

The modalities of regulating CO₂ emissions from vans

Accompanying material to T&E's input to the design of the European Commission's impact assessment

November 2020

Summary

T&E welcomes the opportunity to input into the design of the impact assessment regarding van CO₂ standards, and advocates to:

1. Assess **CO₂ emission reduction targets** of 20% for 2025, 31% for 2027 (brought forward from 2030), **at least 60% for 2030**, at least 86% for 2033 and **100% for 2035** (i.e. all new sales to be zero emission from 2035, as already sought by some Member States, and committed to by the UK);
2. Split vans into **two categories**, above and below 1,760 kg reference mass (RM), and use this new categorisation **to replace mass adjustment**, which is leading to a substantial weakening (~10%) of the emission reduction target;
 - a. Assess separately the cost curve data, emission reduction potential and zero emission output for both categories, i.e. above and below 1,760 kg RM;
3. **Convert the current ZLEV benchmark into a zero-emission vehicle target** of 15% of van sales in 2025, 25% in 2027, **50% in 2030**, 80% in 2033, 100% in 2035;
 - a. Within the ZEV sales target, apply a **multiplier of 1.11 for vans above 1,760 kg RM** to boost the electrification of heavier LCVs;
4. Consider a time-limited extra weight allowance of up to 300 kg for zero emission vans above 1,760 kg RM until 2030 to support the electrification of heavier LCVs;
5. Avoid creating any PHEV loophole. PHEV vans are only expected to make up 1.2% of vans produced in 2027. Regulation is best focused on the solution - BEVs, and steer away from mechanisms with strong potential to be used to avoid real-world compliance, such as PHEVs.

The two key points regarding the current regulation that need to be addressed are the low supply of e-vans and that mass adjustment makes a weak target even weaker.

Low e-van supply despite positive TCO The weak target is not motivating OEMs to sell electric vans: only 1.8% of sales were electric in 2020. Only 4 models had more than 1,000 sales in 2019, and just 13 models had sales higher than 100. The current regulation is failing to deliver e-vans, in contrast to the car CO₂ targets which are driving investment in, and the supply of, electric cars.

At 132 gCO₂/km, best in class ICE van models are already performing 10% better than the 2020 target (of 147 gCO₂/km) and are only 7g away from the current 2025 target - and this excludes any electrification potential. Without prompt, targeted reform, there will be no incentive to ramp up investment into e-vans any time soon, and the low penetration of zero-emission vans will continue in the 2020s. Owning and operating smaller e-vans already makes economic sense, and when a van-maker builds a vehicle with a good range and positive TCO, buyers respond. Renault-Nissan are making e-vans with ranges 200 - 230km, and are selling twice as many e-vans (15,000 in 2019) as all other main competitors combined.

Mass adjustment Most vanmakers were already compliant with the 2020 target in 2019, but this is largely thanks to generous mass-adjustment, which is increasing the target from the official average level of 147 gCO₂/km to a projected 159 g/km in 2020 and 162 gCO₂/km in 2021. The mass-adjusted target disincentivises lightweighting, and drives the market towards heavier vans that enable manufacturers to have higher emissions.

ZEV sales targets, and emissions reduction targets Both are needed. If emission reduction targets are not accompanied by ZEV sales targets, van-makers may focus excessively on ICE improvements at the expense of boosting ZEV output, leading to a failure to deliver the needed stepwise increase in ZEV sales.

The risk of van-makers leaving themselves with too low an e-van production base in the 2020s to go fully electric in the first half of the 2030s needs to be definitively regulated out by EU law-makers. This can only be done by ensuring a steady, increasing trajectory of e-van sales from the early 2020s to 2035, namely 15% ZE van sales 2025, 25% in 2027, 50% in 2030, 80% in 2033, 100% in 2035.

Enforcement will need to be stepped up by using data from on-board fuel consumption meters (FCMs) to correct any van-maker/s engaging in test manipulation. Progressive van-makers should not be compromised by unscrupulous competition.

Summing up

The upcoming review of the van CO₂ standards is a unique opportunity to strengthen the targets, drive the uptake of zero-emission vans, enable zero-emission cities, and align the sector with Europe's broader climate ambitions.

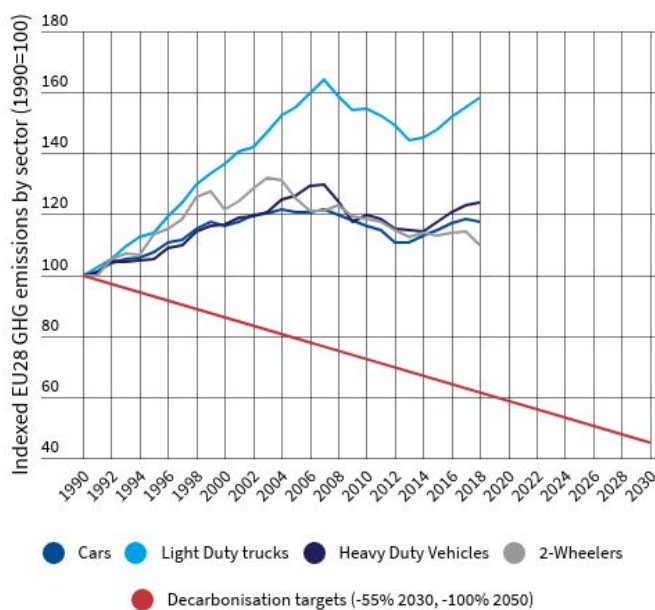
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Introduction

When it comes to reducing climate emissions, vans often slip through the legislative gap between passenger cars and heavy duty vehicles. Moreover, vans are often exempt from safety and environmental policy such as driving regulations or tolls, compared to trucks. This enhances the attractiveness of vans and, combined with the surging demand for e-commerce¹, explains why their sales and emissions are growing.

Vans accounted for 13% of road transport CO₂ emissions in 2018 and van emissions are now 58% higher than they were in 1990 (based on UNFCCC, see Figure 1), which makes them by far the road transport sector with the biggest emission increase. For comparison, car and truck emissions have increased by around 20% since 1990. In absolute values, CO₂ emissions from vans were 113.1 Mt in 2018 (vs. 71.5 Mt in 1990) and 103.3 Mt in 2013 (lowest post-financial crisis low point). This is a 10% increase in CO₂ emissions in five years. Furthermore sales of vans have risen by 57% between 2012 and 2019².



Data source: Member State reporting to the UNFCCC

Figure 1: Evolution of CO₂ emissions from road transport

¹ total activity in terms of total LCV kilometres is projected to increase by 12% between 2020 and 2030, based on the EU Reference scenario 2016.

² EEA, Monitoring of CO₂ emissions from vans – Regulation 510/2011. [Link](#)

TCO: e-vans are cost competitive

A study commissioned by T&E and undertaken by consultancy CE Delft³ analyses the European van market and quantifies the total cost of ownership (TCO) potential of battery electric vans. As vans are predominantly owned or operated by businesses, they tend to act as more economically rational operators than passenger car buyers. TCO affects the bottom line of a business and generally plays an important role in van purchase decisions.

The CE Delft analysis looks at the van market as well as emission reduction technologies and their costs. Amid rapidly decreasing battery costs, CE Delft shows that electric vans in the smaller segment reached cost parity with diesel models in 2018. The TCO parity would be reached at the latest in 2022 and 2023 for medium and large vans⁴. This means that electric vans have huge potential to be purchased in large numbers now, or very soon, but the key barrier remains a lack of appropriate supply. Today there is already evidence of e-van leasing contracts offered for less than the cost of the equivalent diesel van⁵.

E-van range is already sufficient for most uses

According to CE Delft, the average annual mileage of vans is around 21,000 km, with bigger vans having the highest mileage (large and extra large vans 24,000 km, medium-sized vans 21,200 km and small vans 18,600 km). This equates to around 75 to 100 km travelled per working day.

Renault's e-Kangoo and Nissan's NV200, the top 2 selling e-vans, have ranges of 200 - 230 km, and most e-vans have a range of at least 150 km.

³ <https://www.transportenvironment.org/publications/co2-emissions-vans-time-put-them-back-track>

⁴ Given strong reduction of battery costs since 2017, the low battery cost scenario was considered.

CE Delft (2017). Van use in Europe and their environmental impact.

https://www.transportenvironment.org/sites/te/files/publications/CE_Delft_4L06_Van_use_in_Europe_def.pdf

⁵ <https://www.electrive.com/2020/10/21/volta-e-van-leasing-costs-less-than-diesel-vans/>

1. CO₂ emission reduction targets

Recent van sales / performance

T&E has analysed historic EEA van registration data and has acquired van registration data covering the first 8 months of 2020 (January - August). The data (from Dataforce) provides an insight into the market evolution in 2020 following the introduction of the new CO₂ standards. This analysis has been broken down per van classes (see box below).

Category N1 vehicles and weight classes I - III

Regulation 2019/631 on CO₂ emission performance standards applies to all motor vehicles of category N1 with a reference mass not exceeding 2,610 kg and to those vehicles of category N1 to which type-approval is extended in accordance with Article 2(2) of Regulation (EC) No 715/2007.⁶

Regulation 715/2007 on type-approval defines the category N1 classes I - III based on their reference mass (RM) as follows:⁷

Class I	Class II	Class III
RM ≤ 1,305 kg	1,305 kg < RM ≤ 1,760 kg	RM > 1,760 kg

More heavy vans

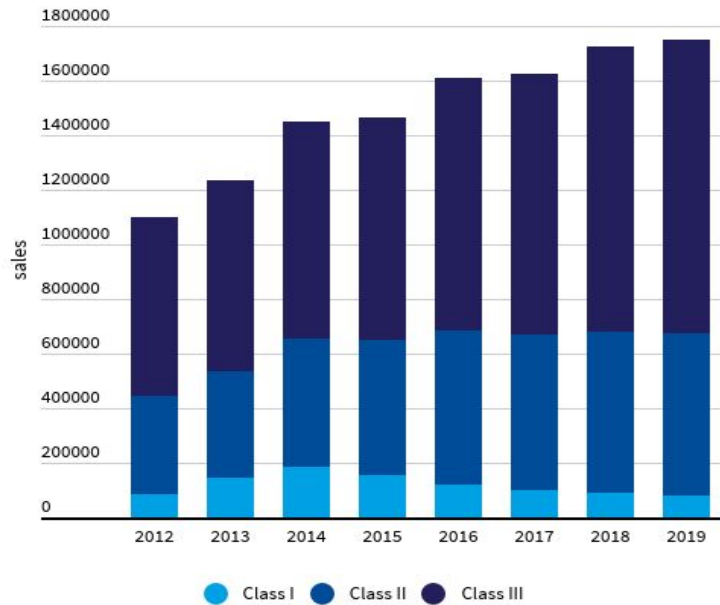
Sales in the heaviest N1 van class III have increased by a third between 2015 and 2019. As a result, they now account for 62% of new van registrations (compared to 56% in 2015); see Figure 2. Given the higher average reference mass (2131 kg) in Class III compared to the other classes (1495 kg for class II, and 1205 kg for class I), the higher share of sales from class III has driven an increase in the mass of the average van sold from 1748 kg in 2015 to 1870 kg in 2019. That's a 7% increase in 4 years.⁸

⁶ Extension to vehicles which are registered in the Union for the first time and which have not previously been registered outside the Union

<https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A02019R0631-20200121>

⁷ <https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX%3A32007R0715>; the classes are used today for the purposes of regulating air pollutant emissions.

⁸ For comparison the average reference mass within each class has been much more constant: +1% for class I, +0% for class II and +3% for class III



Source: T&E analysis, data from the EEA monitoring of CO₂ emissions from vans

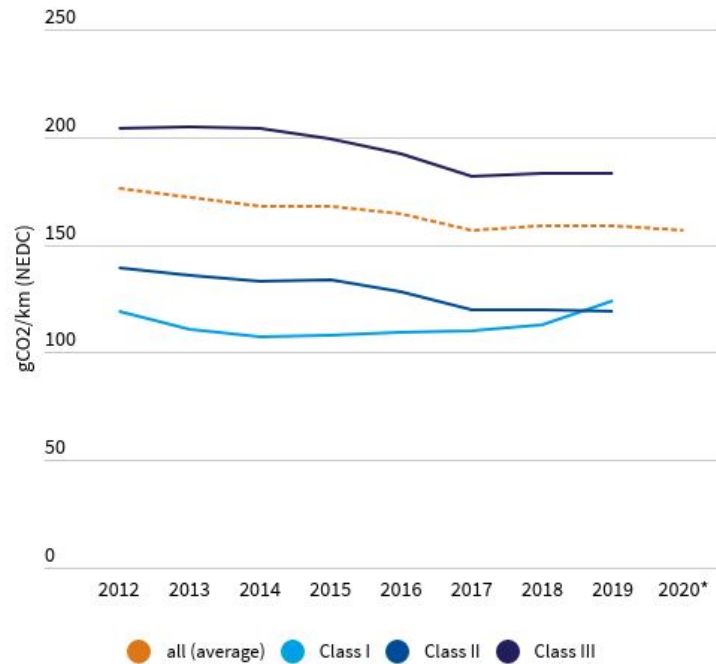
Figure 2: Evolution of van sales per class in the EU

CO₂ emissions

Average CO₂ emissions from new vans in the EU decreased marginally between 2012 and 2017 and have been increasing slowly since (from 158 gCO₂/km in 2018 to 159 gCO₂/km in 2019), mainly due to an increase in sales of higher emission large vans. Looking at emissions from ICE vans only, emissions have increased from 159 gCO₂/km in 2017 to 162 gCO₂/km in 2019. Data covering the first eight months of 2020 suggests van emissions decreased slightly to around 158 gCO₂/km⁹.

The emissions per class are shown below. Emissions from class I have surpassed emissions from class II because of increasing sales of smaller petrol vans.

⁹ Dataforce only provided NEDC or WLTP emissions values, and so a specific NEDC-WLTP uplift per OEM has been applied to convert all values to NEDC. This uplift has been calculated from 2019 EEA registrations having both NEDC and WLTP values. Moreover, due to missing data for France, the average gCO₂/km of vans for 2020 has been extrapolated using the change in the average CO₂ emissions of other Member States between 2019 and 2020. This led to an average of 158 gCO₂/km with France compared to 160 gCO₂/km without France.



Source: T&E analysis, data from EEA monitoring of CO2 emissions from vans, 2020 data from Dataforce and from January to August 2020

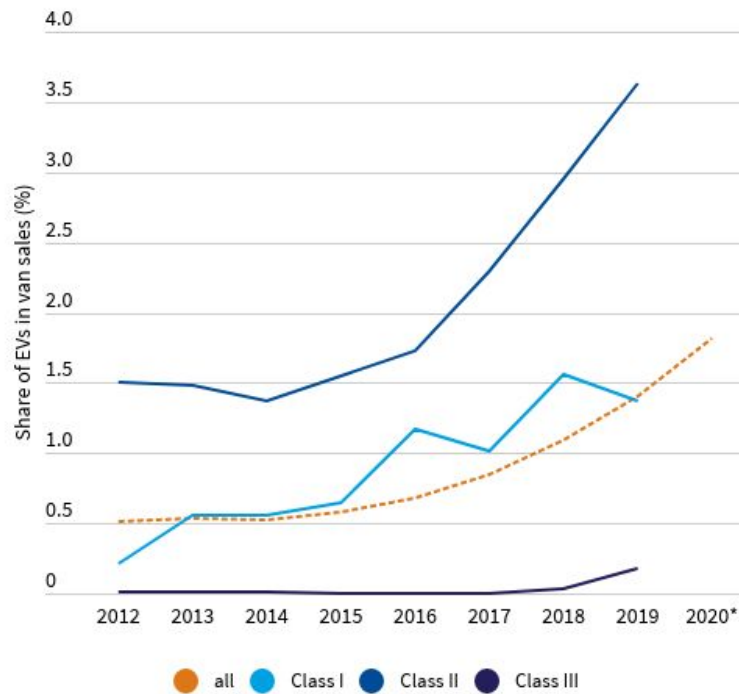
*2020 CO2 emissions for France were not available and have been extrapolated from 2019 emissions.

Figure 3: Evolution of CO2 emissions from vans in the EU

Van electrification

The supply of electric vans is extremely limited. In 2019, sales of battery electric vans reached only 1.4% and have been increasing by around 0.2 percentage points annually in the past years (from 0.7% in 2016). From January to August 2020, e-vans sales reached 1.8% of all vans sales (based on extrapolation for France, or 1.7% excluding France).

CO₂ standards for vans are much weaker than for cars. Overall, van makers do not deploy the same efficient and innovative technologies to vans to lower their emissions, but there are strong differences between the three N1 classes - which in turn gives an insight into the potential for much greater electrification. In the largest light duty van class (Class III), only 0.2% of sales were electric in 2019. The smallest vans (Class I, <1.3t reference mass) fare better, with e-vans accounting for 1.4% of new sales. Only in vans 1.3t to 1.76t reference mass (Class II) does electrification have any real foothold, with e-vans in this class making up 3.6% of new sales.



Source: T&E analysis, data from the EEA monitoring of CO₂ emissions from vans, 2020 data from Dataforce and from January to August 2020

*2020 EV sales for France were not available and have been extrapolated from 2019 sales.

Figure 4: Evolution of EV van shares in the EU¹⁰

New CO₂ emission reduction targets and phase out of ICE vans sales by 2035

It is clear that the current van CO₂ standards need to be strengthened to drive the uptake of zero-emission vans and be in line with the climate neutrality objective by 2050. Therefore, we recommend the Commission to assess: an increase of the 2025 CO₂ emission reduction target from 15 to 20%, bringing forward the 2030 target of 31% to 2027, and an increase of the target for 2030 to at least 60%, an intermediate target of at least 86% for 2033 and 100% for 2035. A 100% CO₂ emissions reduction target for 2035 corresponds to all new sales being zero emission from 2035 as further outlined below (3. ZEV sales target) and as already sought by some Member States, and committed to by the UK.

For the entire van fleet to be zero emission in 2050, the last new van with any CO₂ emitting engine must be sold no later than 2035. This means that not only diesel and petrol cars, but gas-powered,

¹⁰ Due to missing data for France, the average share of EVs for 2020 has been extrapolated using the change in the average EV share of other Member States between 2019 and 2020. This led to an average EV share of 1.8% with France compared to 1.7% without France.

hybrid and plug-in hybrid models need to be phased-out. Such a timeframe is also necessary to meet the goals of the European Green Deal, which commits to a path “towards zero emissions mobility from 2025 onwards” for light duty vehicles. Overall, post-2030 targets are crucial to provide much needed investment certainty to manufacturers, transport companies, alongside local, national and international authorities.

2. Splitting vans into two categories

2.a The case for two separate categories with no mass-adjustment

Initial observation

Under the current regulation, there is an important design flaw in the form of the mass-adjusted target as it disincentives lightweighting, and drives the market towards heavier vans given that OEMs have higher targets when they sell heavy vans. Indeed, the average mass of vans from 2015 and 2019 has increased from 1748 kg to 1870 kg (7% increase).

In 2019, the average mass of vans sold was 104 kg above the reference mass (1870 kg vs. 1766 kg). Based on data from 2014 to 2016, the reference mass is used for target adjustment from 2019 to 2022. This means that the actual average target for 2020 - based on average 2019 mass - would be 10 g/km above the official target, or **157 g/km and not 147 g/km**. If the increasing mass trend was extrapolated, the average mass would be 1889 kg in 2020 and 1918 kg in 2021¹¹, and be equivalent to an average target of **159 g/km in 2020 and 162 g/km in 2021**.

Because of battery weight, electrification will, at least in the early 2020s, continue to push the weight slightly upwards, further relaxing the targets. For example, in 2019 the average mass of ICEs Class II was 1491 kg, while it was 1585 kg for Class II BEVs (6% higher, which would correspond to an increased target of 1 g/km for every additional 11% BEV sales).

Solution: two separate categories with no mass-adjustment within each category

The sales of vans should be divided into two categories: category 1 including small and medium vans (equivalent to category N1 classes I and II), and category 2 including large vans (class III).¹² With regards to CO₂ targets, the post-2020 targets (-20% in 2025, -31% in 2027, and -60% in 2030, -86% in 2033, and -100% in 2035, as proposed here) should be applied to each of the two categories separately, working from a category-specific baseline in 2021. The mass-adjustment formula would no

¹¹ Linear interpolation based on 2015-2019 data.

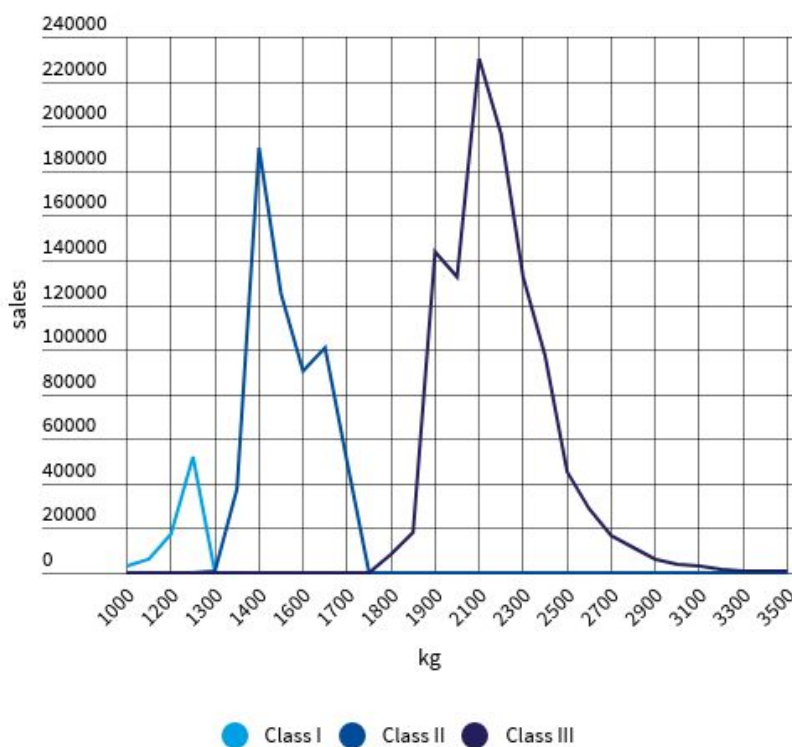
¹² Regulation 2019/631 does not foresee differentiated monitoring and reporting based on category N1 classes. However, the N1 classes I - III are already defined in Regulation 715/2007 on which basis vehicles could be allocated to the category 1 (classes I and II) and 2 (class III) respectively.

longer apply for either category, and a multiplier of 1.11 would be applied to category 2 vans (>1760 kg reference mass) to boost their electrification, as explained further below (3. ZEV sales target).

To recap, removing mass adjustment incentivises OEMs to make light vans within each of those categories and prevents the issues described above (increasing mass trend and weakening of targets). The suggested reform ensures a more harmonised CO₂ reduction across van output. But it also requires that the European Commission distinguishes the two category-specific baselines used for the targets from 2025.

Data-based justification for 2 separate categories with no mass adjustment

The sales distribution of the mass of vans sold in the EU shows three peaks, corresponding to the three van classes. Given the shape of the distribution (figure 5), we see that two van categories are necessary to subdivide van sales and that most sales within one class have a similar mass. This supports the fact that there is no need to have a continuous mass-adjustment formula as if van sales were heterogeneously distributed (i.e. if the graph below would show horizontal lines).



Source: T&E analysis, data from the EEA monitoring of CO₂ emissions from vans

Figure 5: Mass distribution of vans in 2019

Finally, the analysis of the historic evolution of the average diesel van mass shows that the mass has stayed relatively constant for each class over time. Between 2012 and 2019, the dispersion (measuring the extent to which a distribution is stretched or squeezed) of average diesel mass values was 4% for the overall mass, but only 2%, 0% and 1% within each respective class, meaning that diesel mass does not change much within one class over the years - but rather there is some movement in the split between classes.

3. ZEV sales target

A ZEV target is the most effective mechanism to build up the output of ZEVs in Europe and ensure the transition to e-mobility is made swiftly and effectively, while guaranteeing the international competitiveness of European van makers. For historic reasons (i.e. weak targets, and how the shift from NEDC to WLTP has introduced new baseline weakness in 2020/1), the baseline is elevated leaving much untapped potential for CO₂ emission reduction.

CO₂ targets alone simply would not drive e-van roll-out at a rate that comes close to the deployment potential (unless these targets were set at a level that would not be politically palatable and workable, e.g. a CO₂ reduction greater than 70% by 2030). Similarly, if emission reduction targets were not accompanied by ZEV sales targets, van-makers may focus excessively on ICE improvements at the expense of boosting ZEV output, leading to a failure to deliver the needed stepwise increase in ZEV sales. To add the time dimension, **ZEV targets are needed in addition to CO₂ reduction targets to guard against van-makers leaving themselves with too low an e-van production base in the 2020s to go fully electric in the first half of the 2030s.**

This ZEV target can take the form of a binding minimum ZEV target to be reached, or can convert the existing EU ZLEV benchmark into a target by adding a malus to the existing bonus and increasing the ambition level. If the malus is not added, the benchmark is a mere voluntary one, with the bonus mechanism only creating additional risks to weaken the CO₂ reduction target, without anything in return.

Importantly, a ZEV target should be **focused exclusively on zero emission vehicles**, thus excluding low emissions vehicles (or PHEVs from the scope), see also below '*5. Avoid the PHEV loophole*'.

To recap, the risk of van-makers leaving themselves with **too low an e-van production base in the 2020s to go fully electric in the first half of the 2030s needs to be definitively regulated out** by EU law-makers. And this can only be done by ensuring a steady, increasing trajectory of e-van sales from the early 2020s to 2035, namely **15% ZE van sales 2025, 25% in 2027, 50% in 2030, 80% in 2033, 100% in 2035.**

3.a Applying a multiplier to category 2 e-vans

Because the electrification of category 2 vans is far slower (0.4% of sales in 2019), we propose applying a multiplier to e-vans above 1,760 kg reference mass.

Our recommendation is to set the multiplier at 1.11, which comes from dividing the projected output of sub-1,760 kg e-vans in 2027 (16.8%) by the projected e-van output greater than 1,760 kg (15.1%). The 2027 projections are from IHS Markit, and we take them as a reasonable basis for 2030 output (also post-2027 projections aren't yet available).

Application of such a multiplier means that the target proposed for 2030 of 50% would be met with 47% e-van across output as a whole, as shown in the table below.

2027 IHS projection and T&E's 2030 ZEV target proposal

	2027 total production	2027 EV production	2027 EV split cat 1 vs cat 2 *	2030 min ZEV sales **
PSA	764756	15,2 %	34 % / 66 %	46,7 %
Renault	348634	18,9 %	90 % / 10 %	49,5 %
Daimler	297526	12,7 %	38 % / 62 %	46,9 %
VW	220630	23,1 %	54 % / 46 %	47,7 %
Fiat	181096	8,4 %	48 % / 52 %	47,4 %
Ford	125407	14,1 %	0 % / 100 %	45,1 %
IVECO	74842	0,2 %	0 % / 100 %	45,1 %
Toyota	49289	24,2 %	26 % / 74 %	46,3 %
Nissan	40160	40,6 %	95 % / 5 %	49,8 %
Total	2102340	15,8 %	44 % / 56 %	47,1 %

Source: T&E analysis, data from IHS Markit projections for vans

* Category 1 defined as current Class I + Class II, Category 2 as current Class III. Classes not being provided in IHS Markit projections, for 2027 they are estimated from reference mass per model from 2019 EEA database.

** Minimum ZEV sales needed for each van maker to reach the overall 50% ZEV target in 2030 assuming that their EV sales split stays the same as the production in 2027 and after applying a multiplier of 1.11 on Category 2 vans.

Figure 6: Applying a multiplier of 1.11 to Cat 2 e-vans

4. Zero emission van extra weight allowance

Zero emission vans currently do not get an extra weight allowance to take into account the impact of the additional weight from the battery pack on the maximum payload of the vehicle. Heavy duty vehicles currently benefit from a weight allowance up to 2t extra under the Weights and Dimensions Directive¹³, which is considered to be an important enabler for electrifying heavy duty vehicles. Allowing for a similar flexibility for the heavier class III vans would provide favourable conditions for the electrification of heavier (light duty) vans. Hence, T&E supports giving a limited **extra weight allowance of up to 300 kg for zero emission vans sold up to 2030**.

An additional weight allowance of up to 300 kg is justified by the fact that this is approximately the weight of the battery of the most sold van: the Renault e-Kangoo has a battery of 33 kWh with a total weight of 260 kg (127 Wh/kg).¹⁴ It is expected that the battery density will improve by at least a factor of two in the 2020s (according to Ricardo's low battery pack density assumptions: 183 Wh/kg in 2020, 245 Wh/kg in 2025 and 318 Wh/kg¹⁵) which will allow for large 100 kWh batteries to be fitted with no extra weight penalty up until 2030 (100 kWh * 0.318 Wh/kg = 318 kg). This extra weight allowance should be discontinued after 2030.

It is essential that PHEVs do not benefit from this extra weight allowance as this would create an unjustified and harmful loophole which would push the market towards heavy PHEV vans for compliance purposes only and thus slow down the adoption of BEV vans.

5. Avoid PHEV loopholes

For the moment PHEV van sales are virtually non-existent while they make up around half of the EV sales for passenger cars where it's clear PHEVs are being exploited by car OEMs as a compliance tool, while having questionable benefits on the road (PHEV passenger car emissions are two to four times higher in real world than in official laboratory tests¹⁶).

¹³ <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32015L0719&from=EN>

¹⁴ <https://cdn.group.renault.com/ren/ie/transversal-assets/brochures/kangoo-brochure-dec.pdf>

¹⁵

https://publications.jrc.ec.europa.eu/repository/bitstream/JRC117790/jrc117790_jrc_circular_econ_for_ev_batteries_ricardo2019_final_report_pubsy_online.pdf

¹⁶ ICCT (2020). Fact sheet: Real-world usage of plug-in hybrid electric vehicles. Available at: <https://theicct.org/publications/phev-fs-eng-sept2020>

In contrast to battery electric vans (BEVs), PHEV vans are not expected to play a real role, comprising 1.2% of van production in 2027. Regulation is best focused on the solution - BEVs, and steer away from mechanisms with strong potential to be used to avoid real-world compliance, i.e. PHEVs.

Currently the van regulation offers the same treatment of PHEVs (as for cars) under the WLTP tests but it is key that the new regulation does not introduce any kind of additional PHEV incentive which would have the adverse effect of driving the market towards compliance with “fake EVs” which are not charged, like we have seen for cars.

This means van regulation should avoid adding an additional PHEV incentive as part of a ZEV target. Indeed, in the passenger car CO₂ regulation, the credit value of PHEV is inflated (the so-called ‘0.7 multiplier’). With regard to vans, the ZEV target should focus on incentivising ZEVs only given that LEVs (or PHEVs) are already treated very generously in their emissions test. We recommend a ZEV target and if LEVs were to be included, very important safeguards should be preserved: no multiplication factor should be added for PHEV and the threshold for LEV should be kept at a maximum of 50 g/km. And their real-world emissions and fuel consumption must be reported using on-board fuel consumption meters, including for setting OEM-specific utility factors to be used for WLTP CO₂ value calculation.

Note: There would be very limited merit in additional regulatory steps for LEVs. IHS Markit’s van production forecast shows an expected 0.9% production of PHEV vans in 2025 and 1.2% in 2027, with only 26,000 units produced in total in 2027 (almost all coming from two van-makers, Volkswagen and Daimler).

Given the technology and cost superiority of BEVs over PHEVs, the revised van CO₂ standards should keep away from unjustified PHEV loopholes risking that they would be used for compliance purposes only by OEMs while delaying the mass adoption of zero emission vans.

Further information

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