EEA Report | No 19/2017

# Monitoring $CO_2$ emissions from new passenger cars and vans in 2016

ISSN 1977-8449

European Environment Agency

EEA Report | No 19/2017

# Monitoring $CO_2$ emissions from passenger cars and vans in 2016

European Environment Agency

Cover design: EEA
Cover photo: © Ales Jakubec/EEA
Left photo: © EEA
Right photo: © PhotoAlto_photographer
Layout: EEA/Alejandra Bize



Luxembourg: Publications Office of the European Union, 2017

ISBN 978-92-9213-925-4
ISSN 1977-8449
doi:10.2800/987976

European Environment Agency
Kongens Nytorv 6
1050 Copenhagen K
Denmark

Tel.: +45 33 36 71 00
Web: eea.europa.eu
Enquiries: eea.europa.eu/enquiries

# Contents

# Abbreviations

| | |
|---|---|
| AFV | Alternative fuel vehicle |
| BDR | Business Data Repository |
| BEV | Battery electric vehicle |
| CDR | Central Data Repository |
| E85 | Petrol containing 85 % ethanol |
| EEA | European Environment Agency |
| ETC/ACM | European Topic Centre on Air Pollution and Climate Change Mitigation |
| HDV | Heavy-duty vehicle |
| IVA | Individual vehicle approval |
| LPG | Liquefied petroleum gas |
| NEDC | New European Driving Cycle |
| NG | Natural gas |
| $NO_X$ | Nitrogen oxide |
| NSS | National small series |
| PHEV | Plug-in hybrid electric vehicle |
| PM | Particulate matter |
| UNECE | United Nations Economic Commission for Europe |
| VIN | Vehicle identification number |
| WLTP | World Harmonised Light Vehicle Test Procedure |

**Country groupings**

Throughout this report, the following abbreviations are used to refer to specific country groupings:

- EU-13: Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia, Slovenia;
- EU-15: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden and the United Kingdom;
- EU-27: EU-28 excluding Croatia;
- EU-28: EU-15 and EU-13.

# Acknowledgements

This report was prepared by the European Environment Agency (EEA), supported by its European Topic Centre on Air Pollution and Climate Change Mitigation (ETC/ACM). The ETC/ACM is a consortium of European institutes assisting the EEA in its support to EU policy implementation in the field of air pollution and climate change mitigation. The ETC/ACM partner involved in the support for data quality assurance was EMISIA.

The author is Diana Vedlugaitė (EEA).
Cinzia Pastorello and Peter Christian Kjeld (EEA) are thanked for their assistance in compiling 2016 data, as well as other EEA colleagues for their support during the process of preparing this report.

**Caveat**

This report documents the latest official data submitted by Member States and vehicle manufacturers. It is not possible to assess the extent to which incorrect data from vehicle manufacturers may alter the analysis and conclusions. The final $CO_2$ performance for each manufacturer and pool is confirmed by a European Commission Decision.

It is also important to mention that, for both passenger cars and vans, the reported $CO_2$ emissions are based upon measurements performed in the laboratory using a standard European vehicle test cycle. Such measurements may not reflect real-world driving performance.

# Executive summary

This report provides a summary of the $CO_2$ emission levels of new passenger cars and vans in the European Union in 2016. The report is based on the data collected by the European Environment Agency (EEA) concerning the $CO_2$ performance of passenger cars, in accordance with Regulation (EC) No 443/2009 (EU, 2009), and of light commercial vehicles (vans) in accordance with Regulation (EU) No 510/2011 (EU, 2011). The regulation for passenger cars sets a target for the average $CO_2$ emissions from new passenger cars of 130 g $CO_2$/km by 2015, while the regulation for light commercial vehicles sets the average $CO_2$ emissions target for new light commercial vehicles of 175 g $CO_2$/km by 2017. Stricter targets will apply under these regulations from 2020 (vans) and 2021 (cars). These regulations are based on emissions measured using the New European Driving Cycle (NEDC).

For each manufacturer, average specific emissions, defined as the average value for each manufacturer's fleet of newly registered vehicles in the EU that year, are compared with specific emission targets. Starting from 2013 for cars and 2014 for vans, a binding specific emission target applies for each manufacturer, based on a limit value curve according to the average mass of the new vehicles registered by that manufacturer.

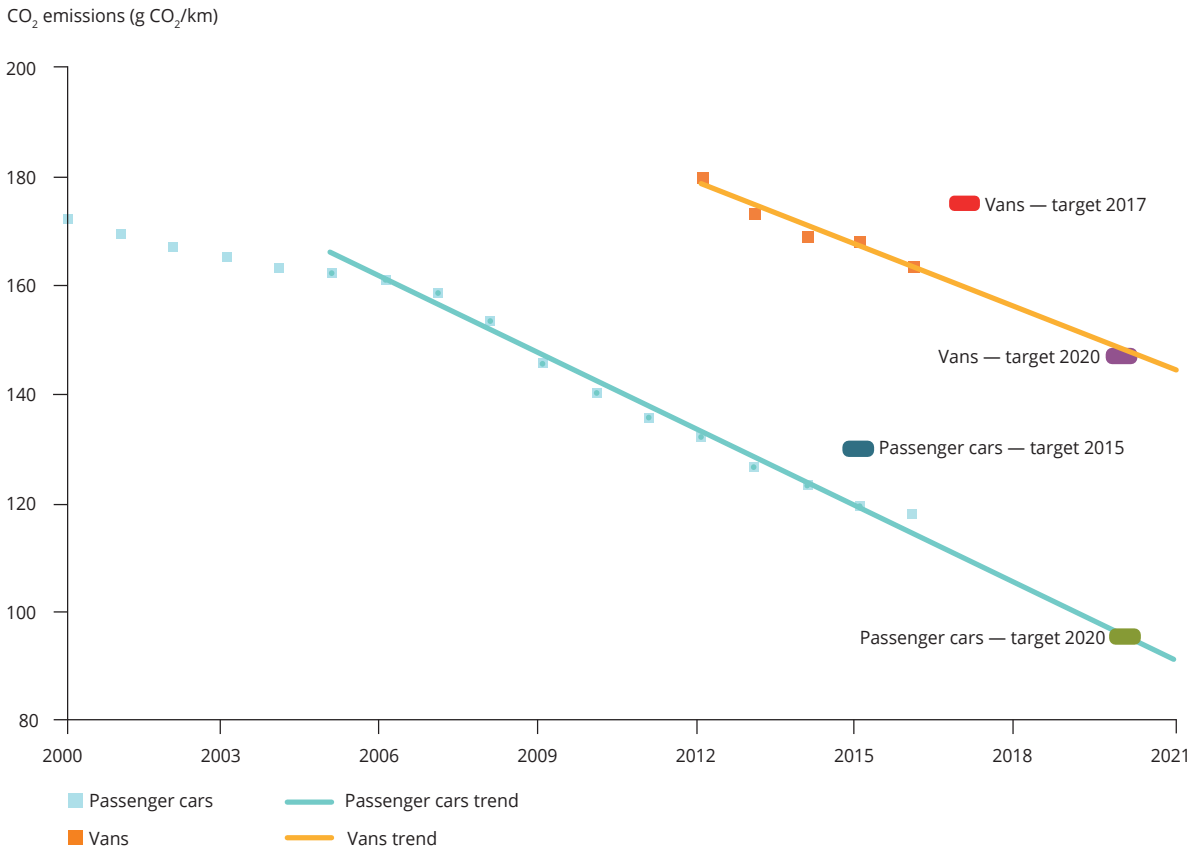
This report presents the main statistics reported by Member States, as well as the manufacturers' progress towards their targets. The EEA has collected and quality-checked data on $CO_2$ emissions from passenger cars and vans registered in all EU Member States ([1]) since 2010. Using Member State data, as verified by manufacturers ([2]), this report provides an overview of the performance of car and van manufacturers in meeting their 2016 $CO_2$ emission targets.

The main findings are:

- New cars sold in the EU in 2016 had average $CO_2$ emissions ([3]) of 118.1 g $CO_2$/km, which is 23 g/km above the 2021 target, and 1.5 g/km lower than in 2015.
- The average emissions of new light commercial vehicles registered in 2016 were 163.7 g $CO_2$/km, below the 2017 target of 175 g $CO_2$/km and a reduction of 2.8 % compared with 2015.
- Average NEDC type-approved $CO_2$ emissions from new cars have decreased by 27 % in the last 10 years, while the emissions of new vans decreased by more than 9 % in the last 5 years. In order to meet their EU 2020/21 targets, the average $CO_2$ emissions from new cars and vans will need to continue decreasing at a similar pace (Figure ES.1).
- The difference between provisional average specific emissions (the emission data reported earlier in 2016 by each of the Member States) and final average specific emission data (the emission data considering error notifications by manufacturers) was insignificant (below 0.1 g $CO_2$/km).
- As in recent years, diesel and petrol cars accounted for the large majority of the new fleet (96.5 % of new registrations), and diesel cars constituted the majority of the new registrations (49.4 %). The proportion of plug-in hybrid and battery electric vehicles remained similar to the 2015 level and constituted just over 1 % in 2016. Other alternative fuel vehicles, such as liquefied petroleum gas and

([1]) The geographical scope of the data changes over time. See Annex 1 for details.
([2]) Relevant registration data are reported to the EEA and the European Commission by EU Member States. The provisional data and the provisional calculations are then notified to manufacturers, which have 3 months to notify any errors to the Commission. The Commission then considers any notifications from manufacturers and either confirms or amends the provisional calculations. These amended/confirmed data are referred to as final average specific emissions.
([3]) Average $CO_2$ emissions are calculated as simple averages, without taking into account any adjustments.

**Figure ES.1 Average $CO_2$ emissions historical development and targets for new passenger cars and vans in the EU-28**




compressed natural gas vehicles, covered the remaining registrations (2 %).

- As in 2014 and 2015, the average diesel passenger car was more than 300 kg heavier than the average petrol vehicle.
- Diesel-fuelled passenger cars emitted on average 116.8 g $CO_2$/km, which is 4.9 g $CO_2$/km less than the average petrol vehicle, whereas in 2000 the emission difference between diesel and petrol vehicles was much larger (17.1 g $CO_2$/km).
- On average, the most efficient cars were bought in Portugal (104.7 g $CO_2$/km), Denmark, Greece and the Netherlands (106 g $CO_2$/km for the last three Member States). For new vans, average emission levels were lowest among those sold in Portugal (140 g $CO_2$/km), Bulgaria (141 g $CO_2$/km and Cyprus (144 g $CO_2$/km).

All car and van manufacturers met their $CO_2$ specific emission ([4]) targets in 2016 when taking into account the pools and derogations.

([4]) The figure for $CO_2$ specific emissions is, in relation to a manufacturer, the average of the specific emissions of $CO_2$ of all new passenger cars of which it is the manufacturer; it is calculated using all the adjustments described in Section 2.2.

# 1 Introduction

To reduce $CO_2$ emissions in the road transport sector, the European Parliament and the Council adopted two regulations: Regulation (EC) No 443/2009, which introduced mandatory $CO_2$ emission performance standards for new passenger cars, and Regulation (EU) No 510/2011, which introduced mandatory $CO_2$ emission performance standards for new vans.

For new passenger cars, the regulation sets the average $CO_2$ specific emission target at 130 g $CO_2$/km by 2015, defined as the average value for the fleet of newly registered passenger cars in the EU. A target of 95 g $CO_2$/km has been set for 2021 (phase-in from 2020). The modalities for compliance with those targets are presented in Chapter 2.

For new light commercial vehicles, Regulation (EU) No 510/2011 sets the average $CO_2$ emissions target at 175 g $CO_2$/km by 2017, defined as the average value for the fleet of newly registered vans in the EU. A medium-term target of 147 g $CO_2$/km has been set for 2020.

The modalities of compliance with the targets have been established for both regulations and are presented in Chapter 2.

The progress of manufacturers in meeting the targets is evaluated on an annual basis by calculating the difference between their $CO_2$ average specific emissions; and their specific $CO_2$ emissions target for that year.

In May 2017, the European Commission presented the communication 'Europe on the Move', which was accompanied by a wide-ranging set of proposals aiming to achieve clean, competitive and connected mobility in the EU. This communication included a proposal for a Commission regulation on the determination, and a legislative proposal for the monitoring and reporting, of the $CO_2$ emissions and fuel consumption from heavy duty vehicles (HDVs) that have not yet been monitored and reported so far in the EU. EU standards for HDVs are also under consideration and are planned for the first half of 2018.

For both cars and vans, the Commission has started reviewing the legislation, and a proposal on post-2020/21 $CO_2$ emission standards for cars and vans is anticipated at the end of this year.

# 2 Overview of the monitoring system for passenger cars and vans

Since 2010, the EEA has collected data on passenger cars registered in all EU Member States. Since 2013, the EEA has been collecting data about vans as well. For both cars and vans, the same schedule applies for the data monitoring:

- Member States shall record information for each new passenger car and van registered in their territory and transmit this information to the Commission by 28 February of each year. Data are submitted to the Central Data Repository (CDR ([5])), managed by the EEA.
- For vans only, manufacturers submit the vehicle identification number (VIN) ([6]) for each new van sold in the EU-28 to the Commission by 28 February of each year. Data are submitted to the BDR ([7]), managed by the EEA.
- The EEA performs several quality checks to evaluate the accuracy and the quality of the data sets. On the basis of these checks and the feedback from Member States, the EEA finalises and publishes the provisional database. At the same time, notification letters are sent to manufacturers informing them of their provisional $CO_2$ performances.
- Manufacturers can, within 3 months of being notified of the provisional calculation, notify the Commission of any errors in the data.
- The EEA and the European Commission assess the manufacturers' corrections, and, where justified, take them into account for the calculation of the manufacturers' final average $CO_2$ emissions and specific emission targets. The final data and targets are to be published by 31 October each year.
- In the remainder of this chapter the process is presented in further detail.

## 2.1 Data quality

The EEA performs several quality checks to evaluate the accuracy and the quality of the Member States' data. These checks cover various areas, listed in the bullet points below:

- Completeness rate. This comprises two main components: numerical data, such as vehicle mass and emission values for each vehicle; and the extent to which more granular data — such as model type — are available for each vehicle that has been registered.
- Data plausibility and outliers ([8]).
- Assignment to a specific manufacturer using a harmonised denomination. Identical vehicles are often sold under different brand or model names in different countries. For the purposes of the monitoring, one naming system is used to ensure correct attribution to manufacturers.
- Data variability. For the same vehicle, an estimate of the variability of the mass, emissions and engine capacity has been developed.
- Fuel type classification.
- Handling of unknown individual vehicle approvals (IVAs) and national small series (NSS) vehicles ([9]).
- For vans, VINs provided by Member States and by manufacturers are compared. Whenever VINs are matching but data are missing in a Member State's

([5]) The CDR is an electronic online reporting system, making available data reports on the environment submitted by Member States (more information available at http://cdr.eionet.europa.eu).
([6]) The VIN is a unique code including a serial number, used by the automotive industry to identify individual motor vehicles, as defined in ISO 3833.
([7]) The BDR, or Business Data Repository, is an electronic online reporting system specifically developed for handling confidential company-based information (more information available at http://bdr.eionet.europa.eu).
([8]) An outlier observation is well outside the expected range of values in a study or experiment, and it is often discarded from the data set.
([9]) IVAs are made on vehicles imported from non-Member States or on own-build vehicles that have to be individually approved. NSS vehicles are vehicles that are approved nationally in very small numbers, typically because they are made by smaller manufacturers.

submission, the manufacturer's data ([10]) will be used to complete the data set for the main parameters (emission- and mass-related entries).

After the quality checks the provisional database is finalised. Based on the provisional database, the EEA calculates the provisional performance of car and van manufacturers in meeting their specific emission targets. The performance is calculated as the difference between the average $CO_2$ specific emissions and the specific emission target for each manufacturer. The provisional calculations are notified by the Commission to each manufacturer (and pool) and the provisional data are published on the EEA website.

Manufacturers can notify the Commission of errors in the provisional $CO_2$ emission data set. The notification must be submitted within 3 months of the notification of the provisional calculations.

As it does for Members States' data, the EEA performs several quality checks to evaluate the accuracy and the quality of the data that have been corrected in the notification of errors. The verification process is very similar to the one performed for Member States' data, presented in the previous paragraphs. After this additional quality check the database is finalised.

Based on the final data, the EEA calculates the performance of car and van manufacturers in meeting their specific emission targets. The performance is calculated as the difference between the average $CO_2$ specific emissions and the specific emission target for each manufacturer. The final calculations are notified by the Commission to each manufacturer (and pool) and the final data are published on the EEA website.

## 2.2 Calculation of average specific emissions of $CO_2$

Average specific emissions of $CO_2$ are calculated as a weighted average of the manufacturer's fleet of new registrations in a particular year. The average specific emissions for each manufacturer are subsequently adjusted to take into account the following modalities (summarised in Table 2.1):

- phase-in;
- super-credits;
- eco-innovations.

***Phase-in***

A phase-in schedule applies for calculating average specific emissions.

For passenger cars:

- During the period 2012–2014, only a certain percentage (65 % in 2012, 75 % in 2013 and 80 % in 2014) of the best-performing registered cars had to be taken into account in determining the performance of manufacturers. For the period 2015–2019, 100 % of new cars from each manufacturer have to be taken into account.
- The 2021 specific emission targets will be phased in from 2020, taking into account 95 % of the best-performing cars in that year. From 2021, 100 % of new cars from each manufacturer will be taken into account (see also Table 2.2).

For vans:

- During the period 2014–2016, only a certain percentage (70 % in 2014, 75 % in 2015 and 80 % in 2016) of the best-performing registered vans had to be taken into account in determining the manufacturers' performance. From 2017, 100 % of new cars from each manufacturer will have to be taken into account.

***Super-credits***

The regulation provides for the allocation of super-credits for new passenger cars and new vans with $CO_2$ emissions lower than 50 g $CO_2$/km. These vehicles are temporarily given a greater weight in calculating the average specific emissions, as they are considered to have the following equivalences:

- For passenger cars: 3.5 cars in 2012 and 2013, 2.5 cars in 2014 and 1.5 cars in 2015. For the 95 g $CO_2$/km target, the super-credit weight factor will become 2 cars in 2020, 1.67 cars in 2021 and 1.33 cars in 2022. In the period 2020–2022, the use of super-credits is subject to a cap of 7.5 g $CO_2$/km for each manufacturer.
- For vans: 3.5 vans in 2014 and 2015, 2.5 vans in 2016 and 1.5 vans in 2017. For the duration of the super-credit scheme, the maximum number of vans per manufacturer to be taken into account for the application of the super-credit multipliers shall not exceed 25 000.

([10]) In addition to VINs, manufacturers may submit detailed monitoring data for the vehicles registered.

*E85 extra credits*

For years prior to 2015, additional reductions in average specific emissions were assigned to vehicles capable of running on a mixture of petrol with 85 % ethanol (E85). For these years, the emissions of such vehicles were counted as being 5 % less than their actual emissions in recognition of their ability to reduce emissions when running on biofuels. This reduction was applied only where at least 30 % of the filling stations in the Member State in which the vehicle was registered provided this type of alternative fuel. In 2015, as in the previous years, this applied only to Sweden.

*Eco-innovations*

Certain innovative technologies cannot demonstrate their $CO_2$-reducing effects under the current type-approval test procedure. To support technical development, a manufacturer or supplier can apply to the Commission for the approval of such innovative technologies. The approval conditions are set out in Commission Regulation (EU) No 725/2011. If a manufacturer fits its car fleet of new registrations with an approved eco-innovation, the average emissions of that manufacturer may be reduced by a maximum of 7 g $CO_2$/km on account of emission savings from eco-innovations.

*Specific emission targets*

Under the regulations, each manufacturer has an individual annual target, calculated on the basis of the overall target and the average 'mass in running order' ([11]) of its registered cars and vans. The following formulae apply to passenger cars (1) and vans (2) until 2020:

Passenger cars:

(1) Specific emission target of $CO_2 = 130 + a \times (M - M_0)$

Vans:

(2) Specific emission target of $CO_2 = 175 + a \times (M - M_0)$

where:

M is the average mass of the manufacturer's fleet of new registrations in kilograms;

$M_0$ is the reference mass (1 392.4 kg for passenger cars in 2016, 1 706.0 kg for vans);

a is 0.0457 for passenger cars and 0.093 for vans.

This means that, for example, if the average mass of a manufacturer's newly registered passenger car fleet in a given year is 1 392.4 kg, the target for that manufacturer is 130.0 g $CO_2$/km.

If the average mass of the newly registered passenger car fleet is 1 492.4 kg, the target for that manufacturer is 134.57 g $CO_2$/km. If the average mass of the newly registered passenger car fleet is 1 292.4 kg, the target will be 125.43 g $CO_2$/km. These formulae aim to guarantee undistorted competition between manufacturers while taking into account their differences.

The manufacturer complies with its specific emission target if its average specific emissions (taking into account all the relevant modalities described above) are lower than the target.

The reference mass ($M_0$) is adjusted every 3 years to reflect changes in the average mass of newly registered vehicles. For cars, the new $M_0$ was adjusted in 2014 and is 1 392.4 kg for 2016–2018. Since the average mass of the new fleet in the period 2011–2013 increased by 20 kg compared with the $M_0$ in formula (1), the target of a manufacturer that is responsible for an annual fleet of new registrations with an average mass of 1 392.4 kg became 130 g $CO_2$/km from 2016, while the target for that manufacturer was 130.9 g $CO_2$/km prior to the $M_0$ adjustment. A new $M_0$ value will be valid from 2019.

For vans, $M_0$ was amended in 2016 and will be 1 766.08 kg from 2018. Since the average mass of the new fleet in the period 2013–2015 increased by 60 kg compared with the $M_0$ in formula (2), the target of a manufacturer that is responsible for an annual fleet of new registrations with an average mass of 1 766.08 kg will become 175.0 g $CO_2$/km from 2018, while the target for that manufacturer was 180.6 g $CO_2$/km in prior to the $M_0$ adjustment.

([11]) According to Regulation (EC) No 443/2009, mass in running order means the mass of the car with bodywork, coolant, oils, fuel, spare wheel, tools and driver, as stated in the certificate of conformity and defined in Section 2.6 of Annex I to Directive 2007/46/EC.

Regulation (EU) No 333/2014 (EU, 2014) amended Regulation (EC) No 443/2009 with a view to defining the modalities for reaching the 2020 target to reduce $CO_2$ emissions from new passenger cars. The following formula applies to passenger cars from 2020:

(3) Specific emission targets of $CO_2 = 95 + a \times (M - M_0)$ where:

M is the average mass of the manufacturer's fleet of new registrations in kilograms;

$M_0$ is the reference mass (see above);

a is 0.0333.

For vans, Regulation (EU) No 253/2014 (EU, 2014) amended Regulation (EU) No 510/2011 with a view to defining the modalities for reaching the 2020 target to reduce $CO_2$ emissions from new vans. The following formula applies from 2020:

(4) Specific emission targets of $CO_2 = 147 + a \times (M - M_0)$ where:

M is the average mass of the manufacturer's fleet in kilograms;

$M_0$ is the reference mass (see above);

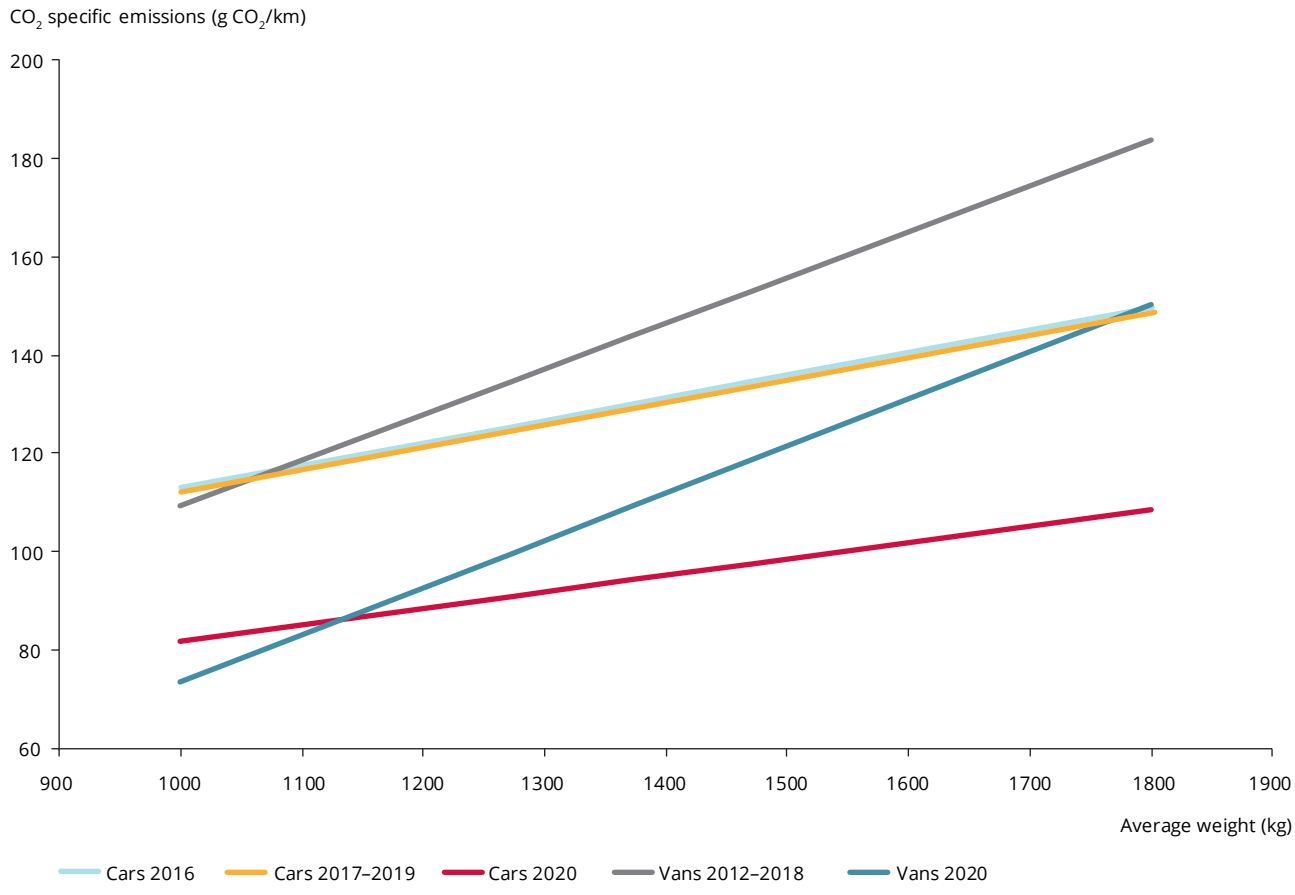
a is 0.096.

***Pools***

Manufacturers may form a pool with other manufacturers in order to create a common target.

In this case, the binding target will be the pool target (calculated on the basis of the whole fleet of new registrations of the pool registered in that year). In 2016, 14 pools for passenger cars (Table 2.3) and nine pools for vans (Table 2.4) were declared.

**Figure 2.1 Limit value curves for cars and vans**




**Note:** 2020 limit curve for vans is calculated using $M_0$ = 1 766.35 kg.

*Derogations*

For passenger cars, manufacturers selling fewer than 10 000 vehicles per year can apply for a small-volume derogation. In this case, a specific emission target consistent with the manufacturer's economic and technological potential to reduce specific $CO_2$ emissions can be granted. In 2016, 31 manufacturers were granted a small-volume derogation target (Table 2.5).

Niche derogations are available to manufacturers responsible for between 10 000 and 300 000 new passenger car registrations. In this case, a special target is established, corresponding to a 25 % reduction from the average specific emissions of that manufacturer in 2007 for the period 2012-2019 and a 45 % reduction from the 2007 level as of 2020. In 2016, five niche derogations were granted for passenger cars (Table 2.6).

For vans, six manufacturers were granted a derogation target (Table 2.7)

*De minimis exemptions*

A manufacturer that, together with all of its connected undertakings, is responsible for fewer than 1 000 new registered cars may be exempt from meeting a specific emission target pursuant to Regulation (EC) No 443/2009 and Regulation (EU) No 510/2011, as amended by Regulation (EU) No 333/2014 and Regulation (EU) No 253/2014. In 2016, 48 manufacturers, responsible for a total of around 8 600 registrations, benefited from an exemption (26 for passenger cars and 22 for vans).

**Table 2.1 Summary of the parameters applying to the calculation of manufacturer performance from 2016 to 2019**

| Parameter | Vehicles | 2016 | 2017 | 2018–2019 |
|---|---|---|---|---|
| Phase-in | Passenger cars | 100 % | 100 % | 100 % |
| | Vans | 80 % | 100 % | 100 % |
| Super-credit for vehicle emitting less than 50 g $CO_2$/km | Passenger cars | 1.0 | 1.0 | 1.0 |
| | Vans | 2.5 | 1.5 | 1.0 |
| Emission reduction for E85 vehicles ([a]) | Passenger cars/vans | 0 % | 0 % | 0 % |

**Note:** ([a]) Applies only where at least 30 % of the filling stations in the Member State in which the vehicle is registered provide this type of alternative fuel.

**Table 2.2 Summary of the parameters applying to the calculation of passenger cars manufacturer performance from 2020**

| Parameter | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|
| Phase-in | 95 % | 100 % | 100 % | 100 % |
| Super-credit for vehicle emitting less than 50 g $CO_2$/km | 2.0 | 1.67 | 1.33 | 1.0 |

([12]) Subject to a cap of 7.5 g $CO_2$/km in the period 2020–2022 (relates to Table 2.2).

**Table 2.3 Manufacturers' pools in 2016 (passenger cars)**

| Pool | Manufacturer |
|---|---|
| BMW Group | Bayerische Motoren Werke AG |
| | BMW M GmbH |
| | Rolls-Royce Motor Cars Ltd |
| Daimler AG | Daimler AG |
| | Mercedes-AMG GmbH |
| FCA Italy SPA | Alfa Romeo SPA |
| | FCA US LLC |
| | FCA Italy SPA |
| Ford-Werke GmbH | CNG-Technik GmbH |
| | Ford India Private Limited |
| | Ford Motor Company of Australia Limited |
| | Ford Motor Company |
| | Ford-Werke GmbH |
| General Motors | Chevrolet Italia SPA |
| | General Motors Company |
| | General Motors Holdings LLC |
| | GM Korea Company |
| | Adam Opel AG |
| Honda Motor Europe Ltd | Honda Automobile China Co Ltd |
| | Honda Motor Co Ltd |
| | Honda Turkiye AS |
| | Honda of the UK Manufacturing Ltd |
| | Honda Automobile Thailand Co Ltd |
| Hyundai | Hyundai Motor Company |
| | Hyundai Assan Otomotiv Sanayi ve Ticaret AS |
| | Hyundai Motor Manufacturing Czech SRO |
| | Hyundai Motor Europe GmbH |
| | Hyundai Motor India Ltd |
| Kia | Kia Motors Corporation |
| | Kia Motors Slovakia SRO |
| Mitsubishi Motors | Mitsubishi Motors Corporation MMC |
| | Mitsubishi Motors Europe BV MME |
| | Mitsubishi Motors Thailand Co Ltd MMTH |
| Pool Renault | Avtovaz JSC |
| | Automobile Dacia SA |
| | Renault SAS |
| Suzuki | Magyar Suzuki Corporation Ltd |
| | Maruti Suzuki India Ltd |
| | Suzuki Motor Corporation |
| | Suzuki Motor Thailand Co Ltd |
| Tata Motors Ltd, Jaguar Cars Ltd, Land Rover | Jaguar Land Rover Limited |
| | Tata Motors Limited |
| Toyota-Dahaitsu Group | Daihatsu Motor Co Ltd |
| | Toyota Motor Europe NV SA |

**Table 2.3 Manufacturers' pools in 2016 (passenger cars) (cont.)**

| Pool | Manufacturer |
|---|---|
| VW Group Pc | Audi AG |
| | Audi Hungaria Motor KFT |
| | Bugatti Automobiles SAS |
| | Man Truck & Bus AG |
| | Dr Ing HCF Porsche AG |
| | Quattro GmbH |
| | Seat SA |
| | Skoda Auto AS |
| | Volkswagen AG |

**Table 2.4 Manufacturers' pools in 2016 (vans)**

| Pool | Manufacturer |
|---|---|
| Daimler | Daimler AG |
| | Mitsubishi Fuso Truck & Bus Corporation |
| | Mitsubishi Fuso Truck Europe SA |
| | MFTBC |
| FCA Italy SPA | FCA US LLC |
| | FCA Italy SPA |
| Ford-Werke GmbH | CNG-Technik GmbH |
| | Ford India Private Limited |
| | Ford Motor Company of Australia Limited |
| | Ford Motor Company |
| | Ford-Werke GmbH |
| General Motors | Chevrolet Italia SPA |
| | General Motors Company |
| | General Motors Holdings LLC |
| | GM Korea Company |
| | Adam Opel AG |
| Hyundai | Hyundai Motor Company |
| | Hyundai Assan Otomotiv Sanayi VE |
| | Hyundai Motor Manufacturing Czech SRO |
| Kia | Kia Motors Corporation |
| | Kia Motors Slovakia SRO |
| Mitsubishi Motors | Mitsubishi Motors Corporation MMC |
| | Mitsubishi Motors Europe BV MME |
| | Mitsubishi Motors Thailand Co Ltd MMTH |
| Renault | Avtovaz JSC |
| | Automobile Dacia SA |
| | Renault SAS |

**Table 2.4 Manufacturers' pools in 2016 (vans) (cont.)**

| Pool | Manufacturer |
|---|---|
| Volkswagen Group LCV | Audi AG |
| | Audi Hungaria Motor KFT |
| | Bentley Motors Ltd |
| | Bugatti Automobiles SAS |
| | Automobili Lamborghini SPA |
| | Man Truck & Bus AG |
| | Dr Ing HCF Porsche AG |
| | Quattro GmbH |
| | Seat SA |
| | Skoda Auto AS |
| | Volkswagen AG |

**Table 2.5 Manufacturers with low volume derogations granted for 2016 (passenger cars)**

| Manufacturer | Specific emissions targets in g $CO_2$/km |
|---|---|
| Alpina Burkard Bovensiepen GmbH e Co KG | 220.00 |
| Artega Automobil GmbH e Co KG | 286.00 |
| Aston Martin Lagonda Ltd | 309.00 |
| Automobili Lamborghini SPA | 318.00 |
| Bentley Motors Ltd | 294.00 |
| Caterham Cars Limited | 210.00 |
| Donkervoort Automobielen BV | 178.00 |
| DR Motor Company SRL | 130.00 |
| Ferrari SPA | 290.00 |
| Great Wall Motor Company Limited | 188.00 |
| Koenigsegg Automotive AB | 275.00 |
| KTM-Sportmotorcycle AG | 185.00 |
| Litex Motors AD | 154.00 |
| Lotus Cars Limited | 280.00 |
| Mahindra & Mahindra Ltd | 144.00 |
| Marussia Motors LLC | 270.00 |
| Maserati SPA | 245.00 |
| Mclaren Automotive Limited | 275.00 |
| MG Motor UK Limited | 146.00 |
| Morgan Technologies Ltd | 168.00 |
| Noble Automotive Ltd | 360.00 |
| Pagani Automobili SPA | 340.00 |
| PGO Automobiles | 160.00 |
| Potenza Sports Cars | 205.00 |
| Perusahaan Otomobil Nasional SDN BHD | 167.00 |
| Radical Motosport Ltd | 198.00 |
| Secma SAS | 131.00 |
| Spyker Automobielen BV | 330.00 |
| Ssangyong Motor Company | 180.00 |
| Wiesmann GmbH | 274.00 |
| Zejiang Zoyte Automobile Manufacturing Co Ltd | 159.50 |

**Note:** This table includes all manufacturers that benefitted from a small volume derogation target even if they did not sell any vehicles in 2016.

**Table 2.6 Niche derogations granted for 2016 (passenger cars)**

| Manufacturer/pool | Specific emission targets in g $CO_2$/km |
|---|---|
| Fuji Heavy Industries Ltd | 164.616 |
| Tata Motors Ltd, Jaguar Cars Land Rover | 178.025 |
| Mazda Motor Corporation | 129.426 |
| Suzuki Pool | 123.114 |
| Ssangyong Motor Company | 167.573 |

**Table 2.7 Manufacturers with derogations granted for 2016 (vans)**

| Manufacturer | Specific emission targets in g $CO_2$/km |
|---|---|
| Gonow Auto Co Ltd | 175.00 |
| Jaguar Land Rover Limited | 276.93 |
| Mitsubishi Motors Pool | 210.00 |
| Piaggio & C SPA | 155.00 |
| Ssangyong Motor Company | 210.00 |
| Great Wall Motor Company Limited | 205.00 |

**Note:** This table includes all manufacturers that benefitted from a small volume derogation target even if they did not sell any vehicles in 2016.

**Box 2.1 New legislative driving cycle**

The new World Harmonised Light Vehicle Test Procedure (WLTP) is mandatory for all new vehicle types from September 2017 and for all new vehicles from September 2018 (EU, 2017a; EU, 2017b; EU, 2017c). The WLTP will provide more realistic $CO_2$ emissions and fuel consumption values, which will benefit consumers and regulators at both EU and national levels. As the existing EU $CO_2$ regulations for cars and vans are based on emissions measured using the New European Driving Cycle (NEDC), and as many Member States have taxation systems in place based on NEDC-based $CO_2$ figures, it will be necessary to determine NEDC-based $CO_2$ emission figures for some time after the WLTP has been introduced. Therefore, a specific computer simulation programme called $CO_2$MPAS ([13]) has been developed to calculate NEDC-based $CO_2$ emission figures.

([13]) https://CO2mpas.io.

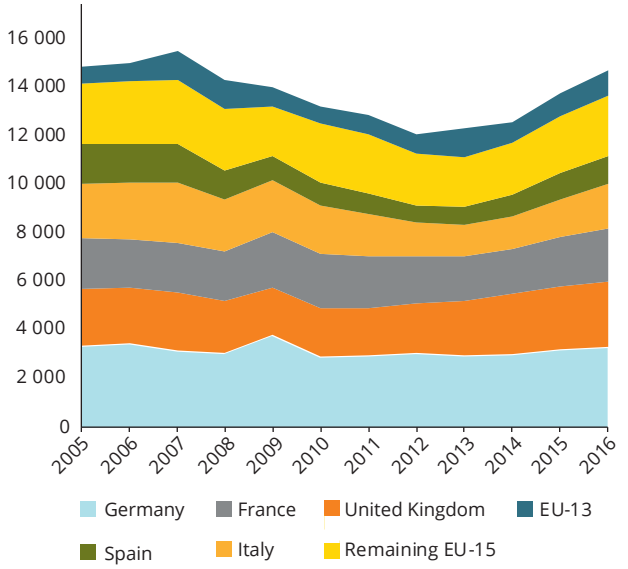
# 3 Passenger cars

## 3.1 Number of new registrations

Since 2007, when 15.5 million passenger cars were registered in the EU-27 (see Figure 3.1 and Table A1.1), the number of new registrations continuously decreased until 2013 (11.9 million). In 2016, for the third year in a row, the number of new passenger car registrations again increased, reaching 14.7 million, which is nearly a million more than in 2015. The number of registrations increased in 25 out of the 28 Member States, with the biggest increases observed in Croatia (+26 %), Cyprus (+25 %), and Hungary (+24 %). The largest decrease was seen in the Netherlands (–14 %).

The EU new passenger car market is centred on a few countries, as 76 % of all registrations occur in Germany, the United Kingdom, France, Italy and Spain. Germany is the largest new vehicle market in Europe, with 23 % in 2016, followed by the United Kingdom (18 %) and France (15 %). Together, these countries represent 56 % of the EU fleet of new car registrations. Italy and Spain registered 12 % and 8 % respectively of the EU fleet of new car registrations in 2016. In these countries, the number of new car registrations has fallen by 27 % and 26 % respectively since 2007, but vehicle sales have been rising sharply again in the last few years: in 2016, registrations in Italy and in Spain were about 16 % and 10 % above 2015 levels.

**Figure 3.1 Number of vehicles registered in EU-28 between 2005 and 2016**




**Note:** Remaining EU-15 includes Austria, Belgium, Denmark, Finland, Greece, Ireland, Luxembourg, the Netherlands, Portugal and Sweden.

## 3.2 Average $CO_2$ emissions from new passenger cars

The final data presented here confirm the provisional data published by the EEA earlier in 2017. The average $CO_2$ emissions from the new passenger car fleet in the EU in 2016 were 118.1 g $CO_2$/km (Table 3.1), which is 1.45 g $CO_2$/km lower than in 2015 (1.3 %). Since the entry into force of the legislation, in 2009, the average $CO_2$ emissions have decreased by 27.6 g $CO_2$/km, by an average of 4 g $CO_2$/km per year.

The average $CO_2$ emissions have dropped for all engine technologies. Compared with 2015, the emissions decreased by 2.4 and 0.8 g $CO_2$/km respectively for diesel and petrol vehicles. The difference between the diesel and petrol fleets of new passenger cars has started to increase in the past few years, and in 2016 it increased to 4.9 g $CO_2$/km, almost reaching the same level as in 2007 (Table 3.1 and Figure 3.2).

The distribution of emissions and mass across the new passenger car fleet in five selected years (2005, 2010, 2015 and 2016) are shown in Figure 3.3. The emission distribution of newly registered cars has not changed significantly in the last 2 years. In this period, the largest group of cars emitted between 100 and 120 g $CO_2$/km (39.3 % in 2015 and 42.4 % in 2016). In 2010, the largest group emitted between 120 and 140 g $CO_2$/km. In 2016, around 20 % of newly registered vehicles emitted less than 100 g $CO_2$/km (0.5 % less than in 2015). While there was a big difference in terms of the emission performance of vehicles between 2005 and 2014, the mass distribution has changed little in the same period.

During 2012–2015, the progress made in the EU-13 was comparable to the progress made in the EU-15. Over this period, the average emissions in the EU-13

**Table 3.1 Average $CO_2$ emissions (g $CO_2$/km) from new passenger cars by fuel (EU)**

| | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 (a) | 2011 (a) | 2012 (a) | 2013 (a) | 2014 (a) | 2015 (a) | 2016 (a) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| All fuels | 172.2 | 169.7 | 167.2 | 165.5 | 163.4 | 162.4 | 161.3 | 158.7 | 153.6 | 145.7 | 140.3 | 135.7 | 132.2 | 126.7 | 123.4 | 119.5 | 118.1 |
| Petrol | 177.4 | 175.3 | 173.5 | 171.7 | 170.0 | 168.1 | 164.9 | 161.6 | 156.6 | 147.6 | 142.5 | 137.6 | 133.7 | 128.5 | 125.6 | 122.5 | 121.7 |
| Diesel | 160.3 | 159.7 | 158.1 | 157.7 | 156.2 | 156.5 | 157.9 | 156.3 | 151.2 | 145.3 | 139.3 | 134.5 | 131.5 | 126.9 | 123.2 | 119.2 | 116.8 |
| AFV (b) | 208.0 | 207.4 | 179.2 | 164.7 | 147.9 | 149.4 | 151.1 | 140.0 | 137.0 | 125.8 | 126.0 | 124.7 | 118.5 | 98.3 | 90.8 | 79.2 | 87.2 |

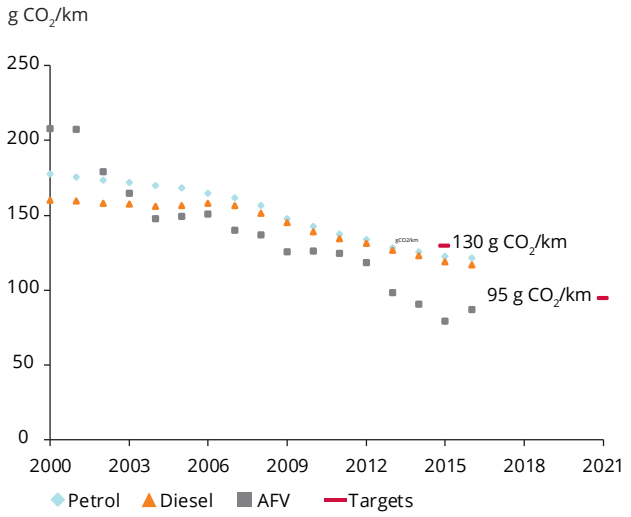
**Note:** (a) The calculation for the years 2010–2016 was done without considering out of scope vehicles.

(b) For the calculation of the average $CO_2$ emissions of AFVs, pure electric, liquefied petroleum gas vehicles (LPGs), natural gas vehicles (NG), ethanol (E85), biodiesel, and plug-in hybrid vehicles are all included.

(c) Fuel type is available for 95 % of the vehicle registrations in 2013.

The geographical scope of the data changes over time from EU-15 through EU-25 and EU-27 to EU-28; see Annex 1 for details.

**Figure 3.2 Average $CO_2$ emissions (g $CO_2$/km) from new passenger cars by fuel (EU)**




**Notes:** For the calculation of the average $CO_2$ emissions of alternative fuel vehicles, battery electric, liquefied petroleum gas, natural gas, E85, biodiesel and plug-in hybrid vehicles are all included.

The geographical scope of the data changes over time from EU-15 through EU-25 and EU-27 to EU-28; see Annex 1 for details.

decreased by 13.7 g $CO_2$/km, which is an average yearly reduction of 4.6 g $CO_2$/km. For the EU-15, the reduction in average $CO_2$ emissions over the same period was 12.7 g $CO_2$/km. In 2016, progress made in the EU-15 significantly slowed down to a 1.1 % reduction in emissions (3.1 % in 2015), while average emissions in the EU-13 continued to decrease at a similar pace as in 2015, i.e. 2.7 %.

In all EU Member States, except the Netherlands, the $CO_2$ emissions from newly registered passenger cars fell in 2016 compared with 2015. Figure 3.4 shows the absolute and percentage reductions by Member State between 2015 and 2016.

In 2016, only in Estonia were average $CO_2$ specific emissions from newly registered cars higher than the EU's 130 g $CO_2$/km target (Figure 3.5).

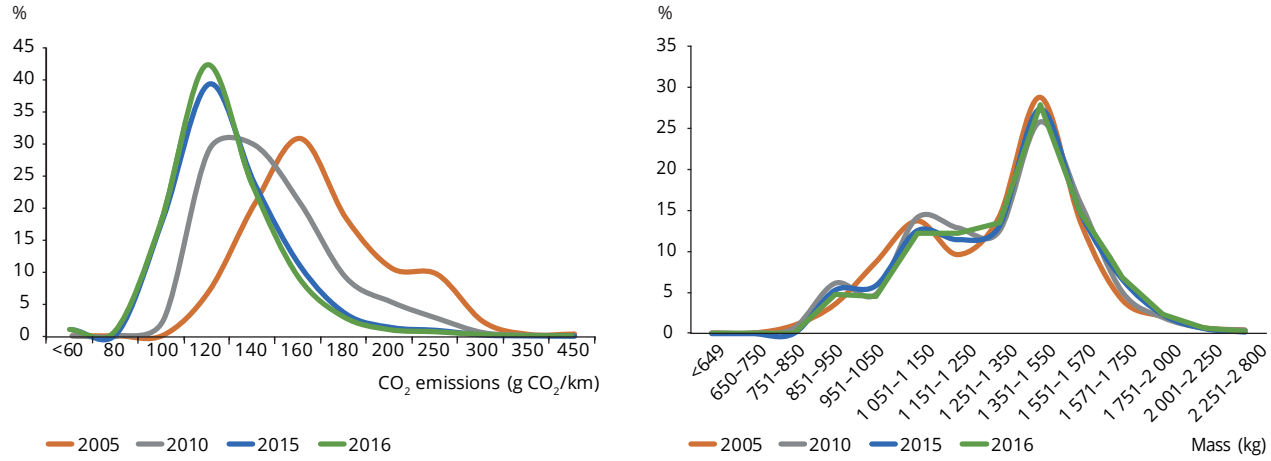
On average, the highest emitting cars were sold in Estonia and Latvia (133.9 and 128.9 g $CO_2$/km), followed by Germany (126.9 g $CO_2$/km). In 2016, Portugal (104.7 g $CO_2$/km) registered the lowest emitting new passenger car fleet. The Netherlands, Denmark and Greece followed, with average emissions of around 106 g $CO_2$/km.

In the Netherlands, the proportion of cars emitting less than 50 g $CO_2$/km (mainly battery electric, or BEVs, and plug-in hybrid electric vehicles, or PHEVs) is the highest in Europe (5.7 %). This has an important impact on the average emissions. Without the contribution of these low-emitting vehicles, the average $CO_2$ emissions in the Netherlands would be 110 g $CO_2$/km. In addition, the Netherlands has the lowest engine capacities in Europe, followed by Greece and Malta.

In Greece and Denmark, the low average emissions are mainly related to the registration of relatively small cars: the average mass of the new fleet of these countries is around 1 250 and 1 261 kg respectively. However, the lowest average mass is recorded in Malta (1 216 kg). In addition to this, the new fleet of Greece has the lowest average engine power in Europe.

The four best-performing Member States differed in the compositions of their new passenger car fleet: in the Netherlands and Denmark the majority of the new passenger car fleet is fuelled by petrol (75 % and 63 % respectively), while in Portugal and Greece diesel is the dominant fuel type (65 % and 55 % respectively). The percentage of diesel vehicles in the new passenger car fleet is even higher in Ireland (70 %). In contrast, less than 30 % of vehicles registered in the Netherlands and Estonia in 2016 were diesel vehicles.

**Figure 3.3** **Frequency distributions of (a) emissions and (b) mass of the vehicles registered in the EU-28 in 2005, 2010, and 2015–2016**




**Note:** 2005 data: data based on Decision 1753/2000 (EU, 2000).
2014–2016 data: data based on Regulation (EC) No 443/2009.

**Figure 3.4** **Absolute reduction and relative reduction (%) in specific emissions by Member State between 2015 and 2016**

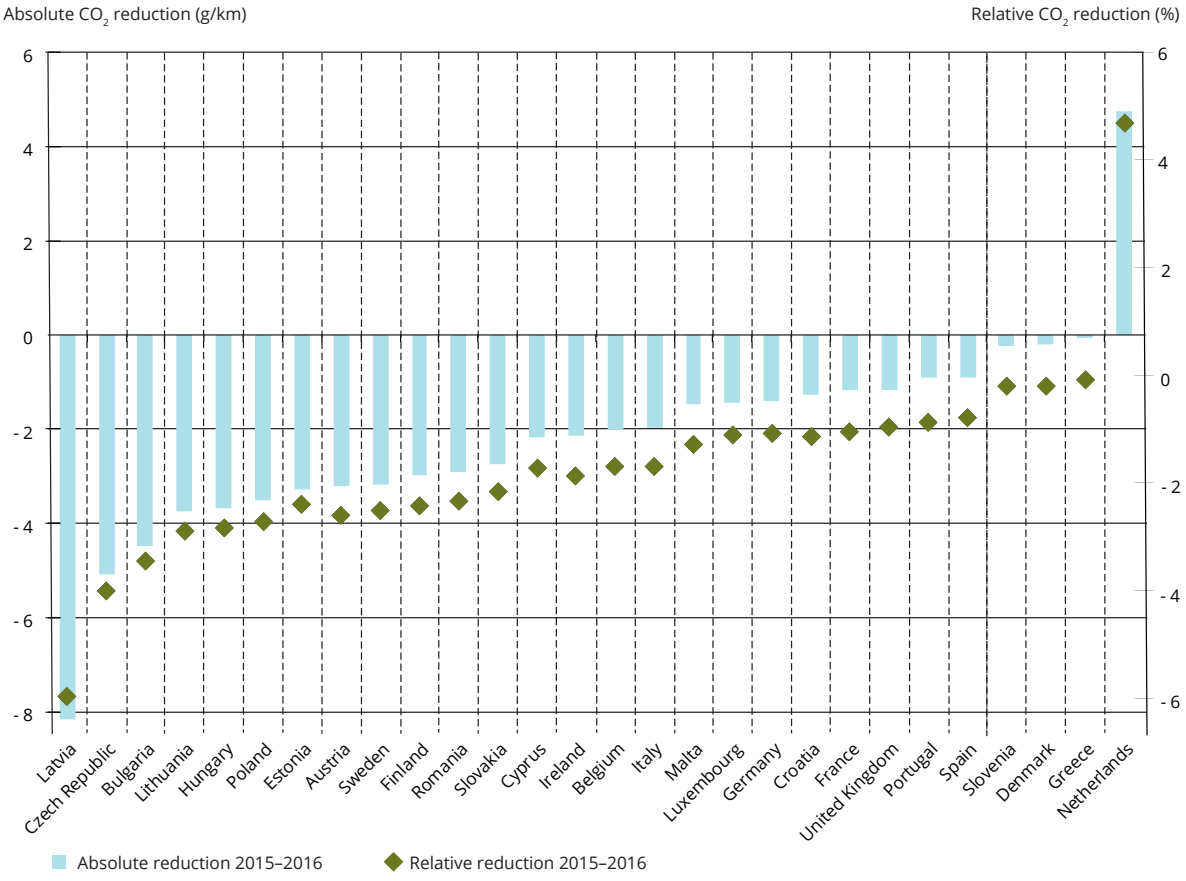
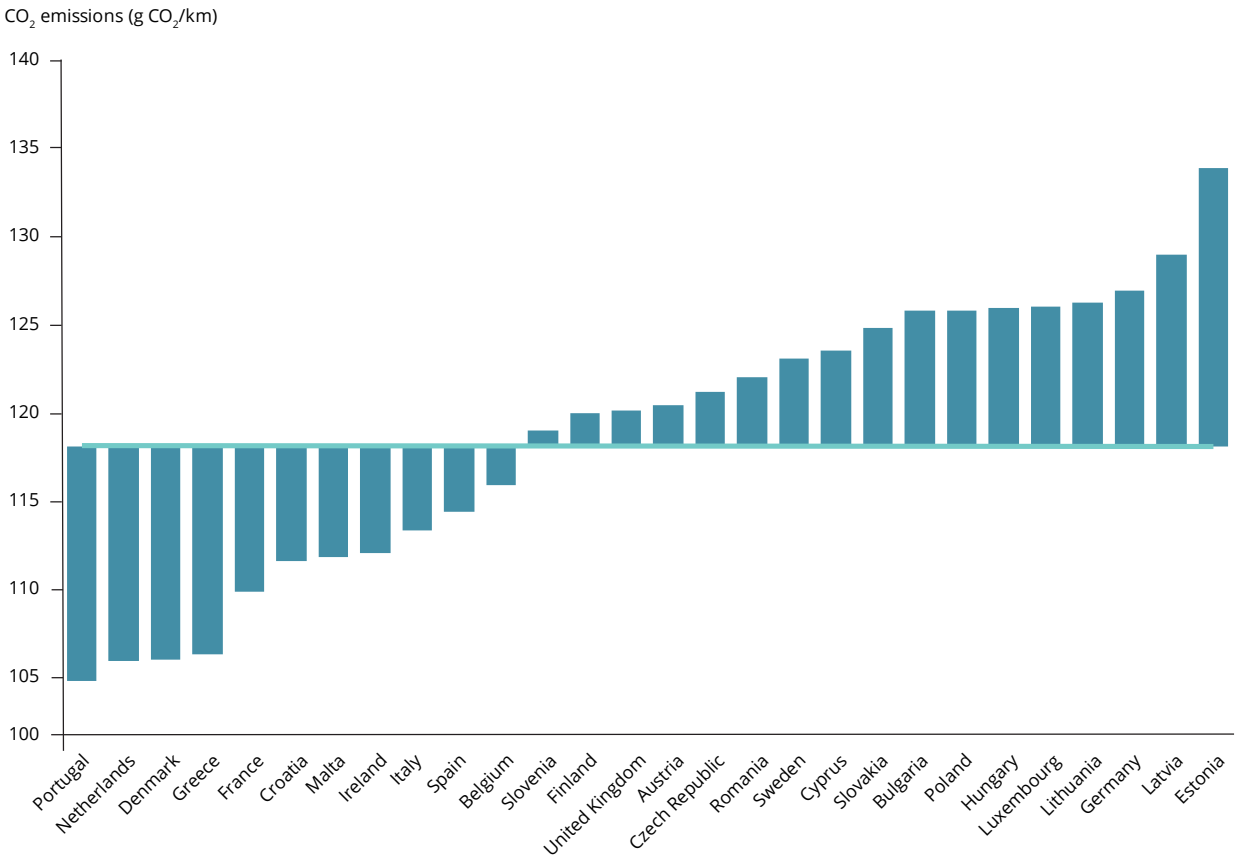


**Figure 3.5 Average $CO_2$ emissions by EU Member State in 2016 compared with the EU average (119.5 g $CO_2$/km)**




Latvia, the Czech Republic and Bulgaria recorded the largest relative reductions in $CO_2$ emissions compared with 2015, about 3.5–6 % on average.

Not surprisingly, the Member States with the highest numbers of vehicle registrations — France, Germany, Italy, Spain and the United Kingdom — are the major contributors to the absolute $CO_2$ emissions from newly registered passenger cars in the EU-28. Of these five, France, Italy and Spain have the lowest average $CO_2$ emissions. In Italy, for example, this is for a combination of reasons. Cars registered in Italy have on average the fifth lowest mass among the EU Member States and the second lowest engine power. In addition to this, Italy has a high proportion of small diesel cars (57 % of the vehicles are diesel cars and these have an average mass of 1 438 kg and average emissions of 111.8 g $CO_2$/km) and one of the highest proportions of alternative fuel vehicles (AFVs) (10 %). The latter are mainly liquefied petroleum gas (LPG) and natural gas (NG) cars (8 % of all new registrations) with average CO2 emissions of 117 and 99 g $CO_2$/km respectively.

In France, the large number of small diesel vehicles (average mass 1 430 kg) seems to be the main reason for the relatively low $CO_2$ emissions, as well as in Spain (1 464 kg). However, France has a relatively high proportion of BEVs (1.1 %) with zero emissions, which reduced the average emissions by more than 1 g $CO_2$/km.

At the other end of the scale, Germany has one of the highest average $CO_2$ emissions: its new passenger car fleet is significantly heavier, bigger and more powerful than the EU average (1 453 versus 1 385 kg, 1 717 versus 1 592 $cm^3$ and 109 versus 95 kW).

**Table 3.2 Average $CO_2$ emissions (g $CO_2$/km) from new passenger cars in the EU-13 and EU-15**

| | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EU-13 | | | | | | | | 157.8 | 156.8 | 154.2 | 148.2 | 144.1 | 140.9 | 135.8 | 131.0 | 127.2 | 123.7 |
| EU-15 | 172.2 | 169.7 | 167.2 | 165.5 | 163.7 | 162.6 | 161.5 | 158.8 | 153.3 | 145.2 | 139.9 | 135.1 | 131.6 | 126.1 | 122.8 | 119.0 | 117.6 |
| EU-28 | | | | | | | | 158.7 | 153.6 | 145.7 | 140.3 | 135.7 | 132.2 | 126.7 | 123.4 | 119.5 | 118.1 |

## 3.3 Overview by vehicle fuel types

As in the previous 6 years, in 2016 more diesel vehicles were sold than petrol ones. Diesel vehicles represent 49.5 % of the newly registered vehicle fleet compared with 55.2 % in 2011, the year in which the percentage of diesel vehicles reached its maximum (Table 3.3). The percentage of AFVs has increased in the last 5 years, reaching 3.2 %. Hybrid electric vehicles have been available in Europe since 2000, but registration numbers for these types of vehicle are not available in the officially reported statistics. Such vehicles are reported by Member States as petrol or diesel vehicles.

The registration of AFVs has been increasing substantially in recent years (Figure 3.6). This category accounted for only a few vehicles in 2000, but it exceeded half a million new vehicle registrations in 2009, before dropping to slightly below half a million in 2010. The registration of AFVs increased considerably in the last 3 years, by more than 70 %, after a significant drop between 2010 and 2011 (when registrations fell by 62 %).

On the basis of the monitoring data, it is possible to report $CO_2$ emissions for different fuel types used by AFVs (Table 3.4). It is noteworthy that the mix of vehicles in this category has changed over the years (NG, LPG, biodiesel, E85, BEVs and PHEVs are included in this category). This helps explain the high variability in the trend of emissions and other characteristics of the newly registered AFV fleet (Figure 3.2). In the early 2000s, AFVs were dominated by dual-fuel vehicles, i.e. vehicles mostly able to operate on petrol and ethanol blends. This trend gradually changed because of the introduction of LPG vehicles and NG vehicles, which have greatly outnumbered E85 cars.

**Table 3.3 Share of fuel type in new passenger cars (EU-28)**

| | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 [a] | 2011 [a] | 2012 [a] | 2013 [a] | 2014 [a] | 2015 [a] | 2016 [a] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Petrol | 68.9 | 64.0 | 59.2 | 55.5 | 51.9 | 50.7 | 49.4 | 47.3 | 47.4 | 51.1 | 45.3 | 43.4 | 43.0 | 45.1 | 44.3 | 45.4 | 47.3 |
| Diesel | 31.0 | 35.9 | 40.7 | 44.4 | 47.9 | 49.1 | 50.3 | 51.9 | 51.3 | 45.1 | 51.3 | 55.2 | 54.9 | 52.5 | 53.0 | 51.8 | 49.5 |
| AFV | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.3 | 0.3 | 0.7 | 1.3 | 3.8 | 3.5 | 1.4 | 2.2 | 2.4 | 2.7 | 2.8 | 3.2 |

**Note:** [a] The calculation for the 2010–2015 period was done considering vehicles in the scope of the regulation.

The geographical scope of the data changes over time from EU-15 through EU-25 and EU-27 to EU-28. See Annex 1 for details.

**Table 3.4 AFV data: number of registrations, $CO_2$ emissions, mass and engine capacity**

| | Registration | Average $CO_2$ emissions (g $CO_2$/km) | Average mass (kg) | Average engine capacity ($cm^3$) |
|---|---|---|---|---|
| E85 | 1 877 | 134.9 | 1 408 | 1 693 |
| Electric | 64 316 | 0.0 | 1 607 | - |
| LPG | 252 979 [c] | 121.2 | 1 222 | 1 343 |
| NG-biomethane | 57 257 | 100.4 | 1 285 | 1 209 |
| Petrol-electric | 87 335 | 45.9 | 1 861 | 1 786 |
| Diesel-electric | 6 372 | 48.9 | 2 255 | 2 678 |

**Note:** [a] Electric vehicles are vehicles for which tail-pipe emissions are 0 g $CO_2$/km.

[b] Some countries reported hybrids as plug-in hybrids. The overestimate is around 10 %.

Only exhaust emissions are considered. For electric monofuel vehicles the emission is null. For E85, only the petrol $CO_2$ emissions are reported; for LPG and NG-biomethane the respective LPG and compressed NG $CO_2$ emissions are reported.

**Figure 3.6 Trends in total registrations of AFVs, 2000–2016**

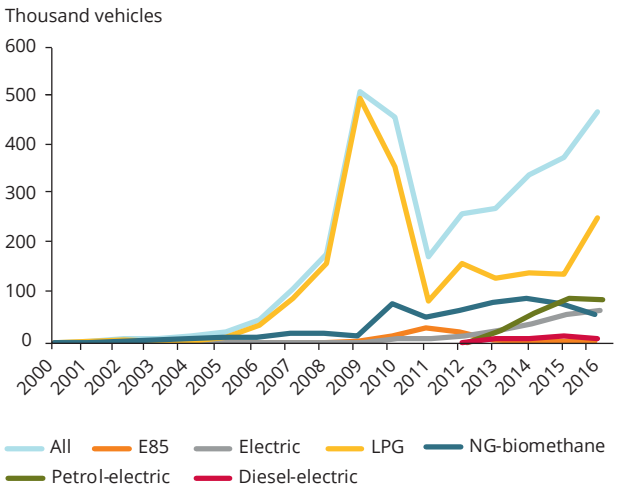
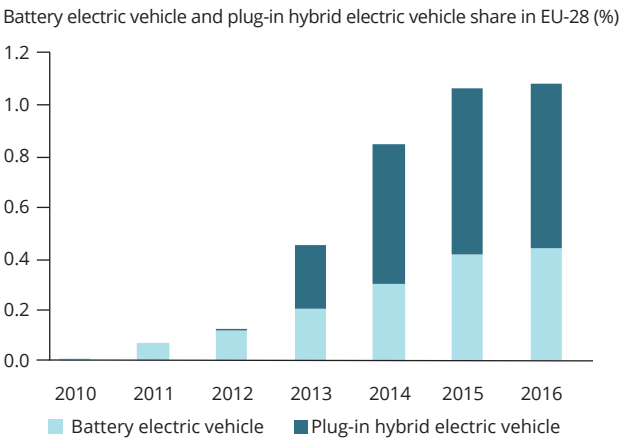



**Figure 3.7 Percentages of BEV and PHEV registrations in the EU-28**




The significant reduction in average $CO_2$ emissions from AFVs over the past few years (Figure 3.2) is not mainly the result of shifts in fuel composition and in engine type. In recent years, the increase in the number of BEVs and PHEVs has slightly contributed to the declining emission levels (Figure 3.7). BEVs are propelled by electric motors, using electrical energy stored in batteries or another energy storage device. The tail-pipe emissions of this kind of vehicle are considered to be 0 g $CO_2$/km.

In 2016, there were almost 7 600 more registrations of BEVs than in 2015, representing 0.44 % of the new passenger car fleet. PHEVs are also identified in the database. The average emissions of PHEVs are in general below 70 g $CO_2$/km. Registrations of PHEVs have increased greatly until 2015, however in 2016 remained broadly similar - approximately 90 000 ([14]) PHEVs were registered in Europe. Together with BEVs, they represent just 1.1 % of the new passenger car fleet.

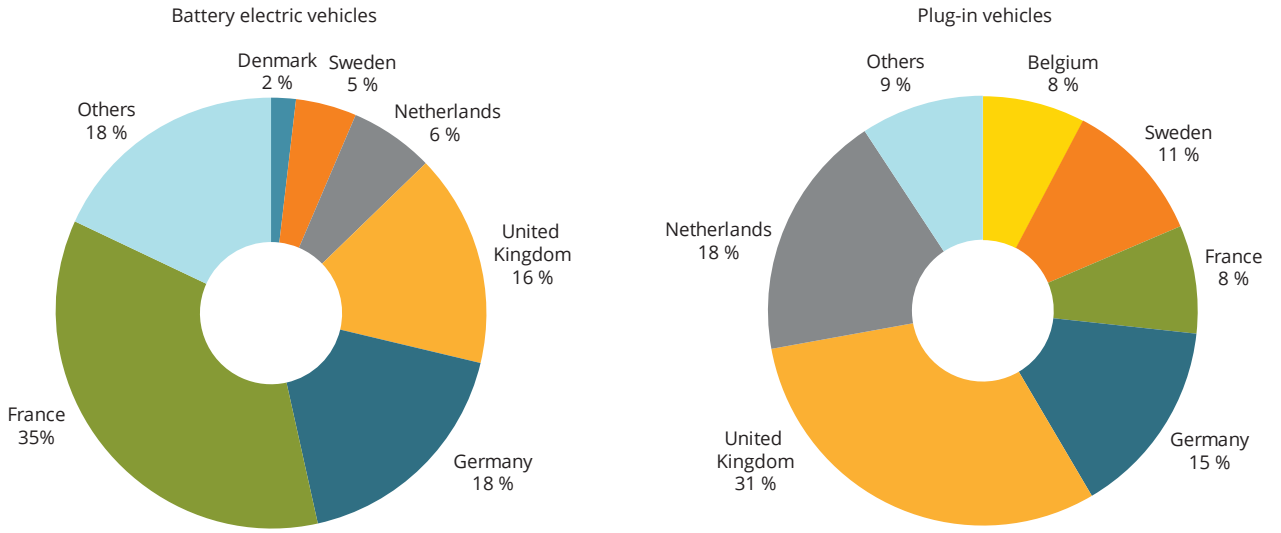
Registrations of BEVs in the EU-28 have increased in the last 6 years from around 700 in 2010 to around 65 000 in 2016. France (more than 22 700 vehicles), Germany (around 11 400 vehicles) and the United Kingdom (almost 10 200 vehicles) are the countries in which the increase in absolute numbers has been the highest in recent years (Figure 3.8). An increase in registrations of BEVs in 2016 was mainly due to sales in France and Austria. It is notable that Austria recently introduced various initiatives to support the use of electric cars, including tax reductions and exemptions. In 2016, the proportion of BEVs in the Austrian fleet doubled in comparison with 2015, and Austria became the country with the highest proportion of BEVs in the new passenger car fleet (1.2 %) in the EU-28.

The number of PHEVs has considerably increased in the United Kingdom: by around 9 300 vehicles to almost 28 700 vehicles registered in 2016. Significant increases in PHEVs have also been noted in Belgium and Sweden (around 4 700 and 4 400 vehicles respectively). Even with the decrease in PHEV registrations, the largest proportion of PHEVs still remains in the Netherlands (4.6 % of the new passenger car fleet).

Of the other types of AFVs, $CO_2$ emissions of LPG and NG vehicles (121 and 100 g $CO_2$/km respectively) have not been improving much, if compared with previous years. Ethanol-fuelled (E85) vehicles have the highest specific emissions (134.9 g $CO_2$/km). The change in these technologies is marginal compared with the previous year and the other technologies: in 2015, LPG and NG vehicles emitted respectively 120 and 99 g $CO_2$/km. Emissions from LPG cars are, on average,

([14]) This figure includes only vehicles correctly reported as PHEVs.

**Figure 3.8 BEVs (left) and plug-in vehicles (right) by Member States (% of EU-28 total)**




higher than those from diesel vehicles, even though their mass is significantly lower (1 222 kg for LPG cars, 1 532 kg for diesel cars).

## 3.4 Other car characteristics: mass and engine capacity

The average mass of new passenger cars registered in the EU-28 has slightly increased since 2015 (Table 3.5). In 2016, the mass of petrol vehicles increased by 1.3 %, while the mass of diesel vehicles remained almost stable (0.5 % increase). Since 2012, the difference in mass between petrol and diesel vehicles has been decreasing. The mass of AFVs varies over the years in relation to the composition of the new passenger car fleet.

The new car fleets of Sweden and Luxembourg were the heaviest, at 1 515 and 1 497 kg respectively (Annex 1). The lightest new cars were sold in Malta, Greece and Denmark (1 216, 1 250 and 1 261 kg respectively). Among the five largest Member States, Germany has the heaviest new passenger car fleet (1 453 kg) and Italy the lightest (1 307 kg).

Since 2004, the average mass has been quite stable, while $CO_2$ emissions have decreased significantly (45.4 g $CO_2$/km). Figure 3.9 shows the relation between average emissions and average mass changes according to fuel type. The average mass of petrol vehicles overall decreased, together with emissions, whereas the average mass of diesel vehicles increased while emissions decreased over the same period. The

**Table 3.5 Average mass (kg) of new passenger cars sold in 2016 by fuel**

| | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 (a) | 2013 (a) | 2014 (a) | 2015 (a) | 2016 (a) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| All fuels | 1 347 | 1 356 | 1 372 | 1 379 | 1 373 | 1 337 | 1 364 | 1 388 | 1 402 | 1 390 | 1 375 | 1 380 | 1 385 |
| Petrol | 1 237 | 1 235 | 1 238 | 1 235 | 1 228 | 1 206 | 1 214 | 1 220 | 1 224 | 1 218 | 1 207 | 1 214 | 1 229 |
| Diesel | 1 463 | 1 479 | 1 501 | 1 510 | 1 508 | 1 498 | 1 507 | 1 523 | 1 547 | 1 539 | 1 518 | 1 524 | 1 532 |
| AFV | 1 415 | 1 404 | 1 392 | 1 271 | 1 237 | 1 169 | 1 202 | 1 270 | 1 247 | 1 294 | 1 343 | 1 428 | 1 416 |

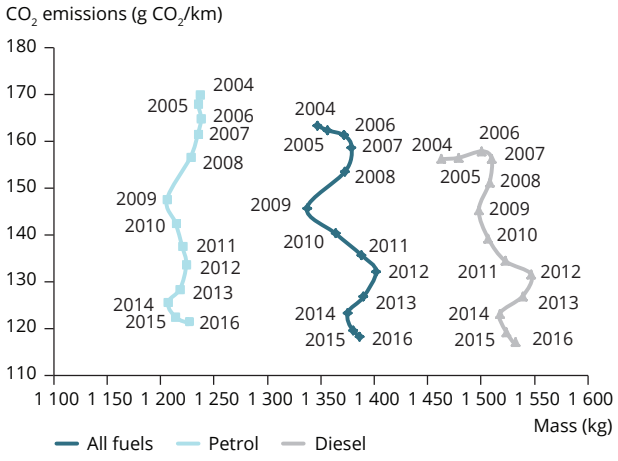
**Note:** (a) For the calculation of the average mass of AFVs, battery electric, LPGs, NG, E85, biodiesel and plug-in hybrid vehicles are all included. Data before 2004 are not shown because the data set is incomplete.

average mass of the new passenger car fleet increased for all fuel types between 2009 and 2012 (more for diesel cars than for petrol cars), followed by a slight decrease to 2014, and in 2016 increasing for the second year in a row.

There has been a slight decrease in average engine capacity in the last 5 years: the average engine capacity of new passenger cars in 2016 was 49 $cm^3$ less than in 2011. The difference between new diesel and petrol vehicles is around 439 $cm^3$, whereas in 2011 it was 372 $cm^3$. In the same period, engine power has increased from 86 to 95 kW.

For both petrol and diesel vehicles, an increase in engine power has been observed: in 2016, diesel vehicles had an average engine power of almost 104 kW, while for petrol vehicles it was around 87 kW. This means that manufacturers are producing more powerful cars (higher engine power in terms of kilowatts) even if they are using smaller engine capacities.

**Figure 3.9 $CO_2$ emissions versus vehicles' mass in the EU-28**




## 3.5 Average specific $CO_2$ emissions per manufacturer in 2016

Table 3.6 presents data (number of registrations, average mass and average emissions) for 2016 for all large manufacturers ([15]) individually, i.e. those that registered more than 100 000 vehicles in 2016. Manufacturers are ranked according to their 2016 average specific emissions (low to high). In total, these manufacturers sold 14 million new cars in the EU-28 in 2016, equivalent to 95 % of the total new registrations. The average emissions of each of those manufacturers in previous years (2010–2015) are also included in the table.

The proportion taken by the main brands has remained quite stable over the years. As in 2015, the most popular brand is Volkswagen, with 12 % of the cars registered in the EU, followed by Renault (8 %), and Ford, Adam Opel and BMW (7 % each).

The average $CO_2$ emissions of the large manufacturers were 117.1 g $CO_2$/km, i.e. 1.0 g $CO_2$/km lower than the average of the total new registrations.

For the last 2 years in a row, 20 large manufacturers had average emissions below 130 g $CO_2$/km, whereas in 2014 only 16 manufacturers were below this value. Thirteen of these 20 manufacturers had average emissions below 120 g $CO_2$/km and four of them had average emissions below 110 g $CO_2$/km. The average emissions of these large manufacturers varied from 101.7 g to 149.8 g $CO_2$/km.

Automobiles Peugeot and Automobiles Citroën remain the lowest emitters among large passenger car manufacturers. In 2016, they improved their performance by 2 and 2.5 g $CO_2$/km respectively. One of the reasons for the improvement is a decrease in the registrations of high-emitting passenger cars: in 2015, 5 % of the Automobiles Peugeot and 7 % of the Automobiles Citroën new passenger car fleet were emitting more than 130 g $CO_2$/km, whereas, in 2016, it was only 1.9 and 2.3 % respectively.

The average mass of the new passenger car fleet of these manufacturers also decreased, as a result of the increased proportion of lighter petrol-fuelled vehicles. Despite this, diesel vehicles remain dominant, and the proportion of petrol-fuelled vehicles increased from 39 % to 45 % for Automobiles Peugeot and from 40 % to 48 % for Automobiles Citroën. In 2016, Automobiles Peugeot had the lowest emitting diesel vehicles among all car manufacturers (99 g $CO_2$/km on average).

Jaguar Land Rover Limited and Chrysler (FCA US LLC) significantly improved their performance compared with 2015; however, they are the manufacturers with the highest average $CO_2$ emissions among these 20 large manufacturers. This is mainly related to the improved performances of the conventional vehicles. The percentages of vehicles emitting less than 130 g $CO_2$/km were 13 % and 23 % in 2015, and

([15]) In this report large manufacturers are those that are responsible for more than 100 000 registrations a year, while in Regulation (EC) No 443/2009 large manufacturers are those responsible for more than 300 000 registrations a year.

**Table 3.6 Main statistics for large car manufacturers (more than 100 000 vehicle registrations per year)**

| Manufacturer | Registrations 2016 [a] | Average mass (kg) 2016 | Average $CO^2$ emissions (g $CO^2$/km) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
| Automobiles Peugeot | 889 060 | 1 247 | 131 | 128 | 121 | 115 | 110 | 104 | 102 |
| Automobiles Citröen | 614 699 | 1 235 | 131 | 126 | 123 | 113 | 111 | 106 | 103 |
| Renault SAS | 1 128 509 | 1 288 | 134 | 129 | 121 | 110 | 108 | 106 | 105 |
| Toyota Motor Europe NV SA | 616 226 | 1 323 | 129 | 126 | 122 | 116 | 113 | 108 | 105 |
| Hyundai Assan Otomotiv Sanayi ve [b] | 164 974 | 1 081 | - | - | - | 112 | 113 | 114 | 112 |
| Nissan International SA | 550 095 | 1 379 | 147 | 142 | 137 | 131 | 115 | 115 | 117 |
| Skoda Auto AS | 627 539 | 1 281 | 139 | 135 | 132 | 125 | 121 | 116 | 112 |
| Fiat Group Automobiles SPA | 768 863 | 1 161 | 125 | 118 | 117 | 116 | 116 | 116 | 116 |
| Seat SA | 340 156 | 1 260 | 131 | 125 | 127 | 119 | 117 | 117 | 116 |
| Ford-Werke GmbH | 1 010 775 | 1 363 | 137 | 132 | 129 | 122 | 121 | 118 | 118 |
| Volkswagen AG | 1 651 375 | 1 397 | 140 | 135 | 133 | 127 | 124 | 119 | 119 |
| Magyar Suzuki Corporation Ltd | 137 789 | 1 186 | 137 | 128 | 128 | 126 | 123 | 120 | 121 |
| Kia Motors Corporation [c] | 250 717 | 1 342 | 143 | 137 | 129 | 128 | 125 | 122 | 120 |
| Volvo Car Corporation | 270 867 | 1 734 | 157 | 151 | 142 | 131 | 126 | 122 | 121 |
| Automobile Dacia SA | 414 892 | 1 200 | 145 | 143 | 137 | 127 | 125 | 123 | 117 |
| Daimler AG | 910 390 | 1 581 | 160 | 153 | 143 | 137 | 131 | 125 | 125 |
| Bayerische Motoren Werke AG | 973 617 | 1 570 | 146 | 144 | 138 | 134 | 131 | 126 | 122 |
| Mazda Motor Corporation | 219 859 | 1 324 | 149 | 147 | 142 | 134 | 128 | 127 | 127 |
| Adam Opel AG | 968 429 | 1 341 | 140 | 134 | 133 | 132 | 130 | 127 | 123 |
| Audi AG | 784 147 | 1 583 | 152 | 145 | 138 | 133 | 131 | 127 | 125 |
| FCA US LLC | 104 390 | 1 664 | 215 | 192 | 193 | 195 | 182 | 159 | 147 |
| Hyundai Motor Manufacturing Czech SRO [b] | 245 617 | 1 479 | - | - | - | 138 | 140 | 135 | 131 |
| Kia Motors Slovakia SRO [c] | 171 007 | 1 453 | - | - | - | 140 | 141 | 138 | 132 |
| Jaguar Land Rover Limited [d] | 225 227 | 1 953 | - | - | - | 182 | 178 | 164 | 150 |

**Note:** [a] These are total number of registrations in the EU-28, not the registrations used for the calculation of the target and of the average emissions (see Annex 1).

[b] In previous years Hyundai appeared as a single manufacturer.

[c] In previous years Kia appeared as a single manufacturer (Kia Motors Corporation).

[d] In previous years Jaguar and Land Rover appeared as two separate manufacturers.

they increased to 25 % and 33 % in 2016 for Jaguar Land Rover Limited and Chrysler respectively. The new passenger car fleets of both manufacturers are strongly led by heavier diesel vehicles that represent around 93 % and 81 % of their new passenger car fleets. However, these two manufacturers decreased the average mass of their passenger cars by 43 kg and 113 kg respectively, which also contributed to the lower emissions. Since 2010, Chrysler has been the manufacturer with the most significant reduction in average $CO_2$ emissions (by 68 g $CO_2$/km — from 215 g $CO_2$/km in 2010 to 146.7 g $CO_2$/km in 2016).

Over the last 4 years, Renault's average emissions decreased by almost 16 g $CO_2$/km. In 2016, 94 % of Renault vehicles emitted less than 130 g $CO_2$/km, and 31 % of those vehicles emitted less than 95 g $CO_2$/km (see Figure 3.12). Almost 2 % of the Renault new passenger car fleet was BEVs; they contributed to reducing the average $CO_2$ emissions by 2 g $CO_2$/km. Diesel vehicles were around 56 % of the Renault new passenger car fleet (slight decrease from the previous year), with average emissions of 99.7 g $CO_2$/km, one of the lowest among all car manufacturers.

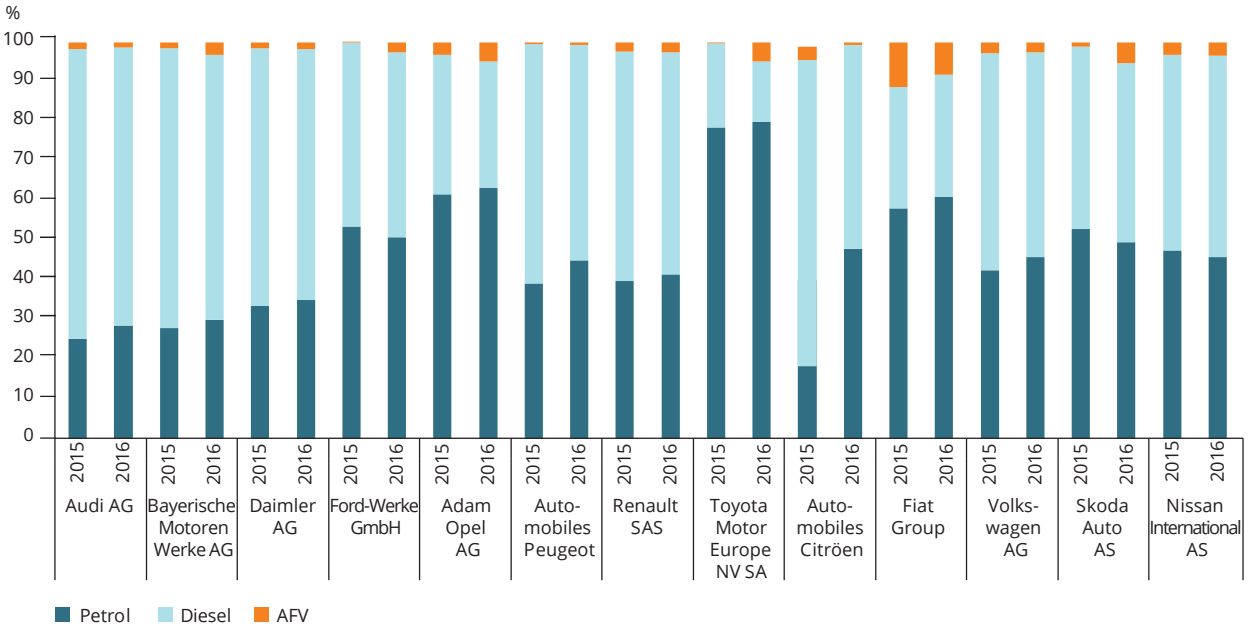
Toyota Motor Europe continued to increase its production of low-emitting vehicles in the new car fleet, as around 44 % of its new passenger car fleet had emissions below 95 g $CO_2$/km. The Toyota Motor Europe fleet of new passenger cars comprised 75 % petrol vehicles, with the lowest average emissions (103.4 g $CO_2$/km) of the large manufacturers. This was mainly related to the high proportion of hybrid vehicles emitting between 75 and 100 g $CO_2$/km.

For both Skoda and Hyundai Assan, average $CO_2$ emissions were 116 g $CO_2$/km. In 2016, Skoda reduced its emissions by 3.6 g $CO_2$/km, while the average mass remained quite stable. Skoda has kept increasing its proportion of vehicles emitting less than 130 g $CO_2$/km from 84 % to 90 %. Hyundai Assan decreased its average $CO_2$ emissions by 1.5 g $CO_2$/km and, after a slight increase in average $CO_2$ emissions in the last 2 years, it returned to its 2013 level. As in the last 2 years, Hyundai Assan had the lowest mass among the group (1 081 kg) and the highest percentage of petrol vehicles (88 %). In addition, Hyundai Assan diesel vehicles are the smallest and one of the lowest emitting among all car manufacturers.

For both Seat and Fiat, the average emissions were 116 g $CO_2$/km and they improved slightly by less than 1 g $CO_2$/km in 2016. The average mass of cars from both manufacturers remained almost stable: as in previous years, in 2016, Fiat had one of the lowest average masses among the large manufacturers (1 161 kg) and Seat slightly increased its average mass by 12 kg to 1 260 kg. The fleets of new passenger cars from Seat and Fiat remained petrol dominated, and the proportions of petrol-fuelled vehicles increased from 57 % to 62 % and from 58 % to 61 % respectively. The proportion of AFVs in Fiat's fleet of new passenger cars is 8 %, but it is mainly composed of those vehicles that run on LPG and NG. On average, NG vehicles emitted 98 g $CO_2$/km while LPG vehicles emitted 115 g $CO_2$/km, around 5.7 g $CO_2$/km less than petrol vehicles and 6.5 g $CO_2$/km more than diesel vehicles (108.5 g $CO_2$/km). Fiat's performance did not significantly improve in 2016: its vehicles emitted on average 116 g $CO_2$/km, the same emission level since 2013 and only 1 g $CO_2$/km less than in 2012.

After significant improvements in 2013 and 2014, and stabilisation of its emission levels in 2015, Nissan increased its average $CO_2$ emissions. Registration of vehicles emitting more than 130 g $CO_2$/km increased from 18 % to 25 %, and it caused an increase in average $CO_2$ emissions of 1.6 g $CO_2$/km to 117 g $CO_2$/km in 2016. The average mass of Nissan cars also fluctuated: from a peak in 2013 (1 399 kg), it decreased to 1 351 kg in 2014 and has kept increasing since to 1 379 kg in 2016. This might be the result of a change in the proportion of heavier diesel vehicles in the new passenger car fleet: it increased from 49 % in 2015 to 51 % in 2016.

**Figure 3.10 Fuel type for the largest manufacturers (more than 500 000 vehicle registrations per year)**



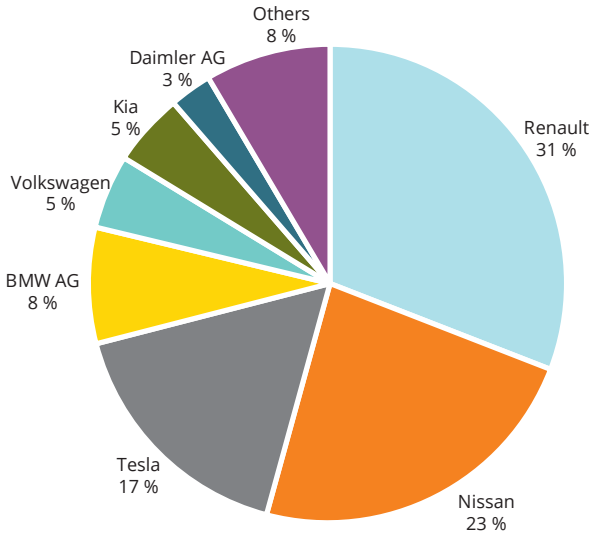

The majority of large manufacturers reduced their average emission levels in 2016. The largest reductions were achieved by Jaguar Land Rover Limited (14.2 g $CO_2$/km) and Chrysler (12.1 g $CO_2$/km). They were followed by Dacia with a decrease of 5.3 g $CO_2$/km. Dacia, accompanied by Kia, crossed the threshold of 120 g $CO_2$/km and reached 117 and 119.7 g $CO_2$/km respectively. Since 2009, when the car emission legislation came into force, the greatest decreases among the largest manufacturers have been recorded for Volvo, Daimler AG and Nissan (51.8 g, 41.8 g and 37.6 g $CO_2$/km respectively). The difference between the highest and lowest emitting car manufacturers has decreased significantly in recent years: from 90.2 g $CO_2$/km in 2010 to 48 g $CO_2$/km in 2016.

As a general observation, diesel vehicles continue to dominate in the total new passenger car fleet ([16]) in 2016. For only 5 out of the 13 large manufacturers, the proportion of diesel vehicles in 2016 was lower than 50 %: Ford Werke (46.7 %), Dacia (45.4 %), Skoda (45.1 %), Opel (31.9 %), Fiat (30.7 %) and Toyota (14.4 %). However, Automobiles Citroën, Automobiles Peugeot and Toyota were the manufacturers that most significantly reduced the proportion of diesel vehicles in the new passenger car fleet last year (by 6-7 %).

Despite the increasing trend, the proportion of AFVs remains low in absolute terms, and hence it has not significantly contributed to the observed reductions in emissions. However, in 2016, the contribution of AFVs became important for some manufacturers, accounting for more than 5 % of registrations for Fiat, Dacia and Kia (Figure 3.11). The majority of electric vehicles registered in the EU are produced by Renault (around 19 800), Nissan (almost 15 000), 31 % and 23 % of BEVs registered in 2016 respectively (Figure 3.11).

([16]) Diesel vehicles generally emit more air pollutants per kilometre than their conventional petrol equivalents. This is particularly true for emissions of black carbon, which has impacts on health and the climate, but also for particulate matter (PM) and nitrogen oxides ($NO_x$). See the EMEP/EEA air pollutant emission inventory guidebook 2016 (http://www.eea.europa.eu/publications/emep-eea-guidebook-2016).

**Figure 3.11 Registrations of alternative fuel vehicles (AFVs)**




The distribution of registrations over different emission classes (Figure 3.12) shows that for some manufacturers (i.e. Volvo, Nissan, Renault and BMW AG) the market for cars emitting less than 50 g $CO_2$/km is increasing. However, for each of those manufacturers, the percentage of electric vehicles is lower than 3.2 %. For Toyota and Renault, the percentage of vehicles emitting less than 95 g $CO_2$/km are relatively high at 44 % and 32 % respectively. Vehicles with emissions below 130 g $CO_2$/km account for the largest proportion of registrations for all the large manufacturers (74 % on average). For only a few manufacturers in this group (Jaguar Land Rover Limited, Chrysler, Kia and Motors Slovakia SRO), the large majority of the vehicles sold emit more than 130 g $CO_2$/km.

## 3.6 Distance to the 2016 targets

The distance of manufacturers from their specific emission targets is calculated by considering the average emissions of their entire new car fleet (no phase-in since 2015), while taking into account the modalities listed in Chapter 2 (super-credits and eco-innovations), as well as applicable derogations.

Some manufacturers fall within the scope of the de minimis threshold, according to which, manufacturers with fewer than 1 000 registrations are exempt from achieving a specific emission target. In total, 26 manufacturers with fewer than 4 430 vehicles registered in 2016, i.e. fewer than 0.03 % of all registrations, benefited from the de minimis exemption. The data are available in Annex 2.

Based on their average $CO_2$ emissions in 2016, the other 66 manufacturers out of all 92 achieved their targets.

Figure 3.13 shows the distance to target for the manufacturers that registered more than 100 000 vehicles in 2016. Some manufacturers that would have missed their specific emission targets as individual manufacturer have met their obligations as members of a pool. This was the case, for example, for Audi Hungaria (VW Group PC pool) and Chrysler (FCA Italy SPA pool). In addition, the Suzuki pool and the Tata and Jaguar Land Rover pool benefited from niche derogations (see Chapter 2).

The distance to the target varies between 4.3 g $CO_2$/km above target for Chrysler and 28.2 g $CO_2$/km below target for Jaguar Land Rover Limited (Figure 3.13). All relevant data are included in Annex 1.

As explained in Chapter 2, the limit value curve implies that heavier cars are allowed higher emissions than lighter cars. As a result, the specific $CO_2$ emission targets range from 116 to 178 g $CO_2$/km.

The distance to target for pools of manufacturers is presented in Table 3.7. In 2016, all the pools achieved their specific emission targets. However, the distributions of emissions are different in the different pools.

**Figure 3.12 Percentage of registrations in different specific emission classes**


## 3.7 Excess emission premiums

If a manufacturer's or a pool's average specific $CO_2$ emissions exceed the specific emission target, Regulation (EC) No 443/2009 requires the payment of an excess emission premium. This premium is calculated by multiplying the following three elements:

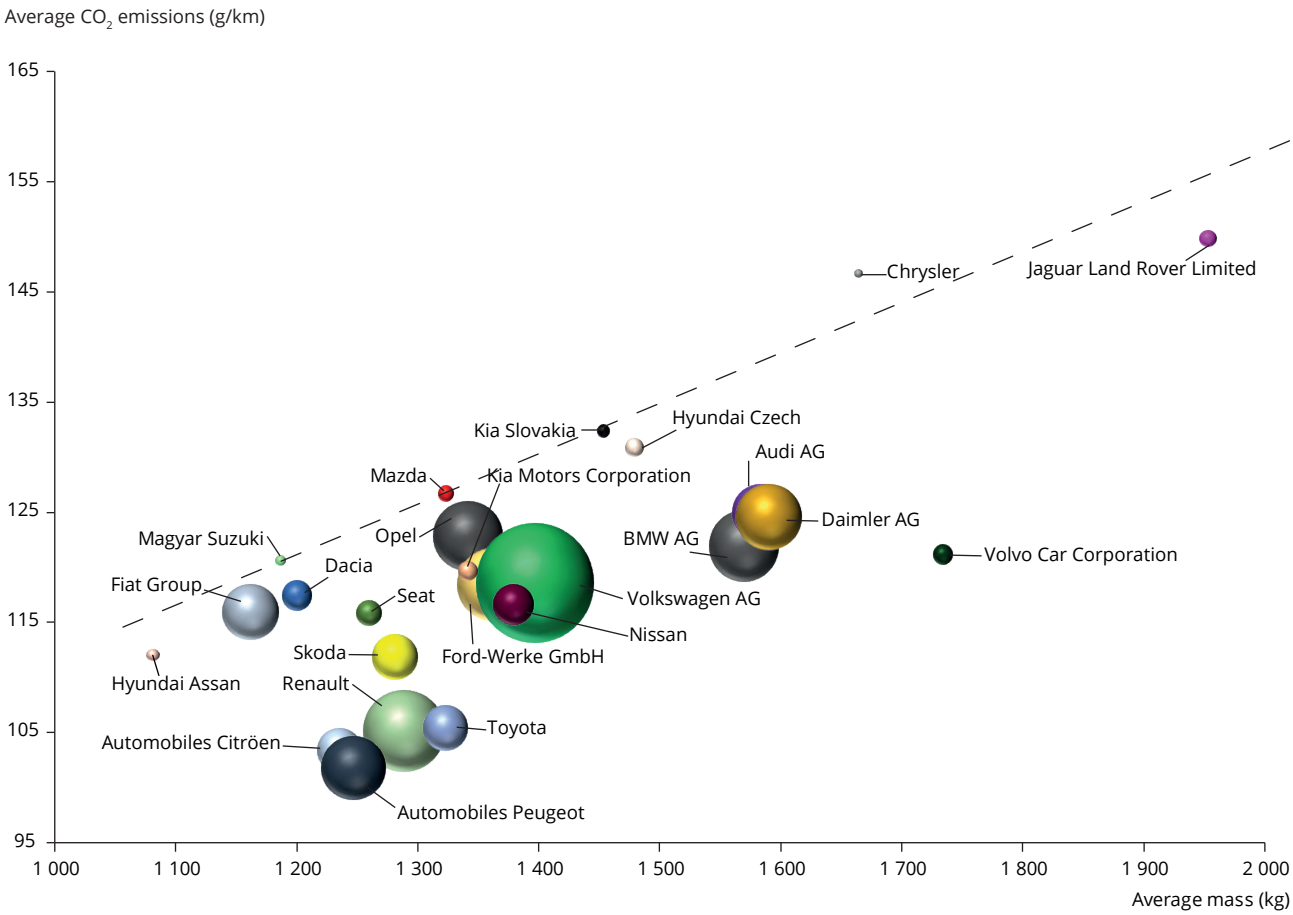
- the distance to the emission target in a given year (in g $CO_2$/km), i.e. the excess emissions;
- the number of vehicles registered by the manufacturer during that year;
- the premium level included in Table 3.8.

The premium amounts to EUR 5 for the first gram of $CO_2$/km of exceedance, EUR 15 for the second, EUR 25 for the third and EUR 95 for each subsequent gram. A greater distance to the target therefore implies a higher excess premium per gram of $CO_2$/km emitted.

For example, if a manufacturer registers 100 000 vehicles in the EU, the formula to be used for calculating the excess emission premium varies depending on the distance to the target as follows:

- if the distance to the target is 0.5 g $CO_2$/km, the first formula in Table 3.8 applies, and the excess emission premium = 0.5 * 5 * 100 000 = EUR 250 000;

**Figure 3.13 Distance to 2016 target by individual manufacturers registering more than 100 000 vehicles per year**

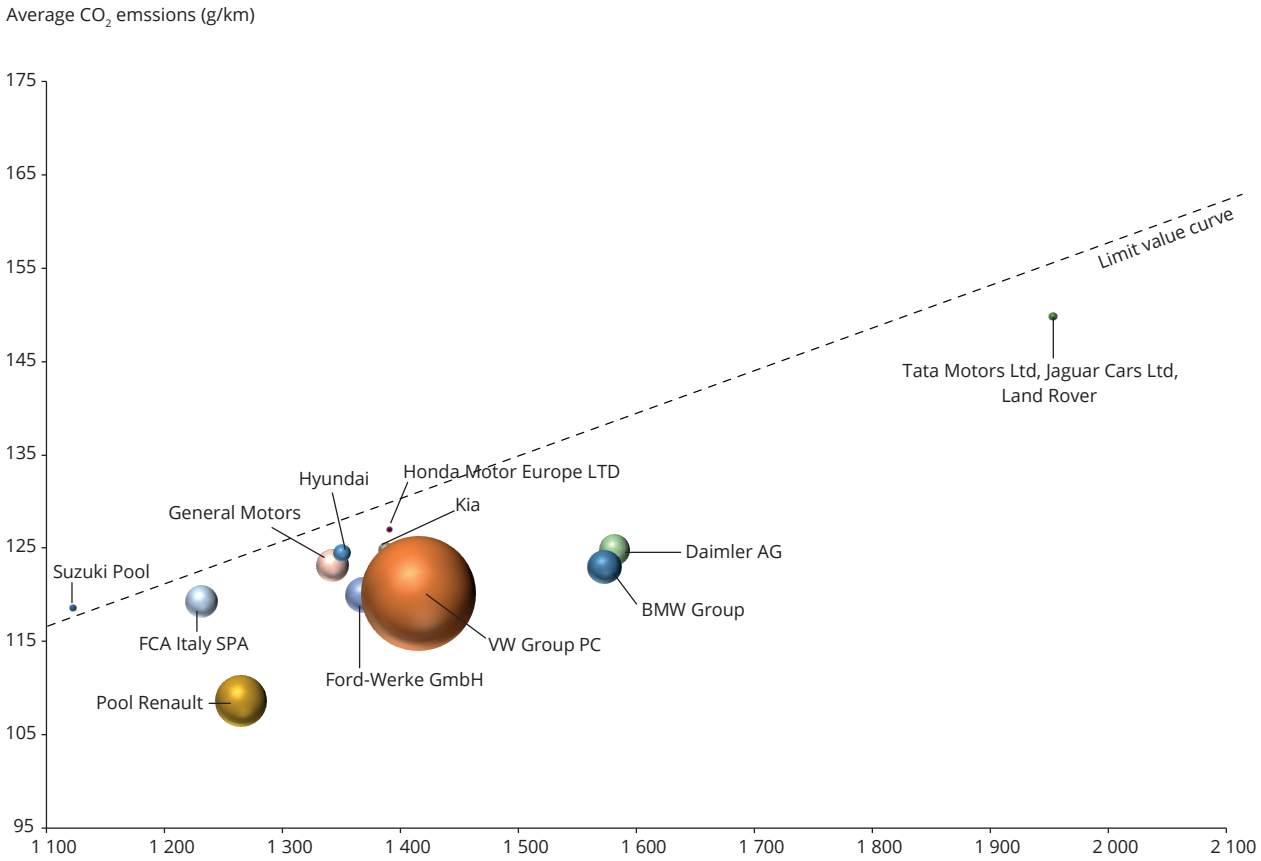



**Note:** The size of the bubble is proportional to the number of vehicles registered in the EU-28.

- if the distance to the target is 1.5 g $CO_2$/km, the second formula in Table 3.8 applies and the excess emission premium = (1 * 5 + (1.5 – 1) * 15) * 100 000 = EUR 1 250 000;
- if the distance to the target is 2.5 g $CO_2$/km, the third formula in Table 3.8 applies and the excess emission premium = (1 * 5 + 1 * 15 + (2.5 – 2) * 25) * 100 000 = EUR 3 250 000;
- if the distance to the target is 3.5 g $CO_2$/km, the fourth formula in Table 3.8 applies and the excess emission premium = (1 * 5 + 1 * 15 + 1 * 25 + (3.5 – 3) * 95) * 100 000 = EUR 9 250 000.

In 2016, no manufacturers will be required to pay the excess emission premium (see Annex 2).

## Figure 3.14 Distance to 2016 target by pools




**Note:** The size of the bubble is proportional to the number of vehicles registered in the EU-28.

## Table 3.7 Distance to target for the pools in 2016

| Pool | Manufacturer | Average emissions (g $CO_2$/km) | Target (g $CO_2$/km) | Distance to target (g $CO_2$/km) |
|---|---|---|---|---|
| | Bayerische Motoren Werke AG | 122 | 138 | – 16 |
| | BMW M GmbH | 176 | 144 | 32 |
| | Rolls-Royce Motor Cars Ltd | 334 | 183 | 151 |
| BMW Group | | 123 | 138 | – 15 |
| | Daimler AG | 125 | 139 | – 14 |
| | Mercedes-AMG GmbH | 220 | 141 | 79 |
| Daimler AG | | 125 | 139 | – 14 |
| | Alfa Romeo SPA | 115 | 128 | – 13 |
| | FCA US LLC | 147 | 142 | 4 |
| | FCA Italy SPA | 116 | 119 | – 3 |
| FCA Italy SPA | | 119 | 123 | – 3 |
| | CNG-Technik GmbH | 163 | 138 | 25 |
| | Ford-Werke GmbH | 118 | 129 | – 10 |
| | Ford Motor Company | 217 | 149 | 68 |
| | Ford Motor Company of Australia Ltd | 206 | 174 | 32 |
| | Ford India Private Limited | 114 | 115 | – 1 |
| Ford-Werke GmbH | | 120 | 129 | – 9 |
| | Mitshubishi Motors Corporation MMC | 125 | 140 | – 15 |
| | Mitshubishi Motors Thailand Co Ltd MMTH | 96 | 109 | – 12 |
| Mitshubishi Motors | | 118 | 132 | – 14 |

## Table 3.7 Distance to target for the pools in 2016 (cont.)

| Pool | Manufacturer | Average emissions (g $CO_2$/km) | Target (g $CO_2$/km) | Distance to target (g $CO_2$/km) |
|---|---|---|---|---|
| | General Motors Company | 266 | 151 | 114 |
| | General Motors Holdings LLC | 267 | 152 | 115 |
| | GM Korea Company | 122 | 124 | – 3 |
| | Chevrolet Italia SPA | 116 | 120 | – 4 |
| | Adam Opel AG | 123 | 128 | – 5 |
| General Motors | | 123 | 128 | – 5 |
| | Honda Automobile China Co Ltd | 129 | 119 | 10 |
| | Honda Motor Co Ltd | 117 | 123 | – 6 |
| | Honda of the UK Manufacturing Ltd | 135 | 135 | – 1 |
| | Honda Turkiye AS | 155 | 125 | 29 |
| Honda Motor Europe Ltd | | 127 | 130 | – 3 |
| | Hyundai Motor Manufacturing Czech SRO | 131 | 134 | – 3 |
| | Hyundai Assan Otomotiv Sanayi ve Ticaret AS | 112 | 116 | – 4 |
| | Hyundai Motor Company | 131 | 136 | – 4 |
| | Hyundai Motor India Ltd | 115 | 118 | – 4 |
| | Hyundai Motor Europe GmbH | 109 | 117 | – 8 |
| Hyundai | | 125 | 128 | – 4 |
| | Kia Motors Corporation | 120 | 128 | – 8 |
| | Kia Motors Slovakia SRO | 132 | 133 | 0 |
| Kia | | 125 | 130 | – 5 |
| | Avtovaz JSC | 180 | 120 | 60 |
| | Automobile Dacia SA | 117 | 121 | – 4 |
| | Renault SAS | 105 | 125 | – 20 |
| Renault | | 109 | 124 | – 16 |
| | Magyar Suzuki Corporation Ltd | 121 | 123 | – 3 |
| | Maruti Suzuki India Ltd | 100 | 123 | – 23 |
| | Suzuki Motor Corporation | 156 | 123 | 33 |
| | Suzuki Motor Thailand Co Ltd | 97 | 123 | – 26 |
| Suzuki | | 119 | 123 | – 5 |
| | Jaguar Land Rover Limited | 150 | 178 | – 28 |
| | Tata Motors Limited | 150 | 178 | – 28 |
| Tata Motors Ltd, Jaguar Cars Ltd , Land Rover | | 150 | 178 | – 28 |
| | Audi AG | 125 | 139 | – 14 |
| | Audi Hungaria Motor KFT | 145 | 130 | 15 |
| | Bugatti Automobiles SAS | 568 | 157 | 411 |
| | Dr Ing HCF Porsche AG | 185 | 153 | 32 |
| | Quattro GmbH | 215 | 147 | 67 |
| | Seat SA | 116 | 124 | – 8 |
| | Skoda Auto AS | 112 | 125 | – 13 |
| | Volkswagen AG | 119 | 130 | – 12 |
| VW Group PC | | 120 | 131 | – 11 |

## Table 3.8 Coefficients to be used in the formula for calculating excess emissions premium

| Excess emissions (g $CO_2$/km) | Fine (EUR) | | | | Number of vehicles | Formula for calculating excess emission premium (EUR) |
|---|---|---|---|---|---|---|
| | 5 | 15 | 25 | 95 | | |
| 0–1 | (EE) | - | - | - | NV | ((EE) * 5)*NV |
| 1–2 | 1 | (EE — 1) | - | - | NV | (1*5 + (EE-1)*15)*NV |
| 2–3 | 1 | 1 | (EE — 2) | - | NV | (1*5 + 1*15 + (EE-2)*25)*NV |
| > 3 | 1 | 1 | 1 | (EE — 3) | NV | (1*5 + 1*15 + 1*25 + (EE-3)*95)*NV |

**Note:** EE, distance to target or excess emission; NV, number of vehicles registered.

# 4 Light commercial vehicles (vans)

## 4.1 Number of new registrations

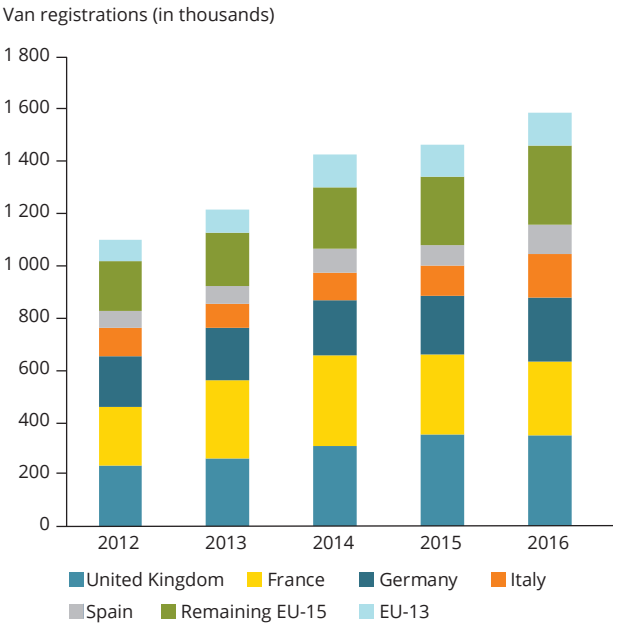
In 2016, there were around 1.6 million new light commercial vehicle registrations in the EU-28 (around 10 % of the total light-duty vehicles ([17]). This includes around 6 600 IVAs ([18]), 8 400 vehicles approved under NSS rules, 2 800 unknown vehicles ([19]) and 1 600 unidentified vehicles ([20]).

It should be noted that there are uncertainties in both the 2012 and 2013 data sets, mainly due to the difficulty experienced by Member States in the monitoring of multi-stage vans ([21]). These uncertainties were reduced by the new monitoring system, based on VINs, in place from 2015 with effect from the 2014 data collection.

For almost all Member States, the number of registrations increased in 2016, except for Latvia (- 24 %), the Czech Republic (- 22 %), France (- 8 %) and Bulgaria (- 4 %). The biggest increases in new vehicle registrations were observed in Italy (+ 46 %), Spain (+ 41 %), the Netherlands and Malta (+ 30 % each).

The largest markets in Europe with regard to the new registrations of vans are the United Kingdom (22 %), France (18 %) and Germany (15 %) (Figure 4.1). The EU-15 still accounts for the vast majority of registrations of new light commercial vehicles in the EU, with 92 % of the total registrations. Compared with 2015, the number of vehicles registered in the EU-15 has increased by 9 %, while the number of newly registered vehicles in the EU-13 has increased by 4 %.

**Figure 4.1 Number of light commercial vehicles registered in the EU-28 between 2012 and 2016**




**Note:** In 2012, France did not provide information on its entire fleet of vans because of an update of the registration system.

## 4.2 EU statistics

The average $CO_2$ emissions from the new light commercial vehicle fleet in the EU-28 in 2016 were 163.7 g $CO_2$/km, a reduction of 4.7 g $CO_2$/km from the previous year (168.3 g $CO_2$/km in 2015).

([17]) Light-duty vehicles include cars and vans.
([18]) IVAs are applicable to vehicles imported from non-Member States or own-build vehicles that have to be individually approved. NSS vehicles are those that are approved nationally in very small numbers, typically because they are made by smaller manufacturers.
([19]) Unknown vehicles are those for which the entries for the manufacturer's name are missing in the database. Those vehicles cannot be attributed to a manufacturer and are therefore not included in the provisional calculation of targets.
([20]) Unidentified vehicles are those for which the entries for the mass in running order or the $CO_2$ emissions are missing in the database. Unidentified vehicles were not considered in the calculation of the average specific emissions or the specific emission targets for manufacturers.
([21]) Multi-stage vans are vehicles built in two or more stages. An incomplete vehicle, such as a chassis-cab or a cut-away chassis, built by one manufacturer, is completed by another manufacturer, which adds work-performing or cargo-carrying components to the vehicle (e.g. box truck, dump truck).

In 2016, the average new light commercial vehicle in the EU-15 emitted 4.8 g $CO_2$/km less than the average newly registered vehicle in the EU-13, the same difference as in 2015. In fact, while the average new light commercial vehicle in the EU-15 emitted 0.4 g $CO_2$/km less than the average newly registered vehicle in 2016 (Table 4.1), in the EU-13 it emitted 4.4 g $CO_2$/km more.

Diesel vehicles accounted for more than 96 % of the total new van registrations in 2016 (Table 4.2). The average $CO_2$ emissions of diesel vehicles decreased by 4.5 g $CO_2$/km, while the average emissions of petrol vehicles decreased by only 0.5 g $CO_2$/km, compared with 2015 (Figure 4.2).

In 2016, the average diesel vehicle emitted 165.3 g $CO_2$/km, about 13.6 g $CO_2$/km more than the average petrol vehicle (in 2015 the difference between diesel and petrol vehicles was 17.6 g $CO_2$/km) (Table 4.3). It should be noted that this difference in the average $CO_2$ emissions between diesel and petrol vehicles is due to the difference in their average mass. Diesel vehicles are generally bigger, and hence heavier (1 824 kg on average), than petrol vehicles (1 404 kg on average). There are also differences in terms of engine capacity and engine power: 1 920 $cm^3$ and 88 kWh for diesel, 1 629 $cm^3$ and 87 kWh for petrol vehicles. It should also be noted that the proportion of petrol vehicles is particularly small: less than 2 %.

There were 9 930 newly registered electric vehicles in 2016, compared with 7 850 registered in 2015. Of the other types of AFVs, LPG and NG were the vehicles most sold (9 229 and 9 594 vehicles registered respectively).

**Table 4.1 Average $CO_2$ emissions (g $CO_2$/km) from light commercial vehicles by region**

| | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|
| EU-28 | 180.2 | 173.3 | 169.1 | 168.3 | 163.7 |
| EU-15 | 180.0 | 172.9 | 168.8 | 167.9 | 163.3 |
| EU-13 | 182.5 | 178.5 | 172.2 | 172.8 | 168.0 |

**Note:** Croatia provided data from 2014, whereas for 2012 and 2013, data for Croatia were not included in the calculations.

**Table 4.2 Percentage of fuel type in light commercial vehicles (EU)**

| | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|
| Diesel | 96.5 | 96.5 | 96.8 | 96.7 | 96.2 |
| Petrol | 1.8 | 2.0 | 2.0 | 1.8 | 1.9 |
| AFV | 1.7 | 1.5 | 1.2 | 1.5 | 1.8 |

**Note:** The geographical scope of the data changes over time from EU-27 to EU-28; see Annex 1 for details.

**Figure 4.2 Evolution of $CO_2$ emissions from light commercial vehicles by fuel type in the EU-28**

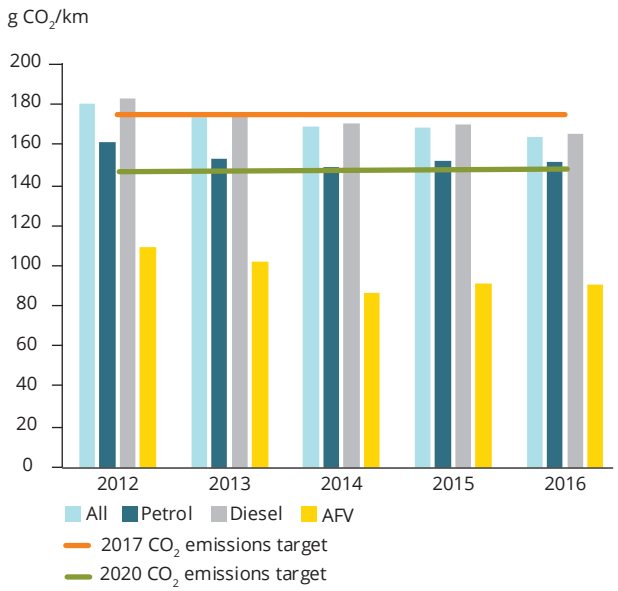



**Table 4.3 Average $CO_2$ emissions (g $CO_2$/km) from light commercial vehicles by fuel (EU)**

| | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|
| All fuels | 180.2 | 173.3 | 169.1 | 168.3 | 163.7 |
| Petrol | 161.3 | 153.0 | 149.0 | 152.2 | 151.7 |
| Diesel | 182.7 | 175.2 | 170.5 | 169.8 | 165.3 |
| AFV | 109.4 | 101.8 | 86.8 | 91.4 | 90.9 |

**Note:** [a] For the calculation of the average $CO_2$ emissions of AFVs, battery electric, LPG, NG, E85, biodiesel and plug-in vehicles are included.

The geographical scope of the data changes over time from EU-27 to EU-28; see Annex 1 for details.

## 4.3 Comparison between Member States

With the exception of France, Cyprus, Denmark and the Czech Republic, in which the average $CO_2$ emissions in 2016 increased from 2015, in all other countries $CO_2$ emissions from light commercial vehicles fell in 2016 (Figure 4.3). Average $CO_2$ specific emissions from newly registered vans were already below the 175 g $CO_2$/km EU target set for 2017 in twenty-five Member States (twenty in 2015) ([23]) (Figure 4.4). Thirteen of these had emission values below 160 g $CO_2$/km, compared with ten in 2015. There is a clear correlation by Member State between the average emissions and the average mass: higher average mass values correspond to higher average emissions. For some Member States (Portugal and Bulgaria), the low average emissions are mainly related to the registration of relatively small vehicles: the average mass of the new fleet of these countries was 1 615 and 1 553 kg respectively. For the second year in a row, Portugal registered vans with the lowest average engine capacity in Europe and one of the lowest average engine powers (third position). Spain had the lowest average engine power, followed by Malta, Portugal, Cyprus and Croatia. There were only two Member States with average $CO_2$ emissions higher than 180 g $CO_2$/km: the Czech Republic and Slovakia. Their new fleets also had the highest average mass (> 1 950 kg), engine size (> 2 050 $cm^3$) and power (> 94 kW).

For light commercial vehicles, the percentage of diesel vehicles is very high. In some Member States, more than 99.5 % of the new fleet is fuelled by diesel: Ireland, Portugal and the United Kingdom. For the majority of Member States (exceptions are Bulgaria, Estonia and Poland), the proportion of diesel vehicles is above 90 %.

Because of their market size, the Member States with higher numbers of vehicle registrations — France, Germany, Italy, Spain and the United Kingdom — are the major contributors to the total reductions in EU-28 $CO_2$ emissions from light commercial vehicles. Of these five, Italy, Spain and France have the lowest average $CO_2$ emissions. In Italy, this was for a combination of reasons. Italy, similarly to Portugal, had one of the lowest average engine capacity values (1 721 $cm^3$, the second lowest among the EU Member States) and low average mass (1 631 kg, the fourth lowest). In addition to this, AFVs comprised 6 % of the Italian new van fleet. The latter are mainly NG vehicles (65 % of all AFV registrations in Italy) with an average value of 132.4 g $CO_2$/km and LPG vehicles (29 % of all AFV

France, it seems that the new small diesel fleet (149 g $CO_2$/km with an average mass of 1 687 kg and 161 g $CO_2$/km with an average mass of 1 768 kg) was the main reason for their low $CO_2$ emissions. In addition, as in the previous year, France had a relatively high percentage of battery electric vans (1.5 % of vehicles registered in France), with zero emissions.

## 4.4 Average specific $CO_2$ emissions per manufacturer in 2016

Table 4.4 presents data (number of registrations, average mass and average emissions) for large van manufacturers that registered more than 10 000 vehicles in 2016. In total they account for 97.4 % of the new van fleet. The same table also presents the average emissions of those manufacturers for the 2012–2016 period.

In 2016, the most popular brand was Ford-Werke GmbH, with 16 % of the vans registered in the EU-28. Renault and Volkswagen AG followed with 14 % and 12 % each.

Nine manufacturers, representing more than 80 % of the European new van fleet, had average emissions lower than 175 g $CO_2$/km: Automobile Dacia SA, Automobiles Citroën, Automobiles Peugeot, Renault, Nissan International SA, FCA Italy SPA, Adam Opel AG, Volkswagen AG and Ford-Werke GmbH. The first three of these manufacturers also had the lowest average mass in the group. The average emissions for all large manufacturers are in the range of 124–216 g $CO_2$/km. Average mass values are in the range of 1 281–2 323 kg.

For the fourth year in a row, Automobile Dacia SA achieved the lowest average $CO_2$ emissions (124 g $CO_2$/km), and like the previous year it had the lowest average mass (1 281 kg). From the previous year, Automobile Dacia SA decreased their average $CO_2$ emissions by 8 g to 124 g $CO_2$/km.

The next three best-performing manufacturers had similar emission levels, around 150 g $CO_2$/km. Among them, Automobiles Citroën and Automobiles Peugeot decreased their emissions by 3.9 and 3.3 g $CO_2$/km in 2016 respectively, while for Renault an increase in emissions of 4.1 g $CO_2$/km was observed in the same period. For all of them a slight increase in average mass was observed in 2016.

([23]) Regulation (EU) No 510/2011 sets an average emission target of 175 g $CO_2$/km by 2017 for new light commercial vehicles registered in the EU as a whole.

**Figure 4.3 Absolute reduction and relative reduction in specific emissions by Member State between 2014 and 2016**

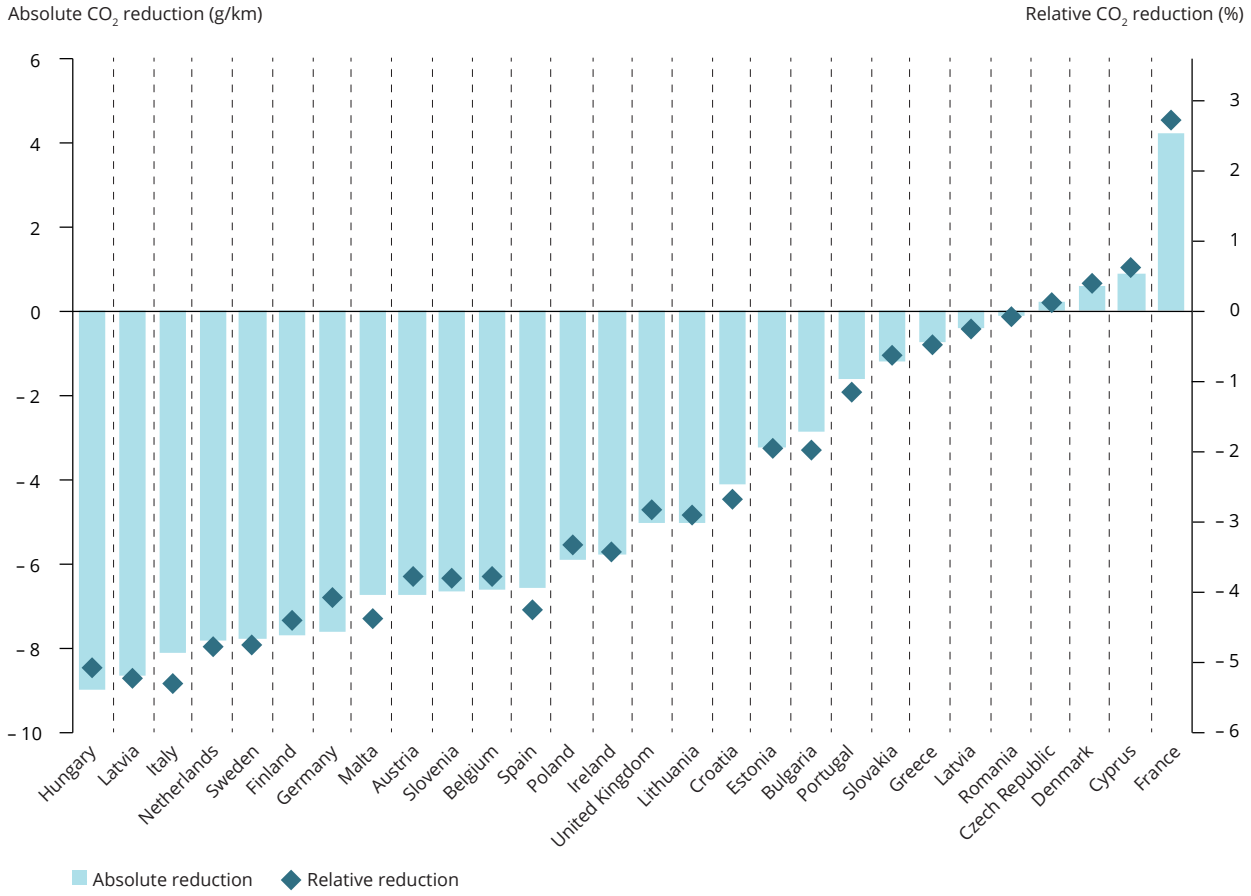
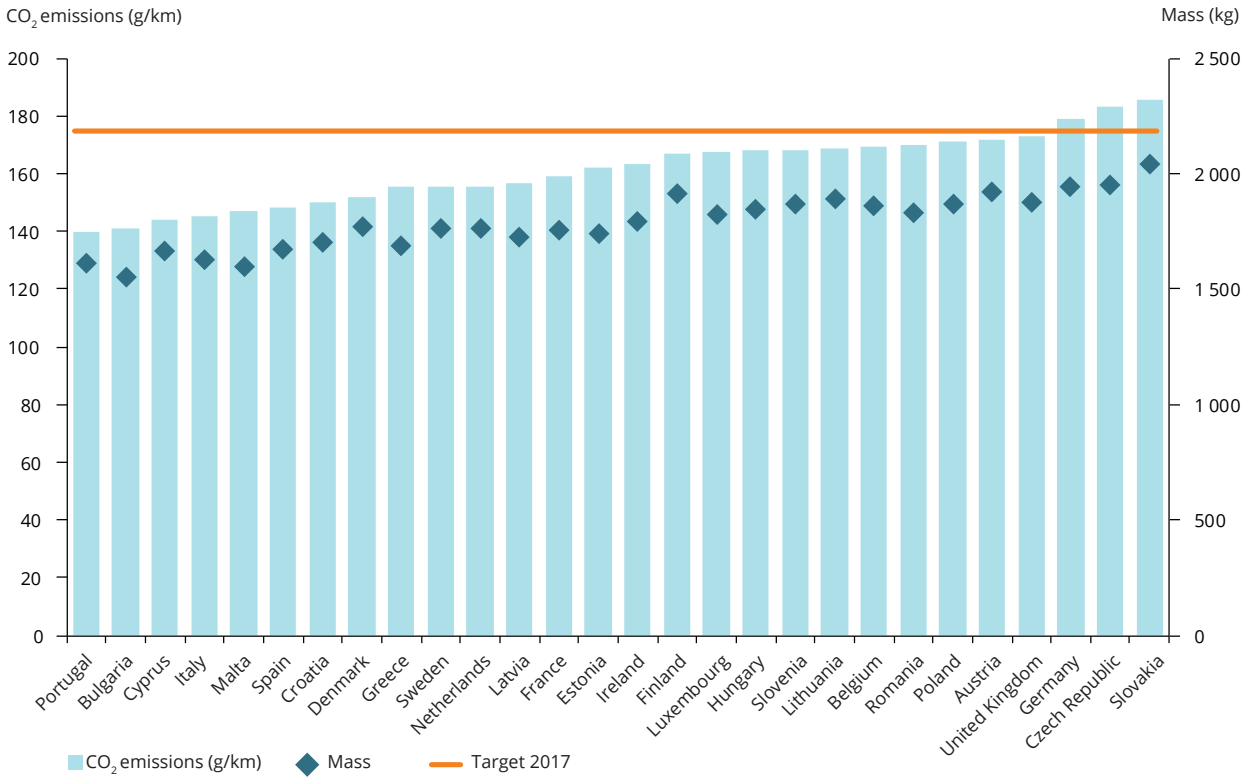



**Figure 4.4 Average $CO_2$ emissions and average mass by EU Member State in 2016**




**Note:** 2017 target is the target for the EU as a whole.

registrations) with an average value of 126.5 g $CO_2$/km. In Spain and

Over the last 5 years, Nissan International SA has improved its performance the most: average emissions decreased by 34 g $CO_2$/km from 2012 to 164 g $CO_2$/km in 2016 (by 12 g $CO_2$/km since 2015). Nissan International SA has significantly reduced the amount of vehicles with very high emissions (i.e. more than 250 g $CO_2$/km). This might also be explained by the high proportion of BEVs it produces (5 % in 2016).

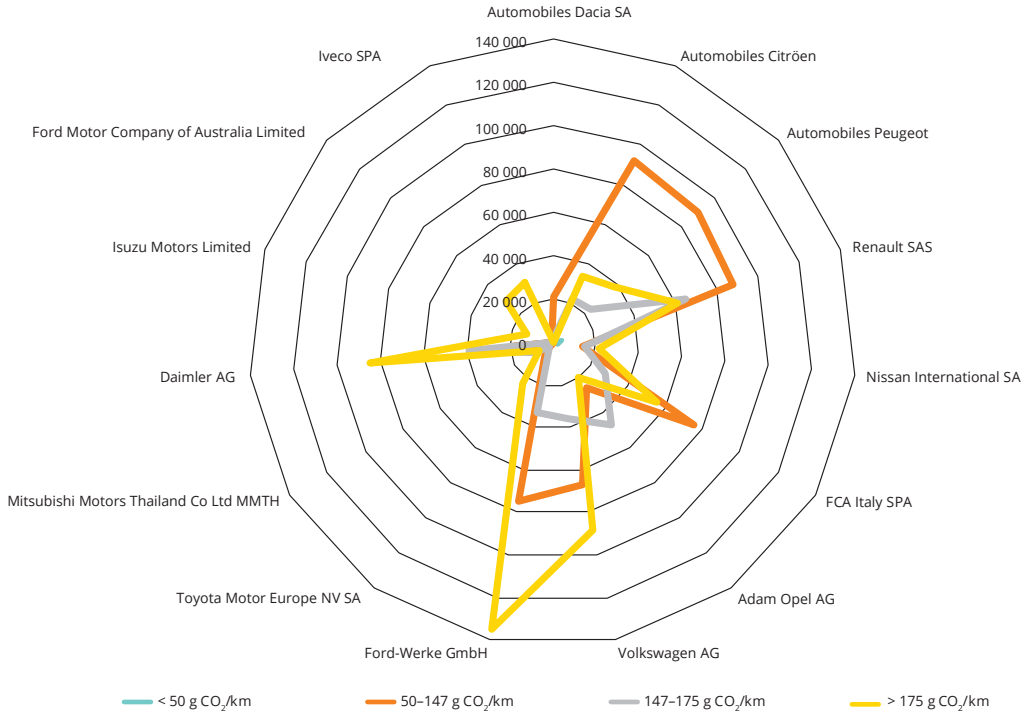
Thirteen out of 15 manufacturers in this group reduced their average emission levels in 2016 compared with 2015. The largest reductions in average emissions were achieved by Ford Motor Australia (– 22.7 g $CO_2$/km), Mitsubishi Motors Thailand and Volkswagen AG (– 15.3 g $CO_2$/km each). Since 2012, in addition to Nissan International SA, Daimler AG, Mitsubishi Motors Thailand and Toyota also recorded average decreases in emissions of 31.0 g, 30.4 g and 22.6 g $CO_2$/km respectively. These are the greatest decreases among the largest manufacturers.

The distribution of registrations over the emission classes (Figure 4.5) shows that the new fleet composition is very different among manufacturers. Low-emitting vehicles (< 50 g $CO_2$/km) represent a very small percentage for the large majority of the manufacturers: only for Nissan and Renault are the proportions of these vehicles around 5 % and 2 % respectively. For three manufacturers (Automobile Dacia SA, Automobiles Peugeot and Automobiles Citroën), the percentage of vehicles emitting less than 147 g $CO_2$/km is around or higher than 60 %. For Renault SAS and Fiat Group, the most frequent class is 50-147 g $CO_2$/km. For Adam Opel and Mitsubishi Motors Thailand, vehicles emitting between 147 and 175 g $CO_2$/km are the most registered. For all the other manufacturers, the majority of vehicles emit more than 175 g $CO_2$/km.

**Table 4.4 Main statistics for large van manufacturers (more than 10 000 vehicle registrations per year)**

| Manufacturer | Registrations 2016 | Average mass (kg) 2016 | Average $CO_2$ emissions (g $CO_2$/km) | | | | |
|---|---|---|---|---|---|---|---|
| | | | 2012 | 2013 | 2014 | 2015 | 2016 |
| Automobile Dacia SA | 23 928 | 1 281 | 145 | 132 | 132 | 133 | 124 |
| Automobiles Citröen | 147 478 | 1 630 | 158 | 153 | 148 | 150 | 146 |
| Automobiles Peugeot | 152 454 | 1 655 | 159 | 154 | 147 | 151 | 148 |
| Renault SAS | 216 516 | 1 713 | 171 | 152 | 149 | 148 | 152 |
| Nissan International SA | 53 075 | 1 879 | 199 | 192 | 184 | 176 | 164 |
| FCA Italy SPA | 158 560 | 1 675 | 157 | 157 | 158 | 158 | 153 |
| Adam Opel AG | 92 843 | 1 755 | 178 | 178 | 173 | 161 | 161 |
| Volkswagen AG | 191 448 | 1 792 | 185 | 180 | 180 | 181 | 166 |
| Ford-Werke GmbH | 243 337 | 1 893 | 188 | 189 | 175 | 171 | 169 |
| Toyota Motor Europe NV SA | 30 766 | 1 949 | 202 | 191 | 193 | 188 | 179 |
| Mitsubishi Motors Thailand Co Ltd MMTH | 16 429 | 1 935 | 210 | 207 | 207 | 195 | 179 |
| Daimler AG | 141 853 | 2 142 | 219 | 205 | 200 | 189 | 188 |
| Isuzu Motors Limited | 12 658 | 2 072 | 212 | 203 | 200 | 201 | 204 |
| Ford Motor Company of Australia Limited | 31 598 | 2 202 | 228 | 227 | 228 | 236 | 213 |
| Iveco SPA | 30 999 | 2 323 | 230 | 224 | 228 | 219 | 216 |

**Figure 4.5 Number of registrations over different specific emission classes**




## 4.5 Distance to the 2016 target

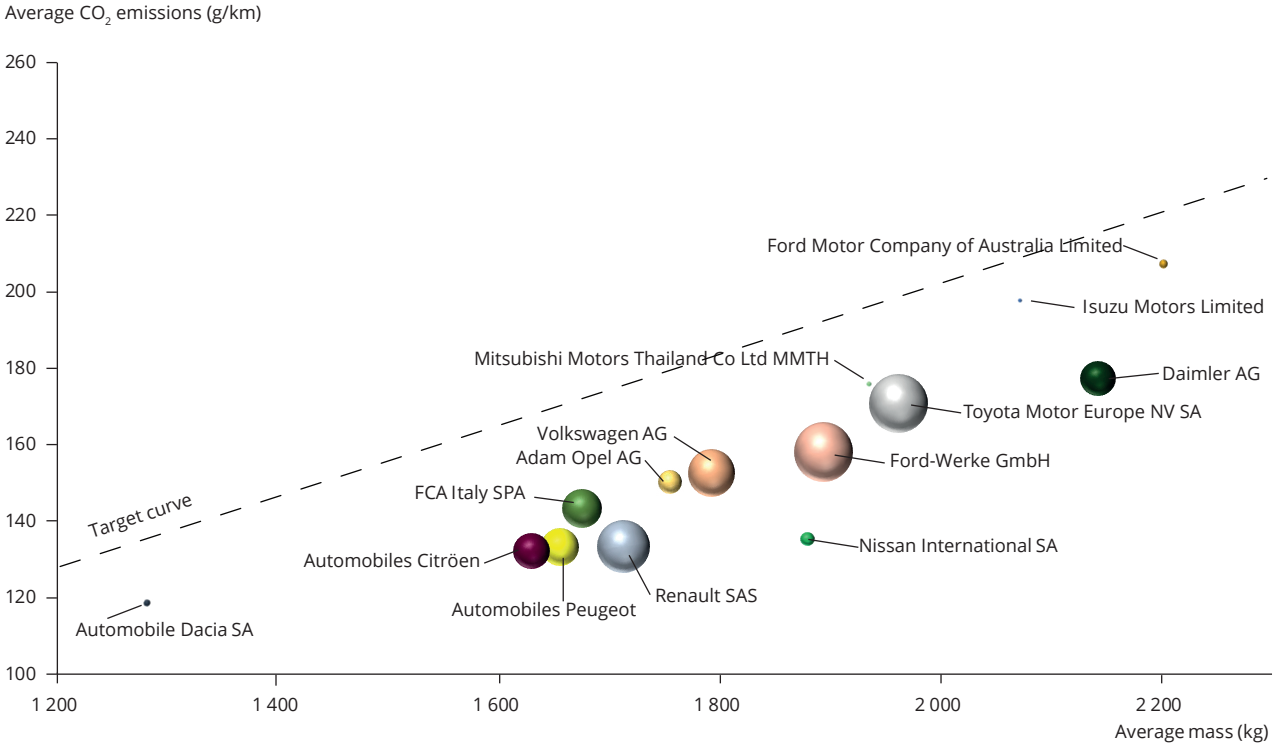
The distance of the manufacturers from their specific emission targets is calculated by taking into account the modalities listed in Chapter 2 (i.e. phase-in, super-credits and eco-innovations).

Based on their average CO2 emissions in 2016, all 15 larger manufacturers, representing about 97 % of the total registrations in the EU, achieved their specific emission targets for 2016. All granted derogation targets were met.

Individual manufacturers exceeding their target were members of their pools. Manufacturers with fewer than 1 000 registrations are exempt from achieving a specific emission target. In total, 22 manufacturers with fewer than 4 180 vehicles registered in 2016 benefited from the de minimis exemption. The data are available in Annex 2. Figure 4.6 graphically illustrates the distance to target for the 15 manufacturers with more than 10 000 new registered vehicles in 2016.

The distance to target for the eight pools of manufacturers is presented in Table 4.5. In 2016, all the pools of manufacturers achieved their specific emission targets. A derogation target has been granted for Mitsubishi Motors.

**Figure 4.6 Distance to 2016 target by individual manufacturers (only manufacturers registering > 10 000 vehicles per year in Europe)**




**Note:** The size of the bubble is proportional to the number of vehicles registered in EU-28.

## 4.6 Distance to the 2017 targets

The distance of the largest manufacturers (i.e. manufacturers registering more than 10 000 vehicles per year) from their 2017 targets is calculated based on the 2016 $CO_2$ emission data.

Progress towards the target for 2017 is calculated on the basis of the modalities summarised in Chapter 2. A different set of modalities is applied as follows: for 2017, the calculation includes 100 % of the new vehicle fleet, and manufacturers receive super-credits of 1.5 for vehicles emitting less than 50 g $CO_2$/km. Manufacturers have one more year to further reduce $CO_2$ emissions and ensure compliance with their targets in 2017. In 2016, among the 15 large manufacturers, all of them already complied with their 2017 targets.

## 4.7 Excess emission premiums

Similarly to Regulation (EC) No 433/2009, if a manufacturer's or a pool's average specific $CO_2$ emissions exceed the specific average target, Regulation (EU) No 510/2011 requires the payment of an excess emission premium. The formulae for calculating the excess emission premium for failing to meet the specific $CO_2$ emission target is equivalent to the ones used for passenger cars (see Section 3.8).

The first year in which the target was binding for vans was 2015. Neither in 2015 nor in 2016 did manufacturers exceed their target.

**Table 4.5 Distance to target for the pools in 2016**

| Pool | Manufacturer | Average $CO_2$ emissions (g $CO_2$/km) | Target (g $CO_2$/km) | Distance to target (g $CO_2$/km) |
|---|---|---|---|---|
| | Daimler AG | 177 | 212 | – 34 |
| | Mitsubishi Fuso Truck & Bus Corporation | 236 | 265 | – 29 |
| | Mitsubishi Fuso Truck Europe SA | 0 | 276 | – 276 |
| | MFTBC | 236 | 264 | – 29 |
| Daimler | | 178 | 216 | – 38 |
| | FCA US LLC | 202 | 207 | – 5 |
| | FCA Italy SPA | 144 | 174 | – 30 |
| FCA Italy SPA | | 144 | 172 | – 29 |
| | CNG-Technik GmbH | 108 | 155 | – 47 |
| | Ford Motor Company of Australia Limited | 207 | 222 | – 14 |
| | Ford Motor Company | 203 | 216 | – 13 |
| | Ford-Werke GmbH | 158 | 191 | – 33 |
| Ford-Werke GmbH | | 162 | 196 | – 33 |
| | General Motors Company | 270 | 257 | 13 |
| | Adam Opel AG | 150 | 179 | – 29 |
| General Motors | | 150 | 180 | – 29 |
| | Hyundai Motor Company | 208 | 211 | – 4 |
| | Hyundai Assan Otomotiv Sanyi VE | 100 | 111 | – 12 |
| | Hyundai Motor Manufacturing Czech SRO | 154 | 161 | – 6 |
| Hyundai | | 201 | 220 | – 19 |
| | Kia Motors Corporation | 116 | 142 | – 26 |
| | Kia Motors Slovakia SRO | 125 | 152 | – 27 |
| Kia | | 119 | 152 | – 33 |
| | Mitsubishi Motors Corporation MMC | 166 | 210 | – 44 |
| | Mitsubishi Motors Thailand Co Ltd MMTH | 176 | 210 | – 34 |
| Mitsubishi Motors | | 175 | 195 | – 20 |
| | Avtovaz JSC | 216 | 137 | 79 |
| | Automobile Dacia SA | 119 | 135 | – 17 |
| | Renault SAS | 133 | 171 | – 38 |
| Renault | | 131 | 172 | – 41 |
| | Audi AG | 137 | 178 | – 40 |
| | Dr Ing HCF Porsche AG | 180 | 216 | – 35 |
| | Quattro GmbH | 189 | 205 | – 16 |
| | Seat SA | 103 | 127 | – 24 |
| | Skoda Auto AS | 103 | 133 | – 30 |
| | Volkswagen AG | 153 | 189 | – 36 |
| Volkswagen Group LCV | | 150 | 181 | – 31 |

# 5 Distance to the 2020/2021 targets

Regulation (EU) No 333/2014 defines the modalities for reaching the 95 g $CO_2$/km target for passenger cars. Taking into account those modalities, it is possible to make an estimate of the emission reduction that manufacturers would have to achieve from 2017 onwards to reach their respective targets in 2021 (phasing in for 95 % of vehicles in 2020).

The calculation of the distance to target for manufacturers in 2021 is based on the average 2016 vehicle mass values. It also accounts for other modalities, such as 1.67 cars as super-credit being considered for each vehicle emitting less than 50 g $CO_2$/km.

Some manufacturers, such as Automobiles Peugeot and Renault SAS are already very close to their 2021 targets: they need to reduce their average emissions by less than 12 g CO2/km or less in the next 5 years (Figure 5.1).

Other manufacturers still have to make considerable progress to achieve their 2021 targets.

Figure 5.2 presents the progress of the manufacturers responsible for more than 500 000 vehicles a year in terms of annual percentage changes for three periods: 2000–2009, 2009–2016 and 2016–2021. These rates include the expected reductions for respecting the 2021 target set by the regulation.

For large manufacturers, the rate of progress required from now until 2021 is in general higher than the rate that has been achieved in the years since Regulation (EU) No 443/2009 came into force. There are only four manufacturers (Automobiles Peugeot, Automobiles Citroën, Renault SAS, Toyota Motor Europe NV SA) for which the progress rates required in the period 2016-2021 are lower than in the previous years.

Moreover, there is only one manufacturer (Toyota Motor Europe NV SA) that needs a progress rate lower than it was in 2000–2009. The figure also shows that in the majority of cases the greatest improvements will be required over the coming years.

Regarding vans, Regulation (EU) No 253/2014 defines the modalities for reaching the 2020 target to reduce $CO_2$ emissions from new light commercial vehicles.

As for passenger cars, the calculation of the 2020 targets for manufacturers is based on the latest average 2016 vehicle mass values. However, there are no super-credits anticipated for that year and phase-in is 100 %.

Five large manufacturers (Daimler AG, Nissan International SA, Ford-Werke GmbH, Renault SAS and Automobiles Peugeot) are already very close to their 2020 targets: they need to reduce their average emissions by less than 12 g $CO_2$/km in the next 4 years. Other manufacturers still have to make significant progress to achieve their 2020 targets (Figure 5.3).

Figure 5.4 presents the manufacturers' progress in terms of annual percentage changes for two periods: 2012–2016 and 2016–2020. These rates include the expected reductions towards meeting the 2020 target set by the regulation.

For eight manufacturers, the rate of progress required from 2016 to 2020 is lower than or comparable to the rate that has been achieved in the years since Regulation (EU) No 510/2011 came into force. There are seven manufacturers for which the progress rates in the period 2016–2020 are greater than in the previous years. The figure also shows that the greatest improvements were achieved over the period 2012-2016.

**Figure 5.1 Comparison of past and future progress towards meeting the 2021 target**

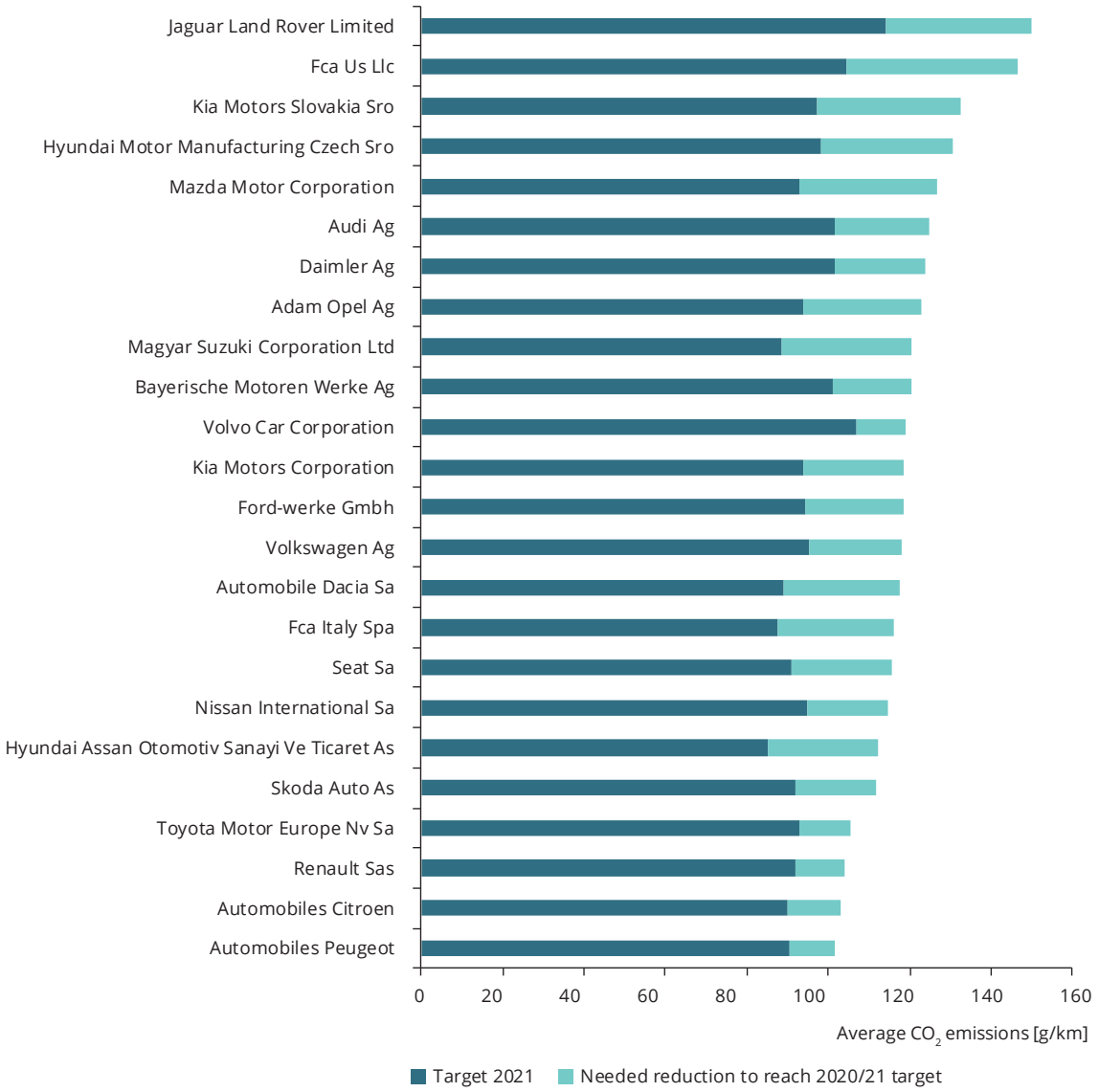


**Figure 5.2 Comparison of past and future progress towards meeting the 2021 target**

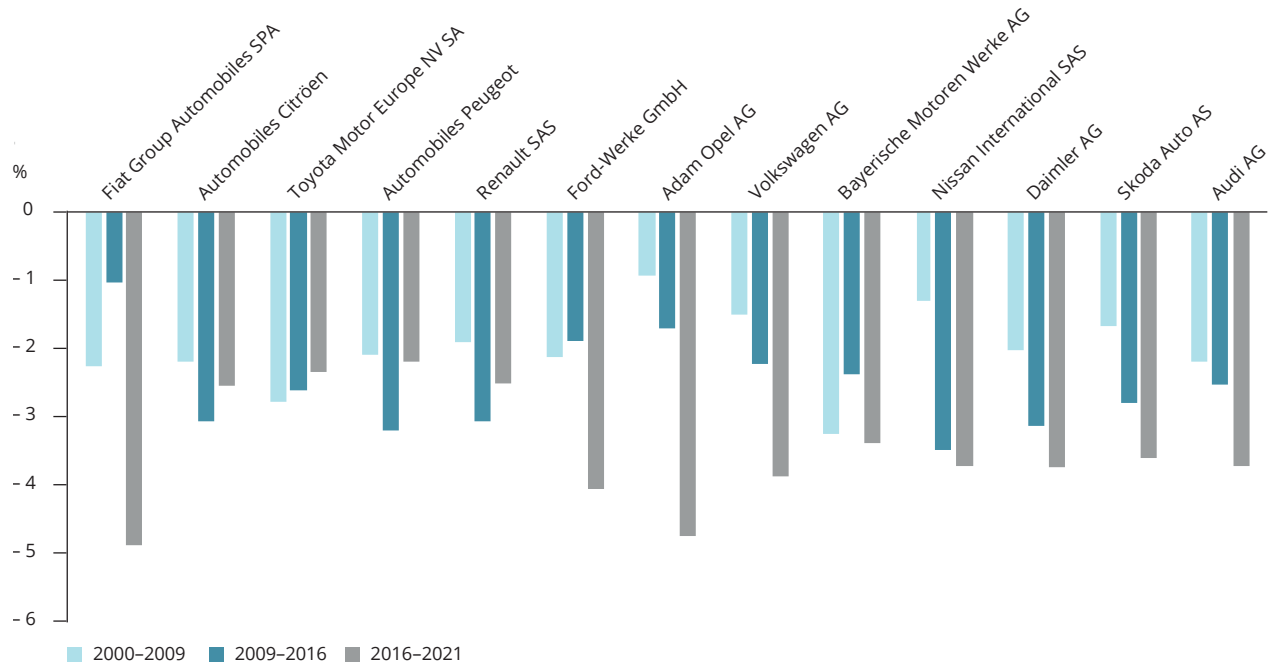



**Figure 5.3 Van manufacturers' progress towards meeting the 2020 target**

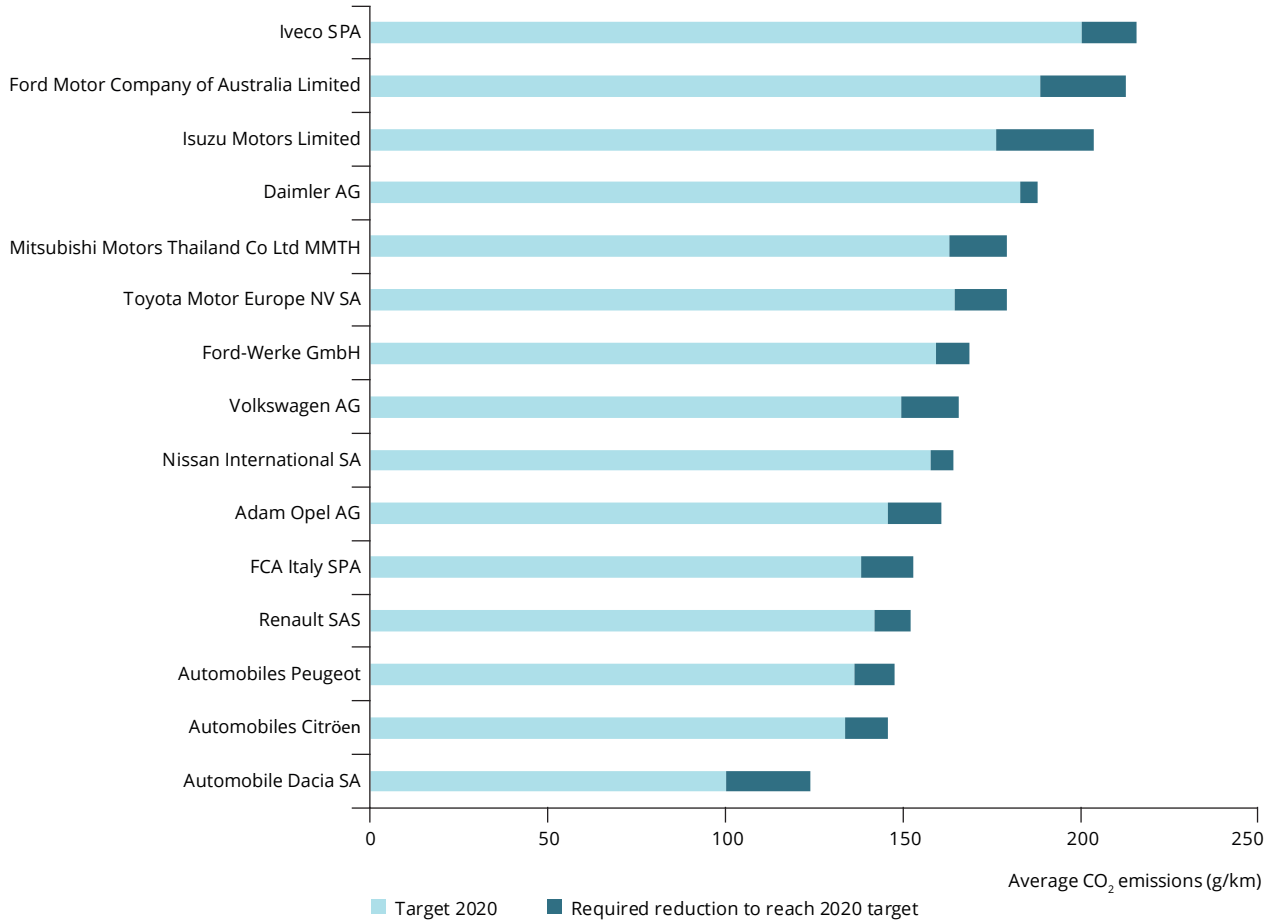
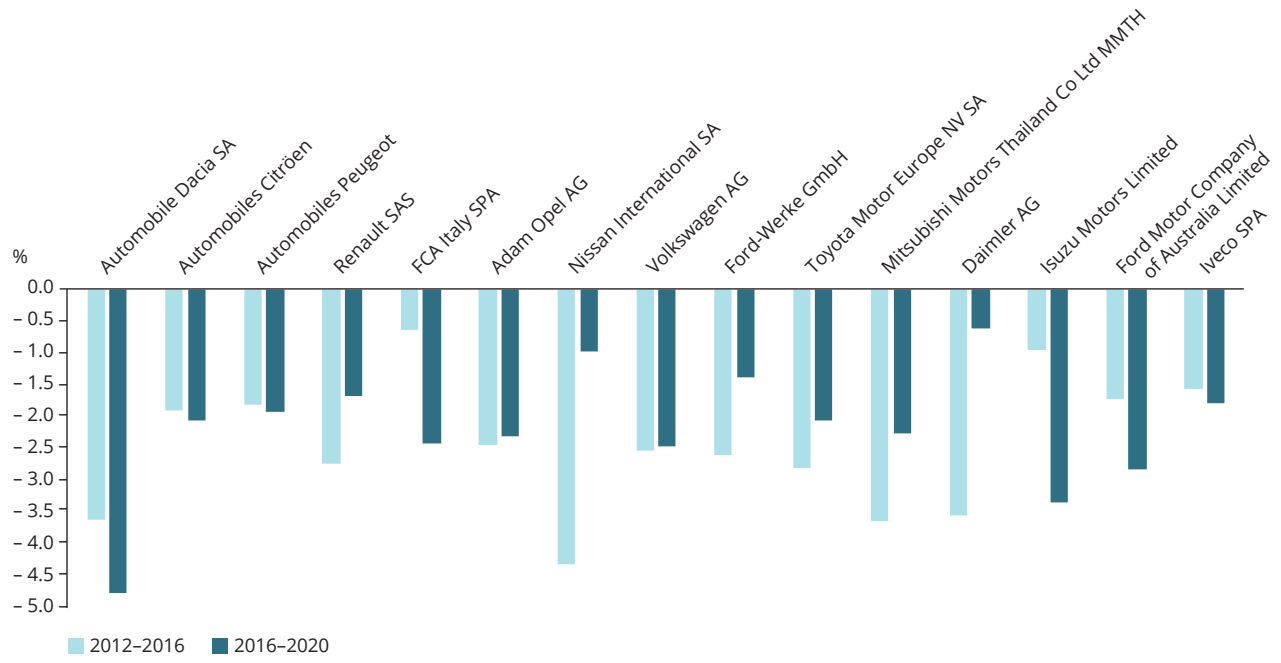


**Figure 5.4 Comparison of past and future progress towards meeting the 2020 target**



# References

EC, 2016, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, 'A European strategy for low-emission mobility' (COM(2016) 501 final of 20 July 2016) (http://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX%3A52016SC0244) accessed 26 October 2017.

EEA, 2017a, 'Monitoring of CO2 emissions from passenger cars — Regulation 443/2009', European Environment Agency (http://www.eea.europa.eu/data-and-maps/data/CO2-cars-emission-13) accessed 26 October 2017.

EEA, 2017b, 'Monitoring of CO2 emissions from vans — Regulation 510/2011', European Environment Agency (https://www.eea.europa.eu/data-and-maps/data/vans-9) accessed 26 October 2017.

EU, 2000, Decision No 1753/2000/EC of the European Parliament and of the Council of 22 June 2000 establishing a scheme to monitor the average specific emissions of CO2 from new passenger cars (OJ L 202, 10.8.2000, p. 1-13). (http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32000D1753) accessed 26 October 2017.

EU, 2009, Regulation (EC) No 443/2009 of the European Parliament and of the Council of 23 April 2009 setting emission performance standards for new passenger cars as part of the Community's integrated approach to reduce CO2 emissions from light-duty vehicles (OJ L 140, 5.6.2009, p. 1-15). (http://eur-lex.europa.eu/legal-content/en/ALL/?uri=CELEX:32009R0443) accessed 26 October 2017.

EU, 2011, Regulation (EU) No 510/2011 of the European Parliament and of the Council of 11 May 2011 setting emission performance standards for new light commercial vehicles as part of the Union's integrated approach to reduce CO2 emissions from light-duty vehicles (OJ L 145, 31.5.2011, p. 1-18) (http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32011R0510) accessed 26 October 2017.

EU, 2014, Regulation (EU) No 333/2014 of the European Parliament and of the Council of 11 March 2014 amending Regulation (EC) No 443/2009 to define the modalities for reaching the 2020 target to reduce CO2 emissions from new passenger cars (OJ L 103, 5.4.2014, p. 15-21) (http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv%3AOJ.L_.2014.103.01.0015.01.ENG) accessed 26 October 2017.

EU, 2017a, Commission Regulation (EU) 2017/1151 of 1 June 2017 supplementing Regulation (EC) No 715/2007 of the European Parliament and of the Council on type-approval of motor vehicles with respect to emissions from light passenger and commercial vehicles (Euro 5 and Euro 6) and on access to vehicle repair and maintenance information, amending Directive 2007/46/EC of the European Parliament and of the Council, Commission Regulation (EC) No 692/2008 and Commission Regulation (EU) No 1230/2012 and repealing Commission Regulation (EC) No 692/2008, OJ L 175, 7.7.2017, p. 1. (http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32017R1151) accessed 27 October 2017.

EU, 2017b, Commission Implementing Regulation (EU) 2017/1153 of 2 June 2017 setting out a methodology for determining the correlation parameters necessary for reflecting the change in the regulatory test procedure and amending Regulation (EU) No 1014/2010 (OJ L 175, 7.7.2017, p. 679) (http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32017R1153) accessed 27 October 2017.

EU, 2017c, Commission Implementing Regulation (EU) 2017/1152 of 2 June 2017 setting out a methodology for determining the correlation parameters necessary for reflecting the change in the regulatory test procedure with regard to light commercial vehicles and amending Implementing Regulation (EU) No 293/2012 (OJ L 175, 7.7.2017, p. 644) (http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32017R1152) accessed 27 October 2017.

# Annex 1

**Table A1.1 Registration of new passenger cars by Member State (in thousands)**

| | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Austria | 295 | 280 | 300 | 311 | 308 | 309 | 298 | 294 | 319 | 328 | 356 | 335 | 319 | 303 | 308 | 329 |
| Belgium | 497 | 468 | 459 | 485 | 480 | 526 | 525 | 536 | 475 | 551 | 577 | 490 | 490 | 485 | 503 | 541 |
| Bulgaria | - | - | - | - | - | - | 86 | 91 | 21 | 14 | 14 | 14 | 15 | 16 | 17 | 20 |
| Croatia | - | - | - | - | - | - | - | - | - | - | - | - | 28 | 35 | 36 | 45 |
| Cyprus | - | - | - | 20 | 18 | 20 | 25 | 24 | 16 | 15 | 15 | 11 | 7 | 8 | 9 | 12 |
| Czech Republic | - | - | - | 115 | 105 | 107 | 126 | 134 | 159 | 165 | 169 | 170 | 162 | 179 | 227 | 214 |
| Denmark | 97 | 113 | 102 | 124 | 147 | 154 | 160 | 148 | 111 | 151 | 170 | 171 | 184 | 188 | 204 | 221 |
| Estonia | - | - | - | 17 | 20 | 25 | 31 | 24 | 10 | 10 | 17 | 19 | 20 | 21 | 21 | 23 |
| Finland | 106 | 113 | 145 | 141 | 146 | 143 | 123 | 137 | 89 | 109 | 122 | 107 | 100 | 103 | 106 | 115 |
| France | 2 228 | 2 120 | 1 988 | 1 996 | 2 059 | 1 986 | 2 050 | 2 037 | 2 259 | 2 250 | 2 174 | 1 932 | 1 827 | 1 838 | 2 011 | 2 167 |
| Germany | 3 342 | 3 122 | 3 237 | 3 267 | 3 319 | 3 445 | 3 126 | 3 067 | 3 786 | 2 873 | 2 933 | 3 062 | 2 930 | 3 012 | 3 177 | 3 316 |
| Greece | 245 | 242 | 203 | 264 | 274 | 279 | 294 | 279 | 221 | 140 | 97 | 57 | 58 | 71 | 76 | 79 |
| Hungary | - | - | - | 230 | 199 | 193 | 167 | 163 | 66 | 43 | 47 | 52 | 55 | 68 | 77 | 95 |
| Ireland | 117 | 152 | 146 | 154 | 171 | 177 | 186 | 151 | 56 | 89 | 90 | 73 | 74 | 96 | 123 | 146 |
| Italy | 2 430 | 2 278 | 2 244 | 264 | 2 237 | 2 325 | 2 494 | 2 163 | 2 160 | 1 954 | 1 745 | 1 402 | 1 304 | 1 351 | 1 573 | 1 823 |
| Latvia | - | - | - | 11 | 16 | 25 | 31 | 19 | 5 | 6 | 10 | 10 | 10 | 12 | 14 | 15 |
| Lithuania | - | - | - | 9 | 11 | 15 | 21 | 22 | 7 | 7 | 12 | 12 | 12 | 14 | 17 | 20 |
| Luxembourg | 22 | 44 | 44 | 48 | 49 | 51 | 51 | 52 | 47 | 50 | 50 | 49 | 46 | 49 | 46 | 49 |
| Malta | - | - | - | 4 | 7 | 6 | 6 | 5 | 6 | 4 | 6 | 6 | 6 | 6 | 7 | 7 |
| Netherlands | 526 | 507 | 487 | 479 | 452 | 478 | 494 | 493 | 396 | 480 | 554 | 500 | 416 | 384 | 438 | 378 |
| Poland | - | - | - | 297 | 230 | 223 | 264 | 305 | 221 | 219 | 275 | 274 | 288 | 304 | 354 | 417 |
| Portugal | | 232 | 194 | 202 | 208 | 199 | 204 | 215 | 159 | 223 | 154 | 96 | 105 | 142 | 179 | 207 |
| Romania | - | - | - | - | - | - | 313 | 286 | 115 | 94 | 82 | 66 | 57 | 70 | 81 | 95 |
| Slovakia | - | - | - | - | 45 | 65 | 65 | 57 | 70 | 65 | 69 | 70 | 66 | 74 | 78 | 89 |
| Slovenia | - | - | - | 37 | 64 | 62 | 69 | 72 | 60 | 60 | 55 | 50 | 51 | 54 | 53 | 53 |
| Spain | 400 | 969 | 1 319 | 1 606 | 1 640 | 1 622 | 1 606 | 1 165 | 964 | 976 | 810 | 704 | 732 | 895 | 1 076 | 1 185 |
| Sweden | 223 | 249 | 257 | 260 | 269 | 278 | 300 | 248 | 209 | 277 | 289 | 263 | 252 | 297 | 338 | 364 |
| United Kingdom | 2 232 | 2 611 | 2 558 | 2 512 | 2 386 | 2 295 | 2 390 | 2 112 | 1 968 | 2 026 | 1 937 | 2 036 | 2 254 | 2 467 | 2 623 | 2 687 |

## Table A1.2 Average mass of new passenger cars by Member State (kg)

| | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Austria | 1 314 | 1 335 | 1 426 | 1 432 | 1 435 | 1 449 | 1 445 | 1 431 | 1 385 | 1 409 | 1 442 | 1 453 | 1 448 | 1 446 | 1 459 | 1 467 |
| Belgium | 1 288 | 1 319 | 1 361 | 1 375 | 1 396 | 1 407 | 1 423 | 1 425 | 1 406 | 1 406 | 1 416 | 1 439 | 1 421 | 1 415 | 1 418 | 1 413 |
| Bulgaria | - | - | - | - | - | - | - | - | - | 1 454 | 1 462 | 1 485 | 1 475 | 1 424 | 1 408 | 1 402 |
| Croatia | - | - | - | - | - | - | - | - | - | - | - | - | 1 309 | 1 307 | 1 326 | 1 336 |
| Cyprus | - | - | - | 1 205 | 1 277 | 1 316 | 1 354 | 1 372 | 1 367 | 1 388 | 1 377 | 1 370 | 1 367 | 1 391 | 1 395 | 1 408 |
| Czech Republic | - | - | - | 1 704 | 1 242 | 1 247 | 1 261 | 1 275 | 1 335 | 1 380 | 1 368 | 1 368 | 1 370 | 1 364 | 1 374 | 1 352 |
| Denmark | - | 1 306 | 1 325 | 1 327 | 1 324 | 1 328 | 1 370 | 1 320 | 1 313 | 1 335 | 1 312 | 1 248 | 1 227 | 1 216 | 1 227 | 1 261 |
| Estonia | - | - | - | 1 349 | 1 408 | 1 433 | 1 465 | 1 456 | 1 471 | 1 473 | 1 502 | 1 514 | 1 508 | 1 474 | 1 456 | 1 463 |
| Finland | 1 752 | 1 759 | 1 336 | 1 355 | 1 381 | 1 401 | 1 437 | 1 442 | 1 447 | 1 426 | 1 452 | 1 455 | 1 445 | 1 440 | 1 421 | 1 422 |
| France | 1 254 | 1 280 | 1 305 | 1 327 | 1 341 | 1 349 | 1 375 | 1 387 | 1 326 | 1 326 | 1 343 | 1 385 | 1 350 | 1 310 | 1 315 | 1 322 |
| Germany | 1 332 | 1 352 | 1 381 | 1 408 | 1 412 | 1 424 | 1 433 | 1 425 | 1 347 | 1 433 | 1 460 | 1 466 | 1 448 | 1 443 | 1 447 | 1 453 |
| Greece | 1 172 | 1 223 | 1 262 | 1 277 | 1 287 | 1 304 | 1 314 | 1 311 | 1 423 | 1 252 | 1 231 | 1 242 | 1 243 | 1 240 | 1 250 | 1 250 |
| Hungary | - | - | - | 1 182 | 1 203 | 1 237 | 1 264 | 1 288 | 1 330 | 1 370 | 1 396 | 1 390 | 1 401 | 1 398 | 1 394 | 1 369 |
| Ireland | 1 248 | 1 276 | 1 265 | 1 314 | 1 341 | 1 372 | 1 441 | 1 440 | 1 440 | 1 380 | 1 378 | 1 420 | 1 397 | 1 410 | 1 393 | 1 385 |
| Italy | 1 604 | 1 632 | 1 649 | 1 259 | 1 277 | 1 294 | 1 287 | 1 285 | 1 255 | 1 269 | 1 306 | 1 311 | 1 314 | 1 307 | 1 305 | 1 307 |
| Latvia | - | - | - | 1 452 | 1 445 | 1 468 | 1 502 | 1 498 | 1 535 | 1 522 | 1 543 | 1 563 | 1 552 | 1 519 | 1 491 | 1 438 |
| Lithuania | - | - | - | 1 433 | 1 448 | 1 483 | 1 481 | 1 467 | 1 486 | 1 481 | 1 498 | 1 497 | 1 486 | 1 435 | 1 423 | 1 412 |
| Luxembourg | 1 834 | 1 851 | 1 442 | 1 471 | 1 487 | 1 504 | 1 498 | 1 490 | 1 462 | 1 473 | 1 519 | 1 528 | 1 505 | 1 488 | 1 495 | 1 497 |
| Malta | - | - | - | - | - | - | - | 1 317 | 1 182 | 1 200 | 1 216 | 1 465 | 1 212 | 1 199 | 1 206 | 1 216 |
| Netherlands | 1 260 | 1 264 | 1 301 | 1 314 | 1 337 | 1 332 | 1 350 | 1 324 | 1 295 | 1 254 | 1 249 | 1 266 | 1 288 | 1 285 | 1 323 | 1 300 |
| Poland | - | - | - | 1 181 | 1 242 | 1 271 | 1 304 | 1 260 | 1 261 | 1 317 | 1 378 | 1 383 | 1 376 | 1 356 | 1 383 | 1 393 |
| Portugal | - | 1 229 | 1 254 | 1 295 | 1 329 | 1 352 | 1 365 | 1 352 | 1 344 | 1 333 | 1 354 | 1 361 | 1 350 | 1 345 | 1 343 | 1 339 |
| Romania | - | - | - | - | - | - | 1 268 | 1 286 | 1 291 | 1 281 | 1 325 | 1 381 | 1 365 | 1 347 | 1 333 | 1 341 |
| Slovakia | - | - | - | - | 1 174 | - | - | - | - | 1 386 | 1 418 | 1 421 | 1 410 | 1 410 | 1 420 | 1 426 |
| Slovenia | - | - | - | 1 246 | 1 305 | 1 316 | 1 340 | 1 350 | 1 346 | 1 332 | 1 355 | 1 358 | 1 344 | 1 333 | 1 335 | 1 361 |
| Spain | 1 266 | 1 725 | 1 317 | 1 335 | 1 374 | 1 395 | 1 416 | 1 400 | 1 394 | 1 399 | 1 413 | 1 410 | 1 396 | 1 355 | 1 357 | 1 363 |
| Sweden | 1 448 | 1 454 | 1 472 | 1 467 | 1 470 | 1 488 | 1 503 | 1 488 | 1 490 | 1 497 | 1 510 | 1 522 | 1 520 | 1 513 | 1 526 | 1 515 |
| United Kingdom | 1 347 | 1 356 | 1 392 | 1 387 | 1 374 | 1 390 | 1 394 | 1 380 | 1 358 | 1 384 | 1 410 | 1 398 | 1 394 | 1 381 | 1 393 | 1 411 |

**Table A1.3 Average $CO_2$ emissions from new passenger cars by Member State (g $CO_2$/km)**

| | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Austria | 165.6 | 164.4 | 163.8 | 161.9 | 162.1 | 163.7 | 162.9 | 158.1 | 150.2 | 144.0 | 138.7 | 135.7 | 131.6 | 128.5 | 123.7 | 120.4 |
| Belgium | 163.7 | 161.1 | 158.1 | 156.5 | 155.2 | 153.9 | 152.8 | 147.8 | 142.1 | 133.4 | 127.2 | 128.0 | 124.0 | 121.3 | 117.9 | 115.9 |
| Bulgaria | - | - | - | - | - | - | 171.6 | 171.5 | 172.1 | 158.9 | 151.4 | 149.2 | 141.7 | 135.9 | 130.3 | 125.8 |
| Croatia | - | - | - | - | - | - | - | - | - | - | - | - | 127.1 | 115.8 | 112.8 | 111.5 |
| Cyprus | - | - | - | 173.4 | 173.0 | 170.1 | 170.3 | 165.6 | 160.7 | 155.8 | 149.9 | 144.3 | 139.2 | 129.8 | 125.7 | 123.5 |
| Czech Republic | - | - | - | 154.0 | 155.3 | 154.2 | 154.2 | 154.4 | 155.5 | 148.9 | 144.5 | 140.8 | 134.6 | 131.6 | 126.3 | 121.2 |
| Denmark | 172.9 | 170.0 | 169.0 | 165.9 | 163.7 | 162.5 | 159.8 | 146.4 | 139.1 | 126.6 | 125.0 | 117.0 | 112.7 | 110.2 | 106.2 | 106.0 |
| Estonia | - | - | - | 179.0 | 183.7 | 182.7 | 181.6 | 177.4 | 170.3 | 162.0 | 156.9 | 150.3 | 147.0 | 140.9 | 137.2 | 133.9 |
| Finland | 178.1 | 177.2 | 178.3 | 179.8 | 179.5 | 179.2 | 177.3 | 162.9 | 157.0 | 149.0 | 144.0 | 139.1 | 131.8 | 127.4 | 123.0 | 120.0 |
| France | 159.8 | 156.8 | 155.0 | 153.1 | 152.3 | 149.9 | 149.4 | 140.1 | 133.5 | 130.5 | 127.7 | 124.4 | 117.4 | 114.2 | 111.0 | 109.8 |
| Germany | 179.5 | 177.4 | 175.9 | 174.9 | 173.4 | 172.5 | 169.5 | 164.8 | 154.0 | 151.1 | 145.6 | 141.6 | 136.1 | 132.5 | 128.3 | 126.9 |
| Greece | 166.5 | 167.8 | 168.9 | 168.8 | 167.4 | 166.5 | 165.3 | 160.8 | 157.4 | 143.7 | 132.7 | 121.1 | 111.9 | 108.2 | 106.4 | 106.3 |
| Hungary | - | - | - | 158.5 | 156.3 | 154.6 | 155.0 | 153.4 | 153.4 | 147.4 | 141.6 | 140.8 | 134.4 | 133.0 | 129.6 | 125.9 |
| Ireland | 166.6 | 164.3 | 166.7 | 167.6 | 166.8 | 166.3 | 161.6 | 156.8 | 144.4 | 133.2 | 128.3 | 125.1 | 120.7 | 117.1 | 114.1 | 112.0 |
| Italy | 158.3 | 156.6 | 152.9 | 150.0 | 149.5 | 149.2 | 146.5 | 144.7 | 136.3 | 132.7 | 129.6 | 126.2 | 121.1 | 118.1 | 115.2 | 113.3 |
| Latvia | - | - | - | 192.4 | 187.2 | 183.1 | 183.5 | 180.6 | 176.9 | 162.0 | 154.4 | 152.0 | 147.1 | 140.4 | 137.1 | 128.9 |
| Lithuania | - | - | - | 187.5 | 186.3 | 163.4 | 176.5 | 170.1 | 166.0 | 150.9 | 144.4 | 144.2 | 139.8 | 135.8 | 130.0 | 126.2 |
| Luxembourg | 177.0 | 173.8 | 173.5 | 169.7 | 168.6 | 168.2 | 165.8 | 159.5 | 152.5 | 146.0 | 142.2 | 137.0 | 133.4 | 129.9 | 127.5 | 126.1 |
| Malta | - | - | - | 148.8 | 150.5 | 145.9 | 147.8 | 146.9 | 135.7 | 131.2 | 124.7 | 121.5 | 118.7 | 115.3 | 113.3 | 111.8 |
| Netherlands | 174.0 | 172.4 | 173.5 | 171.0 | 169.9 | 166.7 | 164.8 | 156.7 | 146.9 | 135.8 | 126.1 | 118.6 | 109.1 | 107.3 | 101.2 | 105.9 |
| Poland | - | - | - | 154.1 | 155.2 | 155.9 | 153.7 | 153.1 | 151.6 | 146.2 | 144.5 | 141.3 | 138.1 | 132.9 | 129.3 | 125.8 |
| Portugal | - | 154.0 | 149.9 | 147.1 | 144.9 | 145.0 | 144.2 | 138.2 | 133.8 | 127.2 | 122.8 | 117.6 | 112.2 | 108.8 | 105.7 | 104.7 |
| Romania | - | - | - | - | - | - | 154.8 | 156.0 | 157.0 | 148.5 | 140.7 | 139.0 | 132.1 | 128.2 | 125.0 | 122.0 |
| Slovakia | - | - | - | - | 157.4 | 152.0 | 152.7 | 150.4 | 146.6 | 149.0 | 144.9 | 141.0 | 135.1 | 131.7 | 127.6 | 124.8 |
| Slovenia | - | - | - | 152.7 | 157.2 | 155.3 | 156.3 | 155.9 | 152.0 | 144.4 | 139.7 | 133.4 | 125.6 | 121.3 | 119.2 | 119.0 |
| Spain | 156.8 | 156.4 | 157.0 | 155.3 | 155.3 | 155.6 | 153.2 | 148.2 | 142.2 | 137.9 | 133.8 | 128.7 | 122.4 | 118.6 | 115.3 | 114.4 |
| Sweden | 200.2 | 198.2 | 198.5 | 197.2 | 193.8 | 188.6 | 181.4 | 173.9 | 164.5 | 151.3 | 141.8 | 135.9 | 133.2 | 131.0 | 126.3 | 123.1 |
| United Kingdom | 177.9 | 174.8 | 172.7 | 171.4 | 169.7 | 167.7 | 164.7 | 158.2 | 149.7 | 144.2 | 138.0 | 132.9 | 128.3 | 124.6 | 121.3 | 120.1 |

**Table A1.4 New vans by Member State: registrations, mass and average emissions (g $CO_2$/km)**

| | Registrations | | | | | Mass | | | | | Average emissions | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2012 | 2013 | 2014 | 2015 | 2016 | 2012 | 2013 | 2014 | 2015 | 2016 | 2012 | 2013 | 2014 | 2015 | 2016 |
| Austria | 26 | 27 | 30 | 31 | 34 | 1 856 | 1 860 | 1 900 | 1 905 | 1 928 | 186.6 | 185.8 | 183.6 | 178.3 | 171.6 |
| Belgium | 53 | 51 | 52 | 59 | 65 | 1 842 | 1 861 | 1 883 | 1 875 | 1 861 | 185.8 | 182.8 | 179.4 | 175.8 | 169.2 |
| Bulgaria | 8 | 7 | 8 | 9 | 9 | 1 578 | 1 592 | 1 545 | 1 526 | 1 553 | 160.8 | 156.3 | 149.2 | 144.0 | 141.1 |
| Croatia | | | 4 | 6 | 7 | | | 1 668 | 1 646 | 1 708 | | | 158.8 | 154.3 | 150.1 |
| Cyprus | 1 | 1 | 1 | 1 | 2 | 1 605 | 1 734 | 1 674 | 1 661 | 1 665 | 151.5 | 170.6 | 158.1 | 143.2 | 144.1 |
| Czech Republic | 10 | 10 | 12 | 13 | 11 | 1 827 | 1 835 | 1 942 | 1 890 | 1 959 | 196.0 | 189.1 | 191.2 | 183.0 | 183.2 |
| Denmark | 11 | 17 | 25 | 29 | 34 | 1 854 | 1 793 | 1 736 | 1 731 | 1 777 | 178.1 | 166.8 | 155.0 | 151.1 | 151.7 |
| Estonia | 2 | 3 | 3 | 4 | 4 | 1 821 | 1 831 | 1 831 | 1 724 | 1 741 | 184.4 | 182.0 | 178.1 | 165.1 | 161.9 |
| Finland | 10 | 10 | 10 | 10 | 12 | 1 922 | 1 910 | 1 936 | 1 952 | 1 917 | 193.5 | 182.0 | 179.7 | 174.7 | 167.0 |
| France | 227 | 300 | 348 | 309 | 283 | 1 804 | 1 601 | 1 625 | 1 674 | 1 761 | 170.2 | 152.8 | 151.6 | 154.7 | 158.9 |
| Germany | 195 | 199 | 212 | 224 | 245 | 2 034 | 1 911 | 1 913 | 1 908 | 1 946 | 195.5 | 192.9 | 190.1 | 186.3 | 178.7 |
| Greece | 2 | 3 | 5 | 5 | 6 | 1 634 | 1 624 | 1 598 | 1 602 | 1 690 | 170.3 | 161.3 | 157.0 | 156.0 | 155.2 |
| Hungary | 8 | 10 | 15 | 15 | 19 | 1 828 | 1 845 | 1 843 | 1 884 | 1 850 | 184.0 | 181.9 | 177.7 | 177.0 | 168.0 |
| Ireland | 6 | 10 | 16 | 22 | 26 | 1 762 | 1 785 | 1 778 | 1 820 | 1 799 | 175.6 | 177.2 | 168.7 | 169.3 | 163.5 |
| Italy | 106 | 92 | 107 | 117 | 167 | 1 713 | 1 707 | 1 674 | 1 626 | 1 631 | 168.2 | 163.5 | 157.0 | 153.2 | 145.0 |
| Latvia | 2 | 2 | 2 | 2 | 2 | 1 770 | 1 750 | 1 728 | 1 747 | 1 728 | 176.9 | 171.6 | 167.4 | 165.3 | 156.6 |
| Lithuania | 1 | 2 | 2 | 2 | 3 | 1 891 | 1 856 | 1 830 | 1 814 | 1 896 | 190.8 | 180.3 | 176.3 | 169.2 | 168.8 |
| Luxembourg | 3 | 3 | 3 | 3 | 4 | 1 902 | 1 857 | 1 845 | 1 817 | 1 830 | 188.3 | 179.2 | 178.8 | 172.8 | 167.8 |
| Malta | 0 | 0 | 0 | 1 | 1 | 1 507 | 1 518 | 1 520 | 1 602 | 1 598 | 147.5 | 150.5 | 145.4 | 153.6 | 146.9 |
| Netherlands | 47 | 49 | 46 | 49 | 63 | 1 777 | 1 774 | 1 778 | 1 785 | 1 763 | 177.5 | 173.4 | 167.4 | 163.3 | 155.5 |
| Poland | 30 | 34 | 61 | 47 | 47 | 1 778 | 1 796 | 1 779 | 1 834 | 1 872 | 179.6 | 176.4 | 168.5 | 177.2 | 171.3 |
| Portugal | 13 | 17 | 24 | 27 | 29 | 1 579 | 1 583 | 1 581 | 1 570 | 1 615 | 154.2 | 150.9 | 144.8 | 141.7 | 140.1 |
| Romania | 8 | 6 | 8 | 9 | 10 | 1 806 | 1 766 | 1 781 | 1 791 | 1 832 | 183.1 | 171.8 | 171.9 | 170.3 | 170.1 |
| Slovakia | 5 | 5 | 5 | 7 | 7 | 1 986 | 1 995 | 2 026 | 2 006 | 2 045 | 200.8 | 196.3 | 193.2 | 186.8 | 185.6 |
| Slovenia | 5 | 6 | 5 | 6 | 7 | 1 860 | 1 849 | 1 877 | 1 853 | 1 873 | 191.2 | 188.0 | 185.1 | 174.9 | 168.2 |
| Spain | 65 | 70 | 90 | 76 | 113 | 1 764 | 1 734 | 1 672 | 1 659 | 1 680 | 167.4 | 162.9 | 156.1 | 154.6 | 148.0 |
| Sweden | 21 | 20 | 26 | 28 | 30 | 1 724 | 1 760 | 1 811 | 1 775 | 1 763 | 165.8 | 167.1 | 170.4 | 163.0 | 155.2 |
| United Kingdom | 232 | 262 | 307 | 351 | 350 | 1 815 | 1 827 | 1 838 | 1 848 | 1 879 | 186.3 | 185.2 | 181.0 | 177.9 | 172.9 |

# Annex 2

**Table A2.1 Data used in calculating the $CO_2$ emission performance of car manufacturers in 2016**

| Manufacturer | Pools and derogations | Number of registrations | Average $CO_2$ (75 %) corrected | Specific emission target | Distance to target |
|---|---|---|---|---|---|
| Adidor Voitures SAS | DMD | 16 | 179 | | |
| Alfa Romeo SPA | P3 | 63 120 | 115.042 | 128.478 | – 13.436 |
| Alpina Burkard Bovensiepen GmbH E CO KG | DMD | 773 | 172.604 | | |
| Anhui Jianghuai Automobile | DMD | 52 | 232.692 | | |
| Aston Martin Lagonda LTD | D | 1 367 | 308.661 | 309 | – 0.339 |
| Audi AG | P14 | 783 896 | 124.968 | 138.723 | – 13.755 |
| Audi Hungaria Motor KFT | P14 | 9 950 | 144.517 | 130 | 14.517 |
| Automobiles Citröen | | 614 686 | 103.312 | 122.81 | – 19.498 |
| Automobiles Peugeot | | 889 051 | 101.748 | 123.348 | – 21.6 |
| Avtovaz JSC | P10 | 2 676 | 180.06 | 120.367 | 59.693 |
| Bentley Motors LTD | D | 3 260 | 285.502 | 294 | – 8.498 |
| Bluecar SAS | | 1 466 | 0 | 128.873 | – 128.873 |
| Bluecar Italy SRL | | 8 | 0 | 133.089 | – 133.089 |
| Bayerische Motoren Werke AG | P1 | 973 555 | 121.947 | 138.104 | – 16.157 |
| BMW M GMBH | P1 | 15 780 | 175.968 | 144.25 | 31.718 |
| Bugatti Automobiles SAS | P14 | 7 | 568.143 | 157.376 | 410.767 |
| BYD Auto Industry Company Limited | DMD | 32 | 0 | | |
| Caterham Cars Limited | DMD | 130 | 150.438 | | |
| Chevrolet Italia SPA | P5 | 1 | 116 | 120.293 | – 4.293 |
| FCA US LLC | P3 | 104 390 | 146.673 | 142.421 | 4.252 |
| CNG–Technik GmbH | P4 | 567 | 162.695 | 137.799 | 24.896 |
| Automobile Dacia SA | P10 | 414 892 | 117.432 | 121.203 | – 3.771 |
| Daimler AG | P2 | 910 189 | 124.543 | 138.64 | – 14.097 |
| Donkervoort Automobielen BV | DMD | 5 | 178 | | |
| DR Motor Company SRL | DMD | 490 | 147.808 | | |
| Ferrari SPA | D | 2482 | 281.007 | 290 | – 8.993 |
| FCA Italy SPA | P3 | 768 863 | 115.961 | 119.443 | – 3.482 |
| Ford India Private Limited | P4 | 7 363 | 113.646 | 114.583 | – 0.937 |
| Ford Motor Company of Australia Limited | P4 | 1 | 206 | 173.762 | 32.238 |
| Ford Motor Company | P4 | 16 184 | 216.871 | 149.108 | 67.763 |
| Ford-Werke GmbH | P4 | 1 010 774 | 118.435 | 128.663 | – 10.228 |
| Fuji Heavy Industries LTD | ND | 30 249 | 158.756 | 164.616 | – 5.86 |
| General Motors Company | P5 | 1 138 | 265.656 | 151.235 | 114.421 |
| General Motors Holdings LLC | P5 | 642 | 267.399 | 152.108 | 115.291 |

**Table A2.1 Data used in calculating the $CO_2$ emission performance of car manufacturers in 2016 (cont.)**

| Manufacturer | Pools and derogations | Number of registrations | Average $CO_2$ (75 %) corrected | Specific emission target | Distance to target |
|---|---|---|---|---|---|
| GM Korea Company | P5 | 378 | 121.569 | 124.182 | – 2.613 |
| Great Wall Motor Company Limited | DMD | 167 | 184.964 | | |
| Honda Automobile China CO LTD | P6 | 5 | 128.8 | 118.657 | 10.143 |
| Honda Motor CO LTD | P6 | 66 732 | 116.989 | 123.4 | – 6.411 |
| Honda Turkiye AS | P6 | 1 081 | 154.871 | 125.445 | 29.426 |
| Honda of the UK Manufacturing LTD | P6 | 83 283 | 134.565 | 135.144 | – 0.579 |
| Hyundai Motor Company | P7 | 78 881 | 131.212 | 135.58 | – 4.368 |
| Hyundai Assan Otomotiv Sanayi VE Ticaret AS | P7 | 164 974 | 112.035 | 115.761 | – 3.726 |
| Hyundai Motor Manufacturing Czech SRO | P7 | 245 611 | 130.815 | 133.97 | – 3.155 |
| Hyundai Motor Europe GmgH | P7 | 840 | 109.012 | 116.796 | – 7.784 |
| Hyundai Motor India Ltd | P7 | 15 | 114.533 | 118.194 | – 3.661 |
| Isuzu Motors Ltd | DMD | 9 | 198.556 | | |
| Jaguar Land Rover Limited | P12/ND | 225 192 | 149.841 | 178.025 | – 28.184 |
| Kia Motors Corporation | P8 | 250 700 | 119.687 | 127.681 | – 7.994 |
| Kia Motors Slovakia SRO | P8 | 171 005 | 132.348 | 132.789 | – 0.441 |
| Koenigsegg Automotive AB | DMD | 4 | 377.75 | | |
| KTM-Sportmotorcycle AG | DMD | 30 | 189.967 | | |
| Lada Automobiel GmbH | DMD | 889 | 215.847 | | |
| Automobili Lamborghini SPA | D | 856 | 315.729 | 318 | – 2.271 |
| Litex Motors AD | DMD | 51 | 181.902 | | |
| Lotus Cars Limited | DMD | 784 | 207.352 | | |
| Magyar Suzuki Corporation Ltd | P11/ND | 137 789 | 120.61 | 123.114 | – 2.504 |
| Mahindra & Mahindra Ltd | DMD | 396 | 172.326 | | |
| Maruti Suzuki India Ltd | P11/ND | 14 234 | 100.181 | 123.114 | – 22.933 |
| Maserati SPA | D | 7 111 | 197.005 | 245 | – 47.995 |
| Mazda Motor Corporation | ND | 219 859 | 126.74 | 129.426 | – 2.686 |
| McLaren Automotive Limited | D | 739 | 262.188 | 275 | – 12.812 |
| Mercedes– AMG GmbH | P2 | 2 194 | 220.39 | 141.17 | 79.22 |
| MG Motor UK Limited | D | 4 159 | 126.445 | 146 | – 19.555 |
| Mitsubishi Motors Corporation MMC | P9 | 78 199 | 125.408 | 140.027 | – 14.619 |
| Mitsubishi Motors Thailand Co Ltd MMTH | P9 | 26 176 | 96.226 | 108.56 | – 12.334 |
| Morgan Technologies Ltd | DMD | 473 | 187.977 | | |
| National Electric Vehicle Sweden | DMD | 1 | 161 | | |
| Nissan International SA | | 550 090 | 116.666 | 129.402 | – 12.736 |
| Noble Automotive Ltd | DMD | 2 | 333 | | |
| Adam Opel AG | P5 | 968 401 | 122.854 | 127.667 | – 4.813 |
| Pagani Automobili SPA | DMD | 1 | 343 | | |
| PGO Automobiles | DMD | 26 | 172.423 | | |
| DR Ing HCF Porsche AG | P14 | 67 643 | 185.019 | 152.535 | 32.484 |
| Quattro GmbH | P14 | 9 275 | 214.612 | 147.126 | 67.486 |
| Radical Motorsport Ltd | DMD | 5 | 319.8 | | |
| Renault SAS | P10 | 1 128 508 | 105.185 | 125.246 | – 20.061 |
| Renault Trucks | DMD | 49 | 172.184 | | |

**Table A2.1 Data used in calculating the $CO_2$ emission performance of car manufacturers in 2016 (cont.)**

| Manufacturer | Pools and derogations | Number of registrations | Average $CO_2$ (75 %) corrected | Specific emission target | Distance to target |
|---|---|---|---|---|---|
| Rolls-Royce Motor Cars Ltd | P1 | 756 | 334.075 | 183.226 | 150.849 |
| Seat SA | P14 | 340 155 | 115.849 | 123.936 | – 8.087 |
| Secma SAS | DMD | 39 | 132.846 | | |
| Shanghai Maple Automobile Co Ltd | DMD | 1 | 256 | | |
| Skoda Auto AS | P14 | 627 533 | 111.894 | 124.918 | – 13.024 |
| Ssangyong Motor Company | D | 18 228 | 153.254 | 167.573 | – 14.319 |
| Suzuki Motor Corporation | P11/ND | 14 893 | 156.047 | 123.114 | 32.933 |
| Suzuki Motor Thailand Co Ltd | P11/ND | 26 427 | 96.76 | 123.114 | – 26.354 |
| Taiqi Electric Vehicle Co. Limited | DMD | 1 | 0.000 | | |
| Tata Motors Limited | P12/ND | 5 | 149.800 | 178.025 | – 28.225 |
| Tazzari Gl Spa | DMD | 2 | 0.000 | | |
| Tesla Motors Ltd | | 10829 | 0.000 | 169.018 | – 169.018 |
| Toyota Motor Europe Nv Sa | | 616164 | 105.447 | 126.835 | – 21.388 |
| Volkswagen Ag | P14 | 1651339 | 118.551 | 130.216 | – 11.665 |
| Volvo Car Corporation | | 270854 | 121.166 | 145.620 | – 24.454 |

**Notes:** The number of registrations represents the number of vehicles having both a mass and an emission value. The parameters used in calculating manufacturer performance for 2016 are set out in Table 2.1.

The Commission implementing decision confirming the 2016 $CO_2$ emissions assigns some manufacturers an uncertainty adjustment for 2016 data, which modifies the distance to their targets. Here the uncertainty is not reported. A detailed description of the uncertainty calculation is presented with the Commission implementing decision.

'D' indicates that a derogation for small-volume manufacturers has been granted in accordance with the Commission implementing decision.

'DMD' means that a *de minimis* derogation applies, i.e. a manufacturer which together with all its connected undertakings was responsible for fewer than 1 000 new registered vehicles in 2016. According to the Regulation (EU) No 333/2014, they do not have to meet a specific emission target. However the targets are reported in the above table for information purposes only.

'ND' indicates that a derogation for niche manufacturers has been granted in accordance with the Commission implementing decision.

'P' indicates that the manufacturer is member of a pool in accordance with Article 7 of Regulation (EC) No 443/2009.

**Table A2.2 Data used in calculating the $CO_2$ emission performance of light commercial vehicle manufacturers in 2016**

| Manufacturer | Pools and derogations | Number of registrations | Average $CO_2$ (75 %) corrected | Specific emission target | Disatnce to target |
|---|---|---|---|---|---|
| Alfa Romeo Spa | | 3 | 108.000 | 145.302 | – 37.302 |
| Audi Ag | P9 | 610 | 137.399 | 191.687 | – 54.288 |
| Automobiles Citroen | | 147 450 | 132.337 | 167.907 | – 35.570 |
| Automobiles Peugeot | | 152 426 | 133.395 | 170.220 | – 36.825 |
| Avtovaz Jsc | P8 | 30 | 216.000 | 135.847 | 80.153 |
| Bluecar Sas | DMD | 173 | 0.000 | | |
| Bayerische Motoren Werke Ag | DMD | 324 | 143.344 | | |
| Bmw M Gmbh | DMD | 291 | 127.203 | | |
| Fca Us Llc | P2 | 163 | 202.208 | 204.098 | – 1.890 |
| Cng-Technik Gmbh | P3 | 2 | 108.000 | 152.541 | – 44.541 |
| Comarth Engineering Sl | DMD | 5 | 0.000 | | |
| Automobile Dacia Sa | P8 | 23 928 | 118.662 | 135.482 | – 16.820 |
| Daimler Ag | P1 | 141 780 | 177.473 | 215.538 | – 38.065 |
| Dfsk Motor Co Ltd | DMD | 503 | 172.291 | | |
| Esagono Energia Srl | DMD | 6 | 0.000 | | |
| Fca Italy Spa | P2 | 158 552 | 143.505 | 172.123 | – 28.618 |
| Ford Motor Company Of Australia Limited | P3 | 31 598 | 207.251 | 221.102 | – 13.851 |
| Ford Motor Company | P3 | 512 | 202.836 | 218.576 | – 15.740 |
| Ford-Werke Gmbh | P3 | 243 326 | 158.071 | 192.422 | – 34.351 |
| Fuji Heavy Industries Ltd | DMD | 86 | 155.735 | | |
| Mitsubishi Fuso Truck & Bus Corporation | P1 | 543 | 235.756 | 253.909 | – 18.153 |
| Llc Automobile Plant Gaz | DMD | 4 | 285.000 | | |
| General Motors Company | P4 | 11 | 269.750 | 250.558 | 19.192 |
| Gonow Auto Co Ltd | DMD | 44 | 191.314 | | |
| Goupil Industrie Sa | DMD | 60 | 0.000 | | |
| Great Wall Motor Company Limited | DMD | 183 | 196.610 | | |
| Honda Motor Co Ltd | DMD | 38 | 108.500 | | |
| Honda Of The Uk Manufacturing Ltd | DMD | 89 | 134.817 | | |
| Hyundai Motor Company | P5 | 3489 | 207.827 | 225.072 | – 17.245 |
| Hyundai Assan Otomotiv Sanayi Ve Ticaret | P5 | 32 | 99.600 | 125.504 | – 25.904 |
| Hyundai Motor Manufacturing Czech Sro | P5 | 461 | 154.310 | 186.196 | – 31.886 |
| Isuzu Motors Limited | | 12 658 | 197.733 | 208.994 | -11.261 |
| Iveco Spa | | 30 686 | 210.302 | 232.423 | -22.121 |
| Jaguar Land Rover Limited | D | 7 435 | 247.609 | 272.000 | – 24.391 |
| Kia Motors Corporation | P6 | 498 | 115.834 | 147.327 | – 31.493 |
| Kia Motors Slovakia Sro | P6 | 436 | 124.736 | 158.336 | – 33.600 |
| Lada Automobile Gmbh | DMD | 15 | 216.000 | | |
| Magyar Suzuki Corporation Ltd | DMD | 25 | 117.350 | | |
| Mahindra & Mahindra Ltd | DMD | 386 | 208.808 | | |
| Mazda Motor Corporation | DMD | 556 | 138.385 | | |
| Mftbc | P1 | 162 | 235.806 | 258.513 | – 22.707 |
| Mitsubishi Motors Corporation Mmc | P7/D | 955 | 166.357 | 195.000 | – 28.643 |
| Mitsubishi Motors Thailand Co Ltd Mmth | P7/D | 16 429 | 175.873 | 195.000 | – 19.127 |
| Nissan International Sa | | 52 940 | 135.342 | 191.107 | – 55.765 |

**Table A2.2 Data used in calculating the $CO_2$ emission performance of light commercial vehicle manufacturers in 2016 (cont.)**

| Manufacturer | Pools and derogations | Number of registrations | Average $CO_2$ (75 %) corrected | Specific emission target | Disatnce to target |
|---|---|---|---|---|---|
| Adam Opel Ag | P4 | 92 815 | 150.202 | 179.531 | – 29.329 |
| Piaggio & C Spa | D | 2 966 | 130.872 | 155.000 | – 24.128 |
| Dr Ing Hcf Porsche Ag | P9 | 96 | 180.487 | 210.465 | – 29.978 |
| Quattro Gmbh | P9 | 2 | 189.000 | 166.072 | 22.928 |
| Renault Sas | P8 | 216 516 | 133.477 | 175.639 | – 42.162 |
| Renault Trucks | | 9 111 | 196.829 | 229.655 | – 32.826 |
| Romanital Srl | DMD | 20 | 155.000 | | |
| Saic Maxus Automotive Co Ltd | DMD | 447 | 249.994 | | |
| Seat Sa | P9 | 952 | 103.075 | 126.562 | – 23.487 |
| Skoda Auto As | P9 | 5 188 | 103.349 | 130.968 | – 27.619 |
| Ssangyong Motor Company | DMD | 795 | 195.692 | 210.000 | – 14.308 |
| Streetscooter Gmbh | | 1 669 | 0.000 | 145.715 | – 145.715 |
| Suzuki Motor Corporation | DMD | 119 | 159.063 | | |
| Tata Motors Limited | | 6 | 196.000 | 210.015 | – 14.015 |
| Toyota Motor Europe Nv Sa | | 30 760 | 170.839 | 197.565 | – 26.726 |
| Univers Ve Helem | DMD | 2 | 0.000 | | |
| Volkswagen Ag | P9 | 190 987 | 152.518 | 183.040 | – 30.522 |
| Volvo Car Corporation | | 1 216 | 113.332 | 171.938 | – 58.606 |

**Notes:** The number of registrations represents the number of vehicles having both a mass and an emission value. The parameters used in calculating manufacturer performance for 2016 are set out in Table 2.1.

The Commission implementing decision confirming the 2015 $CO_2$ emissions assigns some manufacturers an uncertainty adjustment for 2015 data, which modifies the distance to their targets. Here the uncertainty is not reported. A detailed description of the uncertainty calculation is presented with the Commission implementing decision.

'D' indicates that a derogation for small-volume manufacturers has been granted in accordance with the Commission implementing decision.

'DMD' means that a *de minimis* derogation applies, i.e. a manufacturer which together with all its connected undertakings was responsible for fewer than 1 000 new registered vehicles in 2015. According to the Regulation (EU) No 253/2014, they do not have to meet a specific emission target. However the targets are reported in the above table for information purposes only.

'ND' indicates that a derogation for niche manufacturers has been granted in accordance with the Commission implementing decision.

'P' indicates that the manufacturer is member of a pool in accordance with Article 7 of Regulation (EC) No 510/2011.

European Environment Agency

**Monitoring $CO_2$ emissions from passenger cars and vans in 2016**

2017 — 58 pp. — 21 x 29.7 cm

ISBN 978-92-9213-925-4
doi: 10.2800/987976

TH-AL-17-019-EN-N
doi:10.2800/987976

European Environment Agency
Kongens Nytorv 6
1050 Copenhagen K
Denmark

Tel.: +45 33 36 71 00
Web: eea.europa.eu
Enquiries: eea.europa.eu/enquiries

Publications Office

European Environment Agency