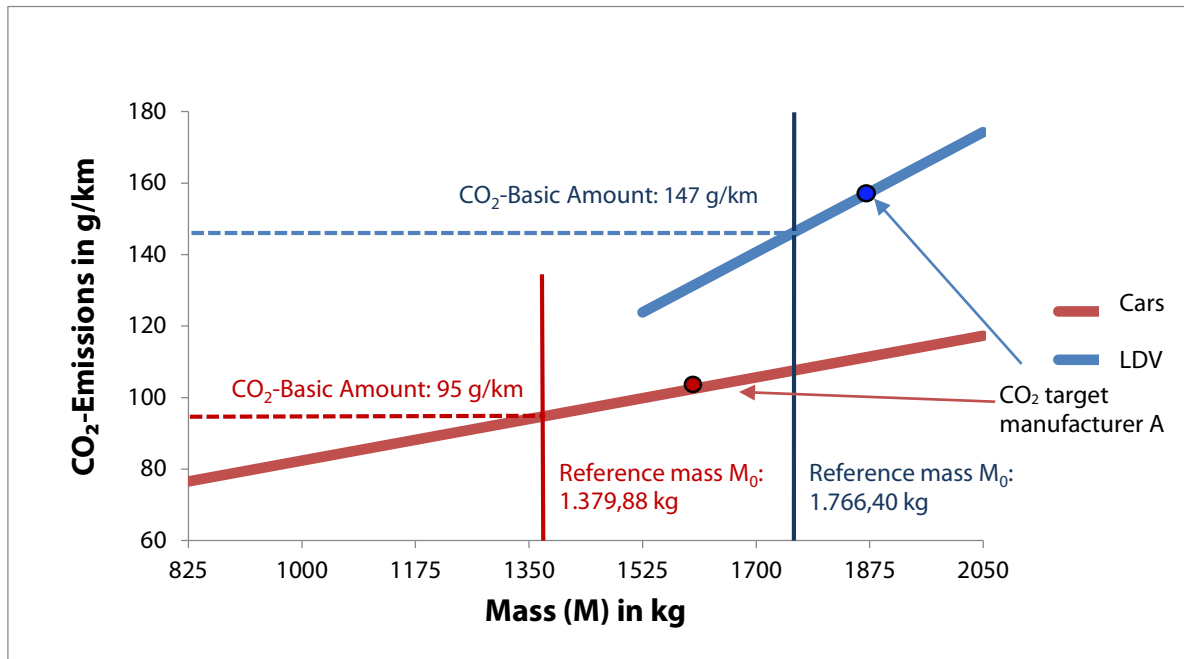


CO₂ LIMITS ON CARS AND LIGHT COMMERCIAL VEHICLES

cepContext: Graphs for cepPolicyBrief No. 2018-02

The following graphs illustrate the calculation of the manufacturer-specific CO₂ targets (1), the change in EU fleet-wide targets (2) and the tightening of the CO₂ targets for heavy vehicles (3).

GRAPH 1: MANUFACTURER-SPECIFIC CO₂ TARGET



Source: own design

- ▶ All vehicle manufacturers must ensure that the average CO₂ emissions from their new fleet of cars or light duty vehicles (LDVs) – measured in grams of CO₂ per km – do not exceed a manufacturer-specific CO₂ target (Art. 4 in conjunction with Annex I; currently CO₂ Emission Standards Regulation for Cars or LDVs, Art. 1 and 4 in conjunction with Annex I).
- ▶ The manufacturer-specific CO₂ target arises
 - from a fixed basic amount, which is the same for all manufacturers (“EU fleet-wide target”) and
 - a variable additional amount which will either reduce or increase the basic amount.

$$\text{Specific CO}_2 \text{ emissions} = S + a \times (M - M_0) \quad [\text{“Limit Value Curve”}]$$

S = Basic Amount (“EU fleet-wide target”)
from 2020: Car = 95 g CO₂/km; LDV = 147 g CO₂/km

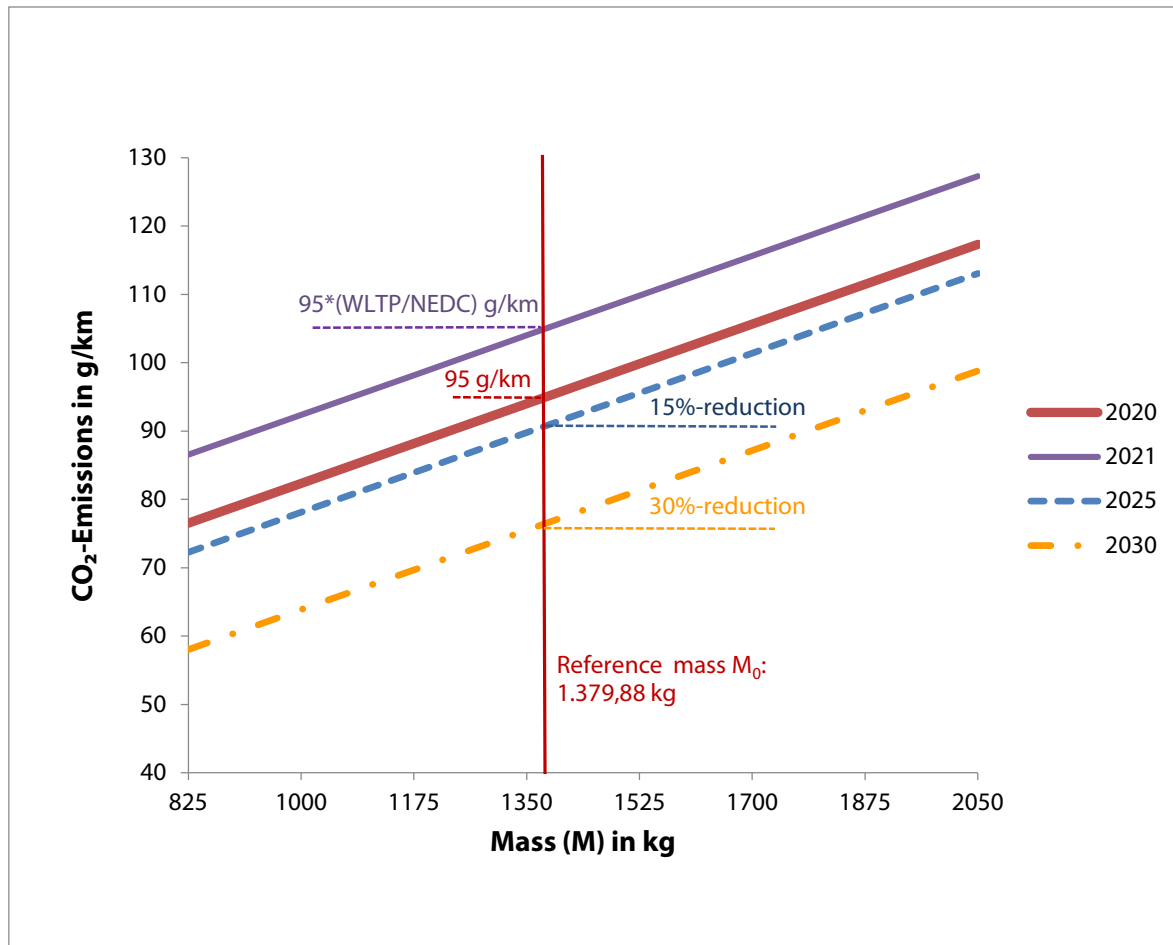
$a \times (M - M_0)$ = Additional Amount

a = Additional-amount factor determines the gradient of the limit value curve:
The higher the additional-amount factor a and the steeper the resulting limit-value curve,
– the more relaxed the manufacturer-specific CO₂ target for light vehicles and
– the stricter the manufacturer-specific CO₂ target for heavy vehicles.
from 2020: Car = 0.0333 g CO₂/km per kg; LDV = 0.096 g CO₂/km per kg

M = Mass of the vehicle “in running order” in kilogrammes

M₀ = Reference mass
from 2020: Car = 1,379.88 kg; LDV = 1,766.40 kg
from 2022: one-off adjustment for cars
from 2024: one-off adjustment for LDVs
from 2025: biannual adjustment for cars and LDVs

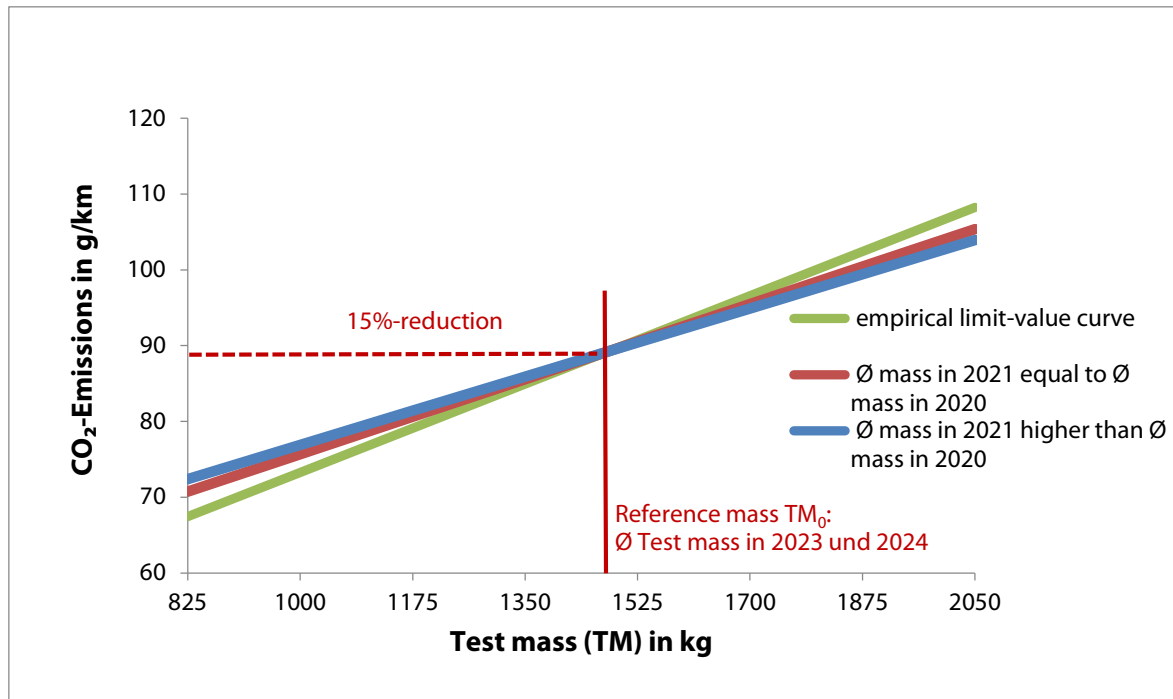
- ▶ Manufacturers must determine the specific CO₂ emissions for each of their newly produced cars or LDVs. The average of the specific CO₂ emissions for the fleet of all new cars or LDVs provides the manufacturer-specific CO₂ target for cars or LDVs (Graph 1 gives an example for manufacturer A).

GRAPH 2: CHANGE TO THE EU FLEET-WIDE TARGET

Source: own design

* Due to a lack of data which has yet to become available, Graph 2 only provides a rough demonstration of the change to the WLTP procedures and does not take account of any change in the reference mass TM_0 or in the gradient of the limit-value curve. Instead, the mass applicable up until the end of 2020 M_0 , of 1.379,88 kg, and as gradient parameter, the additional-amount factor a of 0.0333, are used.

- ▶ The manufacturer-specific CO₂ target for 2020 applies to emissions measured under the NEDC procedure.
- ▶ To calculate the basic amount for the CO₂ target for 2021–2024
 - the average CO₂ emissions in 2020, measured according to the more realistic WLTP procedure, are divided by the average CO₂ emissions measured under the NEDC procedure and multiplied with the basic amount for 2020 (Annex I, Part A, para. 3) and
 - the changes in the average mass as compared with 2020 are taken into account.
- ▶ To calculate the CO₂ targets as of 2025, the average of all manufacturer-specific CO₂ targets in the EU in 2021 is used as the reference value for the basic amount (Art. 1 (4) and (5)).
- ▶ The EU fleet-wide targets will be tightened by reducing the basic amount for new cars and LDVs (Art. 1 (4) and (5) in conjunction with Annex I, Part A, para. 6.11 and 6.12)
 - from 2025 by 15% – from 100% to 85%,
 - from 2030 by 30% – from 100% to 70%
 of the average of all manufacturer-specific CO₂ targets in the EU in 2021.
- ▶ In 2025, the additional-amount factor a and therefore the gradient of the limit-value curve will be adjusted to the changeover to test mass TM and in 2025 and 2030, to the reduction in the basic amounts (Annex I, Part A, para. 6.21 and 6.22). This adjustment of the additional-amount factor is not taken into account in Graph 2, which only shows the change in the basic amount, but is illustrated in Graph 3.

GRAPH 3: STRICTER CO₂ TARGETS FOR HEAVY CARS PKW

Source: own design

* Due to a lack of data which has yet to become available, Graph 3 only provides a rough demonstration of the limit-value curve.

- ▶ The additional-amount factor a and therefore the gradient of the limit-value curve for the manufacturer-specific CO₂ targets, determines
 - the extent to which manufacturers of heavy vehicles are relieved by CO₂ targets as compared with manufacturers of vehicles with an average mass, or
 - the extent to which manufacturers of light vehicles are burdened by them using the same comparison.
- ▶ For 2025–2029, the additional-amount factor a will be calculated as follows:
 - The “gradient of the empirical limit-value curve” a_e is derived from the linear least squares estimation (regression) of the specific CO₂ emissions on the test mass TM of all vehicles in the EU new-car fleet.
 - The gradient of the empirical limit-value curve is multiplied by the basic amount for 2025 and divided by the average manufacturer-specific CO₂ targets for 2021:

$$a_{2025} = a_e \times \text{EU fleet-wide target}_{2025} / \text{average CO}_2 \text{ targets}_{2021}$$

- The average CO₂ targets for 2021 depend, due to the adjustment of the basic amount (see above Graph 2), on the change in the average mass M in 2021 as compared with the average mass in 2020.
- ▶ This has the following consequences:
 - Where the average mass of the EU fleet does not change between 2020 and 2021, the gradient in the limit-value curve will become 15% flatter – due to the 15% reduction in the basic amount.
 - Where the average mass of the EU fleet increases between 2020 and 2021, the limit-value curve will become even flatter.
 - In both cases, this will result in the manufacturers of heavier vehicles having relatively stricter CO₂ targets and the manufacturers of lighter vehicles, more relaxed targets.

As of 2030, the additional-amount factor a and therefore the gradient of the empirical limit-value curve is multiplied by the basic amount for 2030 and divided by the average manufacturer-specific CO₂ targets for 2021 (not shown on the graph).

- ▶ This has the following consequences:
 - Where the average mass of the EU fleet does not change between 2020 and 2021, the gradient in the limit-value curve will become 30% flatter – due to the 30% reduction in the basic amount.
 - Where the average mass of the EU fleet increases between 2020 and 2021, the limit-value curve will become even flatter.
 - In both cases, this will again result in the manufacturers of heavier vehicles having relatively stricter CO₂ targets and the manufacturers of lighter vehicles, more relaxed targets.