

How can fuel consumption meters ensure car CO₂ limits are met on the road

September 2020

A briefing by



Summary

Although said to be the most ambitious globally, the EU's CO₂ emission standards for cars have been - and continue to be - hamstrung by their inability to deliver CO₂ reductions in the real world. Up to now, almost half the emissions savings achieved on paper by new vehicles in the EU since 2001 have only been managed in the lab. The considerable gap between laboratory CO₂ values and real world emissions (42% in 2017) is not only bad news for the climate, but also for drivers who have had to stump up an extra €150 billion to pay for the extra fuel. With Europe now committed under the European Green Deal to achieving net-zero emissions by 2050, closing this emissions gap must be a top priority.

In an attempt to solve this, the Commission will begin the compulsory collection of real world CO₂ emissions, fuel and energy consumption recorded from on-board fuel consumption meters (OBFCM) starting in 2021. This will provide the Commission with the necessary data to monitor the gap and move towards a regulatory framework which prioritises real world, not just laboratory based compliance. OBFCMs will be mandatory in all new cars and vans from 2021 onwards, with all new models already being fitted with these devices from January this year. But the effectiveness of this depends on how the technical measures - or implementing regulations - are designed in the months to come.

If comparable and consistent data is appropriately collected on fuel consumption and real-world CO₂ across the EU fleet, the Commission and third parties will be able to monitor real world emissions and hold car manufacturers accountable for their misleading claims. This will also help accelerate the shift to electric cars (EVs) as manufacturer's will need to sell more EVs to meet increasingly strict real world CO₂ targets, which they will no longer be able to meet by simply gaming the tests.

To ensure the data collected from vehicles is sufficiently representative, comparable, accurate and accessible, the Commission's Implementing Regulations on the collection of data from on-board fuel consumption meters should as a priority include the following:

1. **Data should be sent directly from the vehicle to the Commission or European Environment Agency (EEA) using over-the-air (OTA) data transfer as soon as possible, and by 2023 at the latest.** OTA involves the transfer of data over a mobile network directly from the vehicle without the involvement of the manufacturer or third parties, reducing the risk of data tampering. This is also the only method of OBFCM data transfer which allows for regular collection of data from the entire OBFCM-enabled EU fleet, resulting in a complete and representative database. While all new cars have to be fitted with OBFCM from January

2021 these do not necessarily have to be OTA capable, so the Commission should ensure all new vehicles are OTA capable by 2023 at the latest.

2. **As a temporary solution prior to the introduction of OTA capability for all new cars, OBFCM data should be collected from cars fitted with OBFCM whenever possible and passed on to the Commission or EEA on an annual basis.** Manufacturers and authorised dealers should retrieve OBFCM data whenever a vehicle is brought in for repair or servicing and while already passing onto the Commission or EEA any data received by already OTA-enabled vehicles. OBFCM data should also be retrieved during Periodic Technical Inspections (PTI) and collected by Member States. This will minimise the data gap before all new cars are OTA capable.
3. **Data should be collected and published by the European Commission or EEA on a quarterly basis for newly registered vehicles' first year on the road (and annually thereafter) for the entire vehicle lifetime.** Quarterly collection of OBFCM data from OTA-enabled new registrations will ensure that the real world performance of new models can be assessed in a timely manner and will enable new models released at the beginning of 2023 to be included into the Commission's fitness check of the CO2 regulation in 2023. Furthermore, published data must be aggregated to enable consumers to directly compare individual vehicle models, not just manufacturers.
4. Given the growing sales of PHEVs and concerns around their on-road emissions, OBFCM should also be used to monitor their real-world performance. **For PHEV vehicles the OBFCM should collect and transmit to the Commission/EEA the car's CO2 emissions, fuel and electrical consumption, and distance travelled in all driving modes available on the vehicle.** This will allow the Commission and third parties to properly assess their CO2 performance. The Commission should on an annual basis also publish type-approval and real world utility factors (used for the calculation of a PHEV's type-approval CO2 emissions) derived from OBFCM data.
5. **The accuracy of data gathered from OBFCM should be verified throughout the lifetime of the vehicle.** OBFCM data collected OTA by the Commission/EEA should be cross checked against data gathered by Member States from Periodic Technical Inspections (PTI). OBFCM accuracy should be verified through market surveillance and in-service conformity testing throughout the lifetime of the vehicle.

In the longer term, OBFCM data should be used to enforce regulatory compliance with manufacturers' fleetwide CO2 emission targets (e.g. through a CO2 target correction mechanism), check the effectiveness of eco-innovation technologies, and further improve consumer awareness on real world fuel consumption, CO2 emissions and electric range. Fuel consumption meters are the best technology available to finally bring car emissions in check and ensure Europe's climate targets are met on road, not paper. The upcoming discussions in the technical committees will be crucial to set the OBFCM framework on the right track. **It is incumbent on the Commission and member states to ensure the provisions in the cars CO2 regulation on the collection of real world data from January 2021 are properly and fully implemented.**

1. Introduction: The real world vs laboratory fuel consumption and CO2 emissions scam

While the EU's CO₂ emission standards for cars are said to be the most ambitious globally, one of the biggest weaknesses of the regulation to date has been its failure to deliver CO₂ reductions in the real world. Although new car CO₂ emissions measured using the NEDC laboratory test have fallen by 31% since 2000, progress on the road has told a different story, with the same vehicles delivering real world reductions of just 10%. The gap between official test results and the real world performance of new cars' CO₂ emissions has grown at an alarming rate, jumping from 9% in 2000 to 28% in 2012 and to 42% in 2017¹. Despite a recent stabilisation at around 39%², this discrepancy not only means that less than half of the CO₂ emission reductions achieved by new vehicles on paper since 2001 have actually been delivered on the road, but the cost to drivers who pay for the additional fuel burned to produce these emissions comes in at an extra €150 billion EU-wide³. Meanwhile, the old NEDC test was replaced with the new Worldwide Harmonised Light Vehicle Test Procedure (WLTP), which has been in force for all new cars sold in the EU since September 2018, with a transitional period until 2021 when both tests can be used.

Fuel is the biggest running cost of a car and drivers are not getting the benefit of the fuel economy improvements they have been promised by manufacturers. If left unaddressed, by 2030 the gap will require drivers to cumulatively spend €1 trillion more on fuel and the EU to import six billion extra barrels of oil, worsening energy dependence and the EU's balance of payments⁴. Most importantly, however, as more fuel is burned, increased real-world CO₂ emissions threaten to seriously undermine the EU's climate efforts, making a mockery of the Commission's own objectives under the European Green Deal to achieve climate neutrality, as well as a 90% reduction in transport CO₂ emissions, by 2050. In this context, and with recent figures showing that average CO₂ emissions from new cars grew for the third year running in 2019 (EEA), car manufacturers need to up their game quickly, and not in the lab.

Even with the switch from the obsolete NEDC test to the new WLTP test, the absence of any proper real-world emission monitoring and controls means many of the same issues will remain. Although the WLTP eliminates some of the previous loopholes that were being exploited by car makers under the NEDC, many weaknesses and flexibilities still remain that allow, and incentivise, manufacturers to continue to exploit the tests. For example, by engine and transmission optimisation to the WLTP test cycle; the continued optimisation of 'road load' values⁵, or using different tyres over the vehicle's life from the ones used in lab tests. In fact, the WLTP test underestimates real world CO₂ emissions by around a quarter, a gap which is expected to grow to a third by 2025⁶.

The only credible solution to disincentivise and prevent such gaming is to overhaul how CO₂ targets are currently enforced and move to real-world emission monitoring and checks. Switching the focus to real world emissions - and not laboratory - improvements, car makers will be much less likely to be able to mislead consumers and authorities about the supposed efficiency and CO₂ values of their fossil combustion engine cars. This will also mean more electric cars (EVs) on the road as manufacturers will

¹ Transport & Environment: [Ending the cheating and collusion: Using real-world CO₂ measurements within the post-2020 CO₂ standards](#), 2018

² ICCT (2019), [From Laboratory to road](#), 2019

³ Transport & Environment: [Ending the cheating and collusion: Using real-world CO₂ measurements within the post-2020 CO₂ standards](#), 2018

⁴ Transport & Environment: [Mind the Gap 2016: Fixing Europe's flawed fuel efficiency tests](#), 2016

⁵ 'Road load' captures the aerodynamic and rolling resistance impact on a vehicle and is used to configure the chassis dynamometer (rolling road) for NEDC/WLTP tests. It is one of the most important factors in determining the CO₂ performance of cars and was a key contributing factor to the growing gap between lab and road figures in the old NEDC test as OEMs optimised their vehicles to underestimate the 'road load' during the test, giving lower CO₂ emissions. T&E has shown that similar flexibilities remain under the WLTP test: [Get Real testing campaign: why new laboratory tests will do little to improve real-world fuel economy](#), 2019.

⁶ Transport & Environment: [CO₂ emissions from cars: the facts](#), 2018

need to sell more of those to meet increasingly strict CO2 targets in the real world if they cannot comply by gaming tests.

2. Measuring the gap using On-Board Fuel Consumption Meters

As part of the recently agreed Regulation for the 2025/2030 CO2 emission performance standards for new cars and vans, the European Commission is mandated to collect data on real world CO2 emissions, fuel and (if applicable) energy consumption of light-duty vehicles recorded by fuel consumption meters (FCM) fitted onto vehicles directly, or on-board FCM (OBFCM), starting with new vehicles registered in 2021. The collection, monitoring and analysis of this data is an essential first step in getting the EU CO2 vehicles regulation to where it needs to be, as it allows the Commission and third parties to identify and measure the gap between type approval and real world CO2 emissions across the entire EU fleet, and monitor how the gap evolves over time. Such an analysis is not done EU-wide today because, as it stands, there is no recognised, comparable or consistent data collected on fuel consumption and real-world CO2 across the EU fleet, meaning car makers are not being held to account for their emissions claims.

In terms of the technology itself, fuel consumption meters measure volumetric fuel consumption, that is, fuel volume passing through the vehicle fuel line per unit of time. This data can then be used to calculate average fuel consumption, e.g. liters per 100 km or miles per gallon (mpg). Fuel consumption meters are the most accurate⁷ and cost effective way we have of measuring on road fuel consumption (and therefore real world CO2 emissions), and will be mandatory in all new cars and vans from 2021 onwards, with some vehicles already on sale today fitted with these devices.

Once the current technical regulations on the use of FCMs are in force, this data should in the near future be used to ensure vehicle manufacturers' compliance with CO2 targets in the review planned for 2023. This should be done by adjusting the specific CO2 emission targets for car makers if the gap grows (see below section 4). This is not only crucial for the credibility of the EU CO2 regulations to make sure that the EU can deliver on its climate targets under the European Green Deal, but also for vehicle owners and consumers to know and assess the actual fuel consumption and CO2 emissions of vehicles to make better informed purchasing decisions.

3. T&E recommendations for the OBFCM Implementing Regulations

As part of the new cars CO2 regulation⁸, the Commission is required to prepare implementing legislation to cover the monitoring and reporting by vehicle manufacturers and Member States of real-world fuel and/or energy consumption values recorded by OBFCMs. In order to implement these provisions into law, at present there are two discrete work streams within the Commission on this topic:

⁷ Transport & Environment: [Real World Fuel Economy Measurements: TECHNICAL INSIGHTS FROM 400 TESTS OF PEUGEOT, CITROEN AND DS CARS](#), 2017

⁸ [Regulation \(EU\) 2019/631 setting CO2 emission performance standards for new passenger cars and for new light commercial vehicles](#)

1. Developing the implementing legislation covering the process of OBFCM data collection and reporting by vehicle manufacturers and EU member states to the Commission and EEA. This is done by DG Climate Action (CLIMA).
2. Developing the implementing legislation covering the technical specifications of OBFCM including how data is stored and transferred from the OBFCM to the Commission. This work is led by DG Internal Market, Industry, Entrepreneurship and SMEs (GROW).

In this paper, we primarily focus on the ongoing work by DG CLIMA and the national experts in the Climate Change Committee⁹ on what data should be collected, how this data can be best transferred to the Commission, and what should be done with the data. However, the relevant provisions of the DG GROW act, including ensuring timely and accurate data transfer from OBFCM, are also included.

3.1 What data should be collected/reported

Real world fuel and electrical energy consumption and CO2 emission data is essential not only to check regulatory compliance, but it is also an important element from a consumer perspective. Easy access to this data would allow consumers to make informed vehicle purchases including on the vehicles environmental credentials.

Data collected from conventional vehicles

For OBFCM data to be useful for informing consumers on real world fuel consumption, as well as CO2 emissions, the data must be made available on a regular basis, especially for new vehicle models and should also be published in a format which allows easy comparison between vehicle models.

As such, it is not enough to annually publish the data aggregated by manufacturer only - as is the case in the current Commission proposal - as this does not allow consumers to compare the real world performance of individual vehicles. Aggregation by interpolation families alone, as is currently proposed in the draft act, is not sufficient as it groups vehicle data based on engine and gearbox, but to be useful such information must be model-specific and differentiate between different generation models. This will allow consumers and other third parties to compare the real world fuel efficiency and CO2 emissions of individual cars with the real world fleet average of respective vehicle models. This will highlight best in class vehicles and help raise awareness of the issue, leading to better informed consumer purchasing decisions and pressure on manufacturers to lower CO2 emissions across all their vehicles.

For newly registered cars, data should also be collected and reported on a quarterly basis during their first year on the road. This is particularly important for new vehicle models entering the market as it will allow the Commission, consumers and third parties to receive information of the vehicles real world performance as soon as possible, without having to wait - potentially in excess of a year - for the data. Most importantly, this should also allow the Commission to include OBFCM data from new models released at the beginning of 2023 into its review of the effectiveness of CO2 standards in 2023, providing a more complete picture of the state of play of real world CO2 emissions from the EU fleet.

⁹ DRAFT COMMISSION IMPLEMENTING REGULATION (EU) .../...of XXX on monitoring and reporting of data relating to CO2 emissions from passenger cars and light commercial vehicles pursuant to Regulation (EU) 2019/631 and repealing Implementing Regulations (EU) No 1014/2010, No 293/2012, 2017/1152 and 2017/1153

Following the first year of registration, annual collection and reporting of OBFCM data should continue throughout the entire lifetime of the vehicle. In order to allow for the assessment of vehicle ageing and its impact on fuel/electrical consumption and CO2 emissions OBFCM data needs to be aggregated and transferred as discrete annual data sets and not only as lifetime figures, which is the Commission's current proposal.

T&E therefore recommends that:

- **The published data should be further broken down per: interpolation family, vehicle segment, fuel type, vehicle model, engine model, transmission type and registration year to enable consumers to directly compare the real-world figures of different vehicle models as well as those of different brands.**
- **Data from newly registered vehicles should be published on a quarterly basis for the first year, followed by an annual basis thereafter.**
- **Finally, OBFCM data should be aggregated into discrete annual data sets.**

Data collected from plug-in hybrid cars (PHEVs)

A big problem with PHEVs¹⁰ is the way their type-approval CO2 emissions and electric range are established. This uses overly optimistic assumptions around the ratio of pure-electric driving as a function of the electric range - or utility factors (UF) - that are not underpinned by consistent evidence of how they are used in real life. Worse still, there have been recent consumer reports¹¹ that some PHEVs, by their design, often cannot even be used in a zero-emission or pure electric mode, meaning the combustion engine is always in use.

With OBFCM data, the real world share of PHEV engine and electric motor operation can be analysed. With serious question marks surrounding the actual environmental credentials of PHEVs, the data could be significant in understanding their real world fuel consumption and CO2 emissions. However, to be able to assess the real world performance of PHEVs, it is necessary that significantly more & targeted data is gathered for these vehicles than for traditional combustion engine only cars. The fuel and electrical consumption, distance travelled, as well as the CO2 emissions of every PHEV operating mode¹² should be collected by the OBFCM and transferred to the Commissions or EEA. This is crucial as some PHEV vehicles may have five or more different driving modes, which all make different use of the engine and battery and therefore the fuel and electrical consumption as well as the CO2 emissions of these driving modes will differ.

The real-world fuel consumption and electrical consumption data is important to establish more representative utility factors for PHEVs and should be determined and published by the Commission or EEA on a quarterly basis during the first year for new cars entering the market, followed by an annual basis thereafter. This will equally incentivise all carmakers to improve their PHEV offering, as well as design driver awareness programmes to encourage regular charging.

¹⁰ Also known as off-vehicle charging-hybrid electric vehicles (OVC-HEV).

¹¹ The Guardian, 2020,

<https://www.theguardian.com/business/2020/mar/01/hybrid-carmakers-accused-of-con-over-zero-emissions-claims>

¹² Such as charge depleting or charge sustaining.

Real-world electrical consumption data should also be consistently collected and reported on zero emission vehicles, i.e. those driven on battery or fuel cell. This will help consumers to know the actual range of their cars when used in real-world operation.

- ***To this end, T&E recommends for externally chargeable hybrid electric vehicles, the fuel and electric energy consumed, distance travelled and CO2 emissions distributed over all of the different driving modes should be collected.***
- ***Furthermore, data derived from PHEV OBFCM should be used to establish (and regularly update) real-world utility factors to be used for the purposes of measuring and declaring CO2 emissions of PHEVs. This should be an EU average UF to begin with, with OEM-specific utility factors established and used no later than 2025.***

3.2 How the data should be transferred

In order for the data collected by vehicle OBFCMs to be analysed, the data must first be transferred to the Commission or EEA, for which there are several possibilities¹³. One option is so-called over-the-air (OTA) transfer, which refers to the ability of a vehicle to transmit data wirelessly via secure internet connections established through a mobile network. T&E believes that OTA data transfer is the optimal data transfer pathway for the reasons explained below.

Compared to other possible data transfer pathways (such as roadside spot checks and commercial fleet sampling), OTA transfer is **much more time and cost effective** as it does not require connection to the vehicle's OBD (onboard diagnostics) port. Collecting data from the OBD port, on the other hand, requires increased manpower and effort proportional to the number of vehicles checked due to the need for the vehicle to be directly plugged into a computer or other data collection device. This requires large scale authority-led roadside inspections - so red tape heavy - or for the vehicles to be brought into the dealer on a regular basis - so time consuming.

OTA data transfer directly from the vehicle to the Commission or EEA is also the most **accurate and cheat-proof** method available. Relying on roadside checks and fleet sampling also risks data tampering or manipulation if the data has to first pass through the vehicle manufacturer or Member States before being passed to the Commission or EEA. Similarly, gathering data solely from commercial fleets is unlikely to be representative of the wider EU vehicle fleet (in terms of both driving patterns and vehicle models) and therefore not representative of real world EU fuel consumption.

Another option would be to collect data from vehicles via so-called periodic roadworthiness tests (PTI), which are mandated under Directive 2014/45/EU. However, there are several problems with this approach. Firstly, relying on periodic roadworthiness tests as the primary data collection pathway will mean data from new vehicles is not collected until 3 to 4 years after first registration¹⁴. Given that the Commission must, under the new cars CO2 regulation, already assess by 2023 how this data can be used

¹³ For more details, see ICCT: [One goal, multiple pathways: A review of approaches for transferring on-board fuel consumption meter data to the European Commission](#), 2019.

¹⁴ The current Directive 2014/45/EU on periodic roadworthiness tests does not require the first test for new vehicles until four years after registration, however some Member States require a test after 3 years.

to prevent the real-world emissions gap from growing, this approach would appear to be too late and thus wholly inadequate as it is unlikely the Commission will have enough data by then to actually do so.

Another way suggested is to require manufacturers to report data only if it is made available to them via third parties¹⁵. This is not only unlikely to produce a sufficiently representative data sample - because of e.g. biases of commercial fleets' fuel use (due to fuel cards) - but also increases the risk and likelihood of data tampering. A difficulty of this approach is that a lot of actors need to be included, which could undermine the secure treatment of data (and increase risk of tampering): while some maintenance is done by OEM dealers and their franchises, other drivers might prefer to use independent maintenance dealers or even DIY.

Therefore, **only OTA data transfer is able to provide a cost-effective regular fleet-wide collection of OBFCM data that is needed to ensure a truly representative data sample**. Assessment by the JRC¹⁶ also supports this, concluding that OTA data transfer over a cellular network is the best option available as many new vehicles on the market are already fitted with the necessary technology, and most car brands are publicly committed to a universal roll out of connected car capability (over cellular network connectivity) across their fleets in the next few years.

Unfortunately, as it stands, the Commission's draft text (by DG CLIMA) does not include any requirements for the mandatory collection of OBFCM data using OTA data transfer by the Commission or the European Environmental Agency. The Commission instead proposes that OBFCM data is collected by Member State authorities via periodic roadworthiness tests and from vehicle manufacturers via a national authority (but only if made available to them voluntarily by authorised dealers, repairers, or vehicles by OTA transfer). This would not enable an accurate and complete picture to assess the real-world fuel consumption and emissions of vehicles and is therefore not in line with the principles of the EU car CO2 regulation.

Currently not all vehicles equipped with OBFCM will be OTA capable as the technical specifications are still under development by DG GROW. It is therefore important to finalise this regulation as soon as possible. However, once the technical requirements are finalised and the relevant Implementing Regulation comes into force, OTA data transfer should become the primary method of OBFCM data collection.

However, taking into account the short lead time left until the OBFCM data collection requirements come into force in January 2021, an interim solution will be needed for those vehicles until all new vehicles are OTA capable, in order to avoid a data collection gap and to ensure that the EC has a sufficient volume of data to undertake its assessment of the data in 2023¹⁷. In the interim, manufacturers should require OBFCM data to be retrieved and recorded by all authorised dealers and repairers every time a vehicle is brought in for repair or servicing, and to ensure that the data is made available to the manufacturer on a

¹⁵ The Commission's current draft text states: "Authorised dealer or repairer or by an independent operator as the case may be, or through over-the-air transfer from a vehicle to the manufacturer".

¹⁶ JRC: Over-the-Air transfer of OBFCM data: Exploration of alternative pathways for reporting on-board fuel consumption monitoring data, 2020

¹⁷ According to Article 12(3) of the cars CO2 regulation, "In order to prevent the real-world emissions gap from growing, the Commission shall, no later than 1 June 2023, assess how fuel and energy consumption data may be used to ensure that the vehicle CO2 emissions and fuel or energy consumption values determined pursuant to Regulation (EC) No 715/2007 remain representative of real-world emissions over time for each manufacturer."

continuous basis. This should not place an unnecessary burden upon the vehicle manufacturers given that other data, including warranty and repair information, is already gathered in a similar manner by most, if not all, manufacturers. OBFCM data should continue to be collected in this manner from non-OTA enabled vehicles throughout their lifetime supplemented by OBFCM data collected during PTI inspections.

Therefore, T&E recommends:

- **To set a clear date by which all OEMs & new vehicles on the market will send real-world OBFCM data by OTA data transfer only, no later than 2023.**
- **That all OTA data transfer occurs directly from the vehicle to the Commission or the European Environmental Agency independently of the vehicle manufacturer, or responsible third party, to reduce the potential risk of data tampering or cheating. This approach will also reduce the data collection burden of vehicle manufacturers and Member States and allow for data to be collected automatically on a more regular basis.**
- **That OTA data transfer occurs on a quarterly basis for all newly registered vehicles during their first year on the road, followed by annual collection and reporting thereafter.**
- **As a first/interim step from January 2021, that OBFCM data is retrieved and recorded by authorised dealers or repairers every time a vehicle is brought in for repair or servicing and reported to the European Commission/EEA until automatic OTA transfer is established for all new vehicles (by 2023 at the latest). This first/interim step should, however, continue to be used to collect OBFCM data from all non-OTA enabled vehicles to ensure continued data collection from those vehicles post-2023 and a fully representative fleet wide lifetime data set is established.**

3.3 Access to data

All data (aggregated and anonymised) must be publicly accessible for free and on a regular basis so that third parties can do their 'watchdog job' and for consumers to have an idea of how vehicles perform before making a purchase decision.

- **T&E recommends that access to anonymised data for both manufacturers and relevant third parties should be made available on a quarterly basis.**

This will ensure that the most up to date information is used for monitoring compliance with regulatory targets and that data can be used by the Commission and accredited third parties to monitor the gap.

3.4 Data accuracy verification

The accuracy of on-board fuel consumption meters needs to be verified during the type-approval process, as well as throughout the lifetime of the vehicle, as there is an inherent incentive for vehicle manufacturers to cheat when it comes to real world CO₂ reporting. This is especially the case if, in the future, this data is used to verify compliance with fleet-wide CO₂ emission targets as the Commission is able to impose large fines on manufacturers if targets are not met. While OTA data transfer will ensure data is gathered from the vast majority of vehicles fitted with OBFCM and prevent manufacturers

tampering with data once it is collected from the vehicle prior to transfer to the Commission or EEA (as the data is transferred directly from the vehicle to the Commission/EEA), additional safeguards are necessary to ensure the accuracy of OBFCM throughout the lifetime of the vehicle. For example, to prevent illegal software on the engine control unit (ECU), or transferred to the vehicle over the air, from tampering with the data prior to OTA transfer to the Commission or EEA.

T&E therefore recommends that the following steps are taken to prevent cheating:

- ***Market surveillance and in-service conformity testing should be used to verify the accuracy of the OBFCM throughout the lifetime of the vehicle. Data collected during these tests should also be cross checked against OBFCM data collected by the Commission/EEA and from PTI tests.***
- ***Data transferred to the Commission should be cross checked against OBFCM data collected during PTI.***
- ***The Commission should be empowered to check and verify the OBFCM data submitted and request any detail/explanation necessary and where inaccurate or insufficient data is transferred, vehicle manufacturers should be forced to undertake urgent remedial action.***
- ***Additionally, fleet sampling, for example of commercial fleets where large data sets are easiest to obtain, could also be used to verify the accuracy of the data transferred by OTA, including against fuel logbook data.***

The above recommendations should help to ensure that the transmitted data has not been tampered with. However, additional measures are necessary to ensure the accuracy of the OBFCM itself and to prevent any device or software tampering with the data collected by the OBFCM. In addition to the above points, the Commission should consider introducing the following provisions as part of DG GROW's OBFCM workstream:

- ***Any tampering with the accuracy of the OBFCM or the data obtained from OBFCM should be treated as an illegal defeat device.***
- ***The accuracy of on board fuel consumption meters needs to be properly checked and verified at type-approval during both WLTP and RDE tests.***

4. Longer-term solutions using OBFCM data

4.1 Ensuring real world compliance with CO2 targets

The collection and monitoring of real world fuel consumption data and monitoring the gap between real world and type approval CO2 values should not be seen as an end in itself, but rather an important first step in the process towards ensuring only real world compliance with vehicle CO2 standards.

For the reasons outlined in this paper, it is crucial that laboratory tests are complemented (and eventually replaced) with on-road compliance and enforcement. The new car CO2 standards regulation only envisages the use of real world CO2 values for mandatory compliance with targets as of 2030. This should start much sooner than the 2030 date foreseen by the Commission.

- ***T&E therefore recommends to introduce a correction mechanism that adjusts manufacturers' CO2 targets if the gap between the WLTP type approval test and real world performance grows,***

or reaches a certain threshold to ensure CO2 emission reductions are met in reality and not just on paper¹⁸. This mechanism should be introduced no later than 2027.

- ***Real world checks at type-approval with OBFCMs should be accompanied by independent JRC and third party tests on in-use vehicles to ensure continuous compliance.***

4.2 Check the effectiveness of CO2 ‘eco-innovations’

Under Article 11 of the cars CO2 regulation, manufacturers are incentivised to use innovative technologies or so-called ‘eco-innovations’. Manufacturers who use eco-innovation technologies and demonstrate (via an additional lab test) that they deliver CO2 emission reductions outside of the standard type approval test cycle are allowed to deduct savings of up to 7g CO2/km when determining compliance with their CO2 targets. Manufacturers can use the assumed effectiveness of these technologies to meet their CO2 emission targets, meaning they can do less on making their engines more CO2 efficient or electrifying their powertrains.

Clearly, proper verification of these assumptions is crucial to avoid further gaming of CO2 values, by claiming high credits in manufacturer eco innovation test reports, and subsequent higher real-world emissions. OBFCM data can therefore be used for fleet-wide verification of the real world effectiveness of these eco-innovations, for example, by comparing the CO2 emissions of similar vehicles with and without eco-innovations. The gap between real-world CO2 emissions and type approval values must not be higher for vehicles that use eco-innovations¹⁹ otherwise the eco-innovations do not deliver actual real world CO2 savings.

- ***T&E recommends that OBFCM data is used to check the validity of manufacturers’ claims and the effectiveness of the eco-innovations and, if found to be false, adjust or annul the approved CO2 savings.***

4.3 Improve consumer awareness of vehicles’ real world emissions, fuel and energy consumption, and electric range

Improving consumer awareness of the real world emissions and fuel consumption of cars allows consumers to make informed vehicle purchase decisions, including on the vehicle’s environmental credentials and can have an impact on reducing the EU fleet’s CO2 emissions.

The new cars CO2 regulation requires the Commission to review the EU Car Labelling Directive²⁰ by the end of December 2020. The Car Labelling Directive is an important instrument that sets out the requirements for the labeling of cars at the point of purchase including the required information on the car’s CO2 emissions and fuel consumption. Clear and accurate labelling of cars in terms of their environmental credentials could be a power tool to stimulate demand for more fuel-efficient cars and also help nudge consumers towards electric cars.

- ***Since the WLTP will not close the CO2 gap between laboratory test and on-road emissions performance, T&E recommends that the revised Car Labelling Directive should provide***

¹⁸ For more details on how this adjustment mechanism would work, see Transport and Environment: [How Fuel Consumption Meters can be used to deliver real-world CO2 improvements as part of post-2020 CO2 standards](#), 2018

¹⁹ ICCT: [One goal, multiple pathways: A review of approaches for transferring on-board fuel consumption meter data to the European Commission](#), 2019.

²⁰ (1999/94/EC)

real-world information on fuel consumption, electric range and CO2 emissions to drivers and consumers from data gathered from OBFCM to give accurate information on the fuel economy of their vehicles.

Additionally, with the continued and projected increase of EVs on the European market and with many new models expected from now until 2030, it will be increasingly important to ensure that the real world electric drive range of new EVs matches what is promised to consumers. As OBFCMs are also able to measure the electrical energy consumption of EVs, the Commission should consider collecting data on the electric energy consumption per km for EVs so that consumers can compare the real world electric range of different EVs on the market.

Further information

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