NO _x	2015	0.274	0.945	3.712	5.085	7.419	0.181
NO _x	2020	0.197	0.685	2.082	2.911	4.546	0.143
NO _x	2025	0.154	0.488	1.060	1.539	2.690	0.117
NO _x	2030	0.132	0.378	0.662	0.966	1.766	0.100
NO _x	2035	0.124	0.327	0.538	0.758	1.393	0.091
Pb	1990	0.005	0.004	0.000	0.000	0.000	0.002
Pb	1995	0.002	0.001	0.000	0.000	0.000	0.001
Pb	2000	0.000	0.000	0.000	0.000	0.000	0.000
Pb	2005	0.000	0.000	0.000	0.000	0.000	0.000
Pb	2010	0.000	0.000	0.000	0.000	0.000	0.000
Pb	2015	0.000	0.000	0.000	0.000	0.000	0.000
Pb	2020	0.000	0.000	0.000	0.000	0.000	0.000
Pb	2025	0.000	0.000	0.000	0.000	0.000	0.000
Pb	2030	0.000	0.000	0.000	0.000	0.000	0.000
Pb	2035	0.000	0.000	0.000	0.000	0.000	0.000
PM exhaust	1990	0.016	0.121	0.449	0.456	0.950	
PM exhaust	1995	0.015	0.139	0.390	0.401	0.826	
PM exhaust	2000	0.015	0.121	0.272	0.330	0.637	
PM exhaust	2005	0.014	0.090	0.188	0.232	0.340	
PM exhaust	2010	0.011	0.065	0.096	0.128	0.125	
PM exhaust	2015	0.007	0.041	0.057	0.080	0.060	
PM exhaust	2020	0.004	0.023	0.028	0.038	0.027	
PM exhaust	2025	0.002	0.012	0.012	0.017	0.013	
PM exhaust	2030	0.002	0.007	0.006	0.008	0.009	

Emission	Year	PC	LCV	HGV	Coach	UBus	MC
PM exhaust	2035	0.001	0.005	0.004	0.005	0.008	
PM nonexhaust	1990	0.037	0.038	0.160	0.162	0.246	0.009
PM nonexhaust	1995	0.037	0.038	0.156	0.159	0.246	0.009
PM nonexhaust	2000	0.037	0.038	0.154	0.159	0.246	0.009
PM nonexhaust	2005	0.038	0.038	0.154	0.158	0.246	0.009
PM nonexhaust	2010	0.038	0.038	0.154	0.158	0.246	0.009
PM nonexhaust	2015	0.038	0.038	0.154	0.158	0.246	0.009
PM nonexhaust	2020	0.038	0.038	0.155	0.158	0.246	0.009
PM nonexhaust	2025	0.038	0.038	0.155	0.158	0.246	0.009
PM nonexhaust	2030	0.038	0.038	0.155	0.158	0.246	0.009
PM nonexhaust	2035	0.038	0.038	0.155	0.158	0.246	0.009
PN	1990	5.2E + 12	6.3E + 13	1.0E + 14	1.2E + 14	1.4E + 14	
PN	1995	5.4E + 12	7.6E + 13	1.1E + 14	1.2E + 14	1.4E + 14	
PN	2000	6.2E + 12	8.2E + 13	1.2E + 14	1.2E + 14	1.4E + 14	
PN	2005	1.1E + 13	8.3E + 13	1.6E + 14	1.6E + 14	1.3E + 14	
PN	2010	9.7E + 12	6.9E + 13	1.0E + 14	1.3E + 14	5.9E + 13	
PN	2015	6.3E + 12	4.2E + 13	6.5E + 13	8.8E + 13	3.3E + 13	
PN	2020	3.2E + 12	2.3E + 13	3.2E + 13	4.4E + 13	1.5E + 13	
PN	2025	1.4E + 12	1.1E + 13	1.2E + 13	1.8E + 13	6.0E + 12	
PN	2030	8.1E + 11	4.9E + 12	4.0E + 12	6.8E + 12	2.7E + 12	
PN	2035	6.7E + 11	2.0E + 12	1.7E + 12	2.9E + 12	1.7E + 12	
SO ₂	1990	0.040	0.093	0.719	0.774	1.061	0.010
SO ₂	1995	0.031	0.041	0.174	0.186	0.260	0.011
SO ₂	2000	0.022	0.034	0.132	0.144	0.201	0.008
SO ₂	2005	0.001	0.001	0.005	0.005	0.007	0.000
SO ₂	2010	0.001	0.001	0.005	0.005	0.007	0.001
SO ₂	2015	0.001	0.001	0.005	0.005	0.007	0.001
SO ₂	2020	0.001	0.001	0.005	0.005	0.006	0.000
SO ₂	2025	0.001	0.001	0.005	0.005	0.006	0.000
SO ₂	2030	0.001	0.001	0.005	0.005	0.006	0.000
SO ₂	2035	0.001	0.001	0.005	0.005	0.006	0.000
Toluol	1990	0.155	0.177	0.003	0.002	0.007	0.387
Toluol	1995	0.093	0.119	0.002	0.002	0.006	0.250
Toluol	2000	0.057	0.066	0.002	0.002	0.005	0.183
Toluol	2005	0.035	0.032	0.001	0.002	0.002	0.132
Toluol	2010	0.022	0.016	0.001	0.001	0.001	0.085
Toluol	2015	0.015	0.010	0.000	0.001	0.000	0.055
Toluol	2020	0.011	0.006	0.000	0.000	0.000	0.039
Toluol	2025	0.009	0.004	0.000	0.000	0.000	0.031
Toluol	2030	0.009	0.003	0.000	0.000	0.000	0.028
Toluol	2035	0.008	0.003	0.000	0.000	0.000	0.026
Xylol	1990	0.131	0.146	0.007	0.006	0.018	0.350
Xylol	1995	0.081	0.101	0.006	0.005	0.015	0.227
Xylol	2000	0.051	0.057	0.004	0.005	0.011	0.165
Xylol	2005	0.032	0.028	0.003	0.004	0.006	0.119

Emission	Year	PC	LCV	HGV	Coach	UBus	MC
Xylol	2010	0.020	0.015	0.001	0.002	0.002	0.076
Xylol	2015	0.014	0.009	0.001	0.001	0.001	0.050
Xylol	2020	0.010	0.006	0.000	0.001	0.001	0.035
Xylol	2025	0.009	0.004	0.000	0.000	0.000	0.028
Xylol	2030	0.008	0.003	0.000	0.000	0.000	0.025
Xylol	2035	0.008	0.003	0.000	0.000	0.000	0.023

A6-2 Emission factors by emission type

Tab. 20 > Emission factors in grams per kilometre ("warm" and running losses) and grams per start or stop (hot/warm soak), grams per vehicle and day (diurnal)

Emission	Year	Emission type	PC	LCV	MC
CO	1990	Warm	6.78	15.64	14.70
CO	1990	Start	54.74	78.52	
CO	1995	Warm	3.33	10.83	14.14
CO	1995	Start	39.06	60.55	
CO	2000	Warm	1.87	6.35	13.62
CO	2000	Start	28.64	40.31	
CO	2005	Warm	1.21	2.94	11.68
CO	2005	Start	20.04	22.85	
CO	2010	Warm	0.75	1.44	8.02
CO	2010	Start	14.24	13.08	
CO	2015	Warm	0.47	0.84	5.68
CO	2015	Start	10.78	8.86	
CO	2020	Warm	0.29	0.49	3.99
CO	2020	Start	8.74	6.42	
CO	2025	Warm	0.22	0.29	2.96
CO	2025	Start	7.97	5.14	
CO	2030	Warm	0.19	0.20	2.44
CO	2030	Start	7.72	4.48	
CO	2035	Warm	0.18	0.15	2.15
CO	2035	Start	7.62	4.16	
CO ₂ (rep.)	1990	Warm	228.8	240.6	82.4
CO ₂ (rep.)	1990	Start	108.9	140.5	
CO ₂ (rep.)	1995	Warm	229.5	243.7	90.2
CO ₂ (rep.)	1995	Start	102.5	134.3	
CO ₂ (rep.)	2000	Warm	219.7	246.5	92.1
CO ₂ (rep.)	2000	Start	99.4	126.9	
CO ₂ (rep.)	2005	Warm	203.5	238.4	94.2
CO ₂ (rep.)	2005	Start	100.9	116.0	
CO ₂ (rep.)	2010	Warm	182.9	231.5	96.8
CO ₂ (rep.)	2010	Start	102.5	106.6	
CO ₂ (rep.)	2015	Warm	160.9	224.3	91.7

Emission	Year	Emission type	PC	LCV	MC
CO ₂ (rep.)	2015	Start	99.2	100.3	
CO ₂ (rep.)	2020	Warm	146.8	218.7	90.4
CO ₂ (rep.)	2020	Start	99.6	98.0	
CO ₂ (rep.)	2025	Warm	135.4	214.2	89.6
CO ₂ (rep.)	2025	Start	98.9	96.4	
CO ₂ (rep.)	2030	Warm	125.7	211.8	89.1
CO ₂ (rep.)	2030	Start	98.3	95.5	
CO ₂ (rep.)	2035	Warm	116.5	210.5	88.8
CO ₂ (rep.)	2035	Start	98.0	94.9	
CO ₂ (total)	1990	Warm	228.8	240.6	82.4
CO ₂ (total)	1990	Start	108.9	140.5	
CO ₂ (total)	1995	Warm	229.5	243.7	90.2
CO ₂ (total)	1995	Start	102.5	134.3	
CO ₂ (total)	2000	Warm	219.7	246.6	92.1
CO ₂ (total)	2000	Start	99.4	127.0	
CO ₂ (total)	2005	Warm	203.7	239.0	94.2
CO ₂ (total)	2005	Start	100.9	116.2	
CO ₂ (total)	2010	Warm	186.6	234.8	99.0
CO ₂ (total)	2010	Start	104.6	108.3	
CO ₂ (total)	2015	Warm	171.0	232.6	99.1
CO ₂ (total)	2015	Start	106.0	104.6	
CO ₂ (total)	2020	Warm	155.5	226.4	97.6
CO ₂ (total)	2020	Start	106.1	102.1	
CO ₂ (total)	2025	Warm	143.2	221.4	96.8
CO ₂ (total)	2025	Start	105.3	100.3	
CO ₂ (total)	2030	Warm	132.7	218.8	96.3
CO ₂ (total)	2030	Start	104.7	99.2	
CO ₂ (total)	2035	Warm	123.0	217.3	96.0
CO ₂ (total)	2035	Start	104.3	98.6	
HC	1990	Warm	0.770	1.135	3.569
HC	1990	Start	9.128	8.565	
HC	1990	Hot/warm soak	2.288	3.120	0.246
HC	1990	Diurnal	0.795	0.991	0.281
HC	1990	Running losses	0.141	0.183	0.025
HC	1995	Warm	0.365	0.721	2.509
HC	1995	Start	7.327	7.012	
HC	1995	Hot/warm soak	0.922	1.726	0.292
HC	1995	Diurnal	0.412	0.592	0.303
HC	1995	Running losses	0.056	0.100	0.028
HC	2000	Warm	0.170	0.367	1.952
HC	2000	Start	5.881	5.199	
HC	2000	Hot/warm soak	0.274	0.623	0.308
HC	2000	Diurnal	0.229	0.269	0.311
HC	2000	Running losses	0.016	0.035	0.028
HC	2005	Warm	0.080	0.154	1.505

Emission	Year	Emission type	PC	LCV	MC
HC	2005	Start	4.129	3.176	
HC	2005	Hot/warm soak	0.089	0.195	0.329
HC	2005	Diurnal	0.163	0.121	0.321
HC	2005	Running losses	0.004	0.010	0.030
HC	2010	Warm	0.037	0.073	1.007
HC	2010	Start	2.971	1.884	
HC	2010	Hot/warm soak	0.044	0.084	0.385
HC	2010	Diurnal	0.133	0.068	0.348
HC	2010	Running losses	0.002	0.004	0.033
HC	2015	Warm	0.019	0.041	0.697
HC	2015	Start	2.209	1.305	
HC	2015	Hot/warm soak	0.034	0.041	0.402
HC	2015	Diurnal	0.115	0.047	0.356
HC	2015	Running losses	0.001	0.002	0.034
HC	2020	Warm	0.011	0.024	0.501
HC	2020	Start	1.705	0.940	
HC	2020	Hot/warm soak	0.028	0.020	0.412
HC	2020	Diurnal	0.102	0.034	0.361
HC	2020	Running losses	0.001	0.001	0.034
HC	2025	Warm	0.008	0.015	0.398
HC	2025	Start	1.490	0.739	
HC	2025	Hot/warm soak	0.026	0.010	0.421
HC	2025	Diurnal	0.096	0.027	0.365
HC	2025	Running losses	0.001	0.000	0.035
HC	2030	Warm	0.008	0.011	0.349
HC	2030	Start	1.408	0.634	
HC	2030	Hot/warm soak	0.025	0.008	0.427
HC	2030	Diurnal	0.093	0.023	0.368
HC	2030	Running losses	0.001	0.000	0.035
HC	2035	Warm	0.008	0.009	0.322
HC	2035	Start	1.378	0.583	
HC	2035	Hot/warm soak	0.024	0.006	0.432
HC	2035	Diurnal	0.092	0.021	0.370
HC	2035	Running losses	0.001	0.000	0.035
NO ₂	1990	Warm	0.042	0.120	0.007
NO ₂	1990	Start	0.052	-0.001	
NO ₂	1995	Warm	0.032	0.104	0.010
NO ₂	1995	Start	0.116	0.051	
NO ₂	2000	Warm	0.030	0.106	0.011
NO ₂	2000	Start	0.119	0.070	
NO ₂	2005	Warm	0.050	0.217	0.011
NO ₂	2005	Start	0.060	0.045	
NO ₂	2010	Warm	0.069	0.301	0.010
NO ₂	2010	Start	-0.014	-0.116	
NO ₂	2015	Warm	0.072	0.306	0.009

Emission	Year	Emission type	PC	LCV	MC
NO ₂	2015	Start	-0.055	-0.235	
NO ₂	2020	Warm	0.054	0.224	0.007
NO ₂	2020	Start	-0.054	-0.316	
NO ₂	2025	Warm	0.040	0.159	0.006
NO ₂	2025	Start	-0.045	-0.361	
NO ₂	2030	Warm	0.031	0.121	0.005
NO ₂	2030	Start	-0.037	-0.389	
NO ₂	2035	Warm	0.028	0.102	0.005
NO ₂	2035	Start	-0.033	-0.401	
NO _x	1990	Warm	1.136	2.082	0.147
NO _x	1990	Start	0.647	0.027	
NO _x	1995	Warm	0.763	1.698	0.196
NO _x	1995	Start	1.524	0.704	
NO _x	2000	Warm	0.564	1.485	0.212
NO _x	2000	Start	1.564	0.772	
NO _x	2005	Warm	0.419	1.276	0.222
NO _x	2005	Start	0.983	0.343	
NO _x	2010	Warm	0.311	1.080	0.200
NO _x	2010	Start	0.545	0.083	
NO _x	2015	Warm	0.257	0.949	0.181
NO _x	2015	Start	0.283	-0.065	
NO _x	2020	Warm	0.186	0.692	0.143
NO _x	2020	Start	0.173	-0.102	
NO _x	2025	Warm	0.145	0.494	0.117
NO _x	2025	Start	0.145	-0.091	
NO _x	2030	Warm	0.124	0.384	0.100
NO _x	2030	Start	0.141	-0.089	
NO _x	2035	Warm	0.116	0.332	0.091
NO _x	2035	Start	0.140	-0.088	
PM exhaust	1990	Warm	0.016	0.115	
PM exhaust	1990	Start	0.006	0.101	
PM exhaust	1995	Warm	0.014	0.131	
PM exhaust	1995	Start	0.007	0.119	
PM exhaust	2000	Warm	0.015	0.114	
PM exhaust	2000	Start	0.008	0.114	
PM exhaust	2005	Warm	0.013	0.082	
PM exhaust	2005	Start	0.016	0.129	
PM exhaust	2010	Warm	0.010	0.056	
PM exhaust	2010	Start	0.016	0.143	
PM exhaust	2015	Warm	0.006	0.034	
PM exhaust	2015	Start	0.011	0.107	
PM exhaust	2020	Warm	0.003	0.019	
PM exhaust	2020	Start	0.006	0.063	
PM exhaust	2025	Warm	0.002	0.010	
PM exhaust	2025	Start	0.004	0.036	

Emission	Year	Emission type	PC	LCV	MC
PM exhaust	2030	Warm	0.001	0.006	
PM exhaust	2030	Start	0.003	0.021	
PM exhaust	2035	Warm	0.001	0.004	
PM exhaust	2035	Start	0.003	0.013	
PN	1990	Warm	5.0E + 12	6.3E + 13	
PN	1990	Start	3.2E + 12	1.4E + 13	
PN	1995	Warm	5.2E + 12	7.5E + 13	
PN	1995	Start	3.7E + 12	1.8E + 13	
PN	2000	Warm	5.9E + 12	8.1E + 13	
PN	2000	Start	4.3E + 12	2.4E + 13	
PN	2005	Warm	1.0E + 13	8.1E + 13	
PN	2005	Start	7.8E + 12	3.0E + 13	
PN	2010	Warm	9.3E + 12	6.7E + 13	
PN	2010	Start	6.8E + 12	3.2E + 13	
PN	2015	Warm	6.0E + 12	4.1E + 13	
PN	2015	Start	4.5E + 12	2.3E + 13	
PN	2020	Warm	3.0E + 12	2.2E + 13	
PN	2020	Start	2.3E + 12	1.3E + 13	
PN	2025	Warm	1.4E + 12	1.1E + 13	
PN	2025	Start	1.1E + 12	7.1E + 12	
PN	2030	Warm	7.7E + 11	4.7E + 12	
PN	2030	Start	6.9E + 11	3.8E + 12	
PN	2035	Warm	6.3E + 11	1.9E + 12	

A6-3 Emission factors by road category

Tab. 21 > Emission factors in grams per kilometre, incl. cold starts and evaporation

Emission	Year	Road cat.	PC	LCV	HGV	Coach	UBus	MC
CO	1990	Motorway	5.93	13.74	1.85	1.45		27.38
CO	1990	Rural	5.89	13.15	2.31	2.01	3.70	14.49
CO	1990	Urban	19.52	34.88	3.65	3.64	7.24	11.94
CO	1995	Motorway	3.15	11.08	1.72	1.42		26.08
CO	1995	Rural	2.88	8.78	2.15	1.96	3.51	12.84
CO	1995	Urban	11.94	24.86	3.37	3.51	6.87	10.72
CO	2000	Motorway	2.14	7.71	1.42	1.33		24.98
CO	2000	Rural	1.62	4.84	1.76	1.82	2.85	11.81
CO	2000	Urban	7.57	14.44	2.66	3.14	5.64	9.91
CO	2005	Motorway	1.62	3.84	1.31	1.22		20.52
CO	2005	Rural	0.99	2.13	1.62	1.80	1.74	9.53
CO	2005	Urban	5.01	7.39	2.56	2.87	3.57	8.90
CO	2010	Motorway	1.08	1.94	1.19	1.22		13.64
CO	2010	Rural	0.57	1.03	1.46	1.75	0.87	6.06
CO	2010	Urban	3.36	3.96	2.26	2.84	1.82	6.64

Emission	Year	Road cat.	PC	LCV	HGV	Coach	UBus	MC
CO	2015	Motorway	0.68	1.17	1.10	1.18		9.52
CO	2015	Rural	0.34	0.59	1.33	1.63	0.68	4.16
CO	2015	Urban	2.49	2.52	2.04	2.74	1.42	4.79
CO	2020	Motorway	0.41	0.72	0.88	0.98		6.57
CO	2020	Rural	0.20	0.33	1.06	1.32	0.70	2.86
CO	2020	Urban	1.94	1.70	1.66	2.30	1.43	3.50
CO	2025	Motorway	0.30	0.45	0.74	0.83		4.74
CO	2025	Rural	0.16	0.19	0.87	1.10	0.76	2.07
CO	2025	Urban	1.76	1.27	1.41	1.97	1.51	2.77
CO	2030	Motorway	0.26	0.31	0.68	0.76		3.78
CO	2030	Rural	0.14	0.12	0.80	1.01	0.79	1.67
CO	2030	Urban	1.68	1.07	1.31	1.83	1.58	2.41
CO	2035	Motorway	0.24	0.24	0.66	0.74		3.25
CO	2035	Rural	0.14	0.09	0.77	0.97	0.81	1.46
CO	2035	Urban	1.64	0.97	1.27	1.77	1.62	2.21
CO ₂ (rep.)	1990	Motorway	242	248	725	750		135
CO ₂ (rep.)	1990	Rural	202	217	788	829	886	84
CO ₂ (rep.)	1990	Urban	267	284	1038	1201	1363	69
CO ₂ (rep.)	1995	Motorway	243	260	724	745		135
CO ₂ (rep.)	1995	Rural	203	220	793	825	893	89
CO ₂ (rep.)	1995	Urban	266	278	1039	1193	1367	74
CO ₂ (rep.)	2000	Motorway	232	271	692	722		133
CO ₂ (rep.)	2000	Rural	194	222	760	803	877	90
CO ₂ (rep.)	2000	Urban	254	269	972	1149	1318	74
CO ₂ (rep.)	2005	Motorway	213	260	728	711		130
CO ₂ (rep.)	2005	Rural	180	214	797	801	865	92
CO ₂ (rep.)	2005	Urban	238	262	1011	1136	1271	76
CO ₂ (rep.)	2010	Motorway	190	249	710	705		124
CO ₂ (rep.)	2010	Rural	162	208	777	794	856	94
CO ₂ (rep.)	2010	Urban	218	256	964	1108	1214	82
CO ₂ (rep.)	2015	Motorway	165	240	689	695		114
CO ₂ (rep.)	2015	Rural	142	202	752	781	846	90
CO ₂ (rep.)	2015	Urban	195	248	925	1081	1171	78
CO ₂ (rep.)	2020	Motorway	150	234	684	699		111
CO ₂ (rep.)	2020	Rural	130	197	745	784	848	89
CO ₂ (rep.)	2020	Urban	181	242	914	1082	1160	78
CO ₂ (rep.)	2025	Motorway	138	228	682	701		108
CO ₂ (rep.)	2025	Rural	120	193	742	787	850	88
CO ₂ (rep.)	2025	Urban	169	238	909	1086	1154	78
CO ₂ (rep.)	2030	Motorway	127	226	680	703		107
CO ₂ (rep.)	2030	Rural	111	191	739	788	850	88
CO ₂ (rep.)	2030	Urban	158	235	906	1088	1151	78
CO ₂ (rep.)	2035	Motorway	118	224	679	703		106
CO ₂ (rep.)	2035	Rural	103	190	737	789	850	88
CO ₂ (rep.)	2035	Urban	148	234	904	1089	1151	78

Emission	Year	Road cat.	PC	LCV	HGV	Coach	UBus	MC
CO ₂ (total)	1990	Motorway	242	248	725	750		135
CO ₂ (total)	1990	Rural	202	217	788	829	886	84
CO ₂ (total)	1990	Urban	267	284	1 038	1 201	1 363	69
CO ₂ (total)	1995	Motorway	243	260	724	745		135
CO ₂ (total)	1995	Rural	203	220	793	825	893	89
CO ₂ (total)	1995	Urban	266	278	1 039	1 192	1 367	74
CO ₂ (total)	2000	Motorway	232	271	693	723		133
CO ₂ (total)	2000	Rural	194	222	761	804	878	90
CO ₂ (total)	2000	Urban	254	269	973	1 151	1 320	74
CO ₂ (total)	2005	Motorway	214	261	731	714		130
CO ₂ (total)	2005	Rural	180	214	800	804	868	92
CO ₂ (total)	2005	Urban	238	262	1 015	1 140	1 275	76
CO ₂ (total)	2010	Motorway	194	252	718	713		127
CO ₂ (total)	2010	Rural	165	211	786	804	869	96
CO ₂ (total)	2010	Urban	222	260	975	1 121	1 232	83
CO ₂ (total)	2015	Motorway	176	249	709	715		124
CO ₂ (total)	2015	Rural	151	209	774	803	873	97
CO ₂ (total)	2015	Urban	207	257	951	1 111	1 209	84
CO ₂ (total)	2020	Motorway	159	242	704	719		119
CO ₂ (total)	2020	Rural	138	204	767	806	876	96
CO ₂ (total)	2020	Urban	191	251	940	1 113	1 198	84
CO ₂ (total)	2025	Motorway	145	236	701	721		117
CO ₂ (total)	2025	Rural	127	199	763	809	877	95
CO ₂ (total)	2025	Urban	178	246	935	1 117	1 192	84
CO ₂ (total)	2030	Motorway	134	233	700	723		115
CO ₂ (total)	2030	Rural	118	197	760	811	878	95
CO ₂ (total)	2030	Urban	167	243	932	1 119	1 189	84
CO ₂ (total)	2035	Motorway	124	232	699	723		114
CO ₂ (total)	2035	Rural	109	196	758	811	878	95
CO ₂ (total)	2035	Urban	156	242	929	1 120	1 189	84
HC	1990	Motorway	0.59	0.92	0.59	0.45		1.47
HC	1990	Rural	0.78	1.07	0.75	0.62	1.16	3.03
HC	1990	Urban	3.71	4.27	1.52	1.35	2.78	4.62
HC	1995	Motorway	0.28	0.61	0.53	0.43		1.09
HC	1995	Rural	0.37	0.67	0.67	0.60	1.01	1.99
HC	1995	Urban	2.34	3.03	1.34	1.28	2.43	3.85
HC	2000	Motorway	0.13	0.34	0.41	0.40		0.92
HC	2000	Rural	0.17	0.33	0.51	0.55	0.75	1.57
HC	2000	Urban	1.51	1.75	0.99	1.14	1.78	3.21
HC	2005	Motorway	0.07	0.15	0.29	0.32		0.72
HC	2005	Rural	0.08	0.13	0.35	0.44	0.40	1.19
HC	2005	Urban	0.97	0.92	0.69	0.89	0.91	2.71
HC	2010	Motorway	0.03	0.07	0.14	0.18		0.51
HC	2010	Rural	0.03	0.06	0.17	0.25	0.33	0.73
HC	2010	Urban	0.65	0.51	0.32	0.50	0.71	2.11

Emission	Year	Road cat.	PC	LCV	HGV	Coach	UBus	MC
HC	2015	Motorway	0.02	0.04	0.08	0.11		0.40
HC	2015	Rural	0.02	0.04	0.09	0.15	0.31	0.51
HC	2015	Urban	0.48	0.34	0.17	0.29	0.65	1.59
HC	2020	Motorway	0.01	0.02	0.04	0.06		0.31
HC	2020	Rural	0.01	0.02	0.05	0.08	0.29	0.37
HC	2020	Urban	0.36	0.23	0.09	0.14	0.61	1.26
HC	2025	Motorway	0.01	0.01	0.03	0.03		0.25
HC	2025	Rural	0.01	0.01	0.03	0.04	0.29	0.30
HC	2025	Urban	0.32	0.18	0.05	0.08	0.61	1.09
HC	2030	Motorway	0.01	0.01	0.02	0.03		0.21
HC	2030	Rural	0.01	0.01	0.02	0.03	0.29	0.26
HC	2030	Urban	0.30	0.15	0.04	0.06	0.60	1.01
HC	2035	Motorway	0.01	0.01	0.02	0.02		0.19
HC	2035	Rural	0.01	0.01	0.02	0.03	0.29	0.24
HC	2035	Urban	0.29	0.14	0.04	0.05	0.59	0.97
NO ₂	1990	Motorway	0.05	0.15	0.73	0.72		0.03
NO ₂	1990	Rural	0.04	0.11	0.78	0.77	0.94	0.01
NO ₂	1990	Urban	0.04	0.09	0.94	1.02	1.32	0.00
NO ₂	1995	Motorway	0.04	0.13	0.67	0.68		0.03
NO ₂	1995	Rural	0.03	0.09	0.73	0.73	0.91	0.01
NO ₂	1995	Urban	0.05	0.09	0.88	0.98	1.28	0.00
NO ₂	2000	Motorway	0.04	0.14	0.58	0.62		0.03
NO ₂	2000	Rural	0.02	0.09	0.64	0.68	0.82	0.01
NO ₂	2000	Urban	0.05	0.10	0.79	0.92	1.17	0.00
NO ₂	2005	Motorway	0.06	0.28	0.47	0.52		0.03
NO ₂	2005	Rural	0.04	0.19	0.54	0.59	1.06	0.01
NO ₂	2005	Urban	0.06	0.17	0.70	0.86	1.69	0.00
NO ₂	2010	Motorway	0.08	0.40	0.34	0.41		0.02
NO ₂	2010	Rural	0.06	0.26	0.41	0.50	1.35	0.01
NO ₂	2010	Urban	0.07	0.20	0.64	0.84	2.43	0.00
NO ₂	2015	Motorway	0.08	0.41	0.26	0.32		0.02
NO ₂	2015	Rural	0.06	0.26	0.33	0.42	1.06	0.01
NO ₂	2015	Urban	0.06	0.17	0.57	0.77	2.07	0.00
NO ₂	2020	Motorway	0.06	0.30	0.17	0.22		0.02
NO ₂	2020	Rural	0.05	0.19	0.23	0.30	0.68	0.00
NO ₂	2020	Urban	0.05	0.10	0.44	0.61	1.36	0.00
NO ₂	2025	Motorway	0.04	0.21	0.12	0.15		0.01
NO ₂	2025	Rural	0.03	0.13	0.16	0.22	0.41	0.00
NO ₂	2025	Urban	0.03	0.04	0.36	0.49	0.83	0.00
NO ₂	2030	Motorway	0.03	0.16	0.10	0.12		0.01
NO ₂	2030	Rural	0.03	0.10	0.14	0.18	0.28	0.00
NO ₂	2030	Urban	0.03	0.01	0.33	0.44	0.55	0.00
NO ₂	2035	Motorway	0.03	0.14	0.09	0.11		0.01
NO ₂	2035	Rural	0.02	0.09	0.13	0.17	0.23	0.00
NO ₂	2035	Urban	0.02	-0.01	0.31	0.43	0.44	0.00

Emission	Year	Road cat.	PC	LCV	HGV	Coach	UBus	MC
NO _x	1990	Motorway	1.51	2.64	10.41	10.32		0.58
NO _x	1990	Rural	1.01	1.85	11.21	11.04	13.40	0.13
NO _x	1990	Urban	1.04	1.70	13.39	14.61	18.89	0.06
NO _x	1995	Motorway	0.98	2.15	9.58	9.74		0.56
NO _x	1995	Rural	0.66	1.47	10.39	10.48	12.98	0.17
NO _x	1995	Urban	0.96	1.56	12.51	13.95	18.31	0.08
NO _x	2000	Motorway	0.68	1.86	8.34	8.84		0.53
NO _x	2000	Rural	0.47	1.24	9.14	9.67	11.77	0.18
NO _x	2000	Urban	0.84	1.46	11.31	13.20	16.77	0.09
NO _x	2005	Motorway	0.48	1.62	6.73	7.41		0.53
NO _x	2005	Rural	0.35	1.06	7.74	8.44	9.25	0.18
NO _x	2005	Urban	0.63	1.15	9.93	12.22	14.06	0.09
NO _x	2010	Motorway	0.34	1.41	4.18	5.15		0.49
NO _x	2010	Rural	0.26	0.91	5.09	6.39	6.67	0.15
NO _x	2010	Urban	0.44	0.87	8.02	10.80	11.44	0.07
NO _x	2015	Motorway	0.28	1.25	2.82	3.66		0.44
NO _x	2015	Rural	0.21	0.79	3.55	4.83	4.71	0.12
NO _x	2015	Urban	0.33	0.71	6.47	9.08	8.91	0.07
NO _x	2020	Motorway	0.20	0.92	1.51	1.98		0.35
NO _x	2020	Rural	0.16	0.58	1.97	2.73	2.81	0.09
NO _x	2020	Urban	0.23	0.50	3.86	5.54	5.50	0.06
NO _x	2025	Motorway	0.16	0.66	0.73	1.00		0.29
NO _x	2025	Rural	0.12	0.41	0.99	1.42	1.64	0.07
NO _x	2025	Urban	0.18	0.35	2.09	3.09	3.27	0.05
NO _x	2030	Motorway	0.13	0.51	0.43	0.59		0.25
NO _x	2030	Rural	0.10	0.32	0.60	0.87	1.08	0.06
NO _x	2030	Urban	0.16	0.26	1.41	2.05	2.14	0.04
NO _x	2035	Motorway	0.12	0.45	0.34	0.45		0.23
NO _x	2035	Rural	0.10	0.28	0.48	0.67	0.87	0.05
NO _x	2035	Urban	0.15	0.22	1.18	1.67	1.68	0.04
PM exhaust	1990	Motorway	0.02	0.13	0.37	0.34		
PM exhaust	1990	Rural	0.01	0.11	0.43	0.44	0.57	
PM exhaust	1990	Urban	0.01	0.12	0.66	0.73	1.16	
PM exhaust	1995	Motorway	0.02	0.15	0.32	0.30		
PM exhaust	1995	Rural	0.01	0.13	0.38	0.39	0.50	
PM exhaust	1995	Urban	0.01	0.14	0.59	0.65	1.01	
PM exhaust	2000	Motorway	0.02	0.13	0.23	0.25		
PM exhaust	2000	Rural	0.01	0.11	0.27	0.32	0.40	
PM exhaust	2000	Urban	0.01	0.12	0.40	0.53	0.77	
PM exhaust	2005	Motorway	0.02	0.09	0.16	0.18		
PM exhaust	2005	Rural	0.01	0.07	0.18	0.23	0.22	
PM exhaust	2005	Urban	0.01	0.10	0.28	0.37	0.41	
PM exhaust	2010	Motorway	0.01	0.06	0.08	0.10		
PM exhaust	2010	Rural	0.01	0.05	0.09	0.13	0.08	
PM exhaust	2010	Urban	0.01	0.08	0.15	0.21	0.15	

Emission	Year	Road cat.	PC	LCV	HGV	Coach	UBus	MC
PM exhaust	2015	Motorway	0.01	0.04	0.05	0.06		
PM exhaust	2015	Rural	0.01	0.03	0.05	0.08	0.04	
PM exhaust	2015	Urban	0.01	0.05	0.09	0.13	0.07	
PM exhaust	2020	Motorway	0.00	0.02	0.02	0.03		
PM exhaust	2020	Rural	0.00	0.02	0.03	0.04	0.02	
PM exhaust	2020	Urban	0.00	0.03	0.04	0.06	0.03	
PM exhaust	2025	Motorway	0.00	0.01	0.01	0.01		
PM exhaust	2025	Rural	0.00	0.01	0.01	0.02	0.01	
PM exhaust	2025	Urban	0.00	0.02	0.02	0.03	0.02	
PM exhaust	2030	Motorway	0.00	0.01	0.00	0.01		
PM exhaust	2030	Rural	0.00	0.00	0.01	0.01	0.01	
PM exhaust	2030	Urban	0.00	0.01	0.01	0.01	0.01	
PM exhaust	2035	Motorway	0.00	0.00	0.00	0.00		
PM exhaust	2035	Rural	0.00	0.00	0.00	0.01	0.01	
PM exhaust	2035	Urban	0.00	0.01	0.01	0.01	0.01	
PN	1990	Motorway	5.7E + 12	5.8E + 13	8.5E + 13	8.6E + 13		
PN	1990	Rural	4.3E + 12	6.2E + 13	9.5E + 13	1.1E + 14	8.9E + 13	
PN	1990	Urban	5.6E + 12	7.0E + 13	1.6E + 14	1.9E + 14	1.6E + 14	
PN	1995	Motorway	5.7E + 12	6.9E + 13	8.9E + 13	8.7E + 13		
PN	1995	Rural	4.6E + 12	7.4E + 13	9.9E + 13	1.1E + 14	9.0E + 13	
PN	1995	Urban	6.1E + 12	8.7E + 13	1.7E + 14	2.0E + 14	1.7E + 14	
PN	2000	Motorway	6.3E + 12	7.3E + 13	9.7E + 13	9.1E + 13		
PN	2000	Rural	5.2E + 12	7.9E + 13	1.1E + 14	1.2E + 14	9.4E + 13	
PN	2000	Urban	7.1E + 12	9.6E + 13	1.8E + 14	2.1E + 14	1.7E + 14	
PN	2005	Motorway	9.9E + 12	7.3E + 13	1.3E + 14	1.2E + 14		
PN	2005	Rural	8.9E + 12	7.8E + 13	1.4E + 14	1.5E + 14	8.7E + 13	
PN	2005	Urban	1.3E + 13	1.0E + 14	2.5E + 14	2.6E + 14	1.6E + 14	
PN	2010	Motorway	9.2E + 12	5.8E + 13	8.2E + 13	9.4E + 13		
PN	2010	Rural	8.2E + 12	6.4E + 13	9.3E + 13	1.2E + 14	3.9E + 13	
PN	2010	Urban	1.2E + 13	8.7E + 13	1.6E + 14	2.1E + 14	7.1E + 13	
PN	2015	Motorway	6.0E + 12	3.6E + 13	5.4E + 13	6.6E + 13		
PN	2015	Rural	5.3E + 12	3.9E + 13	6.1E + 13	8.6E + 13	2.1E + 13	
PN	2015	Urban	7.7E + 12	5.5E + 13	1.1E + 14	1.5E + 14	3.9E + 13	
PN	2020	Motorway	3.1E + 12	1.9E + 13	2.6E + 13	3.3E + 13		
PN	2020	Rural	2.7E + 12	2.1E + 13	3.0E + 13	4.2E + 13	1.0E + 13	
PN	2020	Urban	3.8E + 12	3.0E + 13	5.1E + 13	7.3E + 13	1.8E + 13	
PN	2025	Motorway	1.5E + 12	9.6E + 12	9.6E + 12	1.3E + 13		
PN	2025	Rural	1.2E + 12	1.0E + 13	1.1E + 13	1.7E + 13	4.0E + 12	
PN	2025	Urban	1.6E + 12	1.5E + 13	1.9E + 13	3.0E + 13	7.1E + 12	
PN	2030	Motorway	9.2E + 11	4.2E + 12	3.2E + 12	5.1E + 12		
PN	2030	Rural	6.4E + 11	4.4E + 12	3.8E + 12	6.7E + 12	1.8E + 12	
PN	2030	Urban	8.5E + 11	6.4E + 12	6.5E + 12	1.1E + 13	3.1E + 12	
PN	2035	Motorway	7.8E + 11	1.7E + 12	1.4E + 12	2.2E + 12		
PN	2035	Rural	5.2E + 11	1.7E + 12	1.6E + 12	2.8E + 12	1.1E + 12	

Emission	Year	Road cat.	PC	LCV	HGV	Coach	UBus	MC
PN	2035	Urban	6.9E + 11	2.6E + 12	2.7E + 12	4.9E + 12	2.0E + 12	0.0E + 00

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Emission factors by fuel type**Tab. 22 > Emission factors by fuel type in grams per kilometre, incl. cold starts and evaporation**

Emission	Year	Fuel	PC	LCV	HGV	Coach	UBus	MC
CO	1990	P	11.052	27.553				14.699
CO	1990	D	0.881	1.394	2.367	2.093	5.988	
CO	1995	P	6.324	21.871				14.143
CO	1995	D	0.720	1.361	2.164	2.013	5.676	
CO	2000	P	4.022	16.140				13.620
CO	2000	D	0.471	0.930	1.747	1.839	4.645	
CO	2005	P	2.960	11.776				11.679
CO	2005	D	0.244	0.482	1.628	1.727	2.922	
CO	2010	P	2.179	8.968				8.019
CO	2010	D	0.154	0.284	1.467	1.701	1.438	
CO	2010	CNG	0.395				2.657	
CO	2015	P	1.695	7.052				5.683
CO	2015	D	0.120	0.204	1.340	1.626	1.088	
CO	2015	CNG	0.355				2.624	
CO	2020	P	1.338	5.498				3.988
CO	2020	D	0.106	0.159	1.079	1.341	1.100	
CO	2020	CNG	0.310				2.602	
CO	2025	P	1.209	4.285				2.964
CO	2025	D	0.102	0.133	0.903	1.135	1.171	
CO	2025	CNG	0.286				2.590	
CO	2030	P	1.160	3.571				2.438
CO	2030	D	0.101	0.122	0.833	1.046	1.230	
CO	2030	CNG	0.274				2.581	
CO	2035	P	1.135	3.246				2.153
CO	2035	D	0.100	0.118	0.809	1.013	1.263	
CO	2035	CNG	0.269				2.578	
CO ₂ (rep.)	1990	P	238	235				82
CO ₂ (rep.)	1990	D	214	284	809	871	1 194	
CO ₂ (rep.)	1995	P	238	235				90
CO ₂ (rep.)	1995	D	213	284	804	860	1 199	
CO ₂ (rep.)	2000	P	228	235				92
CO ₂ (rep.)	2000	D	204	276	763	833	1 162	
CO ₂ (rep.)	2005	P	217	236				94
CO ₂ (rep.)	2005	D	176	251	800	823	1 127	
CO ₂ (rep.)	2010	P	199	230				97
CO ₂ (rep.)	2010	D	165	241	776	812	1 086	
CO ₂ (rep.)	2010	CNG	133				1 109	

Emission	Year	Fuel	PC	LCV	HGV	Coach	UBus	MC
CO ₂ (rep.)	2015	P	175	215				92
CO ₂ (rep.)	2015	D	153	234	751	797	1 053	
CO ₂ (rep.)	2015	CNG	126				1 096	
CO ₂ (rep.)	2020	P	160	207				90
CO ₂ (rep.)	2020	D	144	228	745	800	1 047	
CO ₂ (rep.)	2020	CNG	119				1 089	
CO ₂ (rep.)	2025	P	147	199				90
CO ₂ (rep.)	2025	D	135	223	742	803	1 044	
CO ₂ (rep.)	2025	CNG	112				1 084	
CO ₂ (rep.)	2030	P	136	192				89
CO ₂ (rep.)	2030	D	127	221	740	805	1 042	
CO ₂ (rep.)	2030	CNG	104				1 081	
CO ₂ (rep.)	2035	P	126	187				89
CO ₂ (rep.)	2035	D	118	220	739	805	1 042	
CO ₂ (rep.)	2035	CNG	97				1 080	
CO ₂ (total)	1990	P	238	235				82
CO ₂ (total)	1990	D	214	284	809	871	1 194	
CO ₂ (total)	1995	P	238	235				90
CO ₂ (total)	1995	D	213	284	804	860	1 199	
CO ₂ (total)	2000	P	228	235				92
CO ₂ (total)	2000	D	204	276	764	834	1 163	
CO ₂ (total)	2005	P	217	236				94
CO ₂ (total)	2005	D	177	252	803	826	1 131	
CO ₂ (total)	2010	P	203	236				99
CO ₂ (total)	2010	D	167	243	785	821	1 099	
CO ₂ (total)	2010	CNG	148				1 232	
CO ₂ (total)	2015	P	189	232				99
CO ₂ (total)	2015	D	157	241	773	820	1 083	
CO ₂ (total)	2015	CNG	140				1 218	
CO ₂ (total)	2020	P	172	223				98
CO ₂ (total)	2020	D	148	234	766	823	1 077	
CO ₂ (total)	2020	CNG	132				1 210	
CO ₂ (total)	2025	P	159	215				97
CO ₂ (total)	2025	D	139	229	763	826	1 073	
CO ₂ (total)	2025	CNG	124				1 204	
CO ₂ (total)	2030	P	147	207				96
CO ₂ (total)	2030	D	130	227	761	827	1 072	
CO ₂ (total)	2030	CNG	116				1 201	
CO ₂ (total)	2035	P	136	202				96
CO ₂ (total)	2035	D	121	226	760	828	1 072	
CO ₂ (total)	2035	CNG	107				1 200	
HC	1990	P	1.790	2.706				3.686
HC	1990	D	0.181	0.279	0.834	0.698	2.204	
HC	1995	P	1.046	1.997				2.648
HC	1995	D	0.139	0.270	0.729	0.655	1.926	

Emission	Year	Fuel	PC	LCV	HGV	Coach	UBus	MC
HC	2000	P	0.635	1.318				2.084
HC	2000	D	0.092	0.182	0.545	0.596	1.417	
HC	2005	P	0.421	0.933				1.640
HC	2005	D	0.050	0.090	0.381	0.471	0.731	
HC	2010	P	0.300	0.726				1.157
HC	2010	D	0.031	0.050	0.181	0.265	0.282	
HC	2010	CNG	0.015				8.728	
HC	2015	P	0.235	0.577				0.850
HC	2015	D	0.025	0.036	0.099	0.159	0.143	
HC	2015	CNG	0.013				8.695	
HC	2020	P	0.190	0.454				0.654
HC	2020	D	0.022	0.028	0.055	0.080	0.073	
HC	2020	CNG	0.012				8.674	
HC	2025	P	0.174	0.362				0.551
HC	2025	D	0.021	0.024	0.034	0.047	0.044	
HC	2025	CNG	0.011				8.662	
HC	2030	P	0.166	0.316				0.501
HC	2030	D	0.021	0.022	0.026	0.034	0.035	
HC	2030	CNG	0.011				8.654	
HC	2035	P	0.162	0.297				0.473
HC	2035	D	0.021	0.021	0.024	0.030	0.034	
HC	2035	CNG	0.011				8.651	
MF	1990	P	75.6	74.7				26.2
MF	1990	D	67.9	90.3	256.8	276.6	379.0	
MF	1995	P	75.8	74.7				28.7
MF	1995	D	67.5	90.1	255.4	273.1	380.6	
MF	2000	P	72.7	74.8				29.3
MF	2000	D	64.8	87.7	242.5	264.7	369.2	
MF	2005	P	69.1	75.1				30.0
MF	2005	D	56.2	80.0	254.9	262.2	359.0	
MF	2010	P	64.7	75.0				31.5
MF	2010	D	52.9	77.3	249.4	260.7	348.8	
MF	2010	CNG	53.9				449.1	
MF	2015	P	60.2	73.8				31.5
MF	2015	D	50.0	76.4	245.3	260.4	343.9	
MF	2015	CNG	51.1				444.1	
MF	2020	P	54.9	71.1				31.1
MF	2020	D	47.0	74.4	243.3	261.2	341.8	
MF	2020	CNG	48.2				441.0	
MF	2025	P	50.5	68.5				30.8
MF	2025	D	44.2	72.8	242.3	262.2	340.8	
MF	2025	CNG	45.2				439.0	
MF	2030	P	46.9	66.1				30.6
MF	2030	D	41.3	72.1	241.6	262.7	340.3	
MF	2030	CNG	42.2				437.8	

Emission	Year	Fuel	PC	LCV	HGV	Coach	UBus	MC
MF	2035	P	43.5	64.2				30.6
MF	2035	D	38.6	71.7	241.2	262.9	340.2	
MF	2035	CNG	39.1				437.4	
NO ₂	1990	P	0.044	0.109				0.007
NO ₂	1990	D	0.059	0.147	0.789	0.803	1.186	
NO ₂	1995	P	0.038	0.086				0.010
NO ₂	1995	D	0.056	0.146	0.727	0.758	1.149	
NO ₂	2000	P	0.034	0.075				0.011
NO ₂	2000	D	0.075	0.150	0.638	0.698	1.050	
NO ₂	2005	P	0.023	0.056				0.011
NO ₂	2005	D	0.199	0.306	0.535	0.608	1.466	
NO ₂	2010	P	0.014	0.039				0.010
NO ₂	2010	D	0.210	0.369	0.419	0.522	1.985	
NO ₂	2010	CNG	0.006				3.803	
NO ₂	2015	P	0.008	0.028				0.009
NO ₂	2015	D	0.175	0.347	0.340	0.443	1.617	
NO ₂	2015	CNG	0.005				3.762	
NO ₂	2020	P	0.005	0.018				0.007
NO ₂	2020	D	0.112	0.234	0.240	0.318	0.981	
NO ₂	2020	CNG	0.005				3.736	
NO ₂	2025	P	0.004	0.011				0.006
NO ₂	2025	D	0.075	0.153	0.176	0.237	0.517	
NO ₂	2025	CNG	0.005				3.720	
NO ₂	2030	P	0.004	0.007				0.005
NO ₂	2030	D	0.057	0.107	0.151	0.203	0.275	
NO ₂	2030	CNG	0.005				3.710	
NO ₂	2035	P	0.004	0.005				0.005
NO ₂	2035	D	0.050	0.084	0.143	0.191	0.178	
NO ₂	2035	CNG	0.005				3.706	
NO _x	1990	P	1.208	2.173				0.147
NO _x	1990	D	0.734	1.856	11.274	11.465	16.948	
NO _x	1995	P	0.877	1.690				0.196
NO _x	1995	D	0.695	1.838	10.382	10.824	16.420	
NO _x	2000	P	0.661	1.430				0.212
NO _x	2000	D	0.700	1.646	9.116	9.969	14.999	
NO _x	2005	P	0.436	1.049				0.222
NO _x	2005	D	0.692	1.429	7.615	8.680	12.351	
NO _x	2010	P	0.260	0.736				0.200
NO _x	2010	D	0.566	1.189	5.158	6.642	9.554	
NO _x	2010	CNG	0.056				15.211	
NO _x	2015	P	0.156	0.525				0.181
NO _x	2015	D	0.481	1.034	3.712	5.085	7.058	
NO _x	2015	CNG	0.055				15.047	
NO _x	2020	P	0.100	0.357				0.143
NO _x	2020	D	0.325	0.738	2.082	2.911	4.007	

Emission	Year	Fuel	PC	LCV	HGV	Coach	UBus	MC
NO _x	2020	CNG	0.053				14.943	
NO _x	2025	P	0.084	0.224				0.117
NO _x	2025	D	0.235	0.523	1.060	1.539	2.015	
NO _x	2025	CNG	0.052				14.881	
NO _x	2030	P	0.079	0.143				0.100
NO _x	2030	D	0.190	0.405	0.662	0.966	1.042	
NO _x	2030	CNG	0.051				14.840	
NO _x	2035	P	0.077	0.108				0.091
NO _x	2035	D	0.174	0.350	0.538	0.758	0.652	
NO _x	2035	CNG	0.051				14.826	
PM exhaust	1990	P	0.008	0.015				
PM exhaust	1990	D	0.141	0.388	0.449	0.456	0.950	
PM exhaust	1995	P	0.007	0.014				
PM exhaust	1995	D	0.129	0.367	0.390	0.401	0.826	
PM exhaust	2000	P	0.007	0.013				
PM exhaust	2000	D	0.102	0.238	0.272	0.330	0.637	
PM exhaust	2005	P	0.006	0.012				
PM exhaust	2005	D	0.056	0.131	0.188	0.232	0.340	
PM exhaust	2010	P	0.004	0.010				
PM exhaust	2010	D	0.029	0.081	0.096	0.128	0.127	
PM exhaust	2010	CNG	0.002				0.062	
PM exhaust	2015	P	0.003	0.008				
PM exhaust	2015	D	0.014	0.048	0.057	0.080	0.060	
PM exhaust	2015	CNG	0.002				0.062	
PM exhaust	2020	P	0.002	0.007				
PM exhaust	2020	D	0.006	0.026	0.028	0.038	0.025	
PM exhaust	2020	CNG	0.001				0.062	
PM exhaust	2025	P	0.001	0.005				
PM exhaust	2025	D	0.003	0.013	0.012	0.017	0.011	
PM exhaust	2025	CNG	0.001				0.061	
PM exhaust	2030	P	0.001	0.004				
PM exhaust	2030	D	0.002	0.007	0.006	0.008	0.006	
PM exhaust	2030	CNG	0.001				0.061	
PM exhaust	2035	P	0.001	0.004				
PM exhaust	2035	D	0.002	0.005	0.004	0.005	0.006	
PM exhaust	2035	CNG	0.001				0.061	
PN	1990	P	1.4E + 12	2.3E + 12				
PN	1990	D	6.4E + 13	2.2E + 14	1.0E + 14	1.2E + 14	1.4E + 14	
PN	1995	P	1.3E + 12	2.2E + 12				
PN	1995	D	6.3E + 13	2.1E + 14	1.1E + 14	1.2E + 14	1.4E + 14	
PN	2000	P	1.2E + 12	2.1E + 12				
PN	2000	D	5.9E + 13	1.7E + 14	1.2E + 14	1.2E + 14	1.4E + 14	
PN	2005	P	1.1E + 12	2.0E + 12				
PN	2005	D	5.6E + 13	1.3E + 14	1.6E + 14	1.6E + 14	1.3E + 14	
PN	2010	P	1.1E + 12	2.0E + 12				

Emission	Year	Fuel	PC	LCV	HGV	Coach	UBus	MC
PN	2010	D	3.2E + 13	8.8E + 13	1.0E + 14	1.3E + 14	6.1E + 13	
PN	2010	CNG	9.8E + 11				2.5E + 12	
PN	2015	P	1.0E + 12	2.0E + 12				
PN	2015	D	1.5E + 13	5.1E + 13	6.5E + 13	8.8E + 13	3.4E + 13	
PN	2015	CNG	9.5E + 11				2.5E + 12	
PN	2020	P	9.4E + 11	2.0E + 12				
PN	2020	D	6.2E + 12	2.6E + 13	3.2E + 13	4.4E + 13	1.6E + 13	
PN	2020	CNG	9.0E + 11				2.5E + 12	
PN	2025	P	9.0E + 11	2.0E + 12				
PN	2025	D	2.0E + 12	1.3E + 13	1.2E + 13	1.8E + 13	6.2E + 12	
PN	2025	CNG	8.8E + 11				2.5E + 12	
PN	2030	P	8.8E + 11	1.9E + 12				
PN	2030	D	7.3E + 11	5.2E + 12	4.0E + 12	6.8E + 12	2.7E + 12	
PN	2030	CNG	8.6E + 11				2.5E + 12	
PN	2035	P	8.7E + 11	1.9E + 12				
PN	2035	D	4.5E + 11	2.0E + 12	1.7E + 12	2.9E + 12	1.6E + 12	

A6-5 Emission factors by emission concept

Tab. 23 > Emission factors by emission concept in grams per kilometre, incl. cold starts and evaporation

Emission	Vehicle category	Concept	1990	1995	2000	2005	2010	2015	2020	2025	2030	2035
CO	PC	PC-P-Euro-0	11.052	8.799	7.243	6.885	7.461	9.188	10.158	10.990	11.856	12.405
CO	PC	PC-P-Euro-1		3.206	3.820	3.978	3.917	3.885	3.799	3.767	3.753	3.745
CO	PC	PC-P-Euro-2			2.478	2.980	3.039	3.055	3.010	2.980	2.945	2.926
CO	PC	PC-P-Euro-3			2.062	2.072	2.072	2.105	2.094	2.088	2.058	2.031
CO	PC	PC-P-Euro-4			1.304	1.301	1.297	1.325	1.328	1.341	1.323	1.296
CO	PC	PC-P-Euro-5					1.212	1.212	1.202	1.213	1.210	1.189
CO	PC	PC-P-Euro-6						1.142	1.131	1.139	1.135	1.125
CO	PC	PC alternative					0.395	0.355	0.310	0.286	0.274	0.269
CO	PC	PC-D-Euro-0	0.943	0.901	0.848	0.870	0.921	1.054	1.065	1.084	1.112	1.067
CO	PC	PC-D-Euro-1	0.592	0.601	0.587	0.576	0.560	0.553	0.546	0.550	0.551	0.549
CO	PC	PC-D-Euro-2		0.342	0.329	0.326	0.316	0.314	0.309	0.307	0.307	0.305
CO	PC	PC-D-Euro-3			0.201	0.200	0.192	0.191	0.188	0.187	0.184	0.185
CO	PC	PC-D-Euro-4				0.126	0.120	0.119	0.118	0.117	0.115	0.113
CO	PC	PC-D-Euro-5					0.093	0.093	0.092	0.093	0.091	0.089
CO	PC	PC-D-Euro-6						0.102	0.101	0.102	0.101	0.100
CO	LCV	LCV-P-Euro-0	28.046	28.731	29.143	29.810	30.515	31.019	31.057	30.826	30.435	29.716
CO	LCV	LCV-P-Euro-1	10.892	12.213	13.831	14.700	15.407	16.059	16.609	16.858	16.856	16.728
CO	LCV	LCV-P-Euro-2			6.473	7.537	8.137	8.320	8.466	8.590	8.626	8.605
CO	LCV	LCV-P-Euro-3			3.788	3.914	4.019	4.055	4.041	4.005	3.975	3.977
CO	LCV	LCV-P-Euro-4				3.008	3.060	3.117	3.149	3.180	3.208	3.232
CO	LCV	LCV-P-Euro-5					3.038	3.088	3.130	3.156	3.175	3.198
CO	LCV	LCV-P-Euro-6						3.014	3.045	3.071	3.078	3.074
CO	LCV	LCV-D-Euro-0	1.394	1.420	1.431	1.462	1.487	1.487	1.476	1.474	1.465	1.466
CO	LCV	LCV-D-Euro-1		0.997	1.010	1.035	1.050	1.053	1.055	1.056	1.055	1.056
CO	LCV	LCV-D-Euro-2			0.454	0.470	0.481	0.483	0.484	0.486	0.488	0.488
CO	LCV	LCV-D-Euro-3			0.204	0.217	0.225	0.227	0.228	0.227	0.229	0.231
CO	LCV	LCV-D-Euro-4					0.132	0.134	0.134	0.134	0.134	0.135
CO	LCV	LCV-D-Euro-5					0.109	0.111	0.111	0.112	0.111	0.111
CO	LCV	LCV-D-Euro-6						0.115	0.116	0.116	0.116	0.116
CO	HGV	HGV-D-Euro-0	2.367	2.313	2.342	2.390	2.427	2.484	2.445	2.417	2.389	2.353
CO	HGV	HGV-D-Euro-I		1.695	1.616	1.575	1.682	1.768	1.855	1.898	1.909	1.899
CO	HGV	HGV-D-Euro-II			1.344	1.353	1.374	1.402	1.425	1.447	1.459	1.466
CO	HGV	HGV-D-Euro-III			1.653	1.619	1.548	1.584	1.589	1.580	1.562	1.581
CO	HGV	HGV-D-Euro-IV				1.449	1.336	1.350	1.355	1.352	1.302	1.299
CO	HGV	HGV-D-Euro-V				1.461	1.396	1.372	1.380	1.367	1.338	1.306
CO	HGV	HGV-D-Euro-VI						0.787	0.797	0.804	0.804	0.803
CO	Coach	Coach-D-Euro-0	2.093	2.057	2.065	2.010	1.999	2.071	2.070	2.065	2.066	2.066
CO	Coach	Coach-D-Euro-I		1.774	1.762	1.714	1.712	1.784	1.784	1.782	1.783	1.784
CO	Coach	Coach-D-Euro-II		1.445	1.462	1.418	1.419	1.456	1.455	1.455	1.455	1.455
CO	Coach	Coach-D-Euro-III			1.890	1.838	1.834	1.865	1.863	1.863	1.864	1.863
CO	Coach	Coach-D-Euro-IV				1.633	1.627	1.628	1.627	1.627	1.627	1.627

Emission	Vehicle category	Concept	1990	1995	2000	2005	2010	2015	2020	2025	2030	2035
CO	Coach	Coach-D-Euro-V					1.665	1.666	1.665	1.665	1.665	1.665
CO	Coach	Coach-D-Euro-VI						0.998	0.997	0.997	0.997	0.997
CO	UBus	UBus-D-Euro-0	5.988	5.999	6.090	6.032	6.187	6.392	6.396	6.400	6.404	6.405
CO	UBus	UBus-D-Euro-I		2.790	2.782	2.754	2.827	2.948	2.946	2.946	2.950	2.950
CO	UBus	UBus-D-Euro-II		2.587	2.517	2.484	2.153	2.217	2.164	2.151	2.149	2.155
CO	UBus	UBus-D-Euro-III			2.815	1.448	0.918	0.924	0.920	0.903	0.907	0.905
CO	UBus	UBus-D-Euro-IV				0.670	0.674	0.674	0.675	0.676	0.678	0.677
CO	UBus	UBus-D-Euro-V					0.689	0.685	0.684	0.685	0.685	0.685
CO	UBus	UBus-D-Euro-VI						1.273	1.273	1.274	1.274	1.274
CO	UBus	UBus alternative					2.657	2.624	2.602	2.590	2.581	2.578
CO	MC	Moped-EU0	11.381	11.381	11.455	11.330	11.323	11.381	11.381	11.381	11.381	11.381
CO	MC	Moped-EU1	5.000	5.000	5.033	4.978	4.975	5.000	5.000	5.000	5.000	5.000
CO	MC	Moped-EU2					2.766	2.780	2.780	2.780	2.780	2.780
CO	MC	Moped-EU3						2.224	2.224	2.224	2.224	2.224
CO	MC	Moped-EU4						2.224	2.224	2.224	2.224	2.224
CO	MC	LMC-Euro-0	6.250	6.250	6.291	6.222	6.219	6.250	6.250	6.250	6.250	6.250
CO	MC	LMC-Euro-1	6.250	6.250	6.291	6.222	6.219	6.250	6.250	6.250	6.250	6.250
CO	MC	LMC-Euro-2					2.761	2.775	2.775	2.775	2.775	2.775
CO	MC	LMC-Euro-3						2.225	2.225	2.225	2.225	2.225
CO	MC	LMC-Euro-4						2.225	2.225	2.225	2.225	2.225
CO	MC	MC-2S-Euro-0	20.204	20.199	20.512	20.233	19.602	19.606	19.532	19.451	19.402	19.367
CO	MC	MC-2S-Euro-1	17.274	17.261	17.556	17.274	16.747	16.752	16.691	16.622	16.582	16.552
CO	MC	MC-2S-Euro-2				13.680	13.260	13.263	13.214	13.160	13.128	13.105
CO	MC	MC-2S-Euro-3					7.279	7.328	7.301	7.271	7.254	7.241
CO	MC	MC-2S-Euro-4						7.138	7.113	7.084	7.067	7.055
CO	MC	MC-2S-Euro-5						5.976	5.955	5.931	5.917	5.907
CO	MC	MC-4S-Euro-0	19.858	19.910	20.985	20.365	21.409	21.589	21.563	21.523	21.499	21.483
CO	MC	MC-4S-Euro-1	14.509	14.036	13.670	13.587	13.648	13.781	13.661	13.563	13.508	13.468
CO	MC	MC-4S-Euro-2				5.363	4.747	4.723	4.600	4.515	4.490	4.461
CO	MC	MC-4S-Euro-3					2.121	2.224	2.151	2.037	1.968	1.952
CO	MC	MC-4S-Euro-4						1.969	1.937	1.843	1.708	1.648
CO	MC	MC-4S-Euro-5						1.234	1.232	1.215	1.195	1.176
CO ₂ (rep.)	PC	PC-P-Euro-0	237.5	240.1	242.6	246.4	246.8	237.4	238.9	238.4	237.4	235.8
CO ₂ (rep.)	PC	PC-P-Euro-1		235.6	232.4	230.8	223.1	212.1	215.3	219.2	219.9	218.7
CO ₂ (rep.)	PC	PC-P-Euro-2			216.3	215.7	210.0	197.9	199.3	202.2	204.2	204.3
CO ₂ (rep.)	PC	PC-P-Euro-3			214.6	207.3	201.2	189.4	187.4	189.2	192.3	194.7
CO ₂ (rep.)	PC	PC-P-Euro-4			216.3	203.8	186.5	175.3	172.9	170.5	172.0	175.8
CO ₂ (rep.)	PC	PC-P-Euro-5					173.1	158.6	157.8	156.8	155.4	156.4
CO ₂ (rep.)	PC	PC-P-Euro-6						153.8	147.0	140.9	133.8	125.4
CO ₂ (rep.)	PC	PC alternative					133.0	126.2	119.0	111.6	104.1	96.6
CO ₂ (rep.)	PC	PC-D-Euro-0	214.6	216.7	218.6	220.5	224.2	221.7	220.7	221.1	221.2	219.2
CO ₂ (rep.)	PC	PC-D-Euro-1	211.2	209.9	209.1	209.8	208.1	205.0	206.5	207.8	207.5	207.1
CO ₂ (rep.)	PC	PC-D-Euro-2		207.3	198.5	193.6	191.3	186.6	186.9	188.4	190.3	190.9
CO ₂ (rep.)	PC	PC-D-Euro-3			182.4	170.6	168.6	164.9	164.5	165.1	166.4	166.3
CO ₂ (rep.)	PC	PC-D-Euro-4				161.3	160.5	157.4	157.3	157.7	158.3	158.7

Emission	Vehicle category	Concept	1990	1995	2000	2005	2010	2015	2020	2025	2030	2035
CO ₂ (rep.)	PC	PC-D-Euro-5					157.1	147.6	147.1	146.8	146.4	146.5
CO ₂ (rep.)	PC	PC-D-Euro-6						142.7	136.8	131.3	125.0	117.6
CO ₂ (rep.)	LCV	LCV-P-Euro-0	234.6	236.1	238.8	241.6	245.0	239.4	239.7	236.3	230.8	220.8
CO ₂ (rep.)	LCV	LCV-P-Euro-1	234.7	232.8	234.0	237.1	240.6	236.5	244.7	248.4	248.0	245.7
CO ₂ (rep.)	LCV	LCV-P-Euro-2			232.2	237.2	239.1	233.7	242.7	250.3	252.0	250.1
CO ₂ (rep.)	LCV	LCV-P-Euro-3			231.1	229.4	229.2	223.0	230.9	241.1	248.9	249.6
CO ₂ (rep.)	LCV	LCV-P-Euro-4				220.3	210.5	201.1	205.9	213.3	221.8	229.7
CO ₂ (rep.)	LCV	LCV-P-Euro-5					197.4	189.5	192.4	196.1	200.2	205.9
CO ₂ (rep.)	LCV	LCV-P-Euro-6						180.0	182.5	184.8	185.1	183.9
CO ₂ (rep.)	LCV	LCV-D-Euro-0	284.5	284.7	282.8	284.1	285.1	279.4	274.0	272.9	269.9	270.5
CO ₂ (rep.)	LCV	LCV-D-Euro-1		278.1	277.1	277.4	277.3	274.9	274.5	270.8	269.7	269.8
CO ₂ (rep.)	LCV	LCV-D-Euro-2			269.3	270.7	269.5	266.1	267.2	265.9	263.6	264.1
CO ₂ (rep.)	LCV	LCV-D-Euro-3			227.3	227.9	226.7	223.2	223.8	224.6	223.6	222.4
CO ₂ (rep.)	LCV	LCV-D-Euro-4					238.7	236.4	236.7	237.5	238.1	237.5
CO ₂ (rep.)	LCV	LCV-D-Euro-5					232.6	229.1	229.2	229.4	230.1	230.6
CO ₂ (rep.)	LCV	LCV-D-Euro-6						218.5	218.6	218.7	218.7	218.8
CO ₂ (rep.)	HGV	HGV-D-Euro-0	809.1	818.9	816.5	798.1	815.7	806.2	836.1	854.1	862.7	870.1
CO ₂ (rep.)	HGV	HGV-D-Euro-I		759.1	732.5	742.3	776.2	768.4	801.2	817.6	821.8	818.4
CO ₂ (rep.)	HGV	HGV-D-Euro-II			731.8	769.6	771.7	756.6	767.1	778.5	784.4	788.3
CO ₂ (rep.)	HGV	HGV-D-Euro-III			782.5	816.3	778.3	768.6	771.4	765.6	758.8	767.5
CO ₂ (rep.)	HGV	HGV-D-Euro-IV				831.5	754.5	749.2	751.6	748.9	721.5	720.7
CO ₂ (rep.)	HGV	HGV-D-Euro-V				832.7	778.5	751.3	754.3	746.6	729.6	710.8
CO ₂ (rep.)	HGV	HGV-D-Euro-VI						725.6	734.9	740.6	740.5	738.9
CO ₂ (rep.)	Coach	Coach-D-Euro-0	871.2	873.2	879.4	876.6	865.0	852.4	852.5	850.2	850.3	850.3
CO ₂ (rep.)	Coach	Coach-D-Euro-I		789.6	785.5	782.2	775.4	763.2	763.3	762.6	763.1	763.1
CO ₂ (rep.)	Coach	Coach-D-Euro-II		781.3	793.0	787.1	782.4	770.1	769.9	770.0	770.0	770.1
CO ₂ (rep.)	Coach	Coach-D-Euro-III			848.6	842.7	834.9	821.4	820.8	820.8	821.1	820.6
CO ₂ (rep.)	Coach	Coach-D-Euro-IV				803.0	793.7	781.2	781.1	781.1	781.3	781.4
CO ₂ (rep.)	Coach	Coach-D-Euro-V					805.0	792.4	792.1	792.2	792.2	792.2
CO ₂ (rep.)	Coach	Coach-D-Euro-VI						805.5	805.2	805.3	805.3	805.4
CO ₂ (rep.)	UBus	UBus-D-Euro-0	1194.0	1214.5	1237.6	1254.5	1273.9	1251.6	1252.4	1253.0	1253.7	1253.9
CO ₂ (rep.)	UBus	UBus-D-Euro-I		1058.2	1055.9	1066.7	1081.7	1064.6	1063.9	1064.1	1065.1	1065.3
CO ₂ (rep.)	UBus	UBus-D-Euro-II		1078.8	1053.6	1064.3	1038.5	1019.0	1023.9	1025.5	1025.8	1025.9
CO ₂ (rep.)	UBus	UBus-D-Euro-III			1159.0	1112.5	1099.6	1080.4	1080.3	1080.7	1081.4	1081.4
CO ₂ (rep.)	UBus	UBus-D-Euro-IV				1048.7	1050.1	1033.1	1034.7	1036.6	1039.1	1037.7
CO ₂ (rep.)	UBus	UBus-D-Euro-V					1072.2	1046.7	1046.3	1047.4	1046.7	1046.5
CO ₂ (rep.)	UBus	UBus-D-Euro-VI						1040.1	1040.2	1041.0	1041.6	1041.8
CO ₂ (rep.)	UBus	UBus alternative					1108.7	1096.4	1088.6	1083.9	1080.8	1079.7
CO ₂ (rep.)	MC	Moped-EU0	62.2	62.2	62.2	62.1	60.8	57.5	57.5	57.5	57.5	57.5
CO ₂ (rep.)	MC	Moped-EU1	57.7	57.7	57.7	57.7	56.4	53.4	53.4	53.4	53.4	53.4
CO ₂ (rep.)	MC	Moped-EU2					56.4	53.4	53.4	53.4	53.4	53.4
CO ₂ (rep.)	MC	Moped-EU3						53.4	53.4	53.4	53.4	53.4
CO ₂ (rep.)	MC	Moped-EU4						53.4	53.4	53.4	53.4	53.4
CO ₂ (rep.)	MC	LMC-Euro-0	57.7	57.7	57.7	57.7	56.4	53.4	53.4	53.4	53.4	53.4
CO ₂ (rep.)	MC	LMC-Euro-1	57.7	57.7	57.7	57.7	56.4	53.4	53.4	53.4	53.4	53.4

Emission	Vehicle category	Concept	1990	1995	2000	2005	2010	2015	2020	2025	2030	2035
CO ₂ (rep.)	MC	LMC-Euro-2					56.4	53.4	53.4	53.4	53.4	53.4
CO ₂ (rep.)	MC	LMC-Euro-3						53.4	53.4	53.4	53.4	53.4
CO ₂ (rep.)	MC	LMC-Euro-4						53.4	53.4	53.4	53.4	53.4
CO ₂ (rep.)	MC	MC-2S-Euro-0	91.3	91.2	91.7	91.3	88.1	83.3	83.1	83.0	82.9	82.8
CO ₂ (rep.)	MC	MC-2S-Euro-1	88.2	88.1	88.4	88.3	85.4	80.8	80.7	80.6	80.5	80.4
CO ₂ (rep.)	MC	MC-2S-Euro-2				77.2	74.7	70.7	70.6	70.5	70.5	70.4
CO ₂ (rep.)	MC	MC-2S-Euro-3					63.3	59.9	59.8	59.8	59.7	59.8
CO ₂ (rep.)	MC	MC-2S-Euro-4						58.2	58.1	58.1	58.0	58.0
CO ₂ (rep.)	MC	MC-2S-Euro-5						56.2	56.1	56.1	56.1	56.0
CO ₂ (rep.)	MC	MC-4S-Euro-0	106.8	108.4	113.6	112.3	119.6	113.7	113.7	113.7	113.6	113.6
CO ₂ (rep.)	MC	MC-4S-Euro-1	105.2	105.4	103.0	107.1	110.2	106.0	106.7	107.0	107.3	107.6
CO ₂ (rep.)	MC	MC-4S-Euro-2				101.5	104.8	100.9	102.5	103.7	104.4	105.1
CO ₂ (rep.)	MC	MC-4S-Euro-3					108.0	101.6	102.7	104.2	105.1	105.5
CO ₂ (rep.)	MC	MC-4S-Euro-4						96.0	96.6	98.1	100.3	101.3
CO ₂ (rep.)	MC	MC-4S-Euro-5						93.0	92.8	93.2	93.6	94.1
CO ₂ (total)	PC	PC-P-Euro-0	237.5	240.1	242.6	246.5	252.5	256.5	258.1	257.5	256.5	254.8
CO ₂ (total)	PC	PC-P-Euro-1		235.6	232.4	230.8	228.2	229.2	232.7	236.8	237.6	236.3
CO ₂ (total)	PC	PC-P-Euro-2			216.3	215.8	214.8	213.8	215.3	218.5	220.7	220.8
CO ₂ (total)	PC	PC-P-Euro-3			214.6	207.4	205.8	204.6	202.4	204.5	207.8	210.3
CO ₂ (total)	PC	PC-P-Euro-4			216.3	203.8	190.8	189.4	186.8	184.2	185.9	189.9
CO ₂ (total)	PC	PC-P-Euro-5					177.1	171.3	170.5	169.4	167.9	169.0
CO ₂ (total)	PC	PC-P-Euro-6						166.2	158.9	152.2	144.6	135.5
CO ₂ (total)	PC	PC-Alternative					147.8	140.2	132.2	124.0	115.7	107.3
CO ₂ (total)	PC	PC-D-Euro-0	214.6	216.7	218.9	221.3	226.8	228.0	227.0	227.3	227.5	225.5
CO ₂ (total)	PC	PC-D-Euro-1	211.2	209.9	209.4	210.5	210.5	210.8	212.4	213.7	213.4	213.0
CO ₂ (total)	PC	PC-D-Euro-2		207.3	198.7	194.3	193.6	191.9	192.3	193.8	195.7	196.3
CO ₂ (total)	PC	PC-D-Euro-3			182.7	171.2	170.6	169.6	169.2	169.8	171.2	171.0
CO ₂ (total)	PC	PC-D-Euro-4				161.8	162.4	161.9	161.8	162.2	162.8	163.2
CO ₂ (total)	PC	PC-D-Euro-5					158.9	151.8	151.3	150.9	150.6	150.6
CO ₂ (total)	PC	PC-D-Euro-6						146.8	140.7	135.1	128.6	120.9
CO ₂ (total)	LCV	LCV-P-Euro-0	234.6	236.1	238.8	241.7	250.6	258.6	259.0	255.3	249.4	238.6
CO ₂ (total)	LCV	LCV-P-Euro-1	234.7	232.8	234.0	237.2	246.1	255.5	264.4	268.3	268.0	265.5
CO ₂ (total)	LCV	LCV-P-Euro-2			232.2	237.3	244.6	252.6	262.2	270.4	272.3	270.2
CO ₂ (total)	LCV	LCV-P-Euro-3			231.1	229.5	234.5	241.0	249.5	260.5	269.0	269.6
CO ₂ (total)	LCV	LCV-P-Euro-4				220.3	215.3	217.3	222.4	230.5	239.7	248.2
CO ₂ (total)	LCV	LCV-P-Euro-5					201.9	204.8	207.8	211.9	216.3	222.5
CO ₂ (total)	LCV	LCV-P-Euro-6						194.5	197.2	199.7	200.0	198.7
CO ₂ (total)	LCV	LCV-D-Euro-0	284.5	284.7	283.2	285.1	288.4	287.4	281.7	280.7	277.6	278.2
CO ₂ (total)	LCV	LCV-D-Euro-1		278.1	277.4	278.4	280.6	282.7	282.3	278.5	277.4	277.5
CO ₂ (total)	LCV	LCV-D-Euro-2			269.6	271.6	272.7	273.7	274.8	273.5	271.1	271.6
CO ₂ (total)	LCV	LCV-D-Euro-3			227.6	228.7	229.3	229.6	230.2	231.0	229.9	228.8
CO ₂ (total)	LCV	LCV-D-Euro-4					241.5	243.1	243.4	244.2	244.9	244.3
CO ₂ (total)	LCV	LCV-D-Euro-5					235.3	235.6	235.7	236.0	236.6	237.2
CO ₂ (total)	LCV	LCV-D-Euro-6						224.7	224.8	224.9	225.0	225.0
CO ₂ (total)	HGV	HGV-D-Euro-0	809.1	818.9	817.6	800.8	825.2	829.1	859.9	878.4	887.3	894.8

Emission	Vehicle category	Concept	1990	1995	2000	2005	2010	2015	2020	2025	2030	2035
CO ₂ (total)	HGV	HGV-D-Euro-I		759.1	733.5	744.9	785.2	790.3	824.0	840.8	845.2	841.7
CO ₂ (total)	HGV	HGV-D-Euro-II			732.7	772.3	780.7	778.1	789.0	800.7	806.7	810.7
CO ₂ (total)	HGV	HGV-D-Euro-III			783.5	819.1	787.4	790.5	793.4	787.4	780.4	789.3
CO ₂ (total)	HGV	HGV-D-Euro-IV				834.3	763.3	770.6	773.0	770.2	742.1	741.3
CO ₂ (total)	HGV	HGV-D-Euro-V				835.5	787.6	772.7	775.8	767.8	750.4	731.0
CO ₂ (total)	HGV	HGV-D-Euro-VI						746.3	755.9	761.7	761.6	759.9
CO ₂ (total)	Coach	Coach-D-Euro-0	871.2	873.2	880.5	879.6	875.1	876.7	876.8	874.4	874.5	874.5
CO ₂ (total)	Coach	Coach-D-Euro-I		789.6	786.5	784.9	784.5	784.9	785.0	784.3	784.8	784.8
CO ₂ (total)	Coach	Coach-D-Euro-II		781.3	794.1	789.8	791.6	792.0	791.8	791.9	791.9	792.0
CO ₂ (total)	Coach	Coach-D-Euro-III			849.7	845.6	844.6	844.8	844.1	844.2	844.5	844.0
CO ₂ (total)	Coach	Coach-D-Euro-IV				805.7	802.9	803.5	803.3	803.3	803.5	803.7
CO ₂ (total)	Coach	Coach-D-Euro-V					814.4	814.9	814.6	814.7	814.8	814.8
CO ₂ (total)	Coach	Coach-D-Euro-VI						828.5	828.1	828.2	828.2	828.3
CO ₂ (total)	UBus	UBus-D-Euro-0	1194.0	1214.5	1239.2	1258.8	1288.8	1287.2	1288.1	1288.7	1289.3	1289.6
CO ₂ (total)	UBus	UBus-D-Euro-I		1058.2	1057.3	1070.4	1094.4	1094.9	1094.2	1094.4	1095.5	1095.7
CO ₂ (total)	UBus	UBus-D-Euro-II		1078.8	1055.0	1067.9	1050.6	1048.0	1053.0	1054.6	1055.0	1055.1
CO ₂ (total)	UBus	UBus-D-Euro-III			1160.5	1116.3	1112.4	1111.1	1111.1	1111.4	1112.2	1112.2
CO ₂ (total)	UBus	UBus-D-Euro-IV				1052.3	1062.4	1062.5	1064.2	1066.1	1068.7	1067.2
CO ₂ (total)	UBus	UBus-D-Euro-V					1084.7	1076.4	1076.0	1077.2	1076.5	1076.3
CO ₂ (total)	UBus	UBus-D-Euro-VI						1069.7	1069.8	1070.6	1071.2	1071.4
CO ₂ (total)	UBus	UBus alternative					1231.9	1218.2	1209.5	1204.3	1200.9	1199.7
CO ₂ (total)	MC	Moped-EU0	62.2	62.2	62.2	62.2	62.2	62.2	62.2	62.2	62.2	62.2
CO ₂ (total)	MC	Moped-EU1	57.7	57.7	57.7	57.7	57.7	57.7	57.7	57.7	57.7	57.7
CO ₂ (total)	MC	Moped-EU2					57.7	57.7	57.7	57.7	57.7	57.7
CO ₂ (total)	MC	Moped-EU3						57.7	57.7	57.7	57.7	57.7
CO ₂ (total)	MC	Moped-EU4						57.7	57.7	57.7	57.7	57.7
CO ₂ (total)	MC	LMC-Euro-0	57.7	57.7	57.7	57.7	57.7	57.7	57.7	57.7	57.7	57.7
CO ₂ (total)	MC	LMC-Euro-1	57.7	57.7	57.7	57.7	57.7	57.7	57.7	57.7	57.7	57.7
CO ₂ (total)	MC	LMC-Euro-2					57.7	57.7	57.7	57.7	57.7	57.7
CO ₂ (total)	MC	LMC-Euro-3						57.7	57.7	57.7	57.7	57.7
CO ₂ (total)	MC	LMC-Euro-4						57.7	57.7	57.7	57.7	57.7
CO ₂ (total)	MC	MC-2S-Euro-0	91.3	91.2	91.7	91.3	90.1	90.0	89.8	89.6	89.6	89.5
CO ₂ (total)	MC	MC-2S-Euro-1	88.2	88.1	88.4	88.3	87.4	87.3	87.2	87.0	87.0	86.9
CO ₂ (total)	MC	MC-2S-Euro-2				77.2	76.4	76.4	76.3	76.2	76.1	76.1
CO ₂ (total)	MC	MC-2S-Euro-3					64.8	64.7	64.7	64.6	64.5	64.6
CO ₂ (total)	MC	MC-2S-Euro-4						62.8	62.8	62.7	62.7	62.7
CO ₂ (total)	MC	MC-2S-Euro-5						60.7	60.7	60.6	60.6	60.5
CO ₂ (total)	MC	MC-4S-Euro-0	106.8	108.4	113.6	112.3	122.4	122.8	122.8	122.8	122.8	122.8
CO ₂ (total)	MC	MC-4S-Euro-1	105.2	105.4	103.0	107.2	112.7	114.5	115.3	115.6	115.9	116.2
CO ₂ (total)	MC	MC-4S-Euro-2				101.5	107.2	109.0	110.8	112.1	112.8	113.5
CO ₂ (total)	MC	MC-4S-Euro-3					110.5	109.8	110.9	112.5	113.6	114.0
CO ₂ (total)	MC	MC-4S-Euro-4						103.8	104.3	106.0	108.4	109.5
CO ₂ (total)	MC	MC-4S-Euro-5						100.5	100.3	100.7	101.2	101.7
HC	PC	PC-P-Euro-0	1.790	1.446	1.169	1.090	1.139	1.379	1.521	1.646	1.764	1.857
HC	PC	PC-P-Euro-1		0.542	0.592	0.600	0.583	0.575	0.560	0.556	0.554	0.552

Emission	Vehicle category	Concept	1990	1995	2000	2005	2010	2015	2020	2025	2030	2035
HC	PC	PC-P-Euro-2			0.390	0.410	0.400	0.399	0.391	0.386	0.380	0.376
HC	PC	PC-P-Euro-3			0.237	0.232	0.224	0.224	0.222	0.221	0.215	0.210
HC	PC	PC-P-Euro-4			0.209	0.205	0.201	0.201	0.200	0.203	0.198	0.191
HC	PC	PC-P-Euro-5					0.183	0.182	0.181	0.183	0.183	0.178
HC	PC	PC-P-Euro-6						0.163	0.161	0.163	0.162	0.160
HC	PC	PC alternative					0.015	0.013	0.012	0.011	0.011	0.011
HC	PC	PC-D-Euro-0	0.197	0.185	0.171	0.178	0.193	0.230	0.233	0.238	0.247	0.234
HC	PC	PC-D-Euro-1	0.107	0.109	0.106	0.104	0.101	0.100	0.098	0.099	0.099	0.099
HC	PC	PC-D-Euro-2		0.071	0.069	0.068	0.066	0.066	0.065	0.065	0.064	0.064
HC	PC	PC-D-Euro-3			0.044	0.044	0.042	0.042	0.042	0.041	0.041	0.041
HC	PC	PC-D-Euro-4				0.023	0.022	0.022	0.022	0.022	0.021	0.021
HC	PC	PC-D-Euro-5					0.022	0.022	0.022	0.022	0.022	0.021
HC	PC	PC-D-Euro-6						0.021	0.021	0.021	0.021	0.021
HC	LCV	LCV-P-Euro-0	2.767	2.871	2.915	3.007	3.027	3.027	3.026	3.017	3.002	2.973
HC	LCV	LCV-P-Euro-1	0.640	0.766	0.875	0.932	0.946	0.944	0.937	0.933	0.933	0.935
HC	LCV	LCV-P-Euro-2			0.562	0.622	0.645	0.638	0.624	0.611	0.607	0.609
HC	LCV	LCV-P-Euro-3			0.326	0.352	0.358	0.353	0.343	0.329	0.317	0.315
HC	LCV	LCV-P-Euro-4				0.321	0.342	0.343	0.339	0.331	0.319	0.308
HC	LCV	LCV-P-Euro-5					0.319	0.319	0.318	0.315	0.310	0.303
HC	LCV	LCV-P-Euro-6						0.286	0.285	0.284	0.283	0.285
HC	LCV	LCV-D-Euro-0	0.279	0.283	0.286	0.290	0.292	0.293	0.294	0.294	0.294	0.294
HC	LCV	LCV-D-Euro-1		0.189	0.191	0.195	0.198	0.198	0.199	0.198	0.198	0.198
HC	LCV	LCV-D-Euro-2			0.090	0.092	0.094	0.094	0.094	0.094	0.095	0.095
HC	LCV	LCV-D-Euro-3			0.033	0.034	0.035	0.035	0.036	0.035	0.036	0.036
HC	LCV	LCV-D-Euro-4					0.021	0.021	0.021	0.021	0.021	0.021
HC	LCV	LCV-D-Euro-5					0.021	0.021	0.022	0.022	0.022	0.021
HC	LCV	LCV-D-Euro-6						0.021	0.021	0.021	0.021	0.021
HC	HGV	HGV-D-Euro-0	0.834	0.780	0.791	0.789	0.800	0.881	0.848	0.826	0.809	0.789
HC	HGV	HGV-D-Euro-I		0.569	0.541	0.494	0.525	0.595	0.619	0.632	0.635	0.633
HC	HGV	HGV-D-Euro-II			0.372	0.346	0.352	0.374	0.380	0.385	0.388	0.390
HC	HGV	HGV-D-Euro-III			0.362	0.329	0.316	0.329	0.330	0.328	0.325	0.328
HC	HGV	HGV-D-Euro-IV				0.032	0.029	0.030	0.030	0.030	0.029	0.029
HC	HGV	HGV-D-Euro-V				0.032	0.031	0.030	0.030	0.030	0.029	0.029
HC	HGV	HGV-D-Euro-VI						0.023	0.024	0.024	0.024	0.024
HC	Coach	Coach-D-Euro-0	0.698	0.660	0.659	0.617	0.614	0.690	0.689	0.688	0.688	0.688
HC	Coach	Coach-D-Euro-I		0.629	0.623	0.583	0.582	0.653	0.653	0.652	0.652	0.652
HC	Coach	Coach-D-Euro-II		0.432	0.434	0.405	0.405	0.433	0.433	0.433	0.433	0.433
HC	Coach	Coach-D-Euro-III			0.429	0.400	0.400	0.414	0.414	0.414	0.414	0.414
HC	Coach	Coach-D-Euro-IV				0.035	0.035	0.035	0.035	0.035	0.035	0.035
HC	Coach	Coach-D-Euro-V					0.035	0.035	0.035	0.035	0.035	0.035
HC	Coach	Coach-D-Euro-VI						0.028	0.028	0.028	0.028	0.028
HC	UBus	UBus-D-Euro-0	2.204	2.059	1.997	1.853	1.839	2.061	2.060	2.060	2.060	2.060
HC	UBus	UBus-D-Euro-I		0.747	0.743	0.703	0.712	0.799	0.799	0.799	0.799	0.799
HC	UBus	UBus-D-Euro-II		0.531	0.523	0.494	0.435	0.468	0.455	0.452	0.452	0.453
HC	UBus	UBus-D-Euro-III			0.482	0.250	0.159	0.163	0.162	0.159	0.160	0.160

Emission	Vehicle category	Concept	1990	1995	2000	2005	2010	2015	2020	2025	2030	2035
HC	UBus	UBus-D-Euro-IV				0.019	0.019	0.019	0.019	0.019	0.019	0.019
HC	UBus	UBus-D-Euro-V					0.020	0.019	0.019	0.019	0.019	0.019
HC	UBus	UBus-D-Euro-VI						0.033	0.033	0.033	0.033	0.033
HC	UBus	UBus alternative					8.728	8.695	8.674	8.662	8.654	8.651
HC	MC	Moped-EU0	4.957	4.984	4.955	4.908	4.918	5.003	5.002	5.000	4.997	4.995
HC	MC	Moped-EU1	3.847	3.874	3.851	3.816	3.827	3.892	3.892	3.890	3.887	3.884
HC	MC	Moped-EU2					2.254	2.292	2.292	2.290	2.287	2.284
HC	MC	Moped-EU3						1.866	1.866	1.864	1.861	1.858
HC	MC	Moped-EU4						1.526	1.525	1.523	1.520	1.518
HC	MC	LMC-Euro-0	3.677	3.704	3.682	3.649	3.660	3.722	3.722	3.720	3.717	3.714
HC	MC	LMC-Euro-1	3.677	3.704	3.682	3.649	3.660	3.722	3.722	3.720	3.717	3.714
HC	MC	LMC-Euro-2					2.260	2.298	2.298	2.296	2.293	2.290
HC	MC	LMC-Euro-3						1.871	1.871	1.868	1.866	1.863
HC	MC	LMC-Euro-4						1.526	1.525	1.523	1.521	1.518
HC	MC	MC-2S-Euro-0	7.766	7.797	7.742	7.674	7.716	7.855	7.858	7.859	7.858	7.856
HC	MC	MC-2S-Euro-1	3.237	3.279	3.234	3.184	3.207	3.260	3.257	3.246	3.238	3.235
HC	MC	MC-2S-Euro-2				1.775	1.802	1.831	1.831	1.831	1.822	1.816
HC	MC	MC-2S-Euro-3					1.409	1.431	1.431	1.431	1.429	1.420
HC	MC	MC-2S-Euro-4						1.314	1.312	1.310	1.309	1.307
HC	MC	MC-2S-Euro-5						1.214	1.213	1.211	1.209	1.206
HC	MC	MC-4S-Euro-0	1.304	1.329	1.299	1.307	1.369	1.400	1.406	1.413	1.417	1.419
HC	MC	MC-4S-Euro-1	0.753	0.770	0.767	0.756	0.776	0.789	0.790	0.794	0.795	0.794
HC	MC	MC-4S-Euro-2				0.524	0.537	0.546	0.545	0.545	0.545	0.544
HC	MC	MC-4S-Euro-3					0.301	0.310	0.309	0.305	0.302	0.301
HC	MC	MC-4S-Euro-4						0.295	0.295	0.292	0.285	0.281
HC	MC	MC-4S-Euro-5						0.249	0.251	0.251	0.249	0.247
MF	PC	PC-P-Euro-0	75.633	76.444	77.241	78.484	80.388	81.682	82.176	81.999	81.655	81.120
MF	PC	PC-P-Euro-1		75.010	73.998	73.499	72.652	72.975	74.082	75.395	75.660	75.223
MF	PC	PC-P-Euro-2			68.875	68.701	68.395	68.076	68.550	69.571	70.255	70.294
MF	PC	PC-P-Euro-3			68.314	66.022	65.541	65.155	64.450	65.098	66.166	66.964
MF	PC	PC-P-Euro-4			68.874	64.901	60.740	60.294	59.464	58.651	59.177	60.475
MF	PC	PC-P-Euro-5					56.387	54.548	54.283	53.951	53.461	53.810
MF	PC	PC-P-Euro-6						52.922	50.585	48.461	46.025	43.144
MF	PC	PC alternative					53.877	51.107	48.199	45.218	42.185	39.131
MF	PC	PC-D-Euro-0	68.118	68.790	69.487	70.246	72.000	72.380	72.057	72.171	72.221	71.575
MF	PC	PC-D-Euro-1	67.056	66.642	66.475	66.823	66.835	66.917	67.421	67.834	67.742	67.628
MF	PC	PC-D-Euro-2		65.821	63.093	61.684	61.449	60.915	61.035	61.513	62.121	62.329
MF	PC	PC-D-Euro-3			57.988	54.348	54.159	53.853	53.715	53.906	54.343	54.295
MF	PC	PC-D-Euro-4				51.371	51.544	51.398	51.356	51.497	51.682	51.806
MF	PC	PC-D-Euro-5					50.449	48.198	48.025	47.913	47.802	47.821
MF	PC	PC-D-Euro-6						46.606	44.654	42.873	40.814	38.394
MF	LCV	LCV-P-Euro-0	74.685	75.182	76.032	76.941	79.789	82.348	82.456	81.279	79.403	75.968
MF	LCV	LCV-P-Euro-1	74.731	74.112	74.504	75.523	78.372	81.350	84.184	85.441	85.327	84.530
MF	LCV	LCV-P-Euro-2			73.923	75.540	77.889	80.412	83.477	86.100	86.699	86.023
MF	LCV	LCV-P-Euro-3			73.582	73.058	74.650	76.718	79.437	82.935	85.634	85.853

Emission	Vehicle category	Concept	1990	1995	2000	2005	2010	2015	2020	2025	2030	2035
MF	LCV	LCV-P-Euro-4				70.149	68.561	69.195	70.817	73.392	76.318	79.013
MF	LCV	LCV-P-Euro-5					64.284	65.205	66.178	67.468	68.856	70.842
MF	LCV	LCV-P-Euro-6						61.932	62.798	63.568	63.689	63.278
MF	LCV	LCV-D-Euro-0	90.301	90.391	89.887	90.507	91.554	91.230	89.442	89.096	88.127	88.316
MF	LCV	LCV-D-Euro-1		88.289	88.064	88.368	89.070	89.749	89.632	88.409	88.056	88.089
MF	LCV	LCV-D-Euro-2			85.593	86.222	86.556	86.875	87.247	86.826	86.075	86.214
MF	LCV	LCV-D-Euro-3			72.259	72.594	72.795	72.878	73.077	73.340	72.987	72.625
MF	LCV	LCV-D-Euro-4					76.657	77.180	77.281	77.530	77.752	77.542
MF	LCV	LCV-D-Euro-5					74.689	74.793	74.831	74.905	75.115	75.292
MF	LCV	LCV-D-Euro-6						71.334	71.368	71.403	71.414	71.431
MF	HGV	HGV-D-Euro-0	256.838	259.973	259.539	254.216	261.961	263.211	272.964	278.858	281.662	284.067
MF	HGV	HGV-D-Euro-I		240.970	232.844	236.457	249.278	250.888	261.573	266.922	268.295	267.187
MF	HGV	HGV-D-Euro-II			232.599	245.160	247.850	247.014	250.454	254.171	256.087	257.371
MF	HGV	HGV-D-Euro-III			248.716	260.011	249.972	250.939	251.854	249.958	247.733	250.574
MF	HGV	HGV-D-Euro-IV				264.864	242.309	244.615	245.389	244.492	235.568	235.315
MF	HGV	HGV-D-Euro-V				265.240	250.014	245.297	246.269	243.748	238.204	232.072
MF	HGV	HGV-D-Euro-VI						236.901	239.948	241.789	241.763	241.246
MF	Coach	Coach-D-Euro-0	276.561	277.212	279.520	279.241	277.817	278.300	278.337	277.581	277.620	277.624
MF	Coach	Coach-D-Euro-I		250.671	249.687	249.174	249.037	249.160	249.192	248.988	249.144	249.152
MF	Coach	Coach-D-Euro-II		248.039	252.082	250.738	251.285	251.412	251.366	251.398	251.403	251.425
MF	Coach	Coach-D-Euro-III			269.738	268.448	268.125	268.183	267.969	267.997	268.095	267.923
MF	Coach	Coach-D-Euro-IV				255.785	254.894	255.058	255.009	255.014	255.077	255.124
MF	Coach	Coach-D-Euro-V					258.521	258.696	258.608	258.633	258.647	258.655
MF	Coach	Coach-D-Euro-VI						262.995	262.895	262.915	262.930	262.940
MF	UBus	UBus-D-Euro-0	379.038	385.553	393.389	399.610	409.123	408.618	408.909	409.096	409.307	409.377
MF	UBus	UBus-D-Euro-I		335.939	335.628	339.797	347.411	347.573	347.342	347.409	347.753	347.823
MF	UBus	UBus-D-Euro-II		342.480	334.907	339.017	333.525	332.688	334.283	334.797	334.900	334.960
MF	UBus	UBus-D-Euro-III			368.399	354.386	353.134	352.735	352.716	352.824	353.060	353.055
MF	UBus	UBus-D-Euro-IV				334.067	337.262	337.283	337.826	338.427	339.251	338.788
MF	UBus	UBus-D-Euro-V					344.338	341.721	341.592	341.966	341.730	341.678
MF	UBus	UBus-D-Euro-VI						339.588	339.611	339.860	340.063	340.131
MF	UBus	UBus alternative					449.105	444.117	440.957	439.049	437.794	437.371
MF	MC	Moped-EU0	19.794	19.794	19.794	19.794	19.794	19.794	19.794	19.794	19.794	19.794
MF	MC	Moped-EU1	18.381	18.381	18.381	18.381	18.381	18.381	18.381	18.381	18.381	18.381
MF	MC	Moped-EU2					18.381	18.381	18.381	18.381	18.381	18.381
MF	MC	Moped-EU3						18.381	18.381	18.381	18.381	18.381
MF	MC	Moped-EU4						18.381	18.381	18.381	18.381	18.381
MF	MC	LMC-Euro-0	18.381	18.381	18.381	18.381	18.381	18.381	18.381	18.381	18.381	18.381
MF	MC	LMC-Euro-1	18.381	18.381	18.381	18.381	18.381	18.381	18.381	18.381	18.381	18.381
MF	MC	LMC-Euro-2					18.381	18.381	18.381	18.381	18.381	18.381
MF	MC	LMC-Euro-3						18.381	18.381	18.381	18.381	18.381
MF	MC	LMC-Euro-4						18.381	18.381	18.381	18.381	18.381
MF	MC	MC-2S-Euro-0	29.075	29.043	29.190	29.078	28.693	28.640	28.594	28.543	28.512	28.491
MF	MC	MC-2S-Euro-1	28.077	28.050	28.157	28.110	27.821	27.784	27.750	27.712	27.689	27.673
MF	MC	MC-2S-Euro-2				24.582	24.339	24.311	24.283	24.249	24.237	24.227

Emission	Vehicle category	Concept	1990	1995	2000	2005	2010	2015	2020	2025	2030	2035
MF	MC	MC-2S-Euro-3					20.632	20.605	20.588	20.563	20.549	20.559
MF	MC	MC-2S-Euro-4						20.005	19.996	19.976	19.960	19.950
MF	MC	MC-2S-Euro-5						19.329	19.316	19.300	19.288	19.279
MF	MC	MC-4S-Euro-0	34.011	34.507	36.180	35.765	38.971	39.101	39.108	39.098	39.096	39.096
MF	MC	MC-4S-Euro-1	33.495	33.546	32.798	34.125	35.887	36.448	36.718	36.813	36.907	37.012
MF	MC	MC-4S-Euro-2				32.327	34.118	34.707	35.269	35.688	35.928	36.147
MF	MC	MC-4S-Euro-3					35.175	34.965	35.315	35.834	36.169	36.290
MF	MC	MC-4S-Euro-4						33.041	33.216	33.736	34.499	34.861
MF	MC	MC-4S-Euro-5						31.994	31.939	32.050	32.214	32.374
NO ₂	PC	PC-P-Euro-0	0.044	0.045	0.048	0.052	0.055	0.062	0.065	0.069	0.074	0.076
NO ₂	PC	PC-P-Euro-1		0.030	0.046	0.049	0.048	0.048	0.048	0.048	0.048	0.048
NO ₂	PC	PC-P-Euro-2			0.015	0.023	0.024	0.024	0.024	0.023	0.023	0.023
NO ₂	PC	PC-P-Euro-3			0.004	0.004	0.005	0.005	0.005	0.005	0.005	0.005
NO ₂	PC	PC-P-Euro-4			0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004
NO ₂	PC	PC-P-Euro-5					0.004	0.004	0.004	0.004	0.004	0.004
NO ₂	PC	PC-P-Euro-6						0.004	0.004	0.004	0.004	0.003
NO ₂	PC	PC alternative					0.006	0.005	0.005	0.005	0.005	0.005
NO ₂	PC	PC-D-Euro-0	0.061	0.059	0.058	0.059	0.061	0.066	0.066	0.067	0.067	0.066
NO ₂	PC	PC-D-Euro-1	0.054	0.055	0.055	0.055	0.055	0.055	0.055	0.055	0.055	0.055
NO ₂	PC	PC-D-Euro-2		0.079	0.079	0.079	0.080	0.081	0.081	0.081	0.080	0.080
NO ₂	PC	PC-D-Euro-3			0.255	0.256	0.253	0.253	0.252	0.252	0.253	0.254
NO ₂	PC	PC-D-Euro-4				0.188	0.215	0.216	0.218	0.219	0.221	0.219
NO ₂	PC	PC-D-Euro-5					0.163	0.163	0.163	0.163	0.164	0.164
NO ₂	PC	PC-D-Euro-6						0.048	0.048	0.048	0.048	0.048
NO ₂	LCV	LCV-P-Euro-0	0.111	0.111	0.113	0.113	0.119	0.125	0.126	0.123	0.120	0.114
NO ₂	LCV	LCV-P-Euro-1	0.030	0.051	0.079	0.089	0.092	0.095	0.097	0.098	0.097	0.097
NO ₂	LCV	LCV-P-Euro-2			0.018	0.029	0.035	0.036	0.037	0.037	0.038	0.037
NO ₂	LCV	LCV-P-Euro-3			0.008	0.009	0.009	0.009	0.009	0.009	0.009	0.009
NO ₂	LCV	LCV-P-Euro-4				0.004	0.004	0.004	0.004	0.004	0.004	0.004
NO ₂	LCV	LCV-P-Euro-5					0.003	0.004	0.004	0.004	0.004	0.004
NO ₂	LCV	LCV-P-Euro-6						0.003	0.004	0.004	0.004	0.004
NO ₂	LCV	LCV-D-Euro-0	0.147	0.147	0.147	0.147	0.148	0.148	0.146	0.145	0.144	0.145
NO ₂	LCV	LCV-D-Euro-1		0.135	0.134	0.134	0.135	0.136	0.136	0.134	0.134	0.134
NO ₂	LCV	LCV-D-Euro-2			0.164	0.165	0.165	0.166	0.166	0.166	0.165	0.165
NO ₂	LCV	LCV-D-Euro-3			0.455	0.455	0.454	0.455	0.457	0.460	0.455	0.452
NO ₂	LCV	LCV-D-Euro-4					0.389	0.403	0.403	0.405	0.407	0.407
NO ₂	LCV	LCV-D-Euro-5					0.289	0.290	0.290	0.290	0.291	0.292
NO ₂	LCV	LCV-D-Euro-6						0.068	0.068	0.068	0.068	0.068
NO ₂	HGV	HGV-D-Euro-0	0.789	0.780	0.780	0.763	0.784	0.817	0.838	0.851	0.855	0.858
NO ₂	HGV	HGV-D-Euro-I		0.560	0.539	0.535	0.566	0.593	0.619	0.632	0.635	0.633
NO ₂	HGV	HGV-D-Euro-II			0.587	0.600	0.606	0.615	0.624	0.633	0.638	0.641
NO ₂	HGV	HGV-D-Euro-III			0.474	0.481	0.461	0.470	0.472	0.469	0.464	0.470
NO ₂	HGV	HGV-D-Euro-IV				0.503	0.462	0.467	0.469	0.467	0.450	0.449
NO ₂	HGV	HGV-D-Euro-V				0.333	0.320	0.314	0.316	0.313	0.306	0.299
NO ₂	HGV	HGV-D-Euro-VI						0.138	0.140	0.141	0.141	0.141

Emission	Vehicle category	Concept	1990	1995	2000	2005	2010	2015	2020	2025	2030	2035
NO ₂	Coach	Coach-D-Euro-0	0.803	0.790	0.795	0.781	0.777	0.810	0.810	0.808	0.808	0.808
NO ₂	Coach	Coach-D-Euro-I		0.581	0.578	0.566	0.566	0.589	0.589	0.589	0.589	0.589
NO ₂	Coach	Coach-D-Euro-II		0.632	0.641	0.626	0.628	0.640	0.640	0.640	0.640	0.640
NO ₂	Coach	Coach-D-Euro-III			0.531	0.519	0.518	0.526	0.525	0.525	0.526	0.525
NO ₂	Coach	Coach-D-Euro-IV				0.551	0.549	0.550	0.549	0.549	0.549	0.549
NO ₂	Coach	Coach-D-Euro-V					0.386	0.386	0.386	0.386	0.386	0.386
NO ₂	Coach	Coach-D-Euro-VI						0.186	0.185	0.185	0.185	0.185
NO ₂	UBus	UBus-D-Euro-0	1.186	1.192	1.226	1.230	1.265	1.315	1.317	1.317	1.318	1.318
NO ₂	UBus	UBus-D-Euro-I		0.765	0.763	0.759	0.776	0.808	0.808	0.808	0.809	0.809
NO ₂	UBus	UBus-D-Euro-II		0.844	0.826	0.826	1.165	1.165	1.252	1.274	1.278	1.271
NO ₂	UBus	UBus-D-Euro-III			0.753	2.249	2.928	2.981	2.985	3.008	3.006	3.009
NO ₂	UBus	UBus-D-Euro-IV				1.798	1.798	1.798	1.799	1.800	1.801	1.800
NO ₂	UBus	UBus-D-Euro-V					1.361	1.360	1.360	1.360	1.360	1.360
NO ₂	UBus	UBus-D-Euro-VI						0.145	0.145	0.145	0.145	0.145
NO ₂	UBus	UBus alternative					3.803	3.762	3.736	3.720	3.710	3.706
NO ₂	MC	Moped-EU0	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
NO ₂	MC	Moped-EU1	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
NO ₂	MC	Moped-EU2					0.003	0.003	0.003	0.003	0.003	0.003
NO ₂	MC	Moped-EU3						0.002	0.002	0.002	0.002	0.002
NO ₂	MC	Moped-EU4						0.002	0.002	0.002	0.002	0.002
NO ₂	MC	LMC-Euro-0	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004
NO ₂	MC	LMC-Euro-1	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004
NO ₂	MC	LMC-Euro-2					0.003	0.003	0.003	0.003	0.003	0.003
NO ₂	MC	LMC-Euro-3						0.002	0.002	0.002	0.002	0.002
NO ₂	MC	LMC-Euro-4						0.002	0.002	0.002	0.002	0.002
NO ₂	MC	MC-2S-Euro-0	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
NO ₂	MC	MC-2S-Euro-1	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
NO ₂	MC	MC-2S-Euro-2				0.002	0.002	0.002	0.002	0.002	0.002	0.002
NO ₂	MC	MC-2S-Euro-3					0.002	0.002	0.002	0.002	0.002	0.002
NO ₂	MC	MC-2S-Euro-4						0.002	0.002	0.002	0.002	0.002
NO ₂	MC	MC-2S-Euro-5						0.002	0.002	0.002	0.002	0.002
NO ₂	MC	MC-4S-Euro-0	0.017	0.017	0.017	0.017	0.017	0.018	0.018	0.017	0.017	0.017
NO ₂	MC	MC-4S-Euro-1	0.017	0.016	0.016	0.016	0.016	0.016	0.016	0.016	0.016	0.016
NO ₂	MC	MC-4S-Euro-2				0.015	0.015	0.015	0.015	0.015	0.015	0.015
NO ₂	MC	MC-4S-Euro-3					0.009	0.009	0.009	0.009	0.009	0.009
NO ₂	MC	MC-4S-Euro-4						0.007	0.007	0.007	0.007	0.007
NO ₂	MC	MC-4S-Euro-5						0.004	0.004	0.004	0.004	0.004
NO _x	PC	PC-P-Euro-0	1.208	1.165	1.106	1.111	1.181	1.334	1.420	1.489	1.569	1.622
NO _x	PC	PC-P-Euro-1		0.515	0.841	0.902	0.899	0.900	0.896	0.896	0.895	0.893
NO _x	PC	PC-P-Euro-2			0.251	0.414	0.436	0.435	0.433	0.431	0.429	0.428
NO _x	PC	PC-P-Euro-3			0.077	0.079	0.082	0.083	0.083	0.082	0.082	0.081
NO _x	PC	PC-P-Euro-4			0.086	0.086	0.087	0.090	0.090	0.090	0.090	0.089
NO _x	PC	PC-P-Euro-5					0.082	0.082	0.082	0.082	0.082	0.081
NO _x	PC	PC-P-Euro-6						0.076	0.076	0.076	0.076	0.076
NO _x	PC	PC alternative					0.056	0.055	0.053	0.052	0.051	0.051

Emission	Vehicle category	Concept	1990	1995	2000	2005	2010	2015	2020	2025	2030	2035
NO _x	PC	PC-D-Euro-0	0.747	0.728	0.711	0.728	0.755	0.815	0.818	0.823	0.833	0.812
NO _x	PC	PC-D-Euro-1	0.671	0.672	0.673	0.675	0.676	0.678	0.678	0.678	0.678	0.677
NO _x	PC	PC-D-Euro-2		0.713	0.714	0.716	0.717	0.719	0.718	0.718	0.718	0.718
NO _x	PC	PC-D-Euro-3			0.738	0.739	0.742	0.745	0.745	0.745	0.746	0.745
NO _x	PC	PC-D-Euro-4				0.494	0.492	0.493	0.493	0.492	0.493	0.493
NO _x	PC	PC-D-Euro-5					0.485	0.485	0.486	0.486	0.486	0.487
NO _x	PC	PC-D-Euro-6						0.168	0.168	0.168	0.168	0.169
NO _x	LCV	LCV-P-Euro-0	2.222	2.227	2.252	2.263	2.388	2.503	2.510	2.468	2.400	2.274
NO _x	LCV	LCV-P-Euro-1	0.517	0.934	1.476	1.672	1.742	1.793	1.840	1.860	1.858	1.844
NO _x	LCV	LCV-P-Euro-2			0.299	0.532	0.648	0.666	0.684	0.698	0.701	0.697
NO _x	LCV	LCV-P-Euro-3			0.099	0.106	0.113	0.117	0.118	0.118	0.118	0.117
NO _x	LCV	LCV-P-Euro-4				0.085	0.088	0.092	0.095	0.096	0.097	0.098
NO _x	LCV	LCV-P-Euro-5					0.084	0.087	0.091	0.094	0.095	0.096
NO _x	LCV	LCV-P-Euro-6						0.084	0.087	0.090	0.091	0.091
NO _x	LCV	LCV-D-Euro-0	1.856	1.859	1.854	1.857	1.868	1.868	1.845	1.839	1.827	1.829
NO _x	LCV	LCV-D-Euro-1		1.703	1.699	1.700	1.710	1.723	1.720	1.700	1.694	1.695
NO _x	LCV	LCV-D-Euro-2			1.432	1.433	1.434	1.440	1.444	1.436	1.425	1.427
NO _x	LCV	LCV-D-Euro-3			1.301	1.300	1.301	1.304	1.309	1.317	1.306	1.295
NO _x	LCV	LCV-D-Euro-4					0.925	0.928	0.928	0.932	0.935	0.930
NO _x	LCV	LCV-D-Euro-5					0.882	0.884	0.883	0.884	0.888	0.891
NO _x	LCV	LCV-D-Euro-6						0.311	0.311	0.311	0.311	0.311
NO _x	HGV	HGV-D-Euro-0	11.274	11.145	11.142	10.904	11.194	11.665	11.977	12.155	12.221	12.260
NO _x	HGV	HGV-D-Euro-I		7.994	7.707	7.648	8.081	8.468	8.841	9.028	9.076	9.037
NO _x	HGV	HGV-D-Euro-II			8.381	8.567	8.662	8.792	8.911	9.040	9.110	9.157
NO _x	HGV	HGV-D-Euro-III			6.775	6.873	6.588	6.719	6.747	6.700	6.634	6.714
NO _x	HGV	HGV-D-Euro-IV				4.681	4.314	4.362	4.380	4.373	4.211	4.198
NO _x	HGV	HGV-D-Euro-V				3.274	3.163	3.110	3.133	3.102	3.040	2.968
NO _x	HGV	HGV-D-Euro-VI						0.494	0.499	0.503	0.503	0.502
NO _x	Coach	Coach-D-Euro-0	11.465	11.280	11.364	11.155	11.100	11.570	11.573	11.541	11.543	11.543
NO _x	Coach	Coach-D-Euro-I		8.300	8.253	8.090	8.086	8.418	8.420	8.412	8.418	8.419
NO _x	Coach	Coach-D-Euro-II		9.029	9.161	8.950	8.969	9.139	9.137	9.138	9.138	9.139
NO _x	Coach	Coach-D-Euro-III			7.583	7.412	7.401	7.512	7.504	7.505	7.508	7.503
NO _x	Coach	Coach-D-Euro-IV				5.393	5.369	5.375	5.369	5.369	5.371	5.371
NO _x	Coach	Coach-D-Euro-V					4.020	4.025	4.019	4.019	4.019	4.020
NO _x	Coach	Coach-D-Euro-VI						0.663	0.662	0.662	0.662	0.662
NO _x	UBus	UBus-D-Euro-0	16.948	17.035	17.518	17.568	18.078	18.790	18.808	18.818	18.828	18.832
NO _x	UBus	UBus-D-Euro-I		10.931	10.905	10.847	11.093	11.549	11.541	11.543	11.555	11.557
NO _x	UBus	UBus-D-Euro-II		12.057	11.802	11.724	11.543	11.731	11.776	11.791	11.794	11.796
NO _x	UBus	UBus-D-Euro-III			10.756	10.111	10.048	10.184	10.183	10.185	10.192	10.192
NO _x	UBus	UBus-D-Euro-IV				7.193	7.190	7.191	7.196	7.199	7.205	7.201
NO _x	UBus	UBus-D-Euro-V					5.446	5.441	5.441	5.442	5.441	5.441
NO _x	UBus	UBus-D-Euro-VI						0.517	0.517	0.517	0.517	0.517
NO _x	UBus	UBus alternative					15.211	15.047	14.943	14.881	14.840	14.826
NO _x	MC	Moped-EU0	0.020	0.020	0.019	0.019	0.019	0.020	0.020	0.020	0.020	0.020
NO _x	MC	Moped-EU1	0.020	0.020	0.019	0.019	0.019	0.020	0.020	0.020	0.020	0.020

Emission	Vehicle category	Concept	1990	1995	2000	2005	2010	2015	2020	2025	2030	2035
NO _x	MC	Moped-EU2					0.057	0.060	0.060	0.060	0.060	0.060
NO _x	MC	Moped-EU3						0.048	0.048	0.048	0.048	0.048
NO _x	MC	Moped-EU4						0.038	0.038	0.038	0.038	0.038
NO _x	MC	LMC-Euro-0	0.074	0.074	0.071	0.070	0.070	0.074	0.074	0.074	0.074	0.074
NO _x	MC	LMC-Euro-1	0.074	0.074	0.071	0.070	0.070	0.074	0.074	0.074	0.074	0.074
NO _x	MC	LMC-Euro-2					0.056	0.059	0.059	0.059	0.059	0.059
NO _x	MC	LMC-Euro-3						0.047	0.047	0.047	0.047	0.047
NO _x	MC	LMC-Euro-4						0.038	0.038	0.038	0.038	0.038
NO _x	MC	MC-2S-Euro-0	0.039	0.038	0.037	0.037	0.037	0.038	0.038	0.038	0.038	0.038
NO _x	MC	MC-2S-Euro-1	0.038	0.038	0.037	0.037	0.036	0.038	0.038	0.038	0.038	0.038
NO _x	MC	MC-2S-Euro-2				0.046	0.045	0.048	0.048	0.048	0.048	0.048
NO _x	MC	MC-2S-Euro-3					0.047	0.048	0.047	0.047	0.047	0.047
NO _x	MC	MC-2S-Euro-4						0.045	0.045	0.045	0.045	0.045
NO _x	MC	MC-2S-Euro-5						0.038	0.038	0.038	0.038	0.038
NO _x	MC	MC-4S-Euro-0	0.347	0.341	0.343	0.334	0.334	0.353	0.351	0.349	0.347	0.346
NO _x	MC	MC-4S-Euro-1	0.335	0.328	0.315	0.314	0.310	0.329	0.327	0.325	0.324	0.323
NO _x	MC	MC-4S-Euro-2				0.292	0.291	0.308	0.310	0.307	0.304	0.302
NO _x	MC	MC-4S-Euro-3					0.173	0.176	0.176	0.177	0.177	0.176
NO _x	MC	MC-4S-Euro-4						0.139	0.139	0.139	0.140	0.141
NO _x	MC	MC-4S-Euro-5						0.084	0.083	0.083	0.083	0.083
PM exhaust	PC	PC-P-Euro-0	0.008	0.007	0.007	0.007	0.007	0.008	0.008	0.008	0.009	0.009
PM exhaust	PC	PC-P-Euro-1		0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.006
PM exhaust	PC	PC-P-Euro-2			0.008	0.009	0.009	0.009	0.009	0.009	0.009	0.009
PM exhaust	PC	PC-P-Euro-3			0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003
PM exhaust	PC	PC-P-Euro-4			0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
PM exhaust	PC	PC-P-Euro-5					0.001	0.001	0.001	0.001	0.001	0.001
PM exhaust	PC	PC-P-Euro-6						0.001	0.001	0.001	0.001	0.001
PM exhaust	PC	PC alternative					0.002	0.002	0.001	0.001	0.001	0.001
PM exhaust	PC	PC-D-Euro-0	0.145	0.139	0.133	0.139	0.148	0.169	0.170	0.172	0.175	0.168
PM exhaust	PC	PC-D-Euro-1	0.122	0.122	0.122	0.122	0.122	0.122	0.122	0.122	0.122	0.122
PM exhaust	PC	PC-D-Euro-2		0.086	0.086	0.086	0.085	0.085	0.085	0.085	0.085	0.085
PM exhaust	PC	PC-D-Euro-3			0.041	0.041	0.039	0.039	0.038	0.038	0.038	0.039
PM exhaust	PC	PC-D-Euro-4				0.042	0.022	0.021	0.020	0.019	0.018	0.020
PM exhaust	PC	PC-D-Euro-5					0.002	0.002	0.002	0.002	0.002	0.002
PM exhaust	PC	PC-D-Euro-6						0.002	0.002	0.002	0.002	0.002
PM exhaust	LCV	LCV-P-Euro-0	0.015	0.015	0.015	0.015	0.017	0.018	0.018	0.018	0.017	0.017
PM exhaust	LCV	LCV-P-Euro-1	0.012	0.011	0.011	0.011	0.012	0.013	0.014	0.014	0.014	0.014
PM exhaust	LCV	LCV-P-Euro-2			0.017	0.017	0.018	0.019	0.020	0.021	0.021	0.021
PM exhaust	LCV	LCV-P-Euro-3			0.006	0.005	0.005	0.006	0.006	0.006	0.006	0.006
PM exhaust	LCV	LCV-P-Euro-4				0.004	0.004	0.004	0.004	0.004	0.004	0.004
PM exhaust	LCV	LCV-P-Euro-5					0.003	0.003	0.003	0.004	0.004	0.004
PM exhaust	LCV	LCV-P-Euro-6						0.003	0.003	0.003	0.003	0.003
PM exhaust	LCV	LCV-D-Euro-0	0.388	0.390	0.389	0.393	0.396	0.396	0.391	0.390	0.387	0.387
PM exhaust	LCV	LCV-D-Euro-1		0.222	0.222	0.223	0.225	0.226	0.226	0.224	0.223	0.223
PM exhaust	LCV	LCV-D-Euro-2			0.130	0.131	0.132	0.132	0.133	0.132	0.131	0.132

> Abbreviations, figures and tables

Abbreviations

2S

2-stroke engine

3-way-cat

Regulated catalytic converter

4S

4-stroke Otto engine

A/C

Air Conditioning

8

European Automobile Manufacturers Association

AGV

Ordinance on exhaust emissions

ARE

Federal Office for Spatial Development

ARTEMIS

Assessment and reliability of transport emission models and inventory systems (EU project within the scope of Framework Programme 5)

AT

articulated truck

auto-schweiz

Association of Swiss Automobile Importers

CH₄

Methane

CNG

Compressed natural gas

CO

Carbon monoxide

CO₂

Carbon dioxide

COPERT

Computer Programme to calculate Emissions from Road Transport

CO₂ (rep.)

Reported carbon dioxide (fossil caused CO₂ emission without consideration of admixtures of bio fuels)

COST

European Co-operation in the field of Scientific and Technical Research

COST 346

COST action: "Emissions and fuel consumption of heavy duty vehicles"

D

Diesel

D-A-CH

Co-operation between Germany, Austria and Switzerland on the preparation of emission fundamentals (Handbook of Emission Factors in Road Transport)

DETEC

Federal Department of the Environment, Transport, Energy and Communications

ECE

United Nations Economic Commission for Europe (UNECE)

EF/EFA

Emission factor

EFKO

Swiss Federal Vehicle Inspection Office

EGR

Exhaust Gas Recirculation

EMPA

Swiss Federal Materials Testing and Research Laboratories, Dübendorf

EPEFE

European Program on Emissions, Fuels and Engine Technologies

ESC

European stationary Cycle

ETC

European Transient Cycle

Euro-1, 2, 3, 4, 5, 6

European exhaust regulations for light duty vehicles

Euro I, II, III, IV, V, VI

European exhaust regulations for heavy duty vehicles

FAV 1, 2, 3

Federal ordinances on exhaust emissions (up to 1996)

- 1 = Light duty vehicles,
- 2 = Heavy duty vehicles,
- 3 = Motorcycles

FAV 4

Ordinance on Motorcycle Exhaust Emissions

FC

Fuel consumption

FOEN

Swiss Federal Office for the Environment

FSO

Federal Statistical Office

HBEFA

Handbook of Emission Factors for Road Transport

HC

Hydrocarbons

HDV

Heavy duty vehicle (> 3.5 t total weight;
= general term for heavy goods vehicles and buses)

HGV

heavy goods vehicles (rigid trucks, trucks with trailers and articulated trucks)

HVF

Swiss performance-related heavy vehicle fee

LCV

Light commercial vehicle (< 3.5 t), incl. small buses, utility vehicles, caravans, etc.

LMC

Light motorcycle (< 50 cc)

MC

Motorcycle

MOFIS

Motor Vehicle Information System of the Swiss vehicle inspection office

NABEL

National Air Pollution Monitoring Network

N₂O

Nitrous oxide (laughing gas)

NEDC

New European Driving Cycle

NO₂

Nitrogen dioxide

NH₃

Ammoniac

NIR

Non-ionising radiation

NMHC

Non-methane hydrocarbons

NO_x

Nitrogen oxides

P

Petrol

Pb

Lead

PC

Passenger car

PF

Particle filter

PHEM

Passenger car and heavy duty vehicle emissions model (developed by Technical University Graz)

PM

Particulate matter

PM exhaust

Particles in exhaust

PM non-exhaust

Particles resulting from abrasion and resuspension

PN

Particle number

RL

Running losses (evaporation losses during travel)

RT

Rigid truck

SAEFL

Swiss Agency for the Environment, Forest and Landscapes, Bern

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TAFV Ordinance of 19 June 1995 on the Technical Requirements for Transport Vehicles and their Trailers (SR 741.412). ¹⁴	Fig. 3 Development of vehicle stock by emission category (example: passenger cars)	22
THC Total hydrocarbons	Fig. 4 Mileage trend, 1990 to 2035 (million vehicle kilometres per annum)	24
TT Truck with trailer	Fig. 5 Mileage proportions of the various passenger car segments in the period from 1990 to 2035	26
TU Graz Technische Universität Graz (Technical University Graz, Austria)	Fig. 6 Mileage proportions of the various light commercial vehicle segments in the period from 1990 to 2035	27
v Velocity	Fig. 7 Development of mileage proportions of heavy goods vehicles in the period from 1990 to 2035	28
VOC Volatile organic compounds	Fig. 8 Development of mileage proportions of motor cycles in the period from 1990 to 2035	29
WHDC World-wide harmonised heavy-duty certification procedure for engine exhaust emissions	Fig. 9 Emission concepts by registration (petrol-driven passenger cars)	30
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¹⁴ TAFV 1: Ordinance of 19 June 1995 on the Technical Requirements for Transport Vehicles and their Trailers (SR 741.412). This Ordinance integrates the following standards into Swiss legislation:
 – «Euro-2» for light motor vehicles (Directive 70/220/EEC, version 94/12/EC and/or 96/69/EC) and «Euro-II» for heavy motor vehicles (Directive 88/77/EEC, version 91/542/EC);
 – «Euro-3» and «Euro-4» (Directive 98/69/EC for light motor vehicles) and «Euro-III/IV/V» (Directive 1999/96/EC for heavy motor vehicles).
 TAFV 3: Ordinance on the technical requirements of motorcycles, light, small and three-wheeled motor vehicles, dated 2 September 1998 (SR 741.414); «Euro-1» (in accordance with Directive 97/24/EC, and «Euro-2» and «Euro-3» (in accordance with Directive 2002/51/EC) have been integrated into this ordinance.

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