

# Monitoring CO<sub>2</sub> emissions from new passenger cars in the EU: summary of data for 2011

---





## Executive summary

---

For the second year, the EEA has collected Member States' data on passenger car registrations, in accordance with Regulation (EC) No 443/2009 (CO<sub>2</sub> from cars). All Member States reported information on CO<sub>2</sub> emissions and the mass of cars, together with other vehicle characteristics. This data was used to evaluate the performance in 2011 of the new vehicle fleet, and its progress toward meeting the CO<sub>2</sub> emissions target of 130 gCO<sub>2</sub>/km by 2015.

The current dataset is provisional, and will now be sent for verification to all car manufacturers responsible for cars registered in the EU in 2011. The Commission will take account of errors noted by manufacturers, and correct the dataset as appropriate, before setting the final specific emissions targets for each manufacturer in the second half of 2012.

The provisional dataset indicates that manufacturers have once more improved their performance in terms of CO<sub>2</sub> emissions from

passenger cars: the average CO<sub>2</sub> emissions from the new car fleet in 2011 <sup>(1)</sup> was 135.7 gCO<sub>2</sub>/km, 4.6 gCO<sub>2</sub>/km less than in the previous monitoring year (140.3 gCO<sub>2</sub>/km in 2010).

Some of the key changes observed in the fleet are: the dieselisation of the fleet is continuing (55.2 % of the vehicles registered in 2011 in Europe are diesel vehicles); the average mass is now back to the level prior to the economic crisis (2007); and the engine capacity has decreased by 5 % since 2007.

Some of the above-mentioned changes, together with improved vehicle technology, led to greater fuel efficiency and lower average CO<sub>2</sub> emissions per kilometre travelled.

It should be noted that the 2011 specific emissions targets that subsequently emerge will not have mandatory force. They are intended to help manufacturers identify the effort required to reach the mandatory targets that will be applicable from 2012.

---

<sup>(1)</sup> The average CO<sub>2</sub> emission is calculated considering all the vehicles submitted, excluding IVAs, NSS and 'Out of scope'. IVAs are made on vehicles imported from third countries 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. 'Out of scope' vehicles are included in the database but out of the regulation scope.

# 1 Introduction

---

Carbon dioxide (CO<sub>2</sub>) emissions from road transport have increased by 23 % between 1990 and 2010, and they account for about one fifth of the EU's total CO<sub>2</sub> emissions. In order to ensure that the EU meets its greenhouse gas emission targets under the Kyoto Protocol, a comprehensive strategy to reduce CO<sub>2</sub> emissions from new cars and vans sold in the European Union was adopted in 2007.

As part of that strategy, Regulation (EC) No 443/2009 aims at reducing the average CO<sub>2</sub> emissions of new passenger cars. The Regulation sets a short-term target of 130 grams of CO<sub>2</sub> per kilometre (gCO<sub>2</sub>/km) by 2015, to be phased in from 2012, and a long term target of 95 gCO<sub>2</sub>/km by 2020.

According to Article 8 of Regulation (EC) No 443/2009, Member States shall record and annually transmit to the Commission information for each new passenger car registered on their territory. In particular, the following details are required for each new passenger car registered:

- manufacturer name: the person or body responsible to the type-approval authority (the national organisation responsible for approving and testing new vehicles before they can be sold in a country and for registering them once they have been sold) for all aspects of the type-approval procedure in accordance with Directive 2007/46/EC and for ensuring conformity of production;
- type, variant, version: these entries allow the identification of the vehicles as registered in type approval documentation and certificates of conformity;
- specific emissions of CO<sub>2</sub>: the CO<sub>2</sub> emissions of a passenger car in term of grams of CO<sub>2</sub> emitted per kilometre, and measured in accordance with Regulation (EC) No 715/2007. The specific CO<sub>2</sub> emissions of a vehicle version are determined using a type approval test cycle (NEDC) in laboratory conditions;
- mass in running order: the mass of the vehicle including the driver (75 kg), fuel (90 % filled), liquids (for cooling), and standard equipment as foreseen in the Directive 2007/46/EC;

- wheel base (the distance between the centre of the front and rear wheels);
- track width (the distance between the centre of the wheel on one side of the vehicle and the centre of the wheel on the opposite side); and
- fuel type and fuel mode.

Additional information, such as type approval number (useful for the identification of the vehicles), engine capacity, and engine power were also submitted.

The data now published is provisional. As a first step, it must therefore be verified by manufacturers to prevent specific emission targets being calculated with incorrect data. Manufacturers have three months within which to notify the Commission of any errors. The Commission will correct the dataset as appropriate, and publish the final dataset and specific emission targets, including the distance between the average emissions and the target for each manufacturer, in the fourth quarter of 2012.

Some values included in the provisional dataset will therefore be changed following verification by the manufacturers. But on the basis of the 2010 dataset verification process, those changes are expected to be limited, and will not affect the analysis of the aggregate data given in this document. By way of comparison, the average emissions in 2010 changed following the manufacturer verification process by only a few second decimal points, moving from the provisional 140.34 gCO<sub>2</sub>/km to the final 140.29 gCO<sub>2</sub>/km.

The provisional database provides the detailed data without taking into account other factors required for the calculation of both the specific emissions and the manufacturer targets, such as phase-in percentages, super-credits or eco-innovation credits. Additional information on the calculation of the target by manufacturers is available at: <http://www.eea.europa.eu/data-and-maps/data/co2-cars-emission-1>.

## 2 2011 monitoring exercise

### 2.1 Data submission and processing

For the reporting year 2011, the majority of Member States submitted the data by the deadline of the 28th of February in accordance with Article 8 of Regulation (EC) No 443/2009. However, five Member States (Austria, Cyprus, Czech Republic, Slovakia and Malta) were seriously delayed, and submitted their final datasets between the end of March and early May. One Member State (Ireland) submitted incomplete data (i.e. certain mandatory parameters have not been provided).

Data were submitted to the Central Data Repository (CDR) managed by the EEA. Several quality checks (automatic and manual) were performed in order to evaluate the accuracy and the quality of the dataset. These checks assessed:

- the completeness rate. This is comprised of two main components. The first component concerns numerical data such as vehicle mass and emissions rates for each vehicle. The second component measures the extent to which more granular data — such as data on very slight changes within a model type — are available for each vehicle that has been registered;
- data plausibility and outliers;
- assignment to manufacturer using harmonised denomination. Identical vehicles are often sold under different brand or model names in different countries. For the purposes of this study, one naming system was used to avoid confusion between identical vehicles;
- data variability (for the same vehicle, an estimate of the variability of the mass, emission and engine capacity were developed);
- handling of unknown, individual vehicle approvals (IVAs) and national small series vehicles (NSS) <sup>(2)</sup>.

These issues were addressed during the data evaluation process, and the majority of them were solved without significant data losses.

### 2.2 Monitoring and data quality

Member States have made significant efforts during the last few years to improve the monitoring and quality of the data. The use of official documents, such as type approval documentation (TAD) and Certificates of Conformity (CoC) have resulted in more accurate values being recorded and reported. Accuracy has also been helped by the continuous collaboration between manufacturers, Member States, the EEA and the Commission.

As regards the completeness of the data sets, Member States have, with very few exceptions, provided values for all mandatory parameters. The accuracy of those values will have to be analysed following the verification by the manufacturers.

The completeness rate (defined as the ratio between the number of registrations having a value for a specific entry and the total number of registrations) is a good indication of the improvements in the monitoring systems achieved over the years (Table A.6 of the Annex). The completeness rate for the mandatory parameters is particularly high:

- The *entries for mass and CO<sub>2</sub> emissions* have been completed in 99.95 % of the total registrations.
- The *entries for type, variant and version* have been completed in 95.0 % of the total registrations.
- For other numerical entries: *the wheelbase values* have been completed in 99.8 % and the *steering axle values* in 97.5 % of total registrations.

It is important to stress the need for Member States to provide accurate data and to ensure that the entries are correctly completed. There are still a number of issues that must be addressed for the 2012 monitoring exercise, in particular the correct reporting of type, variant and version. These parameters are essential for enabling the manufacturers to verify the datasets adequately.

<sup>(2)</sup> IVAs are made on vehicles imported from third countries 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.

### 3 Trends in new passenger cars

#### 3.1 Average CO<sub>2</sub> emissions from new passenger cars

The provisional 2011 EU database contains about 340 000 records accounting for 12.8 million vehicles. This includes 12 609 individually approved vehicles (IVAs), 472 vehicles approved under national small series rules (NSS) and around 8 500 unidentified vehicles. Unidentified vehicles are vehicles where the records for either the manufacturer, or the mass in running order, or the CO<sub>2</sub> emissions are missing in the database for unknown reasons. Unidentified vehicles will not be considered for the calculation of the average specific emissions or the specific emissions targets for manufacturers, unless these vehicles are identified and noted by the manufacturer as part of their verification of the data.

The number of registrations in the EU-27 has increased constantly between 2001 and 2007 (calculated on the basis of available Member States' data, see Table A.1 in Annex 1) and decreased since 2007 (when 15.5 million vehicles registered). In 2011 there were 12.8 million registrations compared to 13.2 million in 2010 (Figure 1). Compared to 2010, registrations decreased in 2011 in Greece (– 31 %), Portugal (– 31 %), Spain (– 17 %), Romania (– 13 %), Italy (– 11 %) and Slovenia (– 8 %). Cyprus, France and UK also had a slight decrease in registrations (– 2 to – 4 %). The remaining Member States saw an increase in registrations.

The EU-15<sup>(3)</sup> accounts for the vast majority of registrations of new passenger cars in the Union, with a share of almost 94 % in total registrations. It is important to note that second-hand vehicles are not included in the database. Among the EU-15, France, Germany, Italy, Spain and the United Kingdom account for 80 % of the registrations. Compared to 2010, the number of vehicles registered in the EU-12 has increased by 10 %, while the number of newly registered vehicles in the EU-15 has decreased by 3 %.

According to the provisional data, the average CO<sub>2</sub> emissions from the new car fleet in the EU in 2011

were 135.7 gCO<sub>2</sub>/km (Figure 2). Average specific emissions of CO<sub>2</sub> have decreased by some 4.6 gCO<sub>2</sub>/km, or 3.3 %, compared to the previous year (140.3 gCO<sub>2</sub>/km in 2010).

Diesel vehicles represent 55.2 % of the newly registered vehicle fleet as against 51.3 % in 2010. The average CO<sub>2</sub> emissions of diesel and petrol vehicles decreased by 4.8 gCO<sub>2</sub>/km compared to 2010. As in 2010, the difference between average CO<sub>2</sub> emissions of new diesel and new petrol vehicles is 3.2 gCO<sub>2</sub>/km, a small difference compared to previous years.

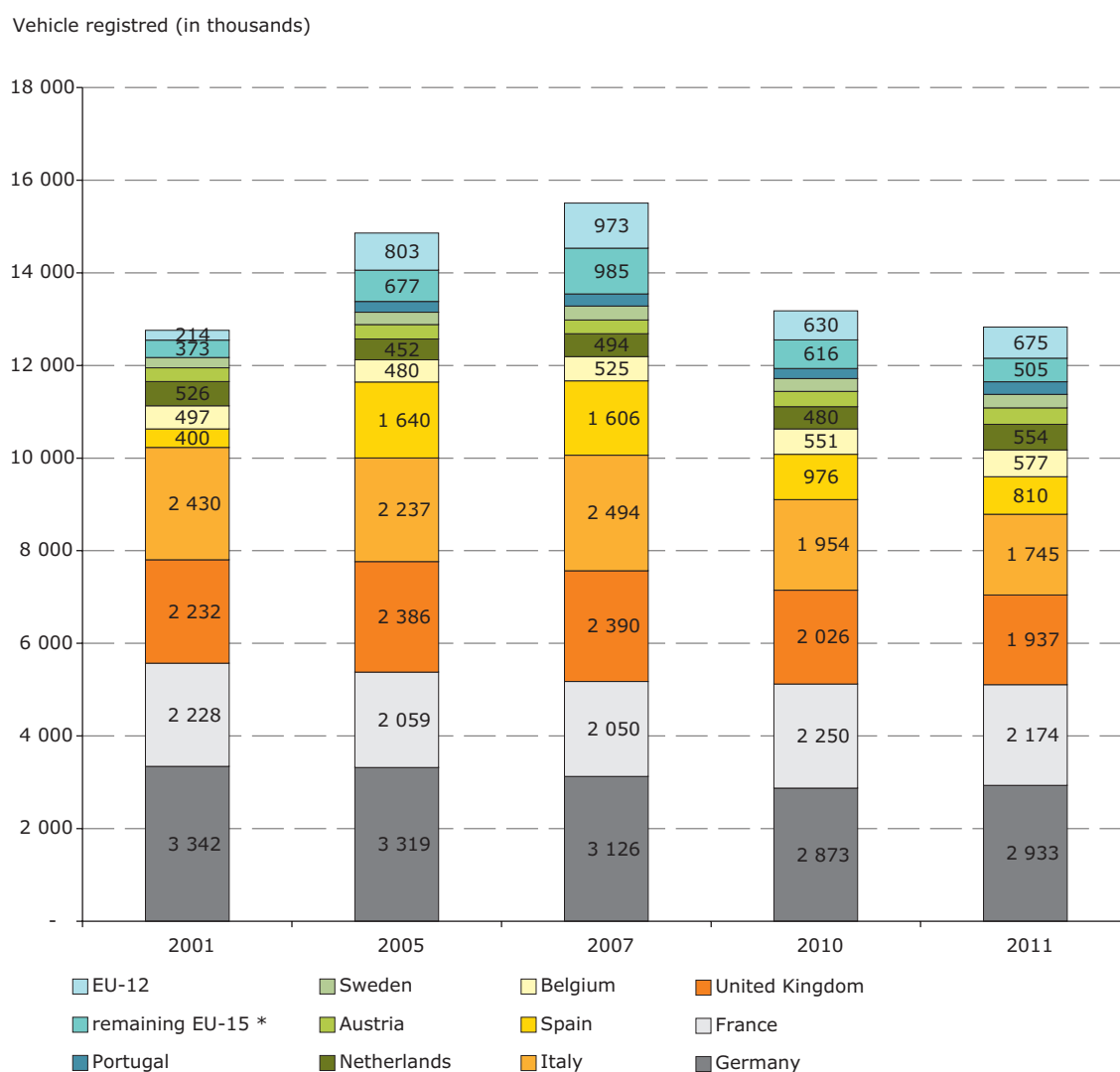
Compared to 2010, there has been a considerable decrease in the share of alternative fuel vehicles (AFVs). This decrease is due to the large drop in new registrations of LPG (liquefied petroleum gas) vehicles in the two Member States with the highest stock of LPG vehicles in Europe, namely France and Italy. Specific emissions of CO<sub>2</sub> from AFVs have decreased slightly compared to 2010.

On the basis of the monitoring data, it is possible to report CO<sub>2</sub> emissions for different fuel types used by AFVs (Table 3). It is noteworthy that the mix of vehicles considered in the AFV categories has changed over the years (natural gas vehicles, LPG vehicles, biodiesel vehicles, E85 vehicles and electric vehicles are included in the category). This helps explain the high variability in the trend of emissions and other characteristics of the vehicle (see Section 3.2).

Pure electric vehicles are propelled by electric motors, using electrical energy stored in batteries or another energy storage device. The average emission of this kind of vehicle is 0 gCO<sub>2</sub>/km. It is important to mention that only end of pipe<sup>(4)</sup> emissions are included in the dataset. Electric vehicles with so-called 'range extenders' are also included in the database. These vehicles have both an internal combustion engine and an electric motor, but the power to the wheels is only provided by the electric motor. The combustion engine is only used to power a generator that drives the electric motor. The emissions of electric vehicles with range extenders

<sup>(3)</sup> Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom.

<sup>(4)</sup> End of pipe emissions are the exhaust emissions of the vehicles. There are not end-of-pipe emissions for pure electric vehicles. However, pure electric vehicles produce indirect emissions when they are plugged in into the electricity grid. The indirect emissions are not taken into account in this report and in the regulation.

**Figure 1** Number of vehicles registered in EU-27 in 2001, 2005, 2007, 2010 and 2011

**Note:** \* Remaining EU-15: Denmark, Finland, Greece, Ireland, Luxembourg. Only from 2007 data on all EU-12 Member States are available.

**Table 1** Average CO<sub>2</sub> emissions from new passenger cars by fuel (EU-27 \*)

gCO <sub>2</sub> /km	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010 <sup>a</sup>	2011 <sup>a, b</sup>
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
Petrol	177.4	175.3	173.5	171.7	170	168.1	164.9	161.6	156.6	147.6	142.5	137.7
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
AFV	208	207.4	179.2	164.7	147.9	149.4	151.1	140	137	125.8	126.0	123.5

**Note:** \* The geographical scope of the data changes over time from EU-15 to EU-25 and EU-27, see Annex 1 for details.

<sup>a</sup>: The calculation for the years 2010 and 2011 was done without considering IVAs, NSS and 'out of scope' vehicles.

<sup>b</sup>: For the calculation of the average CO<sub>2</sub> emissions of AFVs, electric bi-fuel vehicles were not considered, because not correctly reported by Member States. Note that 2011 data are provisional.

are in general below 50 gCO<sub>2</sub>/km. Of the other types of AFVs, natural gas vehicles (NG-biomethane), LPG vehicles, and biodiesel vehicles have the lowest CO<sub>2</sub> emissions (below 125 gCO<sub>2</sub>/km), whereas ethanol-fuelled vehicles (E85) have the highest specific emissions (165 gCO<sub>2</sub>/km).

In 2011, the average new passenger car in the EU-15 emitted 9.5 gCO<sub>2</sub>/km less than the average newly registered vehicle in the EU-12 (Table 4). The last two years (2010 and 2011) were the first years in which significant progress was made in the EU-12: while in the period 2007–2009 the emissions in the EU-12 dropped by 3.6 gCO<sub>2</sub>/km, in the last two years the average emissions decreased by 9.5 gCO<sub>2</sub>/km. For the EU-15, the average reduction of CO<sub>2</sub> emissions (– 18.1 gCO<sub>2</sub>/km) in the last three years is comparable to the reduction of the previous eight years (– 18.9 gCO<sub>2</sub>/km for the period 2000–2008).

In comparison to 2010, the percentage of newly registered vehicles with emissions lower than 100 gCO<sub>2</sub>/km is now nearly twice as high (Figure 3). The number of new passenger cars emitting 101–120 gCO<sub>2</sub>/km also increased compared to the previous year, representing 30.5 % of the total registrations. The number of vehicles emitting less than 140 gCO<sub>2</sub>/km represents 67.0 % of the registrations in 2011 (61.5 % in 2010). This segment increased by more than 500 000 units in 2011.

The distributions of emissions, mass, engine capacity and power for three years (2005, 2010 and 2011) are shown in Figure 3. While there has been a big difference in terms of emissions performance of the vehicles between 2005 and 2011, there have been few changes for the other vehicle characteristics in the same period.

**Table 2** Share of fuel type in new passenger cars (EU-27 \*)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010 <sup>a</sup>	2011 <sup>a</sup>
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
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
AFV incl. electric	0.1	0.1	0.1	0.1	0.2	0.3	0.3	0.7	1.3	3.8	3.5	1.4

**Note:** \* The geographical scope of the data changes over time from EU-15 to EU-25 and EU-27, see Annex 1 for details.

<sup>a</sup>: The calculation for the years 2010 and 2011 was done without considering IVAs, NSS and 'out of scope' vehicles. Note that 2011 data are provisional.

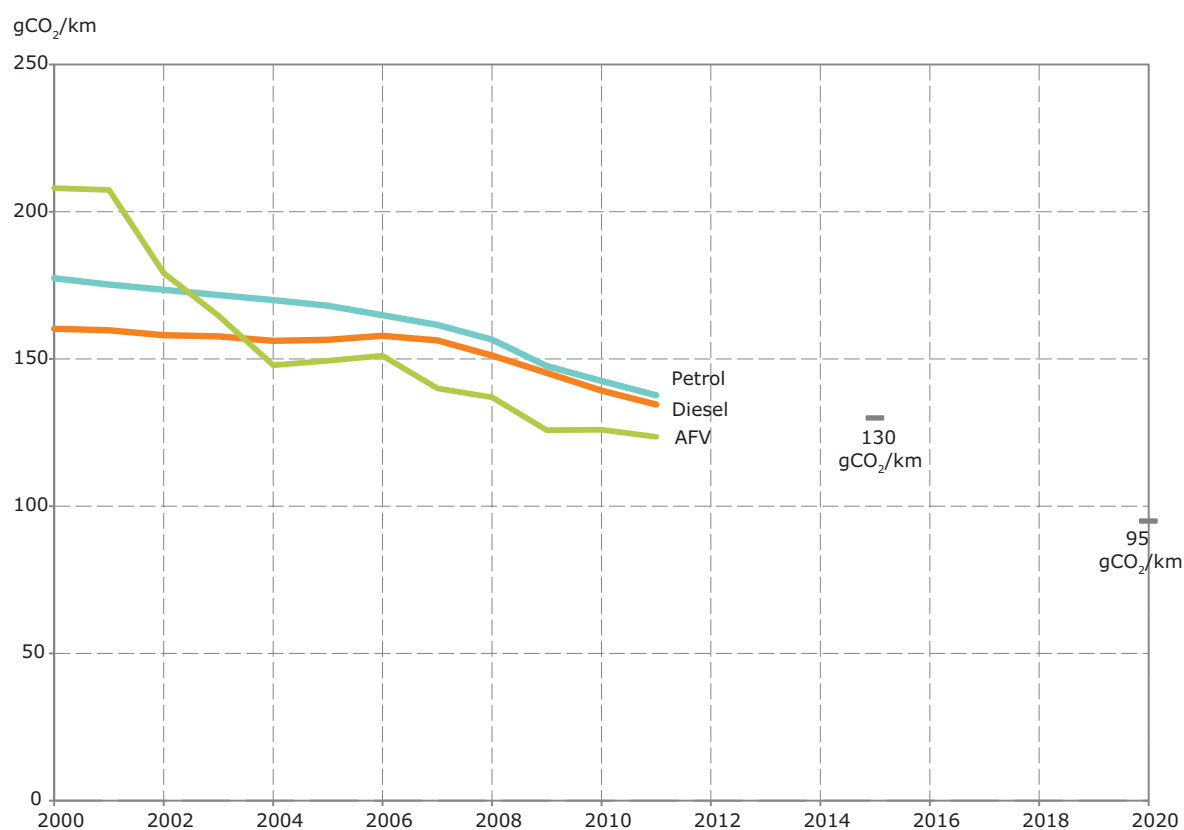
**Table 3** AFV data \*: registration, CO<sub>2</sub> emission (g CO<sub>2</sub>/km), mass (kg) and engine capacity (cm<sup>3</sup>)

	Registration (#)	Average CO <sub>2</sub> emission (gCO <sub>2</sub> /km)	Average mass (kg)	Average engine capacity (cm <sup>3</sup> )
E85	28 372	165	1 392	1 694
Pure electric	8 702	0	1 269	
Electric vehicles with range extender	66 <sup>a</sup>	27	1 735	
LPG	84 537	125	1 175	1 343
NG-biomethane	52 281	119	1 356	1 448
Biodiesel	10	117	1 243	1 320

**Note:** \* Only exhaust emissions are considered. For electric monofuel vehicles the emission is null. For Petrol-E85, the petrol CO<sub>2</sub> emission is reported. For Biodiesel, the diesel CO<sub>2</sub> emission is reported. For LPG and NG (natural gas) the respective LPG and CNG CO<sub>2</sub> emissions are reported.

<sup>a</sup>: A number of Member States submitted data that classified electric vehicles with range extenders under the ordinary petrol category. As a result, there is a small number of AFVs that have been grouped in with conventional petrol-powered cars. The figures in Table 3 thus slightly underestimate the number of registrations of electric vehicles with range extenders. Note that 2011 data are provisional.



**Figure 2 Evolution of CO<sub>2</sub> emissions from new passenger cars by fuel (EU-27)**

**Note:** The geographical scope of the data changes over time from the EU 15 to the EU 25 and the EU 27, see Annex 1 for details

**Table 4 Average CO<sub>2</sub> emissions (gCO<sub>2</sub>/km) from new passenger cars by region**

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
EU-27								158.7	153.6	145.7	140.3	135.7
EU-25					163.4	162.4	161.3	158.7	153.4	145.6	140.3	135.7
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
EU-12								157.8	156.8	154.2	148.2	144.6
EU-10					157.2	158.1	157.3	157.7	155.6	153.0	147.9	145.0

**Note:** EU-15 includes Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden and UK (excluding Northern Ireland).

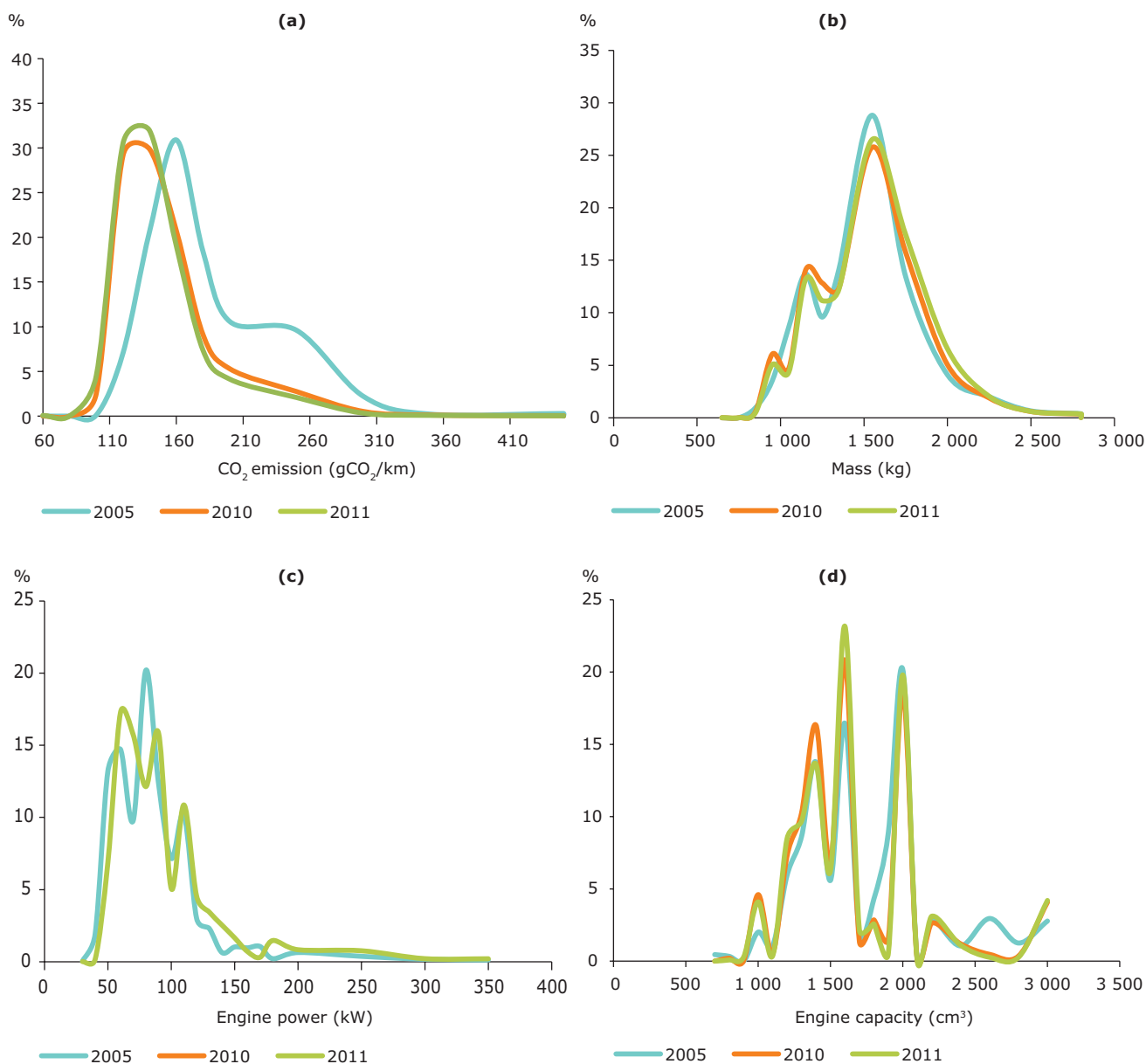
EU-10 includes Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia and Slovenia.

EU-12 includes EU-10, Bulgaria and Romania.

EU-25 includes EU-15 and EU-10.

EU-27 includes EU-15 and EU-12.

**Figure 3** Frequency distributions of emissions (a), mass (b), engine capacity (c), and power (d) of the vehicles registered in Europe in the years 2005 (data based on decision 1753/2000), 2010 and 2011 (data based on regulation 443/2009)



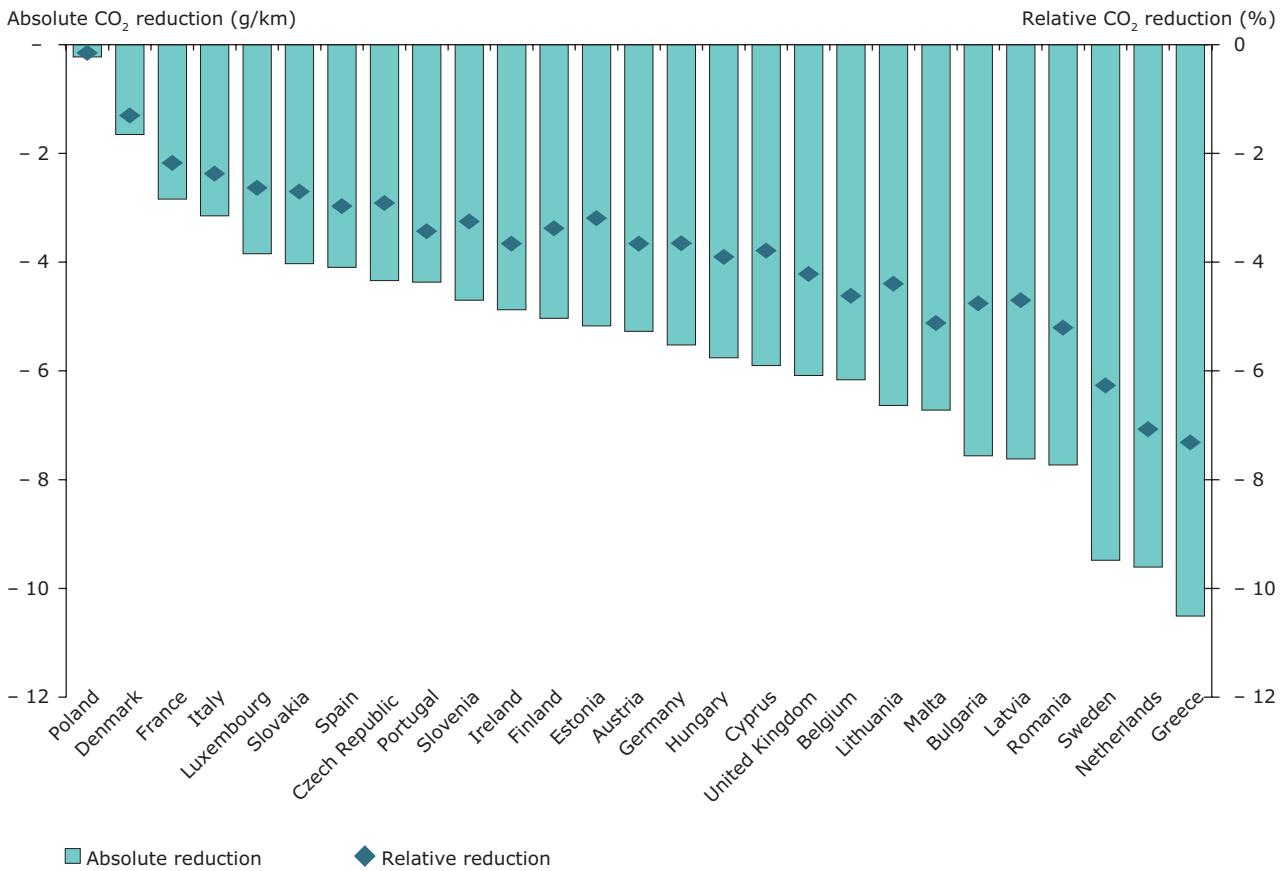
**Note:** \* Engine power data were not collected in 2010. In 2011, few Member States' data are available (please see Annex 1, Table A.4).

In all countries, CO<sub>2</sub> emissions from newly registered passenger cars fell in 2011 (Figure 4). The blue bars in the figure show the absolute reduction by Member State between 2010 and 2011, while the blue spots represent the percentage variation between the same two years.

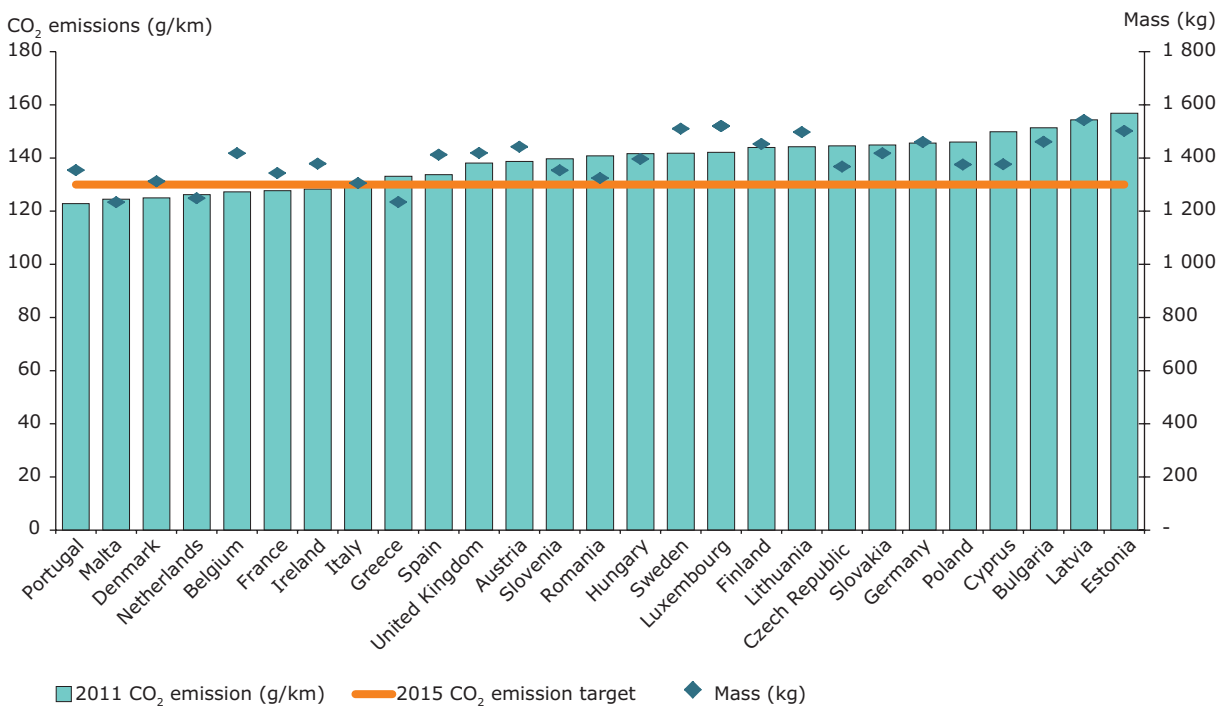
Belgium, Denmark, France, Ireland, Italy, Malta, the Netherlands and Portugal have the lowest average CO<sub>2</sub> specific emissions from newly registered cars in Europe (below 130 gCO<sub>2</sub>/km, the EU target for 2015) (Figure 5). Greece and the Netherlands

recorded the largest annual relative CO<sub>2</sub> emission reductions in newly registered cars, about 7 % on average compared to the previous year. Due to their size, the Member States with higher vehicle registrations — France, Germany, Italy, Spain and the United Kingdom — are the major drivers of the total reductions in EU-27 CO<sub>2</sub> emissions from newly registered cars. Of these five, France and Italy have the lowest average CO<sub>2</sub> specific emissions, while Germany and United Kingdom have the highest percentage decreases compared to the previous year (respectively 3.7 % and 4.2 %)

**Figure 4 Absolute reduction (bar) and the percentage reduction (spot) by Member State between 2010 and 2011**



**Figure 5 Average CO<sub>2</sub> emission and average mass by EU Member States – 2011 data**



### 3.2 Other car characteristics: mass, engine capacity, engine power and footprint <sup>(5)</sup>

The average mass of new passenger cars registered in the EU-27 in 2011 increased by 25 kg compared to the previous year (Table 5). The difference in mass between petrol and diesel vehicles has been increasing slowly but constantly between 2004 (226 kg) and 2011 (300 kg). It should be noted that in 2010 this difference remained almost stable compared to 2009.

There was a slight decrease in average engine capacity compared to 2010 for petrol and diesel vehicles (Table 6). The average engine capacity of new diesel passenger cars in 2011 is more or less unchanged from 2010, falling by only 0.7 cm<sup>3</sup>, while the capacity of petrol cars dropped by 19 cm<sup>3</sup> (– 1.3 %). The difference between new diesel and petrol vehicles decreased to around 371 cm<sup>3</sup> while in 2001 there was 421 cm<sup>3</sup> of difference between new diesel and petrol vehicles. The engine capacity for AFVs increased in 2011 by 79 cm<sup>3</sup> (5.9 %) compared to 2010.

Reporting of data on engine power is optional, and hence the corresponding dataset is incomplete. In addition, no data were collected in 2010. Average engine power in newly registered cars has been increasing steadily over the 2002–2008 period. There was a sudden drop in engine power in 2009, possibly due to the economic and financial crisis. Compared to 2009, there was a considerable increase in average engine power for all fuel types in 2011 (Table 7). It is worthwhile to mention that engine power data are available for only half of the European new vehicles fleet (as reported in the Table A.4 of Annex 1).

Statistical data for the average footprint of new passenger cars exist only for the years 2010–2011 (Table 8). The average footprint is calculated as the product of wheelbase and the average of the axle tracks. There were no major changes in 2011 except for AFVs (in which category average footprint fell 1.7 %). New diesel cars are generally bigger than petrol ones; the difference in footprint is about 0.37 m<sup>2</sup>.

**Table 5** Average mass of new passenger cars by fuel \*

kg	2004	2005	2006	2007	2008	2009	2010	2011 <sup>a</sup>
All fuels	1 347	1 356	1 372	1 379	1 373	1 337	1 364	1 389
Petrol	1 237	1 235	1 238	1 235	1 228	1 206	1 214	1 223
Diesel	1 463	1 479	1 501	1 510	1 508	1 498	1 507	1 523
AFV	1 415	1 404	1 392	1 271	1 237	1 169	1 202	1 269

**Note:** \* Data before 2004 are not shown due to incomplete dataset.

<sup>a</sup>: For the calculation of the average mass of AFV, electric bi-fuel vehicles were not considered, because not correctly reported by Member States.

**Table 6** Average engine capacity of new passenger cars by fuel

cm <sup>3</sup>	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011 <sup>a</sup>
All fuels	1 714	1 731	1 743	1 730	1 726	1 724	1 729	1 703	1 620	1 633	1 641
Petrol	1 560	1 570	1 572	1 571	1 573	1 561	1 556	1 531	1 454	1 454	1 435
Diesel	1 981	1 961	1 948	1 904	1 886	1 885	1 892	1 869	1 832	1 807	1 806
AFV	1 602	1 672	1 628	1 581	1 561	1 562	1 424	1 387	1 328	1 349	1 428

**Note:** <sup>a</sup>: For the calculation of the average engine capacity of AFVs, electric bi-fuel vehicles were not considered, because not correctly reported by Member States.

<sup>(5)</sup> Footprint is defined as the wheelbase (the distance from the front axle to the rear axle) times the average track width (the distance between the centre lines of the tires) of the vehicle.

**Table 7** Average engine power of new passenger cars by fuel

kW	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011 <sup>a</sup>
All fuels	104	70	73	76	77	79	80	83	71	-	86
Petrol	115	63	67	70	70	71	70	76	62	-	78
Diesel	86	79	80	82	83	87	88	89	81	-	93
AFV	75	74	73	68	68	69	61	61	58	-	64

**Note:** <sup>a</sup>: For the calculation of the average engine power of AFV, electric bi-fuel vehicles were not considered, because not correctly reported by Member States.

**Table 8** Average footprint of new passenger cars by fuel

m <sup>2</sup>	2010	2011 <sup>a</sup>
All fuels	3.95	3.97
Petrol	3.77	3.77
Diesel	4.11	4.14
AFV	3.80	3.74

**Note:** <sup>a</sup>: For the calculation of the average footprint of AFV, electric bi-fuel vehicles were not considered, because not correctly reported by Member States.

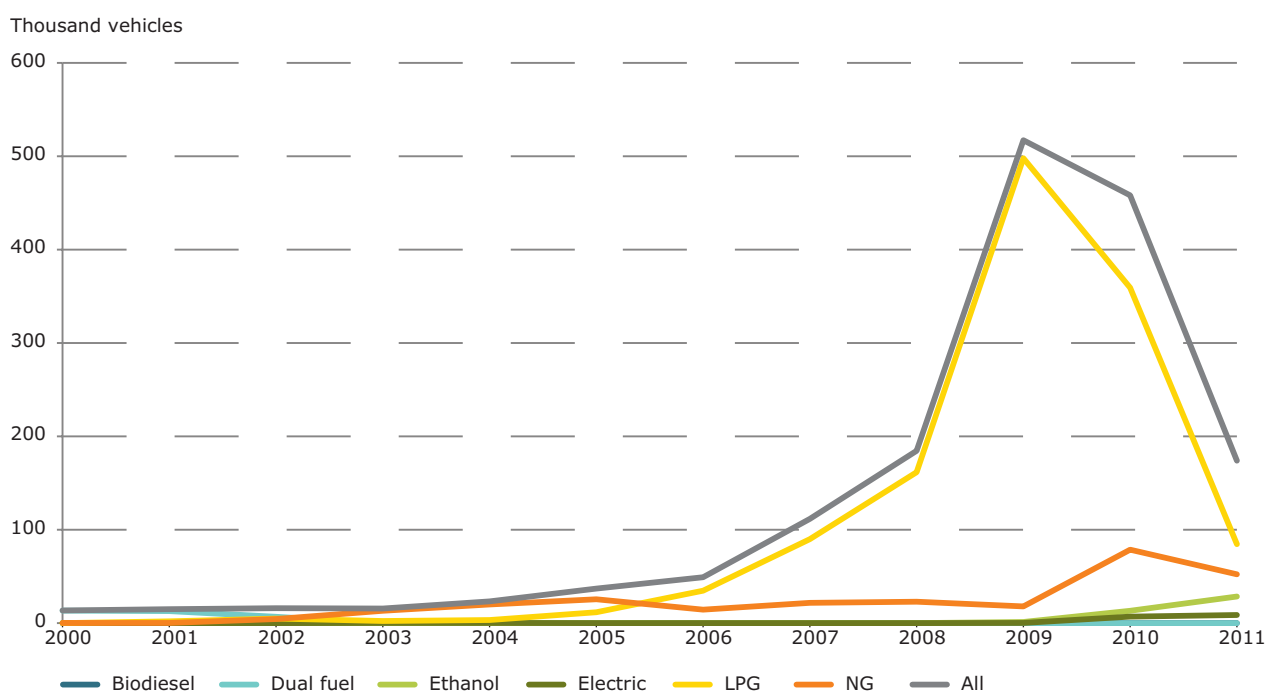
falling from 208.0 gCO<sub>2</sub>/km in 2000 to about 123.5 gCO<sub>2</sub>/km in 2011. The comparative drop in petrol CO<sub>2</sub> emissions is from 177.4 gCO<sub>2</sub>/km in 2000 to 137.7 gCO<sub>2</sub>/km in 2011.

The registration of AFVs has been increasing substantially over the years. This category was dominated by a few special vehicles in 2000. But it exceeded half a million new vehicle registrations in 2009, before dropping to slightly less than half a million in 2010. In 2011 the registrations of AFVs decreased even further (by 62 %), caused mainly by the significant drop in registrations of new LPG vehicles in France and Italy.

### 3.3 Alternative Fuel Vehicles (AFV)

The main analysis of the database shows that alternative fuel vehicles (AFVs) exhibit significant reductions in their CO<sub>2</sub> emissions over the years,

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 due to the introduction of LPG-petrol and

**Figure 6** Evolution of total registrations of AFVs over the years

natural gas –petrol (NG-petrol) cars, which have greatly outnumbered the ethanol cars. LPG cars are particularly popular in Italy and France. Thus the significant reduction in CO<sub>2</sub> emissions from AFVs over the past few years is not necessarily the result of improvements in technology, but has also been caused by shifts in fuel composition and in engine type.

### 3.4 Trends within individual capacity sub-segments

Cars are generally grouped into capacity classes (traditionally three categories: smaller than 1.4 l, between 1.4 l and 2.0 l, and larger than 2.0 l) in order to better analyse vehicles with similar characteristics. It is therefore interesting to explore whether the average characteristics of these classes have changed over the years. Figure 7 shows the number of registrations and the mean capacity per capacity class.

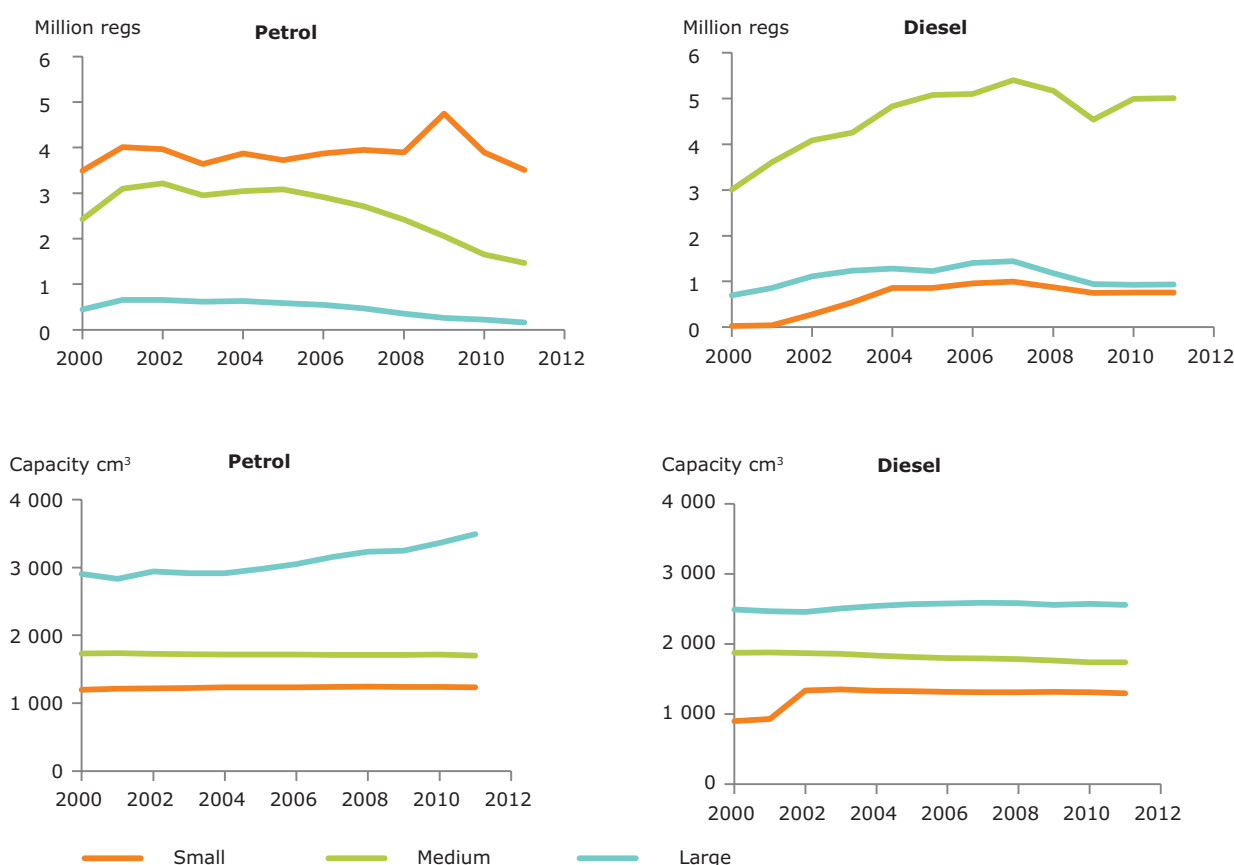
As observed in the previous years, the petrol registrations are dominated by cars with engine

capacity of less than 1.4 l, followed closely by medium-sized cars. There are far fewer registrations of large cars. The registrations of medium and large petrol cars exhibit a significant and continuous drop after 2005.

In terms of their capacity, large petrol cars exhibit a notable increase over the years, rising from 2.9 l in 2000 to 3.5 l in 2011. It is worth mentioning that the number of vehicles in this category has consistently decreased over the same period. The small petrol car class also seems to continuously increase in average capacity from 1.97 cm<sup>3</sup> in 2000 to 1.243 cm<sup>3</sup> in 2008. Only over the three last years, i.e. 2009, 2010 and 2011, has there been a slight decrease, with capacity dropping to 1.233 cm<sup>3</sup> in 2011.

Although registrations of new petrol cars are dominated by small-sized vehicles, diesel registrations are dominated by medium-sized vehicles. The capacity in the medium-sized diesel class has continuously fallen over time from 1.9 l to 1.74 l. The large diesel category exhibited a small increase in the years 2007–2008, reaching ~ 2.6 l (less than the equivalent petrol one), but it has stabilised or marginally dropped since then.

**Figure 7 Evolution of capacity classes over the years ('Small': < 1.4 l, 'Medium': 1.4–2.0 l, 'Large': > 2.0 l)**



## Annex 1 (6)

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

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011 *
Austria	295	280	300	311	308	309	298	294	319	328	356
Belgium	497	468	459	485	480	526	525	536	475	551	577
Bulgaria							86	91	21	14	14
Cyprus				20	18	20	25	24	16	15	15
Czech Republic				115	105	107	126	134	159	165	169
Denmark	97	113	102	124	147	154	160	148	111	151	170
Estonia				17	20	25	31	24	10	10	17
Finland	106	113	145	141	146	143	123	137	89	109	122
France	2 228	2 120	1 988	1 996	2 059	1 986	2 050	2 037	2 259	2 250	2 174
Germany	3 342	3 122	3 237	3 267	3 319	3 445	3 126	3 067	3 786	2 873	2 933
Greece	245	242	203	264	274	279	294	279	221	140	97
Hungary				230	199	193	167	163	66	43	47
Ireland	117	152	146	154	171	177	186	151	56	89	90
Italy	2 430	2 278	2 244	2 264	2 237	2 325	2 494	2 163	2 160	1 954	1 745
Latvia				11	16	25	31	19	5	6	10
Lithuania				9	11	15	21	22	7	7	12
Luxembourg	22	44	44	48	49	51	51	52	47	50	50
Malta				4	7	6	6	5	6	4	6
Netherlands	526	507	487	479	452	478	494	493	396	480	554
Poland				297	230	223	264	305	221	219	275
Portugal		232	194	202	208	199	204	215	159	223	154
Romania							313	286	115	94	82
Slovakia					45	65	65	57	70	65	69
Slovenia				37	64	62	69	72	60	60	55
Spain	400	969	1 319	1 606	1 640	1 622	1 606	1 165	964	976	810
Sweden	223	249	257	260	269	278	300	248	209	277	289
United Kingdom	2 232	2 611	2 558	2 512	2 386	2 295	2 390	2 112	1 968	2 026	1 937

**Note:** \* Data for 2011 are provisional.

(6) Data for the time series 2001–2009 were gathered via the monitoring regulated by Decision 1753/2000/EC which was repealed by Regulation 443/2009 in 2009. These data do not include all Member States in all years, as can be seen from the tables in Annex 1. Moreover, due to changes in methodology and monitoring improvements, breaks in trends may occur.

**Table A.2 Average mass of new passenger cars by Member State (in kg)**

kg	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011 *
Austria	1 314	1 335	1 426	1 432	1 435	1 449	1 445	1 431	1 385	1 409	1 442
Belgium	1 288	1 319	1 361	1 375	1 396	1 407	1 423	1 425	1 406	1 406	1 418
Bulgaria										1 454	1 461
Cyprus				1 205	1 277	1 316	1 354	1 372	1 367	1 388	1 376
Czech Republic				1 704	1 242	1 247	1 261	1 275	1 335	1 380	1 368
Denmark		1 306	1 325	1 327	1 324	1 328	1 370	1 320	1 313	1 335	1 312
Estonia				1 349	1 408	1 433	1 465	1 456	1 471	1 473	1 502
Finland	1 752	1 759	1 336	1 355	1 381	1 401	1 437	1 442	1 447	1 426	1 452
France	1 254	1 280	1 305	1 327	1 341	1 349	1 375	1 387	1 326	1 326	1 343
Germany	1 332	1 352	1 381	1 408	1 412	1 424	1 433	1 425	1 347	1 433	1 460
Greece	1 172	1 223	1 262	1 277	1 287	1 304	1 314	1 311	1 423	1 252	1 234
Hungary				1 182	1 203	1 237	1 264	1 288	1 330	1 370	1 396
Ireland	1 248	1 276	1 265	1 314	1 341	1 372	1 441	1 440	1 440	1 380	1 379
Italy	1 604	1 632	1 649	1 259	1 277	1 294	1 287	1 285	1 255	1 269	1 306
Latvia				1 452	1 445	1 468	1 502	1 498	1 535	1 522	1 543
Lithuania				1 433	1 448	1 483	1 481	1 467	1 486	1 481	1 497
Luxembourg	1 834	1 851	1 442	1 471	1 487	1 504	1 498	1 490	1 462	1 473	1 520
Malta								1 317	1 182	1 200	1 234
Netherlands	1 260	1 264	1 301	1 314	1 337	1 332	1 350	1 324	1 295	1 254	1 248
Poland				1 181	1 242	1 271	1 304	1 260	1 261	1 317	1 375
Portugal		1 229	1 254	1 295	1 329	1 352	1 365	1 352	1 344	1 333	1 354
Romania							1 268	1 286	1 291	1 281	1 324
Slovakia					1 174					1 386	1 418
Slovenia				1 246	1 305	1 316	1 340	1 350	1 346	1 332	1 354
Spain	1 266	1 725	1 317	1 335	1 374	1 395	1 416	1 400	1 394	1 399	1 412
Sweden	1 448	1 454	1 472	1 467	1 470	1 488	1 503	1 488	1 490	1 497	1 510
United Kingdom	1 347	1 356	1 392	1 387	1 374	1 390	1 394	1 380	1 358	1 384	1 419

**Note:** \* Data for 2011 are provisional.



**Table A.3 Average CO<sub>2</sub> emissions from new passenger cars by Member State**

gCO <sub>2</sub> /km	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011 *
Austria	165.6	164.4	163.8	161.9	162.1	163.7	162.9	158.1	150.2	144.0	138.7
Belgium	163.7	161.1	158.1	156.5	155.2	153.9	152.8	147.8	142.1	133.4	127.3
Bulgaria							171.6	171.5	172.1	158.9	151.4
Cyprus				173.4	173	170.1	170.3	165.6	160.7	155.8	149.9
Czech Republic				154	155.3	154.2	154.2	154.4	155.5	148.9	144.6
Denmark	172.9	170.0	169.0	165.9	163.7	162.5	159.8	146.4	139.1	126.6	125.0
Estonia				179	183.7	182.7	181.6	177.4	170.3	162.0	156.9
Finland	178.1	177.2	178.3	179.8	179.5	179.2	177.3	162.9	157.0	149.0	143.9
France	159.8	156.8	155	153.1	152.3	149.9	149.4	140.1	133.5	130.5	127.7
Germany	179.5	177.4	175.9	174.9	173.4	172.5	169.5	164.8	154.0	151.1	145.6
Greece	166.5	167.8	168.9	168.8	167.4	166.5	165.3	160.8	157.4	143.7	133.1
Hungary				158.5	156.3	154.6	155	153.4	153.4	147.4	141.7
Ireland	166.6	164.3	166.7	167.6	166.8	166.3	161.6	156.8	144.4	133.2	128.3
Italy	158.3	156.6	152.9	150	149.5	149.2	146.5	144.7	136.3	132.7	129.5
Latvia				192.4	187.2	183.1	183.5	180.6	176.9	162.0	154.4
Lithuania				187.5	186.3	163.4	176.5	170.1	166.0	150.9	144.3
Luxembourg	177	173.8	173.5	169.7	168.6	168.2	165.8	159.5	152.5	146.0	142.1
Malta				148.8	150.5	145.9	147.8	146.9	135.7	131.2	124.5
Netherlands	174	172.4	173.5	171	169.9	166.7	164.8	156.7	146.9	135.8	126.2
Poland				154.1	155.2	155.9	153.7	153.1	151.6	146.2	146.0
Portugal		154.0	149.9	147.1	144.9	145	144.2	138.2	133.8	127.2	122.8
Romania							154.8	156	157.0	148.5	140.8
Slovakia					157.4	152	152.7	150.4	146.6	149.0	144.9
Slovenia				152.7	157.2	155.3	156.3	155.9	152.0	144.4	139.7
Spain	156.8	156.4	157	155.3	155.3	155.6	153.2	148.2	142.2	137.9	133.8
Sweden	200.2	198.2	198.5	197.2	193.8	188.6	181.4	173.9	164.5	151.3	141.8
United Kingdom	177.9	174.8	172.7	171.4	169.7	167.7	164.7	158.2	149.7	144.2	138.1

**Note:** \* Data for 2011 are provisional.

**Table A.4 Average engine power from new passenger cars by Member State**

Wh	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011 *
Austria	76	77	78	79	80	83	85	84	81	-	-
Belgium	73	74	74	76	77	78	81	82	80	-	82
Bulgaria	-	-	-	-	-	-	-	-	-	-	-
Cyprus	-	-	-	-	-	-	-	-	-	-	-
Czech Republic	-	-	-	-	-	-	-	-	-	-	85
Denmark	-	78.0	79.0	79	79	81	82	79	78	-	78
Estonia	-	-	-	-	-	-	-	-	98	-	-
Finland	82	-	-	-	-	-	-	-	-	-	96
France	71	73	74	76	77	78	80	76	73	-	79
Germany	84	85	87	90	91	93	96	96	87	-	99
Greece	70	-	-	-	-	-	-	-	-	-	-
Hungary	-	-	-	65	68	70	74	76	81	-	-
Ireland	70	68	68	75	75	78	83	82	80	-	-
Italy	65	68	68	70	72	74	74	75	72	-	78
Latvia	-	-	-	-	-	-	-	-	-	-	99
Lithuania	-	-	-	-	-	-	-	-	-	-	-
Luxembourg	87	89	92	93	96	100	103	102	101	-	107
Malta	-	-	-	61	64	65	-	-	-	-	-
Netherlands	76	-	-	-	-	-	-	-	-	-	78
Poland	-	-	-	65	69	73	76	79	-	-	86
Portugal	-	66.0	67	70	73	-	-	-	-	-	80
Romania	-	-	-	-	-	-	68	72	74	-	-
Slovakia	-	-	-	-	65	69	66	-	70	-	-
Slovenia	-	-	-	-	-	-	-	-	-	-	-
Spain	71	-	-	-	80	83	84	85	83	-	-
Sweden	-	-	-	-	-	-	-	-	-	-	-
United Kingdom	-	-	89	93	86	90	88	-	-	-	-

**Note:** \* Data for 2011 are provisional.  
Data not collected in 2010.

**Table A.5 Average footprint from new passenger cars by Member State**

m <sup>2</sup>	2010	2011 *
Austria	3 975	4 008
Belgium	3 964	3 988
Bulgaria	4 017	4 027
Cyprus	3 991	3 966
Czech Republic	4 055	4 114
Denmark	3 856	3 852
Estonia	4 128	4 141
Finland	4 079	4 103
France	3 858	3 913
Germany	4 028	4 069
Greece	3 821	3 931
Hungary	3 983	4 057
Ireland	3 953	4 715
Italy	3 857	3 818
Latvia	4 118	4 112
Lithuania	4 069	4 104
Luxembourg	4 000	4 066
Malta	3 944	-
Netherlands	3 825	3 823
Poland	3 919	4 098
Portugal	3 996	3 915
Romania	3 922	3 959
Slovakia	4 046	4 003
Slovenia	3 941	3 976
Spain	3 962	3 983
Sweden	4 102	4 12
United Kingdom	3 934	3 965

**Note:** \* Data for 2011 are provisional.

**Table A.6 Completeness rates of the main entries of the 2011 submission**

Member State	Type	Variant	Version	Emission	Mass	Wheelbase	Steering axle
Austria	100 %	100 %	100 %	100 %	100 %	100 %	100 %
Belgium	99.1 %	99.1 %	98.9 %	99.1 %	99.0 %	99.1 %	98.9 %
Bulgaria	100 %	100 %	100 %	100 %	100 %	100 %	100 %
Cyprus	100 %	100 %	100 %	100 %	100 %	100 %	100 %
Czech Republic	100 %	100 %	99.0 %	100 %	100 %	100 %	100 %
Germany	100 %	100 %	100 %	100 %	100 %	100 %	100 %
Denmark	100 %	100 %	100 %	100 %	100 %	100 %	100 %
Estonia	100 %	100 %	100 %	100 %	100 %	100 %	100 %
Greece	100 %	100 %	100 %	100 %	100 %	100 %	99 %
Spain	100 %	99.1 %	50.1 %	100 %	100 %	98 %	98 %
Finland	100 %	100 %	100 %	100 %	100 %	100 %	100 %
France	90.9 %	100 %	91 %	100 %	100 %	100 %	100 %
Hungary	100 %	100 %	100 %	100 %	100 %	100 %	100 %
Ireland <sup>(a)</sup>	100 %	100 %	100 %	100 %	100 %	98.8 %	100 %
Italy	100 %	100 %	99.3 %	100 %	100 %	100 %	92.9 %
Lithuania	99.0 %	99.2 %	99.1 %	98.6 %	100 %	100 %	100 %
Luxembourg	100 %	100 %	99.4 %	100 %	100 %	100 %	100 %
Latvia	100 %	100 %	100 %	100 %	100 %	100 %	100 %
Malta	100 %	100 %	100 %	100 %	100 %	0.00 %	0.00 %
Netherlands	100 %	100 %	100 %	100 %	100 %	100 %	100 %
Poland	100 %	100 %	100 %	100 %	100 %	100 %	100 %
Portugal	100 %	100 %	100 %	100 %	100 %	100 %	0.80 %
Romania	100 %	100 %	100 %	100 %	100 %	100 %	100 %
Sweden <sup>(b)</sup>	95.7 %	100 %	100 %	100 %	100 %	100 %	100 %
Slovenia	100 %	100 %	79.9 %	100 %	100 %	100 %	100 %
Slovakia	100 %	100 %	100 %	100 %	100 %	100 %	85.0 %
United Kingdom	100 %	100 %	100 %	100 %	100 %	100 %	100 %
<b>Overall</b>	<b>98.3 %</b>	<b>100 %</b>	<b>95.0 %</b>	<b>100 %</b>	<b>100 %</b>	<b>99.8 %</b>	<b>97.5 %</b>

**Note:** <sup>(a)</sup> Ireland did not report the correct type, variant and version because they do not do not capture the data as required.

<sup>(b)</sup> The field 'type' of Sweden's delivery is a mix of type, commercial name or other characteristics for a car.



European Environment Agency  
Kongens Nytorv 6  
1050 Copenhagen K  
Denmark

Tel.: +45 33 36 71 00  
Fax: +45 33 36 71 99

Web: [eea.europa.eu](http://eea.europa.eu)  
Enquiries: [eea.europa.eu/enquiries](http://eea.europa.eu/enquiries)

