“Real-world” fuel consumption and CO₂ emissions of new European passenger cars exceeded official type-approval values by approximately 42% in 2015, according to a new update to the International Council on Clean Transportation’s From Laboratory to Road study. Since 2001, the gap between official measurements of vehicle efficiency and actual performance in everyday driving has more than quadrupled.

KEY FINDINGS

» Average divergence of real-world from type-approval CO₂ emissions increased from roughly 9% in 2001 to about 42% in 2015. The trend was particularly pronounced in recent years: The gap more than doubled between 2009 and 2015.

» As a result, less than half of the on-paper reductions in CO₂ emission figures since 2001 have been realized in practice. Since 2010, hardly any real-world reductions in CO₂ emission values have been achieved.

» Company cars generally show a higher divergence (approximately 45%) than private vehicles (approximately 40%). The size of the gap differs significantly among vehicle manufacturers and market segments. Plug-in hybrid electric vehicles stand out with particularly high divergence values.

Figure 1. Divergence between real-world and manufacturers’ type-approval CO₂ emission values for various real-world data sources, including average estimates for private cars, company cars, and all data sources.
For an average vehicle owner, the discrepancy translates into additional fuel expenses of approximately €450 per year.

The gap is a result of increasingly unrealistic type-approval CO₂ values rather than changes in driving behavior.

The discrepancy between real-world and official CO₂ emission values is expected to continue to grow unless the certification test procedure changes. The average gap would likely grow to about 50% by 2020 under a business-as-usual scenario. If the Worldwide Harmonized Light Vehicles Test Procedure (WLTP) is implemented as planned by 2017, the gap would likely decrease to approximately 30% by 2020.

But the WLTP will have its own shortcomings and should therefore be complemented by other forms of vehicle testing: random conformity testing of production vehicles by independent bodies (as already mandated by U.S. fuel economy regulations) and on-road testing of CO₂ emissions (as mandated for nitrogen oxide emissions in the EU since 2016).

BACKGROUND AND METHODOLOGY

Official CO₂ and fuel consumption values of new passenger cars (so-called type-approval or certification values) are determined in laboratory tests using the New European Driving Cycle (NEDC).

In 2001, new passenger cars in the EU had an average type-approval CO₂ value of 170 grams per kilometer (g/km), which corresponds to a fuel consumption figure of roughly 7.3 liters per 100 kilometers (l/100 km). After mandatory CO₂ fleet targets for new passenger cars were introduced in the EU in 2008, average CO₂ emission values decreased sharply, to 120 g/km (roughly 5.1 l/100 km) in 2015. The 130 g/km fleet target for 2015 was reached two years in advance.

In 2013, collaborating with the Institute for Energy and Environmental Research Heidelberg (IFEU) and the Netherlands Organisation for Applied Scientific Research (TNO), the ICCT published From Laboratory to Road, documenting for the first time a discrepancy between real-world and type-approval CO₂ emission values that was increasing over time. The report has been updated each year since.

The 2016 update to the From Laboratory to Road series brings together data for approximately 1 million vehicles from seven countries and 13 data sources. The data includes user entries from free web services (Spritmonitor.de – Germany, honestjohn.co.uk – United Kingdom, Fiches-Auto.fr – France), fuel consumption measurements from company cars (Travelcard – Netherlands, LeasePlan – Germany, Cleaner Car Contracts – Netherlands, Allstar fuel card – United Kingdom), and vehicle tests from magazines and websites (AUTO BILD – Germany, auto motor und sport – Germany, auto motor & sport – Sweden, km77.com – Spain, Emissions Analytics – United Kingdom, Touring Club Schweiz – Switzerland).

The divergence of real-world from type-approval values is expressed as a percentage of the type-approval figure. While driving style, vehicle characteristics, and driving conditions vary, aggregating large amounts of real-world data reveals clear trends in the average performance gap.
Figure 2. Estimate of the reasons for the discrepancy between type-approval and real-world CO₂ emission levels for new passenger cars in the past as well as in the future, with and without introduction of the WLTP.