

90% of the world's population breathes polluted air

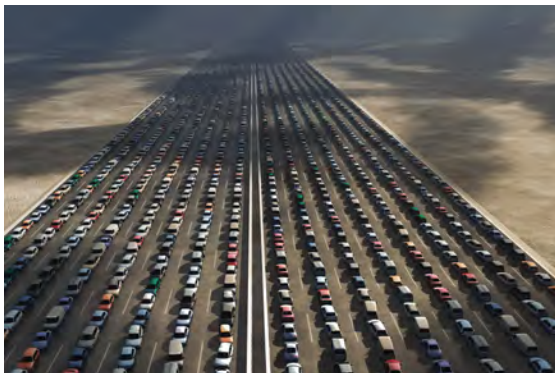


25% of that pollution being caused by transportation; the main sources being petrol and diesel cars. The Government has announced ambitions to end sales of new conventional petrol and diesel cars and vans by 2040 as part of efforts to tackle climate change and air pollution.

In a future preparing to be moved electrically and autonomously, e-mobility and electric vehicles is one of the most urgent and most heatedly debated topics of today. Electrification and autonomous vehicles are dominating the automotive and motorsport news and are set to gather speed as regulatory and industry challenges are confronted.

One of these challenges, facing all OEMs is the new Worldwide Harmonised Light Vehicle Test Procedure (WLTP) and the Real Driving Emissions (RDE) test which replaced the New European Driving Cycle (NEDC) type-approval test which had been in use (with developments) since 1992.

Real-world driving emissions tests – what are they? And why is it important? Alex Vasiliou, Principal Engineer – Emissions Testing at Integral Powertrain (IP) explains and shows how IP are addressing these challenges.



Why do we have them?

Previously, for a car to meet its Euro standard and be made available for mass consumption, it had to pass a test known as the New European Driving Cycle (NEDC) type-approval test, which dates back to the 1980s and was last updated in 1997.

Motorists however have not been able to achieve the fuel economy figures claimed by manufacturers in their advertising and literature. This is primarily because the NEDC tests were carried out in laboratory settings, not on real roads.

This and the 'diesel gate' scandal led to the emergence of tough new tests which were implemented in September 2017. The NEDC was replaced with the new Worldwide Harmonised Light Vehicle Test Procedure (WLTP) and the Real Driving Emissions (RDE) test.

What are real-world driving emissions tests?

Real-world driving emissions tests measure the pollutants a car produces while being driven on real roads as opposed to being solely tested in a lab that simulates real-life driving conditions.

When a car manufacturer produces a car it has to meet a Euro emissions standard, set by the European Union. This standard is in place to ensure the cars that are rolling off

the production lines aren't polluting too many harmful substances into the environment.

To guarantee the cars meet the standard, they have to be tested - real-world driving emissions tests are the latest of these tests.



WLTP Vs RDE Test Cycles - What are they?

What is the RDE Test?

Poor air quality is a major issue. Nitrogen Oxides (NOx) are a key contributor to outdoor air pollution. Long-term exposure to high levels of NOx is linked to a range of adverse health outcomes, including respiratory conditions, as well as stroke, ischemic heart disease, chronic obstructive pulmonary disease, and lung cancer. New research by the International Council on Clean Transportation (ICCT) estimates that 11,400 early deaths in Europe each year are linked to 'excess' diesel NOx emissions – emissions under real-world driving conditions above legal limits.

The Real Driving Emissions (RDE) test measures the pollutants, such as NOx, emitted by cars while driven on the road. RDE does not replace the WLTP laboratory test, but complements it. RDE ensures that cars deliver low emissions over on-road conditions. Europe is the first region in the world to introduce such on-road testing, marking a major leap in the testing of car emissions. Real Driving Emissions (RDE)

features a car being driven on public roads for between 90 minutes and two hours over a route of at least 48Km. The test must include a roughly, equal measure of town, urban or rural and motorway driving. Elevation changes are also mandated, as are testing temperatures.

The Portable Emissions Measurement System (PEMS) will analyse tailpipe emissions of toxic gases such as NOx and CO₂, but also soot particles to ensure all cars meet strict Euro 6 emissions standards on the road as well as in the lab. The PEMS used for testing are sophisticated pieces of equipment, but there is no 'standard' equipment, which means different suppliers might deliver different RDE test results. Due to the accuracy of the PEMS, authorities are using it to only verify certain pollutants such as NOx, rather than calculate fuel economy and CO₂ figures from it. With this in mind, the tests will include a 'conformity factor' to allow for a margin of error.



WLTP testing under laboratory conditions

What is the WLTP Test?

Real Driving Emissions (RDE) testing is complimented by WLTP tests. The WLTP is conducted under laboratory conditions defined by EU law. The Worldwide

Harmonised Light Vehicle Test Procedure (WLTP) laboratory test measures everything from fuel consumption and carbon dioxide (CO₂), to nitrogen oxides (NO_x), particulates and carbon monoxide (CO). The ultimate aim is to improve air quality and tackle climate change. The new test is faster, longer, and more dynamic, with the introduction of new variables to deliver results that are more reflective of real-world conditions.

Where the old NEDC test determined test values based on a theoretical driving profile, the WLTP cycle was developed using real-driving data which was gathered from around the world. WLTP therefore better represents everyday driving profiles. The WLTP will introduce much more realistic testing conditions. These include:

- More realistic driving behaviour;
- A greater range of driving situations (urban, suburban, main road, motorway);
- Longer test distances;
- More realistic ambient temperatures, closer to the European average (14°C);
- Higher average and maximum speeds;
- Higher average and maximum drive power;
- More dynamic and representative accelerations and decelerations;
- Shorter stops;
- Optional equipment: CO₂ values and fuel consumption are provided for individual vehicles as built;
- Stricter car set-up and measurement conditions;
- Enables best and worst-case values on consumer information, reflecting the options available for similar car models.

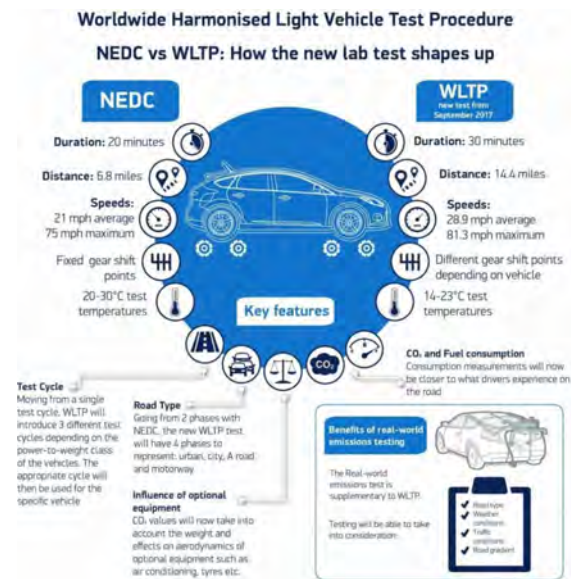


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WLTP simply cannot cover all variations globally – and certainly not every individual driving style. Also in the future, driving behaviour, traffic and weather conditions will continue to differ from one country to another – and therefore individual fuel consumption and CO₂ emissions will also vary.

The WLTP driving cycle is divided into four parts with different average speeds: low, medium, high and extra high. Each part contains a variety of driving phases, stops, acceleration and braking phases. For a certain car type, each powertrain configuration is tested with WLTP for the car's lightest (most economical) and heaviest (least economical) version.

Combined, the WLTP and RDE tests should narrow or eliminate the gap between theory and reality.

Are plug-in hybrids and electric cars measured?

In order to obtain type approval, electrified vehicles will also have to be tested according to the new WLTP rules in Europe. Just as the fuel consumption figures for vehicles with internal combustion engines will change with the WLTP's roll-out, the same will apply to the range specifications of pure electric cars and plug-in hybrid vehicles. There are however CO2 incentive issues with the new testing and Germany's VDA motoring authority highlights how tough the WLTP is on PHEVs.



Integral Powertrain installed Horiba Vulcan II Xtra Cold Dynamometer

What part does Integral Powertrain play?

Integral Powertrain prides itself on being the UK's only independent testing facility capable of providing certified emissions testing from passenger cars to light commercial vehicles. Their Emissions and Driveline Test Facility (EDTF) has recently undergone a multi-million pound investment to re-inforce its position and capabilities and ensure compliance to national, EU and International standards and regulations.

The investment means IP now have a compliant vehicle emissions testing facility,

based around state of the art Horiba equipment, featuring a high power 4WD dynamometer, the latest emissions analysers, integrated STARS test automation, and a truly unique cold climate control system.

Key features of the EDTF are:

- Vehicle emissions (legislative and development)
- Worldwide Harmonised Light Vehicle Test Procedure (WLTP)
- Federal 40 CFR Part 1066
- Fuel consumption
- Vehicle and powertrain control system development
- OBD and calibration development
- Performance work
- Climatic testing
- Real Driving Emissions (RDE) testing
- Each test chamber can run tests independently with gasoline or diesel exhaust systems
- Facilities are available for part or full project and turn-key work

Integral Powertrain's team of test specialists, engineers and technicians provide a wealth of expertise in testing to regulations and standards, to client specific requirements and in the development of appropriate test procedures and methods. To learn more take a tour of our [website](#) or call 01908 278600 to discuss your requirements with one of our emissions' specialists.