TRANSPORT & ENVIRONMENT

Executive Summary

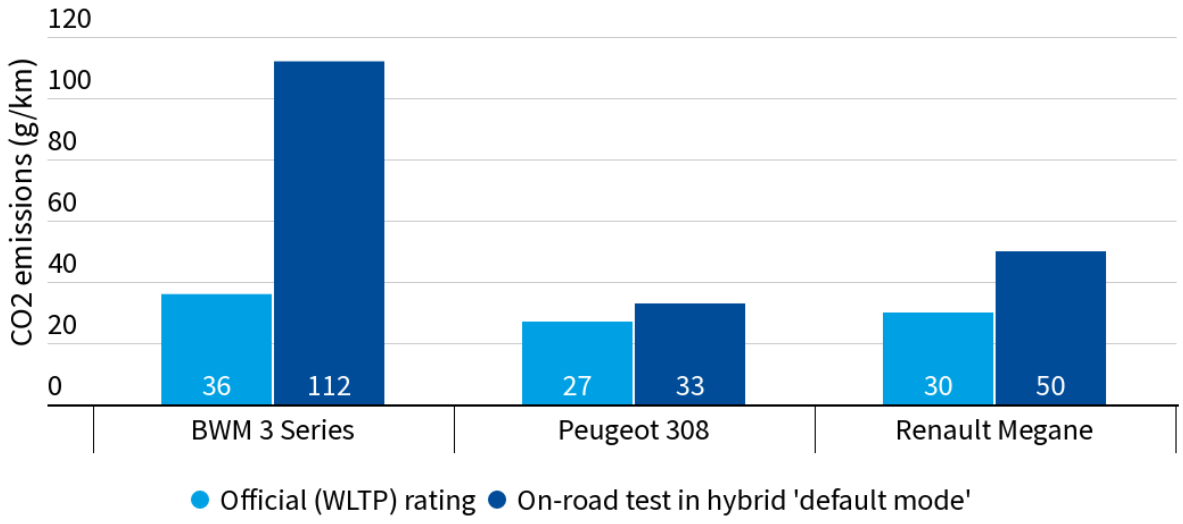
Plug-in hybrids 2.0: A dangerous distraction, not a climate solution

---

T&E commissioned TU Graz to independently test three new popular, average-sized plug-in hybrids (PHEVs): the BMW 3 series, the Peugeot 308 and the Renault Megane on the road.

- **The real-world CO2 emissions of the tested PHEVs are 85-114 g/km, around 3 times the artificially low official rating of 27-36 g/km**
- **When not charged city CO_2 emissions are 5-7 times the official values**
- **When commuting, starting with a fully charged battery, test CO_2 emissions were 1.2-3 times the official values**
- **The city electric range of the BMW was 26% and of the Peugeot 47% lower than expected**
- **BMW's geo-fencing technology does not guarantee zero emission driving in cities**

In commuter tests, PHEVs pollute more than claimed when starting on a full battery



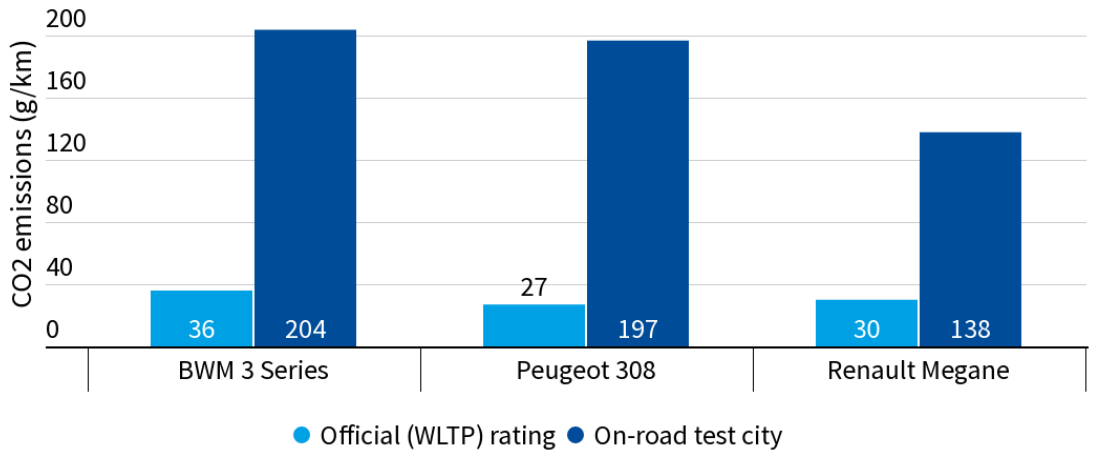
Official WLTP CO2 and that measured on the commuter route, starting with a fully charged battery in the default mode selected by the PHEV. Tested by the Graz University of Technology for Transport & Environment.

Two years ago T&E tested the BMW X5, Volvo XC60 and Mitsubishi Outlander SUV PHEVs under a wide range of conditions, mostly on longer routes. This year T&E tested three smaller PHEVs on shorter routes which can be reasonably done by those living in cities or commuting to see if PHEV performance has improved.

Commuting CO_2

When tested on the commuter route, starting with a fully charged battery and driving in the mode selected by the PHEV, the Peugeot and the Renault emitted 1.2-1.7 times the official CO_2 (33 - 50 gCO_2/km). They still performed comparatively better than the BMW, which emitted over 100 gCO_2/km (3 times the official value). Activation of the BMW's 'anticipatory' mode was needed (by programming the route into the satellite navigation system) to reduce commuting CO_2 by around half to 67g/km (2 times the official value). The necessity to use the sat-nav to reduce CO_2 to levels closer to the other PHEVs tested is not ideal as driver's may not use the sat-nav on known routes resulting in unnecessarily high CO_2 emissions.

In city tests, PHEVs powered by the engine emit 5-7 times advertised CO_2

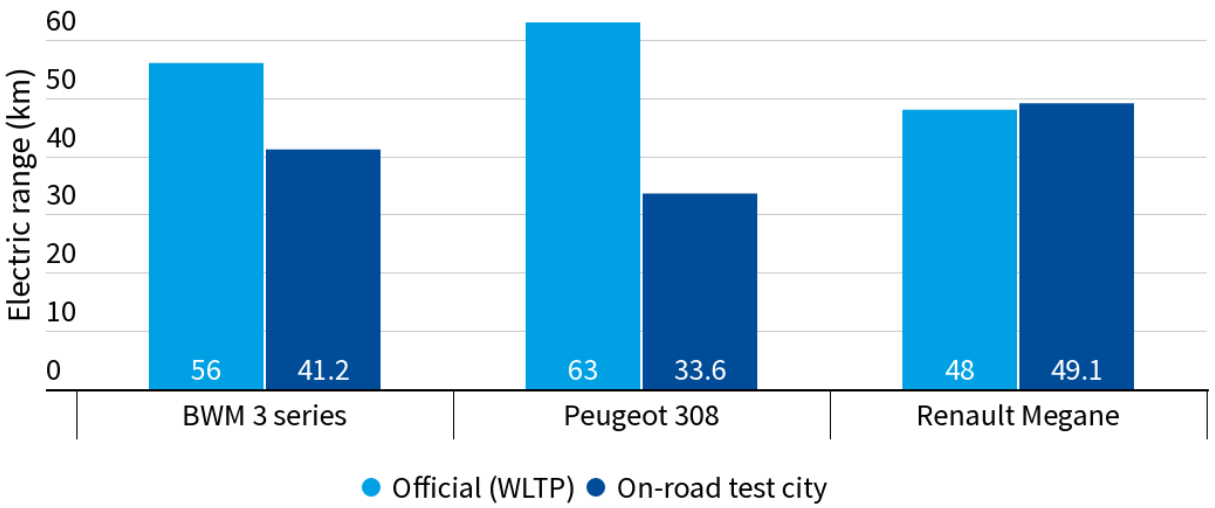


Official WLTP CO2 and that measured during city driving in charge sustaining mode. Tested by Graz University of Technology for Transport & Environment.

CO_2 when not charged

Studies show that many PHEVs, especially company cars, are rarely, if ever charged. T&E's previous testing showed that when not charged, PHEV CO_2 is very high. When tested with an empty battery in the city, CO_2 emissions were still very high (~200g/km) for the BMW and the Peugeot. This is equivalent to the emissions of the VW Tiguan SUV. The Renault had lower emissions of 138g/km. Compared to the over two PHEVs the Renault has around half the engine power, a more powerful electric motor than ICE and lower weight, all factors which are important in restricting PHEV CO_2 emissions.

In city tests, all three PHEVs had less than 50km range



Official WLTP electric range and that measured during city driving. Tested by the Graz University of Technology for Transport & Environment.

City electric range

The electric range of PHEVs is still limited. When driving around the city of Graz, the electric range of all three PHEVs was less than 50km. BMW achieved a 26% lower electric range and Peugeot 47% lower than expected based on official data. Only Renault achieved the expected electric range.

PHEVs are not suitable for clean cities

PHEVs offer cities few climate or air quality benefits because there is no guarantee that they will be driven electrically. BMW's 'eDrive Zone' geo-fencing is advertised as a way to increase PHEV zero emission driving in 138 European cities by automatically switching to zero emission driving when in the city.

During testing the technology failed to guarantee emission free city driving. With geo-fencing technology enabled, the engine switched on twice while driving in the city putting into doubt the effectiveness of the technology.Outside of geo-fenced zones, T&E's tests also showed that the BMW might be conserving battery charge in case of entry into such areas - risking increasing CO_2 from PHEVs when driving outside of cities.

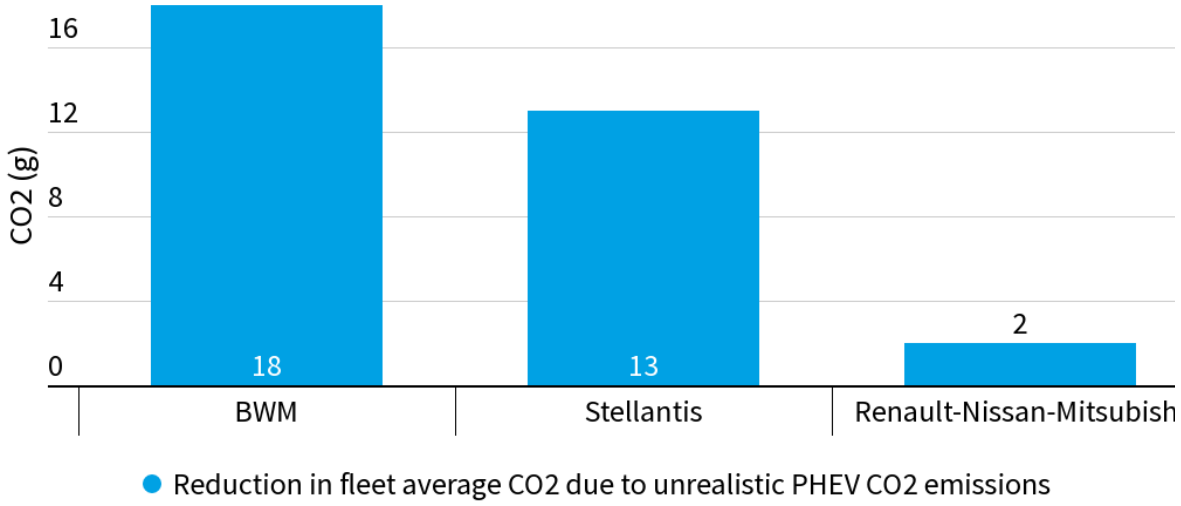
Short electric range and no fast charging, risk PHEVs rapidly running out of charge in geo-fenced zero emission zones. This puts the integrity of future zero emission zones in cities such as Amsterdam, Paris and London at risk and limits their climate and air quality benefits.

Even if an EU-wide geo-fencing standard, required zero emission driving in geo-fenced areas, it is doubtful this can be effectively enforced. PHEVs that turn on their ICE for just short bursts would be nearly impossible for cities to detect.

PHEVs weaken Europe's clean car rules

While official CO_2 emissions of PHEVs are low (27-36 g/km for the tested PHEVs), real world data shows that PHEVs are driven electrically less than assumed by regulation. This means that in reality, the official CO_2 of the three PHEVs tested should be 85-114 g/km.

Carmakers unfairly benefit from artificially low PHEV CO_2 when it comes to compliance with EU car CO_2 standards



Calculated based on H1 2022 sales and 2027 PHEV utility factors.

In 2022, PHEVs will have reduced carmakers fleet average CO_2 by more than any other flexibility in the CO_2 regulation. Due to the unrealistically low PHEV CO_2, the monetary value for carmakers of selling PHEVs is large. T&E calculates that in 2022 this amounted to :

- BMW: €0.9 billion or €8,200 per PHEV
- Stellantis: €1.3 billion or €9,300 per PHEV
- RNM: €0.3 billion or €6,900 per PHEV

Selling PHEVs with artificially low CO_2 also means that fewer BEVs need to be sold for carmakers to comply with CO_2 targets. For the three carmakers 247,000 less BEVs needed to be sold, 22% of 2022 BEV sales.

Carmakers benefit from PHEV subsidies

The benefits for carmakers don't stop at CO_2 compliance. T&E estimates that around €350 million will have been paid out in PHEV purchase subsidies in 2022 for the three carmakers alone. While Germany, which is responsible for the majority of the subsidy spend, has removed PHEV subsidies starting from 2023, other Member States such as Spain plan to continue to support PHEV sales despite the large body of evidence which shows that these cars fail to deliver the promised climate benefits.

Subsidies given to PHEVs in 2022:

	Country	Subsidy total (euro)
	Austria	2,090,795
	France	47,496,000
	Germany	263,467,125
	Italy	11,171,040
	Romania	358,904
	Spain	21,137,064
	Sweden	4,694,433
	Total	**350,415,360**

This all comes at a cost to consumers as, on average, in the EU, it is cheaper to own a BEV than a PHEV. T&E's analysis using comparable BEV models shows that owning a Tesla Model 3 vs. the BMW 3 Series would save €2,600 euro over 4 years, the Citröen eC4 vs. the Peugeot 308 would save €4,800 and the electric Renault Megane vs. the PHEV version would save €1,300.

The results of T&E's testing show that PHEV models are not getting considerably better at CO_2 savings, and cannot guarantee zero emissions driving in cities. Policymakers should take action by ensuring that PHEVs are not treated the same as BEVs when it comes to entry into zero emission zones. T&E recommends the following reforms in the short and medium term:

Key recommendations

1. PHEVs should not be treated as zero emission even if they have geo-fencing capability.

2. PHEV ownership and company car benefit-in-kind taxation should be based on the actual CO_2 reduction delivered by individual PHEVs in the real world.

3. Privately owned PHEVs should not receive purchase subsidies. Where these exist (e.g. in early BEV markets), they should be based on performance criteria, such as: a min electric range of 80km, the power of electric motor at least equal to the power of the ICE, capability to fast charge and maximum engine only CO_2 of 139 g/km.

4. No purchase subsidies should be given to company cars.

5. Official PHEV CO_2 emissions need to be regularly updated with real world data.

6. The option to charge the PHEV using the internal combustion engine should be removed by carmakers.

7. Carmakers should educate and reward PHEV drivers for driving electrically.

Further information: **Full report**
Anna Krajinska, Manager vehicle emissions and air quality
anna.krajinska@transportenvironment.org
Mobile: +44(0)7761536337