

# EU CO<sub>2</sub> EMISSION STANDARDS FOR PASSENGER CARS AND LIGHT-COMMERCIAL VEHICLES

## ICCT POLICY UPDATES

SUMMARIZE  
REGULATORY  
AND OTHER  
DEVELOPMENTS  
RELATED TO CLEAN  
TRANSPORTATION  
WORLDWIDE.

At the end of 2013, the European Parliament and the Council of the European Union reached an agreement regarding two regulatory proposals that will implement mandatory 2020 CO<sub>2</sub> emission targets for new passenger cars and light-commercial vehicles in the European Union. The passenger car standards are 95 g/km of CO<sub>2</sub>, phasing in for 95% of vehicles in 2020 with 100% compliance in 2021. The light-commercial vehicle standards are 147 g/km of CO<sub>2</sub> for 2020.

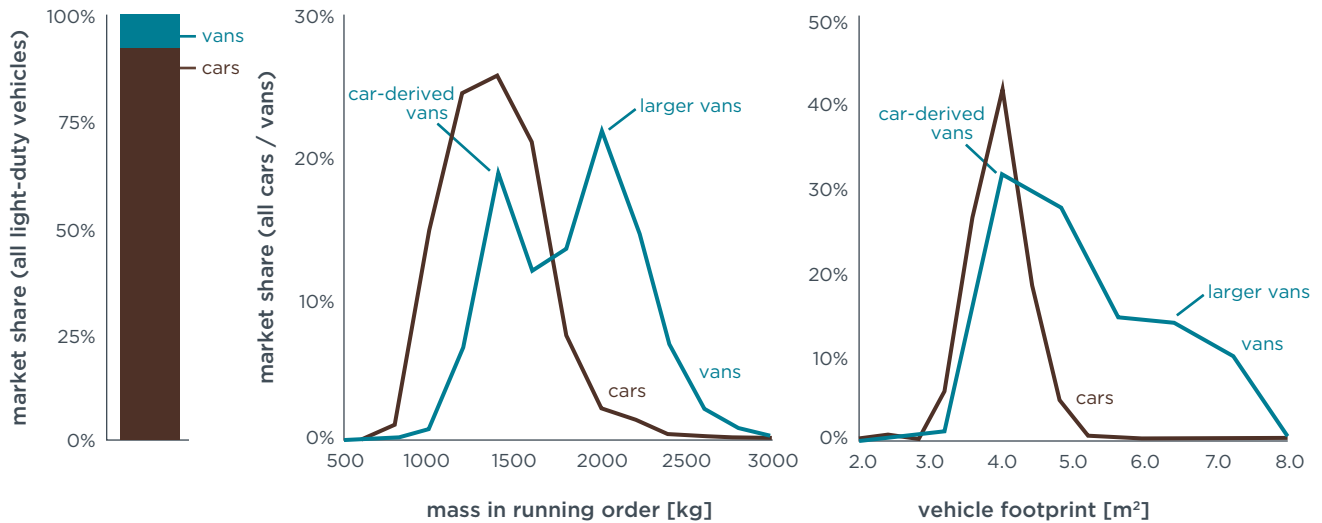
## BACKGROUND

The EU first introduced mandatory CO<sub>2</sub> standards for new passenger cars in [2009](#). The 2009 regulation set a 2015 target of 130 g/km for the fleet average of [all manufacturers combined](#). Individual manufacturers were allowed a higher CO<sub>2</sub> emission value, depending on the average vehicle weight of their fleet. The heavier the average weight of the cars sold by a manufacturer, the higher the CO<sub>2</sub> level allowed. A similar CO<sub>2</sub> standard for new light-commercial vehicles was introduced in [2011](#). It set a target of 175 g/km for [2017](#).

Light-commercial vehicles make up about 10 percent of light-duty vehicles in the EU, and they are often referred to as 'vans'. Generally, there are two different types of light-commercial vehicles:

1. Car-derived vehicles (e.g., VW Caddy), on average having a footprint (wheelbase × track width) of about 4 m<sup>2</sup> and a mass of about 1,500 kg. As illustrated in Figure 1, they are very similar to typical passenger cars, such as the VW Golf.
2. Larger vans (e.g., Mercedes-Benz Sprinter), being more truck-like, typically with a footprint of more than 6 m<sup>2</sup> and a vehicle mass of 2,000 kg or more ([Figure 1](#)).

The maximum *gross* vehicle weight of a light-commercial vehicle is [3,500 kg](#).



**Figure 1.** Characteristics of passenger cars and light-commercial vehicles (vans) in the EU: market share, vehicle mass, and vehicle size (footprint). *Data source: [European Vehicle Market Statistics Pocketbook 2013](#).*

In July 2012, the European Commission put forward two regulatory proposals to set mandatory CO<sub>2</sub> standards for new cars and vans in [2020](#). EU legislative procedures require that any regulatory proposal by the European Commission be discussed and voted on in the European Parliament, as well as in [the Council of the European Union](#)<sup>1</sup>. In the European Parliament, the Environment Committee has the lead on regulation of CO<sub>2</sub> from vehicles. The Environment Committee voted on the 2020 CO<sub>2</sub> standards in [April 2013](#). After negotiations between Parliament and Council, a compromise deal was reached at the end of June 2013. However, in an [unprecedented move](#) the German government prevented a formal vote scheduled for June 27, 2013. Another round of negotiations between the European Parliament and Council followed (see [here](#) and [here](#)). On October 4, an agreement was reached on the regulation for vans, followed by an agreement on [passenger cars](#) on November 29. For the final agreement on cars, a phase-in provision that effectively delays the 95 g/km target from 2020 to 2021, was introduced. Both regulations must still be formally adopted by the European Parliament and the European Council. This will happen in early 2014, and it is regarded as a formality, with no further modifications or delays expected.

## KEY ELEMENTS OF THE REGULATIONS

For the regulation on passenger cars:

- » A target value of **95 g/km of CO<sub>2</sub> for 2020** for the new car fleet is set. However, there is a [one-year phase-in](#) period, requiring 95 percent of new car sales to comply with the target in 2020 and 100 percent from the end of 2020 onwards. Effectively, the 95 g/km target therefore applies from 2021 on.
- » Vehicle weight is retained as the underlying utility [parameter](#), i.e., the heavier a manufacturer's car fleet, the higher the CO<sub>2</sub> emission value allowed by the regulation. The [factor](#) used is 0.0333, meaning that for every 100 kg additional

<sup>1</sup> The Council of the European Union is made up of the governments of the EU member states.

vehicle weight, the emission of 3.33 g/km more of CO<sub>2</sub> is allowed. For the post-2020 time period, other parameters, such as vehicle footprint, will be [considered](#).

- » [Super-credits](#) for low-emission vehicles. Between 2020 and 2022, every car with CO<sub>2</sub> emissions of less than 50 g/km will count more towards meeting the fleet average than cars with emissions above that cutoff. The weighting factors are: 2.00 (2020), 1.67 (2021) and 1.33 (2022). The limit for the use of super-credits, expressed as the difference between average fleet CO<sub>2</sub> emissions calculated with and without the application of super-credits, is set at a maximum of 7.5 g/km for the three years 2020–2022 combined.
- » Test procedure: [The new test procedure](#) (WLTP) should be applied “at the earliest opportunity”. In this context, the 2020 CO<sub>2</sub> targets will be adjusted to the WLTP, making use of the results of a NEDC-WLTP correlation study, to ensure comparable stringency for manufacturers and classes of vehicles. Deviations between the approval CO<sub>2</sub> emission values and [“real-world” emissions](#) should be addressed, including consideration of an independent in-service conformity test procedure that would test a representative sample of vehicles offered for sale.
- » [Eco-innovations](#): As was the case with the 2015 regulation, manufacturers can apply for a maximum of 7 g/km of credits for the use of “innovative technologies” whose benefits are not adequately captured by the test cycle. This applies only until the WLTP is introduced.
- » Excess emission premium for manufacturers failing to meet their emissions target: €95 for every g/km of excess emissions per vehicle. A previous concession, setting a lower excess emission premium for the first three g/km of excess emissions, is discontinued.
- » A review clause to establish CO<sub>2</sub> emission targets for the period beyond 2020. By 31 December 2015, the European Commission is required to review the specific emission targets, modalities, and other aspects of the regulation needed to set standards beyond 2020. The review clause also states that a “clear emissions reduction trajectory, comparable to that achieved in the period to 2020” shall be maintained. The European Parliament in its [April vote](#) recommended an indicative target range of 68–78 g/km for 2025.

For the vans regulation:

- » A target value of **147 g/km of CO<sub>2</sub> for 2020** is set.
- » Vehicle weight is retained as the underlying [parameter](#), with a slope factor of 0.0960, meaning that for every 100 kg additional vehicle weight the emission of 9.60 g/km more of CO<sub>2</sub> is allowed.
- » Test procedure: [The new test procedure](#) (WLTP) should be applied “at the earliest opportunity”. In this context, the 2020 CO<sub>2</sub> targets will be adjusted to the WLTP, making use of the results of a NEDC-WLTP correlation study, to ensure comparable stringency for manufacturers and classes of vehicles. Deviations between the approval CO<sub>2</sub> emission values and emissions derived from vehicles offered for [sales](#) should be addressed, including consideration of an independent in-service conformity test procedure that would test a representative sample of vehicles offered for sale.
- » Eco-innovations: Manufacturers can apply for a maximum of 7 g/km of credits for the use of “innovative technologies” whose benefits are not adequately captured by the test cycle.

- » Excess emission premium for manufacturers failing to meet their emissions target: €95 for any g/km of excess emissions per vehicle. A previous concession, setting a lower excess emission premium for the first three g/km of excess emissions, is discontinued.
- » A review clause that, by 31 December 2015, requires the European Commission to review the specific emission targets, modalities, and other aspects of the regulation in order to establish the CO<sub>2</sub> emission targets for the period beyond 2020.

## THE SITUATION TODAY

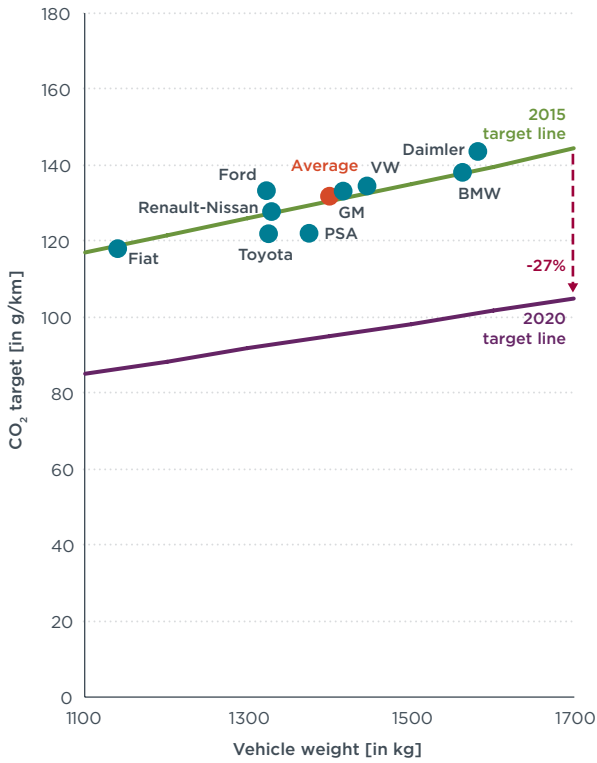
The existing CO<sub>2</sub> regulation for 2015 passenger cars has already led to noticeable results: the average CO<sub>2</sub> emission level of new cars dropped from about [160 g/km in 2006 to 132 g/km](#) in 2012 as measured over the European driving cycle, a 17 percent reduction. The annual reduction rate is about twice what it was before introduction of [mandatory emission targets](#). Hence, the 2015 target of 130 g/km is close to being reached about two years in advance. Most manufacturers have met their individual 2015 target already ([Figure 2](#)).

The required reduction between 2015 and 2020 (effectively 2021, taking into account the phase-in provision) is 27 percent for all manufacturers. The 95 g/km target for 2020 corresponds to about 3.8 liters per 100 kilometer (l/100km) of fuel consumption. PSA and Toyota are already significantly over-complying with their 2015 targets, and are already on their way to meet their 2020 targets (Table 1 and Figure 4). There are a number of individual vehicle models that are commercially available today which already meet 2020 CO<sub>2</sub> emission targets ([Figure 6](#)).

For light-commercial vehicles, the average CO<sub>2</sub> emission in 2012 was [180 g/km](#). The 2017 target of 178 g/km is therefore close to being reached several years in advance (Figure 3). However, the light-commercial vehicle regulation assumes an average vehicle weight of 1,706 kg for the years until 2017, while the real average weight is currently 1,834 kg. Carrying out the 2017 target calculations on this basis—as required by the regulation—the actual target for 2017 would be 187 g/km. This means that all manufacturers are already meeting their individual 2017 target in 2012 (Table 2).

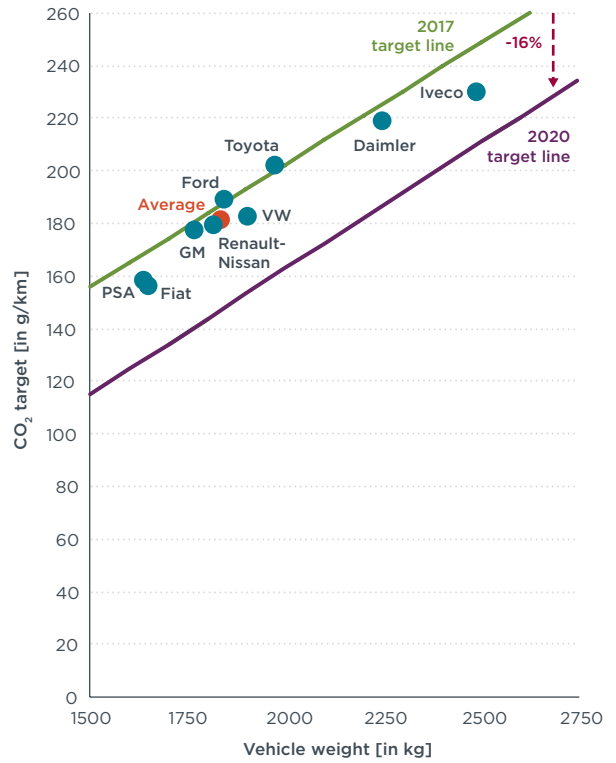
For 2020, the light-commercial vehicle target is 147 g/km, which corresponds to roughly 5.6 l/100 km. For 2020, the vehicle weight used for the calculation of the fleet targets will be adjusted to reflect the real weight of the fleet. The average target will therefore be 147 g/km, independent of any future changes in vehicle weight. The required reduction between 2017 and 2020 is 16 percent. Most key manufacturers are already over-complying with their 2017 target, and are on the right path to meet their 2020 targets (Figure 5, Table 2).

PASSENGER CARS



**Figure 2.** 2012 performance of key EU passenger car manufacturers, including 2015 and 2020 (effectively 2021) target lines. *Data source: EEA.*

LIGHT-COMMERCIAL VEHICLES



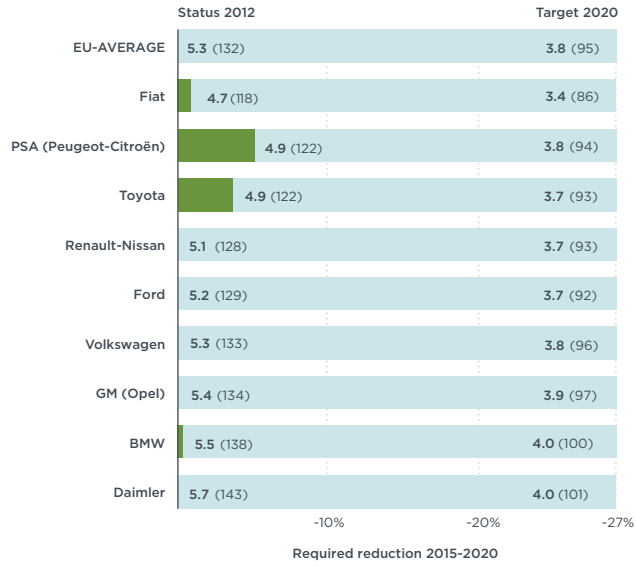
**Figure 3.** 2012 performance of key EU light-commercial vehicle manufacturers, including 2017 and 2020 target lines. *Data source: EEA.*

**Table 1.** 2012 performance of key EU passenger car manufacturers, including 2015 and 2020 (effectively 2021) targets.

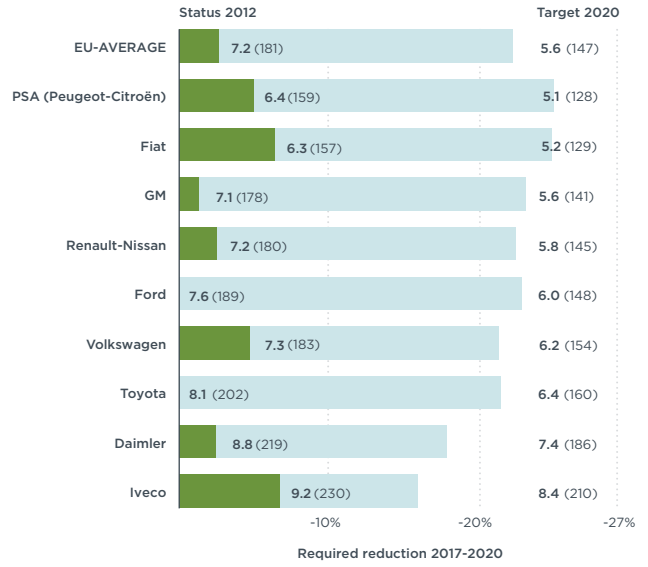
	Market share	Mass [kg]	CO <sub>2</sub> [g/km]		
			2012	2015	2020
Daimler	5%	1583	143	140	101
BMW	6%	1563	138	139	100
GM	8%	1445	134	133	96
Volkswagen	25%	1417	133	132	96
Average		1400	132	130	95
Ford	8%	1322	129	128	92
Renault-Nissan	12%	1329	128	128	93
Fiat (incl. Chrysler)	6%	1209	124	123	89
Toyota	4%	1325	122	128	92
PSA (Peugeot-Citroën)	12%	1374	122	130	94

**Table 2.** 2012 performance of key EU light-commercial vehicle manufacturers, including 2017 and 2020 targets.

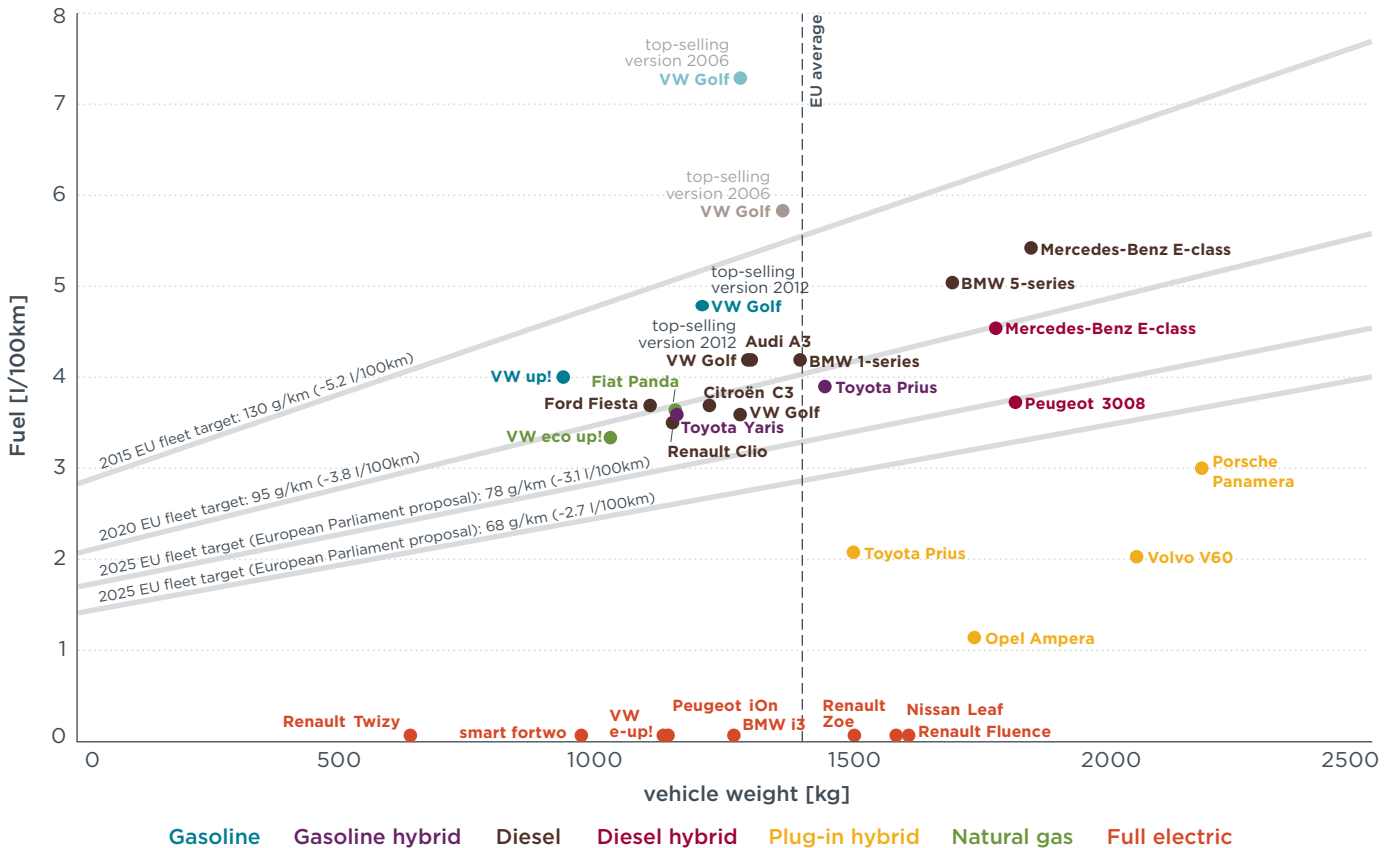
	Market share	Mass [kg]	CO <sub>2</sub> [g/km]		
			2012	2017	2020
Iveco	1%	2487	230	248	210
Daimler	9%	2245	219	225	186
Toyota	2%	1974	202	200	160
Ford	12%	1842	189	188	148
Volkswagen	15%	1904	183	193	154
Average		1834	180	187	147
Renault-Nissan	19%	1816	180	185	145
GM	6%	1767	178	181	141
PSA (Peugeot-Citroën)	21%	1638	159	169	128
Fiat	10%	1647	157	170	129



**Figure 4.** Average 2012 fuel consumption (in l/100 km, bold) and CO<sub>2</sub> emission level (in g/km, in parentheses) of key EU passenger car manufacturers, including 2020 (effectively 2021) targets. Green bars represent the amount of over-compliance with 2015 standards in 2012.



**Figure 5.** Average 2012 fuel consumption (in l/100 km, bold) and CO<sub>2</sub> emission level (in g/km, in parentheses) of key EU light-commercial vehicle manufacturers, including 2020 target. Green bars represent the amount of over-compliance with 2015 standards in 2012.

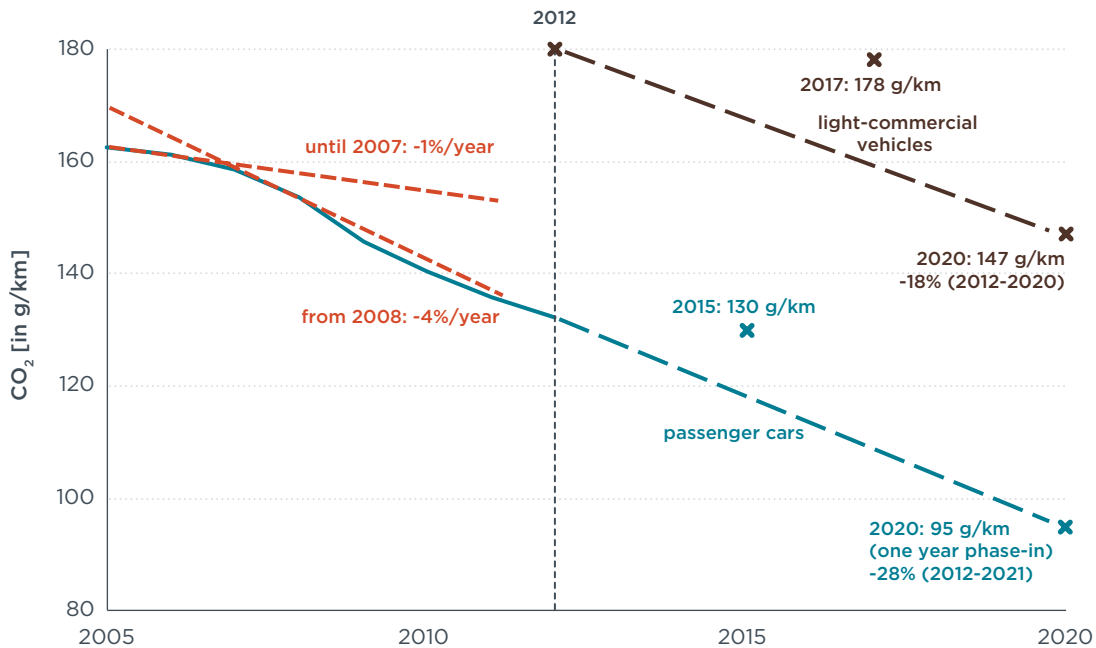


**Figure 6.** CO<sub>2</sub> emissions of selected commercially available passenger car models in the EU in 2013.

## EXPECTED EFFECTS OF THE REGULATIONS

The new regulations will reduce the average CO<sub>2</sub> emission level of new passenger cars to 95 g/km by 2020 (effectively 2021), which corresponds to a fuel consumption of about 3.8 l/100 km. For vans, it will be 147 g/km by 2020, which corresponds to about 5.6 l/100 km (Figure 7). Historical development and future targets for CO<sub>2</sub> emission levels of new passenger cars and light-commercial vehicles in the EU. Effects of phase-in, super-credits and eco-innovations not shown here.). The annual reduction rate required between 2012 and 2020 is about 4.0 percent for cars (3.6 percent if taking into account the 2021 phase-in provision) and the annual reduction rate between 2012 and 2020 for vans is about 2.5 percent. Before 2008, annual CO<sub>2</sub> reduction rates for cars were in the range of 1 percent, but increased to about 4 percent with the introduction of a mandatory Europe-wide CO<sub>2</sub> regulation and CO<sub>2</sub> based vehicle taxation in a number of [EU member states](#). For light-commercial vehicles, historical trend data are available to a [very limited extent only](#).

All values given correspond to the current EU type-approval driving cycle, the NEDC. There exists statistical evidence that the “real-world” CO<sub>2</sub> emission levels of vehicles are [significantly higher](#), in the vicinity of 25 percent for [passenger cars](#). With the introduction of the new driving cycle, the WLTP, it is expected that this gap between laboratory (type-approval) and on-road CO<sub>2</sub> and fuel consumption figures will be [reduced to some extent](#).

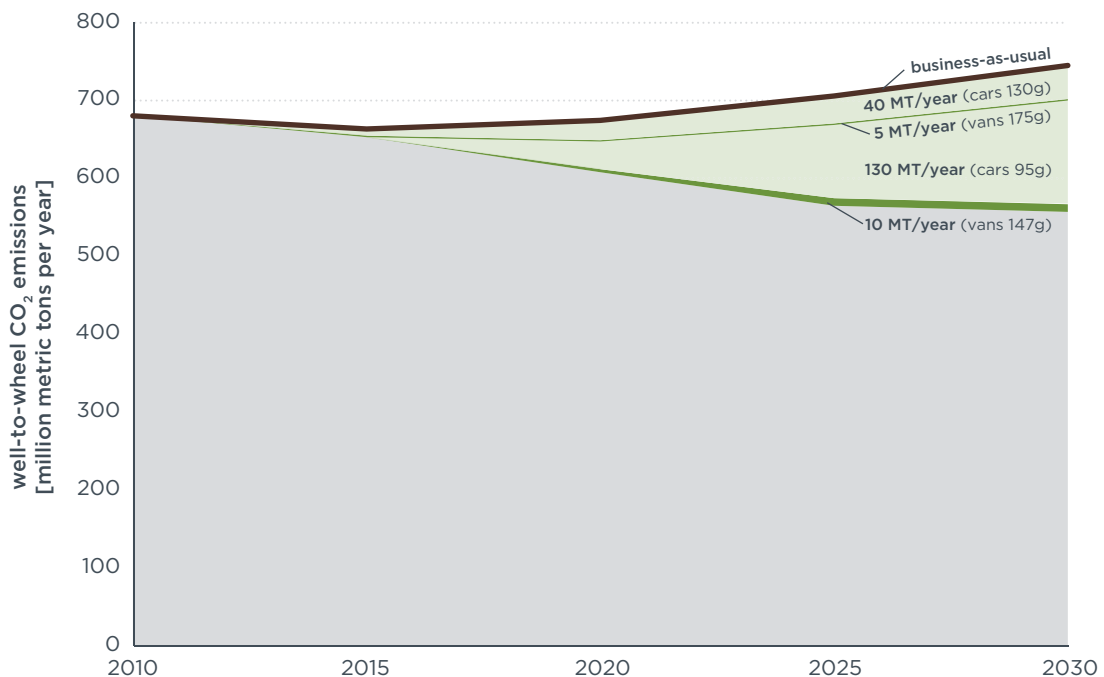


**Figure 7.** Historical development and future targets for CO<sub>2</sub> emission levels of new passenger cars and light-commercial vehicles in the EU. Effects of phase-in, super-credits and eco-innovations not shown here.

In an underlying [impact assessment](#) for the original regulatory proposal (not taking into account any changes during the political negotiations with the European Parliament and Council), the European Commission quantified the expected effects of the proposed cars and vans regulations:

- » Fuel cost savings per car of around €340 in the first year, and an estimated total of €2,904–€3,836 over the vehicle’s lifetime, as compared with the 2015 target. For vans, fuel cost savings are estimated to be around €400 in the first year and €3,363–€4,565 over the vehicle’s lifetime.
- » €30 billion per year in total fuel cost savings for consumers.
- » An increase in EU GDP by €12 billion annually and in spending on employment by €9 billion per year.
- » A 25 percent reduction in fuel consumption, saving 160 million tons of oil between 2020 and 2030 at around €70 billion at today’s prices.
- » Avoided CO<sub>2</sub> emissions of around 420 million tons in the period to 2030.
- » Negative abatement costs for CO<sub>2</sub>—that is, the fuel savings are larger than the cost of complying, resulting in net savings of between €80 and €295 per ton of CO<sub>2</sub> avoided.

Calculations by the ICCT show that for the vehicle stock, CO<sub>2</sub> emission levels are expected to be about 185 megatons (MT) per year lower in 2030 than in the business-as-usual scenario (Figure 8). Of these 185 MT, about 130 MT are due to the introduction of the 95 g/km cars regulation for 2020, and about 10 MT are due to the 147 g/km vans regulation. The remaining 45 MT come from the 2015 / 2017 cars and vans regulation.

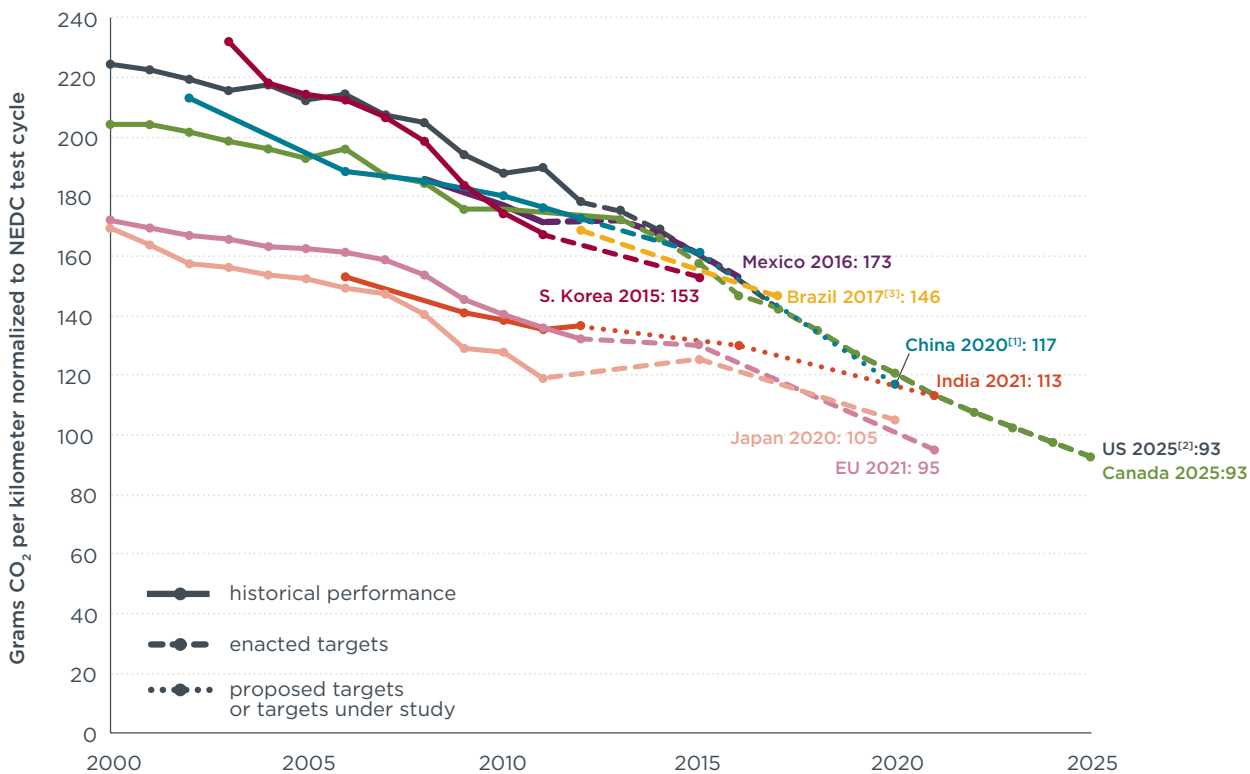


**Figure 8.** CO<sub>2</sub> emission levels of the EU light-duty vehicle fleet, including estimated savings due to the introduction of the cars and vans CO<sub>2</sub> regulation. *Data source: [ICCT Global Transportation Roadmap Model](#).*



## INTERNATIONAL CONTEXT

Figure 9 provides a comparison of the EU CO<sub>2</sub> passenger car standards with similar regulations around the world. The chart converts all regulatory programs to the European test cycle to make them comparable. The EU passenger car standard of 95 g/km for 2020 (effectively 2021) can be compared to similar targets for the US (93 g/km for 2025 passenger cars), Japan (105 g/km by 2020), and China (117 g/km by 2020)<sup>2</sup>. The chart does not take into account any credits (such as super-credits or eco-innovations) or differences in (real-world) enforcement.



[1] China's target reflects gasoline vehicles only. The target may be higher after new energy vehicles are considered.  
 [2] US standards GHG standards set by EPA, which is slightly different from fuel economy standards due to low-GWP refrigerant credits.  
 [3] Gasoline in Brazil contains 22% of ethanol (E22), all data in the chart have been converted to gasoline (E00) equivalent  
 [4] Supporting data can be found at: <http://www.theicct.org/info-tools/global-passenger-vehicle-standards>

**Figure 9.** Comparison of global CO<sub>2</sub> regulations for passenger cars, in terms of [NEDC gCO<sub>2</sub>/km](#).

As vans make up about 10 percent of the light-duty vehicle market in Europe, the average CO<sub>2</sub> emission standard for the EU light-duty vehicle fleet in total in 2020 will be equivalent to about 100 g/km. When taking into account light trucks, the US standard is equivalent to 107 g/km in 2025 when adjusted for the European driving cycle.

## NEXT STEPS

Both regulations must still be formally adopted by the European Parliament and the European Council, which is expected to occur in early 2014. This final step is regarded as a formality, and no further modifications or delays are anticipated.

<sup>2</sup> All numbers provided do not take into account phase-in and super-credit / off-cycle credit provisions.