BRIEFING - September 2025

Closing the growing PHEV loophole

The importance of the planned correction of the 'utility factor' for plug-in hybrids

Summary

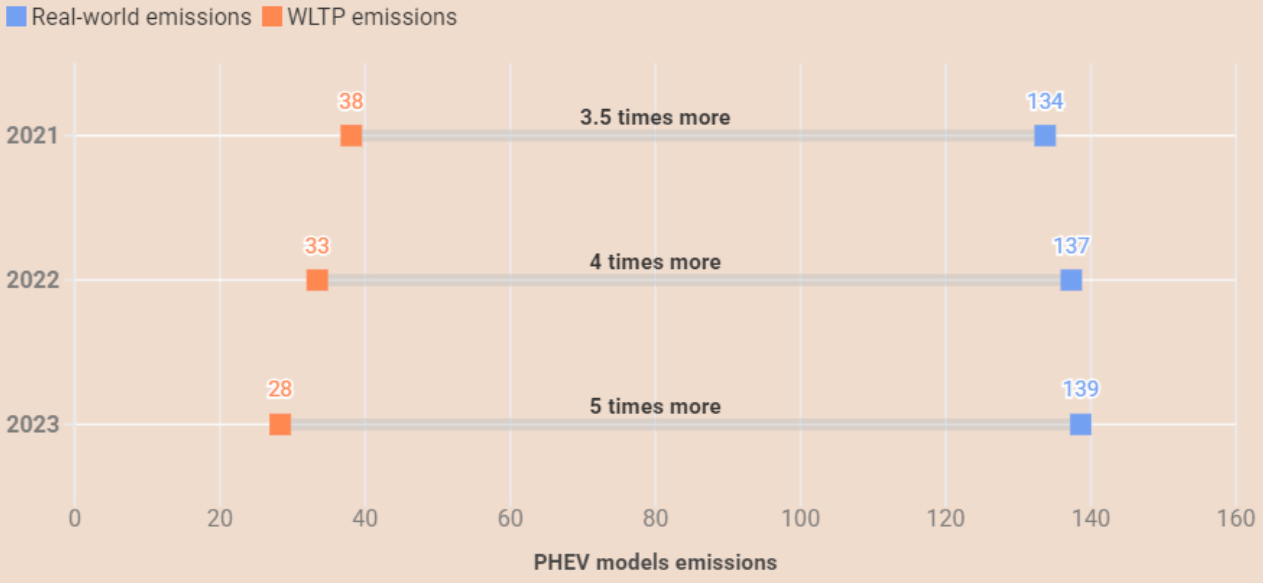
Official real world usage data from plug-in hybrid vehicles (PHEVs) has long been documented, and has proven that real world emissions are multiple times higher than official values. T&E analysis of the latest 2023 real world data shows this gap has now grown to a factor of five.

This has misled consumers about PHEVs' actual emissions and fuel efficiency, and it has allowed carmakers to use PHEVs as compliance vehicles and significantly weaken their CO2 targets by passing off the vehicles as low emissions. To correct this, the EU has updated the assumption about the share of electric driving (utility factors, or UF) to better align the official CO2 ratings with what the vehicles emit in the real world. The UF will adjust upward until 2028 to gradually close the gap between real-world and official emissions.

Since 2021, the European Environment Agency (EEA) has collected data from fuel monitors to inform the decision about which UF to set. T&E has analysed the EEA data, which includes 127,000 PHEVs registered in 2023. The analysis finds:

The gap between PHEVs' real-world and official emissions is widening

Analysis of real-world vs. WLTP emissions by registration year



Source: T&E analysis of 2021-22-23 OBFCM data collected by the European Environmental Agency • Emissions are presented as arithmetic (non-weighted) averages derived from OBFCM data. WLTP emissions calculated with the utility factor applicable before 2025.

- **The real-world CO_2 emissions of PHEV models registered in 2023 are nearly five times higher than the official emissions. This real world gap has been**

widening over the years from 3.5 in 2021 to 4.9 in 2023 based on official data transmitted from on-board fuel consumption meters (OBFCM).

- **The gap is mostly caused by flawed assumptions on the share of electric driving mode (the 'utility factor', UF) which leads to a drastic underestimate of official PHEV emissions.**
- **It is welcome that the UF values are being corrected. But even with the planned 2027/28 UF correction, PHEV real-world emissions would be 18% higher than the official figures.**

Real-world PHEV emissions far higher than WLTP lab values

1. PHEVs and the utility factor: regulatory context and limitations

PHEVs are equipped with two distinct powertrains: an electric motor (e-motor) powered by a rechargeable battery and an internal combustion engine (ICE). These systems generally operate independently, enabling vehicles to switch between electric and combustion-based propulsion depending on driving conditions and battery charge status:

- In **charge-depleting (CD)** mode, the vehicle primarily runs on electricity from the battery. However, the ICE might still kick in when additional power is required such as during rapid acceleration or uphill driving.
- In **charge-sustaining (CS)** mode, propulsion is provided exclusively by the ICE, as the battery is maintained at a steady state of charge.
- In **charge-increasing (CI)** mode, the vehicle's combustion engine is used not only to power the wheels, but also to recharge the battery, resulting in higher fuel consumption and increased CO_2 emissions.

Because of this multi-mode functionality, the actual fuel consumption and resulting CO_2 emissions of PHEVs can vary significantly in real-world use. This variability is related to multiple factors, including how frequently the vehicle is charged and driving behaviour, particularly the share of kilometres driven in CD mode compared to CS mode. As a result of these real-world variabilities, estimating PHEV emissions using standardised test cycles such as the WLTP is often inaccurate. To address this, Article 12 of Regulation (EU) 2019/631 requires the European Commission (EC) to evaluate how well WLTP values reflect real-world driving, based on data collected from OBFCM devices.

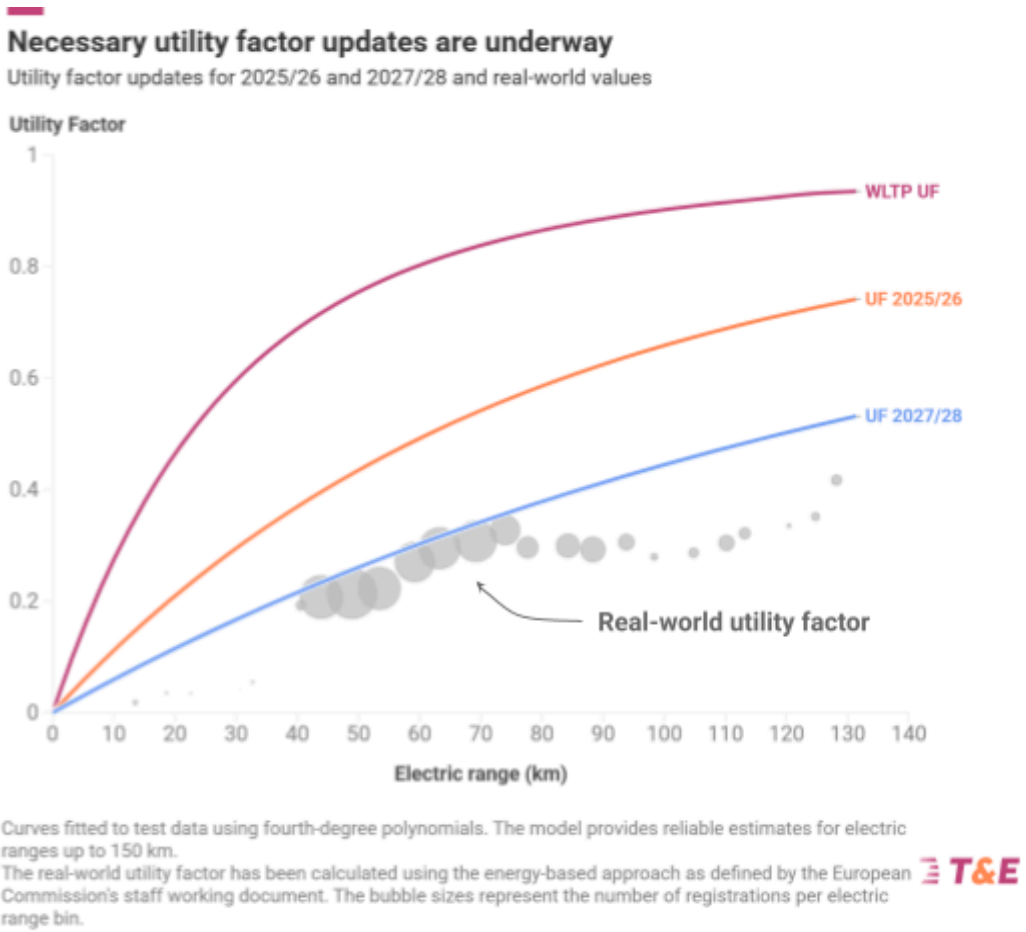
The WLTP relies on fixed assumptions about user behaviour, including how often the battery is charged and how much driving is done in electric mode. Central to the WLTP calculations is the so-called utility factor (UF), which aims to represent the proportion of vehicle operation that is powered by electricity. After research showed that the WLTP included overly optimistic assumptions resulting in large gaps between real-world and official emissions, the European Commission corrected the UF in a two-step approach. The first correction will take effect in 2025 for newly registered PHEVs and in 2026 for existing models. A second correction is scheduled for 2027/28. This is an important correction as it aims to better align official figures with the actual use of PHEVs on the road.

Utility Factor (UF)

The utility factor (UF) is a central parameter in the WLTP used to estimate the official CO_2 emissions of PHEVs. It reflects the share of total driving powered by electricity. Ideally, if the CD mode were driven entirely on electric power, the UF would simply be the distance driven in CD mode over the total distance. In practice, the CD mode often involves both the electric motor and combustion engine. To account for this, the WLTP defines the concept of equivalent all-electric range (EAER) to represent the portion of the CD mode distance powered by electricity during the lab test.

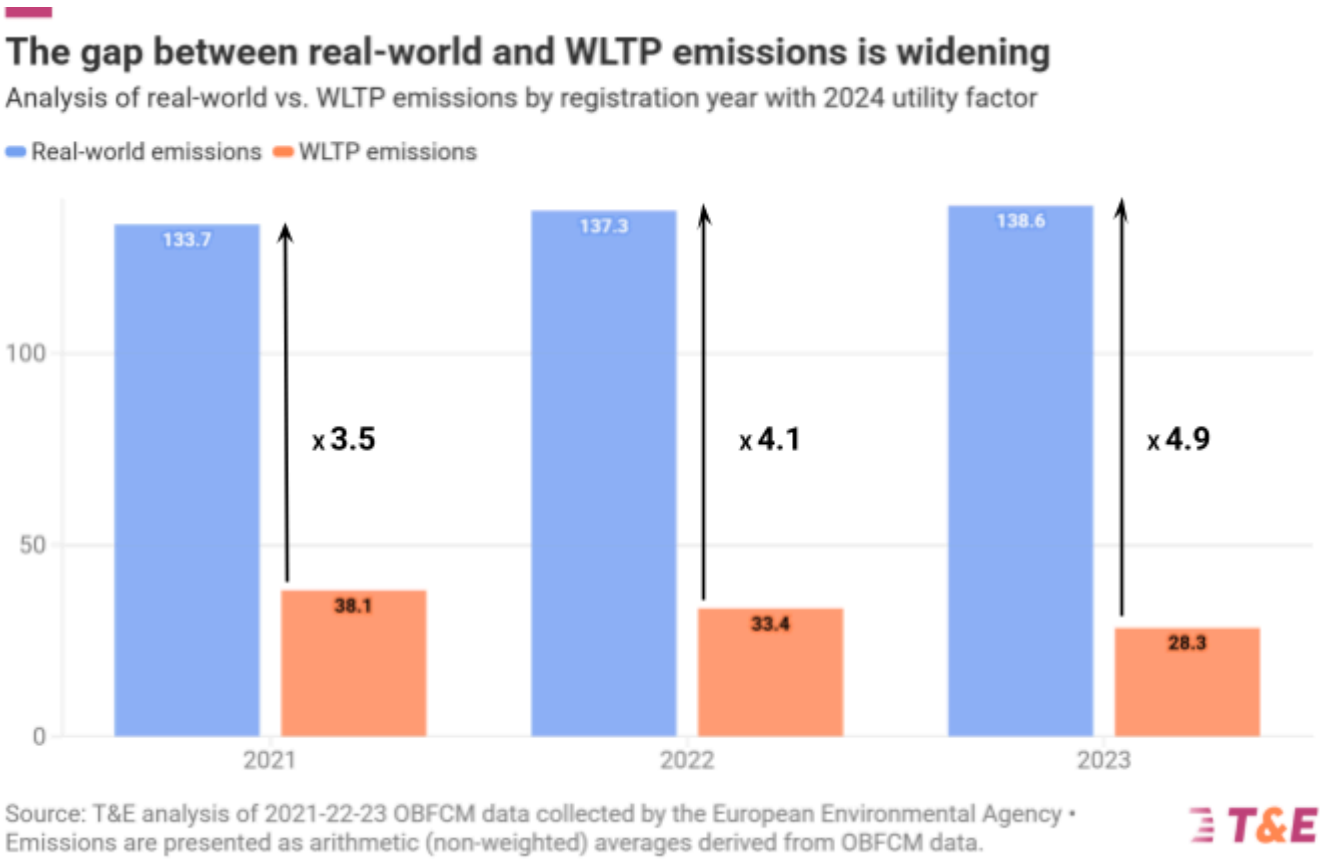
Using the current UF, a PHEV with a 60 km range is expected to drive in CD mode over 80% of the distance. With the UF correction coming into effect in 2025/26, the expected CD mode share for a 60 km range is 54% and 34% after the UF correction in 2027/28.

In real-world conditions, there is no widely agreed definition of the real-world utility factor. A European Commission staff working document suggests calculating the UF based on the total energy charged into the battery. Since the exact share of distance driven on electricity cannot be determined when both e-motor and combustion engine power the vehicle, this approach focuses instead on the vehicle's energy consumption. It defines the UF as the share of total energy consumed supplied by the electricity grid. According to the document, an initial comparison suggests that this energy-based UF better reflects real-world CO_2 emissions than a simpler method based solely on the distance driven in CD mode.



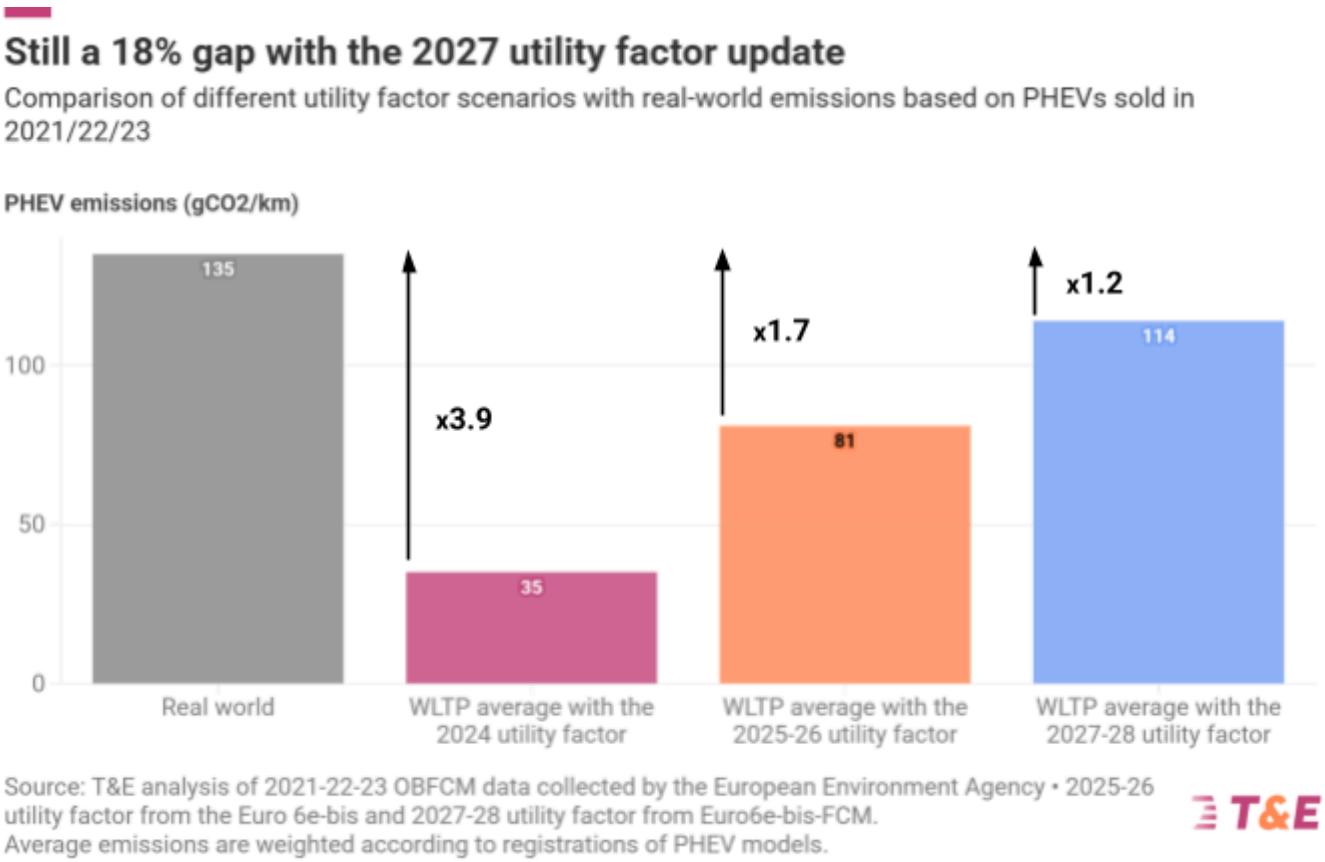
2 Real-world emissions are multiple times higher than WLTP emissions

Real-world emissions from PHEVs are rising, widening the gap between WLTP values and actual performance. The gap between official WLTP values and real-world performance has widened considerably: for vehicles registered in 2021, real-world emissions were about 3.5 times higher than WLTP figures, by 2023 already nearly five times higher based on data available in the OBFCM dataset. Real-world emissions of PHEVs registered in 2023 are on average 5% higher than for vehicles registered in 2021 despite a 25% increase in average electric range between 2021 and 2023. At the same time, the increased range has resulted in a 26% reduction in WLTP emissions. The persistent underestimation of PHEV emissions directly benefits manufacturers by helping them meet CO_2 targets more easily.



This analysis uses [OBFCM data] reported in 2023 (referred to throughout as "real-world data") to calculate emissions based on actual fuel consumption in different driving modes. The dataset covers over 800,000 PHEVs registered between 2021 and 2023 (127,000 PHEVs registered in 2023 alone). When considering the average real-world gap per model and recalculating the average based on official 2023 sales figures, we estimate that the average PHEV market would have emissions four times higher than those reported officially in 2023 on the official EEA dataset.

Real-world CO_2 emissions from PHEVs remain significantly higher than official WLTP values, even with the corrected 2027/28 utility factor (UF). Based on emissions data for all PHEVs reported in 2023, we estimate that average real-world emissions would still be 18% above the WLTP figures under the revised 2027/8 UF. This is a significant improvement, as the gap is even larger under the UF applicable before 2025: on average, real-world emissions are nearly four times higher than those assumed in the regulation. Even with the UF applicable in 2025/26, real-world emissions would still be almost twice the WLTP figures. This confirms that the planned correction in 2027/28 is essential to better reflect actual emissions and prevent underestimation.



For comparison, WLTP emissions were calculated based on estimated CD and CS mode values, applying the different UFs introduced in the previous section. This approach makes it possible to assess how well the current and upcoming UFs reflect real-world PHEV emissions. It should be noted that this is not a forecast: we simply recalculate emissions for the reported 2023 data using different UF curves and applying them to the existing data. For projections of emissions beyond 2025 will be covered in the upcoming full report.

Further information

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