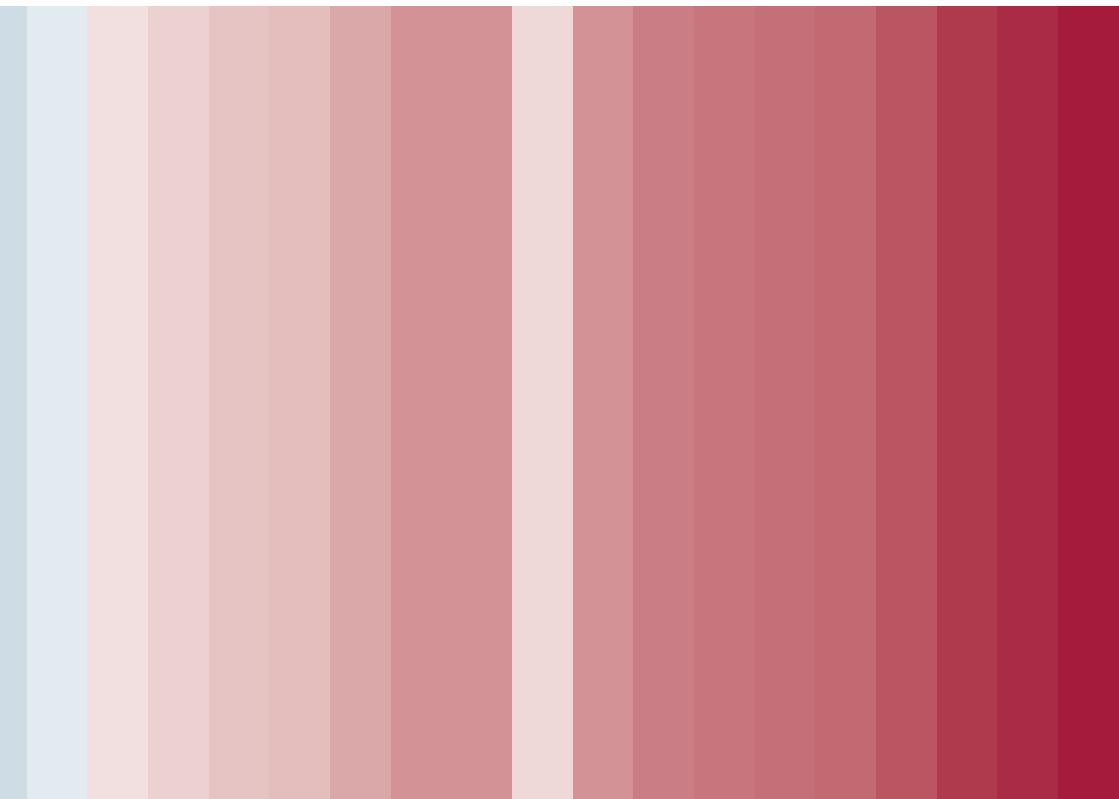


# EUROPEAN VEHICLE MARKET STATISTICS

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Pocketbook 2019/20



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An electronic version of this Pocketbook including  
more detailed statistical data is available online:  
<http://eupocketbook.theicct.org>

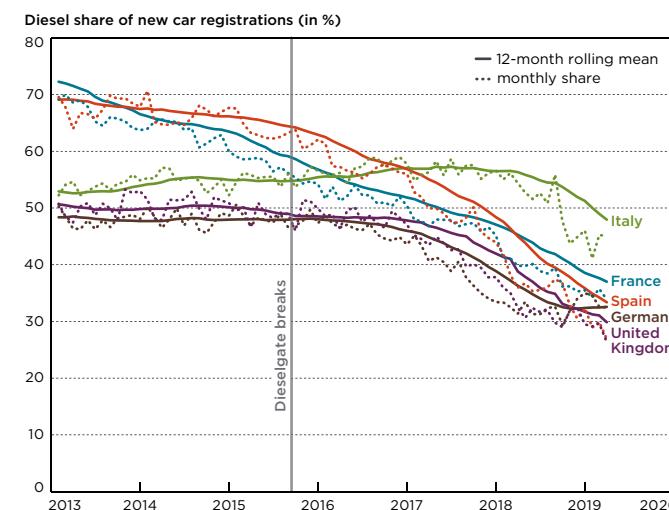
# 1 INTRODUCTION

The 2019/20 edition of *European Vehicle Market Statistics* offers a statistical portrait of passenger car, light commercial, and heavy-duty vehicle fleets in the European Union (EU) from 2001 to 2018. As in previous editions, the emphasis is on vehicle technologies, fuel consumption, and emissions of greenhouse gases and other air pollutants.

The following pages give a concise overview of data in subsequent chapters and also summarize the latest regulatory developments in the EU. More comprehensive tables are included in the annex, along with information on sources.

## Number of vehicles

In 2018, new car registrations in the EU remained roughly constant at 15.1 million. Possibly due to consumer uncertainty concerning Brexit, sales in the United Kingdom (UK) dropped by 7% compared to 2017. During the same time period, the market in Spain expanded by 7%. By far the strongest growth in vehicle sales took place in the sport utility vehicle (SUV) segment. Approximately 5 million new cars in 2018 were SUVs, more than 8 times as many as in 2001. At the same time, small diesel, small gasoline, and medium-sized diesel vehicles – all with comparatively low CO<sub>2</sub> emission values – lost more than 15 percentage points from 2015 to 2018. These relatively small vehicles were replaced by medium-sized gasoline vehicles and SUVs. The increase in the latter group was particularly problematic for fleet-average CO<sub>2</sub> reductions, because SUVs had comparatively high CO<sub>2</sub> emission values.



**Fig. 1-1**

Historical development of the new car diesel market share in selected European member states

<https://t1p.de/aijc>



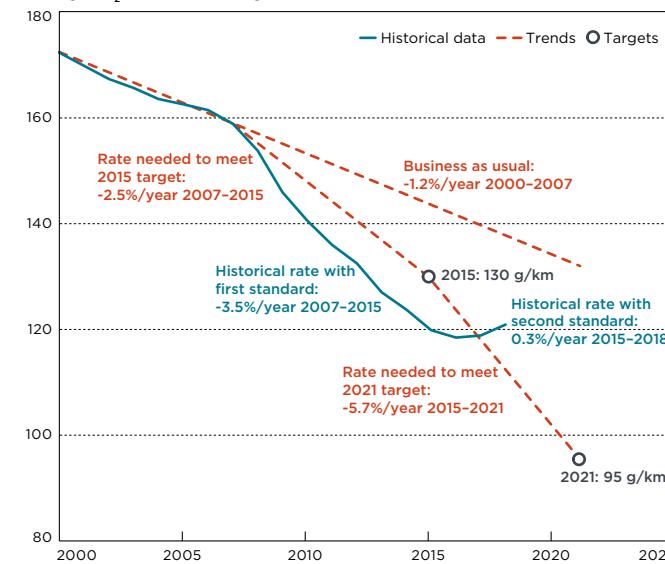
In the aftermath of the Dieselgate scandal, sales of new diesel cars dropped significantly. In 2011–2012, about 55% of newly registered cars in the EU were powered by diesel fuel, an all-time high. Since then, the market share of diesel vehicles decreased slowly, to 49% in 2016, but then declined more quickly, to 36% in 2018. In France, where the diesel market share used to be significantly higher than the EU average, the market share dropped from a high of 77% in 2008 to 39% by 2018. This decline in diesel car sales began before Dieselgate and is likely related to the fact that the French government is equalizing taxes on diesel and gasoline fuel. In Germany, on the other hand, the diesel market share remained stable from 2011 to 2015 at about 48% but began dropping noticeably towards the end of 2016, declining to 30% in late-2018. This recent decrease in diesel car sales is likely due to a loss in trust from consumers who are increasingly concerned about the threat of diesel bans in urban areas (**Fig. 1-1**).

### Fuel consumption and CO<sub>2</sub> emissions

The official level of average carbon dioxide (CO<sub>2</sub>) emissions from new passenger cars in the EU, as measured in the laboratory via the New European Driving Cycle (NEDC) type-approval test procedure, increased to 120 grams per kilometer (g/km) in 2018, which is 2 g/km higher than in the previous year (Tietge, 2019). As CO<sub>2</sub> emissions and fuel consumption are directly linked, this implies a fleetwide average fuel efficiency of 5 liters/100 km.

Before CO<sub>2</sub> standards were introduced, emissions of new passenger cars in the EU, on average, declined by 1.2% per year from 2000 to 2007. When the first mandatory CO<sub>2</sub> standards were agreed upon in 2008, manufacturers significantly outperformed the annual reduction rates required to meet the 2015 target of 130 g/km; instead of the required 2.5% annual reduction, average CO<sub>2</sub> emissions declined by 3.5% per year. After 2015 targets were met, and in the absence of targets before 2020, average CO<sub>2</sub> emissions increased by 0.3% per year. As of 2018, fleet-average CO<sub>2</sub> emissions will have to decline by 7.6% per year to comply with the 2021 target. Manufacturers will likely rely to a larger degree on flexible compliance mechanisms such as super-credits and eco-innovations to comply with 2020/21 targets (**Fig. 1-2**).

Average CO<sub>2</sub> emission values (g/km, NEDC)



**Fig. 1-2**

Historical average CO<sub>2</sub> emission values, targets, and annual reduction rates of new passenger cars in the European Union

<https://t1p.de/r5ck>



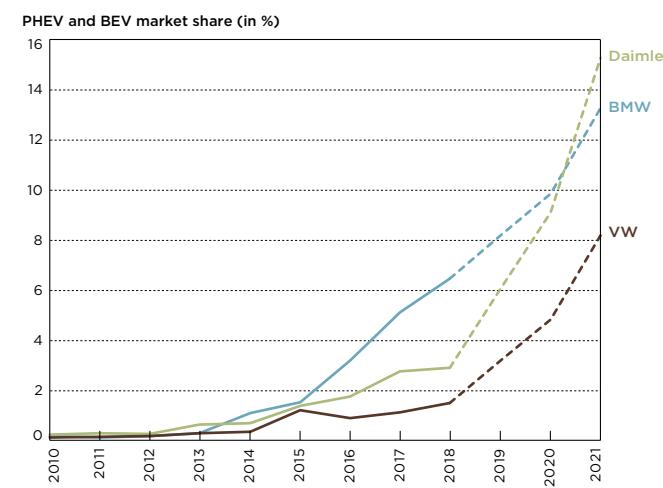
New mandatory CO<sub>2</sub> standards for the years 2025 and 2030 were adopted in early 2019 (Mock, 2019a). For passenger cars, average fleet-wide emissions will have to be reduced by 15% by 2025 and by 37.5% by 2030, with respect to a 2021 baseline. CO<sub>2</sub> emission levels for these new targets will be measured in the Worldwide Harmonized Light Vehicles Test Procedure (WLTP), which became mandatory for new vehicles in September 2018. For heavy-duty vehicles, CO<sub>2</sub> emissions will have to be reduced by 15% by 2025 and 30% by 2030, with respect to a 2019 baseline (Rodríguez, 2019).

## Technologies

The vast majority of Europe's new cars are powered by gasoline or diesel motors. The market share of hybrid electric vehicles (HEV) in the EU was 3% of all new car sales in 2018. Sales of HEVs increased in particular in Finland, where the market share increased to 9% in 2018. Toyota continues to dominate the market for HEVs in Europe, with about 58% of all new Toyota vehicles in 2018 being hybrid electric.

In 2018, plug-in hybrid (PHEV) and battery electric vehicles (BEV) each made up about 1% of new vehicle registrations in the EU. Top EU markets include Sweden, where 6% of new sales were PHEVs, and the Netherlands, where 5% of new sales were BEVs. Outside the EU, sales of electric vehicles are particularly high in Norway, where 18% of new cars sold in 2018 were PHEV, 31% were BEV, and an additional 11% were HEV.

In terms of manufacturer brands, BMW was among the top sellers of PHEVs in 2018, with 5% of its new cars being equipped with this technology. Nissan led sales of BEVs models, with 6% of the brand's sales being battery electric. An analysis of the compliance options for selected manufacturers shows the respective 2021 CO<sub>2</sub> targets can be met by deploying an increased share of electric vehicles. For a company such as BMW, it is estimated that by 2021 a market share of about 13% of PHEV and BEV will be required (Mock, 2019b) (**Fig. 1-3**).



**Fig. 1-3**

Historical development of PHEV and BEV market shares for selected manufacturers (BMW, Daimler and VW), as well as estimated required market shares to comply with 2021 CO<sub>2</sub> targets

<https://t1p.de/a8se>



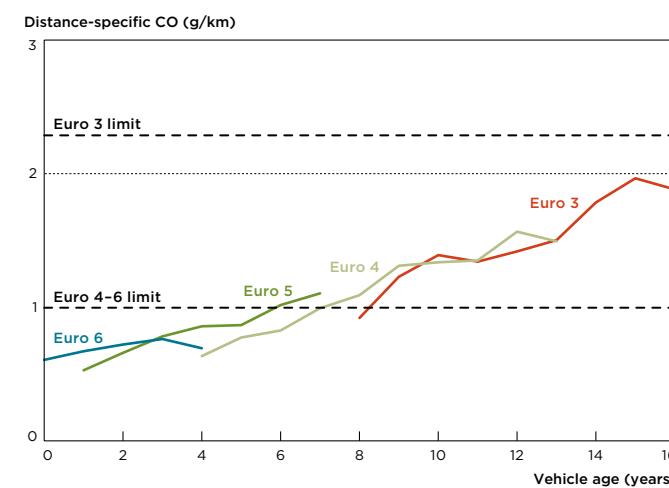
## Key technical parameters

The average mass of new cars in the EU was comparable to the previous year, at 1,397 kg in 2018. Still, this is about 10% higher than 15 years before. The average mass of both the German and Swedish new car fleets were significantly above the EU average, at 1,469 and 1,582 kg, respectively. In contrast, customers in the Netherlands opted for significantly lighter cars, with an average weight of 1,314 kg. The average engine power increased to 98 kW in 2018, which is about 30% more than 15 years earlier. At the same time, the average engine displacement has continued to decrease, and now is about 7% smaller than in 2001.

### Other emissions and on-road

The Real Driving Emissions (RDE) test procedure was phased-in beginning in 2017 for new vehicle types and is required for all new vehicles since September 2019. As part of RDE, conformity factors were introduced that regulate how much higher vehicle emissions are allowed to be during on-road testing than during laboratory testing. For NO<sub>x</sub>, these conformity factors will be 2.1 for the initial phase starting in 2017 (Euro 6d-Temp) and 1.43 from 2020 onward (Euro 6d). This means that currently, measured new diesel car NO<sub>x</sub> emissions can be up to 80 mg/km during laboratory testing but as high as 168 mg/km during an on-road test that is compliant with the RDE requirements. From 2020 onwards the RDE on-road NO<sub>x</sub> emission limit will be 114 mg/km.

In the meantime, through use of remote sensing instruments, the picture of the on-road emissions performance of the current vehicle fleet is becoming clearer. One aspect that can have a significant impact on the in-use emissions of on-road vehicles is the deterioration of emission control systems. As part of a remote sensing measurement campaign in London it was possible to quantify the observable increase in CO emissions with vehicle age that is symptomatic of deteriorated exhaust aftertreatment systems for gasoline passenger cars (Dallmann et al., 2018) (**Fig. 1-4**). To guarantee the emissions performance of vehicles over their complete lifetime, in-service conformity and minimum durability requirements are necessary, elements which are under discussion as part of the current regulatory process for post-Euro 6 emission standards in the EU.



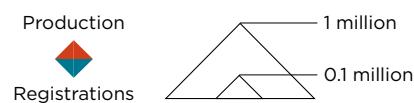
**Fig. 1-4**

Average CO emissions as a function of vehicle age for gasoline vehicles measured with remote sensing technology  
<https://tip.de/qatq>



## 2 NUMBER OF VEHICLES

New passenger car registrations versus production in 2018  
for selected EU member states



Data source: European Automobile Manufacturers Association (ACEA)

Germany is Europe's largest car manufacturer and has the largest number of new car registrations. Germany exports a large fraction of its annual car production to other countries. The same is true for Spain, the second largest manufacturing market in Europe. Countries such as France and Italy, on the other hand, produce less cars than are newly registered each year. Slovakia has the highest per-capita car production in all of Europe and produces about ten times more vehicles than are registered within the country.

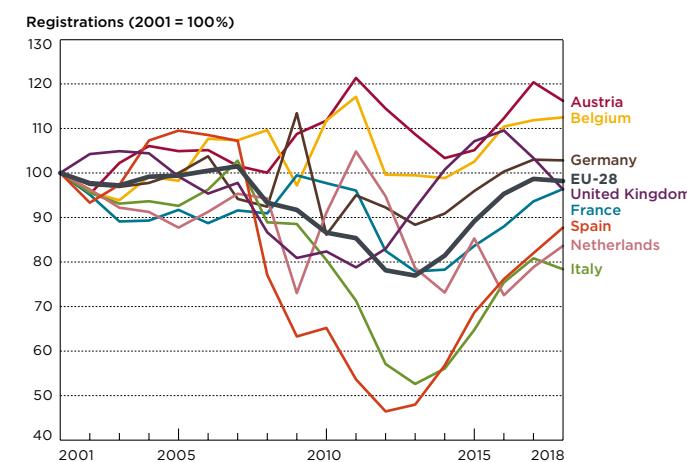
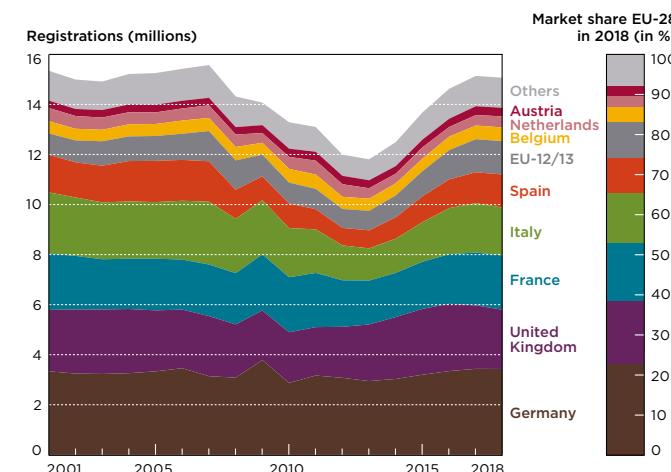
About 15.1 million new cars were registered in the EU in 2018. That number is nearly the same as in 2017 and between the years 2001–2007, before the economic crisis impacted new car sales, particularly in Southern European countries. Registrations in the EU are dominated by the larger member states; the three largest alone – Germany, France, United Kingdom – account for more than 50% of the total (**Fig. 2-1**).

Germany is the largest market, with a 23% share of the total European market. Registrations in Germany dropped between 2006 and 2008, then rose in 2009 thanks to a government scrappage program and from that point on increased again to around 3.4 million vehicles per year. By contrast, in Spain fewer than half as many new vehicles were registered in 2012 as in 2001–2007. But since 2014 sales in Spain are trending sharply upward, rising again by 7% in 2018 compared to the previous year. In the UK, on the other hand, in light of Brexit, new car sales keep decreasing since 2016, with another 7% decline in 2018 (**Fig. 2-2**).

As in previous years, by far the strongest growth in vehicle sales took place in the sport utility vehicle (SUV) segment. About 5 million new cars in 2018 were SUVs, more than 8 times as many as in 2001 (**Fig. 2-4**).

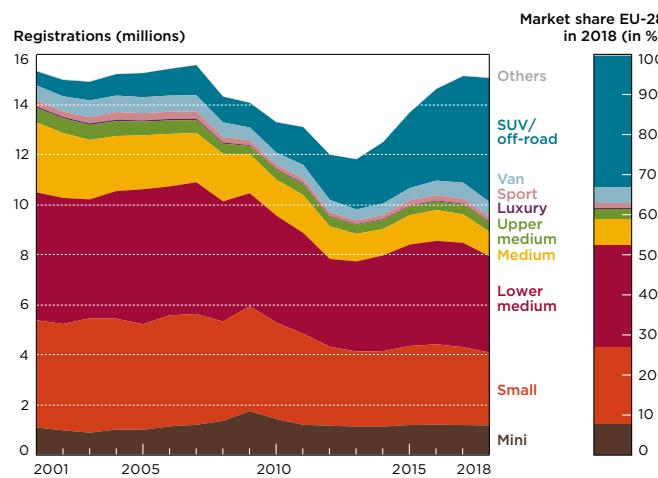
The VW Golf remains the most popular car model in Europe, accounting for about 3% of all new vehicle sales in the EU in 2018. Among the top-selling car models are also three SUVs, the VW Tiguan, Nissan Qashqai and Renault Captur (**Fig. 2-10**).

The total number of newly registered heavy trucks and buses in the EU was over 400 thousand in 2018 (**Fig. 2-12**). The truck market in the EU is dominated by only five manufacturers, together accounting for nearly 100% of all sales (**Fig. 2-15**).

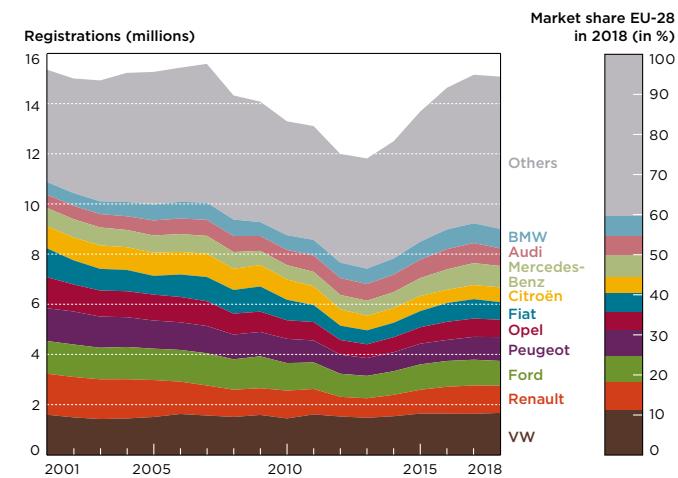


**Fig. 2-3**

Passenger cars:  
registrations by  
vehicle segment

**Fig. 2-4**

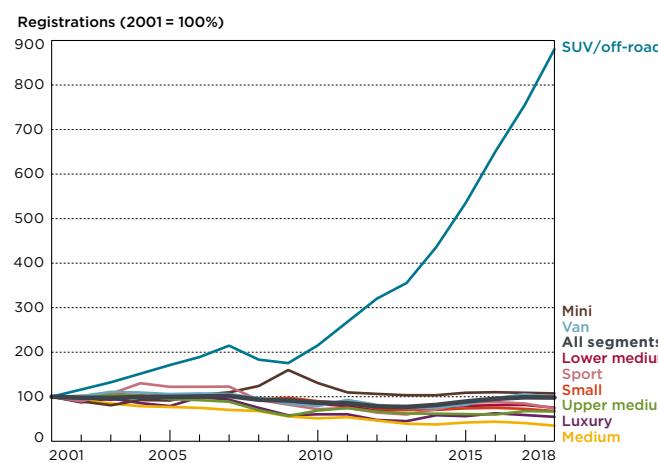
Passenger cars:  
registrations  
by brand



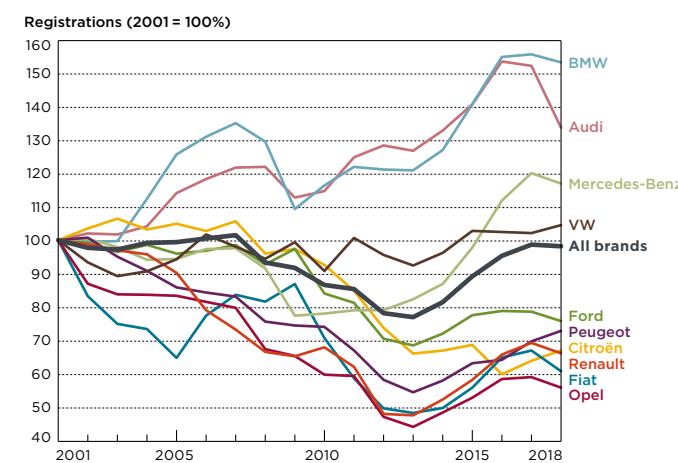
While in reality many brands are part of a larger group (for example VW, Audi, Škoda, Seat and others are part of the Volkswagen Group), for this report, each of the brands are shown individually. The reason for this is that brand affiliations have changed in the past (as for example in the case of Daimler and Chrysler) and may change in the future.

**Fig. 2-4**

Passenger cars:  
registrations  
by vehicle segment

**Fig. 2-6**

Passenger cars:  
registrations  
by brand



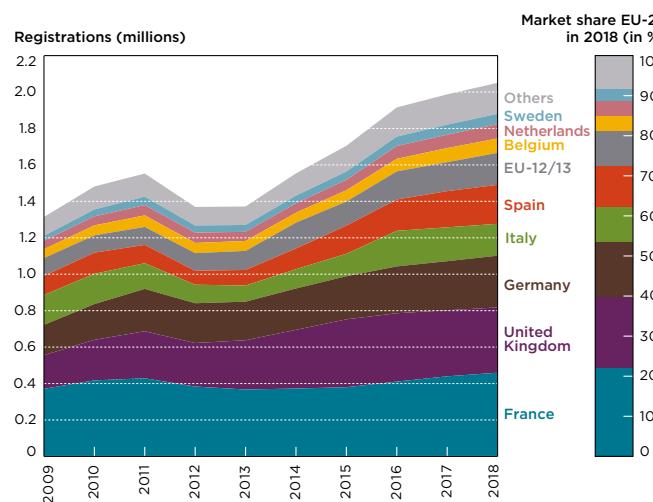
**Tab. 2-1**

Vehicle segment classification used for this report

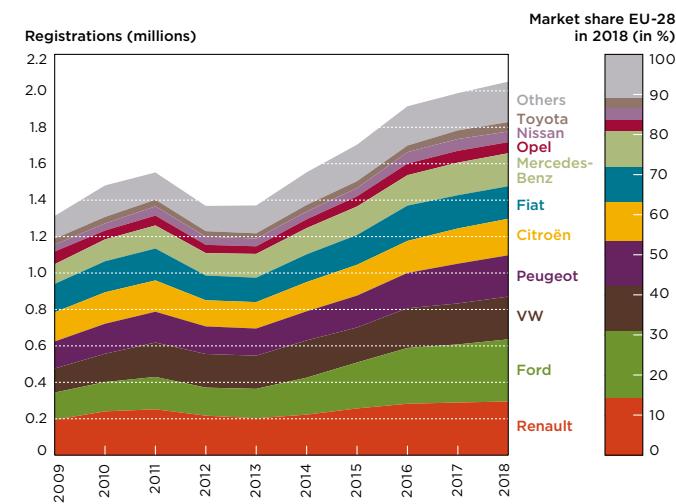
Segment	Model
Mini	Fiat 500, Fiat Panda, VW Up!
Small	Renault Clio, VW Polo, Ford Fiesta
Lower medium	VW Golf, Dacia Sandero, Škoda Octavia
Medium	VW Passat, Mercedes-Benz C-Class, Audi A4
Upper medium	Mercedes-Benz E-Class, BMW 5-Series, Audi A6
Luxury	Mercedes-Benz S-Class, BMW 7-Series, Audi A8
Sport	BMW 4-Series, Mazda MX-5, Audi TT
Van	VW Caddy, Fiat Ducato, Citroën Berlingo
SUV/off-road	VW Tiguan, Nissan Qashqai, Renault Captur

**Fig. 2-7**

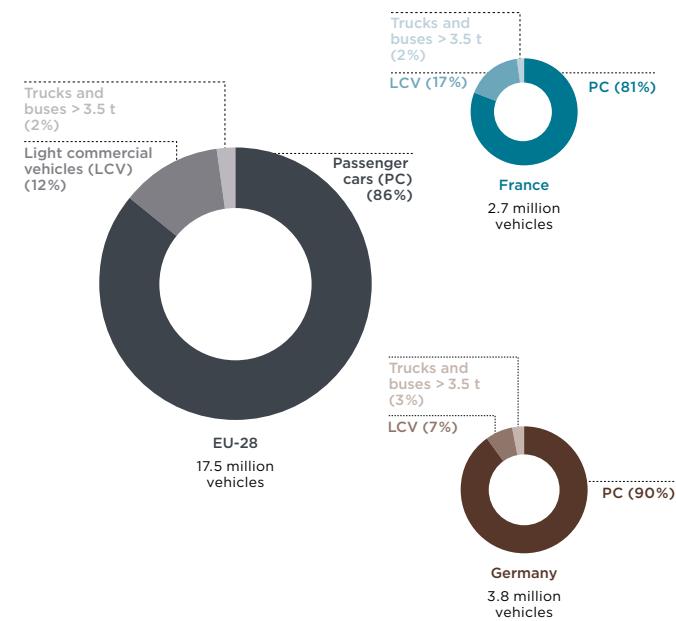
Light commercial vehicles: registrations by member state



Light commercial vehicles (N1 category) in the EU are defined as vehicles designed and constructed for the carriage of goods and having a maximum mass not exceeding 3.5 metric tons. They can be further classified into three sub-categories: N1 class I vehicles with a reference mass (mass in running order plus 25 kg) not exceeding 1,305 kg; N1 class II vehicles with a reference mass between 1,305 and 1,760 kg and N1 class III vehicles with a reference mass above 1,760 kg.

**Fig. 2-8**

Light commercial vehicles: registrations by brand

**Fig. 2-9**

Market share, passenger cars / light commercial vehicles/trucks and buses (2018)

**Fig. 2-10**

Top-selling passenger car models in EU-28 (2018)



**Model / Sales numbers and market share, EU-28**

# Ford Transit

284,635/13.9%

## Mercedes Sprinter

97,942/4.8%

## Citroën Berlingo

91,397/4.5%

## Renault Kangoo

89,886/4.4%

## Peugeot Partner

88,179/4.3%

## VW Transporter

87,190/4.3%

## Renault Master

85,713/4.2%

## Fiat Ducato

80,083/3.9%

## Renault Trafic

72,331/3.5%

## VW Caddy

67,304/3.3%

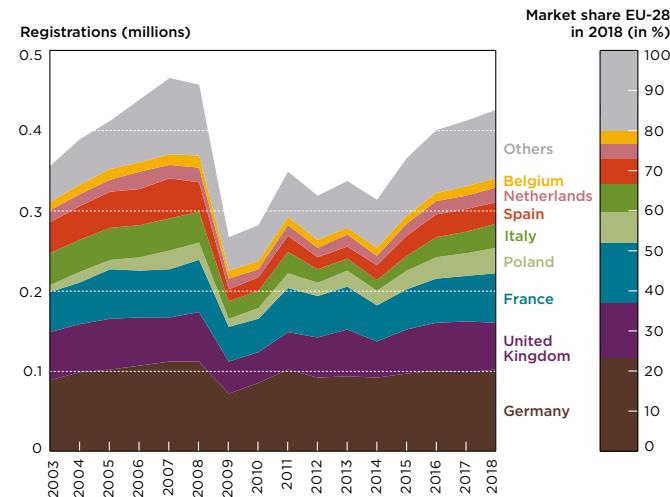
**Fig. 2-11**

Top-selling light commercial vehicle models in EU-28 (2018)



**Fig. 2-12**

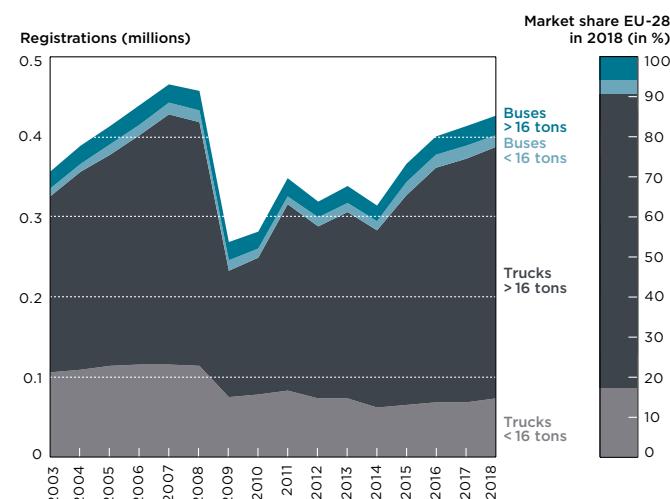
Trucks and buses over 3.5 tons:  
registrations by member state



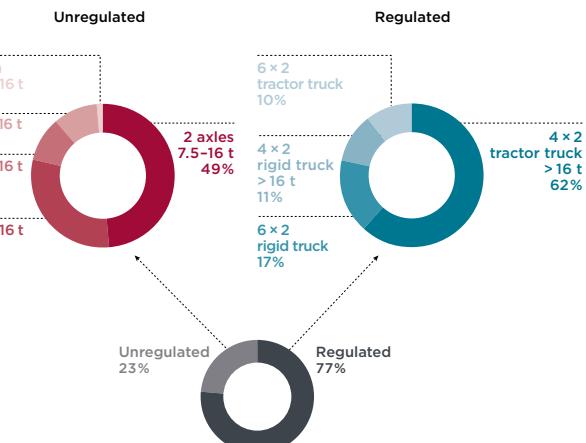
Data source: ACEA; data until 2007 is for EU-25 only, data for UK for 2016 and 2017 is estimated.

**Fig. 2-13**

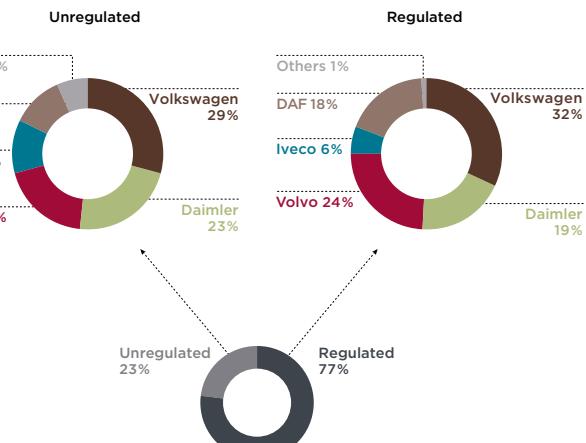
Trucks and buses over 3.5 tons:  
registrations by vehicle type



Data source: ACEA; data until 2007 is for EU-25 only, data for UK for 2016 and 2017 is estimated, distribution of buses below and above 16 tonnes for 2018 is estimated.

**Fig. 2-14**

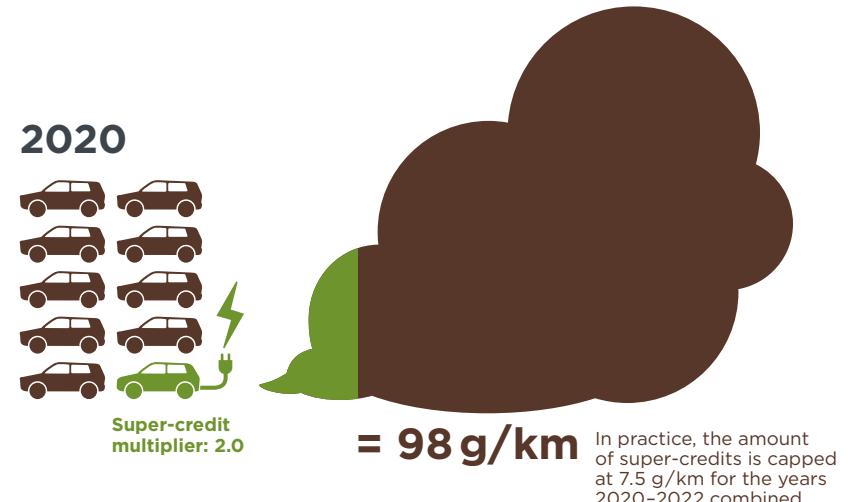
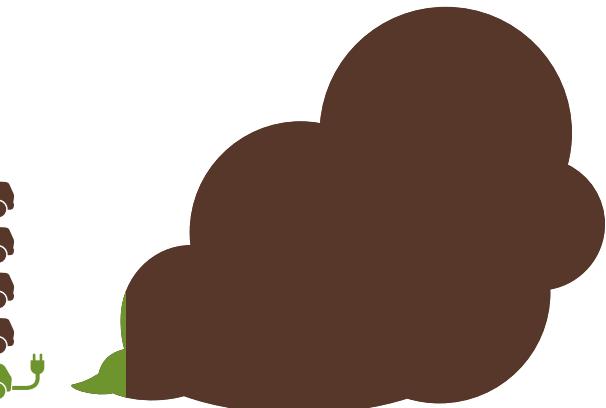
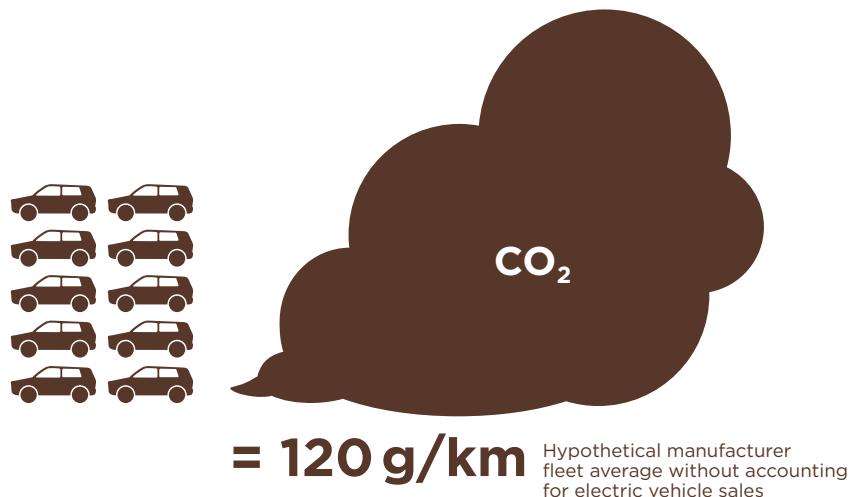
Trucks over 7.5 tons: categories covered and not covered by adopted CO<sub>2</sub> standards (2018)

**Fig. 2-15**

Trucks over 7.5 tons: registration by manufacturer in the segments covered and not covered by adopted CO<sub>2</sub> standards (2018)

## 3 FUEL CONSUMPTION & CO<sub>2</sub>

**Impact of “super-credit” multiplier per combustion engine vehicle on fleet CO<sub>2</sub> average**



During the years 2020 to 2022, manufacturers selling electric vehicles will benefit from an extra credit towards their new car CO<sub>2</sub> targets. In 2020, every electric car sold will be counted twice, i.e. a “super-credit” multiplier of 2.0 will be applied. This multiplier will decrease to 1.67 in 2021 and 1.33 in 2022, before phasing-out in 2022. As a result, the super-credit multiplier provides an incentive for manufacturers to delay the introduction of electric vehicles to the year 2020.



For more information:  
<https://theicct.org/publications/CO2-emissions-PVs-Europe-2018>

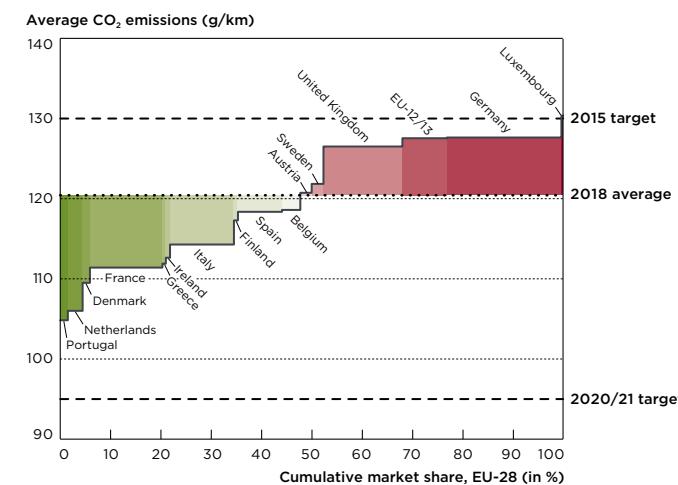
Average CO<sub>2</sub> emissions of newly registered cars in the EU, normalized to the NEDC test cycle, were 120 g/km in 2018. That is 2 g/km more than in the previous year.

Emission levels vary widely among member states, with Germany at the upper end (128 g/km) and France at the lower end (111 g/km) of the spectrum. Portugal (105 g/km) and the Netherlands (107 g/km) have been most successful in reducing emission levels in recent years (**Fig. 3-1**).

By 2021, manufacturers will have to meet an average CO<sub>2</sub> target of 95 g/km for their newly registered passenger cars, with the individual targets dependent on the average vehicle weight of a manufacturer's fleet. In 2018, Smart (87 g/km) and Toyota (99 g/km) had the lowest fleet average CO<sub>2</sub> emission levels of brands sold in the EU. On the other end of the spectrum, Porsche (183 g/km) and Land Rover (169 g/km) had the highest emission levels (**Fig. 3-2**).

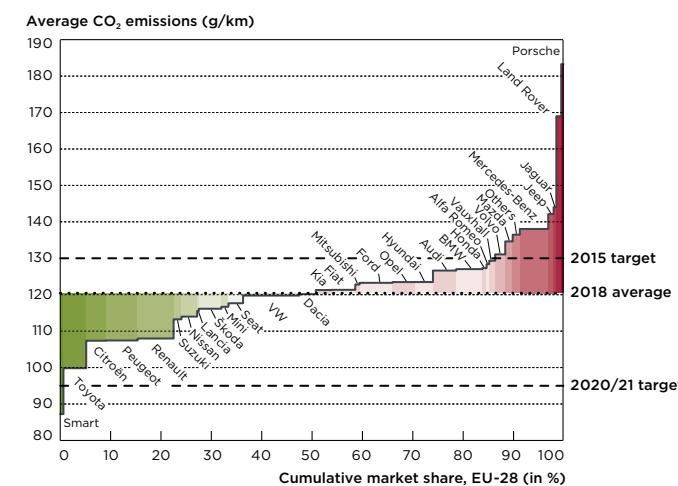
While average CO<sub>2</sub> emission levels for new cars, according to the official test procedure, have decreased by about 30% since 2001, vehicle weight has increased by +10% and engine power has increased by +30%. These developments imply that lower CO<sub>2</sub> emissions would be possible if vehicle weight and engine power were reduced (**Fig. 3-13**).

Beginning in September 2018, the new WLTP test procedure was applied to all new passenger car registrations in the EU. Due to the date the rule was enacted, CO<sub>2</sub> emission levels according to WLTP were only reported for 26% of vehicles in 2018.



**Fig. 3-1**

Passenger cars:  
CO<sub>2</sub> emissions  
and market share  
by member state  
(2018)

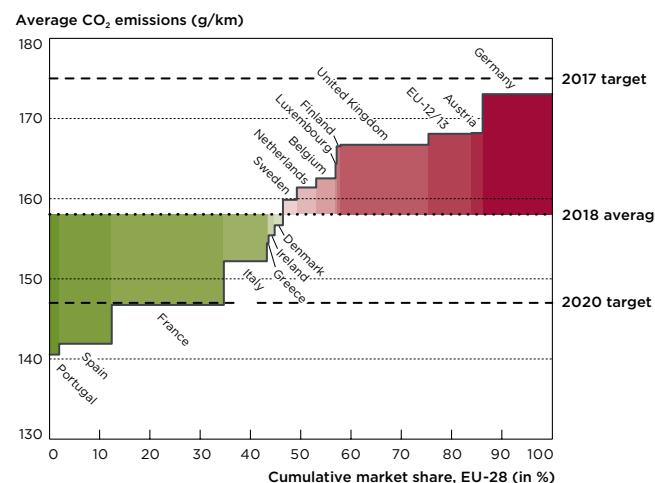


**Fig. 3-2**

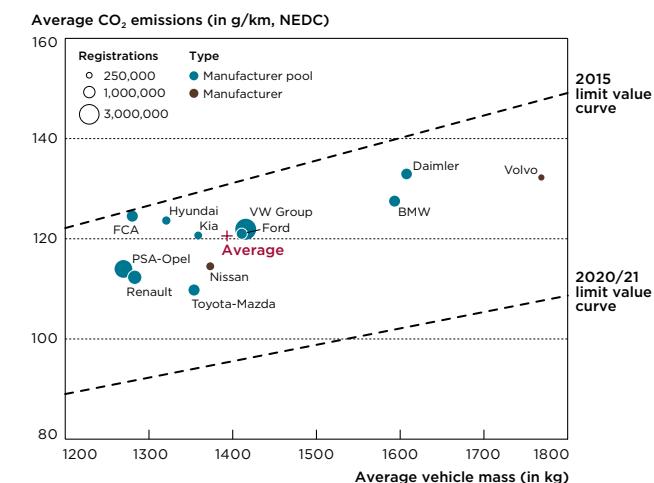
Passenger cars:  
CO<sub>2</sub> emissions  
and market share  
by brand (2018)

**Fig. 3-3**

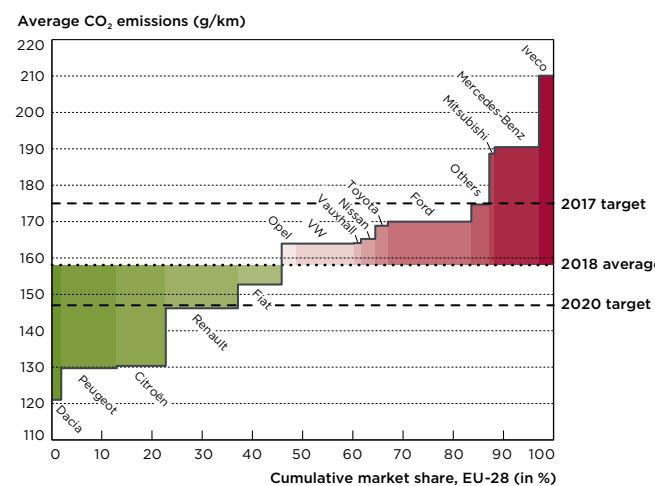
Light commercial vehicles: CO<sub>2</sub> emissions and market share by member state (2018)

**Fig. 3-5**

EU new passenger vehicles CO<sub>2</sub> emissions and weight in 2018 by manufacturer and corresponding 2020/21 targets

**Fig. 3-4**

Light commercial vehicles: CO<sub>2</sub> emissions and market share by brand (2018)

**Tab. 3-1**

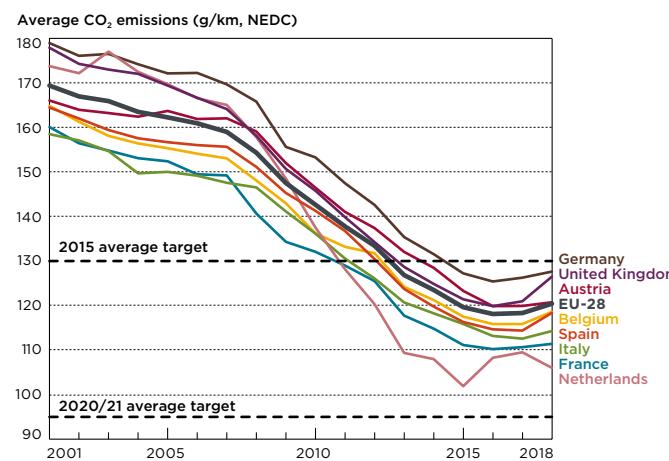
EU new passenger vehicles CO<sub>2</sub> emissions and weight in 2018 by manufacturer and corresponding 2020/21 targets

Manufacturer pool/ Manufacturer	EU market share (%)	Average mass (kg)	CO <sub>2</sub> values (g/km, NEDC)		
			2018 average	Change 2017-2018	2020/21 Target
Toyota-Mazda	6	1351	110	0	94
Renault	11	1281	112	2	92
PSA-Opel	17	1269	114	7	91
Nissan	3	1370	115	-2	95
Ford	7	1411	121	0	96
Kia	3	1356	121	1	94
Average	1392	121	2	95	
FCA-Tesla	6	1300	122	5	92
VW Group	23	1413	122	1	96
Hyundai	4	1318	124	2	93
BMW	6	1589	128	6	102
Volvo	2	1760	132	8	108
Daimler	6	1602	133	6	102

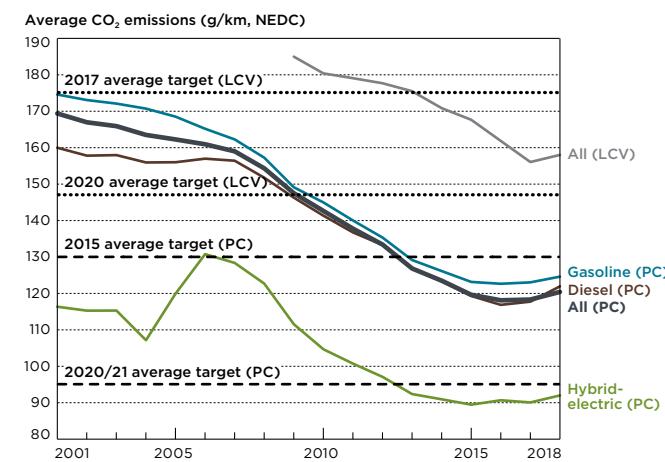


**Fig. 3-6**

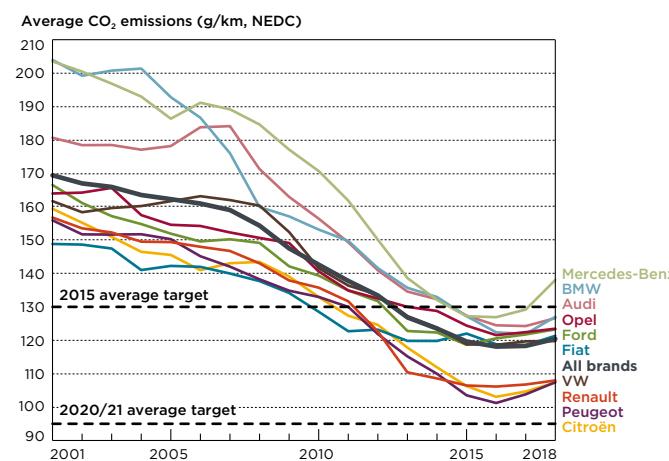
Passenger cars:  
CO<sub>2</sub> emissions  
by member state

**Fig. 3-8**

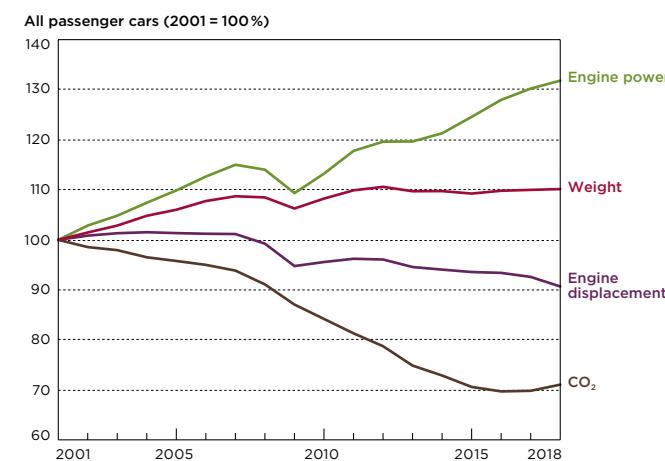
New vehicles:  
CO<sub>2</sub> emissions by  
engine technology

**Fig. 3-7**

Passenger cars:  
CO<sub>2</sub> emissions  
by brand

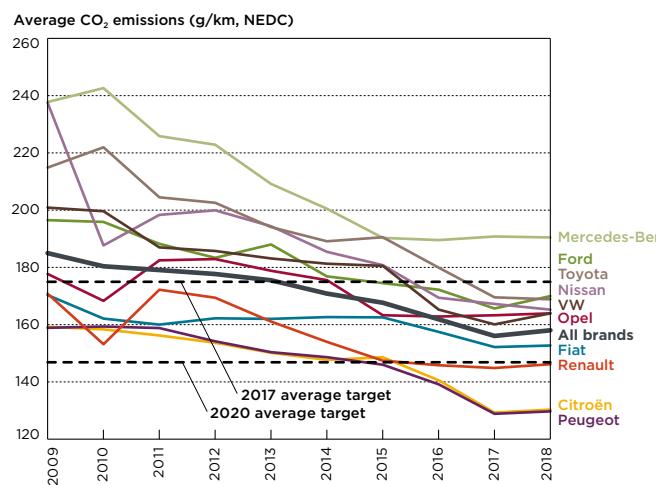
**Fig. 3-9**

Passenger cars:  
CO<sub>2</sub> emissions  
and technical  
parameters

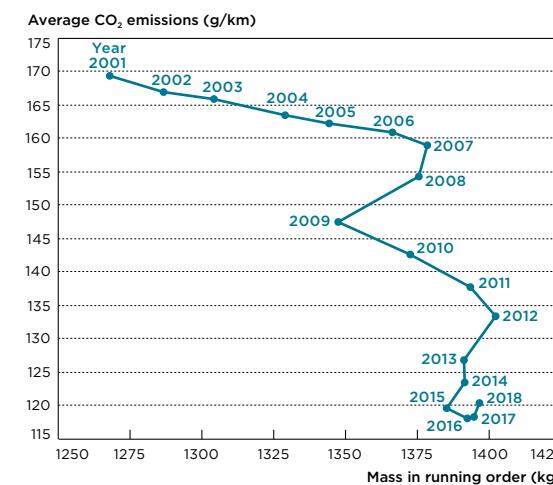


**Fig. 3-10**

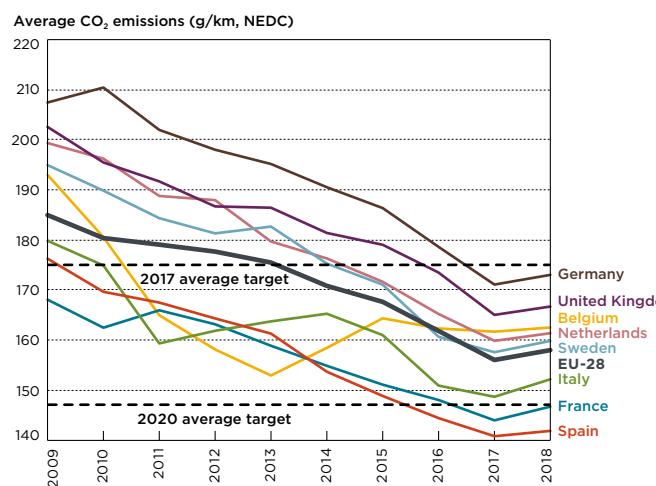
Light commercial vehicles: CO<sub>2</sub> emissions by brand

**Fig. 3-12**

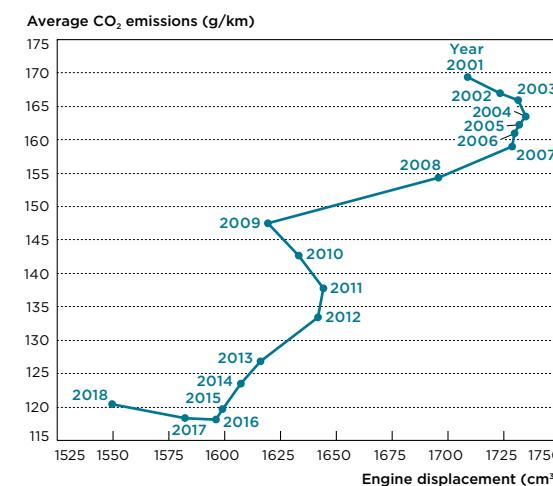
Passenger cars:  
CO<sub>2</sub> emissions  
versus vehicle mass

**Fig. 3-11**

Light commercial vehicles: CO<sub>2</sub> emissions by member state

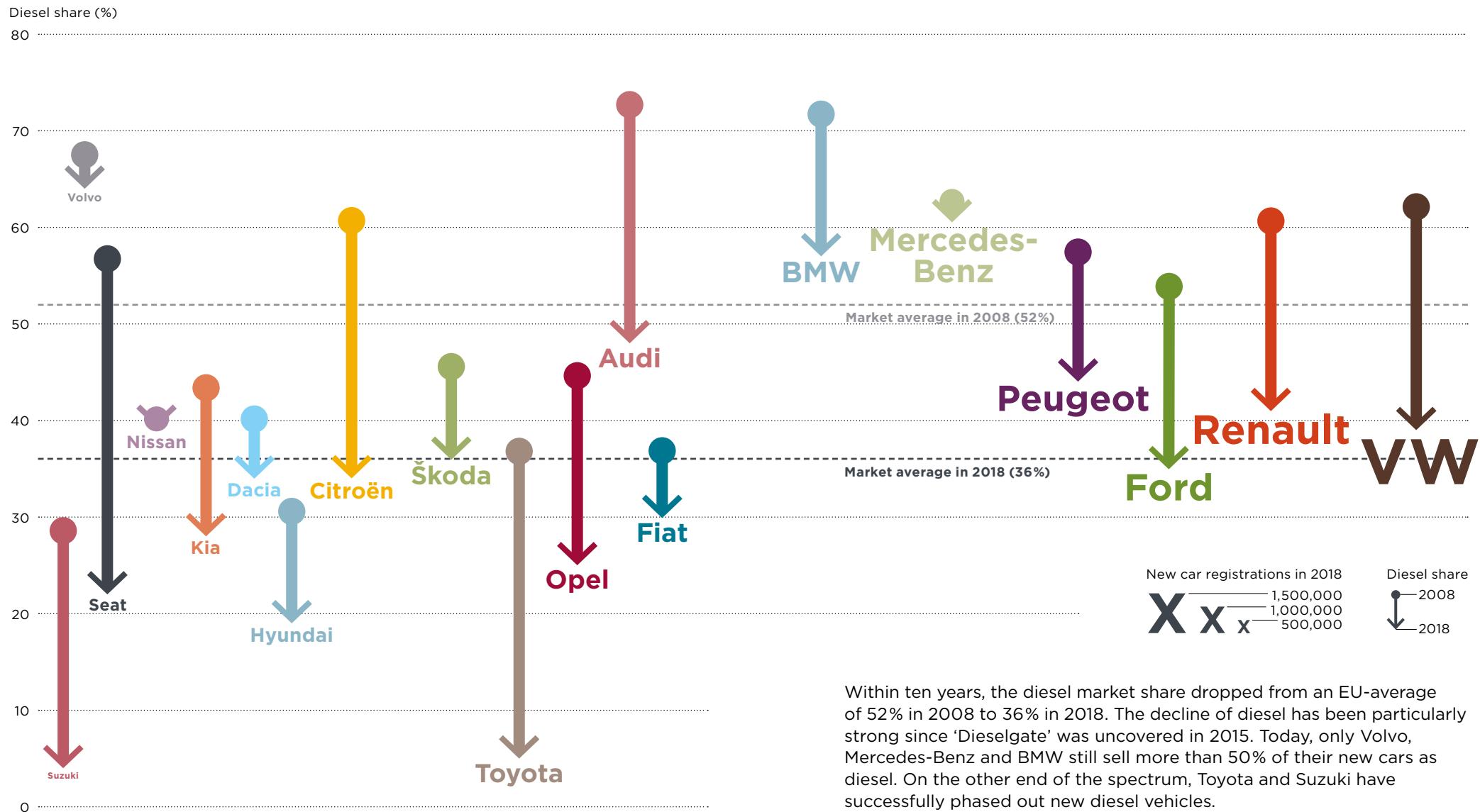
**Fig. 3-13**

Passenger cars:  
CO<sub>2</sub> emissions  
versus engine  
displacement



## 4 TECHNOLOGIES

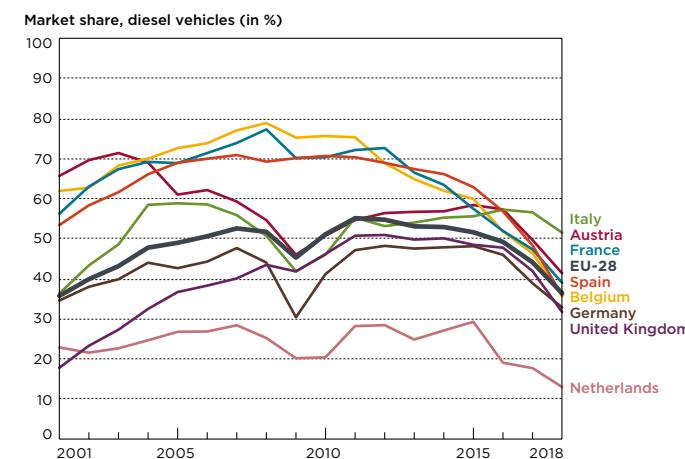
Diesel share of new car registrations by brand, 2008 to 2018



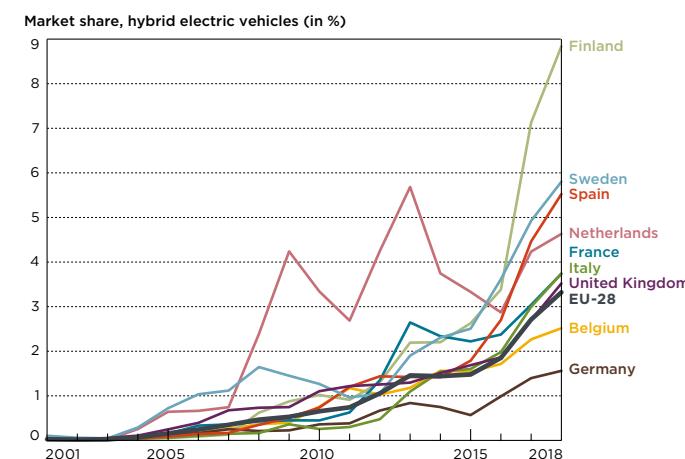
The share of diesel cars sold in the EU dropped considerably from 44% in 2017 to 36% in 2018. This is significantly less than in 2011-2012, when 55% of new cars were still powered by diesel. In France, where the previous diesel market share was significantly higher than the EU average, it dropped from a maximum of 77% in 2008 to 39% in 2018. Italy remains the only major EU member state with a diesel share slightly higher than 50%. In the Netherlands, on the other hand, the share of diesel cars is approaching the 10% threshold (**Fig. 4-1**). Audi, BMW and Mercedes were among the brands with the highest diesel market share, with their combined share of around 55-60% diesel cars sold in the EU (**Fig. 4-6**).

The total market share of hybrid electric cars was 3% in 2018. Sales went up particularly in Finland, where it reached 9% in 2018. Hybrid electric cars were also relatively popular in Ireland, Spain and Sweden, with each having a 6% market share (**Fig. 4-2**). Nearly 60% of all new vehicles manufactured by Toyota which are sold in the EU are hybrid electric (**Fig. 4-7**).

Sales of plug-in hybrid and battery electric vehicles each accounted for 1% of all new cars in 2018. Plug-in hybrid cars were particularly successful in Sweden (6%) and for the BMW brand (5%) (**Fig. 4-3**, **Fig. 4-8**). Battery electric vehicles reached the highest market share in the Netherlands (5%) and for the Renault brand (3%) (**Fig. 4-4**, **Fig. 4-9**).

**Fig. 4-1**

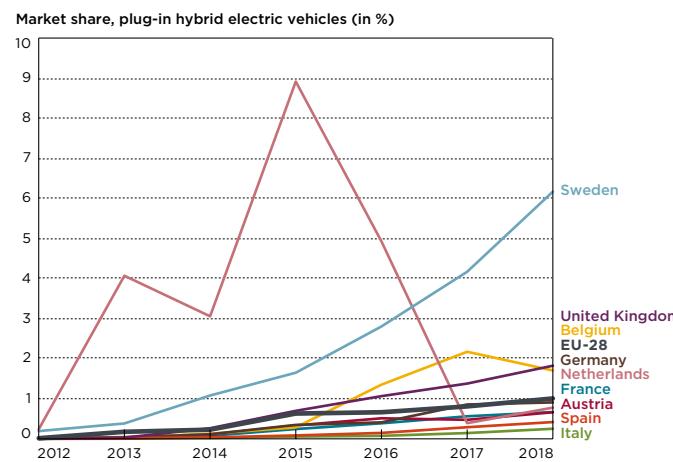
Passenger cars:  
market share,  
diesel vehicles by  
member state

**Fig. 4-2**

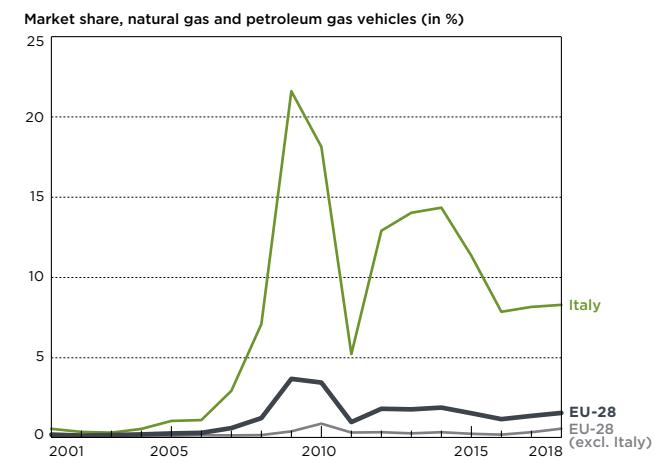
Passenger cars:  
market share,  
hybrid electric  
vehicles (excl.  
plug-in hybrid)  
by member state

**Fig. 4-3**

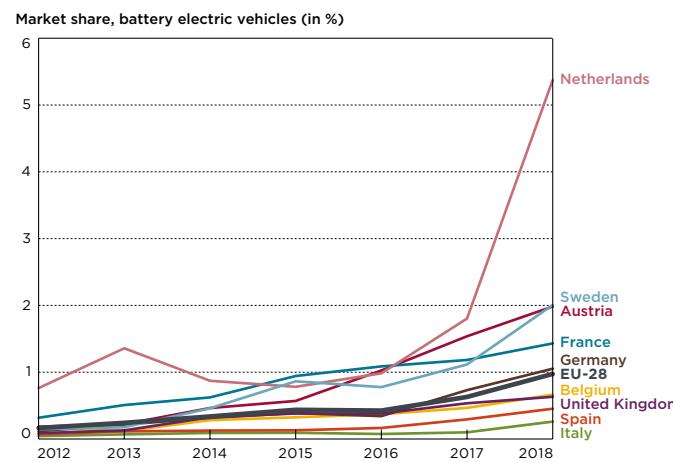
Passenger cars:  
market share,  
plug-in hybrid  
electric vehicles  
by member state

**Fig. 4-5**

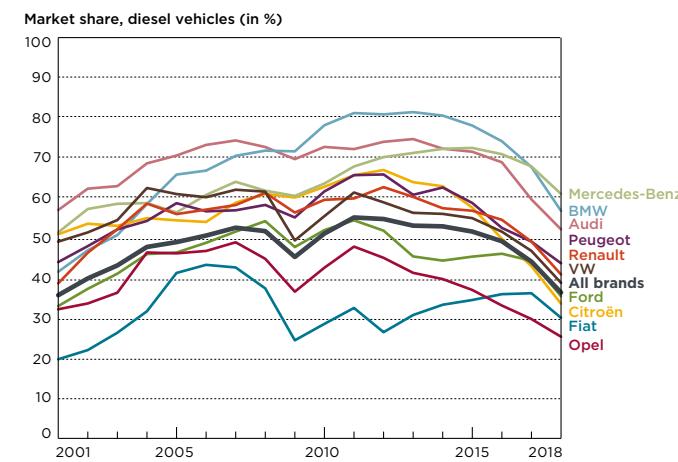
Passenger cars:  
market share,  
natural gas and  
petroleum gas  
vehicles (mono-  
and bivalent)  
by member state

**Fig. 4-4**

Passenger cars:  
market share,  
battery electric  
vehicles by  
member state

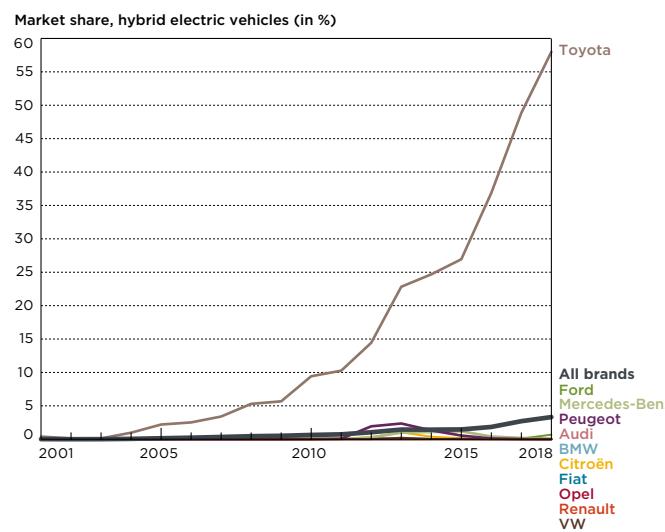
**Fig. 4-6**

Passenger cars:  
market share,  
diesel vehicles  
by brand

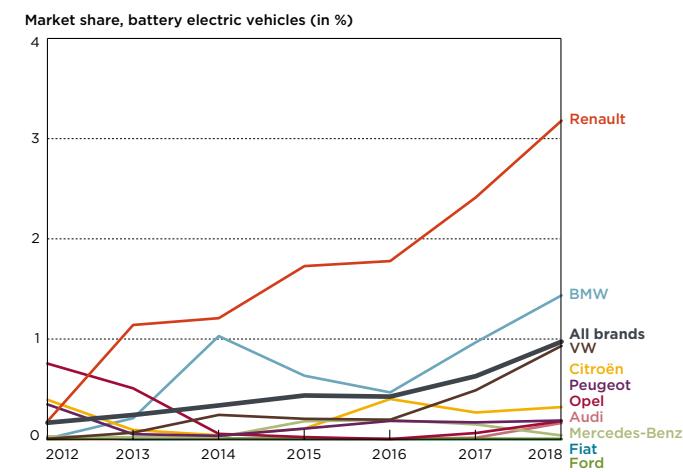


**Fig. 4-7**

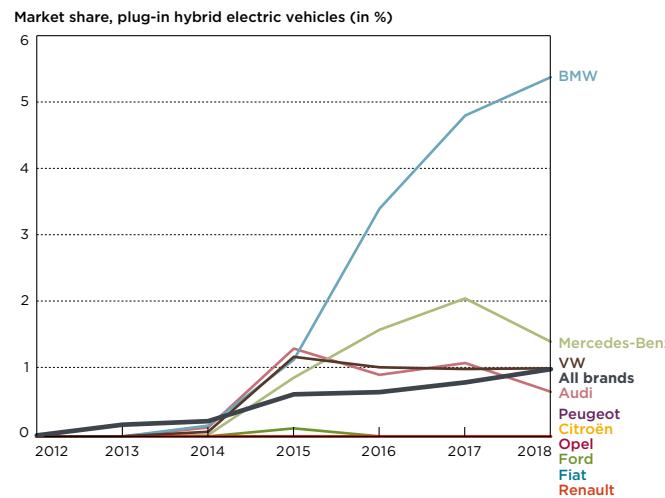
Passenger cars:  
market share,  
hybrid electric  
vehicles (excl.  
plug-in hybrid)  
by brand

**Fig. 4-9**

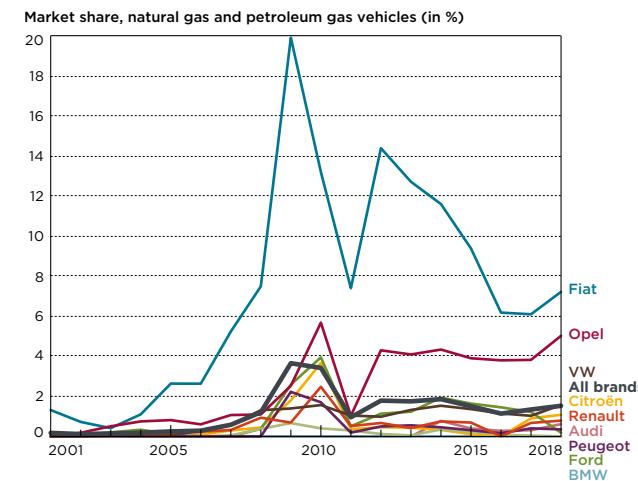
Passenger cars:  
market share,  
battery electric  
vehicles by brand

**Fig. 4-8**

Passenger cars:  
market share,  
plug-in hybrid  
electric vehicles  
by brand

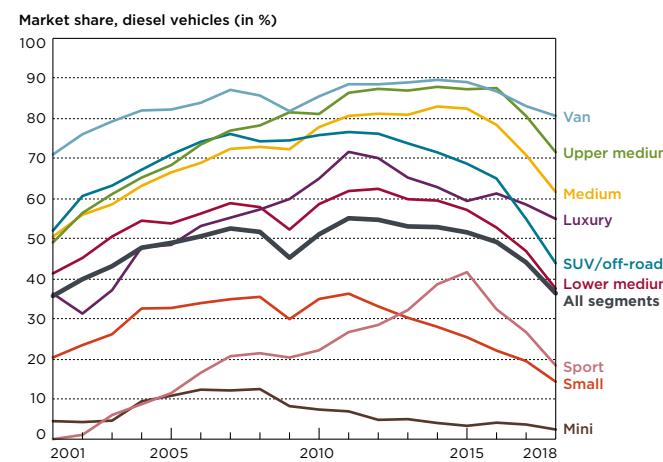
**Fig. 4-10**

Passenger cars:  
market share,  
natural gas and  
petroleum gas  
vehicles (mono-  
and bivalent) by  
brand

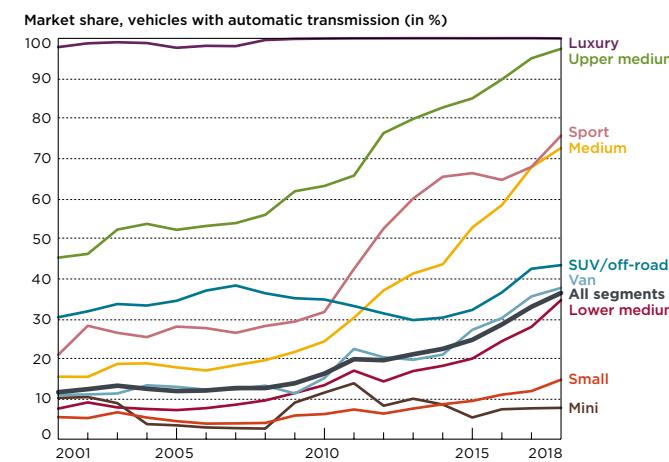


**Fig. 4-11**

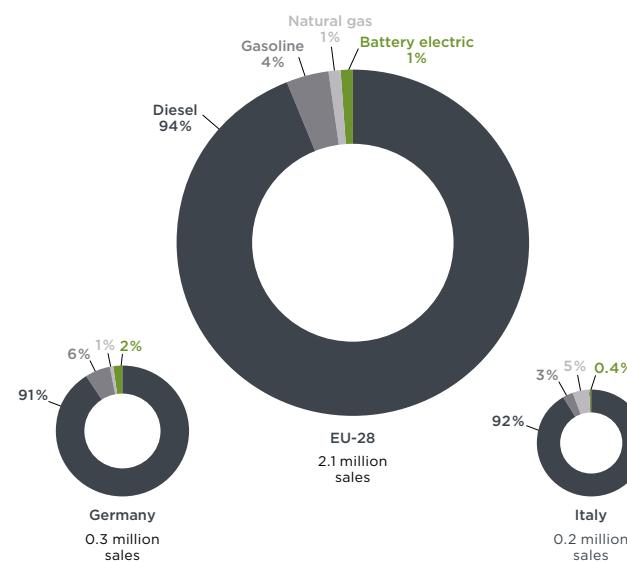
Passenger cars:  
market share,  
diesel vehicles  
by segment

**Fig. 4-13**

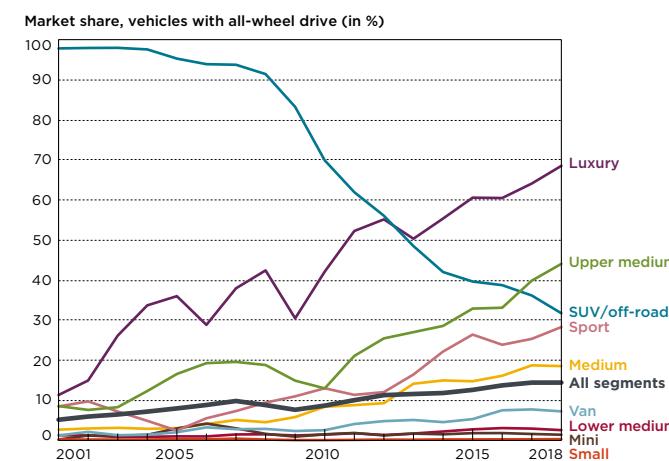
Passenger cars:  
market share,  
vehicles with  
automatic transmission  
by segment

**Fig. 4-12**

Light commercial vehicles: market share, fuels  
by member state

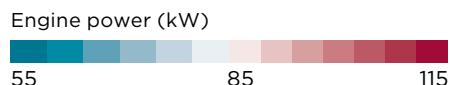
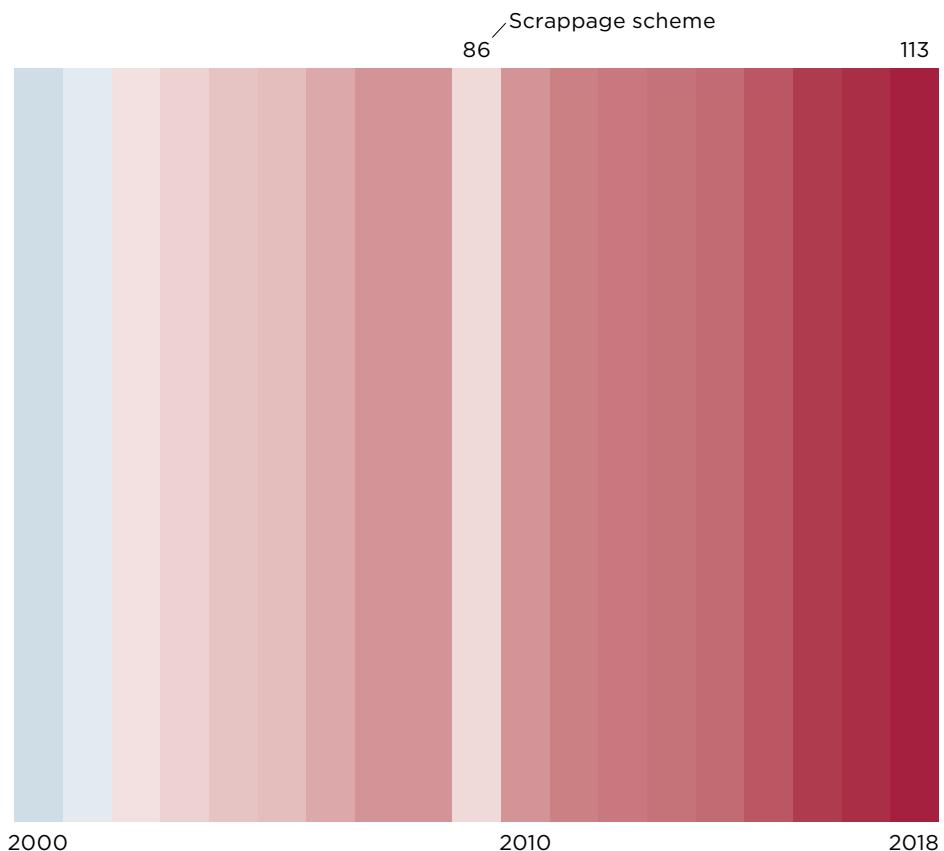
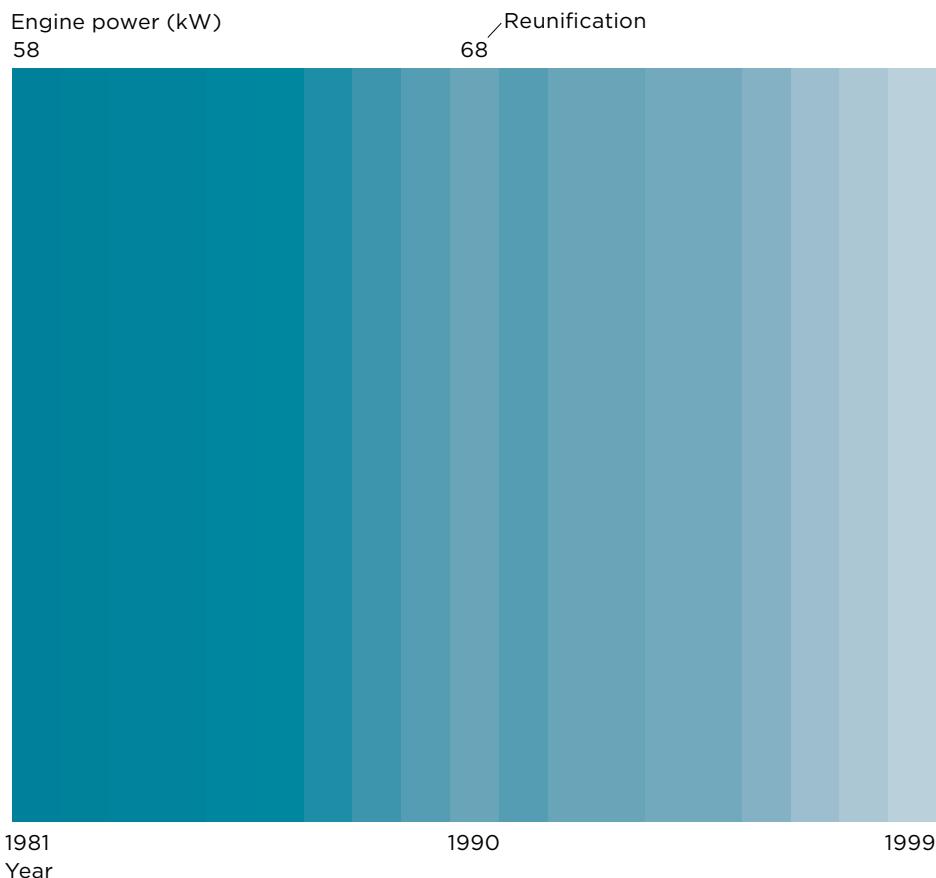
**Fig. 4-14**

Passenger cars:  
market share,  
vehicles with  
all-wheel drive  
by segment



## 5 KEY TECHNICAL PARAMETERS

### Average engine power of new passenger cars in Germany



Data source: European Automobile Manufacturers Association (ACEA), Automobil-Produktion

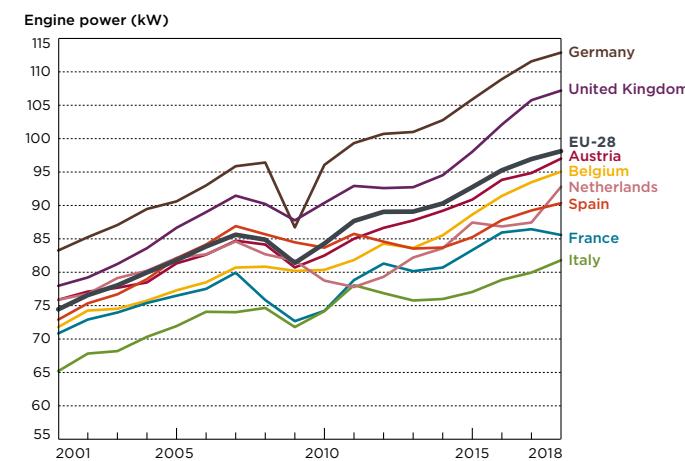
Over the past years, cars in Europe have not only become larger and heavier, but also are equipped with increasingly more powerful engines. While in 1981, the average new car in Germany had an engine power of 58 kW, it increased to 113 kW in 2018. That is a nearly a doubling of power within roughly 40 years. Increasing engine power leads to higher CO<sub>2</sub> emissions, unless counter-balanced with more sophisticated emission reduction technology, a phenomenon called rebound effect.

The average engine power of new passenger cars in the EU increased to 98 kW in 2018, which is 25% more than 15 years before. Vehicles in Germany, which have an average engine power of 113 kW, are equipped with significantly more powerful engines than the EU average. On the other end of the spectrum, the average engine power of new cars in Italy was 82 kW in 2018 (**Fig. 5-1**).

Audi, BMW and Mercedes manufactured vehicles with the highest average engine power, of between 135 to 145 kW. New cars of the Fiat brand had an average engine power of 70 kW in 2018 (**Fig. 5-2**).

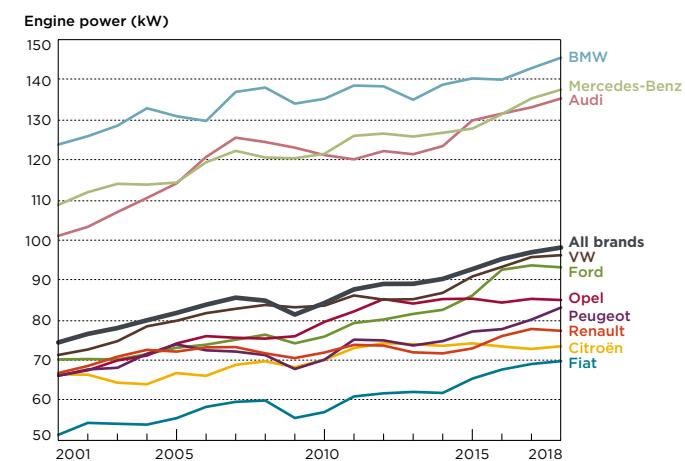
The average engine displacement of new car has been decreasing, in particular since 2007. Initially an effect of the economic crisis, this decrease signals an underlying technological trend: improved combustion processes and turbocharging allow manufacturers to extract more power from smaller engines (**Fig. 5-5**).

The average mass of new cars in the EU remained about constant, at a level of 1400 kg in 2018. However, that is about 10% higher than 15 years before. The average mass of both the German and the Swedish new car fleets are significantly above the EU average, at 1469 kg and 1582 kg respectively in 2018. In contrast, customers in the Netherlands opted for significantly lighter cars, with an average weight of 1312 kg (**Fig. 5-8**).



**Fig. 5-1**

Passenger cars:  
engine power  
by member state

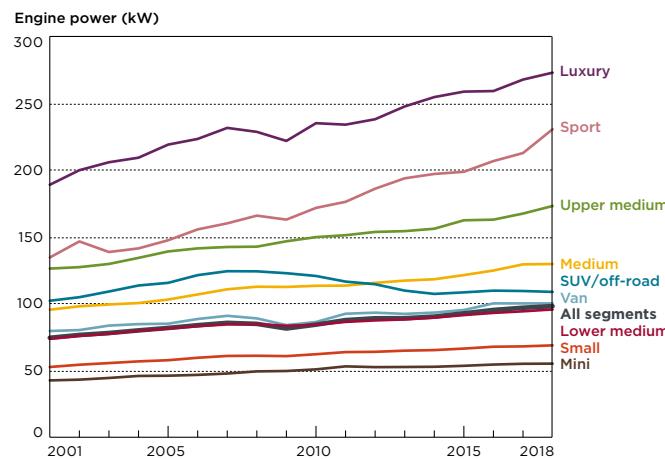


**Fig. 5-2**

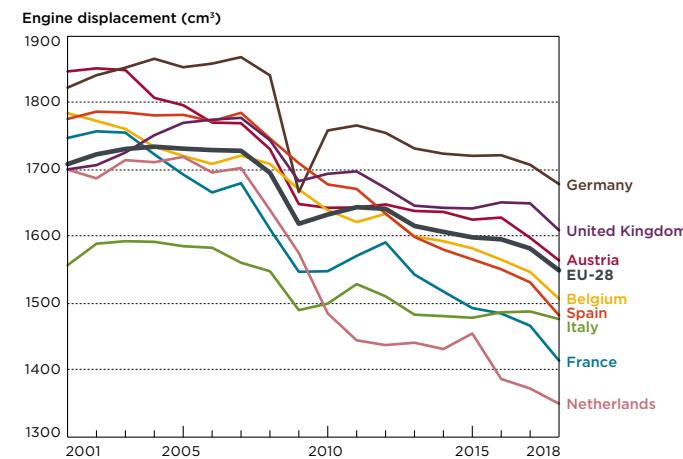
Passenger cars:  
engine power  
by brand

**Fig. 5-3**

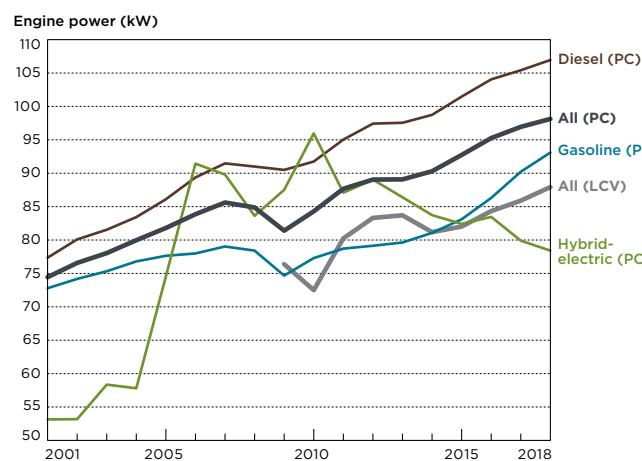
Passenger cars:  
engine power  
by segment

**Fig. 5-5**

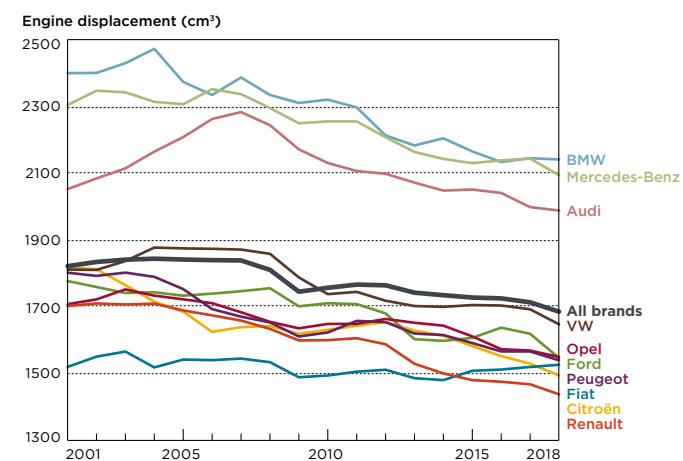
Passenger cars:  
engine displace-  
ment by member  
state

**Fig. 5-4**

New vehicles:  
engine power  
by type of vehicle  
and engine technology

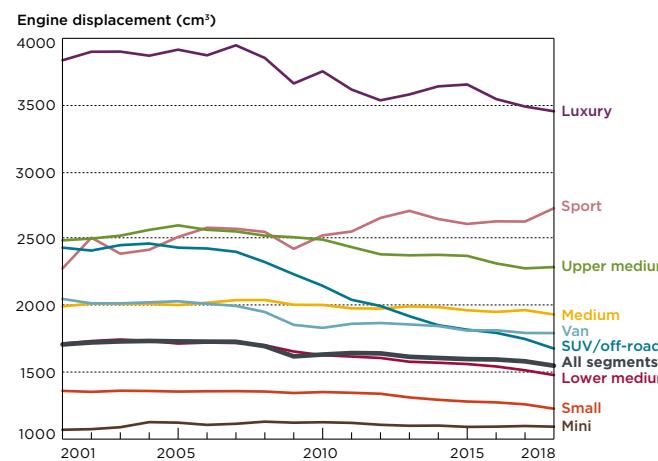
**Fig. 5-6**

Passenger cars:  
engine displace-  
ment by brand

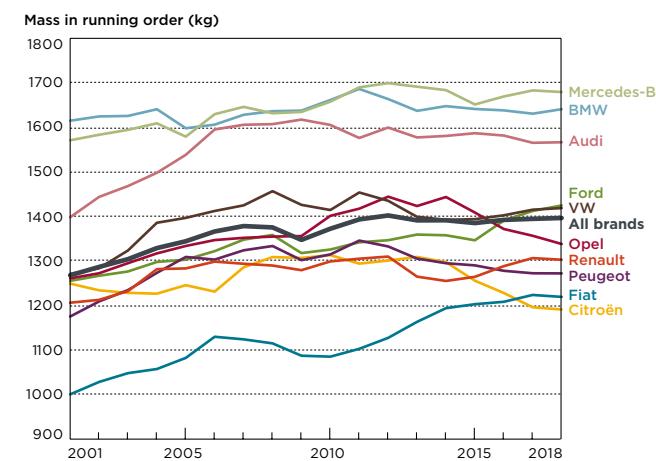


**Fig. 5-7**

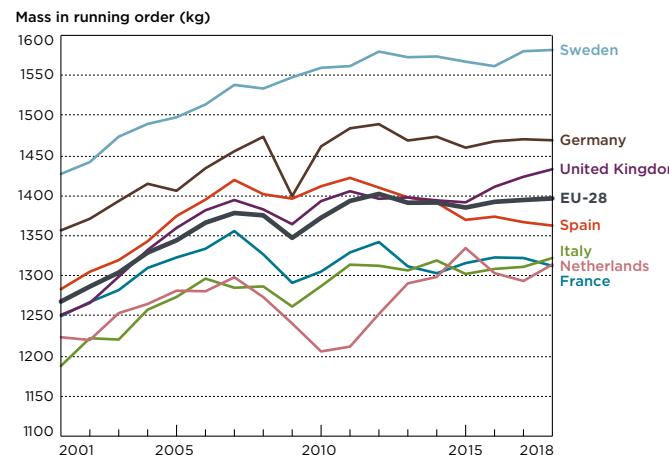
Passenger cars:  
engine displacement  
by segment

**Fig. 5-9**

Passenger cars:  
vehicle mass  
in running order  
by brand

**Fig. 5-8**

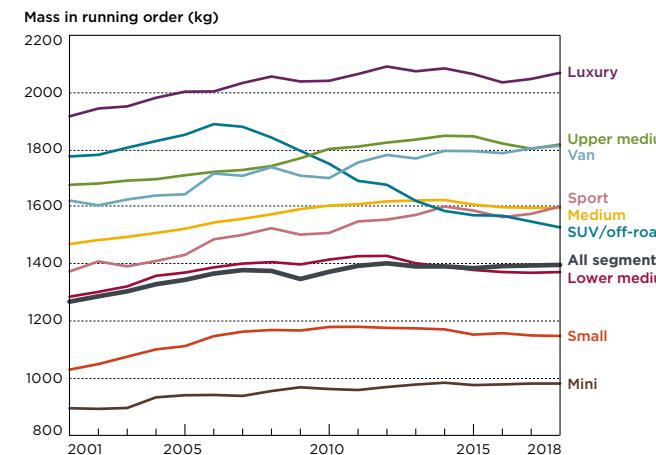
Passenger cars:  
vehicle mass  
in running order  
by member state



Vehicle mass in running order is defined as mass of the empty vehicle plus 75 kg of weight for the driver and some luggage, 90% of the fuel capacity and 100% of the capacity of other liquid containing systems (like water or oil). The weight of optional equipment for the vehicle is not included.

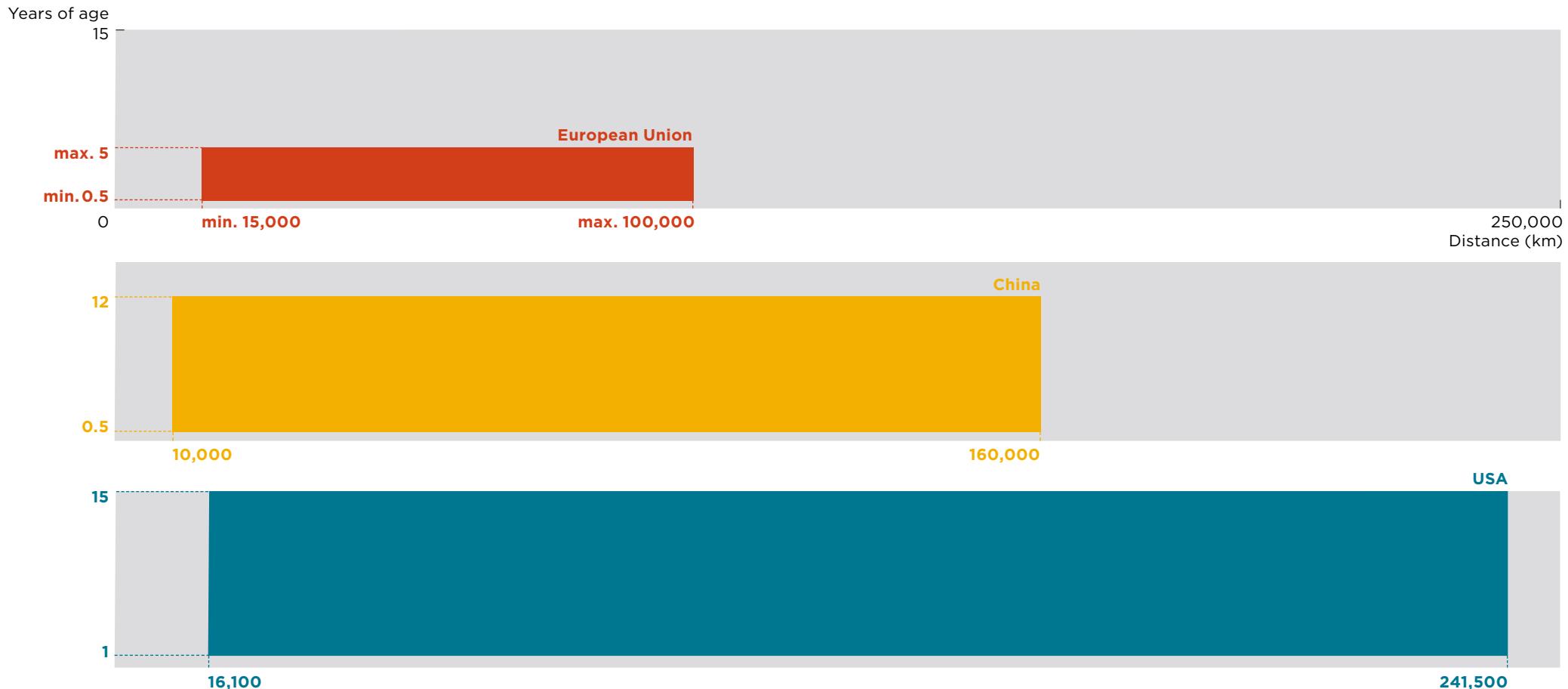
**Fig. 5-10**

Passenger cars:  
vehicle mass  
in running order  
by segment



## 6 AIR POLLUTION & REAL-WORLD

### Passenger car in-service conformity testing requirements in the European Union, China, and the United States



Vehicle emissions are tested not only during type-approval, but also throughout their lifetime on the road. However, the European regulations restrict the allowed testing range significantly. Vehicles tested cannot be older than 5 years and cannot have more than 100,000 km of mileage. In comparison, China foresees in-service conformity testing for vehicles up to 12 years old and with up to 160,000 km of mileage.



For more information:  
<https://theicct.org/publications/recommendations-post-euro-6-eu>

Since September 2014, the Euro 6 emission limit has applied to new vehicle type approvals, and since September 2015, it has been mandatory for all new vehicle sales (Tab. 6-1). By 2018, virtually all new vehicle registrations were Euro 6 compliant (Fig. 6-1). The Real Driving Emissions (RDE) on-road test procedure, implemented in September 2017, applies not-to-exceed emission limits for NO<sub>x</sub> and particulates (Tab. 6-2).

**Tab. 6-1**

EU emission limits for gasoline and diesel passenger cars

<https://transportpolicy.net>



#### EU emission limits for gasoline passenger cars (in g/km)

	Effective date*	CO	HC	NMHC	NO <sub>x</sub>	HC+NO <sub>x</sub>	PM	PN
Euro 3	Jan 2000	2.30	0.20	-	0.15	-	-	-
Euro 4	Jan 2005	1.00	0.10	-	0.08	-	-	-
Euro 5	Sep 2009	1.00	0.10	0.068	0.06	-	0.0050	-
Euro 6	Sep 2014	1.00	0.10	0.068	0.06	-	0.0050	6.0x10 <sup>11</sup> **

#### EU emission limits for diesel passenger cars (in g/km)

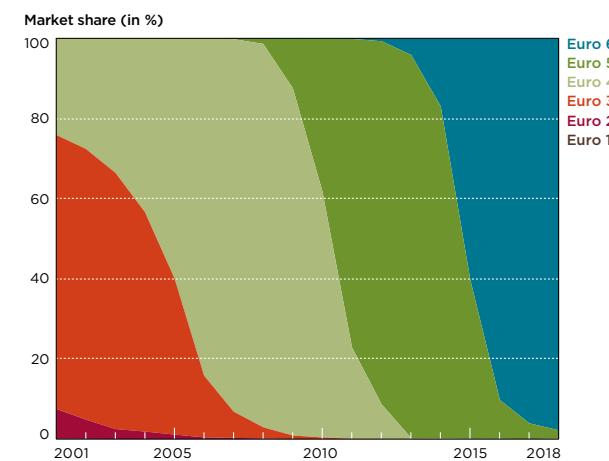
	Effective date*	CO	HC	NMHC	NO <sub>x</sub>	HC+NO <sub>x</sub>	PM	PN
Euro 3	Jan 2000	0.64	-	-	0.50	0.56	0.0500	-
Euro 4	Jan 2005	0.50	-	-	0.25	0.30	0.0250	-
Euro 5	Sep 2009	0.50	-	-	0.18	0.23	0.0050	-
Euro 6	Sep 2014	0.50	-	-	0.08	0.17	0.0050	6.0x10 <sup>11</sup> **

\*For new vehicle types

\*\*6.0x10<sup>11</sup> within first three years from Euro 6 effective dates.  
Applies only to diesel and direct-injection gasoline cars.

Emission limits for light commercial (N1) vehicles class I are identical to passenger car limits listed in Tab. 6-1. N1 class II and N1 class III emission limits are not listed here.

All emission levels as tested in the New European Drive Cycle (NEDC). Emissions levels in real-world driving may differ from the test cycle values. CO: Carbon monoxide; HC: Hydrocarbon; NMHC: Nonmethane hydrocarbon; NO<sub>x</sub>: Nitrogen oxides; HC+NO<sub>x</sub>: Hydrocarbon and nitrogen oxides; PM: Particulate matter; PN: Particulate number

**Fig. 6-1**

Passenger cars:  
market share  
emission standards

**Tab. 6-2**

RDE timeline and conformity factors

Vehicle class	Euro6d-temp	Euro6d
Passenger cars (M1) and small light-commercial vehicles (N1 CL 1)	New types All vehicles	Sep 1 <sup>st</sup> 2017 Sep 1 <sup>st</sup> 2019 Jan 1 <sup>st</sup> 2021
Other light-commercial vehicles (N1 CL 2, 3 and N2)	New types All vehicles	Sep 1 <sup>st</sup> 2018 Sep 1 <sup>st</sup> 2020 Jan 1 <sup>st</sup> 2021 Jan 1 <sup>st</sup> 2022

Not-to-exceed (NTE) emission limits of an RDE test result for the entire trip and the urban part alone

$$NTE_{\text{pollutant}} = CF_{\text{pollutant}} \times \text{EURO 6}_{\text{pollutant limit}}$$

#### Conformity Factor (CF)

Pollutant	Mass of oxides of nitrogen (NO <sub>x</sub> )	Number of particles (PN)	Mass of carbon monoxide (CO)
Temporary CF Euro6d-temp	2.1	1 + margin PN, with margin = 0.5	no on-road limit/ only measured
Final CF Euro6d	1 + margin, with margin = 0.43	1 + margin PN, with margin = 0.5	no on-road limit/ only measured

## Remarks on data sources

The basis for the statistics shown in this report is a database compiled by the ICCT. It includes technical information, emission levels, and registration volumes at a vehicle variant level. Sources of information include data obtained by the European Environmental Agency (EEA) on behalf of the European Commission, by the German Kraftfahrtbundesamt (KBA), the Netherlands Vehicle Authority (RDW), the United Kingdom Vehicle Certification Agency (VCA), Allgemeiner Deutscher Automobil-Club (ADAC), Automobil Revue, IHS Markit, km77.com, vehicle manufacturers' and importers' associations and information provided directly by manufacturers and suppliers. Data included in this publication are aggregated to a great extent and are only intended to illustrate high-level trends. It is not to be considered official data.

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## Abbreviations

<b>ACEA</b>	Association des Constructeurs Européens d'Automobiles (European Automobile Manufacturers' Association)
<b>BEV</b>	Battery electric vehicles
<b>CF</b>	Conformity factor
<b>CO</b>	Carbon monoxide
<b>CO<sub>2</sub></b>	Carbon dioxide
<b>EC</b>	European Commission
<b>EEA</b>	European Environment Agency
<b>EU</b>	European Union
<b>EU-12/13</b>	All 12/13 EU member states having joined the EU between 1995 and 2014
<b>EU-28</b>	All 28 EU member states
<b>HC</b>	Hydrocarbon
<b>HEV</b>	Hybrid electric vehicles
<b>KBA</b>	Kraftfahrtbundesamt
<b>LCV</b>	Light commercial vehicles
<b>LPG</b>	Liquefied petroleum gas
<b>PC</b>	Passenger cars
<b>PHEV</b>	Plug-in hybrid electric vehicles
<b>NEDC</b>	New European Driving Cycle
<b>NMHC</b>	Nonmethane hydrocarbon
<b>NO<sub>x</sub></b>	Nitrogen oxides
<b>PM</b>	Particulate matter
<b>RDE</b>	Real driving emissions
<b>SUV</b>	Sport utility vehicle
<b>UK</b>	United Kingdom
<b>VCA</b>	Vehicle Certification Agency
<b>WLTP</b>	Worldwide Harmonized Light Vehicles Test Procedure















































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