

The Emission Testing Gap

Why business-as-usual for the conventional car industry cannot continue

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VW scandal: a common practice across an entire industry

The recent revelations concerning Volkswagen (VW) having equipped around 11 million of its vehicles with defeat devices to allow its fleet to produce artificially low NOx emission results when the test is conducted triggered a broader investigation into the entire car maker industry. This in turn confirmed Bellona's long-held assumptions about fraudulent practices and test manipulations being commonplace across the entire car industry. Not only are further car makers being added to the list of cheaters, but the practice has been found to also affect CO₂ emissions: the greenhouse gas around which the UN climate negotiations will be revolving at the Paris COP 21 conference next month.

Despite these alarming findings, the European Commission (EC) announced its decision to delay the introduction of a new, more stringent testing technique for NOx emissions by one year, thus leaving all existing car types exempt from its

application until 2019. This decision was taken despite increasing evidence of car makers' fraudulent practices, the release of a number of reports bringing attention to the ever widening mismatch between reported and on-road emissions, and the growing public awareness of the human-health, environmental and economic repercussions this entails.

What this brief sets out to achieve is show that the currently in use 'New European Driving Cycle' is inadequate and needs to be urgently replaced by an independent and transparent EU type approving system. This new system needs to be accompanied by a fair taxation of diesel, hybrid and plug-in hybrids to accurately reflect on-road emissions. As the evidence of fraudulent emission testing practices keeps piling, the importance of electrifying transport becomes ever more apparent: namely its key role in reconciling the decarbonisation of the transport sector and reducing local air pollution in cities.

The NEDC: its loopholes and their exploitation by car makers

The problem of emission test manipulations is particularly pronounced in the EU, where tests have been governed by the deceptively named 'New' European Driving Cycle (NEDC) which was developed in 1970 and entails long outdated and unrealistic criteria and test procedures. The NEDC test is typically done on pre-production vehicle models in a laboratory environment.



The NEDC test: A 'laboratory' environment, lack of third-party supervision and corrupted type approval authorities

Photo Credit: Wikimedia Commons

During the test cars are equipped with devices which monitor emissions of carbon monoxide, NOx, and particulate matter among other pollutants. A number of the NEDC's features have, however, prevented it from delivering real-world accuracy. Firstly, cars are made go through two different test cycles, namely the urban driving cycle (UDC) and the extra-urban driving cycle (EUDC) which when added together take around 20 minutes and 11 kilometres. No simulation of prolonged motorway driving takes place and the top speed achieved is between 90 and 120kph. In addition to unrealistic conditions, car makers often use optimal settings to improve performance, such as bare minimum of fuel and switching off air conditioning. The list continues. Removing side-mirrors, taping over any crevices (such as car doors) to reduce drag, top-charging batteries every time, and driving on unrealistically

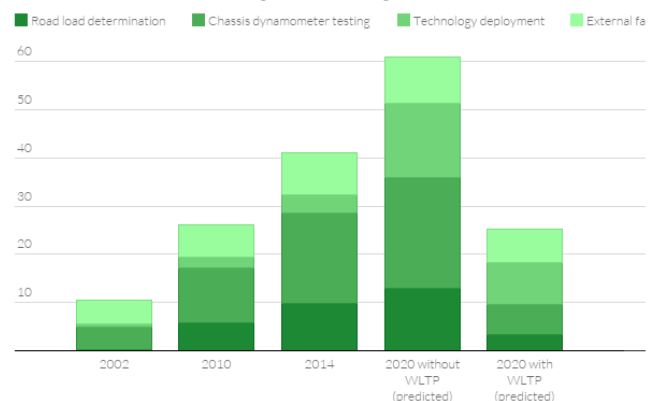
smooth roads are just a few of the changes being allowed within the test parameters, even though these do not have any relation to real use. In the end, the manufacturers are allowed to reduce 4% of measured consumption. By exploiting these loopholes car makers have reported much lower emissions data. This has been reinforced by the lack of third-party supervision and corrupted type-approval authorities.

The growing gap between reported vs. actual emissions

As a result of these deficiencies of the NEDC, car makers have been able to exceed allowable thresholds for air pollutants of NOx and CO₂ mandated by EU law.

How the emissions gap has grown since 2002

In 2002 - 2014, the gap between official and real-world CO₂ emissions for new passenger cars increased from around 10% to about 35%. The new WLTP regime could reduce the gap to about 23%



Source: [Committee on Climate Change Embed](#)

As can be seen in the graph above, in 2002, cars performed 10% better under laboratory tests measuring CO₂ emissions than in the real world. By 2010, the gap had reached 24% and rose again to 35% in 2014. The widening of the gap can be attributed to car makers improving their skills at cheating the system more than focussing on improving car engines. To better illustrate the significance of the gap, a T&E report¹ finds that on average two-thirds of the claimed gains in CO₂ emissions and fuel consumption since 2008 have been delivered through test manipulations.

¹ http://www.transportenvironment.org/sites/te/files/publications/Dont_Breathe_Here_exec_summary_FINAL.pdf

What is more, an ICCT report predicts the gap could be as much as 50% by 2020 if the current testing procedure remains in place, partly as car manufacturers continue to exploit loopholes but also because of the growing uptake of hybrid and plug-in vehicles, which have variable CO₂ output².

Getting emissions testing right is a matter of human lives. A recent study reveals that more than 3 million people a year are killed prematurely by outdoor air pollution, more than malaria and HIV/AIDS combined³. VW's manipulation of emission results for 11 million vehicles means they are responsible for nearly 1 million tonnes of air pollution every year. What makes things worse is that it is the reported emissions data which is used by governments as an indicator to simulate future air pollution levels and set air pollution and public health policies.

The vicious circle of EU air control policies and emission testing

Air pollution control in the EU has been governed by the progressive introduction of increasingly stringent standards. As of September 2015, all newly sold vehicles must comply with the Euro 6 standard which sets maximum allowable exhaust emission levels of NO_x and other pollutants for petrol and diesel cars. For diesel cars, Euro 6 dramatically reduces the permitted level of NO_x emitted down to 80mg/km compared to the 180mg/km level that was required for cars to meet the previous Euro 5 emissions standards. Inadequate emission testing, however, risks undermining the objective of the Euro standards, namely reducing air pollutants. In fact, studies reveal that just one in 10 Euro 6 diesel cars achieve the 80mg/km NO_x limit. The artificially low emission results have in turn served as a basis for the calculation of successive emission limits.

² <https://www.theccc.org.uk/wp-content/uploads/2015/09/Impact-of-real-world-driving-emissions-for-UK-cars-and-vans.pdf>

³ http://www.nature.com/articles/nature15371.epdf?referrer_access_token=554HDpa4cJBQfKPROWbdS9RgN0jAjWEl9jnR3ZoTv0P7-mtyJ35yzVDTICbqYE-

Too little, too late

In attempt to address loopholes in the NEDC, the EC proposed the introduction of new, supposedly stricter, emission testing rules for both CO₂ emissions and air pollutants including NO_x. These are the World Harmonised Light-duty Vehicles Testing Procedure (WLTP) for measuring CO₂ emissions and the real-world driving (RDE) test for NO_x emissions. The RDE would involve using portable emission meters to identify NO_x, and to put on-road cars through a series of tests. The EC, however, last month announced its decision to delay the introduction of this new technique by one year. What this means is that while new types of vehicles will have to undergo these tests from 2017, all existing car types are exempted until 2019, not 2018 as was initially proposed. Scepticism also remains as to whether the RDE test will be able to truly rectify the emissions gap issue as a number of key aspects remain to be finalised, such as the stringency of limits. Member States have been arguing in favour of so-called conformity factors, which would involve 'not-to-exceed' limits and the possibility of raising permitted Euro 6 limit. What is more, the test will initially only apply to diesel NO_x emissions yet these are not the only ones posing a serious health threat to society.⁴

The WLTP for CO₂ emissions, similarly, doesn't appear too convincing as it will be accompanied by a revision of the EU Regulation (EC) 443/2009 setting out CO₂ emission standards for newly sold passenger cars. The initially envisaged CO₂ target of 95g/km to be attained by 2020 will be revised to maintain equivalent stringency with the current NEDC system. This means that even if the new emission testing approach is supposedly stricter, its effect may be undermined by a less stringent emission performance target.⁵ The ICCT predicts

⁴ http://www.transportenvironment.org/sites/te/files/publications/Dont_Breathe_Here_exec_summary_FINAL.pdf

⁵ http://ec.europa.eu/clima/policies/transport/vehicles/cars/documentati on_en.htm

that the tougher WLTC regime would narrow the gap to around 23% but automakers would still be able to exploit a number of loopholes. As a result, the gap could again grow to 31% after 2020. This is a clear indication that the WLTP will only be a short-term remedy.

Why preferential treatment to plug-in hybrids can be particularly harmful?

As can be seen from the graph below (ICCT, 2015) the real-world discrepancy for hybrids is even greater than for ICE cars, and may well be even more so for plug-in hybrids. For instance, the most popular plug-in vehicle in the EU, the Mitsubishi Outlander, has emissions of 49g/km according to NEDC calculations but **three times higher** than this on the road⁶. This reflects the particularly favourable testing assumptions under the NEDC for plug-in hybrids, but also a lack of understanding about how hybrids will be used in future, and how and when plug-ins will be recharged.

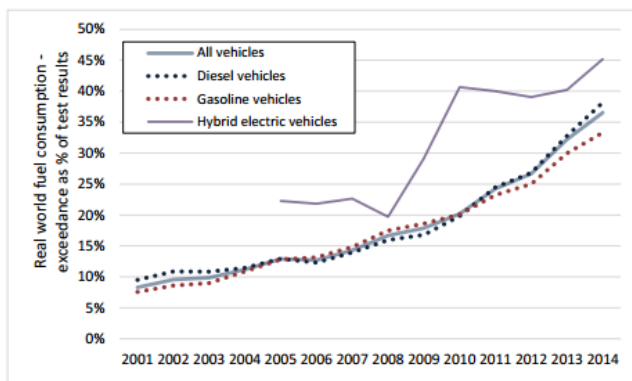


Fig 9: Size of the real-world gap for different engine/fuel types

Test manipulations have enabled car makers to reduce their costs of complying with EU regulations by roughly €7 billion⁷. This cost has instead been incurred by society – in the form of deadly air pollution levels and associated health problems, and by governments, who have incurred substantial revenue losses in terms of omitted tax income. It is time for the car maker industry's true societal costs to be internalised.

⁶http://www.transportenvironment.org/sites/te/files/publications/TE_Mind_the_Gap_2015_FINAL.pdf

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What is the way forward?

Improved emission testing is an important precondition for the accurate taxation of ICEs, hybrids and plug-in hybrids based on their true societal and environmental costs. This in turn means that electric vehicles, where no emissions of NOx and CO₂ take place, are competing on a fair basis with ICEs, hybrids and plug-in hybrids.

Bellona's recommendations for the way forward:

- Establish an EU independent type-approval authority, operating under a clear and transparent mandate;
- Ensure third-party monitoring and sporadic spot checks;
- Conduct test driving under realistic conditions representing real-world weather and road conditions;
- Ensure an open and accessible display of emissions data on the EC's website, so that consumers can make informed purchase decisions ('naming and shaming approach');
- The maximum allowable discrepancy under the new test between reported and actual emissions should not exceed 10%;

Beyond emission testing, to stronger measures for EV uptake:

- Ensure that taxation of diesel, hybrids and plug-in hybrids reflects on-road emissions;
- Put in place tax incentive schemes to encourage users of plug-in hybrids to recharge their more vehicles frequently.

Even if emission testing is improved and vehicles taxed fairly to reflect real-world emissions, there are limits to how much the efficiency of combustion engines can be improved. This means that soon it will be cheaper and more sustainable to incentivise and heavily invest in EVs. If the transport sector is to make a serious contribution to reaching a decarbonised and pollution free society, urgent commitment is needed to enacting stringent and accurate testing techniques, as well as introducing fiscal incentives for the wider uptake of electromobility.

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