

## EURO 6/7 ET CO2 EUROPE

### Comparison of real world fuel consumption versus WLTP measured fuel consumption

#### 1. Executive summary

The WLTP regulation aims at providing a world-wide harmonised method to determine the levels of gaseous and particulate emissions, fuel or energy consumption, electric range, under different conditions in a repeatable and reproducible manner designed to be representative of real world vehicle operation.

Within European type approval and certification procedures, WLTP is intended to be designed in a manner to reflect the diversity of the real world driving conditions and to solve the problem of customer perceptions on the gap between real world and type-approved fuel consumption. However, the tests conducted show that even if WLTP contributes to reduce this gap, differences with real-life conditions still remain significant. Consequently, the French automobile manufacturers suggest the adoption of a weighting factor approach in order to solve this issue (at least partly).

#### 2. Explanation of gap between real world fuel consumption and type-approval fuel consumption

Facing the customer's scepticism on fuel consumption differences, it is important to note that manufacturers comply with the type-approval regulation in a legal framework. The measured fuel consumption through this legal framework is used as customer information on the vehicle performance. The fuel consumption figure is always validated by an independent authority (type approval authorities, often public authorities).

In view of the diversity of the on-road vehicle usage, the difference between the individual customer fuel consumption and the type approved fuel consumption can be explained as follow:

- individual driving behaviour has an important influence on fuel consumption, whatever the representativeness of the type-approval fuel consumption. The same vehicle in the same conditions, driven by two different customers will have different consumption performance. Some drivers may drive the car below the homologated figure if they are aware of the relationship between their driving styles and fuel consumption. The automotive industry tries to address this issue with embedded driving aids technologies (such as GSI) coupled to additional eco-driving training,
- inherent difference between real world driving conditions and laboratory tests prescribed by legal requirements. Driving test cycles are designed by averaging different driving conditions which necessarily deviate from everyday condition. The currently undergoing work for new test cycle and procedures should limit this gap (to a certain extent).

### 3. What about the gap between real world and WLTP fuel consumptions?

Tests have been performed in order to compare real real world fuel consumption<sup>1</sup> with consumption, as shown by the blue curve in Figure 1.

This comparison shows that:

- **WLTP reduces the gap between real world and type approval fuel consumption, but the difference still remain significant**, in particular for large cars.
- **WLTP tends to under estimate the engine displacement and vehicle mass** in terms of fuel consumption (cf. the WLTP's slope in Figure 1). This effect is linked to :
  - the length of the cycle (23,3 km) 50 % longer compared to an average trip (15 km) recorded in among the largest Members States (FR, UK, DE – see value in Annex).
  - the over representation of high speeds. The average speed of the 4 phases is higher than the one reported in current statistics (Average speeds encountered in Europe are in a range of 36 to 43,5 km/h; 6 to 22 % lower compared to the 46,5 km/h in WLTC (current version).
  - the energy efficiency's gap reduction, between a downsized engine and another, as the engine's load increases.
- **Consequently WLTP has a direct impact on future technology development choices**

There is no incentive to develop environmentally friendly technologies to reduce CO2 emissions such as downsizing, mass-reduction, stop/start, hybrid vehicles.

WLTP impact on certain technologies:

	Real life customer advantage	WLTP
Stop / Start	-2,9 gCO2/km	-1,7 gCO2/km
Hybrid vehicle	up to 50 % energy efficiency in urban condition	up to 20% energy efficiency

As illustrated, with WLTP the difference between type-approval and real world fuel consumption still remain important especially for large vehicle and high-powered engines. To address this situation, the French automobile manufacturers suggest the adoption of a weighting factor approach as stated below.

### 4. French proposal : weighted WLTP

The test cycle (WLTC) should be representative of real world operations of the vehicle in terms of fuel/energy consumption measurement and must allow checking pollutant emissions compliance. France considers that high speeds are over-represented in the cycle phases Low/Middle/High/extra-High, and consequently proposes to apply a weighting factor approach. It could consist for example (French proposal EU-WLTP 23th of April 2013) in weighting each cycle phase as follows: 75% applied to sequence (Low + Middle), and 25% applied to sequence (High + extra-High).

<sup>1</sup> Real world fuel consumption is obtained through consumers surveys, covering a variety of vehicles : gasoline engines : 1,2 – 1,6 l with and without turbocharger, Diesel engines : 1,4 l – 2 l, vehicles : class B – C SUV, gearbox : manual and automatic, with and without stop and start.

5. What about the gap between real world and weighted WLTP fuel consumptions?

- **weighted WLTP provides a greater reduction of the gap and so fits better with the intended objective of WLTP.** Weighted WLTP provides more representativeness of real world conditions; and thus contributes to restore consumer confidence with the type approved fuel consumption figures. Weighted WLTP's slope is less important than WLTP's slope, cf. Figure 1, and thus maintains the CO2 benefits of existing environmentally friendly technologies.
- however, **weighted WLTP tends to increase fuel consumption** compared to WLTP base-line (up to 0,6 l/100 km), higher differences are expected for high-powered or larger vehicles,

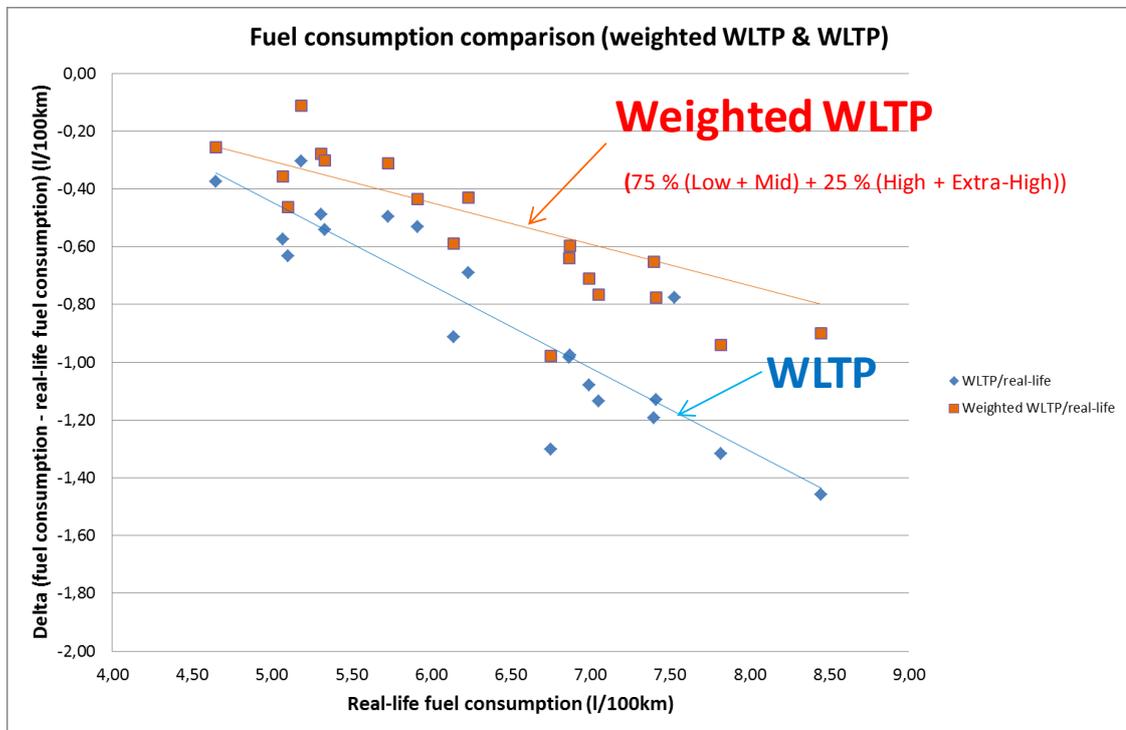


Figure 1. Fuel consumption comparison (weighted WLTP, WLTP)<sup>2</sup>

<sup>2</sup> J-N.LESUEUR – Confidential PSA, *Real-life and WLTP fuel consumptions* – September 9, 2013

**Annex:** characteristics of trips recorded in some Members States

trips	WLTC v5	FR	UK	DE	IT	NEDC
Average speed (km/h)	46,5	40	35,9	43,5	40	33,6
Legal top speed (km/h)	131,3	130 110 (rain condition)	112,6	130 recommended on unlimited portions	130 110 (rain condition)	120
Average trip distance (km)	23,26	13,6	13,7	16,5	10,8	11

**Data sources:**

**FR**

National transport Inquiry and trips in 2008

<http://www.statistiques.developpement-durable.gouv.fr/transports/trv/deplacementmobilite/parc-automobile-menages.html>

**UK**

Transport statistics Great Britain 2011

<http://assets.dft.gov.uk/statistics/releases/transport-statistics-great-britain-2011/roads-and-traffic-summary.pdf>

**DE**

Mobilitaet in Deutschland

[http://www.mobilitaet-in-deutschland.de/02\\_MiD2008/publikationen.htm](http://www.mobilitaet-in-deutschland.de/02_MiD2008/publikationen.htm)

**IT**

Fiat eco-drive database

[http://www2.fiat.co.uk/uploadedFiles/Fiatcouk/Stand\\_Alone\\_Sites/EcoDrive2010/fr/ECO-DRIVING\\_UNCOVERED\\_full\\_report\\_2010\\_FR.pdf](http://www2.fiat.co.uk/uploadedFiles/Fiatcouk/Stand_Alone_Sites/EcoDrive2010/fr/ECO-DRIVING_UNCOVERED_full_report_2010_FR.pdf)