REWARD

REal World Advanced Technologies foR Diesel Engines

EUROPEAN COMMISSION
Horizon 2020
H2020-MG-2014-2015
GA No. 636380

Deliverable No.	REWARD 2.8	
Deliverable Title	Global assessment of demonstrator vehicle	
Deliverable Type	REPORT	
Dissemination level	Confidential – member only (CO)	
Written By	Giorgio Rustici, CRF	
Status	**Final**	2018-05-29
Checked by	Marco Tonetti, CRF (WP2 Leader)	2018-05-18
Submitted to Executive Board		2018-05-18
Approved by Executive Board (EB)		2018-05-29

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 - Instituto 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 Politecnica 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

The Task 2.4 “Technologies and strategies assessment on vehicle” is devoted to the integration of the new 1,6L engine and after-treatment system into a demonstrator vehicle to assess the complete technology package under homologation cycle and on-road driving.
The Jeep Renegade demo vehicle has been assembled with 1.6L engine and aftertreatment system defined as output of previous WP2 and WP3 activities. Dedicated control functions have been developed to properly manage the new components.
The vehicle has been at first tested and calibrated on homologation cycle (WLTP).
After that, the activity has moved on road where calibration has been optimized over a much wider operating area.
Experimental activity has confirmed that the selected aftertreatment system, based on SCRF with close-coupled AdBlue dosing, is able to achieve high emissions reduction efficiency in a wide range of engine operating points.
The REWARD emission targets (NOx = 40mg/km and CF = 1,5) have been achieved both over the WLTP homologation cycle and over real driving conditions with degreened catalysts. RDE tests have been measured with PEMS on an on-road trip defined in the Torino area.
The achievement of these results was allowed not only by an improvements of aftertreatment efficiency but also by a reduction of engine out NOx emission. For that scope the contribution of improved base-engine technology (mainly combustion and EGR as from WP3 activities) has been fundamental.
As expected from previous WP2 activities, the most critical conditions are the warm-up phase and the slow urban driving. In both cases a catalyst heating has been applied and managed by a dedicated thermal control strategy.
The replacement of DOC with a NSC (NOx Storage Catalyst) showed the possibility to reduce the exhaust gas heating. A big effort has been dedicated to calibrate and release the rich purge events (DeNOx). Thanks to that a Fuel Consumption benefit of about 1,5% has been achieved on WLTC with similar tailpipe emissions.