

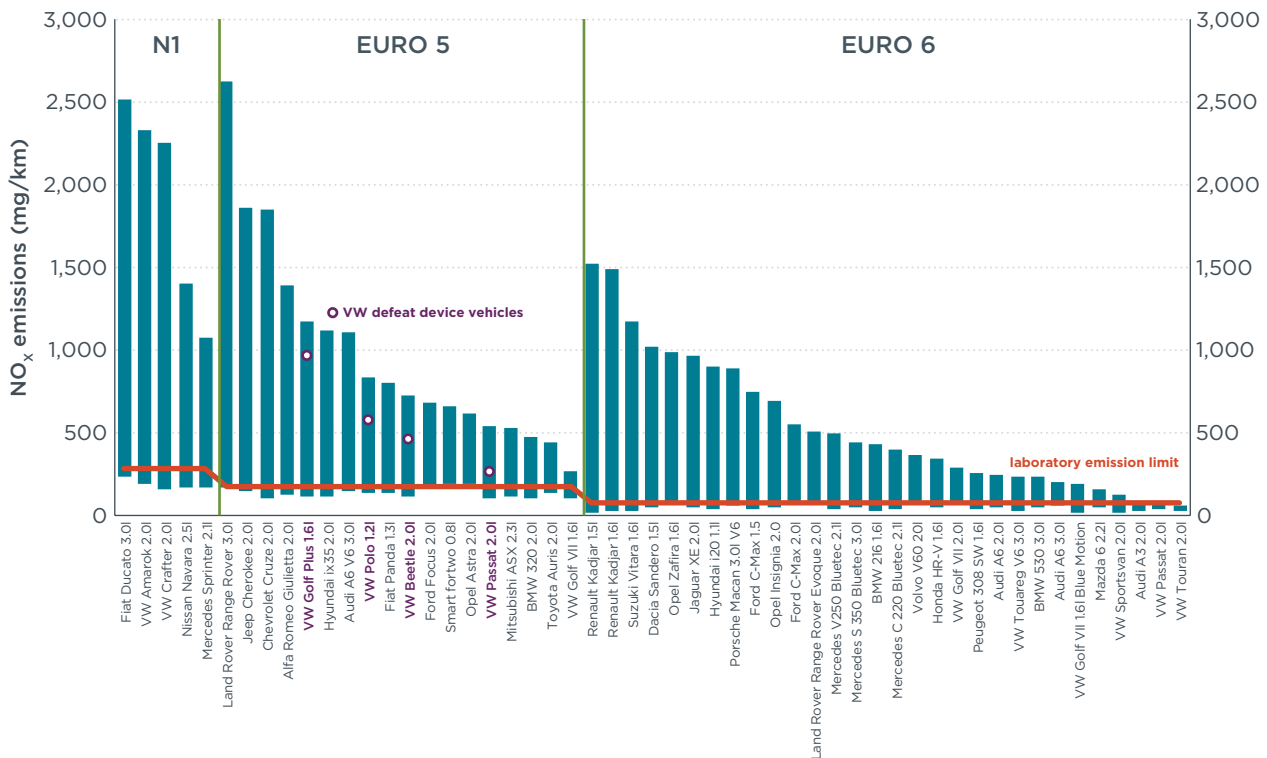
## VEHICLE EMISSIONS TESTING IN THE EUROPEAN UNION

### THERE IS A GROWING GAP BETWEEN TYPE-APPROVAL AND REAL-WORLD EMISSIONS

- » The discrepancy between type-approval and real-world **carbon dioxide (CO<sub>2</sub>)** emission levels of new cars in Europe is growing, **from 8% in 2001 to 40% in 2014**. As a result, real-world CO<sub>2</sub> emission (and fuel consumption) levels of new cars have only marginally decreased in recent years.
- » Euro 5 diesel cars are required to meet a **nitrogen oxides (NO<sub>x</sub>)** emission limit of 180 mg/km, measured according to the New European Driving Cycle (NEDC) test procedure in the laboratory. For Euro 6 diesel cars, the

limit is 80 mg/km. **Real-world emission levels are on average about 7 times higher**, at about 560 mg/km for Euro 6 diesel cars. For comparison, real-world emissions of modern diesel heavy-duty trucks are about 180 mg/km, and of Euro 6 petrol cars about 50 mg/km.

- » Systematic vehicle testing, for example by the German government (see Figure 1), confirms that **high real-world NO<sub>x</sub> emissions are an industry-wide problem**, not restricted to the confirmed illegal defeat devices present on some Volkswagen models.



**Figure 1.** Overview of recent laboratory and on-road vehicle emissions test results by the German Ministry for Transport (lower level corresponds to NEDC laboratory test, upper level to max. on-road test result).

## UNDERLYING REASONS INCLUDE LOOPHOLES AND A LACK OF ENFORCEMENT

- » For CO<sub>2</sub> and fuel consumption, the NEDC testing procedure includes **a number of regulatory loopholes that vehicle manufacturers are increasingly exploiting**. Loopholes exploited as part of the so-called coastdown testing by themselves explain about one-third of the overall discrepancy level for CO<sub>2</sub> and fuel consumption. For example, vehicle manufacturers can select tires with particularly low rolling resistance, harden them in an oven and overinflate them prior to testing. In addition, **some vehicle technologies are specially optimized for the NEDC testing procedure** (for example, stop-start technology), and the **air conditioning is turned off** during testing.
- » For diesel car NO<sub>x</sub> emissions, recent testing confirms that **vehicle manufacturers are applying a wide range of defeat devices** that reduce or shut off the exhaust aftertreatment under conditions that are outside the NEDC testing procedure. These include ambient temperatures below 20°C and above 30°C or velocities above 145 km/h. To justify using these defeat devices, **vehicle manufacturers claim that there is need for protecting the engine or emission aftertreatment against damage**.
- » There is competition between Type Approval Authorities (TAA) and also between Technical Services (TS), as vehicle manufacturers can choose freely when commissioning the type-approval of a new vehicle model. This results in a **potential conflict of interest** for TAA's and TS's.

## A SOLID VEHICLE EMISSIONS TESTING SYSTEM WILL REQUIRE SEVERAL PILLARS

- » For the future it is important to **cover a wide range of driving conditions when testing vehicle emissions**. The Worldwide Harmonized Light Vehicles Test Procedure (WLTP) will provide wider coverage and should be introduced as planned by September 2017. It is important to recognize that the WLTP is only a partial solution, as it will be limited to laboratory testing and it is likely to introduce new loopholes.
- » The Real Driving Emissions (RDE) test will, for the first time, **include on-road testing of new vehicles as part of the type approval procedure**. As a next step, the RDE should be extended to cover cold-start emissions, higher loads, as well as CO<sub>2</sub> emissions and fuel consumption.
- » Vehicle type-approval documents in Europe are currently kept secret and should be available to the public. For example, vehicle manufacturers and Type Approval Authorities refuse to disclose vehicle coastdown results that are a critical input to laboratory test procedures. In the U.S., the same information is freely accessible online, provided by the U.S. Environmental Protection Agency. **The same level of transparency is needed in the EU** to allow independent laboratories to carry out vehicle testing, and to regain the public trust.
- » Currently in the EU, vehicle manufacturers do not inform the authorities about the use of alternative aftertreatment strategies. In the future, if a vehicle manufacturer wishes to deploy such a defeat device, the **details of the functioning of the defeat device as well as detailed reasoning should be provided to the authorities for approval**. The EU must also issue guidance to clarify how to evaluate and approve or reject claims of exception to the vehicle emissions control defeat device prohibition.
- » **Independent confirmatory testing is currently not foreseen in the EU**, unlike in the U.S. where the authorities periodically re-test randomly selected vehicles (see Figure 2). Furthermore, **independent testing of in-use emissions of vehicles will need to be introduced** in the EU as well. If deviations between type-approval emission results and re-tests from independent bodies are found, **penalties should be enforced**. Such an enforcement system will require adequate resources and expertise within the authorities at the EU and/or Member State level.

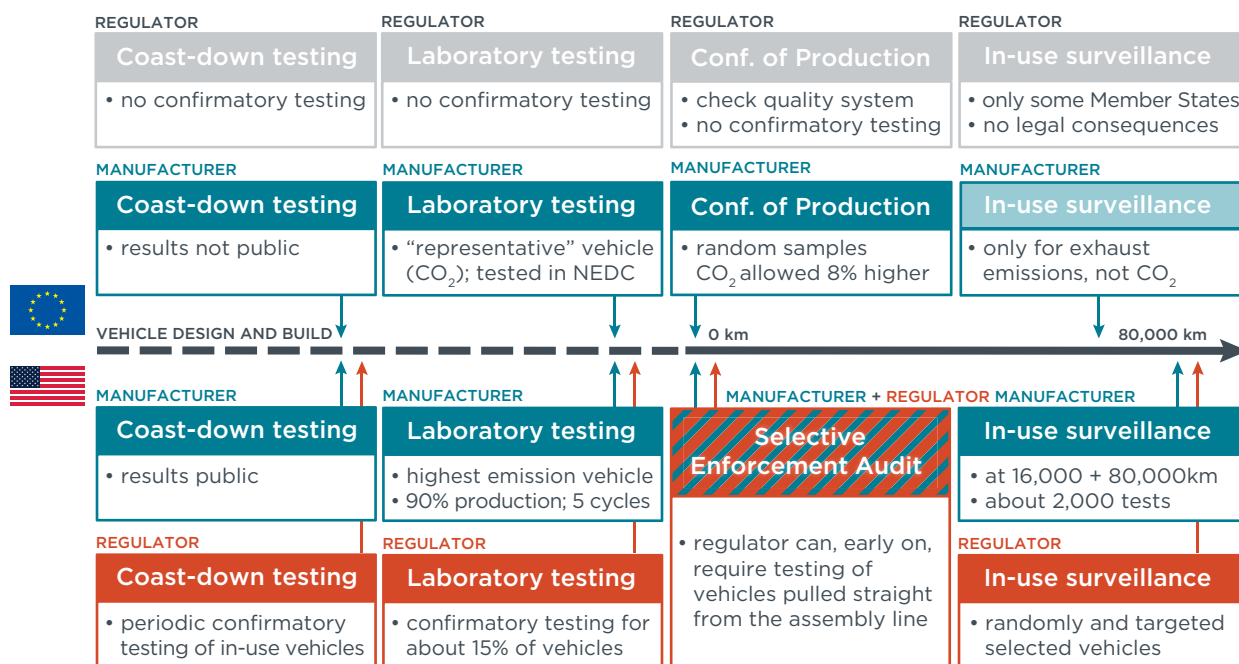


Figure 2. Overview of the EU and U.S. vehicle emissions testing and enforcement schemes.

## MORE INFORMATION

- » The European Real-Driving emissions regulation: <http://www.theicct.org/european-real-driving-emissions-regulation>
- » Defeat devices under the U.S. and EU passenger vehicle emissions testing regulations: <http://www.theicct.org/european-real-driving-emissions-regulation>
- » From Laboratory to Road - A 2015 update of official and "real-world" fuel consumption and CO<sub>2</sub> values for passenger cars in Europe: <http://www.theicct.org/laboratory-road-2015-update>
- » Official vs. real-world road-load parameters in EU vehicle efficiency testing: <http://www.theicct.org/effect-roadload-coeffs-co2-emissions-eu>
- » Real-world exhaust emissions from modern diesel cars: <http://www.theicct.org/real-world-exhaust-emissions-modern-diesel-cars>
- » NO<sub>x</sub> control technologies for Euro 6 diesel passenger cars: <http://www.theicct.org/nox-control-technologies-euro-6-diesel-passenger-cars>
- » The future of vehicle emissions testing and compliance—Aligning regulatory requirements, customer expectations, and environmental performance in the EU: <http://www.theicct.org/future-of-vehicle-testing>
- » Results of the German transport ministry's post-VW vehicle testing: <http://theicct.org/blogs/staff/first-look-results-german-transport-ministrys-post-vw-vehicle-testing>
- » Results of post-VW diesel vehicle testing in France, UK: <http://theicct.org/blogs/staff/first-look-results-post-vw-diesel-vehicle-testing-france-uk>
- » Defeat device testing in the EU: So far, not so good: <http://www.theicct.org/blogs/staff/defeat-device-testing-eu-so-far-not-so-good>
- » The emissions test defeat device problem in Europe is not about VW: <http://www.theicct.org/blogs/staff/emissions-test-defeat-device-problem-europe-not-about-vw>

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