



Consultation: A New Road Vehicle CO2 Emissions Regulatory Framework for the United Kingdom

Which? is the UK's consumer champion. As an organisation we're not for profit - a powerful force for good, here to make life simpler, fairer and safer for everyone. We're the independent consumer voice that provides impartial advice, investigates, holds businesses to account and works with policymakers to make change happen. We fund our work mainly through member subscriptions, we're not influenced by third parties and we buy all the products that we test.

Summary

Which? is concerned that the current official method of calculating greenhouse gas emissions from Plug-in Hybrid Vehicles (PHEVs) does not reflect real-life emissions. We believe that the official tests need to be reformed in order to give a more accurate representation of CO2 emissions from these vehicles, and that these updated figures should be included as part of the chosen framework to regulate CO2 emissions.

Introduction

Which? is committed to bringing sustainability into everything we do, including through our advocacy, product testing and investigations, and we have identified electric vehicles (EVs) as a key priority area where the transition to more sustainable living will have a significant impact on consumers over the next few years. EVs and PHEVs have been a part of our rigorous product testing since these types of cars became available to the UK public, and we have conducted a number of investigations including into the public charging network and the upfront cost of new EVs. We also run an annual car survey which we believe is the largest consumer survey on car reliability in the UK.

We therefore welcome this consultation on a new road vehicle CO2 emissions regulatory framework for the UK, and are responding to the following sections of the consultation:

- Significant Zero Emission Capability

We have limited our response to focus on Plug-in Hybrid Vehicles as this is where we have most expertise and data to contribute at this stage and would be pleased to discuss any aspect of this research in more detail.

Relevant Consultation Questions

Q1 - What metric, or combination of metrics should be used to set eligibility for cars and vans between 2030 and 2035?;

Q2 – For your chosen metric, what threshold should new cars and vans be required to meet from 2030?;

Q3 - What other requirements could be introduced, if any, to maximise zero emission capability?.

Our response also applies to both proposed frameworks.

We believe that the current Worldwide Harmonised Light Vehicle Test Procedure (WLTP) for PHEVs needs to be reformed to better reflect how drivers use PHEVs in the real world, in order to give a more accurate representation of the CO₂ which is generated by these vehicles. These more realistic figures should then inform the chosen framework to regulate CO₂ emissions for PHEVs.

Which? independent testing has found that there is a significant discrepancy between official miles per gallon (mpg) and CO₂ emissions figures for PHEVs as achieved by WLTP tests, and the mpg and emissions that are used and generated in our independent tests that we believe more accurately reflect real world driving conditions. In particular, average fuel use is much higher than the official tests suggest. This discrepancy means that a lot more CO₂ is being released from these vehicles than is currently being accounted for, and that manufacturers' CO₂ fleet averages are inaccurate as a result.

The main reason for this discrepancy is the 'utility factor', or the distance a car can travel in electric-only mode. The higher the calculated electric-only range, the lower the CO₂ emissions. Our tests frequently calculate the electric-only range of a PHEV as lower than the official tests, and show that the average EV range of a PHEV is around 30 miles (28.7 miles actual from cars we've tested so far).

Which? tests are conducted by placing each car on a rolling road in independent labs. This simulates wind resistance and allows the test to be repeated in the same way in the exact same environment. To ensure we get realistic results, we test cars with the air conditioning on, lights on dipped beam and the radio working. We also don't remove any extra weight as this can affect results, and we test cars in their default settings, rather than switching to an economical driving mode.

We test each car using this method for a fixed distance (100km), and calculate its fuel consumption rate and electricity use. For plug-in hybrids, we start both the WLTP cycle and our unique motorway test cycle with a full battery charge, and continue to repeat them until the state of charge drops below 50% in both cycles. We then conduct the same cycles with an empty battery and measure the fuel use and emissions. Our calculation takes all of these factors into account to produce fuel use and emission figures.

The average claimed manufacturer fuel economy figure from the cars we've tested is 179.8mpg (where a range is given, we use the lowest/least efficient figure). In our tests, the

same cars have an average fuel economy of 70.8mpg when the battery has some charge, and 41.9mpg when the battery is depleted. This means that when a PHEV has some charge in our tests, the fuel use increases by 60.6% compared to official figures. But when the battery is depleted, which our tests show can happen around 30 miles, fuel use increases by 76.7% compared to official figures.

When Which? tests regular combustion cars (petrol and diesel), our fuel economy results are typically much more aligned with the official results as derived from the WLTP. PHEVs stand out as the biggest exception and is the fuel type that continually generates, by far, the biggest discrepancy between our fuel economy tests and official fuel economy tests.

Please find below further calculated fuel economy over a distance of 100km when the battery has charge, and separately, fuel use when the battery is empty. As these figures show, the fuel economy and CO2 emissions figures being achieved for PHEVs in official tests are not realistic and are misleading for consumers. The Government should address this flawed approach by reforming the mode of testing, to ensure the new CO2 framework uses more accurate figures.

Fuel consumption/CO2 figures from our tests

Full PHEV fuel data from Which? tests can be found attached with this document. These results are from the tests of 33 plug-in petrol-hybrid vehicles, all of which have been tested in identical conditions under our current test programme (updated in 2017). Highlights from these figures are as follows:

- 1) Average claimed fuel economy in **official** tests (column I)
 - **179.8mpg¹**
- 2) Average tested fuel economy in **Which? tests** (starting with battery full) (column J)
 - **70.8mpg**
 - **106mpg/60.6% less efficient than claimed**
- 3) Average tested fuel economy in **Which? tests** (with battery empty) (column K)
 - **41.9mpg**
 - **129.9mpg/76.7% less efficient than claimed**
- 4) Average difference between fuel economy in **Which? tests** between testing the car with a charged battery versus an empty battery (columns L and M)
 - **28.9mpg less efficient on average, which is an increased fuel use of 39.3%**
- 5) Average electric-only range in Which? Tests (column H)
 - **28.7 miles (min: 16.2 miles, max: 39.1 miles)**

¹ Where fuel economy is presented as a range, we use the lower (worst) figure for the average. I.e. Peugeot 3008 Plug-in hybrid (2020 to present) has a WLTP figure of 166.2 - 235.4mpg - we used the 166.2mpg figure for the average calculation.



Further relevant data

The following data comes from the Which? annual car survey, conducted between April 2021 - June 2021². 48,034 survey participants across the UK told us about 56,853 cars they own. This included 2,184 EV owners and 923 PHEV owners.

How charged is the battery before people start their journeys?

- Sample: 872 people
- SOC: state of charge
- All answers given had to add up to 100%

Please note that survey participants answered the survey between April 2021 and June 2021, and were asked about their experiences in the 12 months prior to answering the survey - this means behaviours are likely to have been affected by COVID and subsequent restrictions.

Percentage of journeys started with battery charged between:

100% - 75% SOC	74% - 50% SOC	49% - 25% SOC	24% - 0% SOC
75%	10%	6%	9%

Given that 75% of people report starting a journey with the battery between 75% to 100% charged, and average electric-only range in Which? tests is 28.7 miles, we can assume a significant proportion of journeys are likely to be undertaken using the battery only. However, given the significant differences between mpg on a full battery and an empty battery that our tests reveal, we believe it is important for the non-electric mode part of journeys to be better reflected by the official tests. In particular, motorway journeys at high speed will faster deplete the battery and, in our tests, is where a plug-in hybrid is the most inefficient and uses the most fuel.

**Which?
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² Consumers were asked about the 12 months prior to answering the survey.