Cars CO2 review: Europe's chance to tackle fake electrics

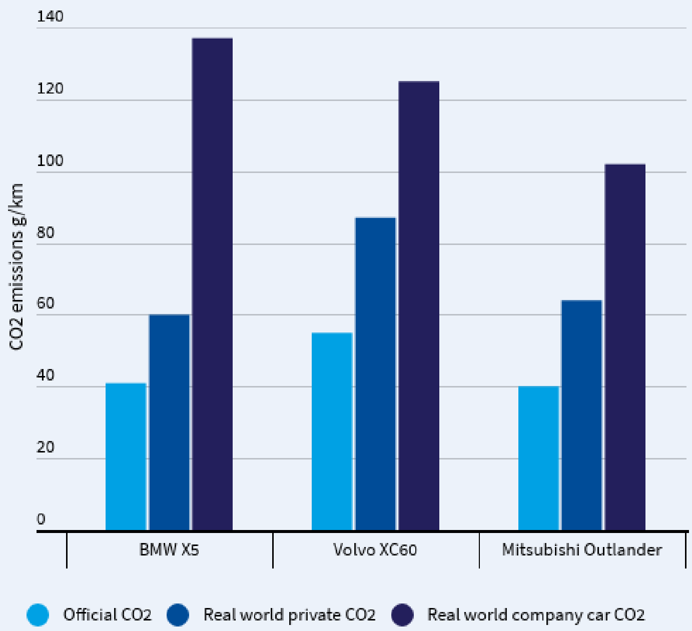
Recommendations on how to tackle plug-in hybrids in the review of the EU Car CO2 standards and beyond

April 2021

Summary

Official PHEV CO2 emissions are unrealistically low

More realistic assumptions on PHEV use are needed for calculating PHEV CO2 emissions



Difference between PHEV CO2 emissions when official and real world assumption on PHEV use (utility factors) are used. Source: Official NEDC CO2 emissions were obtained from the Certificates of Conformity. Real world CO2 emissions are calculated based on real world German utility factors as published in ICCT's 2020 PHEV report.

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Sales of plug-in hybrid (PHEV) cars have soared following the entry into force of the 2020/21 EU car fleet CO2 target of 95g CO2/km, with over half a million units sold in 2020. PHEVs share of total electric car (EVs) sales is now half of the plug-in market and is set to even increase in the short term as a key compliance technology for many carmakers. This is why Europe needs to act fast to ensure only truly low emission PHEVs are sold. This paper presents T&E's recommendations for the regulatory changes necessary.

The increase in PHEV sales is bad news for reducing real-world CO2 emissions from the EU car fleet. While PHEV emissions appear low on paper (often less than 50g CO2/km) - and therefore earn "super credits" for carmakers under the Car CO2 rules - on-road emissions are on average 2-4 times higher (up to 8 times in engine mode). This is largely due to their poor design; small batteries, underpowered electric motors and no fast charging make it hard for users to drive predominantly in zero emission mode.

At the heart of the problem lie so-called utility factors, or the assumptions of how much PHEVs are driven in electric mode based on their electric range. This is the priority area for reform. The artificially low official CO2 emissions of PHEVs today are largely due to these unrealistic regulatory assumptions, set in 2014, that - for an average driver in Germany - are 1.5 times higher than the real world, and even 4 times higher for a company car driver. Real-world data was not available in 2014, but it is now. From the start of 2021 all new cars sold in the EU have to be fitted with an on-board fuel consumption meter (OBFCM), which records real world fuel consumption on the road. The data will be annually collected by the European Commission, starting in April 2022. This means that for the first time comprehensive data on the real world CO2 emissions of PHEVs will be available, so the assumptions can finally be improved.

T&E recommends that this real-world data is used to set more realistic PHEV utility factors for calculating PHEV CO2. The Commission should:

1. **By December 2022 complete a full review of the official type-approval vs the real-world utility factors** to determine the deviation between the currently used assumptions and real-world data derived from OBFCM. The new utility factors can be set based on a new simple formula presented by T&E in this paper.
2. **In 2023, update the EU-wide utility factors within the WLTP regulation based on real world OBFCM data,** to ensure official PHEV CO2 figures represent real world use.
3. **Ensure the new utility factors are used to calculate PHEV CO2 emissions from 2025,** notably for compliance with the car CO2 standards.

Next, Europe's car CO2 rules should also be fixed. Reforming the type-approval of PHEVs alone will not stop the sale of 'fake electrics' as much of their poor design - which makes PHEVs on sale today closer to traditional ICE cars than battery electrics - is down to regulatory design of the car CO2 regulation. The 2021 review of this is the perfect opportunity to improve this, to make sure that future PHEVs sold in Europe are designed to be driven mainly with zero emission, and deliver the required CO2 savings for the transition to zero emission mobility on the road and not just on paper.

The Car CO2 review should:

- **Remove the 0.7 multiplier from the current ZLEV benchmark formula in the regulation** , which adds additional CO2 rewards to PHEVs compared to what's justified[1] and makes PHEVs a more attractive compliance route for carmakers. . This will reduce the number of credits available to sub-optimal PHEVs and require car makers to sell between 2-8% more future-proof zero emission cars to achieve the same compliance.
- **Introduce more stringent criteria for PHEVs to qualify for ZLEV credits** to ensure that only cars which are designed to be low emission on the road qualify**. PHEVs which emit huge amounts of CO2** when powered by the ICE only (charge sustaining) **should not** be considered as low emission. Such emissions should be **capped at 3 times the official CO2**

[1] As per Commission's original impact assessment and proposals in 2017

value[2] for the PHEVs certified as emitting less than 50gCO2/km . For the PHEVs certified with emissions higher than 50gCO2/km, charge sustaining emissions **should not exceed by more than three times the ZLEV benchmark of 50gCO2/km.**

- Additionally, PHEVs should meet the following criteria in both Car CO2 and national tax rules: 1) **electric motor power** should be equal to or more than ICE engine power, 2) have at least **80 km electric only range** and 3) capable of **fast charging** (50 kW) to ensure that PHEVs sold in the EU can easily drive zero emission on the road.

Whether PHEVs will have a role in the e-mobility transition - or be exposed in more emissions scandals - depends on the quality of the technology. European regulations can help push carmakers to improve their offering. T&E's suggested improvements for how PHEVs CO2 emissions are calculated at type-approval and how sales of PHEVs are rewarded within the cars CO2 regulation will help ensure that future PHEVs sold in the EU can actually deliver on their green credentials and aid the transition to zero emission mobility.

[2] Weighted, combined CO2 emissions.

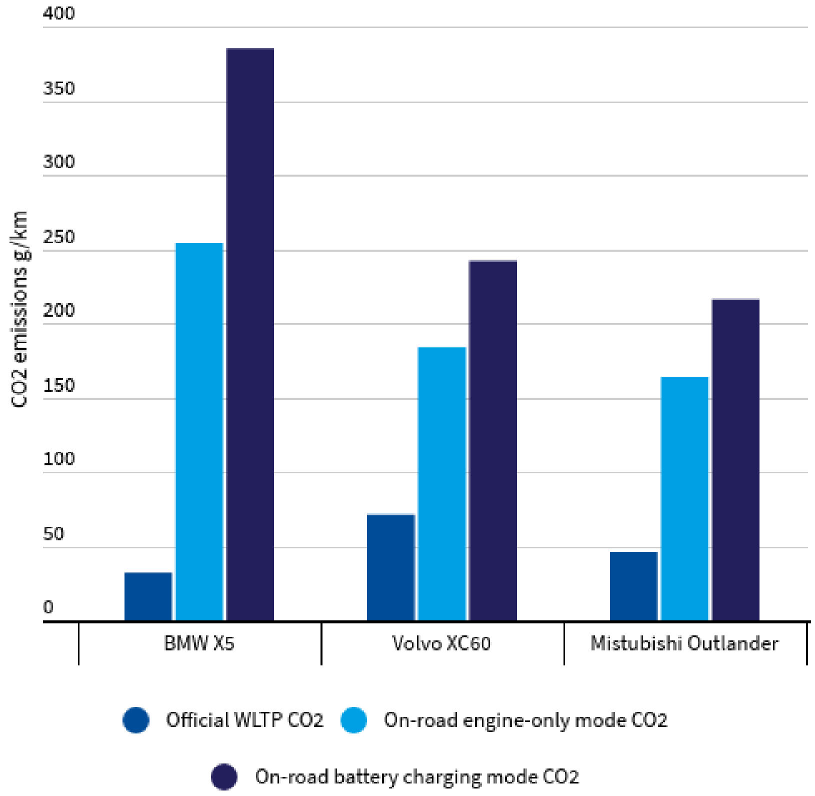
Introduction: why rising PHEV sales are a problem

Sales of plug-in hybrid vehicles (PHEVs) have accelerated fast with the entry into force of the 2020/21 car CO2 targets, as carmakers need to sell low emission cars to comply. 2020 saw their share of total electric car (EV) sales increase to 49%, up from 37% in 2019, with over 500,000 units sold EU-wide[3]. T&E expects[4] sales to continue to increase by another 300,000 this year as the CO2 standards fully enter into force. In the first two months of 2021, sales of plug-in hybrids have overtaken those of pure battery electric models (BEVs), highlighting a potentially concerning trend going forward.

Sales have soared due to the fact that for many car makers, including the likes of BMW and Volvo, PHEVs are a key part of their CO2 compliance strategy. When selling PHEVs car makers benefit twice, firstly from the touted very low CO2 emissions - a third, or less of a conventional combustion engined car - and secondly from super credits, which until 2022 reward the sale of PHEVs in the same way as BEVs - by double counting any cars with emissions of less than 50g/km. From 2025, zero and low emission (ZLEV) credits replace the current system, continuing to reward the sales of PHEVs, albeit at a reduced rate.

The problem with the large increase in PHEV sales is that their real world CO2 performance falls far short of what is expected from official figures. How much CO2 is saved by switching from pure internal combustion engine (ICE) cars to PHEVs depends on the share of kilometers driven electrically. However, data from Europe[5] shows that PHEVs are driven much less electrically than what is assumed when calculating the car's official CO2 figures, meaning that in reality CO2 emissions of PHEVs are on average 2-4 times higher. When not charged, PHEVs have to run on the internal combustion engine and T&E's recent study[6] shows that when running on the ICE, PHEVs are not any better, and sometimes worse than conventional ICE cars. When the engine is used to both power the car and charge the hybrid battery for later use, as much as 12 times the official CO2 value can be emitted (fig. 1), as charging the battery using the engine is on average three times less efficient than charging from the mains. However, this mode of operation is likely to increase if geo-fencing technology, which allows a vehicle to recognise when it is entering a low or zero emission zone, becomes more widespread as the PHEV will have to ensure that its battery is sufficiently charges to operate within the LEZ/ZEZ zone.

[3] T&E. (2021) Car's CO2 review: Europe's change to win the emobility race.
[4] T&E. (2020) Plug-in hybrids: Is Europe heading for a new dieselgate?
[5] ICCT. (2020) Real-world usage of plug-in hybrid electric vehicles: Fuel consumption, electric driving and CO2 emissions.
[6] T&E. (2020) Plug-in hybrids: Is Europe heading for a new dieselgate?



Source: Emissions Analytics tests for T&E, and the respective PHEV's certificate of conformity

Figure 1: Official type-approval and on-road engine only and battery charging emissions of three PHEVs tested by T&E. When running using the engine only PHEV emissions can be 8 times higher than official values and when charging the battery up to 12 times higher.

In essence, the current sales of PHEVs are no more than a compliance trick to meet CO2 targets, allowing manufacturers to benefit from generous incentives given for the sale of low emission vehicles, while failing to deliver CO2 reductions on the road. T&E has shown that if more realistic CO2 emissions were used, it would be much harder for car makers to meet their overall CO2 targets[7]. This means that every PHEV sold in the EU reduces the number of zero emission battery electric cars (BEVs) that need to be sold, cars that are guaranteed to deliver CO2 savings.

Stemming the sales of 'fake electrics', which may make up half of all EVs sold in the coming years, requires urgent regulatory changes to both the car CO2 regulation and the way that CO2 emissions of PHEVs are calculated in the type-approval regulation. This paper outlines T&E recommendations for the urgent regulatory changes needed to ensure that sales of PHEVs do not undermine the EU's efforts to decarbonise road transport and meet the goals set out in the European Green Deal.

[7] T&E. (2020) Plug-in hybrids: Is Europe heading for a new dieselgate?

1. How to better measure PHEV official CO2 emissions

1.1 Utility factors are at the route of the problem

PHEV CO2 emission figures are unrealistically low because the method for calculating PHEV CO2 emissions at type-approval relies heavily on the use of overly optimistic assumptions on the share of electric kilometers driven by PHEVs - known as 'utility factors' - compared to the actual share of electric kilometers driven in the real world. Utility factors are based on very optimistic assumptions on charging frequency (daily) and the share of electric kilometers driven for a given electric range, assumptions which are not underpinned by real world data of PHEV use. For example, for a PHEV with an electric-only range of only 50 km, it is assumed that the car drives 80% of kilometers electrically. However, a recent study on PHEV use in Europe by the International Council on Clean Transportation (ICCT) in collaboration with the Fraunhofer Institute that conducted a large-scale analysis of the real-world usage of PHEV's, found that real world utility factors were up to 4 times lower than official values, meaning that the CO2 emissions of PHEVs on the road are up to 4 times higher than official figures claim.

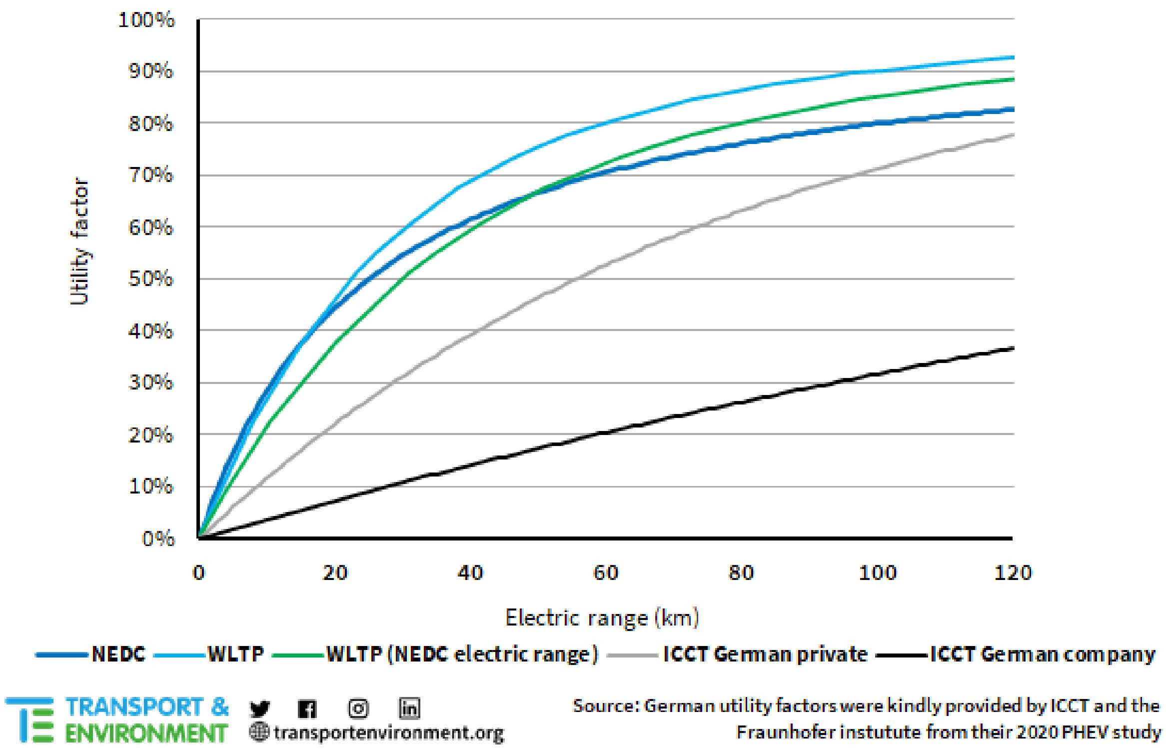


Figure 2: Real world and official (NEDC and WLTP) utility factors[8]. Real world utility factors have been obtained from ICCT and the Fraunhofer Institute and are based on German PHEV usage[9] and show that real world utility factors fall far short of official figures.

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[8] ICCT and NEDC utility factors are based on the all electric range. WLTP utility factors are based on the distance driven in charge depleting mode until the end of the transition cycle (R_{CDC}). The green WLTP plot approximates the WLTP utility factors assuming that the WLTP electric range is equal to 75% of the NEDC range.

[9] ICCT. (2020) Real-world usage of plug-in hybrid electric vehicles: Fuel consumption, electric driving and CO2 emissions and personal communication with Patrick Plötz from the Fraunhofer Institute. As detailed in T&E. (2020) Plug-in hybrids: Is Europe heading for a new dieselgate?

Overly optimistic utility factors (UF) therefore make it easier for manufacturers to meet their CO_2 targets through unrealistically low PHEV CO_2 emission values, while failing to deliver those CO_2 savings on the road where it actually matters. T&E modelled the impact that fleet average UFs of between 20 to 70% would have on the fleet average CO_2 emissions of BMW and Volvo in 2020[10], both of which heavily rely on PHEVs to achieve their CO_2 targets. The modelling shows that in order to meet their fleet average CO_2 emissions targets, both Volvo and BMW need a very high average UF. For BMW this is estimated at 70% - i.e. their PHEVs have to drive in electrically 70% of the time - and for Volvo between 60-70%. This is much higher than the reported real world UF in Europe of 18-53%[11], indicating that in practice it is highly unlikely that PHEVs from Volvo or BMW are achieving these high UFs, and therefore their official CO_2 values, in the real world. Therefore, on paper Volvo and BMW are making the CO_2 reductions necessary but it is highly unlikely that these savings are replicated on the road. Switching to WLTP CO_2 emissions for calculating compliance from 2021 onwards will also not fix the utility factor problem as for longer range vehicles, i.e. those with an electric range of around 45km+, the utility factor under WLTP is more generous than under NEDC.

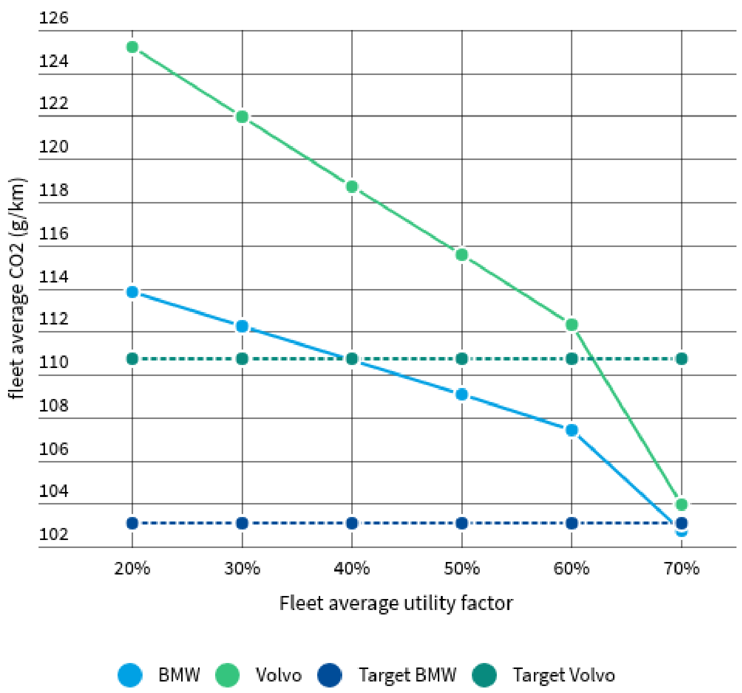


Figure 3: Impact of PHEV fleet average utility factors (share of electric kilometers driven) on fleet average CO_2 emissions of BMW and Volvo.

1.2 Setting realistic utility factors is possible

In order to prevent PHEVs from undermining the integrity of the car CO_2 regulation or the rollout of truly low and zero emission cars, a drastic overhaul of utility factors within the type-approval regulation is required. Fortunately, development of new utility factors by the European Commission based on real

[10] T&E. (2020) Plug-in hybrids: Is Europe heading for a new dieselgate?
[11] ICCT. (2020) Real-world usage of plug-in hybrid electric vehicles: Fuel consumption, electric driving and CO2 emissions.

world PHEV usage data is today feasible thanks to technology such as fuel consumption meters that can measure and record the real-world performance of vehicles on the road. From the beginning of 2021 all cars, including PHEVs, sold in the EU have to be fitted with on board fuel consumption meters (OBFCM). These devices will continuously record the mileage, fuel and electrical consumption of cars, and from next year the Commission is legally obliged to annually collect the data from every car in the EU fitted with an OBFCM device. For the first time, comprehensive data on the real world usage of PHEVs will be available to the Commission as of April 2022.

The collection of OBFCM data will allow the Commission, for the first time, to undertake a thorough review of utility factors using real driving data collected from OBFCM and comparing that to the data used during type-approval.

Based on the parameters collected by the OBFCM, the most robust method of assessing the real world utility factors of PHEVs is to assess the fuel consumption of the car, as CO2 emissions are not directly measured by the OBFCM device. This can be done by comparing the total real-world fuel consumption of the car (l/km) with the fuel consumption emitted when only the engine is used to power the car - so called ‘charge sustaining’ emissions (l/km) - which is the fuel consumption that could be expected from the car if no kilometers were driven electrically[12]. This calculation (fig.4) will give the absolute fuel savings associated with using PHEV technology and therefore the real world utility factor.

$$1 - \frac{Total\ Fuel\ Consumption\ (l/km)}{Fuel\ Consumption\ in\ Charge\ Sustaining\ Operation\ (l/km)}$$

Figure 4: Equation for calculating real world utility factors for PHEVs from data obtained from on board fuel consumption meters (OBFCM).

This real world utility factor can then be compared to the utility factor used at type-approval, in order to assess how accurate the type-approval utility factors are compared to the real world. The data analysis should include data from every PHEV model for which OBFCM data is available and should be agglomerated per vehicle model, engine model and power as well as production year. This will ensure that data is available for every PHEV model type without imposing an excessive administrative burden.

The real world utility factors obtained can then be used to propose new, more representative EU wide utility factor curves for use in the vehicle type-approval regulation. This would help to ensure that official PHEV CO2 emissions are more representative of the real world performance of PHEVs on the road. Once EU wide utility factors have been updated the next step is to introduce manufacturer specific utility

[12] Total fuel consumption (l/km) can be calculated from parameters collected by the OBFCM device by dividing the total fuel consumed (l) by the total distance travelled (km). Similarly fuel consumption in charge sustaining operation (l/km) can also be calculated from OBFCM parameters. First the total fuel consumed during charge sustaining operation (l) can be calculated by subtracting the total fuel consumed in charge depleting operation (l) and the total fuel consumed in driver-selectable charge increasing operation (l) from the total fuel consumed (l). Next, the distance travelled in charge sustaining operation (km) can be calculated by subtracting total distance travelled in charge depleting operation with engine off (km), total distance travelled in charge depleting operation with engine on (km) and the total distance travelled in driver-selectable charge increasing operation (km) from the total distance travelled (km). Finally, the fuel consumption in charge sustaining operation (l/km) can be obtained by dividing the fuel consumed during charge sustaining operation (l) by the distance travelled in charge sustaining operation.

factors to further reduce the gap between real word and official type-approval emissions. For simplification, all new utility factors should be based on the all electric range, i.e. the zero emission range, rather than the charge depleting cycle range[13] in use today, as the former is easier to verify under real world driving conditions.

If the new utility factors are based on the absolute fuel consumption/CO2 savings as proposed in fig. 4, the calculation of PHEV CO2 emissions and fuel consumption at type-approval could also be simplified. As the utility factor would be calculated from the absolute fuel consumption/CO2 saving due to the use of PHEV technology for a given zero emissions range, the final CO2 emissions or fuel consumption can be determined by simply multiplying one minus the utility factor by the charge sustaining (engine only) emissions or fuel consumption as determined on the World Harmonised Light Vehicle Test Procedure (WLTP) to give the final CO2 emissions or fuel consumption of the PHEV. This would no longer require the charge depleting (when the battery or both engine and battery are used to power the car) CO2 emissions of fuel consumption to be taken into account.

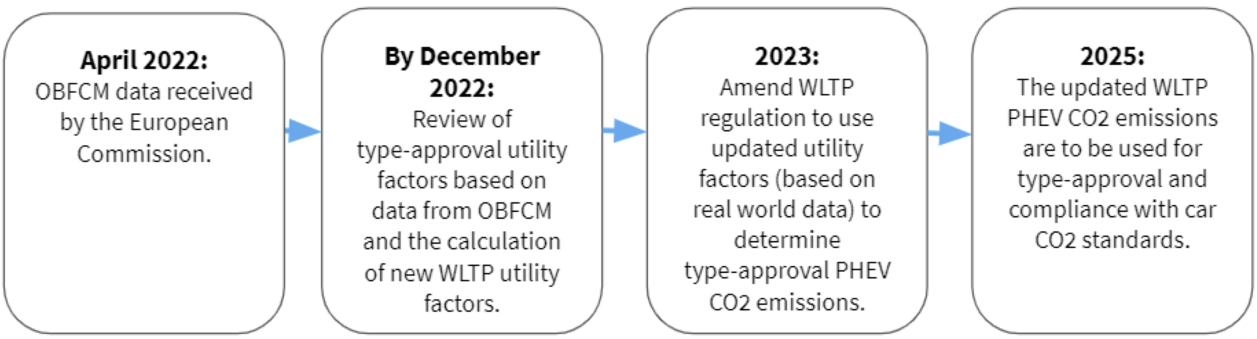
T&E recommends for the European Commission to:

1. **Determine real world utility factors by calculating the ratio between the PHEV's average real world fuel consumption and fuel consumption in engine only (charge sustaining) driving collected from on board fuel consumption meters for all PHEVs on the EU market.**

2. **Use this data to develop new WLTP utility factor curves and use these for the calculation of official (type approval) PHEV CO2 emissions.**

3. **Apply the new utility factors to the all-electric range rather than the charge depleting cycle range in use today.**

Timeline for the review of type-approval and real world utility factors and implementation into WLTP and cars CO2 regulation:



[13] The distance to the end of the World Harmonised Light Vehicle Test Procedure (WLTP) in which the battery is fully depleted.

2. Improvements to the cars CO2 regulation are also necessary

Beyond the problem of how CO2 emissions of PHEVs are derived, much of the incentive to invest and produce the current inadequate PHEV models lies in the design of the current car CO2 regulation. While more realistic CO2 emissions will help strengthen the CO2 regulation, there are two main problems that will continue to drive the demand for suboptimal PHEV technology.

2.1 The PHEV ZLEV credit multiplier must be removed

The first problem lies with the zero and low emission vehicle (ZLEV) credits that will apply from 2025 and replace the current super-credits (a flexibility which allows cars with emissions below 50 gCO2/km to be double counted towards CO2 targets). Under ZLEV credits a zero emission battery or a fuel cell car gets 1 credit, whereas plug-in hybrids up to 50 gCO2/km (WLTP) get lower credits based on their CO2 performance. Overshooting the ZLEV sales benchmark - by having higher EV sales - allows carmakers to claim a CO2 'bonus' by increasing their CO2 target value (in terms of g CO2/km) by up to 5% in 2025 and 2030, resulting in a weakening of the targets[14].

Unfortunately, under the ZLEV credit scheme car makers who sell PHEVs receive up to a third more ZLEV credits than they should due to a 0.7 multiplier, which was added in the final negotiations on the cars CO2 law back in 2018. This multiplier ensures that any PHEV sold with emissions of less than 50 gCO2/km receives at least 0.3 credits, particularly benefitting models with emissions of close to 50 gCO2/km as otherwise these PHEVs would receive zero credits without the multiplier. Overall, based on current PHEV sales, this weakening more than doubles[15], and in the worst case scenario quadruples[16], the number of credits earned by PHEVs. T&E has shown[17] that this is by far the worst loophole added to the cars CO2 regulation in 2018 and may result in half of all EVs sold in 2025-2030 being pure compliance vehicles, achieving low emission on paper but failing to replicate this on the road.

[14] T&E. (2019) New car CO2 standards: Is the job of securing electric cars in Europe done?

[15] Based on PHEV registration data (sales and NEDC test CO2 emissions) over the first half of 2020 from JATO Dynamics. Average PHEV emissions were 42g CO2/km which would average 0.412 credits per PHEV with the multiplier. Without the multiplier the average PHEV credit would be 0.16.

[16] When average PHEV emissions are above 43.5 gCO2/km.

[17] T&E. (2019) New car CO2 standards: Is the job of securing electric cars in Europe done?

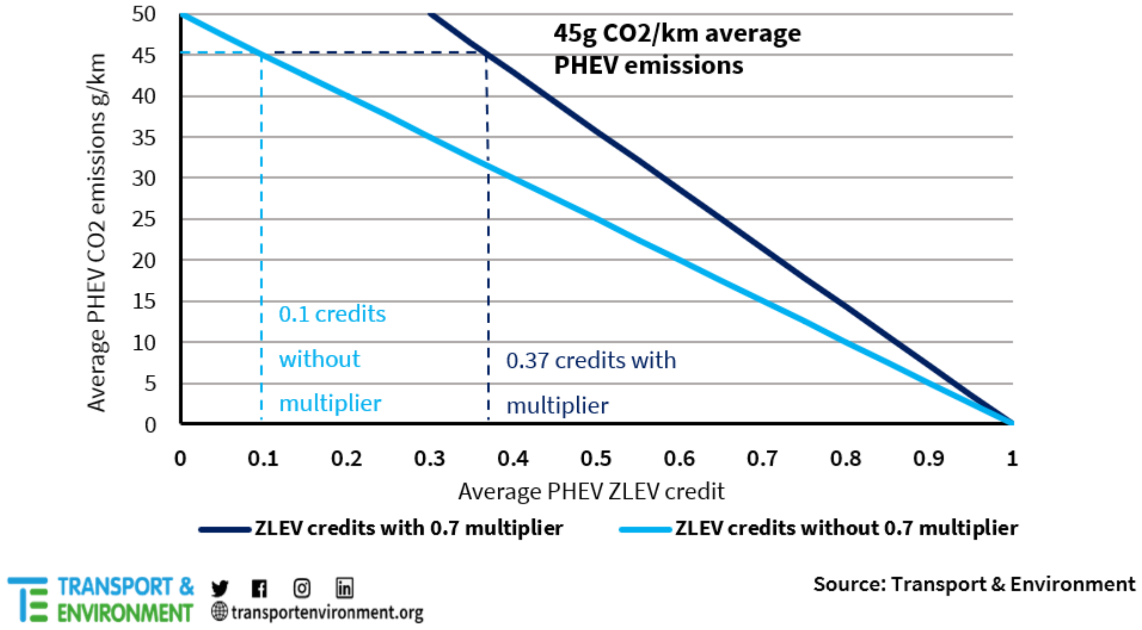


Figure 5: Effect of the 0.7 multiplier on PHEV ZLEV credits. When average PHEV emissions are 45g CO2/km each PHEV is awarded 0.37 credits with the multiplier. Without the multiplier each PHEV would only be awarded 0.1 credits.

Removal of the 0.7 multiplier would require car makers to sell more electric cars to achieve an identical level of ZLEV sales as the reward for selling PHEVs would be reduced. For example, with the multiplier a car maker with average PHEV emissions of 45 gCO2/km receives on average 0.37 credits for each PHEV sold, without the multiplier they receive less than a third (only 0.1). T&E estimates that, in the situation where a car maker would compensate the loss of PHEV credits through increased ZEV sales, it would need to sell an additional 2-8% extra ZEVs to reach the same 5% bonus on the 2030 ZLEV benchmark. The higher end (8%) corresponds to carmakers which are more PHEV-focused (half of all EV sales), i.e those benefiting disproportionately from PHEV sales[18]. Car makers already selling a high ratio of BEVs compared to PHEVs would only need to sell an additional 2-3% ZEVs to reach the 5% bonus on the ZLEV benchmark. This benefit of removing the multiplier only gets stronger as the level of the ZLEV benchmark increases: under a 50% ZLEV benchmark, ZEVs sales would have to increase by 4-10 percentage points to reach the full bonus without the multiplier.

An additional benefit of removing the multiplier would be that carmakers also improve their PHEV offering, selling vehicles with lower emissions to gain the same number of credits. For example a PHEV currently obtaining 0.3 credits, would need an emissions reduction of 15gCO2/km to obtain the same number of credits once the multiplier is removed (from 50g CO2/km down to 35g CO2/km).

[18] Bases on 35% ZLEV sales in 2030 with a 5% ZLEV credit bonus. Bases on modelling of average PHEV emissions of 45gCO2/km and a 50:50 BEV/PHEV split.

2.2 The criteria for low emissions vehicles needs strengthening

Adside from the 50g CO2/km threshold which defines a low emission vehicle, little exists within the CO2 regulation to incentivise the production of PHEVs designed to drive predominantly in zero emission, or electric mode which is required to deliver substantial CO2 savings on the road. Small batteries and no fast charging mean PHEVs on sale today are only designed for very short journeys, as soon as the ICE turns on emissions soar and the lack of fast charging means batteries can't be topped up quickly. Additionally, on average the power of the electric motor fitted in PHEVs is less than half of that of the internal combustion engine (43%, fig. 6), meaning that when more power is needed, for example due to acceleration or the heating is on, the engine turns on. Such poor designs limit the CO2 savings that can actually be delivered by PHEVs on the road and, without better regulation, this is not going to improve; the power of the electric motor vs. ICE is only set to improve by 1% by 2025[19].

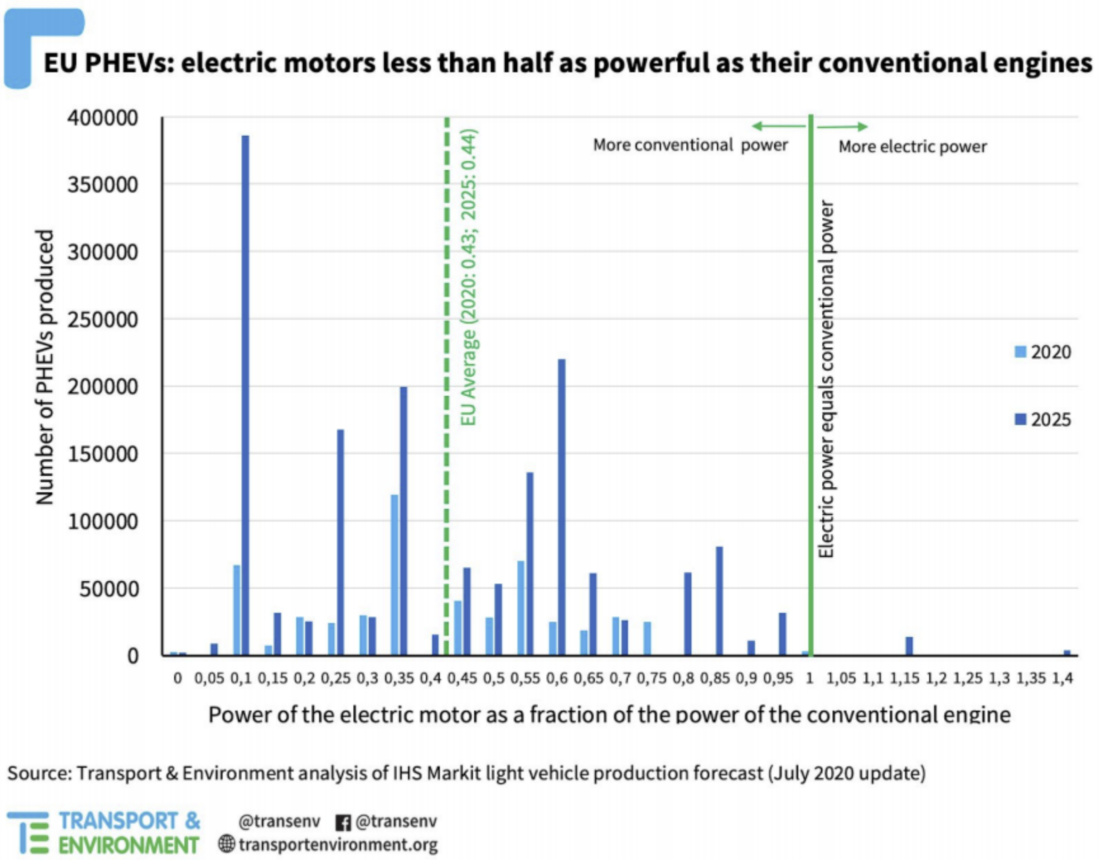


Figure 6: The ratio of electric motor vs. internal combustion engine power from T&E's analysis of IHS Markit light vehicle production forecast (July 2020 update). At a ratio of 0.25 the EV-motor is 25% of the power of the ICE. At a ratio of 1 both have the same power. For ratio above 1 the EV-motor is more powerful than the ICE.

EU PHEV sales are also concentrated in the premium and SUV segments. During the first two months of 2021 60% of PHEVs sold in Western Europe were SUV's/crossovers[20]. This is no coincidence, as on paper CO2 savings are largest for powerful, heavy cars which, as conventional ICEs, have very high CO2

[19] T&E. (2020) Plug-in hybrids: Is Europe heading for a new dieselgate?

[20] Schmidt Automotive Research. (February 2021) The European Electric Car Report: "The elephant in the room:PHEVs". Western Europe in this case represents the 18 EU Member States prior to 2004.

emissions, often in excess of 200gCO2/km - more than double the fleet average CO2 target - but, as PHEVs, often achieve less than 50gCO2/km.

For example the best selling PHEV BMW X5 PHEV tested by T&E last year officially emits only 32gCO2/km, however when running using the engine only WLTP emissions are over 7 times higher at 237gCO2/km. Similarly the XC60 officially emits 71gCO2/km, with the engine only this increases to 199gCO2/km. This means that if these large PHEVs are not charged, which often they are not, their CO2 emissions are huge, in many cases more than double the 95gCO2/km fleet average CO2 target and more than would be emitted from a conventional ICE car[21]. Cars with such high CO2 emissions cannot legitimately be counted as low emissions and should therefore not benefit from ZLEV credits.

T&E recommends:

- **Remove the 0.7 multiplier from the calculation of ZLEV credits in the car CO2 regulation from 2025 onwards**, going back to the original Commission and Parliament proposals from 2018 until the ZLEV benchmark is phased out.
- **The charge sustaining (engine only) emissions should be capped at max 3 times the official CO2 value**[22] for the PHEVs certified as emitting less than 50gCO2/km (and qualifying for a ZLEV credit). For the PHEVs certified with emissions higher than 50gCO2/km, charge sustaining emissions **should not exceed by more than three times the ZLEV benchmark of 50gCO2/km**.
- To qualify for any ZLEV credits until the benchmark is removed, PHEVs should meet all of the following criteria: 1) **electric motor power** should be equal to or more than ICE engine power, 2) at least **80 km electric only range** and 3) capable of **fast charging** (50 kW).

Conclusion

In reality the PHEVs on sale today are closer to conventional internal combustion engined cars than BEVs. To stop car makers undermining the EU cars CO2 regulation with PHEV sales, the EU type-approval regulation requires urgent reform to ensure that official PHEV CO2 values reflect what these cars actually emit on the road. Reform of the car CO2 regulation is also needed as part of the upcoming 2021 review to ensure manufacturers are not unjustly rewarded for PHEV sales and to drive manufacturers to develop PHEVs which are actually low emission vehicles. In combination these measures should ensure that the PHEVs which are sold in the EU can actually deliver the required CO2 savings on the road and aid the transition to zero emission mobility.

Further information

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[21] T&E. (2020) Plug-in hybrids: Is Europe heading for a new dieselgate?
[22] Weighted, combined CO2 emissions.