Honest fuel consumption figures of passenger cars
For consumer rights and climate protection
Background

Car manufacturers are obliged to issue honest fuel consumption and CO₂ emissions figures that can be verified under real-world (on-road) driving conditions. The corresponding Regulation (EC) No. 715/2007 stipulates that type-approval fuel consumption must correspond to in-use fuel consumption throughout the lifetime of the vehicle under normal conditions of use.

However, long-term studies by the Environmental Action Germany (Deutsche Umwelthilfe, DUH), the European umbrella organisation Transport and Environment (T&E), and the independent research organisation International Council on Clean Transportation (ICCT) reveal a very different picture. The actual fuel consumption of new passenger car models increasingly differs from the official specifications of the manufacturers. While the average deviation from type-approval fuel consumption levels in 2001 was about 9%, in 2015 it reached an average value of 42%, without there being any change in test methods or the type-approval procedure during this time.

Until 2008, a voluntary commitment by the automotive industry to reduce average CO₂ emissions of new passenger cars ran in the EU. According to it, average CO₂ emissions were to be cut to 140 grams CO₂ per kilometre (g CO₂/km) by 2008. However, manufacturers missed the target. They failed to take the measures necessary to increase vehicles’ fuel-efficiency. As a result, the European Commission introduced mandatory CO₂ emissions targets for new passenger cars in 2008; the regulation was adopted in April 2009. Climate-damaging CO₂ emissions of passenger cars have since been regulated by a EU-wide regulation: Regulation (EC) No. 443/2009.

According to the regulation, the average CO₂ emissions value of all new passenger cars sold by a manufacturer in a year must be below a certain limit. Failure to comply with the limit values is punishable by payment of fines. These are manufacturer-specific limits, which depend on the average weight of the new cars sold: heavy fleets are allowed to emit more CO₂ than lighter ones. In 2020, average CO₂ emissions of new passenger cars will be limited to 95 g CO₂/km. This limit value corresponds to a consumption of 3.6 litres of diesel fuel or 4.1 litres of gasoline per 100 kilometres. If a manufacturer exceeds his specific CO₂ limit value, he must pay 95 for every gram of CO₂ above his target value and for each vehicle sold.
Since the introduction of mandatory CO₂ emission limit values in 2008, official CO₂ emissions figures of passenger cars have been declining. Since then, however, the deviation between the official fuel consumption data and the actual performance of new vehicles has risen particularly sharply. The success of the allegedly declining CO₂ emissions in the past few years is thus becoming less and less real. **In fact, average CO₂ emissions of new passenger cars in everyday operation have remained virtually unchanged since 2009.** The target of 130 g CO₂/km set by the European Commission for 2015 has been met on paper, but is still absent in reality, as can be seen in the following overview for Germany.

The main reason for this development is that, at present, there is no consistent monitoring of fuel consumption data by any independent body in Germany or in other EU member states. The competent authorities accept the information supplied by the manufacturers without confirmatory tests. **There are no checks, something which is urgently needed; to date, there have been no effective penalties in the event of breaches.** That is why, in the last few years, car manufacturers have been able to optimise their vehicles for type approval without hindrance and to extend their test manipulations in a very deliberate manner. Meanwhile, in some cases, certain software is installed in the vehicles that can detect when the car is undergoing emissions testing and can thus employ a mode that uses less fuel than outside the laboratory. That is why CO₂ emissions values measured in the laboratory are significantly lower than average CO₂ emissions in everyday operation. No adequate measures have as yet been implemented on the part of the authorities to prevent these inadmissible practices in the automobile industry.
The problem of the increasing discrepancy between official data and real-world fuel consumption figures is not limited to certain car manufacturers, but is, rather, systematic. In its “From Laboratory to Road” study, the ICCT analysed the fuel consumption gap levels of various manufacturers and vehicle segments and discovered marked differences between some of them. The umbrella organization T&E, that is cooperating with the DUH in this campaign, has supplemented this information by providing figures for additional manufacturers. Premium vehicles stand out on account of their particularly high deviations. For example, in 2015, new Daimler and Audi car models consumed on average around 50% more fuel than officially stated.

The DUH has been pointing to the discrepancy between the official and real-world values for years. In 2007, it disclosed the fraud perpetrated by the car manufacturers and explained in detail how it came about. Manufacturers are creating enormous advantages for themselves with these “sugar-coated” fuel consumption data: the lower the official fuel consumption and CO₂ emissions figures, the more easily the car manufacturer can meet its EU CO₂ target and thus avoid punitive fines. A lower value also makes a car more attractive to customers, as the amount of car tax levied in many EU member states is calculated based on the CO₂ type-approval data, among other vehicle parameters. Last but not least, the vehicle in question appears to the consumer to be cost-effective in operation due to allegedly low fuel consumption figures.

The supposedly fuel-saving car is thus not only deceptive in terms of climate protection, but also ensures that the driver will experience frustration at the filling station and have to deal with unexpected fuel expenses.
**How is this fraud possible?**

Type-approval CO₂ emissions are measured on a roller test bench, where a defined driving cycle and defined driving conditions are simulated. The aerodynamic and rolling resistance and the inertia of the test vehicle are determined in advance on an outdoor track by letting the vehicle roll out (so-called coast down test). The results of the coast down test are used to set the resistance values of the roller test bench.

The reason for the ever-increasing gap between laboratory values and actual fuel consumption values lies primarily in the increasingly absurd manipulations on the part of the manufacturers – both on the roller test bench and during the coast down test. In the meantime, manufacturers prime the test vehicle for the test in such a way that it has hardly anything in common with the later production vehicle.

The aerodynamic and rolling resistance values of a test vehicle are significantly lower than the average of the corresponding production vehicles. In order to minimize the weight and drag of the test vehicle, several hundred kilos of interior equipment, seats, linings, brake pads, and exterior mirrors are often removed. The cracks in the doors and radiator grille are taped up; the tyres are overinflated and hardened with heat.

On the roller test bench, the motor control software detects that the car is being subjected to a test and, in some cases, switches to a low-consumption mode. A further example is the switching off of the alternator during the test to prevent the car battery from charging. Other manufacturers are suspected of having manipulated fuel consumption values with steering wheel angle recognition. One such software program has been documented by the Californian environmental authority CARB (California Air Resources Board) for a model with automatic transmission: according to CARB findings, a fuel-saving mode was activated when the steering wheel was not turned after starting up – as it isn’t when it is on the roller test bench. As soon as the steering wheel was turned by more than 15 degrees, another switching program was activated, and the vehicle consumed significantly more fuel and had higher CO₂ emissions.

Further, since vehicles are to be tested without extra equipment, manufacturers tend to offer ordinary equipment as extra equipment. For example, replacement tyres, an air-conditioning system or a radio are offered as extra features rather than these items being part of the basic equipment. Some models have only two doors in their basic configuration; other vehicle models have a small fuel tank, which, for an extra charge, can be exchanged for a fuel tank of standard size.

In addition, car manufacturers can specify a CO₂ value that is up to 4% lower than actually measured in the laboratory. In the meantime, the high level of precision of the existing measuring devices allows this leeway to be exploited to almost its full extent. Other measurement tolerances, e.g. with regard to the speed profile or temperature, are similarly exploited.

**This is not a matter of legal tricks or the exploitation of unregulated test rules, but deliberate cases of manipulation.**

Here is an overview of the ways in which manufacturers can manipulate official data:
Using higher gears according to a test-optimized gear shift program allows the engine to operate more efficiently than on the road (valid for vehicles with automatic transmission).

Disconnecting the alternator prevents the battery from charging and reduces energy use.

Carmakers can optimize the engine control strategy to reduce fuel consumption under test conditions.

Pushing the brake pads fully into the callipers reduces rolling resistance.

Taping over indentations or protrusions on the body reduces aerodynamic drag.

Careful lubrication and use of special lubricants help the car run more efficiently.

For NEDC testing, the lightest available version of a vehicle model is tested. No optional vehicle equipment or payload is taken into account.

CO₂ results declared by the manufacturer can be up to 4% below the actual test results.

Taking advantage of test tolerances and adjusting the results header.

Laboratory instrumentation: exploiting the tolerances for laboratory instruments provided for the test (e.g., high test temperature).

Optimizing the coast-down test track and ambient conditions.

Overinflating the tyres reduces rolling resistance.

Fitting special tyres with a lower rolling resistance.

Alter wheel alignment reduces rolling resistance.

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The consequences of this development for the environment, the consumer as well as for the economy and governments are manifold.

» **Climate protection efforts are being undermined:** As a result of the higher fuel consumption of the vehicles, significantly more CO₂ emissions than officially assumed and prescribed within the framework of the CO₂ emissions regulation enter into the atmosphere. As a result, EU climate protection efforts for the transport sector are effectively being undermined.

» **The consumers are also the victims:** Incorrect fuel consumption and CO₂ emissions data issued by car manufacturers now lead to car drivers experiencing increased fuel costs of up to € 7,000 per vehicle. The DUH documented these additional costs when it evaluated the real-world fuel consumption of the 30 vehicles with the highest number of new registrations (January 2017) over an assumed lifetime of 200,000 kilometres, based on on-road fuel consumption estimates reported by the ICCT. According to the ICCT, the additional annual cost for the average car driver is now about € 450 per vehicle. Consumers are being left to deal with this problem by themselves.

» **The economy is being harmed:** An increasing number of companies are trying to reduce the average CO₂ emissions of their fleets. The EU CO₂ fleet limit values for passenger cars serve as a benchmark with regard to this. The efforts of these companies are being undermined by actual additional fuel consumption figures. Additional fuel costs which were previously not taken into account thus arise. Moreover, the European automotive industry neglects genuine innovations for efficient vehicles so long as the evidence of low CO₂ emissions on paper is sufficient. However, the industry should be developing fuel-saving technologies in order to keep pace with global competition.

» **Shortfalls in tax revenue for governments:** In Germany, the Federal Minister of Finance will receive about € 2.6 bn less tax revenue in 2017 alone. Since 2009, besides cylinder capacity, official CO₂ emissions of cars are used to calculate motor vehicle taxes in Germany and other member states. If a vehicle has a higher fuel consumption level, the state would also have to charge higher motor vehicle taxes. Due to the falsified fuel consumption data, the losses in tax revenues are immense.

**National authorities tacitly accept fraud**

To date, no adequate mechanism has been put in place by the authorities to prevent the unacceptable practices of the car industry. The underlying EU regulation (Regulation (EC) No. 715/2007) stipulates that the officially declared fuel consumption data must be aligned with in-use surveillance test results. When a significant discrepancy is identified, sanctions should be imposed that are „effective, proportionate and dissuasive“. For years, though, national authorities have remained idle.

**Manipulations carried out by manufacturers cannot be ruled out if the emissions data provided by them are not checked by an independent body.**

A different approach is being followed in the U.S., where there is a strong focus on independent checks. Both prototypes and in-use vehicles are randomly selected and tested. The US Environmental Protection Agency (EPA) forces car manufacturers to correct their data if the deviations ascertained exceed 4%, publishes the frauds detected, and can order recalls and demand fines of up to three-digit million sums. Moreover, in the U.S., great importance is attached to data transparency and consumer information. For example, an official website on the topics of fuel consumption and vehicle emissions targeted at consumers (https://www.fueleconomy.gov/) is maintained there. Consumers have access to the actual fuel consumption values of current and older vehicle models. Furthermore, car drivers can enter their actual fuel consumption values.
The problem is not the test cycle.

In September 2017, the new test procedure WLTP (Worldwide Harmonized Light-Duty Vehicles Test Procedure) will be introduced in the EU. Compared to the NEDC (New European Driving Cycle) test cycle, the new cycle introduces certain changes that should lead to realistic fuel consumption values: the new test cycle is longer and more dynamic, and it prescribes a higher average and maximum speed. To determine the test weight, extra equipment and the payload of the vehicle are considered to make the simulation of the vehicle’s rolling resistance more realistic. Moreover, the external temperature at which the engine is started is lower than in the previous test cycle.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>NEDC (Euro 6)</th>
<th>EU WLTP</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Test cycle</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cycle</td>
<td>NEFZ</td>
<td>WLTP</td>
</tr>
<tr>
<td>Cycle length</td>
<td>11,03 km</td>
<td>23,27 km</td>
</tr>
<tr>
<td>Duration</td>
<td>19,66 minutes</td>
<td>30 minutes</td>
</tr>
<tr>
<td>Average speed</td>
<td>34 km/h</td>
<td>47 km/h</td>
</tr>
<tr>
<td>Top speed</td>
<td>120 km/h</td>
<td>131 km/h</td>
</tr>
<tr>
<td>Percentage of idle time</td>
<td>24%</td>
<td>13%</td>
</tr>
<tr>
<td>Shifting system (manual gear boxes)</td>
<td>Fixed gear shift points</td>
<td>Vehicle-specific</td>
</tr>
<tr>
<td><strong>Rollout test</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tread depth</td>
<td>50% to 90%</td>
<td>80% to 100%</td>
</tr>
<tr>
<td>Tyre pressure</td>
<td>Not defined</td>
<td>Vehicle-specific</td>
</tr>
<tr>
<td><strong>Vehicle weight</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test mass</td>
<td>Kerb weight + 100 kg</td>
<td>Kerb weight + 100 g + extras + pay-load</td>
</tr>
<tr>
<td>Inertia (classification of test vehicles according to inertia behaviour)</td>
<td>Discrete classes</td>
<td>No classes, vehicle-specific</td>
</tr>
<tr>
<td><strong>Temperature</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outdoor temperature of the preconditioning hall and test cell</td>
<td>20°C to 30°C</td>
<td>14°C / 23°C</td>
</tr>
<tr>
<td>Starting temperature of engine</td>
<td>Cold</td>
<td>Cold</td>
</tr>
<tr>
<td><strong>Other parameters</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mileage of the test vehicle</td>
<td>Max. 3,000 km</td>
<td>3,000 to 15,000 km</td>
</tr>
<tr>
<td>Battery charge level</td>
<td>Not defined</td>
<td>Is not allowed to be charged before the cycle</td>
</tr>
</tbody>
</table>

However, merely switching over to a new test procedure is not a long-term solution. The basic problem remains. Despite all the improvements with the introduction of the WLTP, it cannot fully depict real-world driving conditions and it will likely have legal pitfalls, which manufacturers will exploit to reduce CO₂ emissions on paper. Further, it will still be possible for manufacturers to fit vehicles with software to optimise vehicle emissions in the laboratory but not under real driving conditions. Additional control mechanisms are required to reduce the discrepancy between official and real-world data sustainably.
Including CO₂ emissions in the EU RDE (Real Driving Emissions) regulation would be an important step forward. According to this regulation, vehicle emissions have to be measured on the road using a mobile measuring system (a Portable Emission Measurement System [PEMS]). The route is arbitrary and acceleration and braking are done at random. This is to prevent vehicles from being calibrated for a narrowly defined operating range in the laboratory only instead of for real-world driving conditions. As of September 2017, RDE measurements are required in the EU, but, so far, only the particle count and the concentration of nitrogen oxides are to be determined. What is also important, however, is that CO₂ emissions, which are tracked automatically during PEMS measurements, are also incorporated in the evaluation of the results and regulated. Measurement results must then be made accessible to the public.

Furthermore, random retests of emissions from series production vehicles in everyday operation are essential. The RDE regulation does not cover all driving conditions of the everyday operation of normal passenger cars, e.g. journeys at higher speeds are still excluded from exhaust gas tests. In addition, according to the current version of the RDE regulation, manufacturers themselves may decide which vehicles should be tested. As a rule, the test vehicles are carefully prepared prototypes, which deviate strongly from the mass-produced cars. In addition, manufacturers are allowed to carry out half of the RDE tests themselves, which offers further possibilities for manipulation. Only with a correctly defined testing framework do RDE measurements offer a useful supplement to achieve realistic fuel consumption values.

So long as the gap between official laboratory values and actual fuel consumption figures is not drastically reduced, governments must be held responsible. They have an obligation to ensure that consumers can rely on the manufacturer’s data in the future.

**Our demands**

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**Type-approval procedure**
- Complement laboratory-based type-approval values with on-road RDE testing
- Transparency & reproducibility

**Market surveillance**
- Establishment of an independent official body to monitor real-world fuel consumption
- In-use conformity testing of CO₂ emissions
- Correction of type-approval values in case of official vs. ex-post control discrepancies over 4%
- Impose penalties for non-compliance

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**Consumer rights & information**
- Establishment of an official contact point for false fuel consumption figures
- Support for the enforcement of consumer rights

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Improvement of consumer protection law and establishment of an official contact point

We demand the appointment of a competent authority responsible for false fuel consumption figures, which collects the ascertained deviations from type-approval fuel consumption figures, and helps consumers to enforce their rights against car manufacturers. Aggrieved consumers must not be left to cope with this alone.

In Germany, according to a landmark decision of the Federal Court of Justice, every car owner with a proven increase in fuel consumption of more than 10% compared to the laboratory measurements can demand that the car be bought back and compensation paid. In reality, affected car owners have hitherto had to cope with a legal dispute lasting many years with specialized lawyers and high appraiser costs, without receiving any support from the authorities.

Establishment of an independent body to check official fuel consumption values as well as consistent market surveillance

We demand the immediate introduction of official follow-up spot checks of official CO₂ and air pollutant emissions data by an independent body, analogous to those in the U.S. This also includes checking the coast down parameters as specified by the manufacturer for the laboratory measurement (e.g., rolling resistance). To date, these parameters have not been made publicly available and, therefore, cannot be verified by third parties.

The independence of follow-up checks is indispensable insofar as there are financial links between automobile manufacturers and technical services in the current type-approval procedure. In principle, manufacturers are free to authorise a technical service of their choice to carry out the tests.

The test vehicles should be selected from stock on a random basis as well as when suspicions arise. The data collected must be made publicly available. If a relevant deviation of 4% or more between the manufacturer's specification and the laboratory result of the independent follow-up test is ascertained, the official consumption values must be corrected. Violations must be sanctioned. This is already common practice in the U.S. today.

In the future, in-use checks of fuel consumption data must also be carried out on the road. This is the only way to ensure that fuel consumption data are not distorted by detection of the test cycle and the manipulations in the official test procedure.

Complement the type-approval procedure with CO₂ emissions checks under real driving conditions

In the future, type-approval CO₂ emissions values should be determined on the basis of on-road measurements, as it is already foreseen for nitrogen oxides and other air pollutant emissions. In this way, expected real-world emissions can actually be depicted.
„Get Real: Demand fuel figures you can trust“

The DUH is counteracting this development with the consumer protection campaign „Get Real: Demand fuel figures you can trust“. Together with our project partner Transport & Environment (T&E), we will intensify our efforts towards ending consumer deception in the coming years. Car buyers have to be able to rely on honest fuel consumption figures in the future.

WHAT IS OUR CAMPAIGN ABOUT?

The aim of the campaign is to make public the illegal practices of the manufacturers, such as using test vehicles that deviate significantly from the production models. At the same time, authorities and political decision-makers are to be encouraged to enforce existing regulations and to carry out official investigations. Any discrepancies ascertained shall be published and, in the event of fraudulent practices, sanctions shall be imposed which are „effective, proportionate and dissuasive“. This is what we have in mind:

» We will improve consumer rights. In the future, consumers should be able to make a sound purchase decision and should be able to fight back against misleading fuel consumption data.

» We will encourage the establishment of an official contact point, which will collate any deviations from fuel consumption, make them publicly available, and help to enforce consumer rights.

» A comparative study on consumer rights in various EU countries will be published. A compilation of frequently asked questions and tips regarding how to deal with misleading fuel consumption data will provide legal guidance for aggrieved consumers. Drivers will thus receive essential support for greater legal security in order to counteract distorted fuel consumption figures.

» In addition, we will develop a fuel consumption app, which will allow drivers to enter their own fuel consumption values and view other users’ real-world fuel consumption data of older and current passenger car models. This will provide a large information pool on real-world fuel consumption data, one which is accessible to everyone.

» Over the next few years, we will carry out our own emissions and fuel consumption tests with representative new cars and evaluate the new WLTP test procedure. In addition to making the findings available, we will draw attention to the independent checks that are needed to ensure honest fuel consumption figures.

» We will promote the exchange of experiences between major players in the EU on the subject of fuel consumption. In expert talks and conferences, we will discuss the technical, administrative, and legal aspects together with representatives from politics, science, industry, and other NGOs in order to establish effective control mechanisms and ensure that existing legislation is actually implemented.

» By carrying out intensive press and public relations work, we will continue to inform the public about the topic and create greater awareness of the problems. This includes media events and background discussions, as well as social media activities.

» The campaign provides background information in various languages.
“Get Real” is a joint project between:

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