



# REWARD

REal World Advanced Technologies for Diesel Engines

EUROPEAN COMMISSION

Horizon 2020

H2020-MG-2014-2015

GA No. 636380



<b>Deliverable No.</b>	REWARD D6.6	
<b>Deliverable Title</b>	Demonstrate fuel consumption and emissions	
<b>Deliverable Type</b>	REPORT	
<b>Dissemination level</b>	Confidential – member only (CO)	
<b>Written By</b>	Stefan Bohatsch	2018-06-01
<b>Status</b>	<b>FINAL</b>	2018-06-05
<b>Checked by</b>	Stefan Bohatsch (VCC) WP6 Leader	2018-06-01
<b>Submitted to Executive Board</b>		2018-06-04
<b>Approved by Executive Board (EB)</b>	Approved and accepted by all members of Executive Board	2018-06-05

H2020-MG-2014-2015 – 636380 – REal World Advanced Technologies for Diesel Engines

**Acknowledgement:**

The author(s) would like to thank the partners in the project for their valuable comments on previous drafts and for performing the review.

**Project partners:**

- 1 - AVL - AVL List GmbH - AT
- 2 - REN - Renault SAS - FR
- 3 - VCC - Volvo Car Corporation - SE
- 4 - CRF - CRF SCpA - IT
- 5 - CNRIM - Istituto Motori – Consiglio Nazionale delle Ricerche (CNR) - IT
- 6 - JM - Johnson Matthey Plc - UK
- 7 - RIC - Ricardo Plc - UK
- 8 - SCF - Schaeffler AG - DE
- 9 - LMM - Le Moteur Moderne - FR
- 10 - DELPHI - Delphi Automotive Systems Luxembourg S.A. - LU
- 11 - UNR - Uniresearch BV - NL
- 12 - IFPEN - IFP Energies Nouvelles - FR
- 13 - VIF - Virtual Vehicle Research Center - AT
- 14 - CTH - Chalmers Tekniska Högskola - SE
- 15 - CTU - Czech Technical University - CZ
- 16 - UPVLC - Universitat Politècnica de Valencia – Motores Termicos - ES

**Disclaimer:**

*This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 636380.*



## Publishable Executive summary

This report describes the work carried out in **Task 6.6 Demonstration vehicle**.

A demonstrator vehicle has been built and tested on test track, in real driving on public road and on vehicle dyno in the emission lab. The travel to the final event of the project at TRA conference in Vienna was used to collect data and improve controls and calibration status. Emissions have been measured and analyzed with gas emission analyzers, sample bag results as used for certification (in emission lab) and with a portable emission measurement system (PEMS) in real driving.

The project targets for the emissions could not all be reached as the testing period was very short. Though, focus was put on NO<sub>x</sub> reduction and the targets of the project of ½ EU6 emission levels for NO<sub>x</sub> (40 mg/km) in WLTC and with a conformity factor (CF) of 1.5 (60 mg/km) in real driving (RDE) could be reached. The results in real driving could have been below the 40 mg target. In WLTC, the current calibration status and the adaption of the emission strategies in vehicle lead to some inconsistent behavior, showing a huge spread in results from ~25 mg/km up ~50 mg/km in worst case. The achieved results demonstrate the potential of the combustion and aftertreatment concept, but show also the need for more robust control and improved calibration.

During testing, the particulate filter was slightly damaged, leading to higher particulate numbers slightly above the current EU6 limit of  $6 \cdot 10^6$  #/km. Values from typical in production engines are in the range of  $10^5$  to  $10^8$ . To avoid this, a better adaption of the soot load model in the emission controls is necessary.

Further improvements of the controls and implementation of dedicated cold start strategies are necessary to fulfill HC emission targets.