Car CO_2 review: getting Europe's car market 'fit for 55' on time and affordably

T&E recommendations for the review of the EU car CO_2 standards

November 2021

Summary

Following the entry into force of the 2020/21 EU car CO_2 standards (the main tool to decarbonise cars in Europe) electric cars have entered the mass market much faster than previously expected. The share of plug-in vehicle sales reached 16% so far in 2021, leading to an unprecedented drop in new car CO_2 emissions by 18% - an amount equivalent to the total car emissions of Slovenia. Getting to 100% zero emissions mobility - essential for Europe to meet its own Green Deal goals - is no longer a pipe dream and is now within reach.

With competitive zero and low emission models now on the market, the next task of the regulation is to scale up their production making them affordable and accessible to all Europeans. Analysis shows that if we continue to ramp up electric car production, via higher targets during the 2020s, BEVs will be cheaper to buy than equivalent petrol models in just six years time. But this will not happen on its own: ambitious supply side targets (via the CO_2 regulation) are crucial in ramping up the timely investment and production that will drive the commercialisation of zero emission models replacing those on diesel and petrol.

Despite a flurry of recent commitments by carmakers to electrify their lineups (some more ambitious and credible than others), **what the European Commission proposed on 14 July would require almost no additional effort by OEMs from where they are today until 2029**. The regulation's lack of ambition means that carmakers are being let off the hook as they can decide to exploit the weakness of the standards to sell higher emitting cars and/or delay in the transition towards BEVs. This is bad news from Europe for three reasons:

- **Bad news for the climate** as less CO_2 will be reduced from cars in the coming decade (11% less compared to T&E proposed targets) and fewer clean models replacing polluting ones, undermining our chance of avoiding a climate catastrophe.

- **Bad news for consumers** as slower scaling up of electric car production in the 2020s will delay the point when the price of zero emission cars reaches that of conventional models. This means electric cars will be less affordable and accessible when the world has to accelerate and transition fully to zero emissions vehicles.
- **Bad news for European industry**, as the EU automotive industry risks not moving quickly enough in the 2020s and conceding the lead in future-proof technology to other regions of the world. Catching up by 2030 is too late as Asian, American and other companies are already taking a growing share of the European market and wooing consumers today.

A combination of excessive flexibilities and inadequate emission reduction targets underscores the need to strengthen the car CO_2 standards in the 2020s when the ramp of electric cars is needed to put Europe on a credible path to zero emissions. This is how T&E recommends the regulation is amended by the European Parliament and the European governments:

Increase the ambition of the targets in 2025 and 2030 and add a new interim target in 2027:

- Early build up of battery electric sales volumes is essential in the 2020s for Europe to be able to go to 100% by 2035. Raising the 2030 target alone will not suffice as it will only spur investments towards the very end of the decade and from 2030 onwards. To ensure an optimal supply of BEVs, **Europe needs a 30% CO_2 reduction from new cars from 2025 and at least 45% from 2027**.
- For the entire car fleet to be zero emission in 2050, the **last new car with any CO_2 emitting engine must be sold no later than 2035**. To be on the feasible path to 100% zero emission sales in 2035, sales of BEVs will need to hit at least 67% in 2030, which corresponds to a **CO_2 reduction target of -80%**.

E-fuels used in road transport are **inefficient**, prohibitively **costly** and bring **less lifetime CO_2 savings** than battery electric cars. As carmakers cannot guarantee how their cars will be fueled once they leave showrooms, the CO_2 regulation should not allow them to credit fuels (neither e-fuels nor biofuels) to comply with their targets. Ultimately - while these renewables-based fuels are necessary to decarbonise aviation or heavy industry - their use in cars is a waste and will only undermine the timely and affordable path to zero emissions road transport.

Flexibilities embedded into the regulation - e.g. weaker CO_2 targets for heavier cars or CO_2 bonuses for carmakers with plug-in sales above modest benchmarks - will weaken the already inadequate CO_2 standards by allowing carmakers to cut planned BEV production and/or increase emissions from their conventional models and still remain compliant with the targets. **T&E therefore recommends to improve the design of the regulation** by:

- Removing the ZLEV benchmark and corresponding CO_2 bonus from 2025.

- Reforming the WLTP test to provide realistic CO_2 rating of PHEVs, with the help of real-world data from fuel consumption meters.
- Banning the sales of conventional models with CO_2 emissions above 120g/km (mostly SUVs) as of 2030.
- Stopping the free CO_2 pass for heavier cars by removing the mass adjustment factor as well as limiting the CO_2 savings that can be claimed from eco innovations.

Introduction

Thanks to the entry into force of the 2020/21 EU car CO_2 standards, plug-in cars[1] have entered the mass market much faster than previously expected, reaching 10.5% of new sales last year. This year the 95g CO_2 fleetwide target is applied in full - in 2020 it only applied to 95% of cars - and sales of plug-ins have surged to 16% of the market (7.5% BEV) and are projected to reach at least 18% by end of 2021. The application of the 95g target has also seen an unprecedented drop in CO_2 emissions of new cars, with a total CO_2 emissions drop of 18% since the entry into force of the 2020/21 regulation.

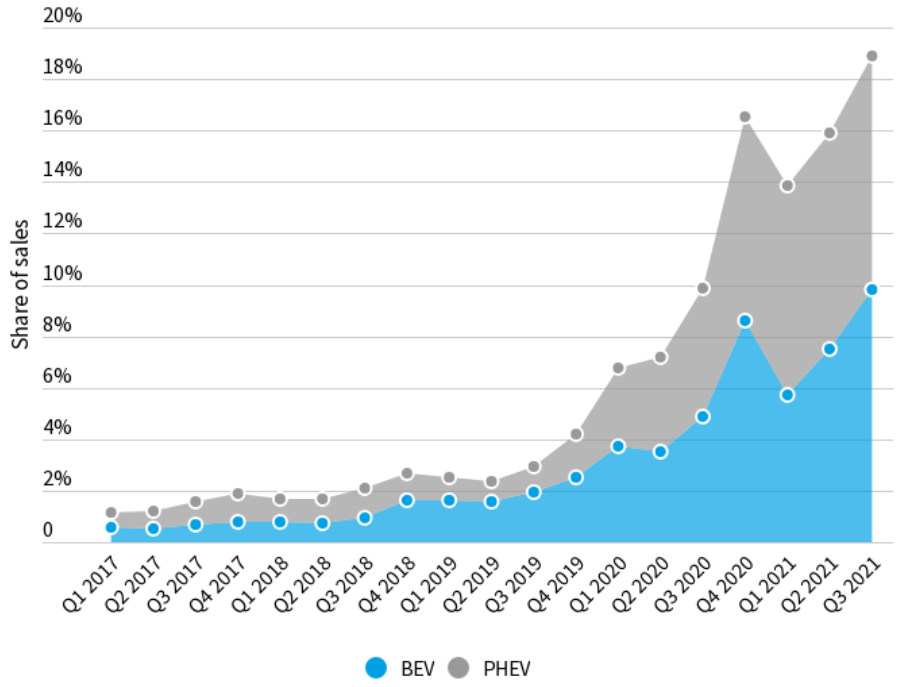
Regulating the car industry directly, European vehicle CO_2 standards are the main measure today to effectively increase the investment in and supply of plug-in cars. Smart taxation and infrastructure policies drive demand for electric cars, but the supply is still limited EU-wide by how many plug-ins carmakers need to make to comply with the CO_2 rules.

With competitive zero and low emission models now on the market, the next task of the regulation must be to scale up their production making them affordable and accessible to all Europeans, after which the regulation will need to ensure carmakers reach 100% zero emission sales in time for Europe to meet the ambition of its Green Deal.

Looking beyond 2021 however, the proposed car CO_2 standards regulation - adopted as part of the European Commission's 'Fit for 55' climate policy package - will only slow the momentum and ramp-up of plug-in sales as the proposed ambition lags well behind the market potential and carmakers' own plans. Without significantly more ambitious targets in the 2020s and 2030, and with numerous flexibilities and loopholes left in the regulation, there is a real danger that investment in and the supply of electric cars will stagnate from 2022 onwards, just as Europe needs to accelerate the decarbonisation of its road transport sector.

In this paper, T&E outlines our analysis of the Commission's proposal, its shortcomings, and our recommendations to ensure Europe is both 'fit for 55' and for the emobility era.

[1] When not otherwise specified, the term 'plug-in' will be used to refer to all plug-in electric cars: fully battery electric (BEV) and plug-in hybrid (PHEV).



Scope: EU27 registrations
Source: ACEA (2021) Quarterly AFV registrations

Figure 1: Plug-in sales (BEV + PHEV) in Europe

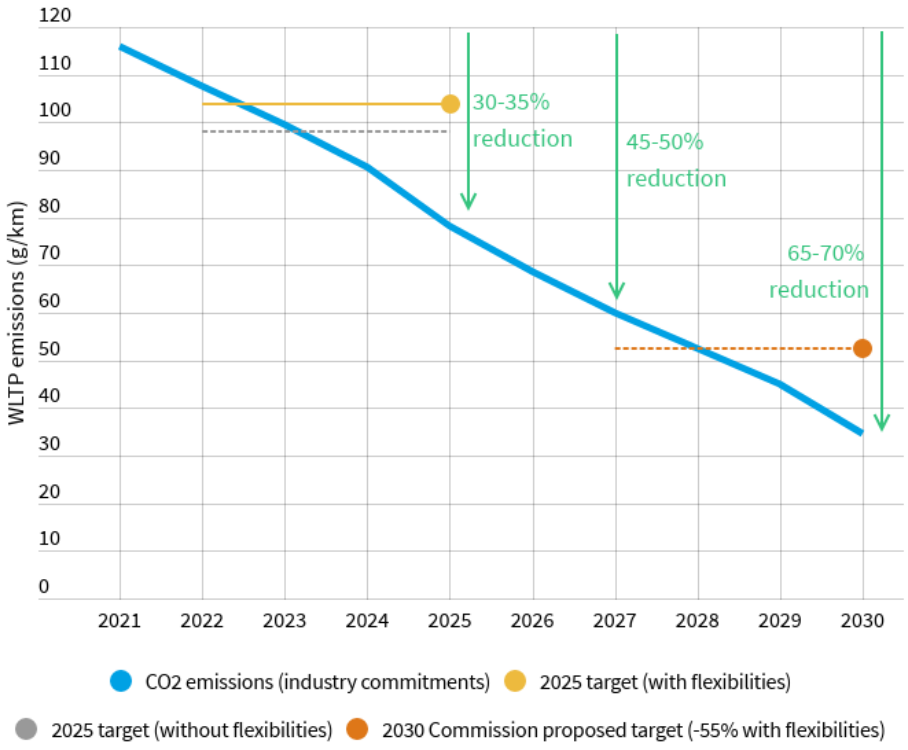
T&E Priority 1 - a more ambitious trajectory needed in the 2020s for cheaper EVs and for the climate

Under the Commission's revised post-2021 CO_2 targets, the pace of CO_2 reductions is far too slow to drive the necessary cost reductions in BEVs to get to zero emissions transport by 2050, needed to meet the goals of the European Green Deal. Under the proposal, carmakers will have to reduce CO_2 emissions from their new cars sold by a mere 15% until 2029 (the 2025 target) and by 55% from 2030.

Thanks to growing investment by carmakers into the supply of BEVs and improvements in battery technology, BEVs are now much cheaper, but still not yet at production price parity. Analysis shows, however, that BEVs will be cheaper to make than fossil fuel alternatives between 2025 and 2027, with the average medium car (e.g. VW Golf) costing the same as petrol without subsidies by 2026. However, the early build up of BEV sales volumes in the 2020s will be a crucial condition to drive these cost reductions. Falling plug-in costs have been primarily driven by two factors: declining battery prices and investments by carmakers into dedicated BEV manufacturing platforms (such as Daimler's EQ and

VW's ID platforms), which ensure further cost reductions through simpler vehicle assembly, standardised battery packs and allowing higher volumes.

T&E has shown (see Figure 2 below) however that, based on current production plans, carmakers will comply with the Commission's proposed 2025 CO_2 target already before 2023, whilst the 2030 target will be met in 2028. As a result, carmakers have considerable room to maneuver and could divert from current production plans toward less ambitious trajectories and strategies: e.g. they can do the strict minimum to comply with the regulation either by suppressing sales of BEVs or stopping all efforts to reduce combustion engines emissions. T&E has shown that under the current proposed Commission targets carmakers could decide to halve their overall EV sales compared to current industry forecasts in 2025 and sell six times less than planned in 2029 and still comply[2]. Alternatively, if they maintain current projected plug-in sales, emissions from new ICE cars can increase by 60% over the second part of the decade, meaning more highly polluting SUVs on our roads.



Source: T&E emission modelling derived from passenger car registration data from the first half of 2021 from Dataforce, carmakers' 2030 sales targets, and EU production data.

Figure 2 - Projected emission reductions in the 2020s compared to the proposed targets

[2] Transport & Environment (2021), *Electric car boom at risk*

This is **bad news for consumers**, as a slower scaling up of electric car production in the 2020s will delay the point when the price of zero emission cars reaches that of conventional models. This means electric cars will be less affordable and accessible at the point we have to accelerate the transition to zero emissions vehicles.

Raising the 2030 target alone won't suffice either, as it will only spur investments towards the very end of the decade and from 2030 onwards, leading to higher retail prices for BEVs and slower uptake of charging infrastructure. In other words, the long term goal of zero emissions mobility cannot be achieved without much more ambitious short and mid-term targets in the 2020s.

Leaving the ambition in the 2020s as it is, and without a much more ambitious 2030 target, is also **bad news for the climate** and means new car sales - with cars being one of the largest climate contributors - will make limited additional contribution to the EU's overall higher 2030 climate target of -55% greenhouse gas emissions.

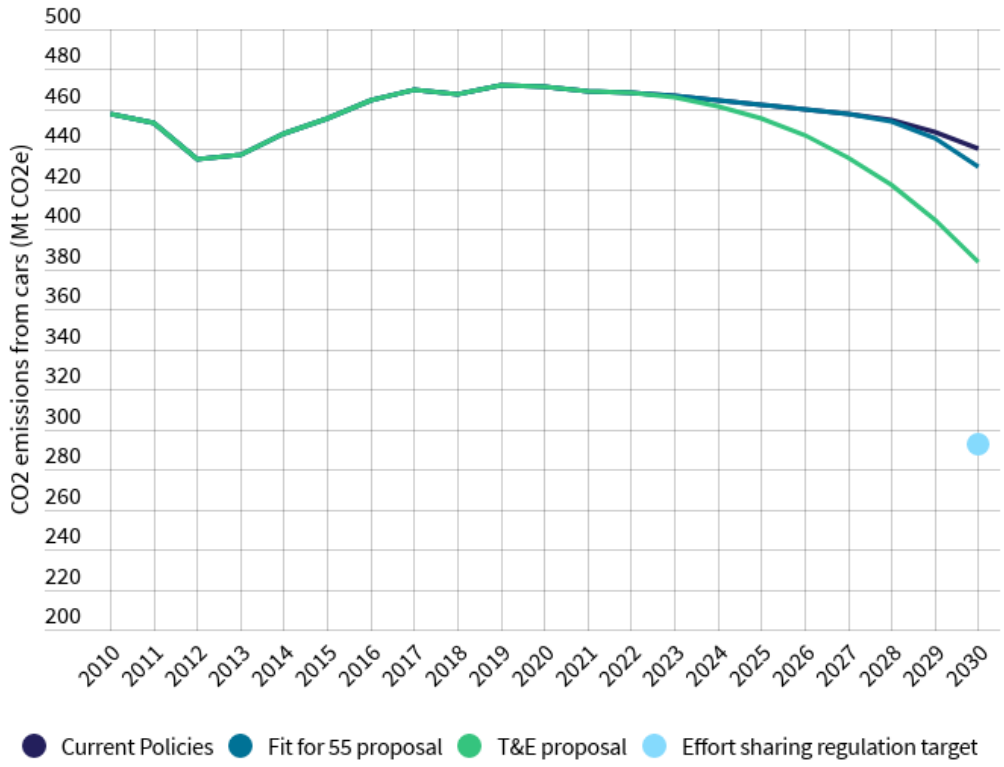
The infographic below (Figure 3), shows what the different ambition scenarios actually mean for CO_2 savings. Under the Commission's proposed targets, total emissions are reduced by 8Mt in 2030 compared to the current policies scenario (-37.5% reduction target in 2030), or slightly less than 2%. This shows that increasing the 2030 target alone falls well short of providing any meaningful contribution to the increased economy-wide 2030 climate ambition.

On the other hand, the T&E pathway would reduce emissions compared to the Commission's proposed target scenario by a further 11%, to 384Mt in 2030 (a total of 48Mt - equivalent to the emissions from the entire car fleet in Spain).

- More than half (57% or 27Mt) of this total reduction of 48Mt, compared to the proposed 2030 target scenario, comes from more ambitious early targets (2025 and 2027 targets).
- A fourth - or 12.5Mt - comes from the increased ambition in 2030, and
- 17% comes from the improvement of the regulation design (*see section on flexibilities below*).

In other words, **higher pre-2030 ambition is critical from a climate (as well as consumer) perspective** and would lower total CO_2 emissions from cars by 6% compared to the Commission's proposal.

With the EU's new objective to reduce GHG emissions by 55% in 2030 compared to 1990 levels, it is clear that the ambition level for car CO_2 reduction should be set significantly higher so that cars are contributing their fair share.



CO2 reduction targets: Current Policies: -15% in 2025 and -37.5% in 2030; Fit for 55 proposal: -55% in 2030
T&E proposal: -25% in 2025, -40% in 2027 and -80% in 2030
Source: T&E's in-house transport emission model, EUTRM

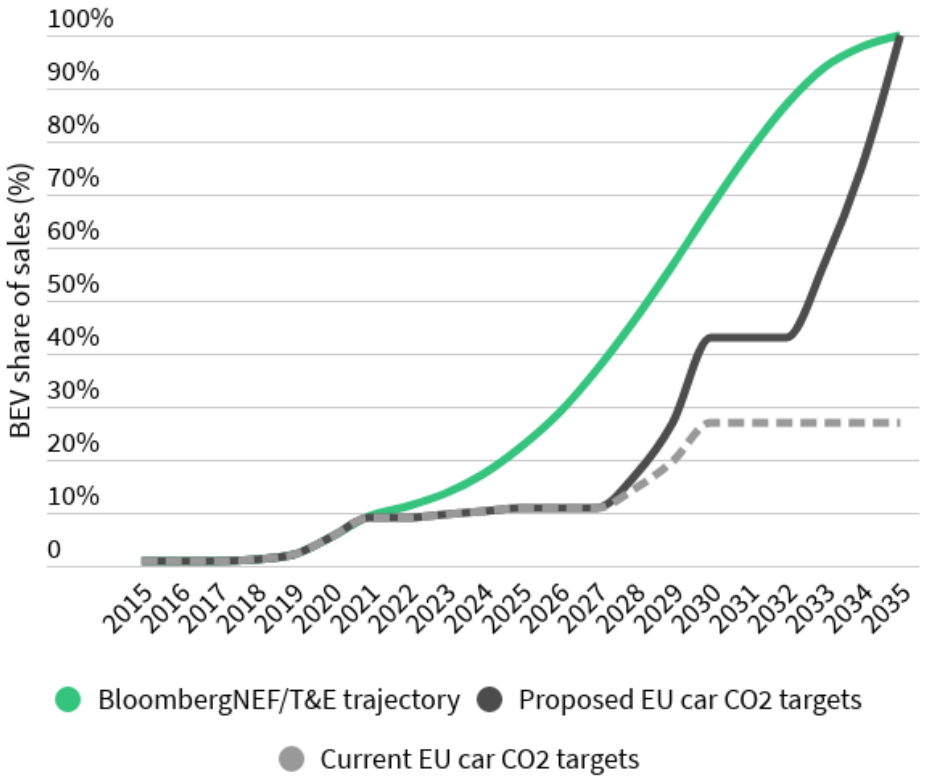
Figure 3: CO_2 emissions from the EU car fleet

Finally, the proposed target ambition is also **bad news for industry**. First, supply from outside Europe will dominate if domestic supply - which closely mirrors the car CO_2 standards - is insufficient, opening the door to Chinese and other OEMs to get a foothold in the EU market. Slow plug-in market growth in the 2020s will also put at risk the current plans for battery gigafactories across Europe, as they might lack the market to sell their product into. Indeed, even with the new proposed 2030 target of -55%, when both the fully and partially financed projects are considered, the planned battery capacity is almost triple the minimum demand up to 2030.

Analysis done for T&E by BloombergNEF shows that, in order to drive the necessary cost reductions for BEVs that are needed to generate the necessary consumer buy-in for further adoption in the future, and ultimately phase out conventional cars in Europe, sales of battery

electric vehicles need to hit 22% in 2025, 37% in 2027 and 67% in 2030 as shown in Figure 4. Based on T&E estimates[3], we therefore recommend to:

- Increase the EU fleet-wide **CO_2 reduction target to at least 30% for 2025**, which will increase the supply of zero emission vehicles (ZEVs) to over 20% of total sales in 2025.
- Set an EU fleet-wide **CO_2 reduction target for 2027 at least 45%**, which will increase supply of ZEVs to over 35% of total sales in 2027.
- Increase the EU fleet-wide **CO_2 reduction target to at least 80% for 2030**, increasing the supply of ZEVs to around 67% of total sales in 2030.



Source: Bloomberg NEF (2021), *Hitting the EV Inflection Point* and T&E modelling of the EU CO2 standards for cars.

Figure 4 - BNEF/T&E trajectory compared to Commission trajectory

[3] Based on the assumptions that BEVs amount to 80% of plug-in sales, pure ICE emissions decrease by 1.5% every year, average emission from PHEVs are 30 g/km, 1.5 g/km eco-innovation credit per ICE, 1 g/km weakening due to the mass adjustment and 2.5% improvement of ICE emissions thanks to test optimisation

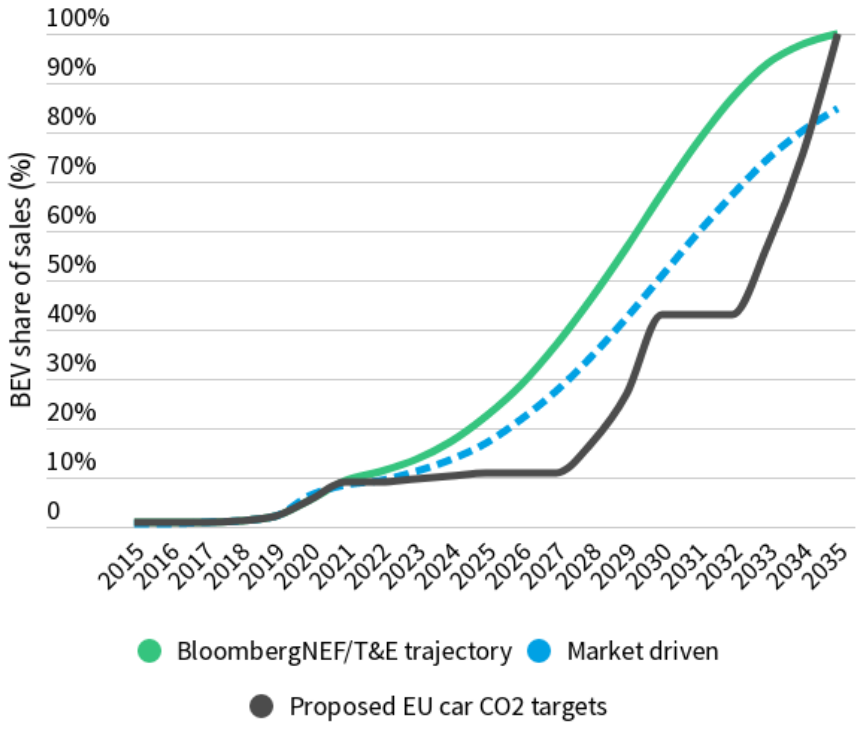
T&E Priority 2 - Automotive transition

All new cars must be zero emission by 2035 at the latest

For the entire car fleet on the road to be zero emission in 2050 - essential for the EU to meet its target to reach carbon neutrality - the last new car with any CO_2 emitting engine (including PHEVs) must be sold no later than 2035. This deadline is supported by analysis commissioned by the European Commission, which shows that the average retirement age of cars in Europe is around 15 years (14 for diesel and 14.4 for petrol).

With this in mind, the results of the aforementioned BNEF study show that, with the right policy support (including smart fiscal incentives, ramp up of charging infrastructure and sufficient supply side targets via the CO2 regulation - *see section above*), conventional cars and vans can be phased out in all European countries between 2030 and 2035. Early action and supply are essential to reach the required BEV sales volumes to be able to phase out combustion cars and go 100% zero emission by 2035. The earlier the market enters the phase of accelerated BEV sales, the easier it will be to reach the ICE phase-out and related climate goals.

The study also shows that, despite BEVs reaching production price parity in the mid-2020s, in the purely market-driven scenario (which is based on the economics of BEVs alone), BEV sales would reach around 85% in 2035 (see Figure 5). This means that, without a binding target in the car CO2 regulation for 100% ZEV sales by 2035, the goal of zero emissions transport by 2050 will be unachievable.



Source: Bloomberg NEF (2021), *Hitting the EV Inflection Point* and T&E modelling of the EU CO2 standards for cars.

Figure 5 - BNEF/T&E trajectory compared to market trajectory

Some market segments (e.g. high-mileage fleets such as taxis and company cars), regions (e.g. EU capitals) and whole countries can and should go 100% zero emissions sooner, as an electric car is already the cheapest option from the total cost of ownership perspective and will reach production price parity with conventional cars in the mid-2020s. But current EU internal market rules make it difficult for individual member states to restrict registration or circulation of new cars in their territory. Given the urgency of the climate action, individual countries or groups thereof should be allowed to set 100% zero emission sales mandates sooner than 2035, in order to achieve their national climate and air quality goals.

To enable the market to be on a Green Deal compliant trajectory to zero emissions by 2035, T&E recommends to:

- **Support the Commission's target to have 100% zero emission car sales** no later than 2035.
- Amend the provisions of the EU type approval framework to **allow individual member states or groups thereof to set earlier dates to reach 100% ZEV sales**.

Ensuring a Just Transition for automotive workers

Transitioning from producing predominantly ICE cars to going 100% electric will mean fundamental and fast-moving changes to the automotive sector and supply chains and the workers involved. Ensuring a just transition should be a central consideration accompanying the phase out of the ICE.

A recent study by Boston Consulting Group (BCG) looked at what impact an accelerated transition to emobility in Europe would have on jobs. Whereas previous studies looking into this important question have either had an overly narrow (only looking at the impact on carmakers) or overly wide (looking at the whole economy) focus, the study is distinctive in that it considers not only core automotive industries (such as OEMs, suppliers, and maintenance providers), but also adjacent industries (including equipment providers, fuel and electricity producers, and providers of fuel and charging infrastructure).

The study concludes that, overall, the net impact on jobs from the shift to plug-ins will be flat, however looking across the different industries shows a more varied picture. Whereas traditional automotive industry sectors (OEMs and ICE-focused suppliers) will see job losses, new industries that support electrification (non-ICE focused suppliers such as batteries, as well as charging infrastructure and energy production) will experience tremendous job growth over the next ten years. The Commission's own impact assessment agrees, stating that "[e]conomy-wide GDP and employment are impacted positively...the number of jobs increases in 2030, and even more in 2040", however "a loss in jobs related to the production of components for conventional engines is projected".

Another study by BCG also concluded that there is hardly any difference in the amount of personnel and work needed to build a battery electric car vs. a vehicle with a combustion engine. Although an ICE requires more labour to build the engine, the production of the BEV powertrain (including battery cells and pack) and power electronic components bring the total labour required up to almost the same level as for conventional cars (99% of that required for an ICE).

As a consequence, massive employment transitions are expected between industries and job profiles, and across regions. A key challenge, therefore, is making sure workers are supported and have the right skills for these new jobs.

It is crucial that Europe accelerates this transition to BEVs (spurred by ambitious CO_2 targets) to ensure it captures and secures this new value chain and the jobs that come with it. This is not yet a given. Delaying the transition to zero emissions by pushing PHEV technology or efuels or delaying the phase out of the ICE will leave European carmakers at a competitive disadvantage, leaving the door open for Asian competitors to fill the growing demand, with negative impacts on investment and jobs.

Accompanying the phase out of ICEs, T&E recommends to:

- **Map the employment impacts of the transition to BEVs**: a clear, granular mapping at company, regional and national levels to identify skills needs and anticipation of change.
- **Ensure adequate resources for active labour market policies**, including retraining and upskilling, as well as economic diversification, as part of a dedicated fund.
- **Transition planning and social dialogue**: map employment effects and strengthen social dialogue through negotiated transition plans at company, regional and sectoral levels, including the extension of the Just Transition Platform to the scope of the automotive sector.

T&E Priority 3 - No (e)fuels credits in the car CO_2 standards

Adding credits for advanced and synthetic fuels into the CO_2 standards has been suggested by the oil and gas industry for a number of years now and is intensifying again following the publication of the Commission's proposal. Synthetic fuels - or e-fuels - are produced by combining hydrogen and carbon in order to create a hydrocarbon (like petrol or diesel) which can be used to propel a conventional petrol or diesel vehicle. T&E has shown why doing so for cars is not a credible idea from an environmental, cost, or regulatory point of view.

First, carmakers cannot guarantee or control how cars are used or fueled over their lifetime, so the vehicle regulation should only regulate what carmakers have control over, i.e. powertrains (or **risk an unenforceable regulation**). Fuels should be regulated in appropriate EU legislation - as is the case already - such as the EU Renewable Energy Directive and the EU Fuel Quality Directive.

Cars powered by **e-fuels actually emit much more CO_2** (38-46% more - see Figure 6) over their lifetime compared to a BEV. The BEV climate advantage is thanks to much lower overall electricity consumption (5 times less), meaning BEVs can perform better than e-petrol cars even when the carbon intensity of the electricity used to charge the car is higher than the one used to produce the fuel.

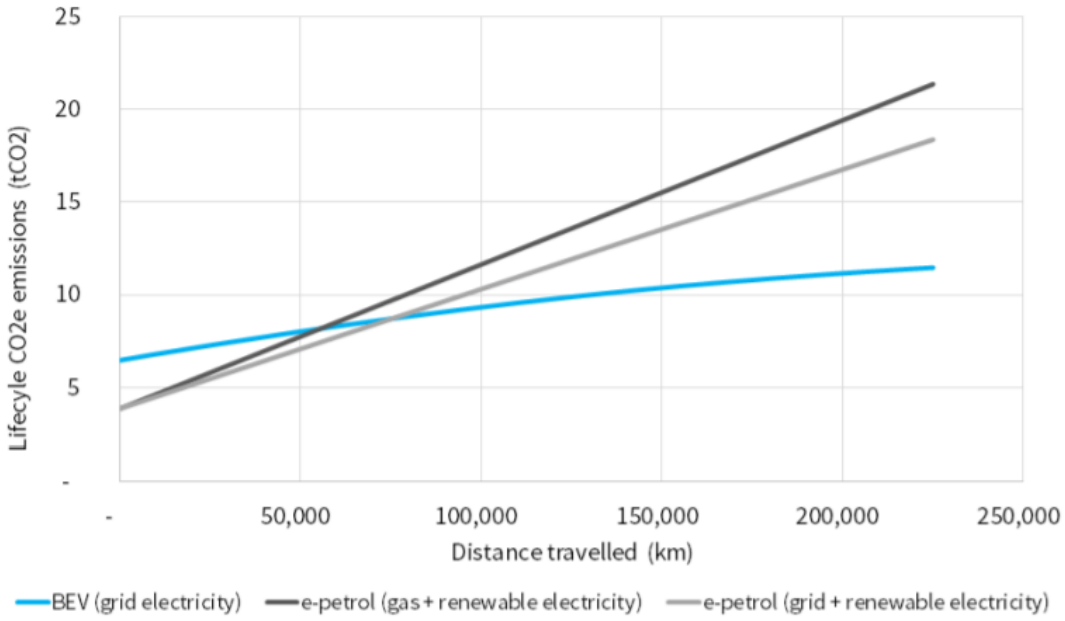


Figure 6: Lifecycle CO_2 emissions: BEV vs. e-petrol

From a driver perspective, the very high costs of operating a conventional **vehicle running on e-fuels would place a significant cost burden on the average European driver**. For both new and second hand cars in 2030, the TCO (total cost of ownership) premium for running a car on e-petrol compared to a BEV is €10,000, or 43% more expensive for an average driver. Critically too, the TCO of running an existing petrol car on e-fuels would still be 10% higher than buying a new battery electric car.

Drivers wouldn't be the only ones hit with a cost premium, as **e-fuels are also the most costly compliance route for carmakers**. It would cost carmakers around €10,000 in fuel credits for the amount of synthetic petrol needed to compensate for the emissions of an efficient petrol car placed on the market in 2030. On the other hand, the cost of a BEV battery could drop to as low as €3,000 by 2030. The e-fuel route would therefore put the competitiveness of the European automotive industry at risk as it would divert large investments away from the transition to emobility.

Finally, **volumes of synthetic fuels on the market will be very limited** until after 2030[4], by which time plug-in cars will be by far the most efficient, cheap and convenient option. Relying on imports of these fuels will also not be a viable option until after 2030. Europe does in fact need renewable e-fuels,

[4] Even with very strong policy support and subsidies the potential volumes of CO_2-based synthetic fuels would be limited to approximately 0.15% of total EU road transport fuel demand in 2030.

but for sectors that have no alternatives to decarbonise – shipping, aviation, heavy industry. It will be important to reserve limited amounts for these uses.

T&E recommends:

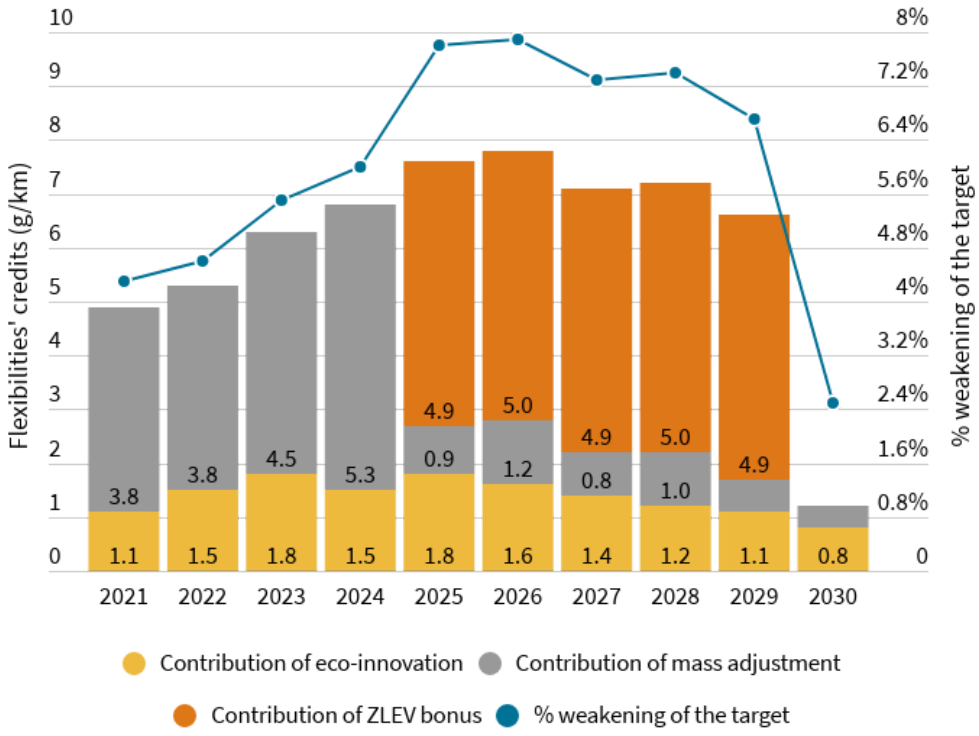
- **No CO_2 credits to carmakers for alternative or synthetic (e)-fuels should be included into the car (or van) CO_2 standards.**

T&E Priority 4 - Closing the regulatory loopholes

T&E has shown that, as a result of the combined impact of the regulatory flexibilities - maintained in the Commission's proposal - the 2025-2029 target (15% CO_2 reduction compared to 2021) is expected to be weakened by 7.4%, due to an average 7.3 g/km total credit from flexibilities (see Figure 7)[5]. This means that, along with the impact of test optimisation[6], carmakers will face an effective CO_2 reduction target of just over 3% in 2025, underlining the importance of closing the regulatory loopholes in the Commission's proposal.

[5] Transport & Environment (2021), *Electric car boom at risk*

[6] With the change from the outdated NEDC to more realistic WLTP emission tests, carmakers regrettably had an incentive to inflate the gap between emissions recorded in the WLTP and NEDC tests in 2020 (e.g. via double-testing vehicles on both test procedures to artificially increase WLTP test values while achieving the low NEDC values for target compliance) as the difference between the two tests in 2020 is used to calculate the 2021 baseline for compliance with the 2025/2030 targets. The JRC suggested that the ratio between the WLTP/NEDC should be 15% whereas it was observed to be 21% in 2020. This results in a 5% gap between actual and theoretical WLTP emissions that could favor OEMs from 2021 and give them a further decrease in their emissions on paper by 5%, just by test optimisation. The official publication of the 2021 WLTP measurements from the EEA will allow further analysis of this potential loophole.



Source: T&E modelling of carmakers' compliance in the 2021-2030 period based on T&E plug-in vehicles sales forecast (production adjusted to take imports/exports and carmaker sales targets into account). Partly based on the analysis of passenger car registration data from the first half of 2021 from Dataforce, August 2021.

Figure 7 - Target weakening due to flexibilities in the 2020s

ZLEV benchmark

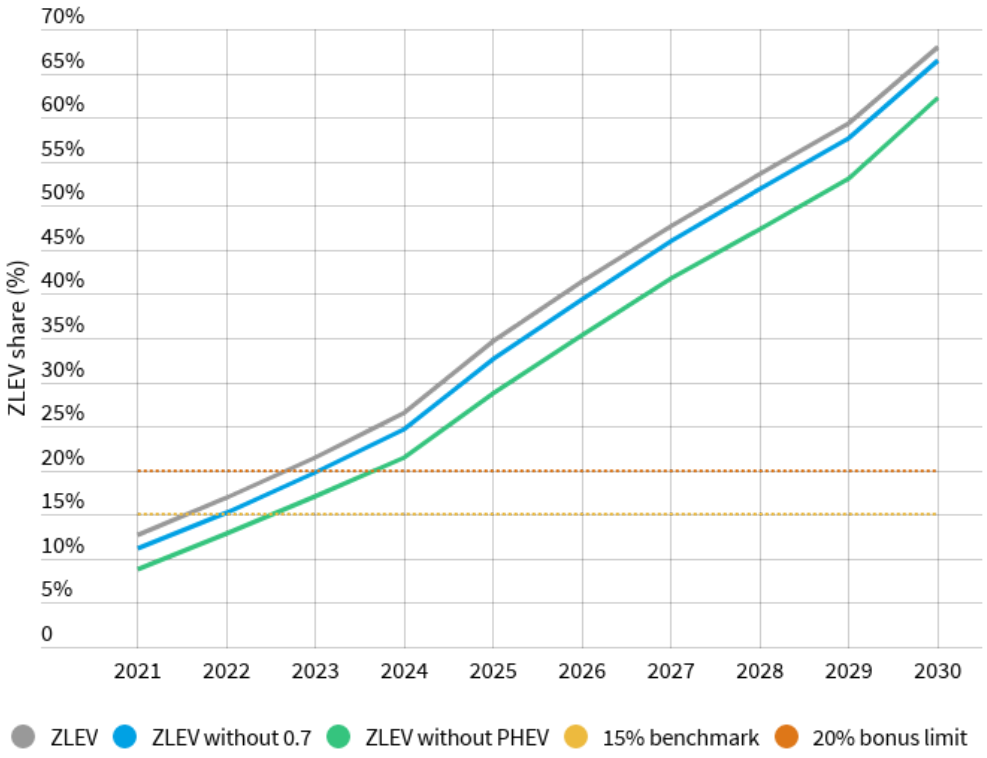
From 2025 on, a new incentive mechanism for the production of ZLEVs (zero- and low-emission vehicles) is introduced, replacing the super-credit mechanism which is phased out after 2022 - the ZLEV benchmark. This crediting system allows a carmaker to relax its specific emissions target if its share of ZLEV sales exceeds the non-binding 15% benchmark from 2025 to 2029[7]. Exceeding the ZLEV benchmark by one percentage point increases the manufacturer's CO_2 target (in g/km) by one percent, making it easier to comply with. Target weakening is capped at 5%, so carmakers benefit from the full bonus by selling at least 20% ZLEV. The share of ZLEV sales is weighted according to a system which counts zero-emission vehicles as one and PHEVs as less than one depending on their emissions.

For low emission vehicles (or PHEVs) under the 50g CO_2/km threshold, the weighting system is based on their WLTP (vehicle type approval test) emissions. This emissions-based weighting is, however,

[7] The ZLEV benchmark and associated bonus initially planned from 2030 is proposed to be removed in the Commission's proposal.

inflated by a 0.7 multiplier that gives, for example, 0.3 of a credit instead of zero to PHEVs emitting 50 g/km. Because of this multiplier, on average, the weight of PHEVs in the ZLEV calculation is almost doubled. Removing this additional factor would decrease the current market ZLEV equivalent share to 11.1% instead of 12.8%.

Based on T&E plug-in vehicles sales forecast, the market average ZLEV share is expected to exceed 15% as early as 2022. The 20% threshold of the bonus limit is expected to be reached on average across OEMs in 2023, or two years before the entry into force of the system. Even when removing PHEVs altogether from the mechanism, the date would only be delayed by a year (full bonus in 2024 on average). In all scenarios, the ZLEV market average will be above 20% before 2025, highlighting that the benchmark is already outdated before it has even entered into force.



Source: T&E's plug-in vehicles sales forecast modelled from passenger car registration data from the first half of 2021 from Dataforce, carmakers' 2030 sales targets, and EU production data.

Figure 8 - Projection of the market average ZLEV share

With the plug-in vehicle market growing much faster than was originally expected in 2018 when the benchmark design was set, the current system of bonuses is now obsolete.

T&E recommends to:

- **Remove the ZLEV benchmark as of 2025,** leaving the CO_2 targets as the mechanism to drive electrification.

Plug-in hybrids

Plug-in hybrid (PHEV) sales have been growing fast with the entry into force of the 2020/21 car CO_2 target as carmakers need to sell low emission cars to comply: the first half of 2021 saw their share of all plug-ins increase to 55% in the EU27, up from 37% in 2019. PHEVs are a compliance strategy for many carmakers as they earn the same super-credits as selling BEVs until 2022 and will receive ZLEV credits after 2025 (unless this particular flexibility is removed).

Many PHEVs on sale today tout very low CO_2 emissions - a third, or less of an equivalent conventional combustion engine car, with a theoretical emissions average of 38.6 g/km. PHEVs' real emissions on the road, however, are much higher than their lab results. T&E tests of three of the best selling PHEV models on the EU market showed real world CO_2 emissions up to 12 times higher, depending on driving mode.

PHEV emissions are under-reported because of the use of overly optimistic assumptions about how much these vehicles drive electrically. So called 'utility factors' (defined as the proportion of distance travelled in electric mode using the battery) are used to calculate the type approval CO_2 emissions of PHEVs alongside their tested values on the WLTP test procedure.

The ICCT has shown that real world PHEV utility factors are about half of those assumed for calculating official PHEV CO_2 figures. According to WLTP measurements, PHEVs emit 72% less than ICE vehicles, but it would be only 37% less[8] on the road. In other words, PHEV emission savings would be halved in the real world compared to lab measurements, making it much harder for carmakers to comply.

Analysis of the sales from the first half of 2021 shows that most PHEVs are SUVs (64.3%). This is an additional issue because, once the battery is exhausted, the combustion engine alone is relied upon to power the vehicle. In the case of large SUVs, which are heavier and have poorer aerodynamics, this results in higher CO_2 emissions and fuel consumption than a smaller car. This trend towards PHEVs is also delaying the uptake of zero emission solutions such as BEVs.

[8] On average in H1 2021, ICEs emit 140 g/km (WLTP) and PHEV emits 39 g/km (WLTP). With an estimated real-world uplift (real-world over WLTP ratio 1.14 and 2.6 for ICE and PHEV respectively), ICEs would emit 160 g/km and PHEVs 100 g/km.

To avoid another emissions scandal, the European Commission must urgently revise the way PHEV emissions are calculated by amending the utility factors under the WLTP regulation using real world fuel consumption data (which is being collected as standard for all new vehicles as of 2021 from on-board fuel consumption meters). This will incentivise all carmakers to improve their PHEV offering, as well as promote driver awareness programmes to encourage regular charging. The Commission has started the process, but progress has been very slow with no meaningful changes expected until 2030, leaving a decade of new polluting PHEV models entering the market. EU and national policy-makers should therefore pressure the Commission to solve this problem sooner.

T&E recommends to:

- As proposed already above (*see section on ZLEV benchmark*), **remove the ZLEV benchmark as of 2025**, as leaving it will incentivise the production and sales of suboptimal PHEV technology at the expense of zero emission cars.
- Include **a requirement for the Commission to revise the WLTP regulation** and set more representative utility factors no later than 2025.

Ban highly polluting ICEs as soon as 2030

T&E has shown that under the CO_2 targets proposed by the Commission, over the 2025-2029 period carmakers could increase the emissions of their ICE and HEVs by 61% compared to 2021 and still comply[9], based on current projected EV sales. Ultimately, higher CO_2 targets will be the most effective incentive and will make electrifying highly-polluting ICEs the most cost-effective compliance strategy. But, if existing loopholes are maintained and the ambition for CO_2 emission reduction is not sufficiently increased during the 2020s, then carmakers could choose to increase their offer of highly polluting (and lucrative) premium SUVs.

In order to drive both increased BEV sales and the continued improvement of ICEs (which will remain on our roads until 2050), stricter measures are required.

T&E recommends to:

- **Ban all new cars with emissions above 120g/km from 2030**, as this is the point at which most (94%) non-plug-in SUV models start.

Mass adjustment

Under the current regulation, carmakers that sell heavier premium cars (and the wealthier drivers who can afford to buy them) are allowed to emit more CO_2, via the so-called mass-adjustment of OEM CO_2

[9] Transport & Environment (2021), *Electric car boom at risk*

targets. This loophole is not justifiable on climate, social justice, or technological grounds and is one of the principal reasons for the surging sales of heavy and highly-polluting SUVs across Europe.

Under the mass adjustment provisions, each carmakers' target is increased (or relaxed) if the average mass of the cars sold in a given year by the OEM is higher than the overall reference mass used in that year. This reference mass is based on the average mass of all vehicles sold two to four years prior to the target year. Because of the combined effect of using a continuously outdated reference mass and the steady increase in vehicle weight, the average mass of cars sold in a given year is usually above the reference value used that year, therefore weakening the target.

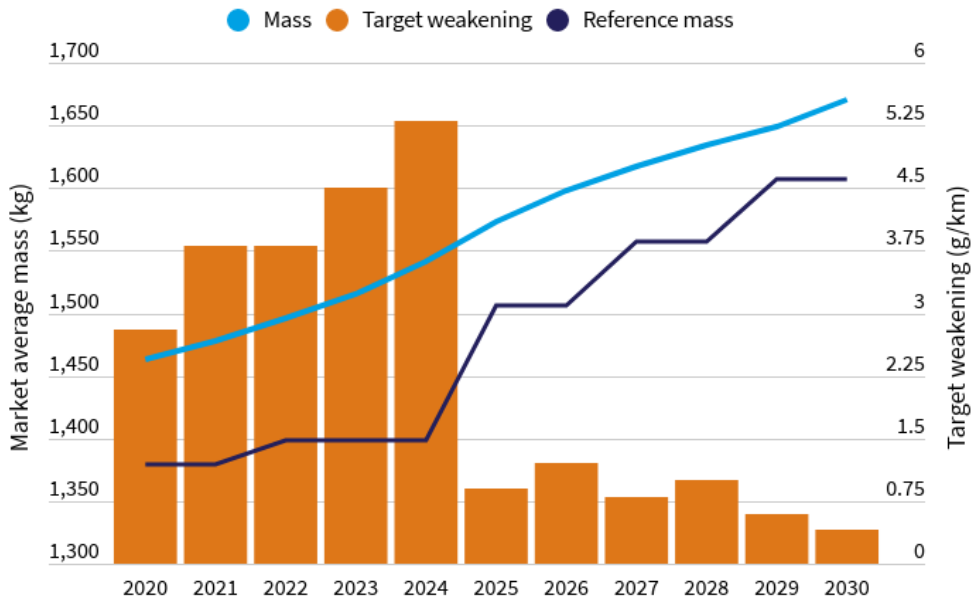
This trend is also likely to continue throughout the next decade, as plug-ins continue to gradually replace ICEs in the overall fleet. Based on 2021 averages, PHEVs weigh close to two tonnes (1,907 kg) which makes them 38% heavier than ICEs (1,384 kg), while BEVs (1,725 kg) are 25% heavier than ICEs[10]. The average vehicle mass in the first half of 2021 was 1,470 kg, and could likely reach more than 1,490 kg in 2022 and 1,510 kg in 2023. T&E projects that, if this trend continues[11], the average mass of cars could increase by around 20 kg per year and reach 1,570 kg in 2025 and 1,670 kg in 2030.

From 2025, two changes to the way the mass adjustment is calculated will come in. First, following the move to the WLTP test, the reference mass will be updated every two years (instead of three years before 2025). Although this change is expected to reduce the impact of the mass adjustment, the reference mass will always lag behind the average mass of cars observed in the EU fleet.

Another modification of the regulation in 2025 is the update of the formula to calculate carmakers specific targets based on the average mass of their sales, which will be updated to fit more closely the correlation between the emissions and the mass of cars registered in 2021. Current calculations, based on 2020 provisional data and carried out by the ICCT and using T&E's plug-in vehicles sales forecast to estimate the market average mass, show that the average mass adjustment in the 2025-2029 period would be around 0.9 g/km.

Despite these modifications, Figure 9 below shows that the mass adjustment leads to significant weakening of the target throughout the 2020s. This mass adjustment factor is clearly not fit for the emobility transition as each heavy electric car sold has the impact of increasing (and therefore weakening) the carmaker's target and unnecessarily allowing them to sell higher-emitting CO_2 models.

[10] T&E analysis based on registrations data in the first half of 2021 from Dataforce and vehicle masses from the European Environment Agency.
[11] Corresponding to an average annual increase in EV sales of 6 percentage points (leading to around 70% plug-in vehicles in 2030), combined with a steady continuation of SUV sales.



Scope: Forecast for the EU27 and Norway

Source: T&E modelling based on mass data from EEA Monitoring of CO2 emissions from passenger cars (2020), registration data from the first half of 2021 from Dataforce, and T&E's plug-in vehicles sales forecast

Figure 9: Result of the mass adjustment target in the CO_2 regulation

Removing the target mass-adjustment mechanism has many benefits: it removes the structural weakening of the stringency of the regulation; ensures that all carmakers have the same target therefore pushing the larger and more polluting segments to electrify more rapidly, in line with their potential and heavier climate impact; it simplifies the regulation; and finally, it removes the incentive to sell more SUVs while incentivising carmakers to use lightweighting.

T&E recommends:

- **Remove the mass-adjustment part from the specific emissions reference target formula from 2025** (effectively setting a_{2025} and a_{2030} at zero) thus requiring all carmakers to achieve the same CO_2 targets regardless of vehicle weight.

Eco-innovations

Under the current regulation, carmakers can claim credits, called eco-innovation credits, for fitting technologies to ICE (and HEV) cars that deliver emissions reductions on the road but not during the type approval test (such as LED headlamps that are not switched on during the test or during coasting). Eco-innovation credits are given based on theoretical calculations and lab measurements,

but their actual use and contribution on the road is unknown. The CO_2 savings allowed to be claimed under eco-innovations are capped at 7 g/km per carmaker, but no OEM has yet reached this cap.

The share of cars fitted with eco-innovation technologies grew to 46% of the market in 2020, nearly three times the 2019 number and the use of these technologies is expected to continue to grow in the coming years as the technologies become cheaper and more widespread (in other words, no longer innovations). Eco-innovation emission savings are correlated with the number of eco-innovations fitted on cars: by fitting two (for instance a combination of light and alternator eco-innovations), savings are increased. As most carmakers were fitting only one eco-innovation in 2020, savings are expected to grow in the future as carmakers are expected to combine multiple technologies.

Eco-innovations are becoming increasingly common and carmakers are expected to cumulate the benefits of fitting multiple technologies on their cars. Though driving technological innovations is an important part of the fight against climate change, rewarding carmakers who fit now common technologies on polluting vehicles is not helping to achieve a major cut in emissions. Furthermore, emissions savings on the road due to eco-innovations are not proven. Eco-innovation credits are mainly weakening the regulation instead of promoting significant emission reduction on the road.

As carmakers will be producing progressively fewer ICEs over the coming years, the number of allowances must also be reduced, in line with the increased CO_2 ambition, to avoid creating a significant loophole to be exploited by OEMs. Of serious concern too is the industry proposal to grant eco-innovation credits to zero emission vehicles, as this would allow carmakers to effectively sell vehicles credited with negative emissions. Such a move would give carmakers yet another flexibility for compliance and even more room to maneuver to either reduce their zero emission vehicle offering or increase emissions from their polluting models.

T&E recommends to:

- Decrease the maximum amount of CO_2 savings carmakers can claim from eco-innovations, in line with the proposed CO_2 reduction target ambition: **5 g/km in 2025, 4 g/km in 2027, and 2 g/km in 2030**.
- Reject industry calls for allowing eco-innovation credits for zero emission vehicles.

Pooling

Under the regulation, carmakers are also allowed to form pools to comply jointly with their CO_2 targets. In a pool, emissions across manufacturer groups included in it are averaged out. Manufacturers who don't sell enough plug-ins can therefore benefit through such collaborations (such as Honda in the current Tesla-Honda pool).

Although pooling does not undermine the overall headline ambition of the CO_2 targets, and can help incentivise new market entrants who only produce and sell BEVs (as it can be an additional source of income through selling credits), pooling disincentivises industry laggards from making timely investments into zero emission technology.

T&E therefore recommends to:

- **Limit the contribution of pooling (in g/km or percentage) towards carmakers meeting their CO_2 targets**, to prevent lower CO2 reductions fleet-wide across Europe.

Conclusion

Following the entry into force of the EU car CO_2 target of 95 g/km, the EU's electric car market has surged beyond anyone's expectation. Looking at sales for the three quarters of the year, plug-ins reached 16% and are projected to finish 2021 at least at 18%. This shows the growing and steady demand for these vehicles, proving that once carmakers bring adequate models and market them effectively, consumers and companies are happy to purchase them. The car CO_2 regulation has also resulted in significant domestic investment into the automotive transition and electrification technologies, including creating a market for dozens of battery gigafactories to set up shop in Europe. It is not just a climate regulation, but a modern-day industrial policy.

Looking beyond 2021, the risk - if the target ambition is not significantly increased during the 2020s and in 2030 - is that investments into the European supply of plug-ins will start stagnating as early as 2022, slowing down the point at which BEVs become cheaper than ICE equivalents. Not only would this be bad news for consumers as electric cars will be less affordable, but also for the climate as less CO_2 will be reduced from cars in the coming decade and fewer clean models replacing polluting ones, undermining our chance of avoiding a climate catastrophe.

The review of the post-2021 EU car CO_2 standards will determine whether there is sufficient and timely investment by EU OEMs into electric vehicle supply and how fast they move away from sub-optimal transition technologies towards climate compatible zero emission vehicles. As such, the review will determine whether Europe can be 'fit for 55' and for the emobility era.

Further information

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