In-Service Conformity & Boundary Conditions in EU Real-Driving Emissions Legislation

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AECC
ASSOCIATION FOR EMISSIONS CONTROL BY CATALYST

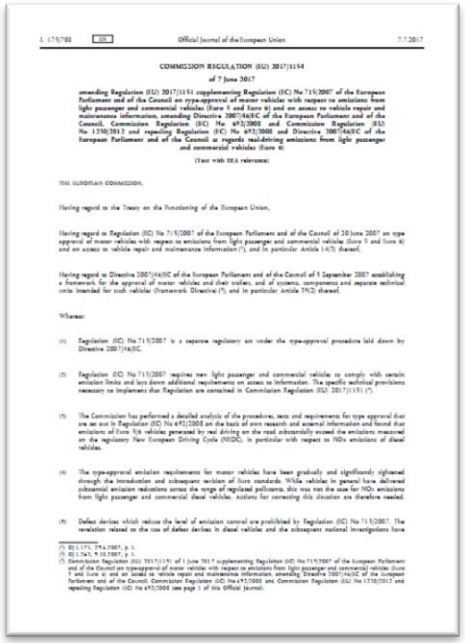
Association for Emissions Control by Catalyst (AECC AISBL)

AECC members : European Emissions Control companies

- Exhaust emissions control technologies for original equipment, retrofit and aftermarket for all new cars, commercial vehicles, motorcycles and non-road mobile machinery

Euro 6 RDE entered into force as of 1 September 2017

- 3rd RDE legislation (EU) 2017/1154 published on 7 July 2017
- RDE legislation contains list of parameters to characterise normal driving
  - RDE route criteria
  - Ambient conditions
  - Dynamic boundary conditions
  - RDE CO_2 emissions within range of WLTP reference
- Not-to-Exceed (NTE) limit = Euro 6 limit x Conformity Factor (CF)
  - Conformity Factor = 1 + error margin for Portable Emissions Measurement Systems (PEMS)
  - Error margin for NOx (as of 1 January 2020) and PN (as of 1 September 2017) set equal to 0.5
  - Error margin to be reviewed annually by European Commission
- NTE limit applies to total RDE trip and also urban part
- PEMS measurement results post-processed with RDE evaluation tools



COMMISSION REGULATION (EU) 2017/1154

of 7 June 2017

ASSOCIATION FOR EMISSIONS CONTROL BY CATALYST

Euro 6 RDE entered into force as of 1 September 2017

- 4th RDE act being developed - updated elements tabled at TCMV meeting on 07 September 2017

EUROPEAN COMMISSION
Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs

Industrial Transformation and Advanced Value Chains
Automotive and Mobility Industries

Brussels, 05/09/2017
GROW.C.4/PD

Background note on RDE4

Updated elements of the 4th RDE act

Following the intense work of the RDE-LDV working group during the first half of 2017, the 4th RDE act is expected to deal with the following main elements:

A. **A redesigned ISC procedure**, including WLTP and RDE testing and introducing the possibility to take into account independent testing by third parties
B. **LCVs, multistage and special purpose vehicles**
C. **Influence of fuel on PN emissions**
D. Review of the need for a more representative **testing method for hybrid vehicles**
E. **Review of the uncertainty margin** for NOx.
F. **Review of the evaluation methods** (CLEAR, EMROAD and new proposals)

Furthermore a PEMS guidance and Q&A document are being prepared.

A. New ISC procedure

Reflecting the RDE testing in the ISC scheme will require it to be completely redesigned. This is due to the much longer time needed for testing a vehicle with both the WLTP and

Source: European Commission, Brussels, 07 September 2017

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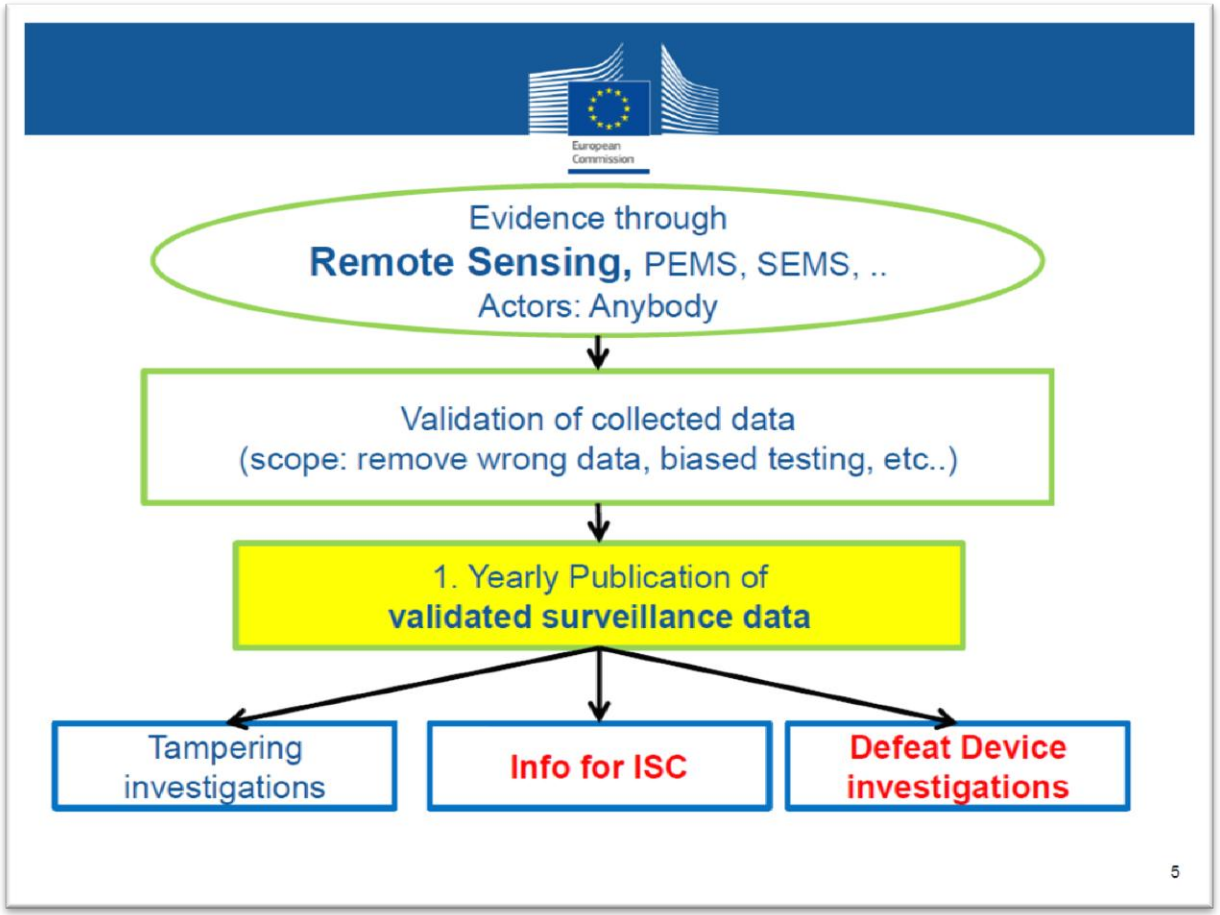
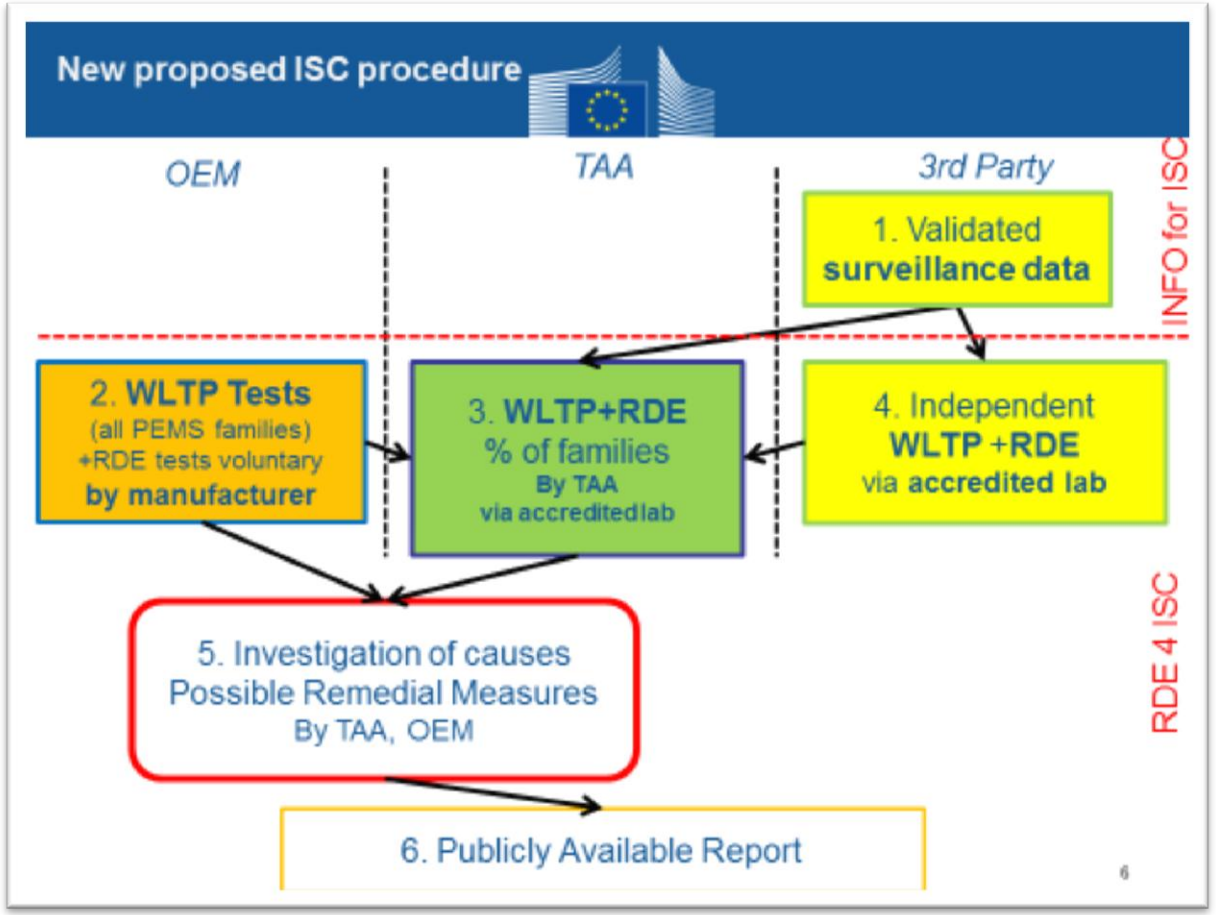
- Details of In-Service Conformity (ISC) and market surveillance to be defined within RDE4

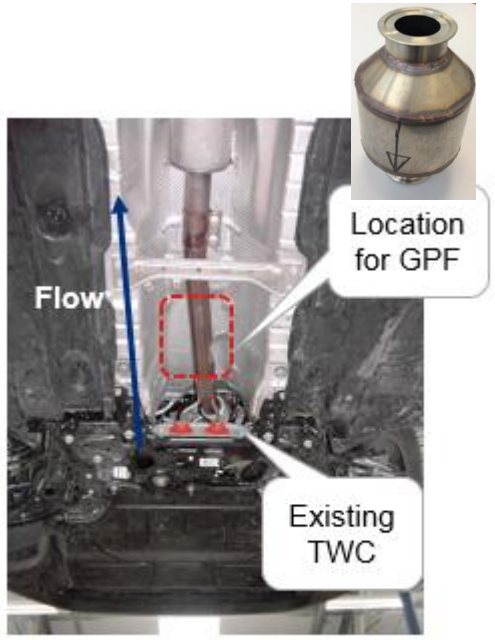




Source: European Commission, Brussels, 28 September 2017

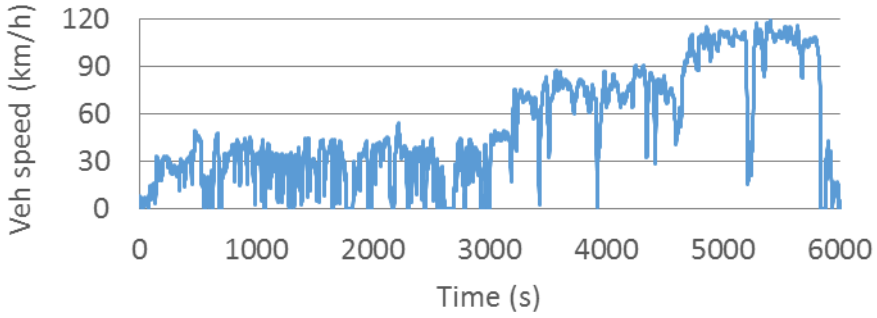
AECC GDI RDE test programme

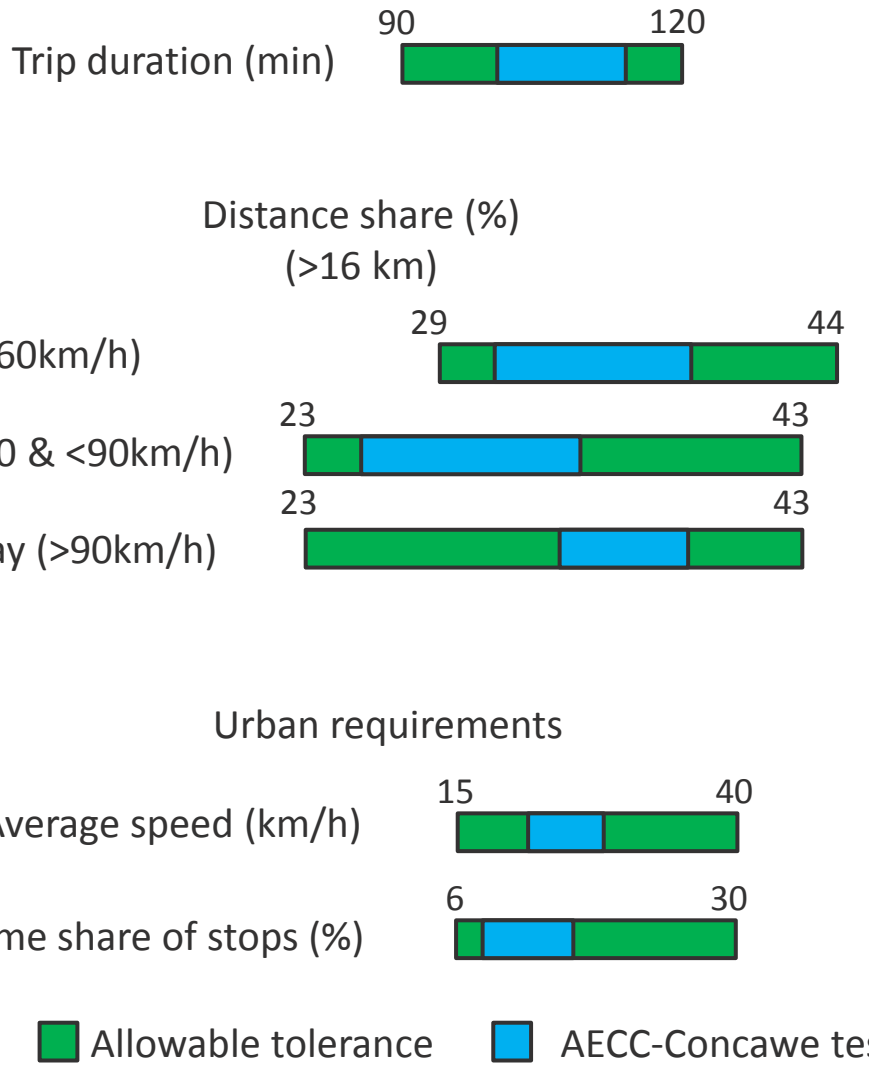
- Objective: investigate NOx & PN RDE of Gasoline Direct Injection (GDI) vehicle without and with Gasoline Particulate Filter (GPF)
- Vehicle
  - C-segment, 1.5l class engine
  - Rental vehicle, Euro 6b type approved
  - Original configuration w/o GPF
  - Add coated GPF demonstrator underfloor
- HORIBA PEMS equipment
  - Gaseous PEMS (CO_2, CO, NOx)
  - PEMS-PN demo unit



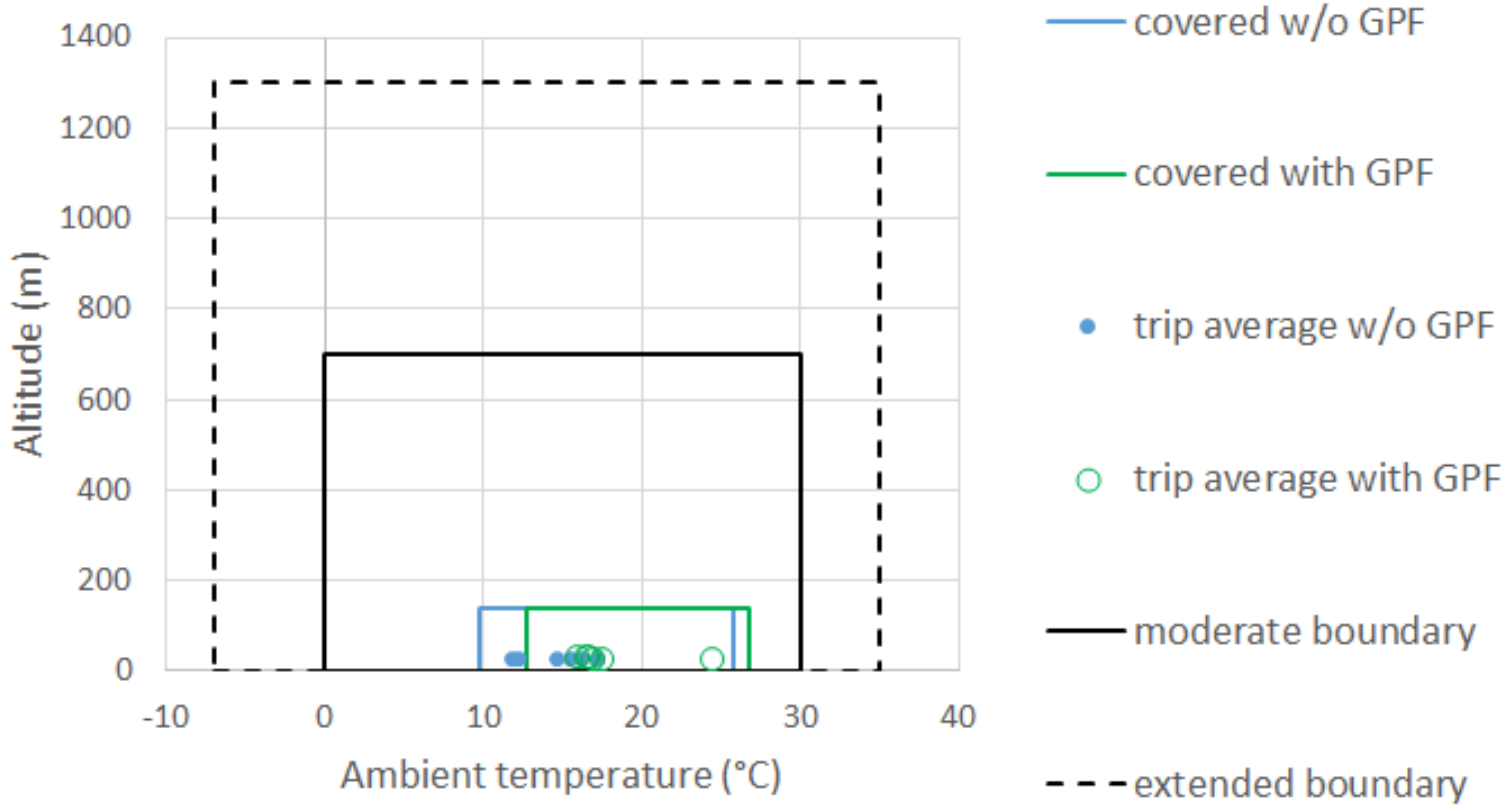
Underfloor view

RDE route is within the RDE requirements



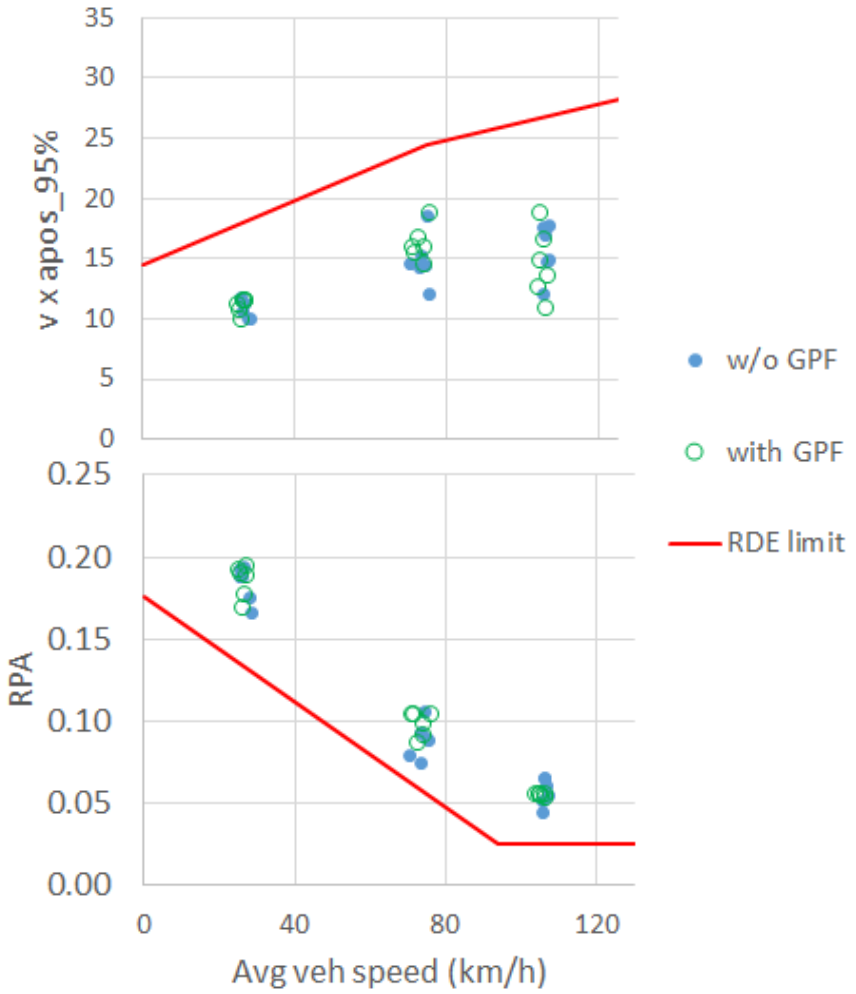


Measured data within the moderate environmental boundaries

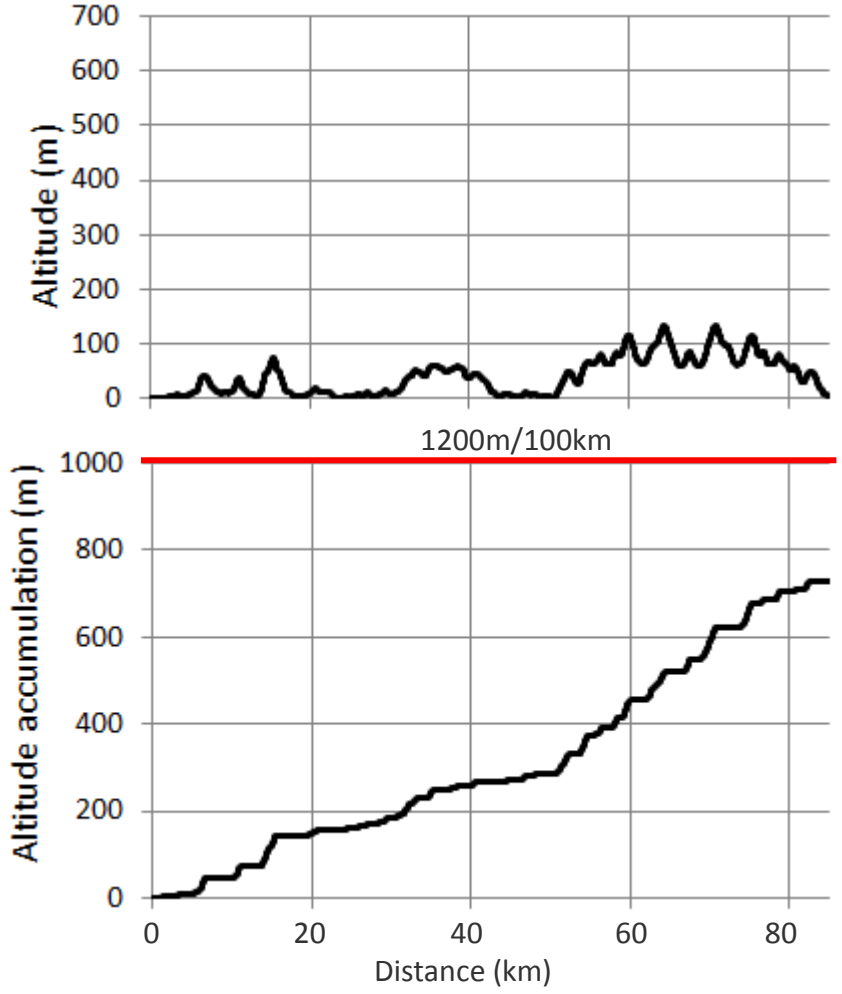


Measured data within the dynamic boundaries

Excess or absence of driving dynamics

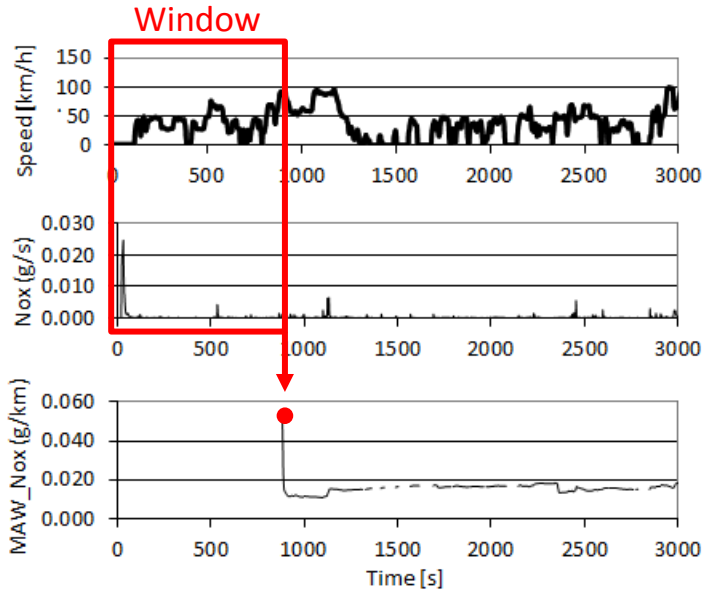


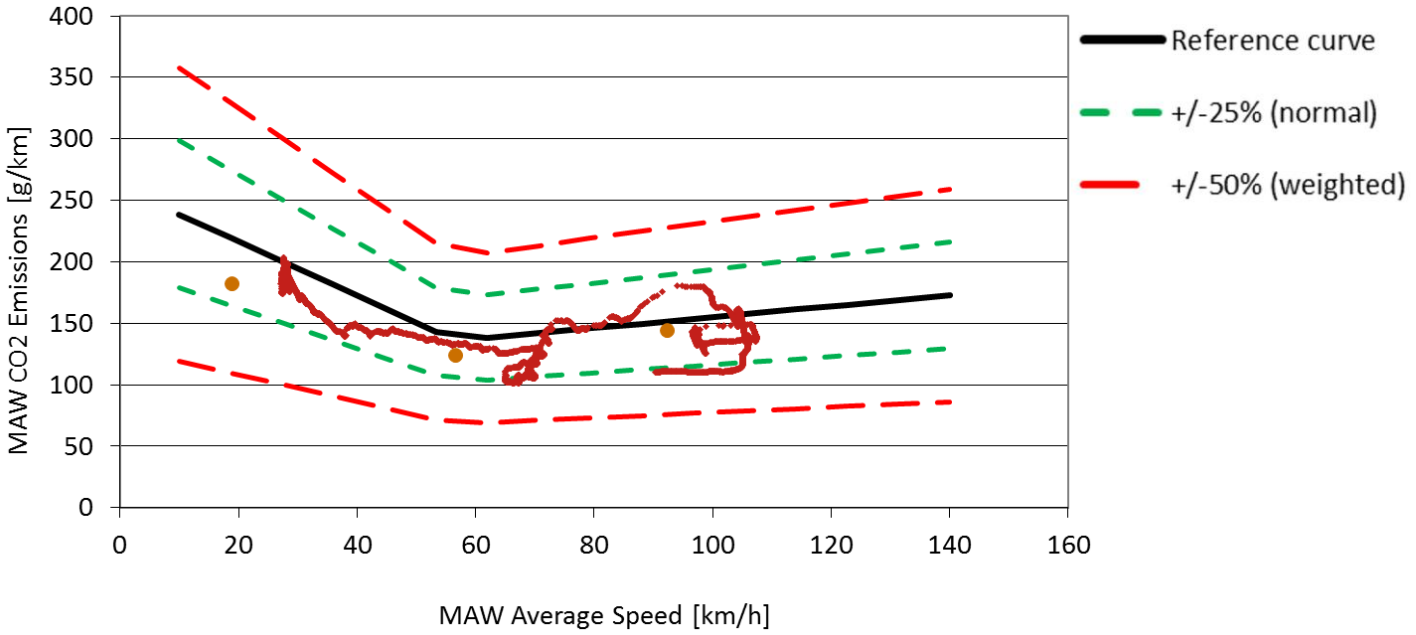
Altitude accumulation



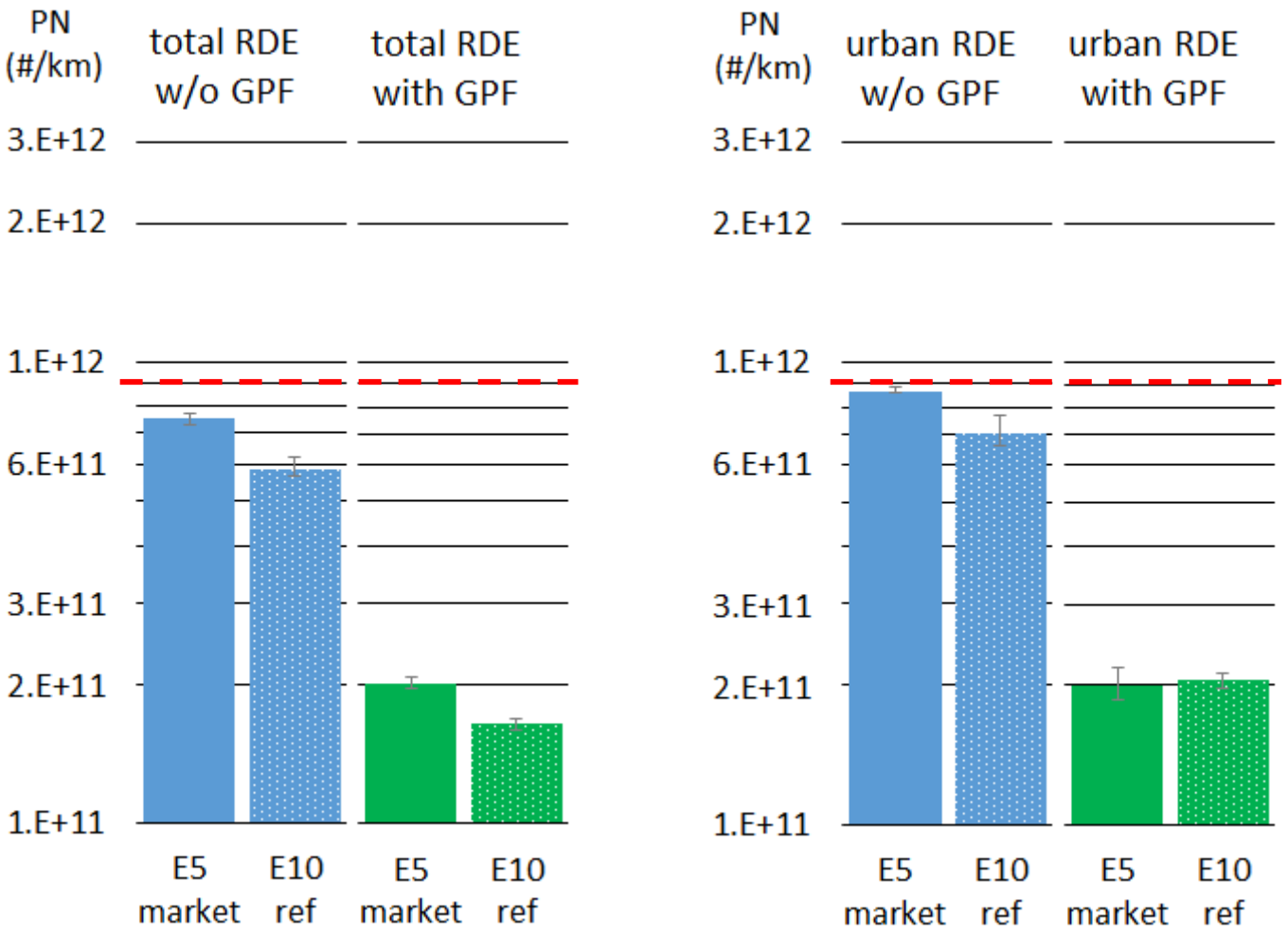
Measured data within ± 25% of WLTC test

Visualised with Moving Average Window (MAW) post-processing approach (EMROAD)





All on-road PN results with GPF are below Euro 6d NTE limit



* Raw data, no exclusion/ normalisation

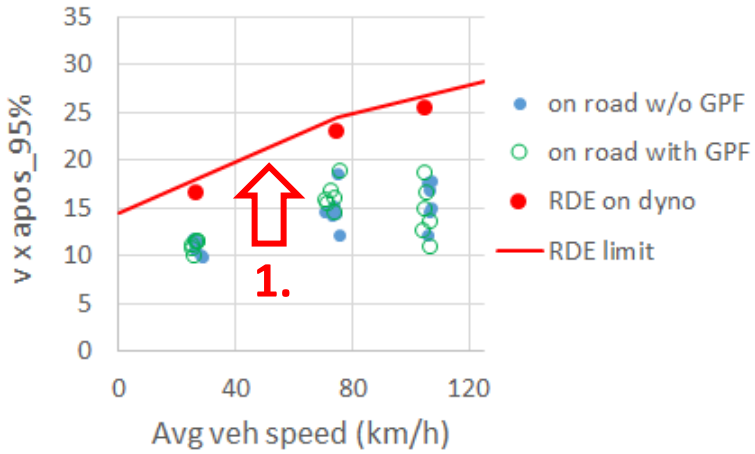
Euro 6d NTE limit

Measurement range 3x RDE

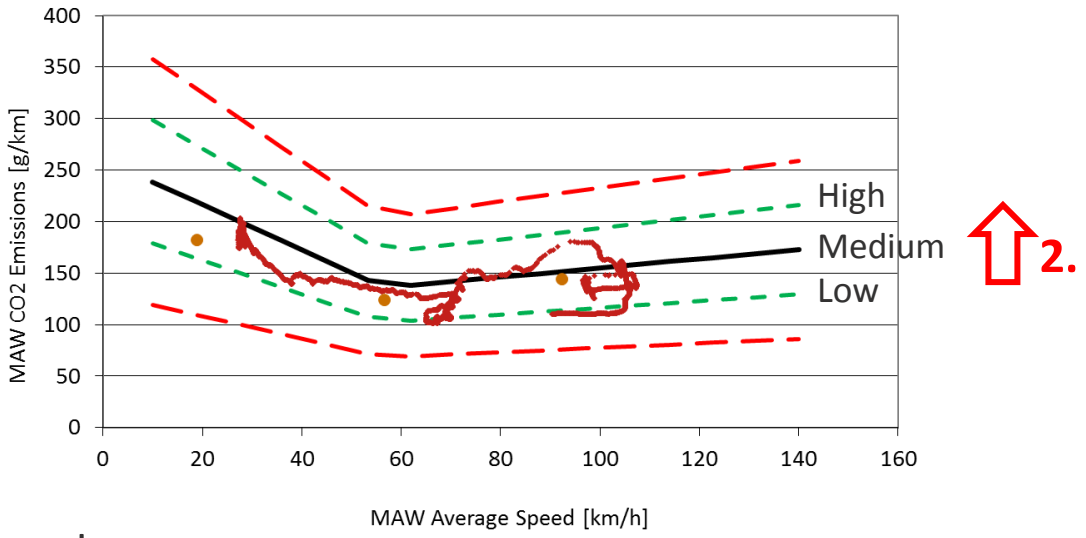
Impact of RDE boundaries tested on the chassis dyno

Severitised RDE testing (SRDE) in the lab

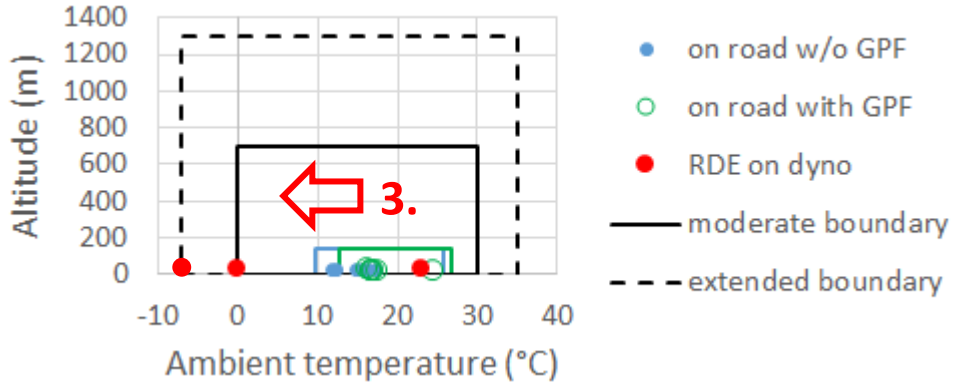
1. Change accelerations



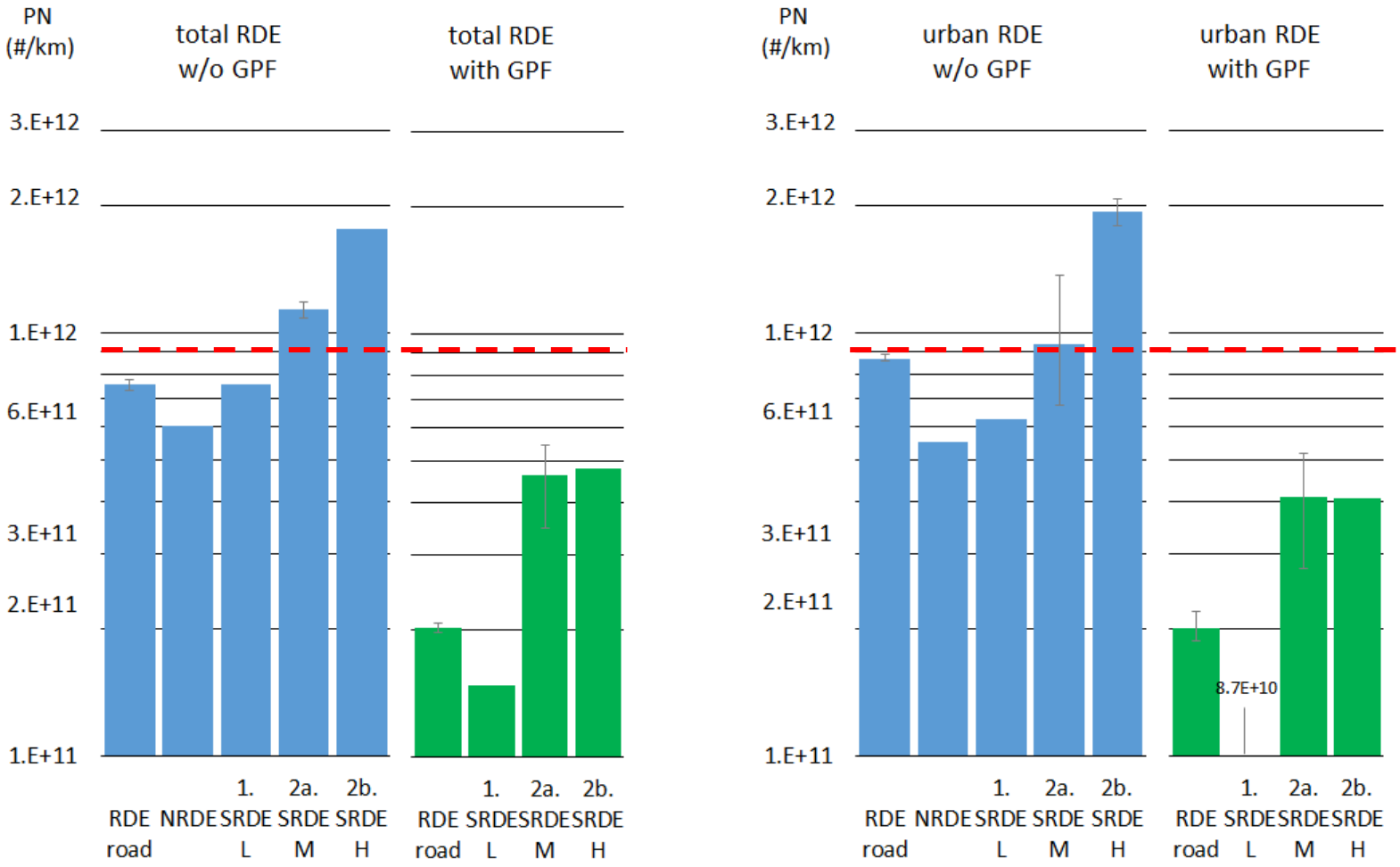
2. Change dyno load



3. Change ambient temperature



Severitised RDE PN with GPF stays below Euro 6d NTE limit



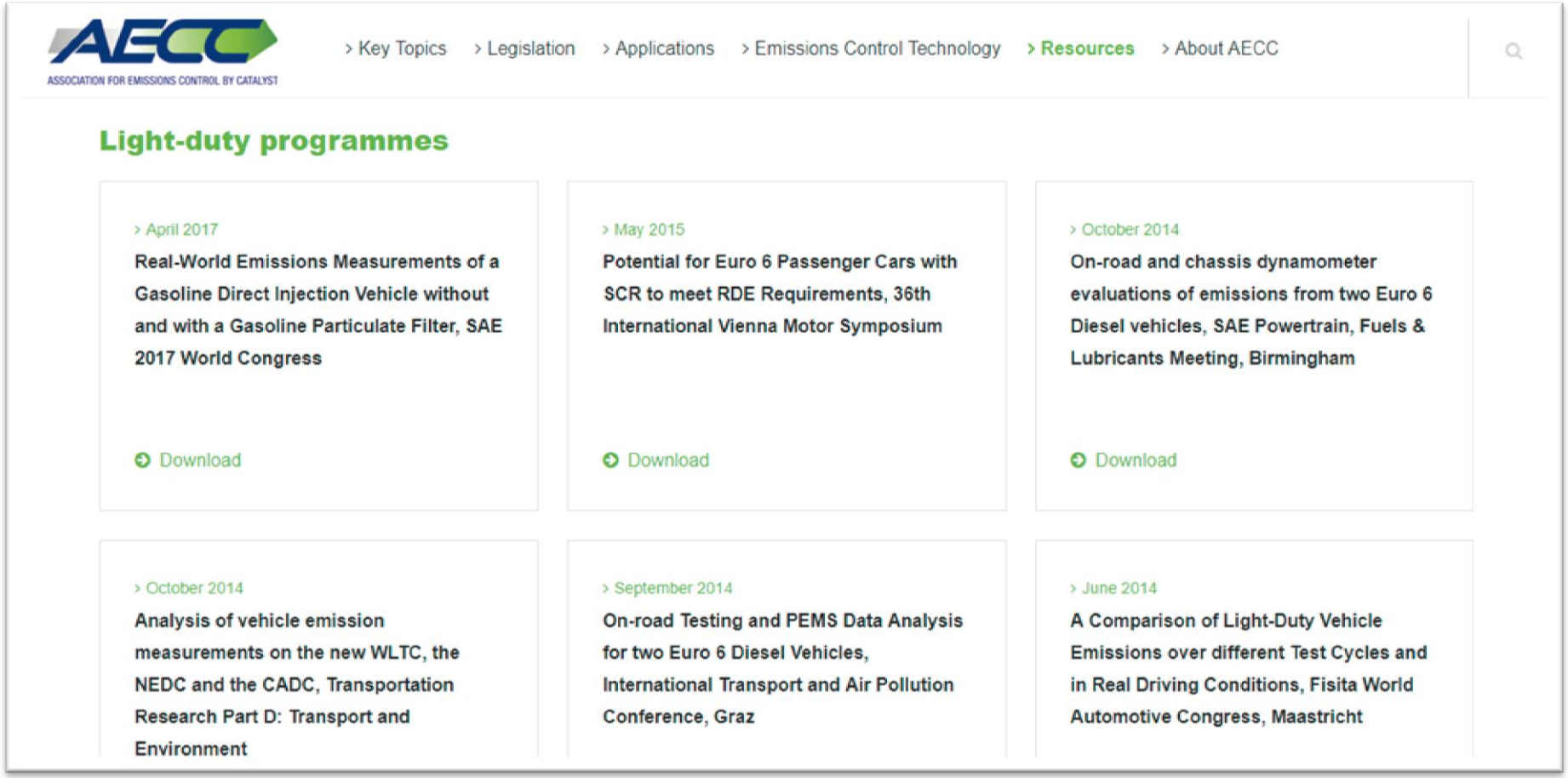
* Raw data, no exclusion/ normalisation

Euro 6d NTE limit

Measurement range repeated tests

AECC experience with RDE testing in Europe

All AECC projects data at http://www.aecc.eu/resources/scientific-publications/



THANK YOU!

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