

### Context and summary

Car buyers deserve reliable fuel consumption data as the less fuel is consumed, the lower CO<sub>2</sub> emissions and cheaper the car is to run and often tax. A growing body of evidence shows the current test is outdated, unrepresentative of real-world driving and lax enough to allow carmakers to systematically manipulate official test results at the expense of consumers' trust.<sup>1</sup> European institutions are presently finalising a regulation to lower CO<sub>2</sub> emissions from cars and vans in 2020.<sup>2</sup> This has stimulated intense debate when and how a new official test should be introduced. This briefing informs this debate in the light of new evidence from the International Council on Clean Transportation (ICCT)<sup>3</sup> that for the first time compares progress in official and real-world vehicle fuel efficiency on a brand-by-brand basis. It shows that all brands achieve less progress on the road than in the official figures. On average only about half (55%) of the improvement claimed in tests resulted in lower emissions and fuel consumption on the road and that there are substantial differences between carmakers. The data illustrates at present there is no level playing field and a new test is needed to provide robust data to consumers, ensure regulations achieve their objectives, and enable fair competition between carmakers.

### What's the problem with the current test?

Official CO<sub>2</sub> and fuel consumption are measured in the laboratory as part of the system of Type Approval – a range of checks that are usually performed on a pre-production car to ensure new vehicles meets EU safety and environmental regulations. There are serious limitations with the current system of testing, known as NEDC:

- The test is over 30 years old and unrepresentative of real-world cars and driving involving slow accelerations and low average speeds with the car stationary for 20% of the test. The test therefore underestimates real emissions and carmakers deploy technology on vehicles to meet regulations (such as stop-start) that is far more effective in the test than on the road
- During the test energy-guzzling accessories like air-conditioning, navigation and media systems, and heated-seats are switched off lowering the official test results
- The test procedures are outdated and lax and contain many loopholes that carmakers are increasingly exploiting to lower the results
- There are no checks to ensure that vehicles actually sold achieve similar results to those that are tested.

### What is the difference between official test results and real-world driving?

New research from the ICCT (2013) illustrates that the gap between official test results and real-world performance is growing rapidly throughout Europe. For example, a large database of real-world fuel consumption in Germany (Spritmonitor) indicates the gap has increased from 7% in 2001 to 23% in 2011. The growing gap is not caused by the way the car is driven or the size of the car or road conditions. The size of the gap is largely determined by the technology choices made by the carmaker to improve efficiency and the extent to which the test results are manipulated. The Spritmonitor data analysed by the ICCT (2013) shows in 2001, 14% of drivers could match official test results for fuel economy but by 2011 this had fallen to just 2%.

<sup>1</sup> T&E 2013, [Mind the Gap](#)

<sup>2</sup> Regulation (EC) No 443/2009 of the European Parliament and of the Council of 23 April 2009 ....

<sup>3</sup> ICCT 2013 From Laboratory to Road

### How and which carmakers manipulate emissions tests?

A new expert study for the European Commission<sup>4</sup> demonstrates the many ways carmakers are able to manipulate test results (see Figure 3, page 3). By creative interpretation of the test procedures carmakers are able to achieve multiple small improvements that lower the test results. Cars tested using the official procedure without utilising flexibilities or specially preparing the car produce results 19-28% higher than type approval values.<sup>5</sup>

All carmakers optimise test results to some extent, but the ICCT analysis demonstrates that the average difference between the test and real-world performance of carmakers vary substantially (Figure 1). Cars produced by BMW, Audi, Vauxhall/Opel (GM) and Mercedes (Daimler) observe the largest gaps, typically 25-30%. The lowest differences, on average around 15%, are found with cars made by Renault, Peugeot Citroen (PSA) and Toyota. It is notable carmakers producing cars with lower emissions generally manipulate the test less than those producing gas-guzzlers.

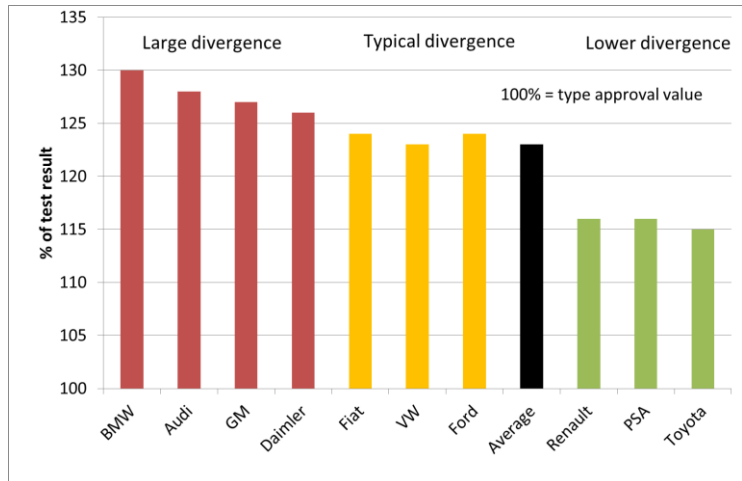


Fig 1: Difference between manufacturers' test results and average real-world driving in 2011 (derived from ICCT, 2013)

### How much of the claimed improvement in tests is achieved on the road?

T&E has reanalyzed the ICCT (2013) data to compare how much of the improvement in emissions claimed by manufacturers between 2005 and 2011 has actually been delivered on the road (Figure 2). On average only about half (55%) of the improvement claimed in tests resulted in lower emissions and fuel consumption on the road. There are substantial differences between carmakers with GM and Ford delivering less than a third of the progress measured in test on the road – and Toyota, PSA and Renault more than three-quarters.

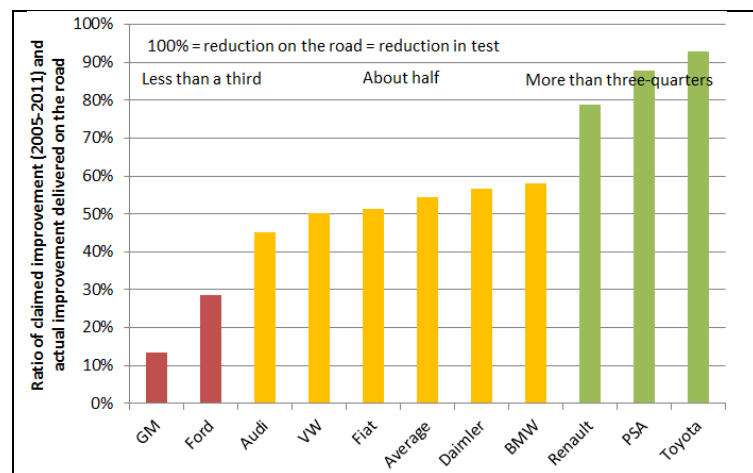


Fig 2: Percentage of the actual improvement in emissions 2005-2011 realised on the road

<sup>4</sup> TNO 2012, Supporting Analysis regarding Test Procedure Flexibilities and Technology Deployment for Review of the Light Duty Vehicle CO<sub>2</sub> Regulations: Note on options for reducing test cycle flexibilities, Framework Contract No ENV.C.3./FRA/2009/0043, European Commission DG Clima, Brussels

<sup>5</sup> TNO 2012a, Road load determination of passenger cars, TNO report TNO 2012 R10237, Delft

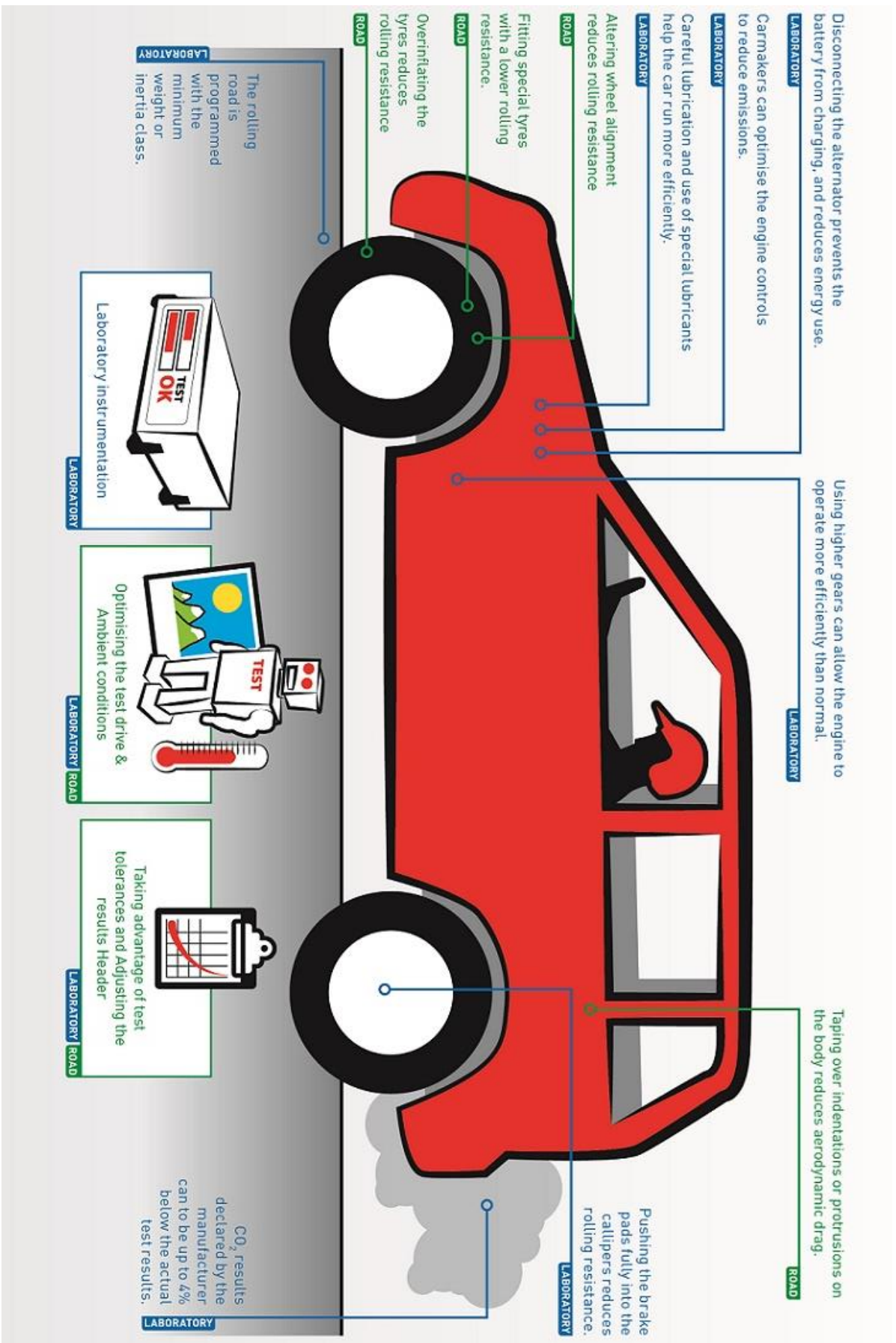


Fig 3: Common ways caremakers manipulate tests for CO2 emissions and fule economy

## What are the reasons for the gap between test results and real-world performance?

Consultants for the European Commission estimated the extent to which manipulation of the tests has contributed to the improvement in official CO<sub>2</sub> figures (TNO, 2012). They conclude around 30% of the net CO<sub>2</sub> emission reduction between 2002 and 2010 does not result from technology deployment and that “utilisation of flexibilities may account for two-fifths to one half of the net CO<sub>2</sub> emission reduction between 2002 and 2010.” From their detailed findings, the causes of the current gap can be estimated to be:

- About 25% due to flexibilities in the laboratory test
- 25-35% due to flexibilities in the road-load test (part of the test conducted outdoors)
- 10-20% due to omissions from the test (like air conditioning systems)
- 10-20% due to the NEDC cycle being unrepresentative
- 10-20% because the test procedure allows the test results to be lowered after the final result has been produced.

## How much progress would be made towards 2015 targets without test flexibilities?

T&E has analysed whether carmakers are on track to achieve their 2015 targets *on the road too*, instead of on paper only. There is a clear split between some that are on track, or better and others making inadequate progress on the road.

The record of Toyota, PSA and Renault shows it is entirely possible to achieve regulatory targets on the road and without excessively manipulating test results – but some companies, for example GM and Ford, have chosen to achieve their targets just in the laboratory thereby cheating their customers, regulators and the environment.

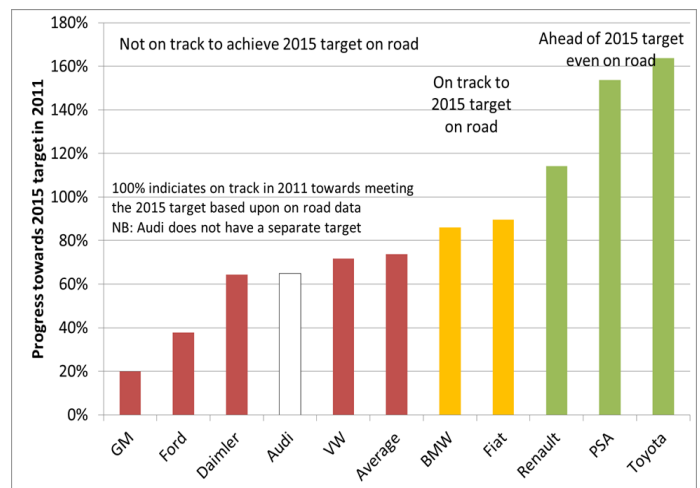


Fig 4: Progress (in 2011) towards meeting 2015 regulatory targets on the road

## What's the solution?

A new global testing system (World Light Duty Test Cycle and Procedures - WLTC/P) has been under development at the UN's Economic Commissions for Europe (UNECE) for several years and will be finalised in the spring of 2014. This test cycle is more representative of real-world driving and the test procedures are more robust. The European Parliament<sup>6</sup> and European Commission have proposed this new test is introduced in 2017. T&E supports this approach but would also like to see loopholes in the current NEDC test closed in the meantime. Carmakers oppose the introduction of the new test because it will reduce their ability to manipulate test results in the future.

The introduction of WLTP will require the 95g CO<sub>2</sub>/km average target for carmakers to achieve for new cars in 2020 to be modified because this is based upon the NEDC test. The European Commission has embarked upon an exercise to do this using a combination of testing under both NEDC and WLTP systems and computer modeling.<sup>7</sup> This represents a robust approach but should ensure that carmakers are not rewarded for the current manipulation of testing procedures. The conversion of the new target is a highly technical exercise, therefore it should be conducted through a technical analysis rather than political co-decision. This will ensure

<sup>6</sup> [http://www.europarl.europa.eu/oeil/popups/ficheprocedure.do?reference=2012/0190\(COD\)&l=en](http://www.europarl.europa.eu/oeil/popups/ficheprocedure.do?reference=2012/0190(COD)&l=en)

<sup>7</sup> <https://circabc.europa.eu/w/browse/8455c93f-f896-495a-a41b-463a4209a3bc>

the stringency of the target is retained without reopening current debates. Inevitably, the change in test procedures will result in carmakers targets being slightly adjusted. This is inescapable, but should be done in a way that seeks to minimise market disruption. The ICCT analysis shows currently there is no level playing field now and the introduction of WLTP will help to address this.

If the new test is not introduced, this will result in the 95g target being delivered to a large extent through flexibilities in the test procedure. By 2020, the gap between test and real-world performance will have grown to 38% if current trends continue.<sup>8</sup> By 2020, these will be worth about 15g, effectively raising the target to 110g/km. For drivers, this will mean additional fuel costs of over €2,000<sup>9</sup> over the lifetime of the car.

The European Parliament has also proposed a valuable amendment to discourage carmakers from manipulating test results. This would introduce checks on production cars before they are sold (so called in-service conformity checks) to ensure cars achieve similar emissions and fuel economy to type approved vehicles. The approach would require a small number of tests to be repeated on production cars; where the results deviate excessively (by more than 4%), the higher value will apply in the following year. Since only small samples will be checked, the task is not expensive or administratively burdensome and manufacturers would be asked to meet the cost of checks. A similar system in the US recently identified Hyundai-Kia had reported incorrect data.

#### **Further information**

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<sup>8</sup> Assumes the gap continues to grow to 2020 at the same rate as from 2001 to 2011

<sup>9</sup> Based on Spritmonitor data and assumes the gap grows from 23% in 2011 to 38% in 2020; fuels costs €1.6/l; 250,000km vehicle lifetime.