



## **Scientific Advice Mechanism**

### **Scoping paper: Closing the gap between light duty vehicle real-world CO<sub>2</sub> emissions and laboratory testing**

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*Research and  
Innovation*

## **Closing the gap between light duty vehicle real-world CO<sub>2</sub> emissions and laboratory testing**

### **Issue at stake**

The CO<sub>2</sub> standards for light duty vehicles represent a key element of the EU policies for decarbonisation of transport. Under the current test regime there has been however a significant and growing gap between the CO<sub>2</sub> emissions of light-duty vehicles certified at type-approval and their average real-world emissions. This may undermine the effectiveness of EU regulations designed to lower CO<sub>2</sub> emissions, affect national taxation and mislead consumers.

### **Current situation**

The New European Driving Cycle (NEDC) laboratory test is presently used at type approval to certify the emissions and fuel economy of light-duty vehicles. It is widely accepted that it is outdated, with evidence taken from multiple sources indicating a divergence of up to around 40% between the certified emissions and the values experienced by drivers on the road.

There are a number of probable different factors which contribute to the existence and increase in the divergence in the CO<sub>2</sub> and fuel consumption test figures from real driving. These include: the deployment of CO<sub>2</sub> reducing technologies delivering more savings under test conditions than on the road; exploitation of flexibilities in the test; growing deployment of untested energy consuming devices; driving modes; road and weather conditions; trip type; driving behaviour.

For this reason the European Union decided, with the adoption of Regulation 333/2014, to introduce by September 2017 the new World-Harmonized Light duty vehicle Test Procedure (WLTP) which is also laboratory based. The new procedure is expected to substantially reduce the divergence with respect to real-world CO<sub>2</sub> emissions. Nevertheless, it is estimated that even under a WLTP regime, a remaining gap is possible due to a range of factors.

For air pollutant emissions such as particles or NO<sub>x</sub>, the European Union decided to introduce as of 1 September 2017 emission tests for pollutants under real driving conditions on real roads. For this purpose a portable emission measurement system (PEMS) will be used. In contrast to CO<sub>2</sub> measurement where the value itself is important, for the pollutant emissions legislation it is only required to ensure that the emissions are below the maximum permitted level.

CO<sub>2</sub> real emissions depend highly on the driving pattern and conditions, CO<sub>2</sub> being simply emitted by cars without retention or treatment. In the case of air pollutants a series of control devices (particles filters, catalytic converters) are installed in the exhaust systems of cars to reduce emissions. Contrary to NO<sub>x</sub> and other pollutants, fuel consumption is a good proxy indicator of the vehicle's CO<sub>2</sub> emissions. Almost all fuel

consumed is directly transformed into CO<sub>2</sub> and H<sub>2</sub>O when reacting with O<sub>2</sub> present in the air.

Thus at present, for CO<sub>2</sub> emissions, no real driving testing is yet foreseen. However, several studies and research activities have been carried out in this context in the EU.

### **Request to SAM**

The Commission, under the lead responsibility of Commissioner Cañete, intends to present early 2017 a proposal for post-2020 emission performance standards for light duty vehicles to be based on the new more realistic test WLTP. At the same time, while preparing for possible further initiatives for the medium to longer term, options are assessed for going beyond laboratory based tests to be capable of verifying CO<sub>2</sub> emissions in real driving conditions, as it is already the case for air quality.

The Commission has already identified two possible further streams of action, on the one hand by ensuring that the WLTP test is kept as representative as possible of “real-world” CO<sub>2</sub> emissions and on the other by exploring the development of complementary procedures, like the use of large-scale fuel-consumption data or the development of a simulation tool. An ex-post assessment of average real-world emissions would allow subsequently more precise ex-ante testing procedures. Capturing the average real-world driving behaviour and circumstances would incentivise vehicle manufacturers to deploy technologies delivering more CO<sub>2</sub> savings in practice.

In this context, SAM is asked to provide scientific advice in view of improving the measurement of light vehicle CO<sub>2</sub> emissions, also in terms of reliability and transparency. The mechanism could explore the progress on this particular matter also in other parts of the world by capitalising on the international liaisons of the scientists. As regards the possible deployment and exploitation of on-board fuel consumption meters, data protection and ownership issues will need to be duly taken into account.

### **Questions to be addressed by SAM**

- *What is the European and world-wide scientific basis for improving the measurement of light vehicle CO<sub>2</sub> emissions and fuel consumption in order to produce values closer to average real-world data?*
- *Which approaches might be considered, what are their strengths and weaknesses, also in terms of reliability and transparency, and what additional scientific and analytical work would be needed?*

The SAM High Level Group is expected to present a scientifically sound analysis of the various options to inform the policy debate expected over the next years.

The opinion of the SAM HLG should be delivered by October 2016. At this point, the need for further independent scientific advice on this topic will be assessed.

### **Further procedures and actors in support of the SAM High Level Group**

EU academies and the wider scientific community: The EU academies are a key provider of scientific evidence to the SAM HLG. The relevant EU academies will be asked for their inputs. The engagement of leading scientists will be organised.

The European Commission's Joint Research Centre (JRC) will also provide scientific evidence to the SAM HLG having developed substantial expertise in the area of vehicle emissions including the use of Portable Emission Measurement Systems (PEMS) and working in close collaboration with the respective EC policy Directorates-General (DG GROW, DG ENV and DG CLIMA). The JRC has been one of the key contributors to the development of the Real Driving Emissions (RDE) test procedure and has played a significant role in the development and validation of the new Worldwide Harmonized Test Procedure (WLTP). Since 2011, the JRC has supported DG CLIMA in the development of new regulations regarding CO<sub>2</sub> emissions from road transport in Europe. Inter alia, the JRC has developed the software to be used for heavy duty vehicles CO<sub>2</sub> emissions certification as well as a simulator for facilitating the introduction of the WLTP in the European type approval scheme for light duty vehicles.