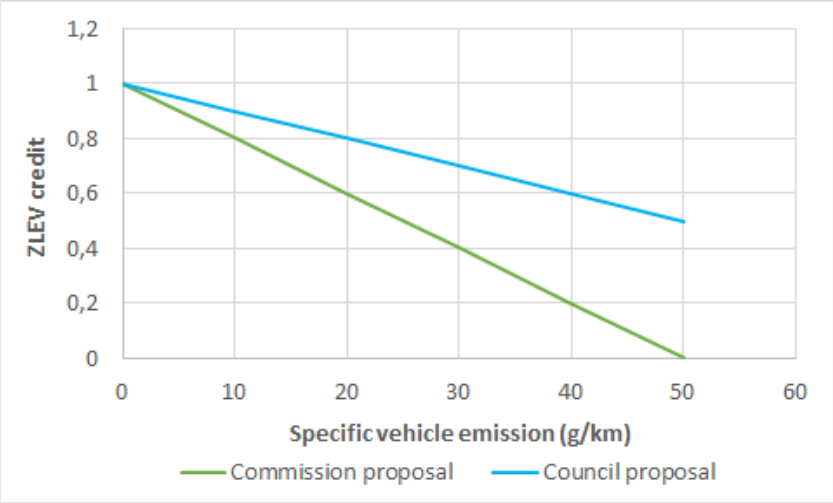
EU Cars CO2 regulation and plug-in hybrid cars

November 2018

This briefing evaluates the impact of the design of the post-2020 CO2 standards for cars on the evolution of the zero and low emission (ZLEV) market in Europe and particularly plug-in hybrid electric cars (PHEVs).

1. Background

As part of the regulation for post 2020 car and van CO2 regulation, the European Commission has proposed a sales benchmark for ZLEV of 15% ZLEVs in 2025 and 30% in 2030. Manufacturers overachieving the benchmark are rewarded with a reduction in their required fleet average emissions target of up to 5%. ZLEV credits are awarded in accordance with the CO2 performance of all cars with emissions below 50g/km, increasing linearly to 1 for a zero emission car such as battery electric or hydrogen fuel cell. The European Parliament in its amendments did not alter the proposed Commission formula, but raised the sales benchmarks to 20% ZLEV sales in 2025 and 35% in 2030. The Council – while increasing the 2030 sales benchmark to 35% - has also amended the ZLEV counting by introducing a 0.5 multiplier and thus increasing the credits to ZLEV as shown below:



Under the Council proposals, a 50 g/km PHEV – representative of current technology - would receive 0.5 credits until 2034, while a state-of-the-art 25 g/km PHEV would receive 0.75, or a quarter credit more.

PHEVs have a small battery with a limited electric range, most current models driving electrically for about 40km.[1] On the road most PHEVs have relatively high average emissions of around 120g/km[2]. Many PHEVs on sale today are compliance vehicles designed to achieve below 50g/km in the laboratory test and therefore qualify for super-credits that double count each car sold towards the 2020/1 regulations. As the electric range of a PHEV increases, evidence suggests it is driven much more using the battery and the real world emissions fall sharply.[3] This is why it is important to design the Cars CO2 regulation in a way that effectively incentivises and rewards PHEVs with longer ranges and is for this reason that the European Commission in its proposal rewards PHEVs with a lower CO2 emission as counting more towards the benchmark, striking an appropriate balance between ZEVs and PHEVs.

[1] https://www.nextgreencar.com/
[2] https://onlinelibrary.wiley.com/doi/full/10.1111/jiec.12623
[3] https://www.nature.com/articles/s41598-017-16684-9/figures/1

The current trilogue discussions between the Parliament, Council and Commission to agree the final law are currently negotiating what multiplier between 1 (EC proposal) and 0.5 (Council) would be most appropriate to incentivise the ZLEV market appropriately; the analysis below quantifies the impact of the options.

2. National incentives influence consumer demand for PHEV

The plug-in vehicle market (PHEV and battery electric models - BEV) in Europe is growing strongly – up 30% in the third quarter of 2018 alone according to industry figures.[4] Total sales now represent around 2.2% of all new car sales, with an even split between BEV and PHEV models EU-wide. However, the ratio of PHEV to total plug-in sales is highly variable between member states and strongly influenced by national financial incentives.

The highest shares of PHEV are seen in member states providing more generous grants for PHEV models. For example, the Netherlands in the past offered generous reductions in registration and company car taxes for PHEV creating a surge in demand for cars that were then rarely charged. As a result, the Netherlands reformed its tax system to be less generous to PHEV, and the share of BEV vehicles is now 89%.[5] Until very recently the UK offered generous grants for PHEVs and significant company car tax reductions, so the share of PHEVs is 75%. The UK grants have just been removed following reports of UK consumers never charging their PHEV,[6] and sales expected to decline as a result. Sweden has a 40% reduction in company car taxes for PHEVs and BEVs, and its share of PHEVs is 76% in the last quarter.

In those member states with less generous incentives for PHEV their share of total plug-in sales is lower. For example is Germany, which rewards ZEV sales (battery and hydrogen) with a slightly more generous bonus (EUR 4k) than plug-in-hybrids (EUR 3k),[7] the shares of BEV and PHEV are similar.

The highest shares of battery cars are observed in member states who incentivise such ZEVs more generously than PHEVs. France has substantially higher bonuses for BEVs - a EUR 6k bonus for a car under 20g/km and an extra subsidy for scrapping an old diesel.[8] BEV share as a result was more than two thirds of all ZLEV sales in 2017. Similarly in the Netherlands ZEVs are exempt from registration taxes and thus represented almost 90% of all new plug-in sales in 2017. In Austria, three quarters of ZLEV sales are battery cars, where the government provides VAT reductions on ZEV vehicles only.[9]

The design and focus of national support schemes is decisive in pushing the market in favour of either PHEV or BEV. Given that PHEV are easier to sell, their **demand is highly dependent on the financial incentives underlying the importance of their targeted and robust design**.

3. Cars CO2 regulation design will influence supply of PHEV

The previous section highlights the sensitivity of the PHEV market to national incentives. But the types of PHEV available are also sensitive to the design of regulation. The current car CO2 regulation provides a super-credit for all cars below 50g/km, meaning they count more than once towards company targets. As a result the vast majority of PHEV on the market just achieve the 50g/km threshold. Only 1 model, the BMW i3 range extender has much lower emissions (25g/km) and it is shortly to be withdrawn. The importance of the threshold is also illustrated by Audi that has withdrawn its A3 PHEV that no longer met the 50g/km threshold after the switch to the WLTP test.

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4 ACEA, https://www.acea.be/press-releases/article/fuel-types-of-new-cars-diesel-18.2-petrol-15.2-electric-30.0-in-third-quart

5 ACEA, https://www.acea.be/uploads/press_releases_files/20180201_AFV_Q4_2017_FINAL.PDF

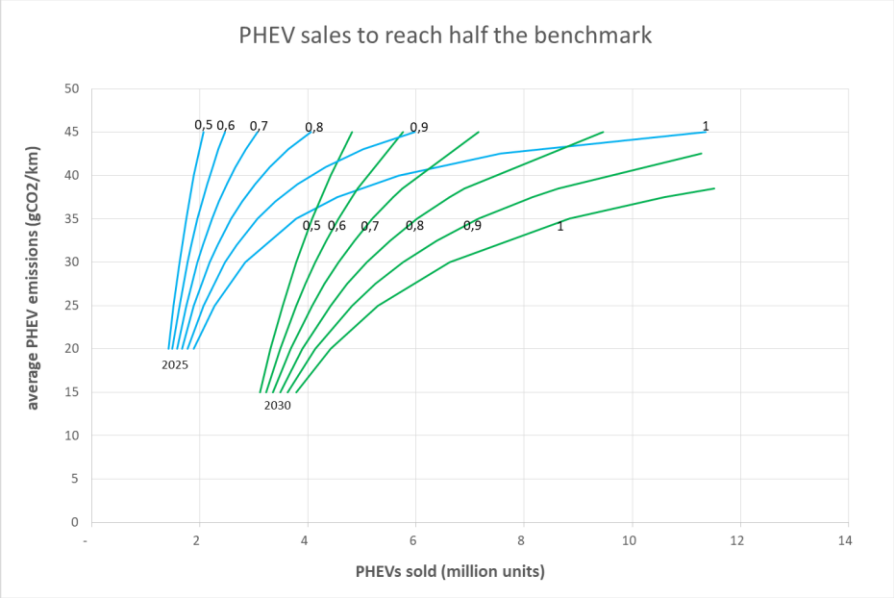
6 BBC, https://www.bbc.com/news/business-46152853

7 ACEA, https://www.acea.be/uploads/news_documents/ACEA_Tax_Guide_2018.pdf

8 ICCT, https://mail.google.com/mail/u/0/#inbox/WhctKJVBFgmVLrpRckQQcbfzglxlNTnmbNcCJGSKbHvNPsXfWgnpkgSnqcjzWwwXVTGzxLq

9 ACEA, https://www.acea.be/uploads/news_documents/ACEA_Tax_Guide_2018.pdf

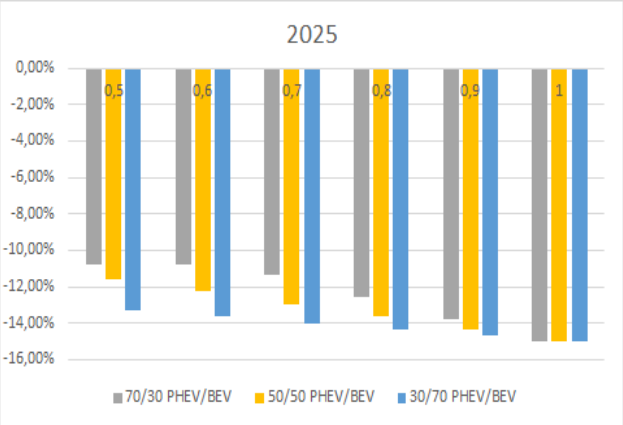
The design of the post-2020 Car CO2 regulation will have a significant impact on the investment in and design of PHEV models in the future, in particular the design of the ZLEV benchmark and how PHEV models count towards this.

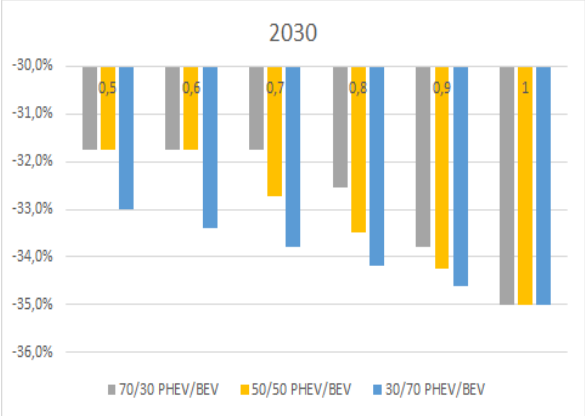


The graph on the left shows the impact on the number of PHEV sales required to meet half the ZLEV benchmark depending on their CO2 emissions for different multipliers from 0.5 to 1.

The lower the multiplier, the less vehicles and with higher CO2 emissions carmakers need to sell to achieve the ZLEV sales benchmarks. For example, in 2025 a 0.5 multiplier would require 2 million ZLEVs with emissions of 45g/km. In comparison a 0.8 multiplier would either increase the number of PHEV required to be sold to 4 million (at 45g/km), or reduce the emissions to around 25g/km if the same 2 million cars are sold. **The multiplier is therefore key in determining the effort carmakers will make to improve ZLEV technology and to sell cleaner ZLEVs**.

If it is assumed that carmakers sell the same number of ZLEVs under the Commission and Council accounting rules, the Council's 0.5 multiplier would make it much easier for them to overachieve the sales benchmarks (by giving more credits to PHEV). They would thus be able to benefit from CO2 credits to reduce their fleet-average CO2 targets by up to 5%.[10] The two tables below summarise the weakening effect of this on 2025 and 2030 CO2 targets for multipliers between 0.5 and 1.





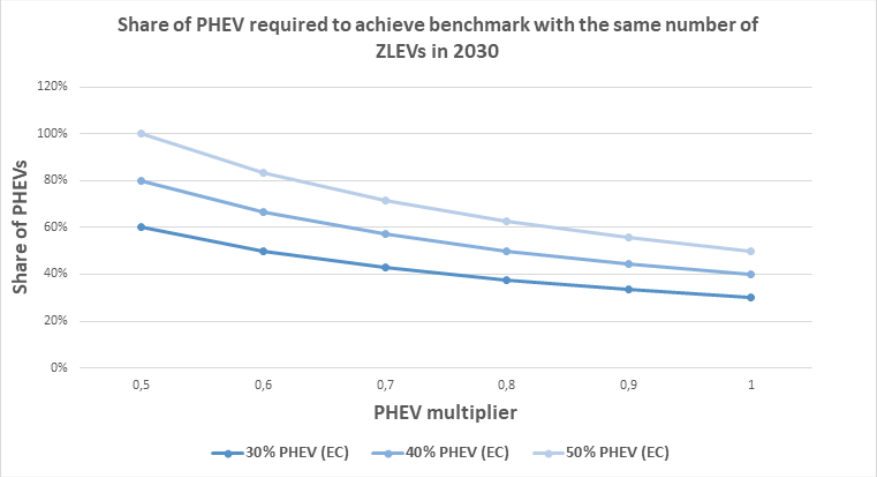
Depending on the PHEV share, **the 0.5 multiplier reduces the 2025 target down up to de facto 10.8% from the 15% reduction proposed, while the 0.8 multiplier weakens the target to 12.5% – 14%**. Similar trends are observed with the 2030 targets, where **the 0.8 multiplier reduces the 35% car reduction down up to 33%, whereas the 0.5 multiplier reduces it by a maximum possible, or down to 31.8%**.

The multiplier has 2 important effects:

[10] A detailed explanation of this analysis can be found here: https://www.transportenvironment.org/publications/council-amendments-counting-electric-cars-backdoor-weakening-cars-co2-limits

1. It increases the rewards for selling PHEVs with much higher CO2 and shorter range. This makes it more likely that carmakers will choose to sell compliance PHEVs just achieving the 50g/km threshold rather than models with lower CO2 emissions, as the incremental increase in the ZLEV credit is less that the effort required.
2. It effectively reduces the stringency of the overall CO2 targets in 2025 and 2030 by making it easier for carmakers to reach sales benchmarks and benefit from a reduction in their overall CO2 target.

A high multiplier will therefore distort the market in favour of selling more PHEVs, which in turn further weakens the regulation as illustrated in the graph below. The graph compares the share of PHEV that carmakers would require under the different multipliers if it is assumed the number of zero and low emission sales is constant. It can be seen that as the multiplier decreases, compliance with the benchmark can be reached with a larger share of PHEVs (for a fixed number of ZLEV sales). For example, in a situation in which the EC proposal (1) requires a 30% PHEV sales (dark blue low line), the same ZLEV benchmark would be achieved with 40% PHEV sales under a 0.8 multiplier and go up to 60% PHEV share with the 0.5 multiplier.



Conclusions

This briefing illustrates how sensitive PHEV supply and demand will be to incentives and policy signals. A higher PHEV multiplier incentivises more PHEV supply with higher CO2. This has a ratchet effect increasing the weakening of the overall regulation by making it much easier for carmakers to benefit from CO2 bonuses.

This is an important consideration for the decarbonisation of the EU car fleet. Increasing sales of PHEVs through incentives to drivers, that would not otherwise choose these cars, risks very low levels of charging – today's experience in both the UK and the Netherlands. This could seriously undermine the real world CO2 savings and result in rising CO2 emissions and missed national climate targets. This underlies that it is essential not to over-reward and encourage the sales of PHEVs through over generous tax breaks or regulatory design. The analysis shows that the ZLEV multiplier should be kept as close to the Commission proposal of 1 as possible.

Further information

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