



Developing an on-road test for light-duty vehicles in Europe

24th CRC Real World Emissions Workshop

30 March – 2 April 2014

San Diego, USA

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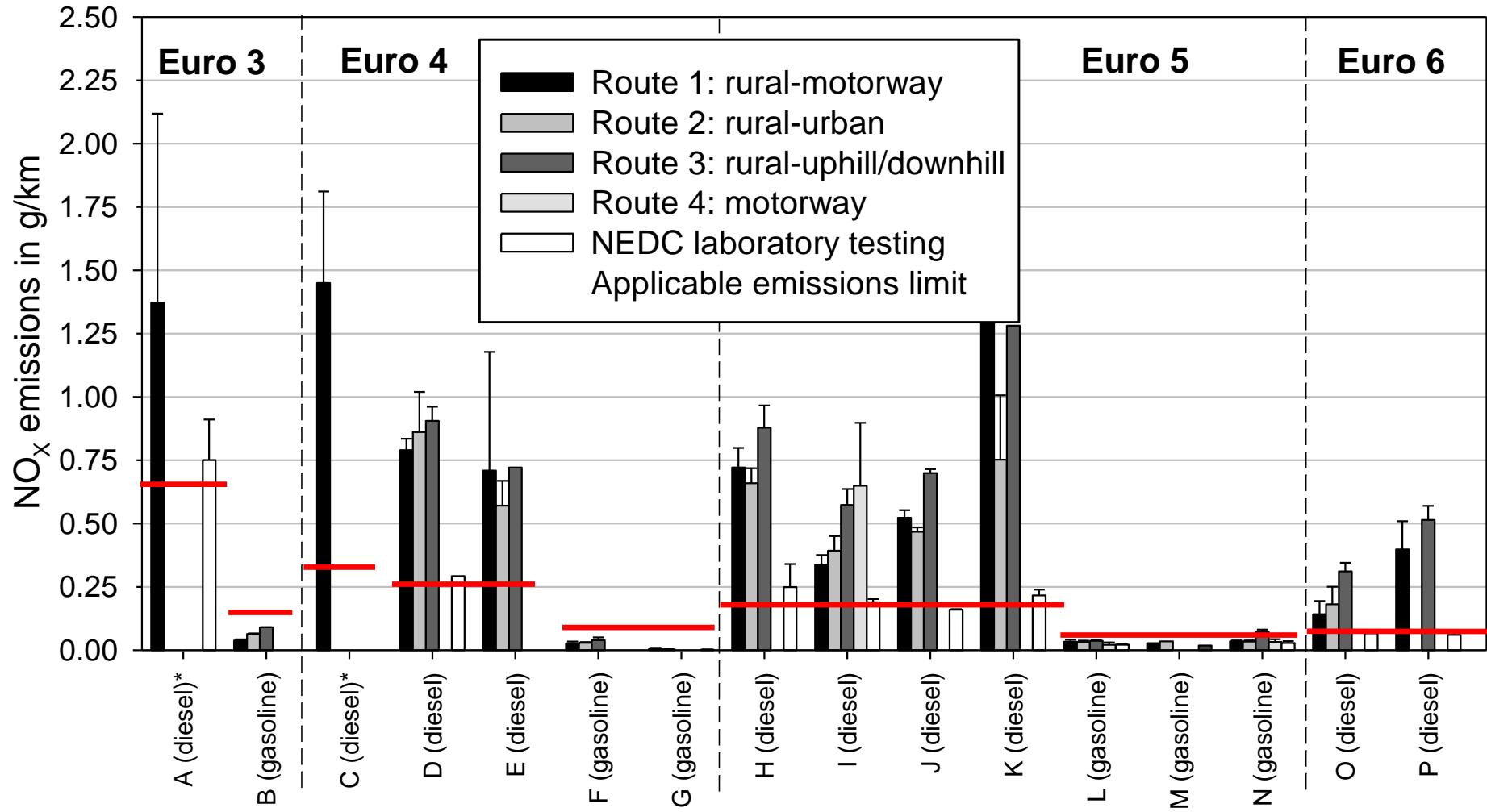
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IET - Institute for Energy und Transport**

Background - legislation

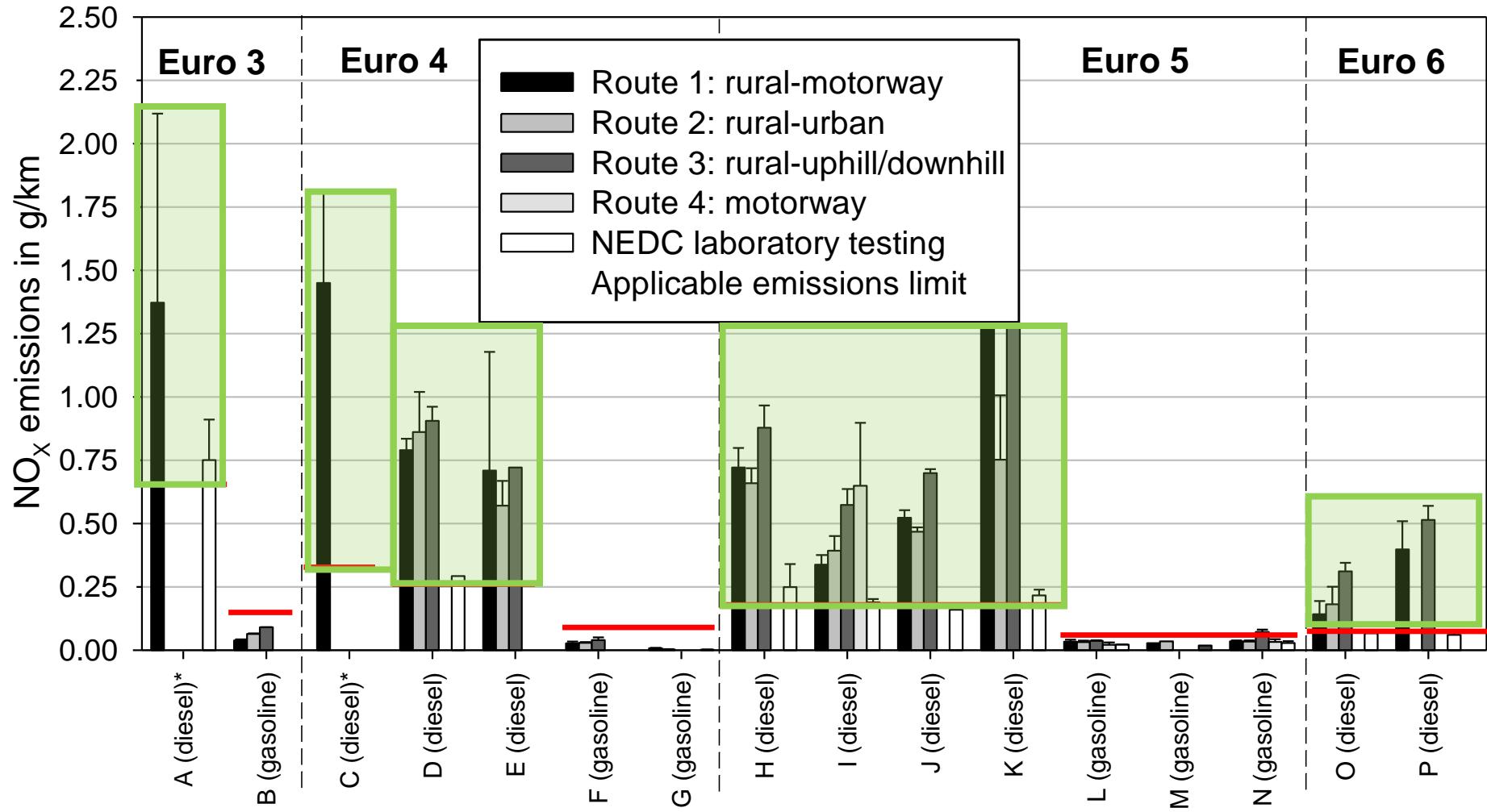


- Regulation 715/2007 defines Euro 5/6 limits
- Introduction of Euro 6 in September 2014
- Reduction of NO_x emissions from 180 mg/km to 80 mg/km
- Additional provisions: "*[...] to ensure that real world emissions correspond to those measured at type approval. The use of portable emission measurement systems [...] should also be considered.*"

Background – NO_x emissions



Background – NO_x emissions



History: RDE test procedure



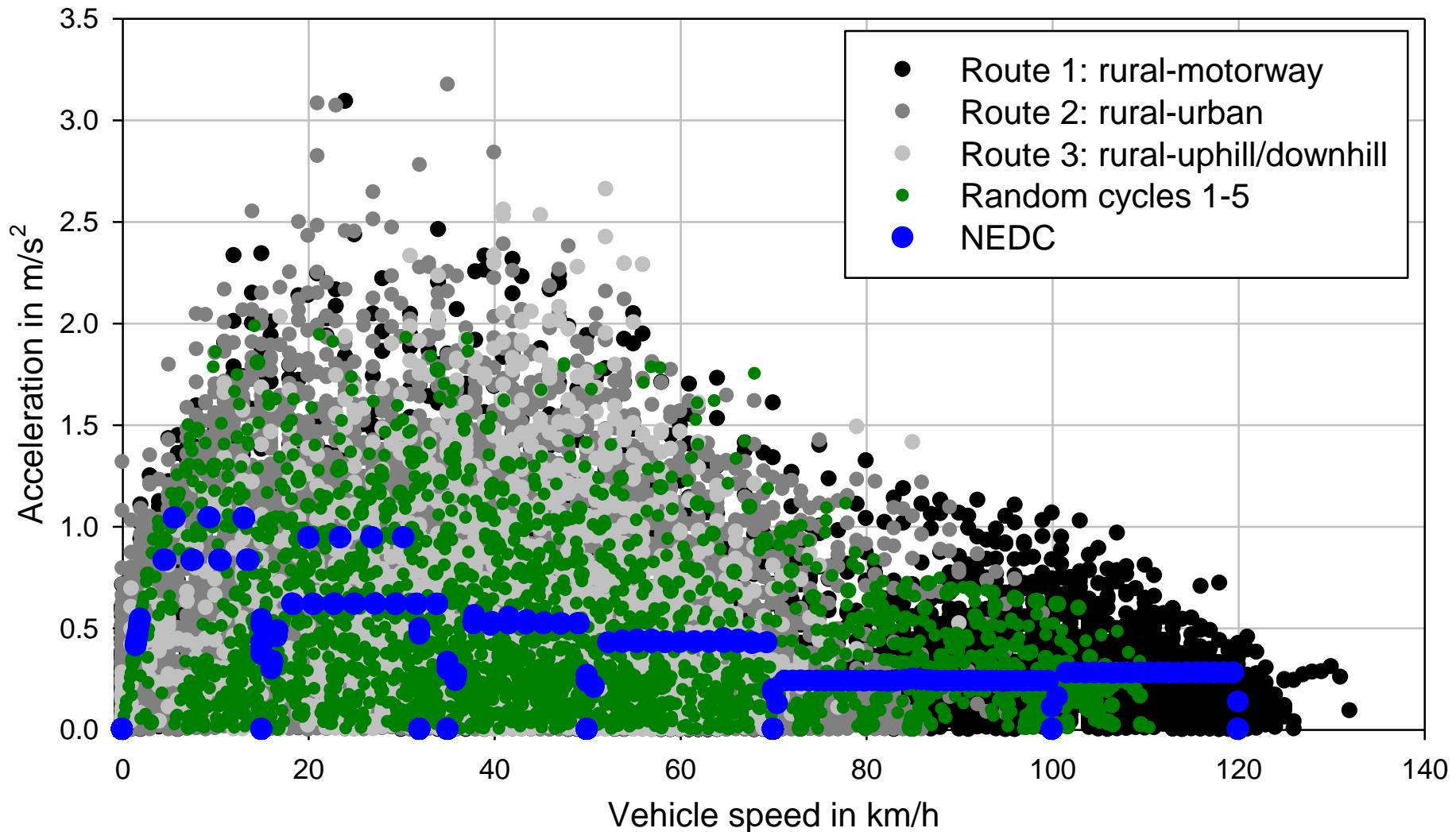
- **Establishment of the Real-Driving Emissions (RDE) working group in 2011**
- **Candidate procedures:** Fixed test cycles

Random test cycles

PEMS on-road testing

Vehicle modeling

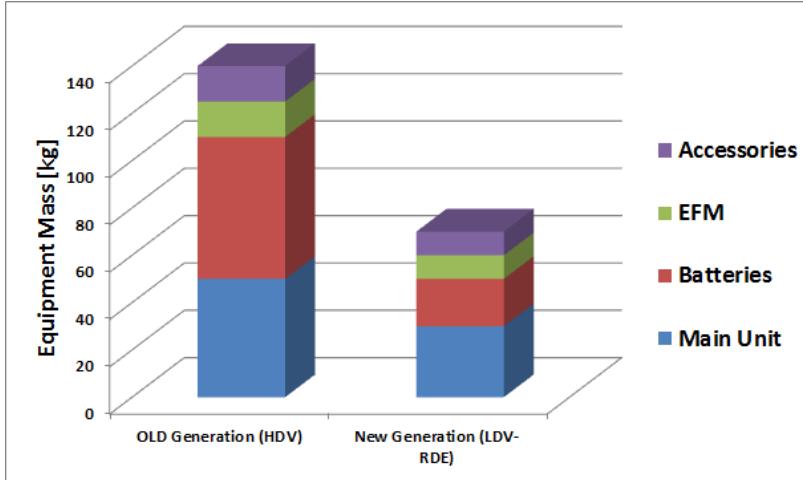
History: RDE test procedure



Challenges in PEMS on-road testing



- **PEMS equipment:**
 - **Size, installation, and measurement performance**
 - **Safety**



Challenges in PEMS on-road testing

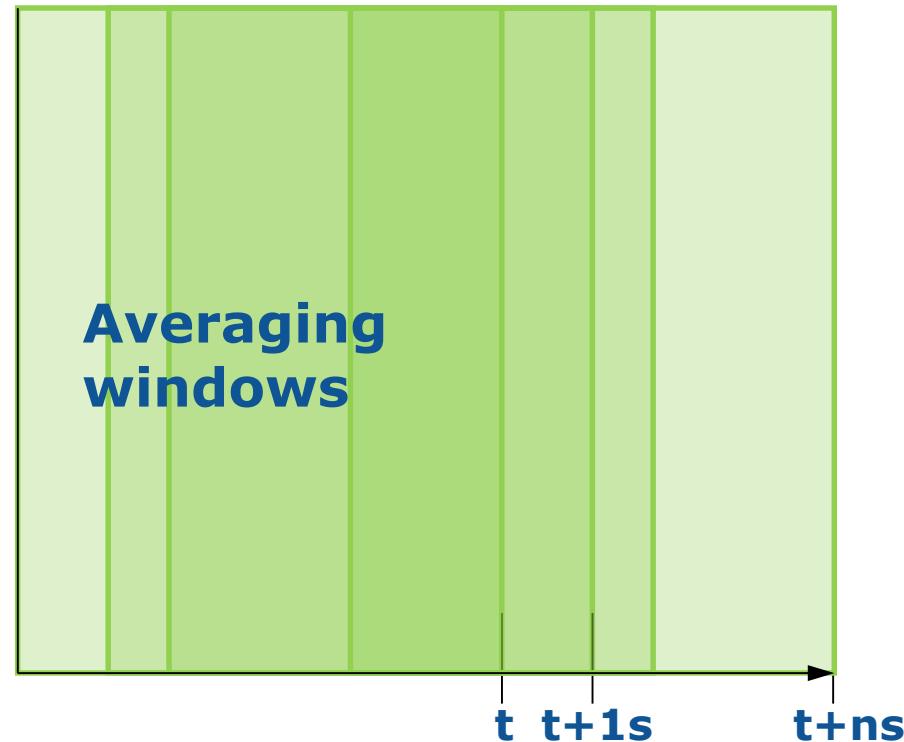
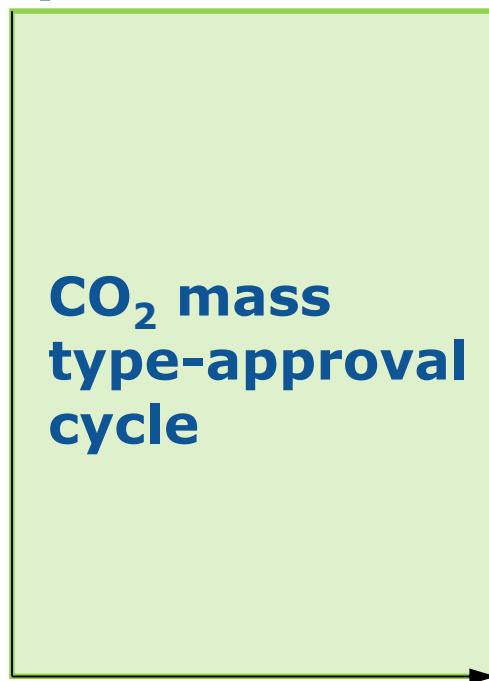


- **PEMS equipment:**
 - **Size, installation, and measurement performance**
 - **Safety**
- **Boundary conditions of on-road tests**
 - **Non-dynamic: altitude, ambient temperature**
 - **Dynamic, controlled: road grade, vehicle payload, route composition**
 - **Dynamic, partially uncontrolled: wind, vehicle speed and acceleration, test duration**
- **Data evaluation**
 - **Moving average windows**
 - **CO₂ as indicator for driving severity**

PEMS: data analysis (JRC approach)

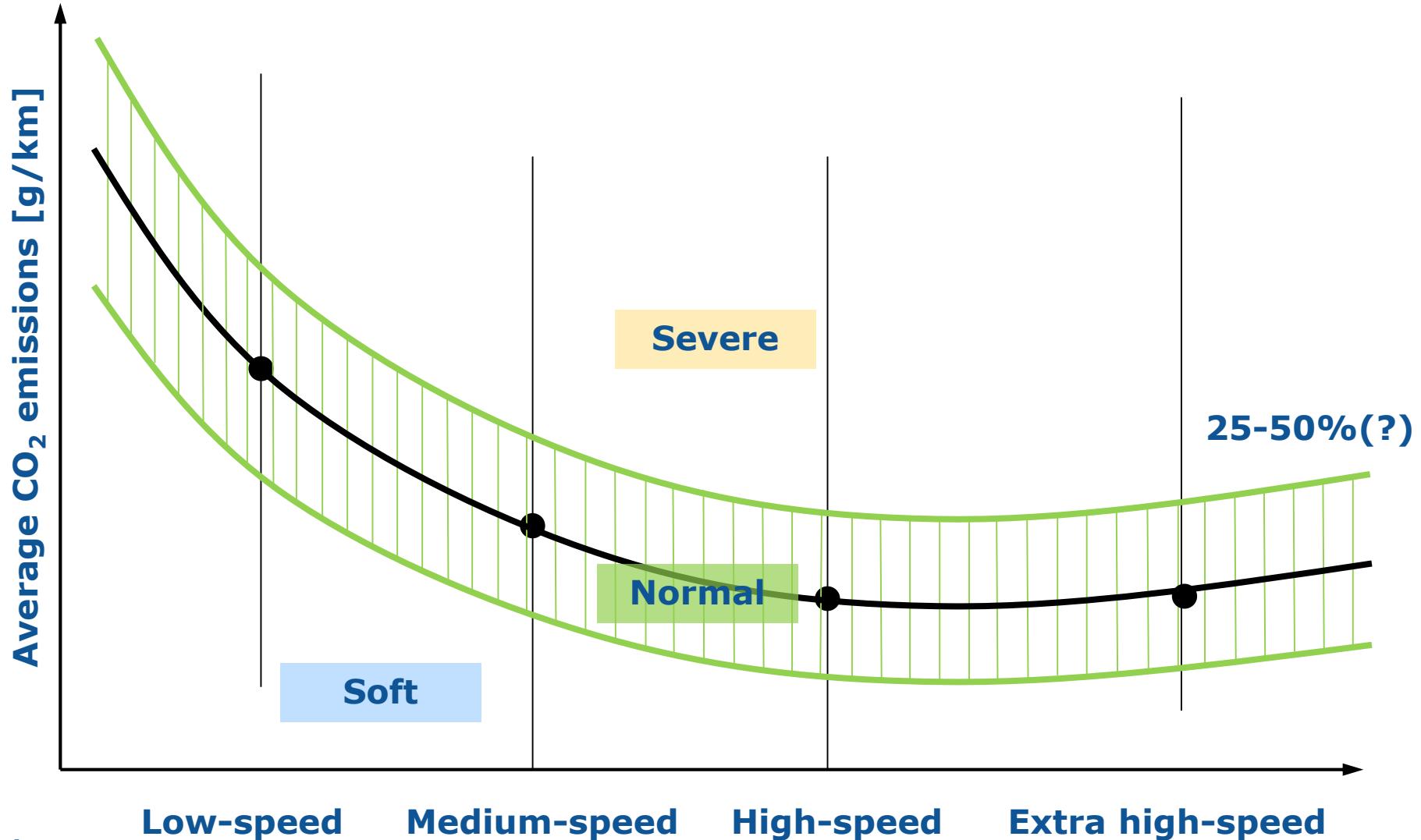


Moving averaging window approach: Averages over subsets of on-road tests; duration in line with type-approval cycle



How to determine the severity of on-road driving?

Moving averaging window approach



Tentative time schedule



- **Drafting of test procedure (mid 2014)**
- **Implementation at Euro 6 dates (from September 2014)**
- **Definition of not-to-exceed limits (spring 2015)**
- **Feasibility of PEMS-PN (until spring 2015)**
- **Random test cycle? (until spring 2015)**
- **Type-approval testing against limits (September 2017)**

Thank you!



 European Commission

JRC SCIENTIFIC AND POLICY REPORTS

A complementary emissions test for light-duty vehicles:
Assessing the technical feasibility of candidate procedures

Conclusions of the Real-Driving Emissions — Light-Duty Vehicles (RDE-LDV) working group

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Report EUR 25572 EN

Joint Research Centre

 Environmental Science & Technology

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On-Road Emissions of Light-Duty Vehicles in Europe

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 Supporting Information

Atmospheric Environment 62 (2012) 657–665

 ELSEVIER

Contents lists available at SciVerse ScienceDirect

Atmospheric Environment

journal homepage: www.elsevier.com/locate/atmosenv

ATMOSPHERIC ENVIRONMENT

Will Euro 6 reduce the NO_x emissions of new diesel cars? – Insights from on-road tests with Portable Emissions Measurement Systems (PEMS)

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