PLENARY SESSION TWO

Future Directions for Vehicle Inspection

Al Bustan Rotana Hotel, Al Rashidya Ballroom A & B

Plenary Session Two

Presentation 1

Strategic Overview of the Findings of the CITA Study on Testing Electronically Controlled Safety Systems (ECSS)

Christoph Nolte

CITA, Deputy Chair of the CITA Regional Advisory Group Europe

Contents

1. Introduction

2. Strategic implications and benefits

3. Role of roadworthiness inspections

4. Way forward

1. Introduction

European Measures in road safety

- Objective: To help improve road safety and reduce emissions
  - Halve number of road deaths in EU by 2020 starting from 2010

25 000
LIVES TO SAVE
European Road Safety Charter

- Method: Progressive strengthening and harmonisation of roadworthiness tests (and technical roadside inspections) whilst adapting to technical progress
  - Once in fleet, vehicles should continue to meet safety standards throughout their lifetime

Milestones in PTI development

77/143/EEC
commercial vehicles > 3.5t,
taxis and ambulances only

88/499/EEC
Include light goods vehicles

91/328/EEC
Include passenger cars, introduce comitology procedures

96/96/EC
consolidate technical amendments

2000/30/EC
on technical roadside inspections

2009/40/ECr
ecast of Directive 96/96/EC

2010/48/EU
Include electronic systems (ABS, ESC), methods for other vehicle categories

2014/45/EU

EU Roadworthiness Package 2012 =>> 2014/45/EU

- Objectives
  - Harmonised, high quality of periodic roadworthiness tests
  - Lowering administrative burdens, increased efficiency of roadside inspections
  - Reduction of the emissions of GHG and air pollutants from road transport

  >> expected benefits: 1,200 fatalities less per year

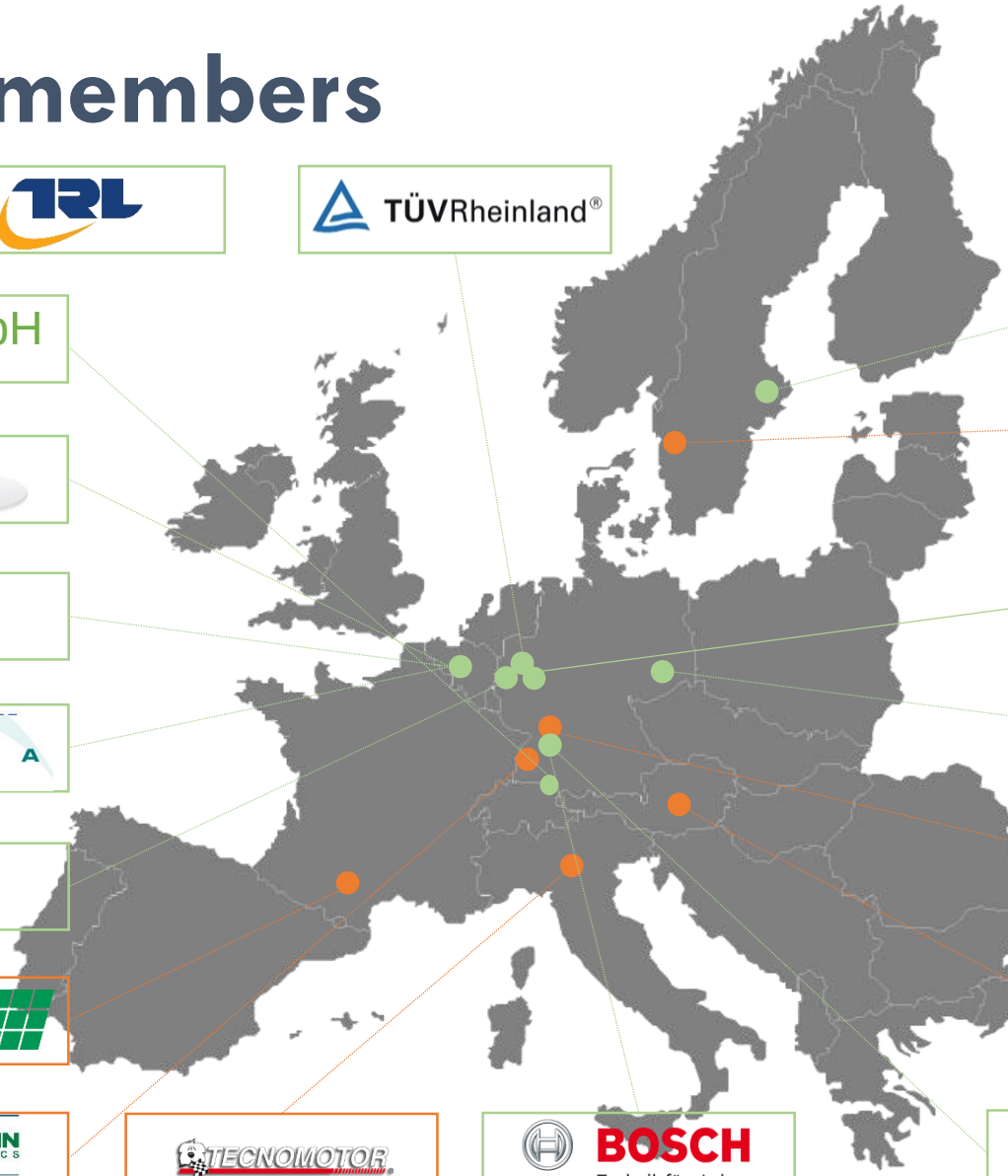
- Three components
  - Periodic roadworthiness tests: 2014/45/EU
  - Technical roadside inspection: 2014/47/EU
  - Registration documents: 2014/46/EU

Objectives

- Develop **new inspection methods** and **requirements for tools** for electronically controlled safety systems (ECSS) suitable for use in a legislative regime

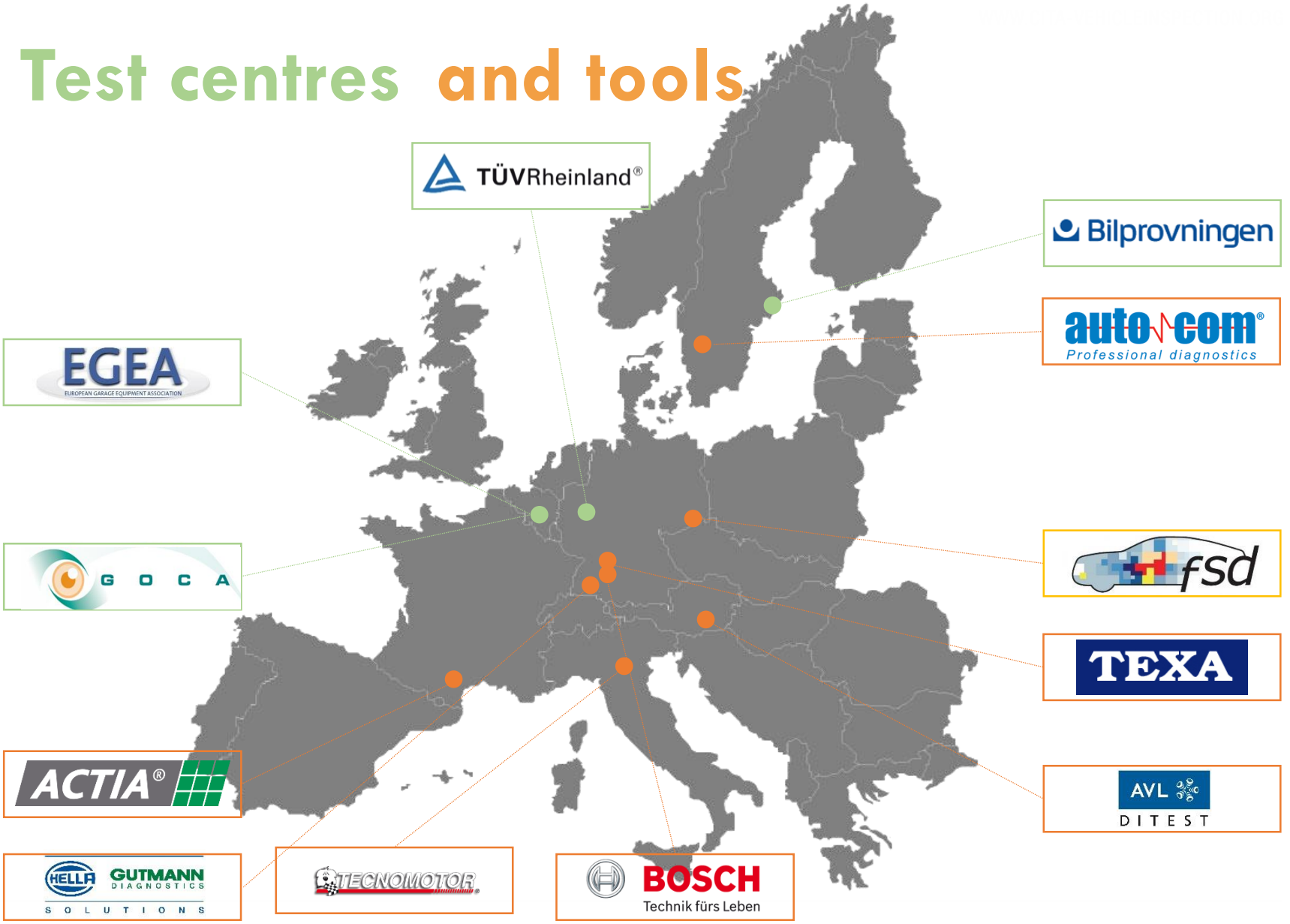
- Perform **cost benefit analysis** for introduction of methods into European legislation

Team members



TRL
TÜVRheinland®
IERC-GmbH
Bilprovningen
EGEA
EUROPEAN GARAGE EQUIPMENT ASSOCIATION
auto-com®
Professional diagnostics
CITA
ADIS
Technology
GOCA
fsd
bast
TEXA
ACTIA®
AVL
DITEST
HELLA GUTMANN
DIAGNOSTICS
SOLUTIONS
TECNOMOTOR
BOSCH
Technik fürs Leben
DEKRA

Test centres and tools



Results

- Electronically Controlled Safety Systems (ECSS) contribute highly to reduction of road accident casualties by avoidance of accidents and reduction of injury severity
- ECSS Study has shown that benefits from ECSS inspections are significant

>> Testing of functionality / performance of ECSS required

>>Test method increased failure rate by 4.8 %

2. Strategic implications

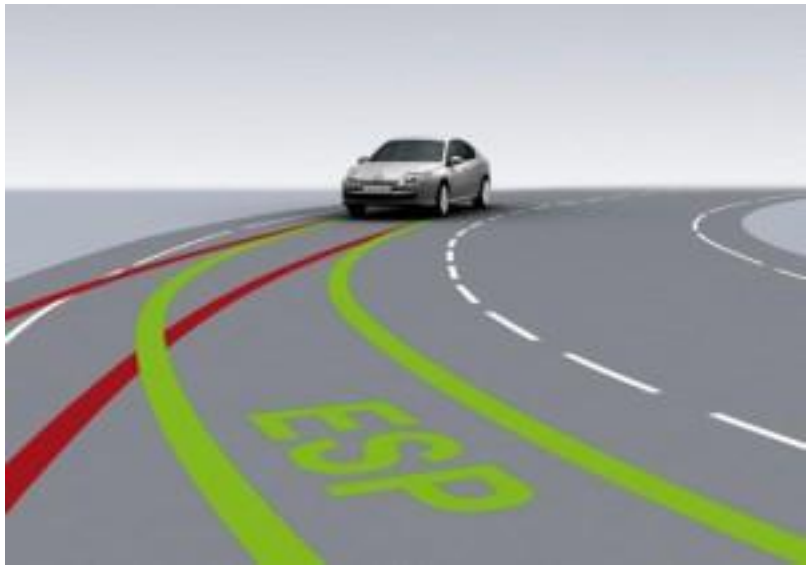
Strategic key elements:

1. Maintain ECSS during the vehicle life time
2. Implement functionality test for ECSS
3. Design of test methods
   - Using an independent approach
   - Using OBD
   - Using external test equipment
4. Vehicle specific Information necessary

Role of roadworthiness inspections:

Ensure:

- Vehicles are still equipped with ECSS
- Safety surplus from ECSS
- ECSS are not manipulated
- Functionality is still given

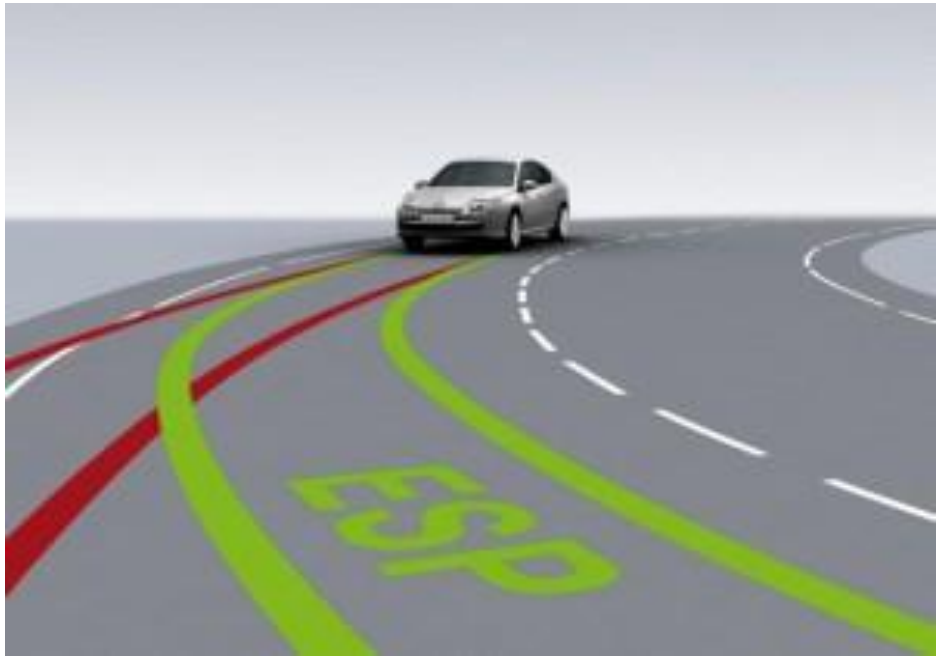


4. Way forward

Next steps

- Support the dialog with ACEA:
  - Develop format and content of information necessary for PTI
- Contribute recommendations
  - Roadworthiness Committee (RWC)
  - Technical working group oft RWC


Thank You
very much for your attention!



http://www.auto.de/magazin/customs/uploads/auto/2011/11/Elektronisches-Stabilit-tsprogramm-ESP-Schleuderschutz-wird-f-r-Neuwagen-zur-Pflicht-gp_eeyt6ovn_RenaultESP_3110-300x210.jpg

Plenary Session Two

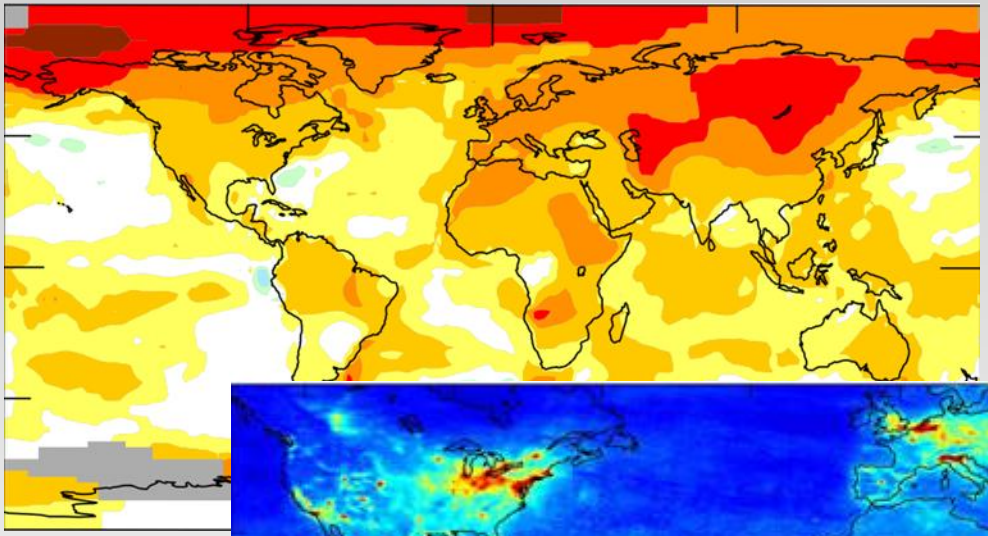
Presentation 2

WORLDWIDE HARMONISED LIGHT VEHICLES TEST PROCEDURE (WLTP) AND REAL DRIVING EMISSIONS (RDE)

Helge Schmidt

Head of Exhaust Emission Division, CITA Technical Expert for Exhaust Emissions, TÜV NORD Mobility, Germany

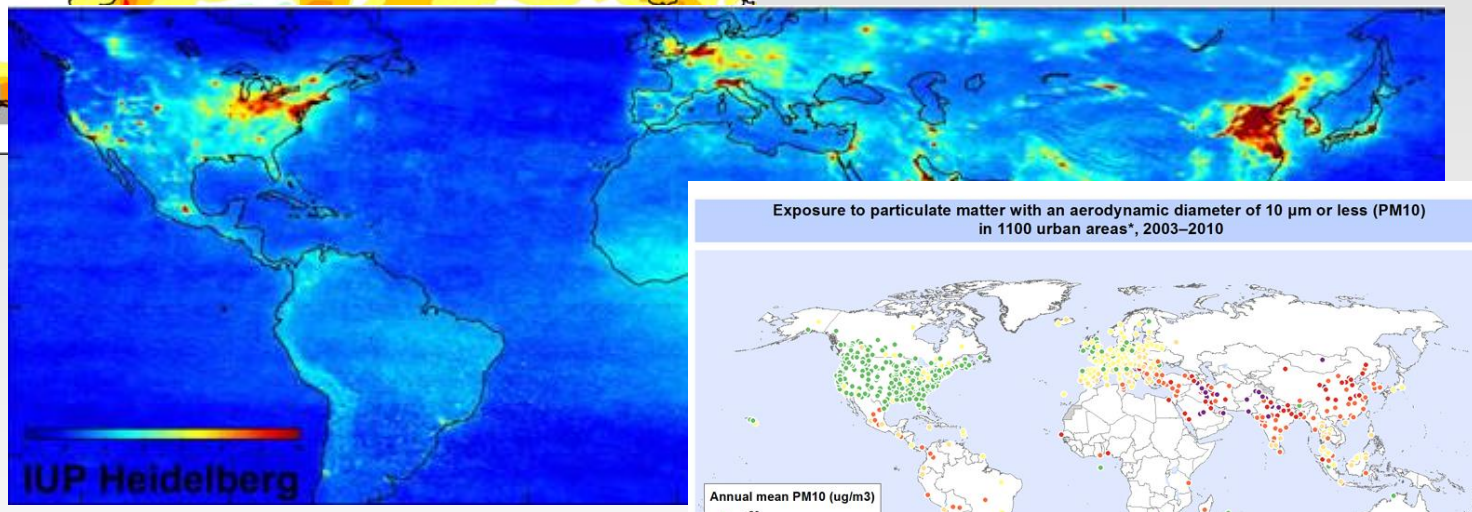
Road traffic related air quality issues



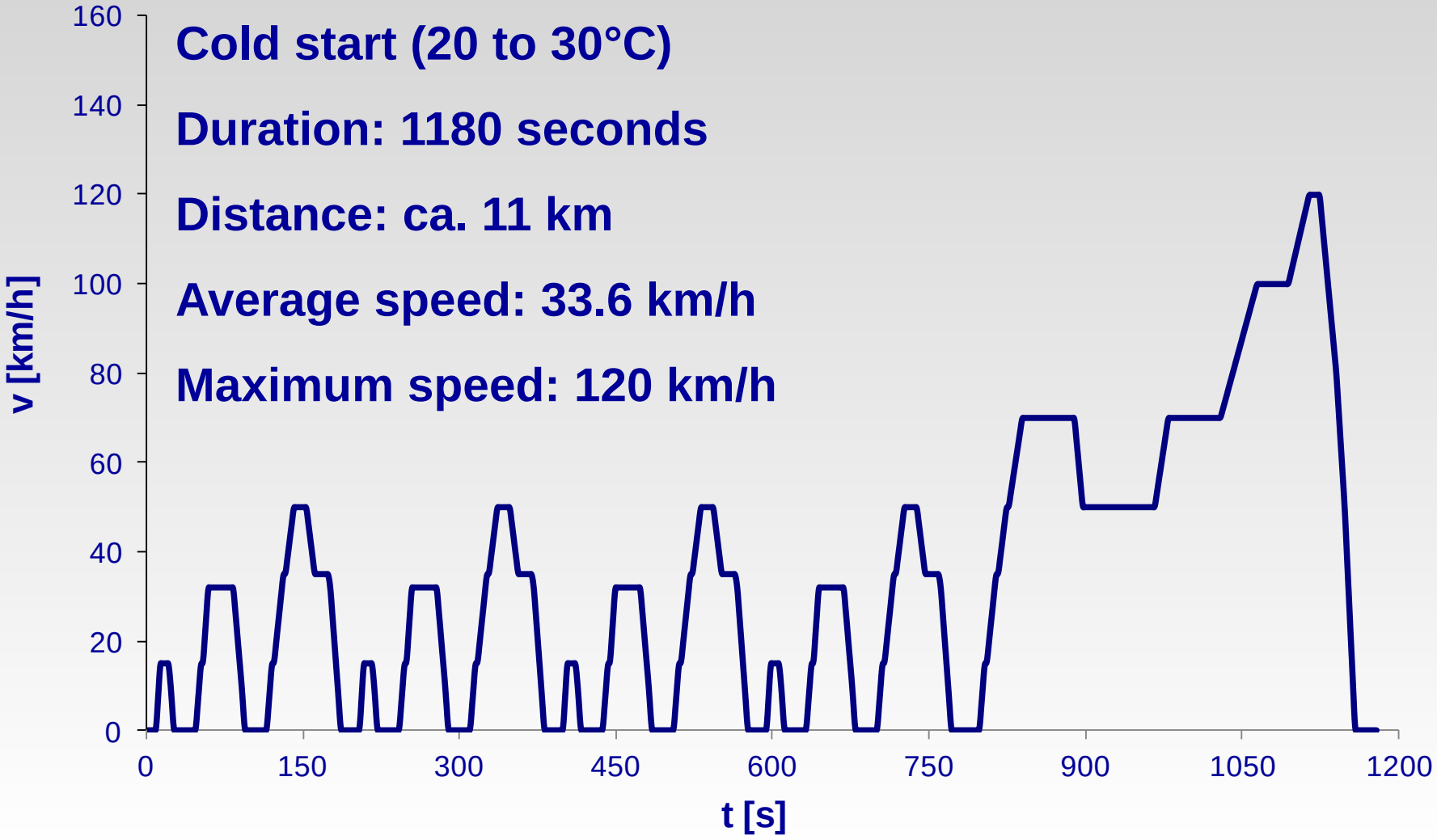
CO_2

NOx

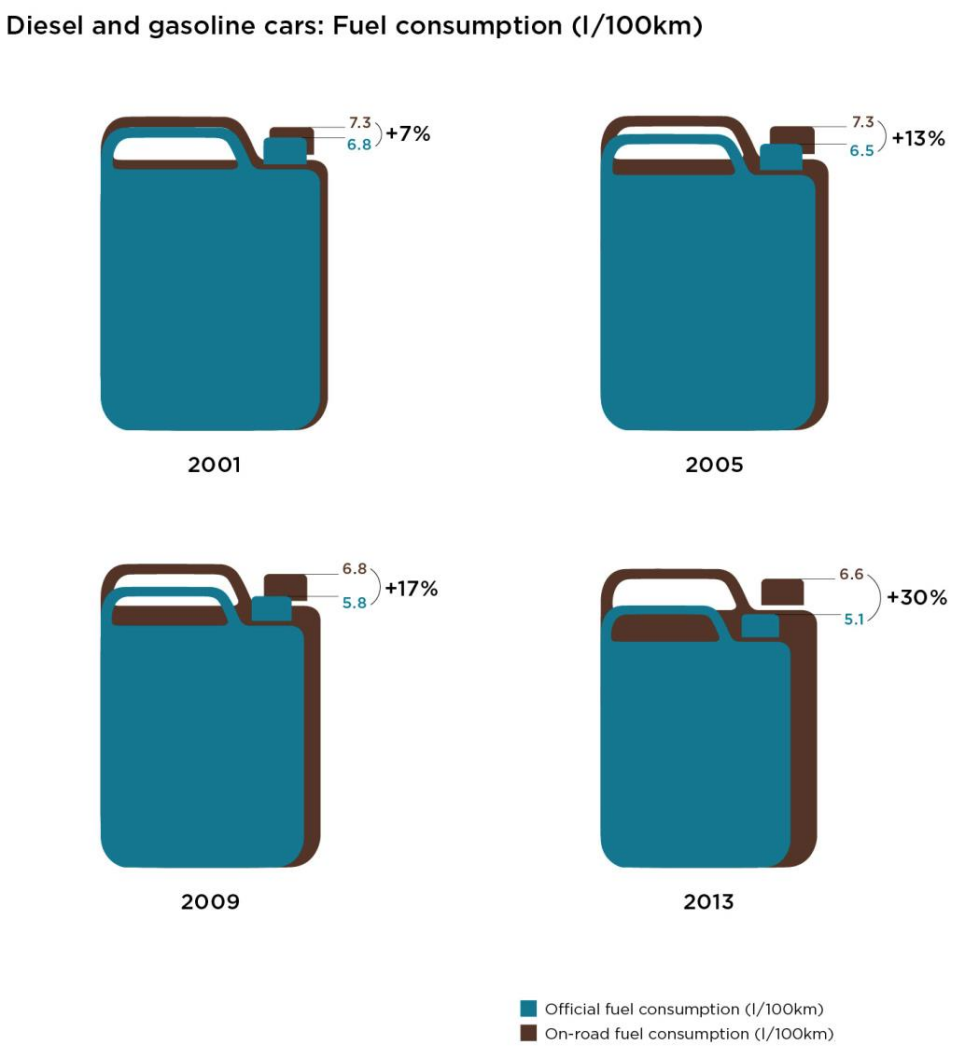
Particles



New European Driving Cycle (NEDC)



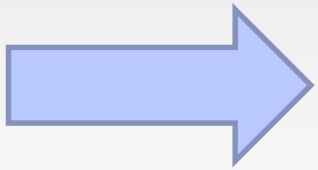
Type approval
versus on-road fuel consumption



ICCT: From laboratory to road – a 2014 update of official and "real-world" fuel consumption and CO_2 values for passenger cars in Europe

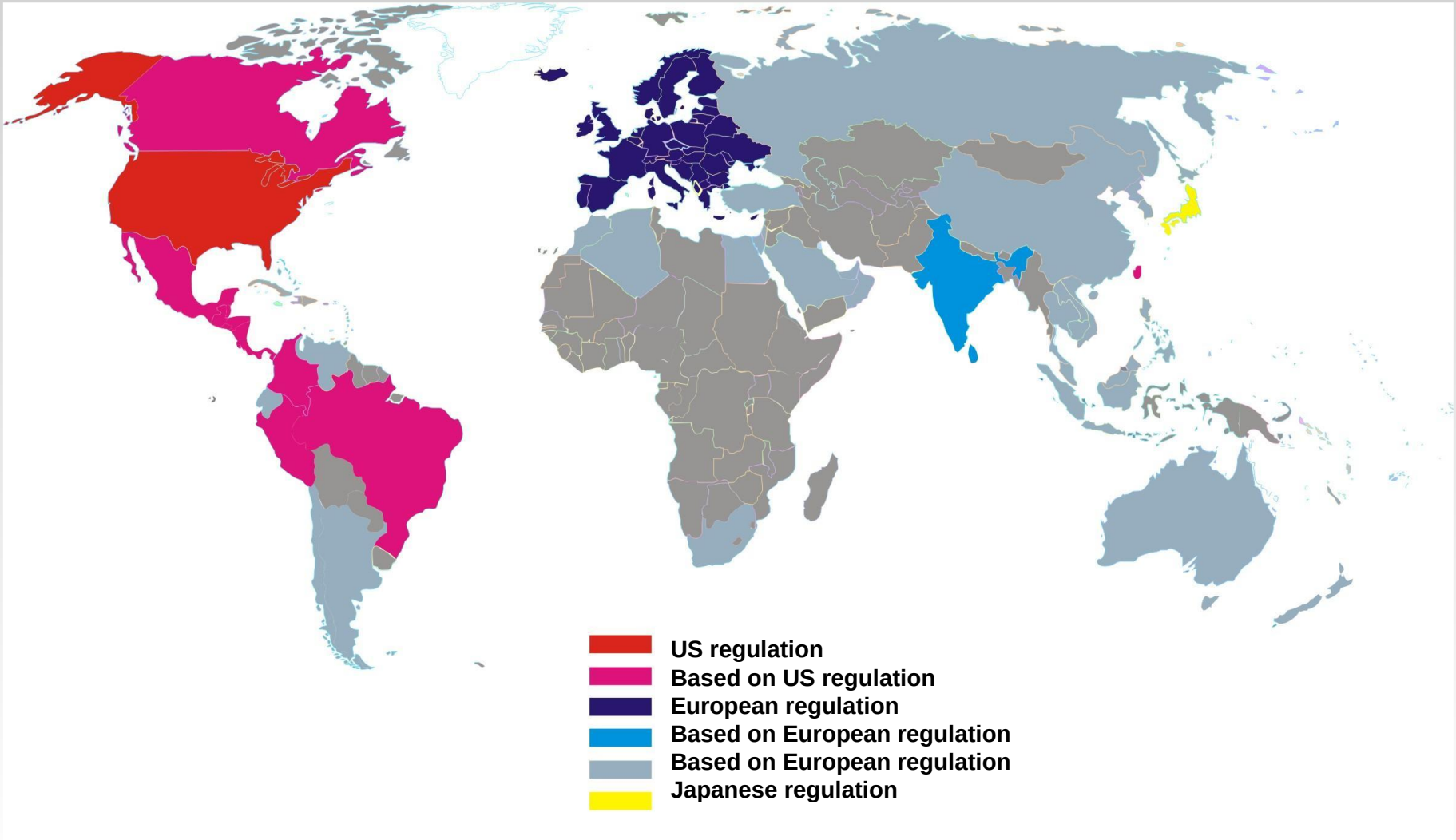
Regulation (EC) No 715/2007

„The Commission should keep under review the need to revise the New European Drive Cycle as the test procedure that provides the basis of EC type approval emissions regulations. Updating or replacement of the test cycles may be required to reflect changes in vehicle specification and driver behaviour.“



WLTP

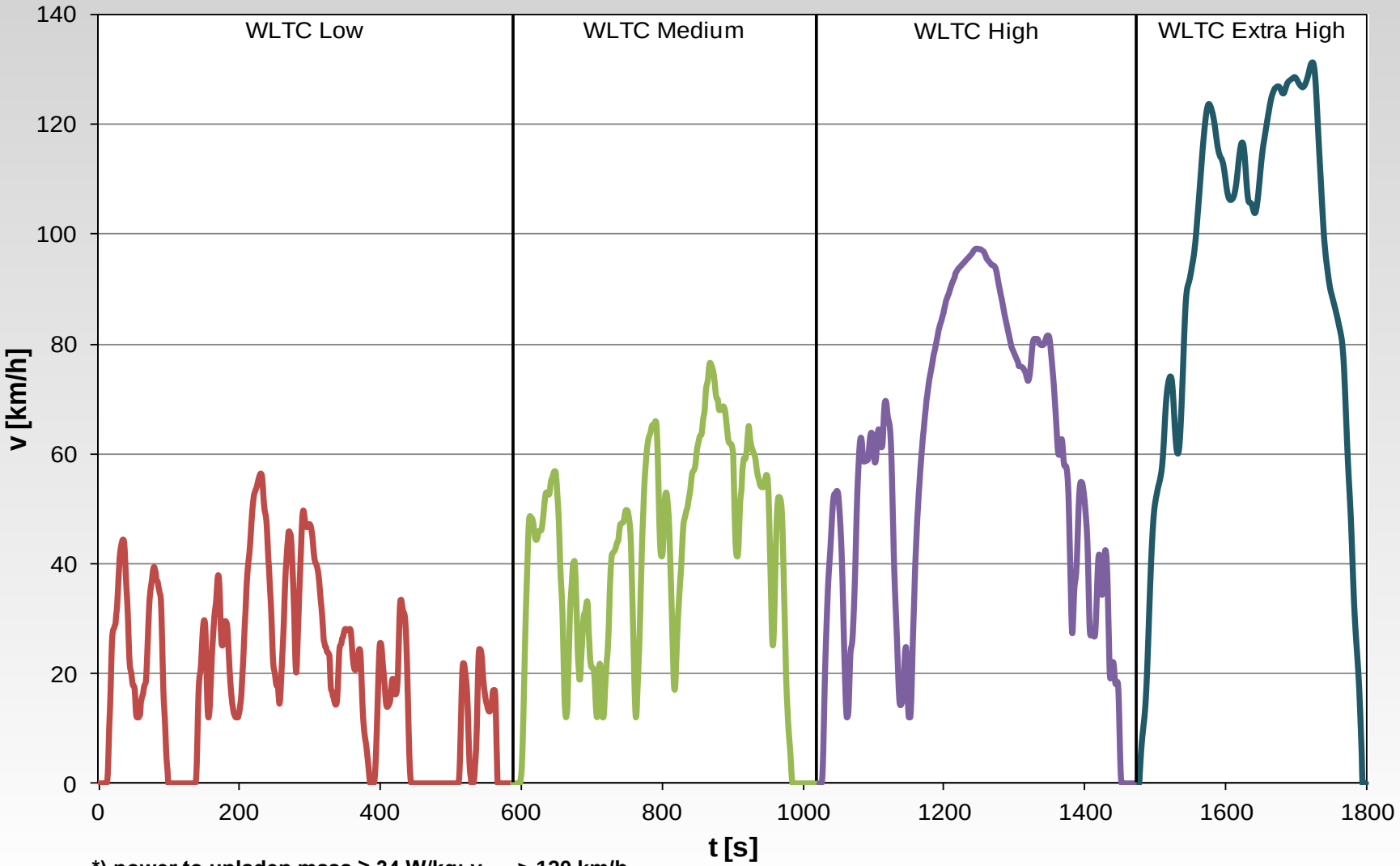
Emission regulations worldwide



Worldwide Harmonized Light-Vehicles Test Procedure (WLTP)

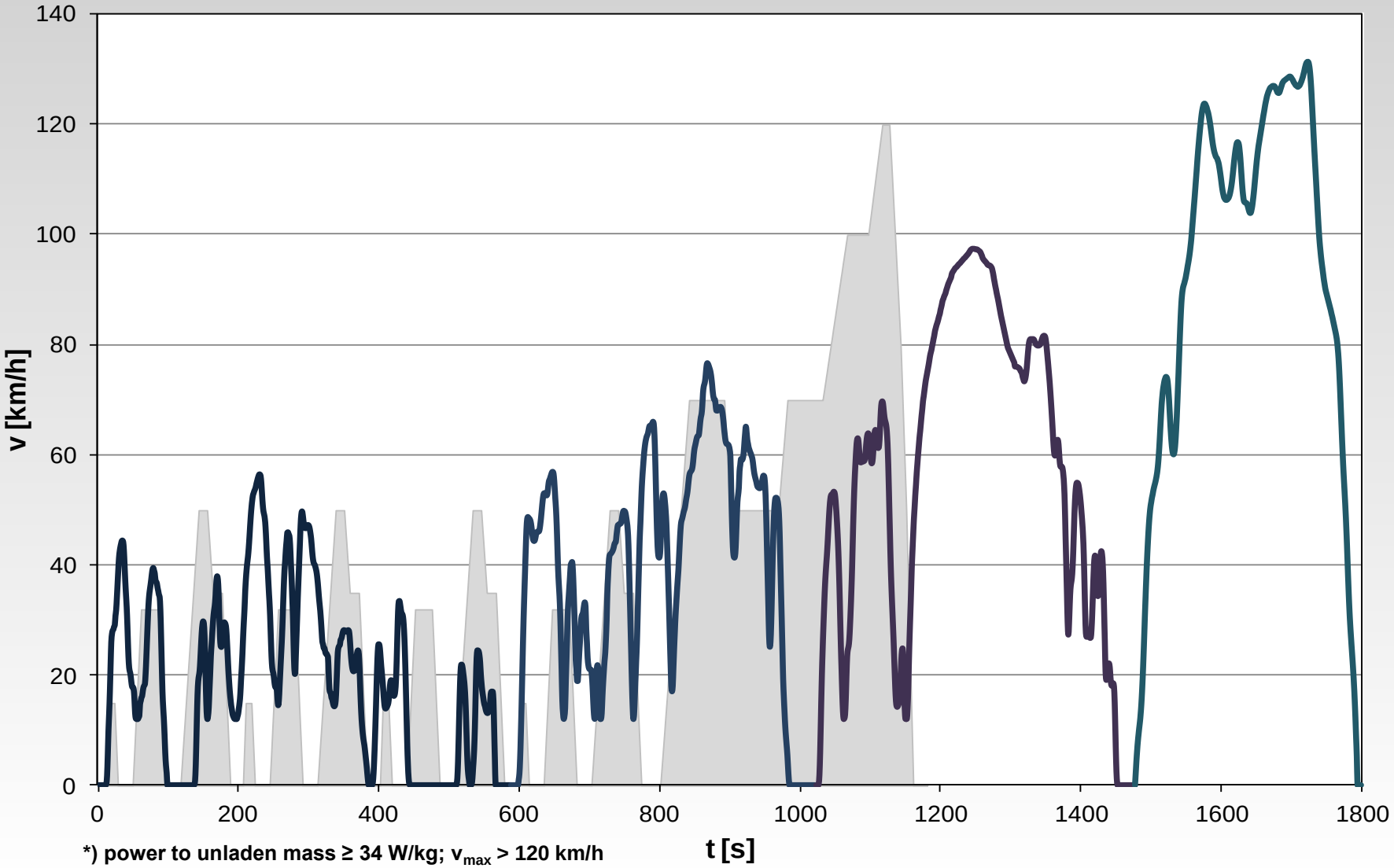
- In November 2007 an UNECE working group was established to create a Worldwide Harmonized Light-Vehicles Test Procedure (WLTP).
- Target is a harmonized measurement of exhaust emissions and energy consumption for different drivetrains (Gasoline, Diesel, LPG, CNG, H2, HEV, EV).
- The work is focused on a harmonized representative driving cycle (DHC) and test procedure (DTP).
- On 2014-03-12 the World Forum for Harmonization of Vehicle Regulations (WP.29) accepted the current GTR concluding Phase 1a of WLTP.

WLTC Version (GTR: 3B*)



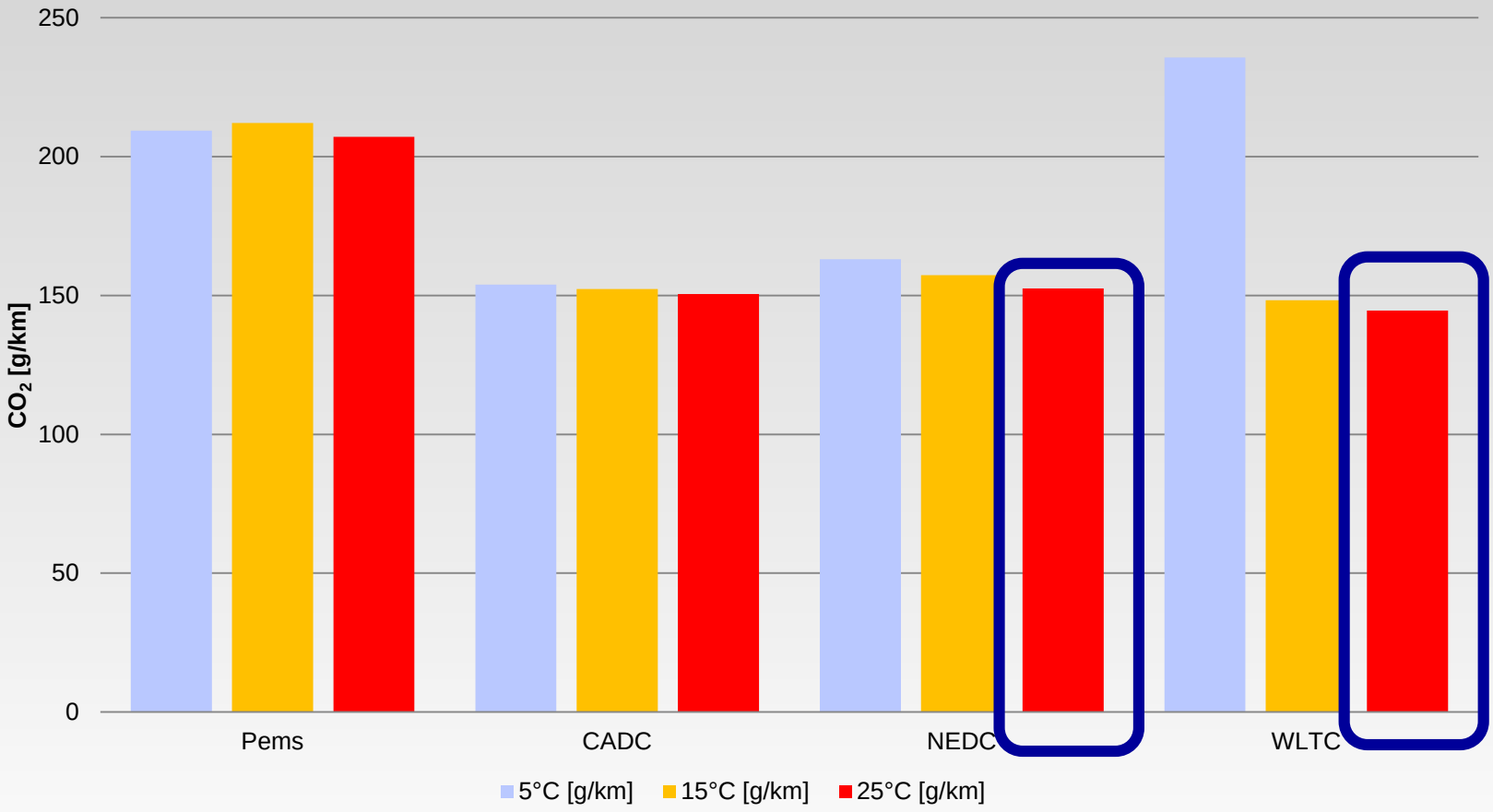
*) power to unladen mass ≥ 34 W/kg; v_{max} > 120 km/h

WLTC Version (GTR: 3B*)



*) power to unladen mass ≥ 34 W/kg; v_{max} > 120 km/h

CO_2 in different driving cycles (1)

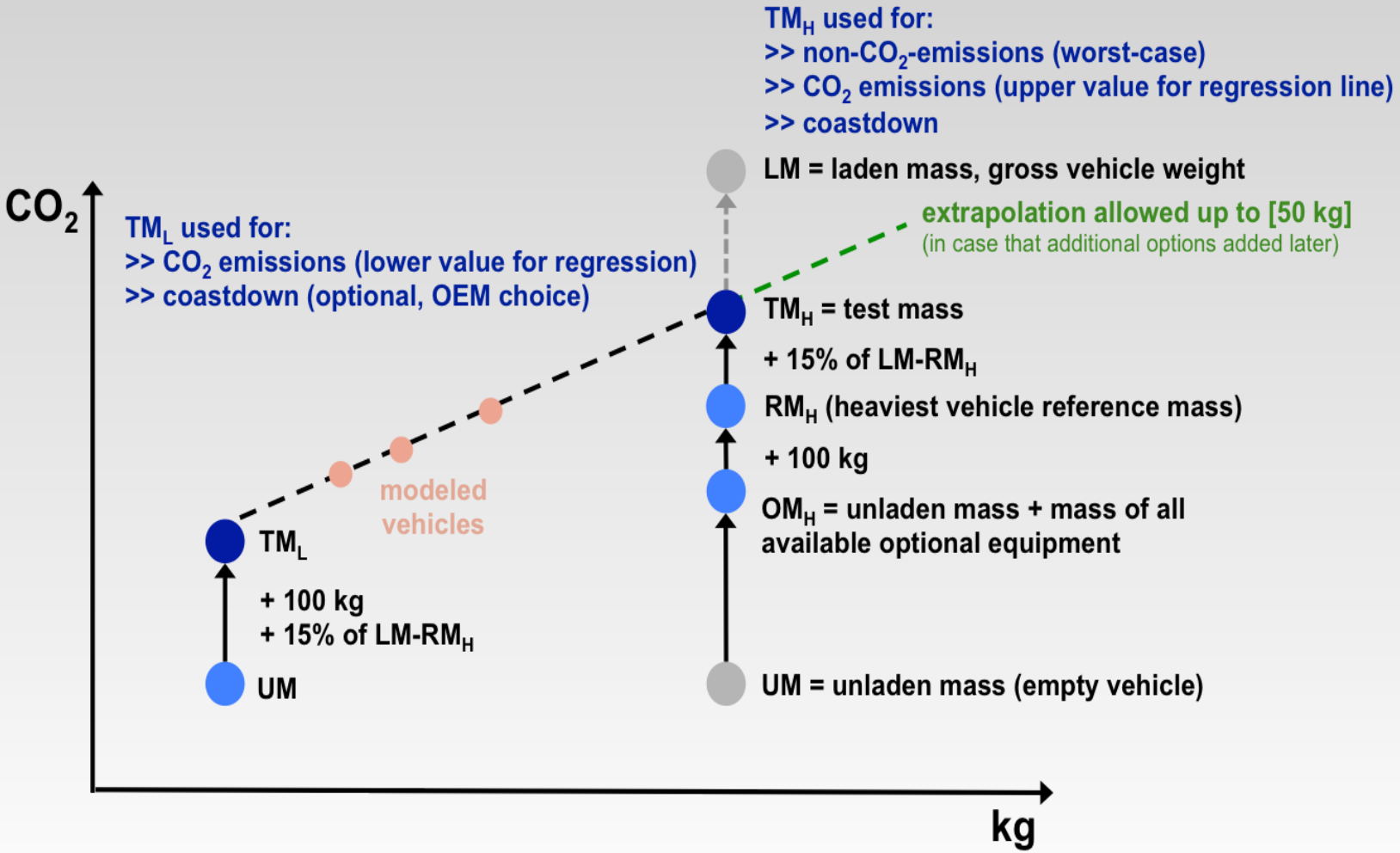


TÜV NORD on behalf of the German Ministry of Environment 2013

WLTP Test Procedure

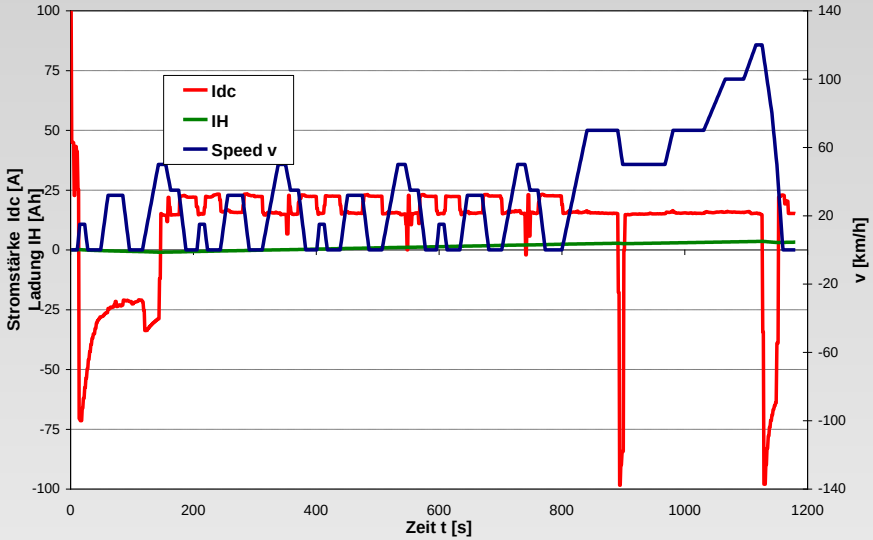
- improvement of coast down procedure
  correction of calculation, definition of test conditions
- test temperature set point 23°C
  test cell +/-5°C
  soak area +/- 3°C
- test mass including optional equipment
- inertia, stepless approach
- reduced tolerences for load setting
- no external battery charging after start of preconditioning test cycle
- RCB correction for all vehicles
- …

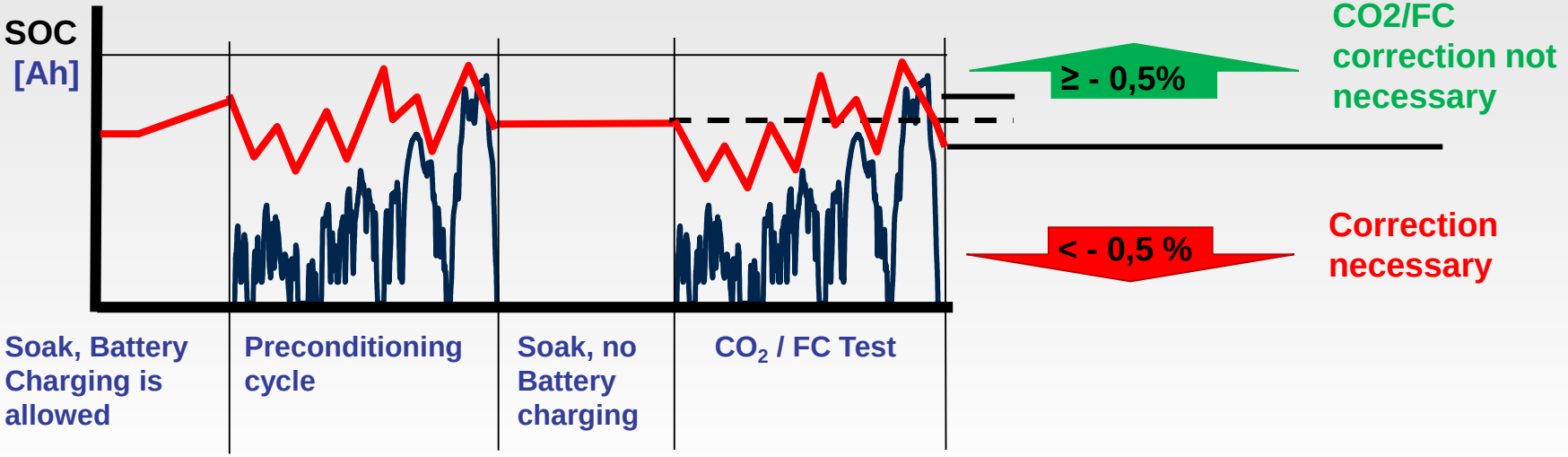
WLTP test mass



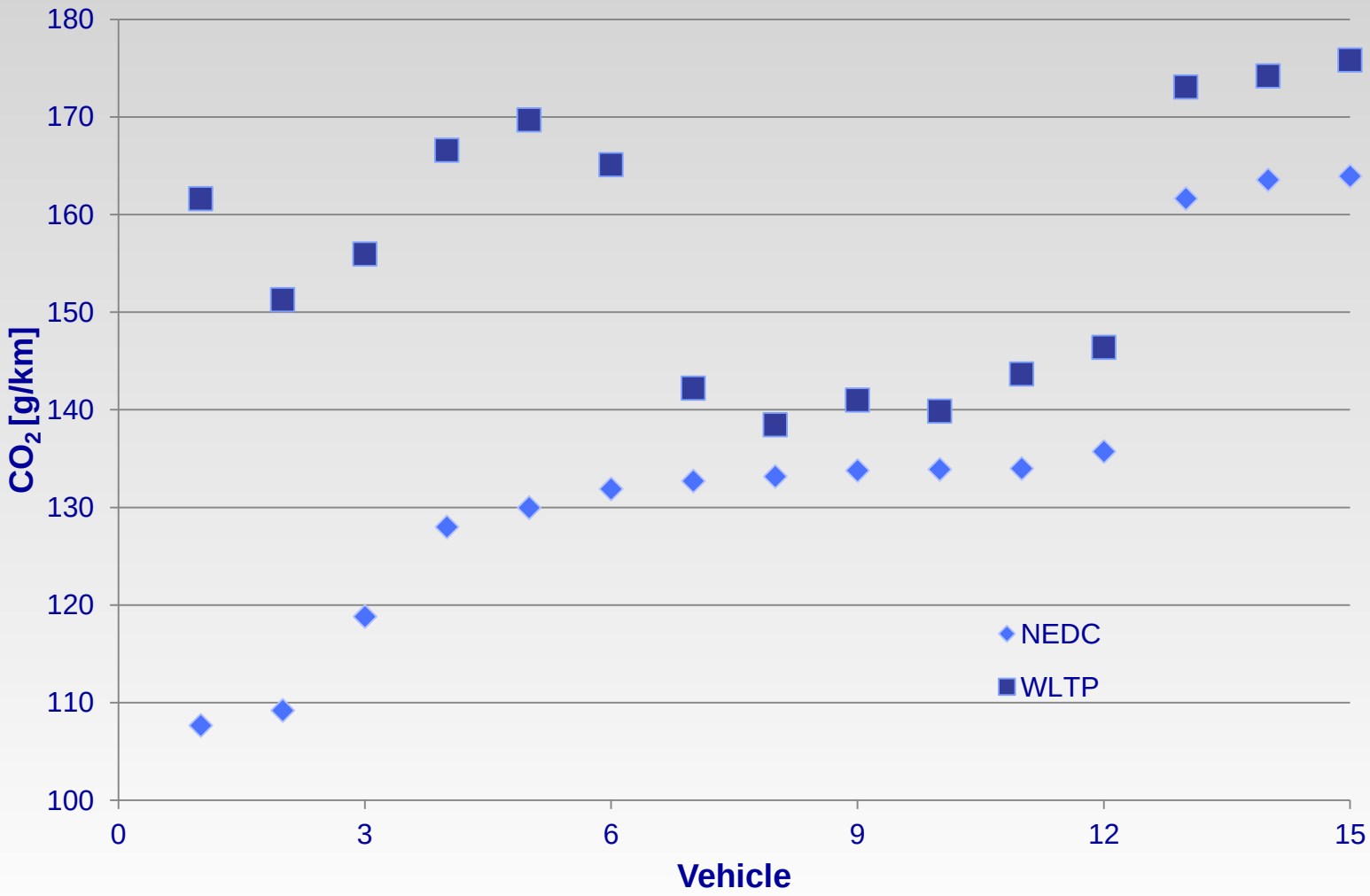
WLTP RCB correction

intelligent battery management: the battery is charged under certain driving conditions only; energy is taken out of the battery during the driving cycle
⇨ lower CO_2 value





NEDC ⇨ WLTP, CO_2 emissions

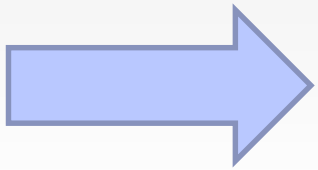


TÜV NORD on behalf of Transportstyrelsen

Climatized 4 wheel dynamometer of TÜV NORD

Regulation (EC) No 715/2007

Exhaust emissions of passenger cars and light duty trucks in Europe are measured by using the NEDC under well defined ambient conditions in a laboratory. The NEDC represents only a small part of all driving conditions in real traffic.
„Revisions may be necessary to ensure that real world emissions correspond to those measured at type approval. The use of portable emission measurement systems and the introduction of the ‘not-to exceed’ regulatory concept should also be considered.“



Real Driving Emissions

Real-Driving-Emissions (RDE) (1)

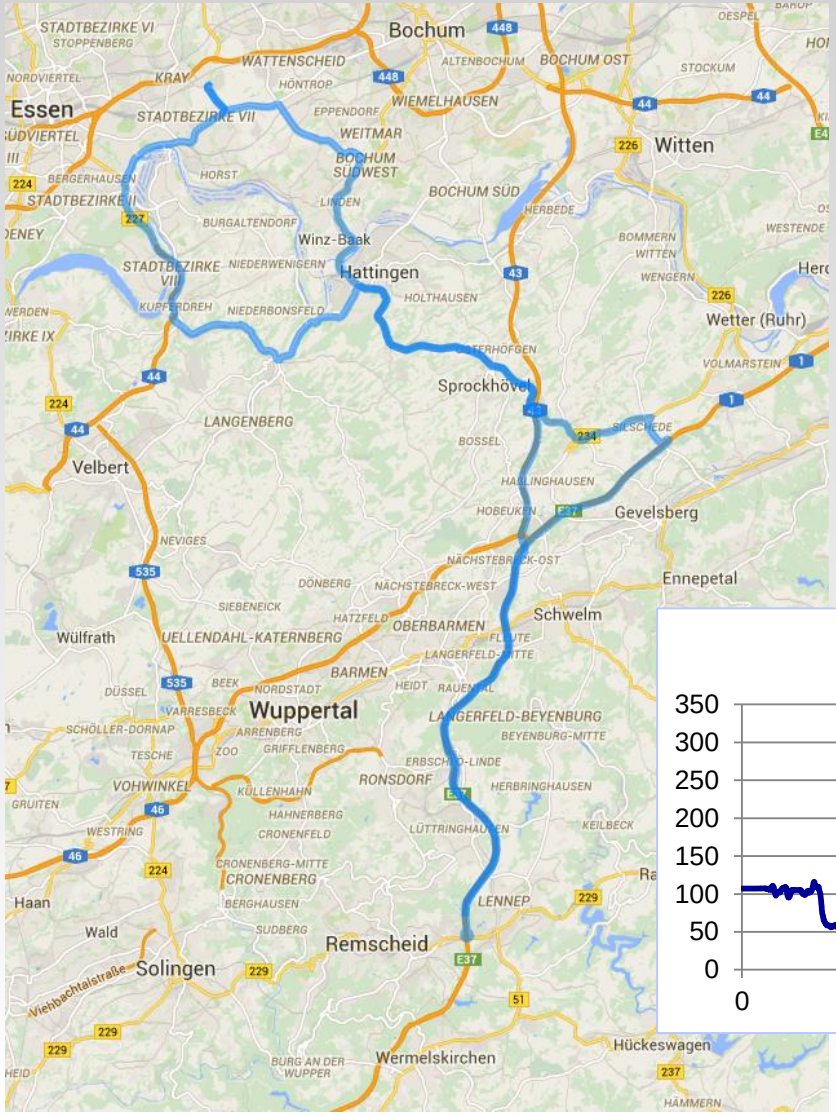
- In Europe it is discussed how to measure exhaust emissions in real traffic (Real Driving Emissions = RDE).
- Due to European air qualitiy regulations NOx emissions are the main issue of RDE.
- European Commission is also interested in particle measurement especially on gasoline direct injection.
- Emissions can be measured by using Portable Emission Measurement Systems (PEMS) in real traffic.
- TÜV NORD is carrying out research programs on behalf of the German government within ithe RDE process. Results are sent to JRC.

PEMS System for Light Duty

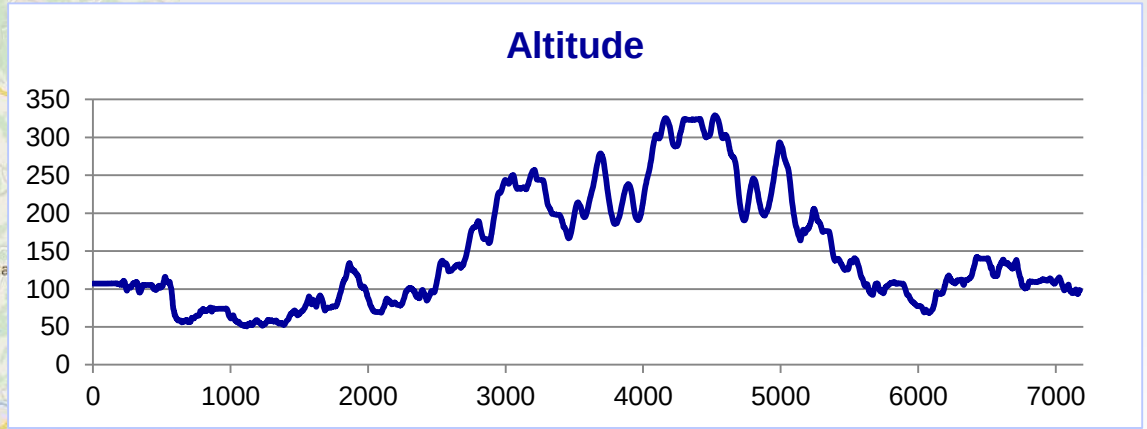
Light Duty PEMS:

- Exhaust Flow Meter
- NDIR: CO, CO_2,
- O_2 - Sensor
- NDUV: NO + NO_2 = NOx
- FID: THC
- Power Supply:
  Li-Fe-Battery, 200 Ah,
  Measurement time 4h

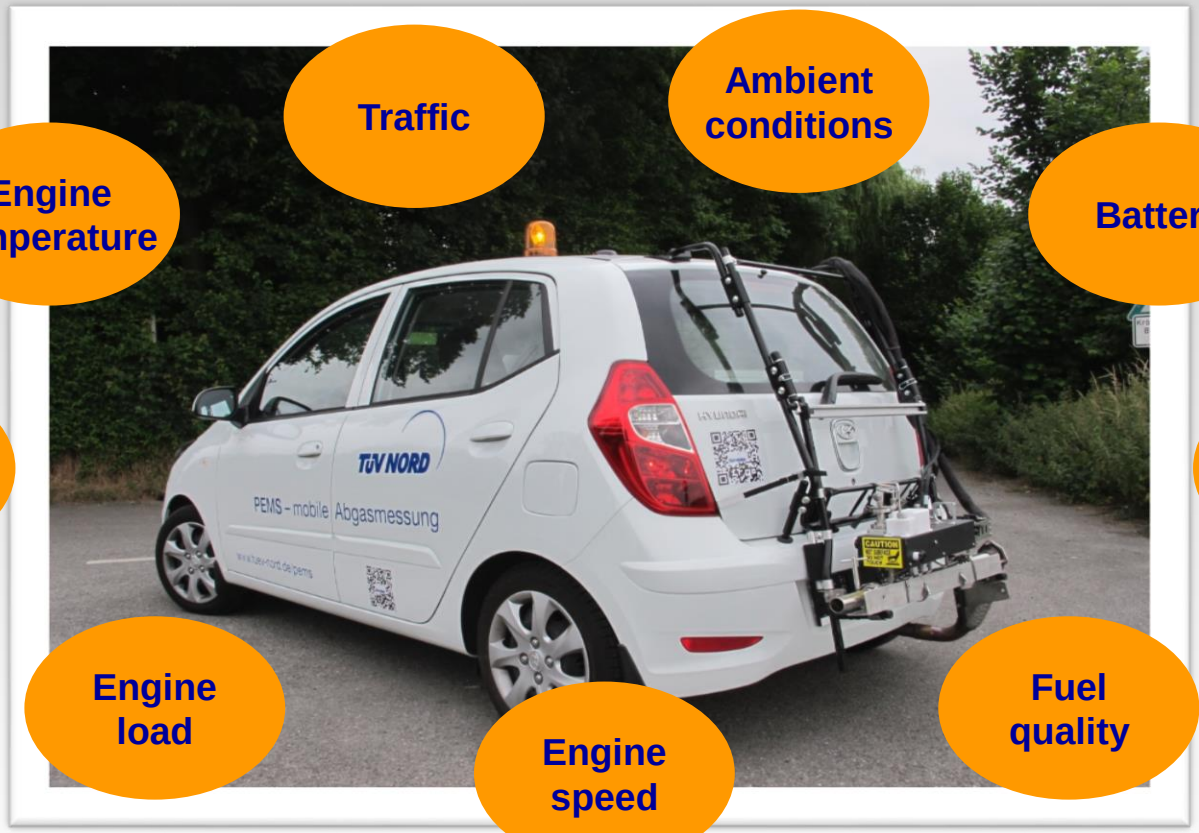
TÜV NORD PEMS-Route (RDE-Draft 15.10.2014)



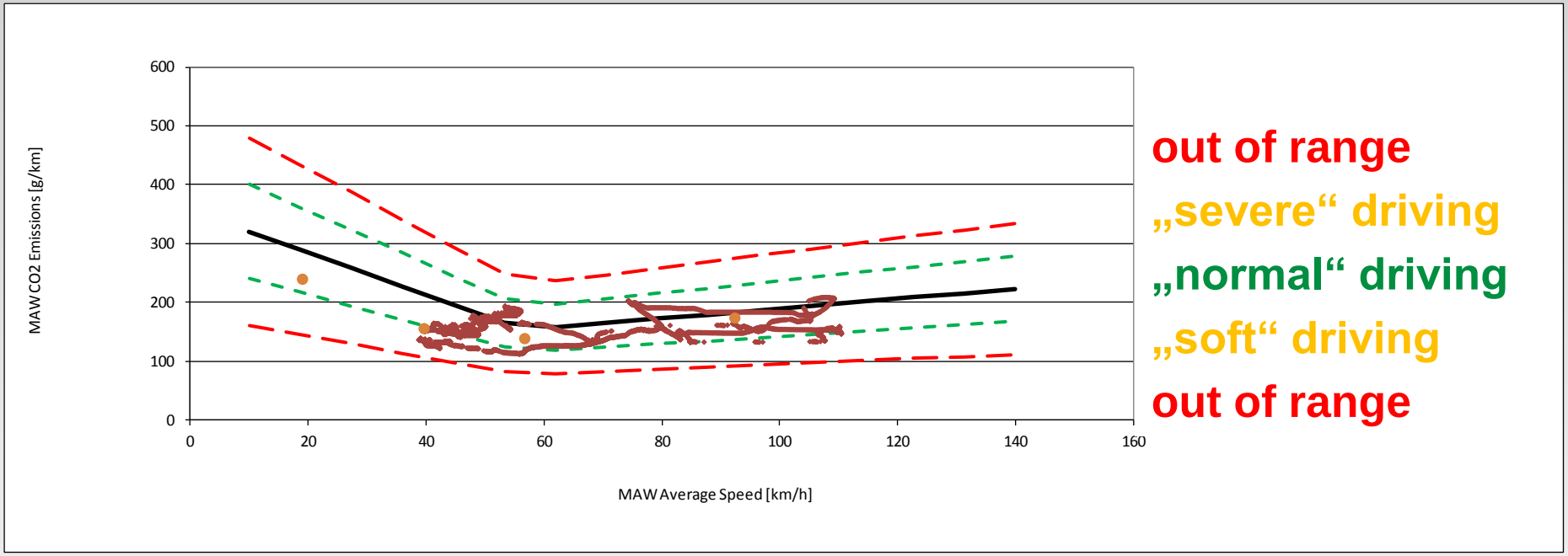
- Distance: about 107 km
- Duration: about 115-120 minutes
- Urban Driving($v_{average}$ ≥ 20km/h): about 33%
- Extra Urban Driving: about 33%
- Motorway Driving(v_{max} ≤ 160 km/h): about 33%
  (related to driven distance, ±5%)



Driving conditions in real traffic



TÜV NORD PEMS-Route
Example of M.A.W.- Method in Emroad



Severity Category >		MAIN RESULTS					NORMAL R-T1<W<R+T1				NORMAL [+] R+T1<W<R+T2				NORMAL [-] R-T2<W<R-T1				ALL WINDOWS			
		URBAN	RURAL	MOT.	CORRECTED U/R/M WEIGHT	ALL	URBAN	RURAL	MOT.		URBAN	RURAL	MOT.		URBAN	RURAL	MOT.					
NUMBER OF WINDOWS							353	2500	1168	4021	0	0	0	0	1221	394	137	1752	1574	2894	1305	5773
% (WITHIN THE CATEGORY)							9	62	29						70	22	8		27	50	23	
% (W / ALL WINDOWS)							22	86	90		0	0	0		78	14	10					
SEVERITY INDICES		-21,98	-6,79	-12,92			-21,98	-6,79	-12,92						-33,75	-29,31	-27,56		-31,11	-9,86	-14,46	
CO_EMISSIONS	**g/km**	**0,07**	**0,09**	**0,14**	**0,10**	**0,10**	**0,07**	**0,10**	**0,15**						**0,07**	**0,06**	**0,11**		**0,07**	**0,09**	**0,14**	
NOx_EMISSIONS	**g/km**	**0,02**	**0,02**	**0,01**	**0,02**	**0,02**	**0,02**	**0,02**	**0,01**						**0,03**	**0,02**	**0,01**		**0,02**	**0,02**	**0,01**	
PN_EMISSIONS	**#/km**	**0,00E+00**	**0,00E+00**	**0,00E+00**	**0,00E+00**	**0,00E+00**	**0,00E+00**	**0,00E+00**	**0,00E+00**						**0,00E+00**	**0,00E+00**	**0,00E+00**		**0,00E+00**	**0,00E+00**	**0,00E+00**	

Components to be measured

NOx and CO:

- NOx and CO will be measured on PI and CI vehicles.

CO_2:

- CO_2 is needed as reference value for data evaluation.

PN:

- Particle Number will be added
- JRC is testing different PN-PEMS candidate instruments
- if PN-PEMS is not available, Random Cycle will be a back up solution.

Summary

- Exhaust emissions of passsenger cars and light duty trucks in Europe are measured in the NEDC.
- In November 2007 an UNECE working group was established to create a Worldwide Harmonized Light-Vehicles Test Procedure (WLTP).
- The work is focused on a harmonized representative driving cycle and test procedure.
- In Europe it is discussed to measure exhaust emissions in real traffic (Real Driving Emissions = RDE).

Thank you for your attention!

Helge Schmidt

Manager
IFM – Drivetrain / Emissions
Passenger cars / Motorcycles
Emissions / Perfomance / Consumption

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Plenary Session Two

Presentation 3

More Effective Testing Through Interactive Test Methods and Equipment

Neil Pattermore

EGEA Technical Advisor

Who are EGEA?

EGEA

European Garage Equipment Association

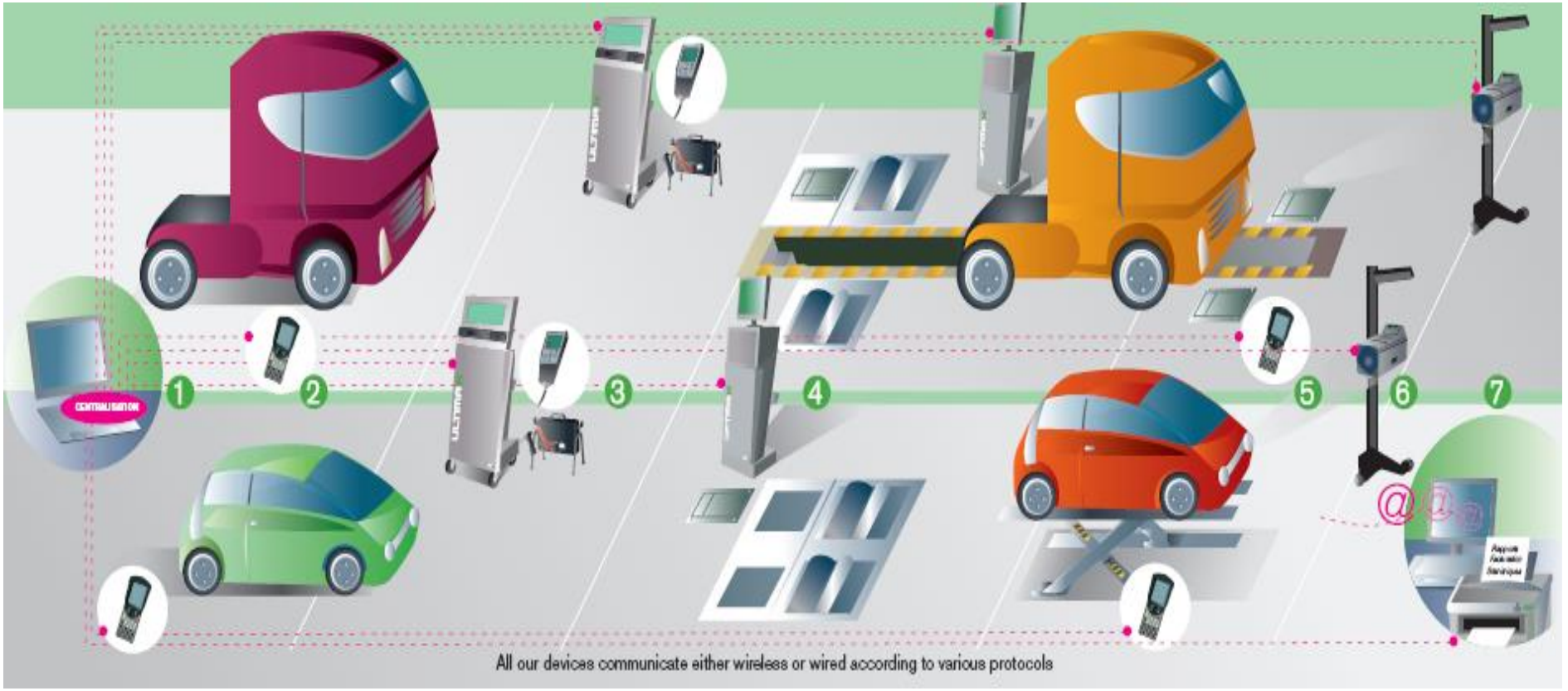
- **Founded in Paris in 1980.**
- Gathers **11 national trade associations** from 11 European countries and 1 industry member (AVL DiTEST – Austria)
- **Represents the interests of garage and test equipment *manufacturers* and *importers***

Our mission

- Achieving a **high level of quality** for products and test procedures
- Upholding **stringent safety rules**
- Creating **common rules** regarding design, manufacturing, installation, servicing and operation of garage and test equipment.

EGEA

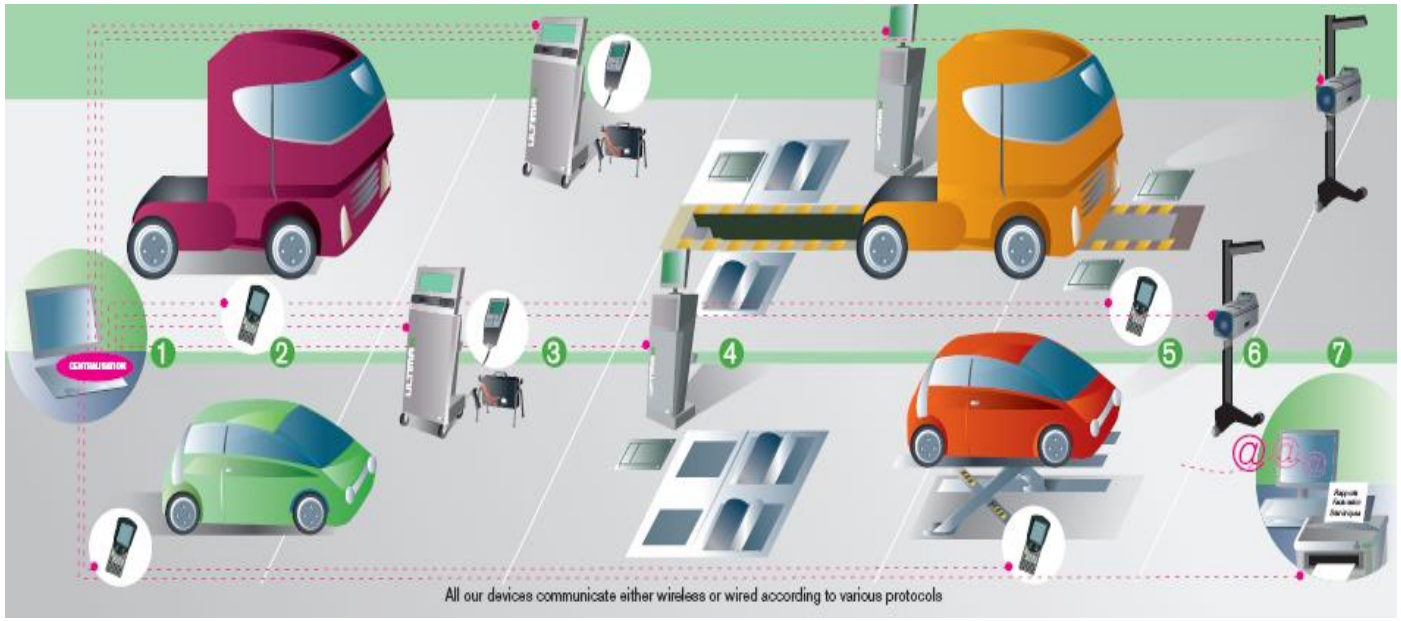
PTI centres today



EGEA

PTI centres today

Vehicle Inspection Management



- Government Agency coupling
- Report
- Process Mgt
- Data collection
- Networking
- Equipment

Solution for Motorcycle, Light & Heavy Vehicles

Software management: Local PTI & Multi sites

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New systems – new challenges

- New systems – e.g. headlight systems, stability systems, active cruise control, eCall, AEBS, ….etc.
- European Commission Electronically Controlled Safety Systems (ECSS) study – new test methods – functionality testing – existing and future systems.
- Although a deeper investigation would be necessary, vehicle safety system failures were detected which were not able to be detected by the vehicle's on-board diagnostic systems (OBD).
- The reliability rates of electronic systems are broadly the same as mechanical systems, but can become a greater issue as the vehicle ages.

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New systems – new test methods

Test Lane

ECU-Diagnostics Interface

ECU-Diagnostics Content

ECU-Diagnostics

PTI database

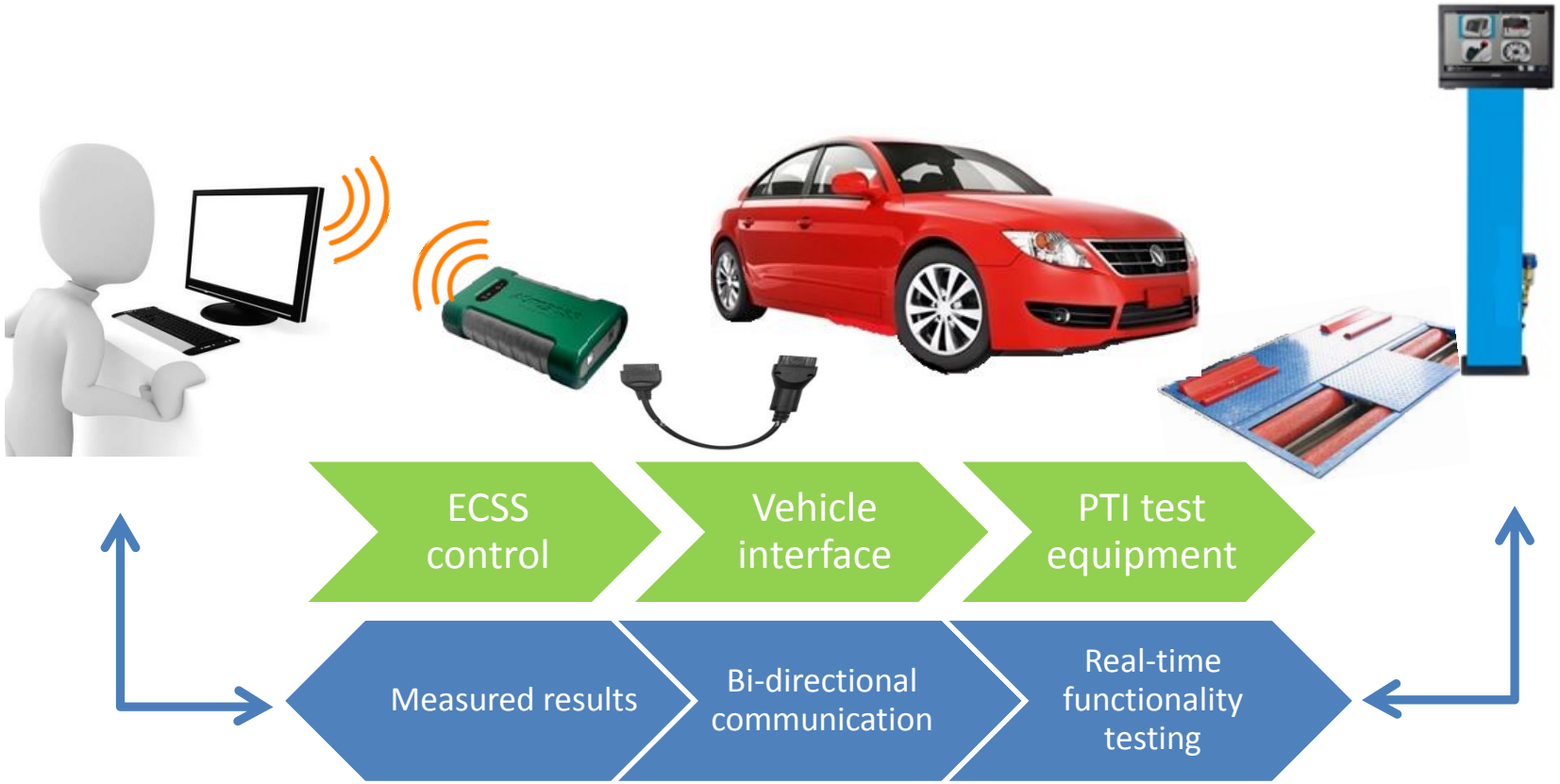
EGEA

New test methods and equipment

- The next step is to automate the Electronically Controlled Safety System (ECSS) functionality testing
- The electronic vehicle communication interface is used to control the vehicle safety system to create the functionality, with the results measured on existing PTI test equipment.
- Control of the system to provide functionality testing (non-intrusive, not dependent on component specification, but functionality)

Functionality testing – added value

- By going one stage further and controlling the vehicle safety system with the measurement equipment results by linking this back to the control unit, a complete automated test sequence is possible:



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New headlight beam technology

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Headlamp system developments

HALOGEN 1964

XENON 1991

FULL LED 2009

MATRIX LED 2013

LASER 2015

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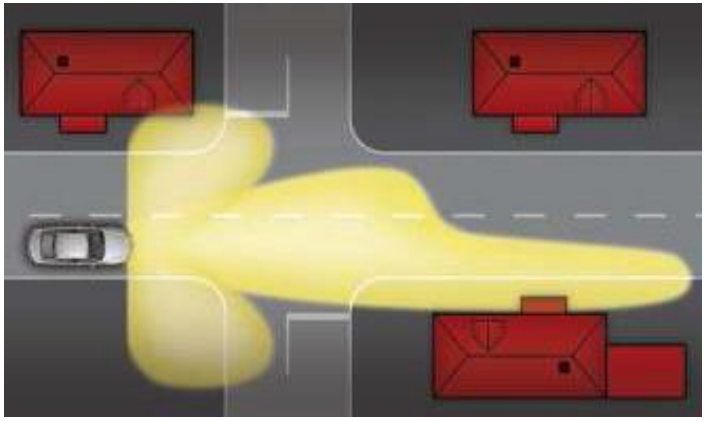
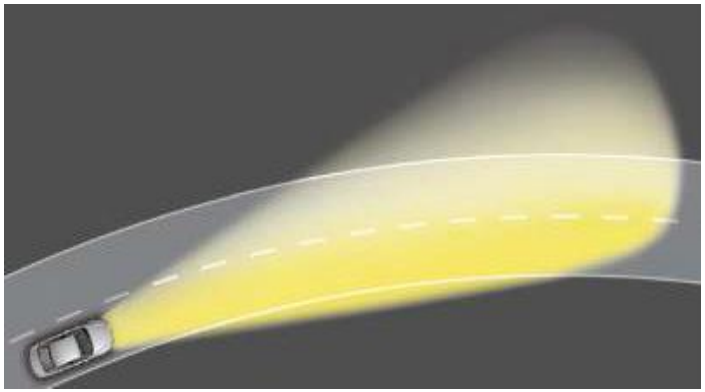
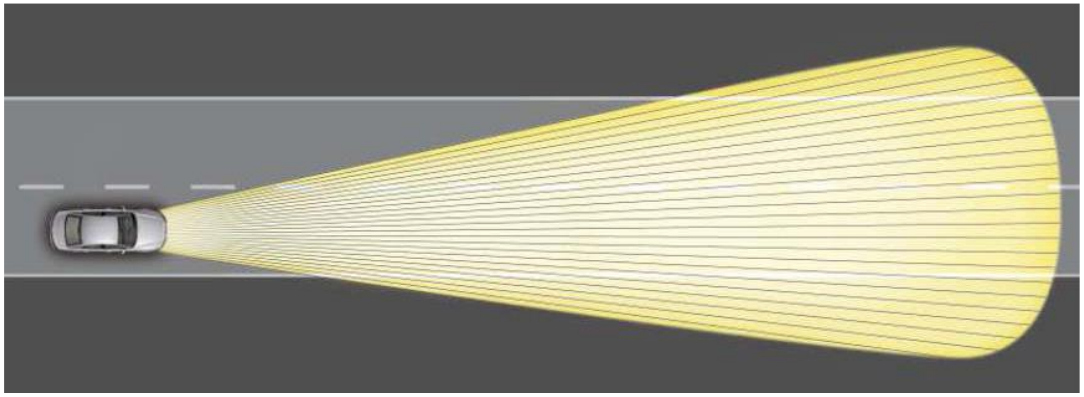
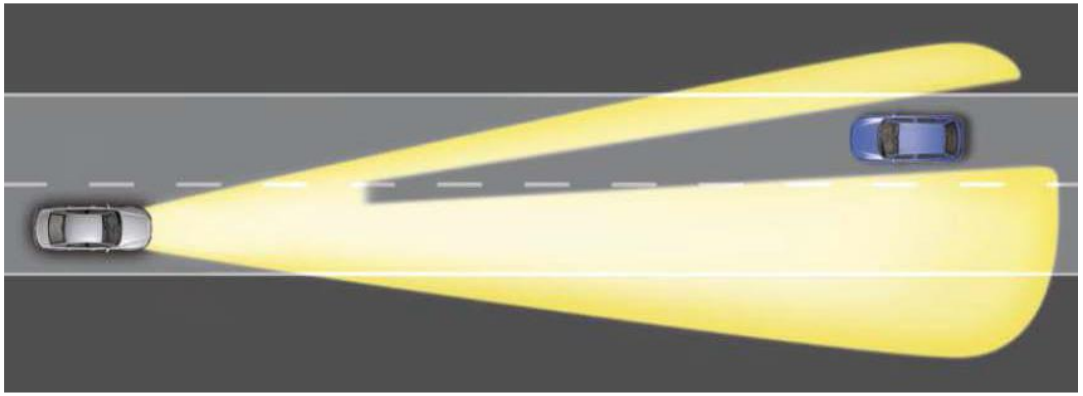
Matrix LED system

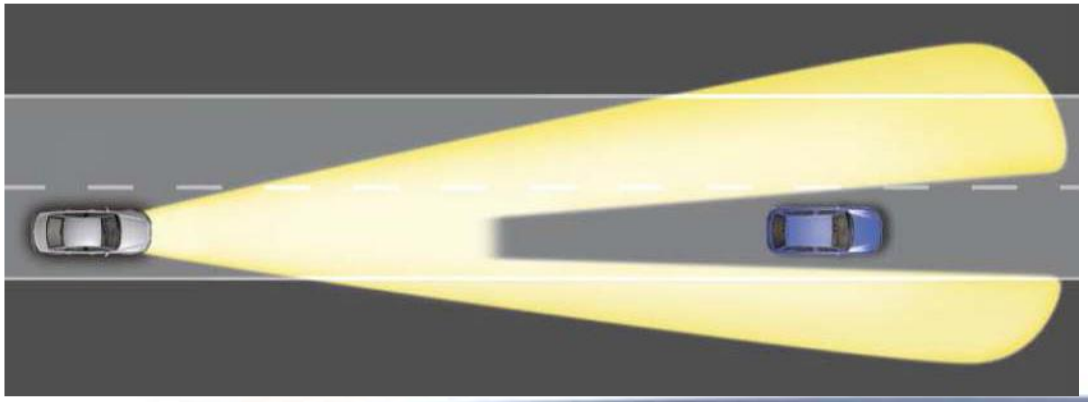
Matrix LED system – lighting control





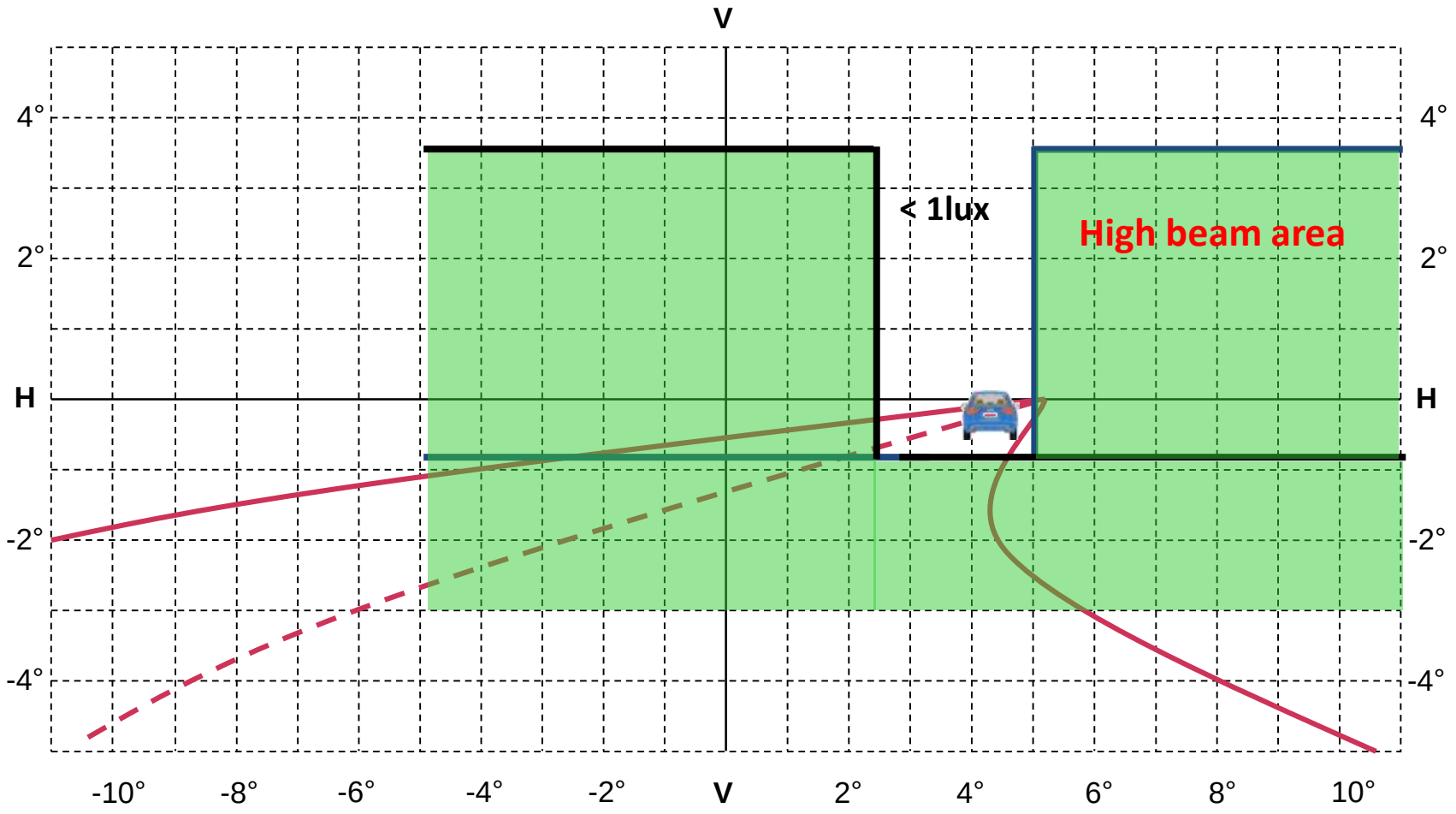






EGEA

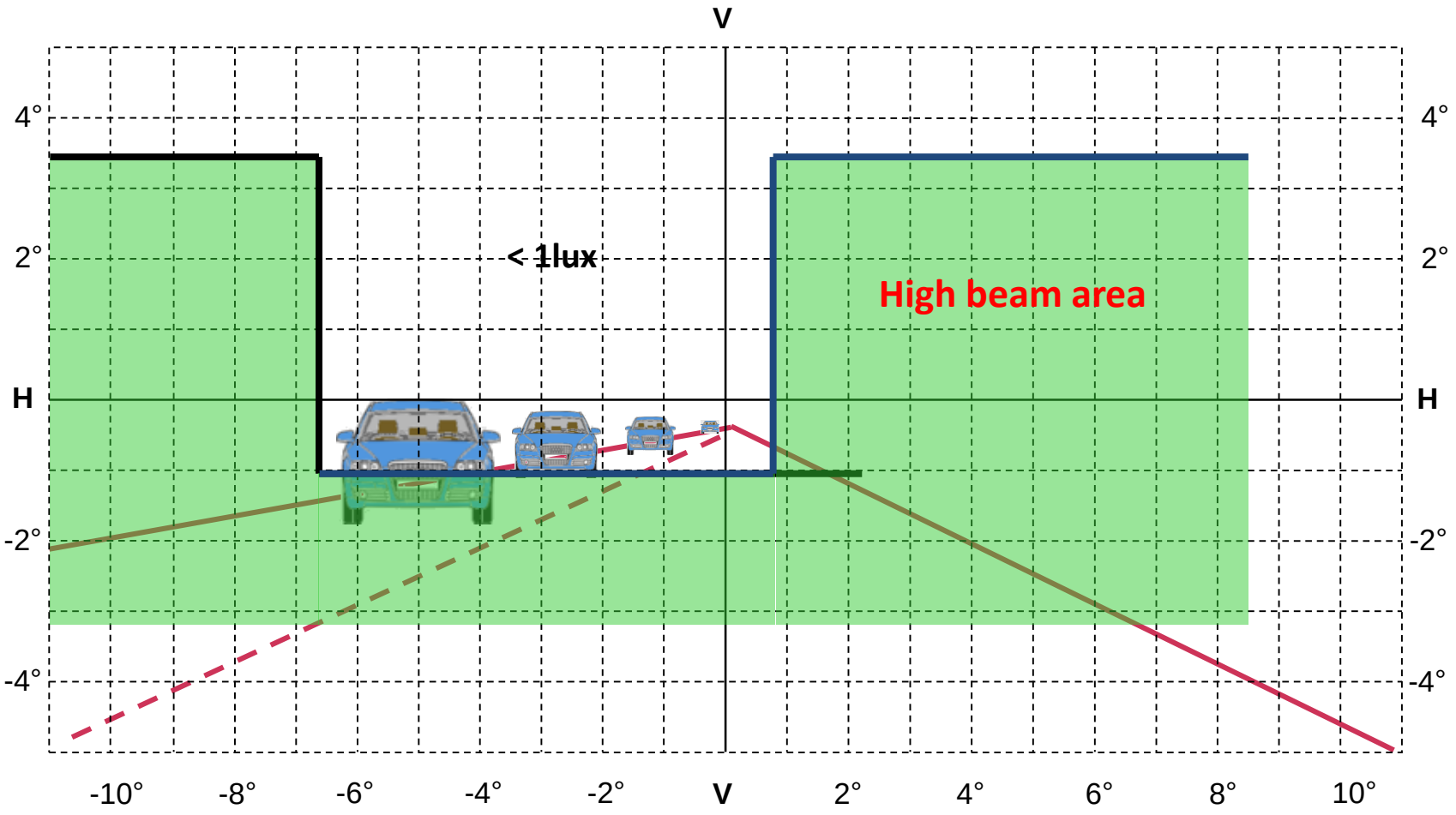
Future test requirements



EGEA

HELLA GUTMANN SOLUTIONS

Future test requirements



EGEA

HELLA GUTMANN SOLUTIONS

Head Light Beam setter: Function and tasks - Static beam

Charge Coupled Device (CCD) imaging sensor system

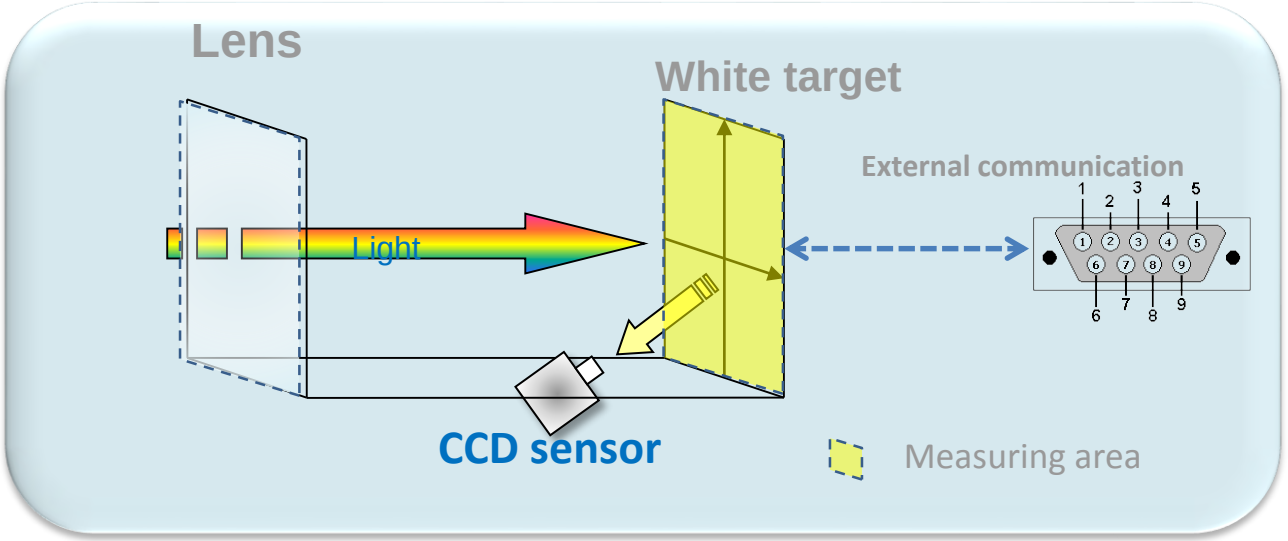
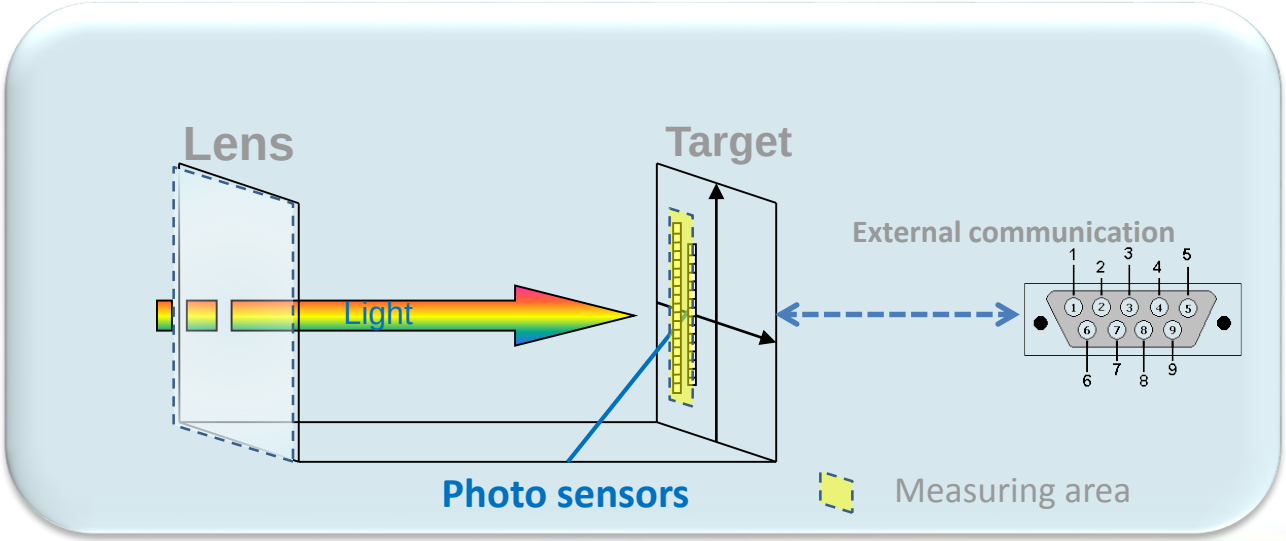


Photo sensor LED barrier system



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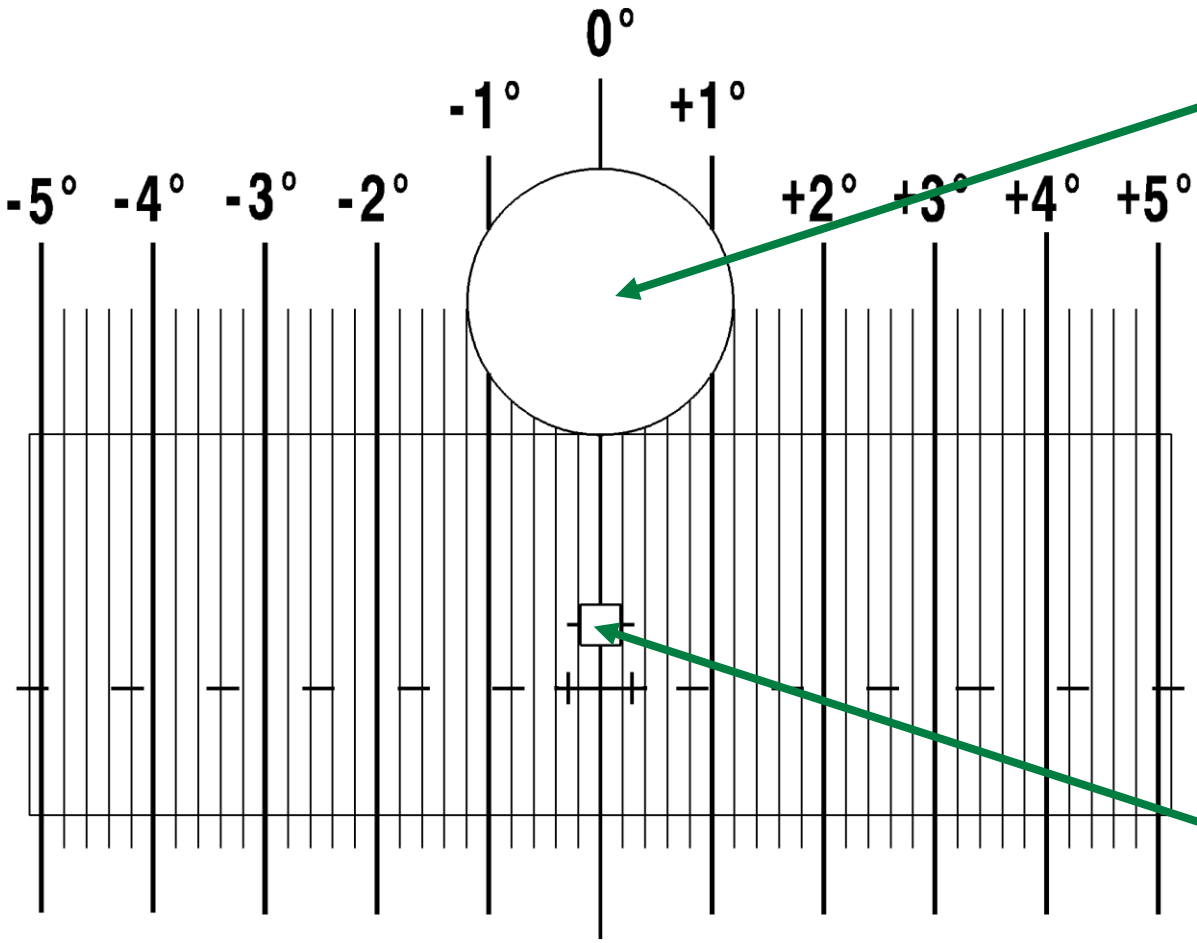
Headlamp tester screen design: non-imaging sensor



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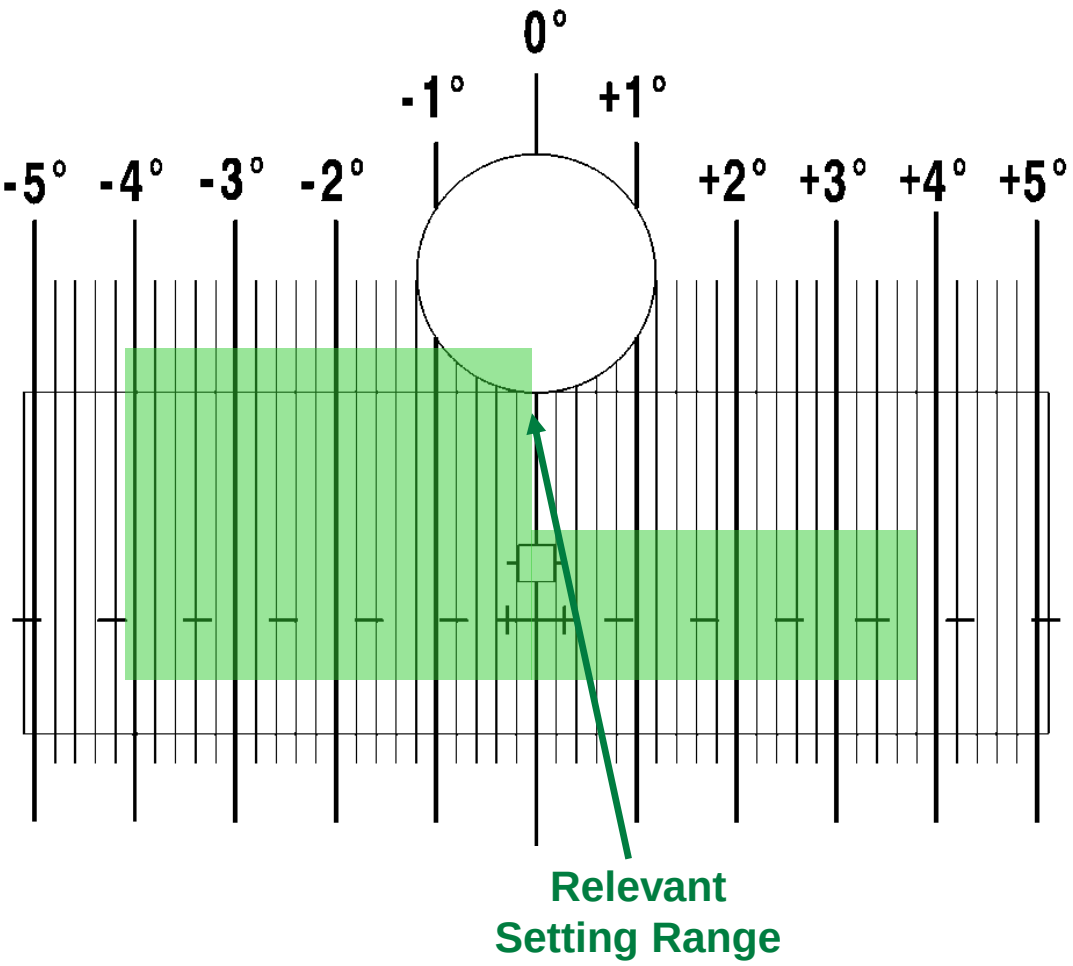
Vertical Cut-Off Line: VW Golf VII – Xenon lights

- The green area on the diagram shows the light distribution from the lefthand headlamp.
- The arrow indicates the vertical cut-off and must be on the 0° line.
- The righthand headlamp produces a mirrored image



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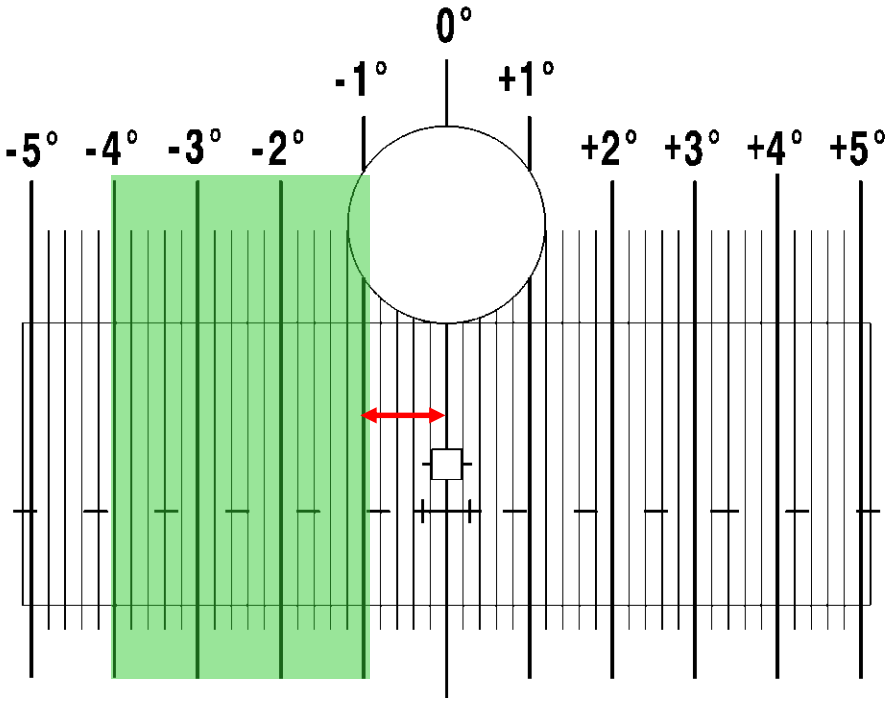
LED matrix system Audi A8: highbeam

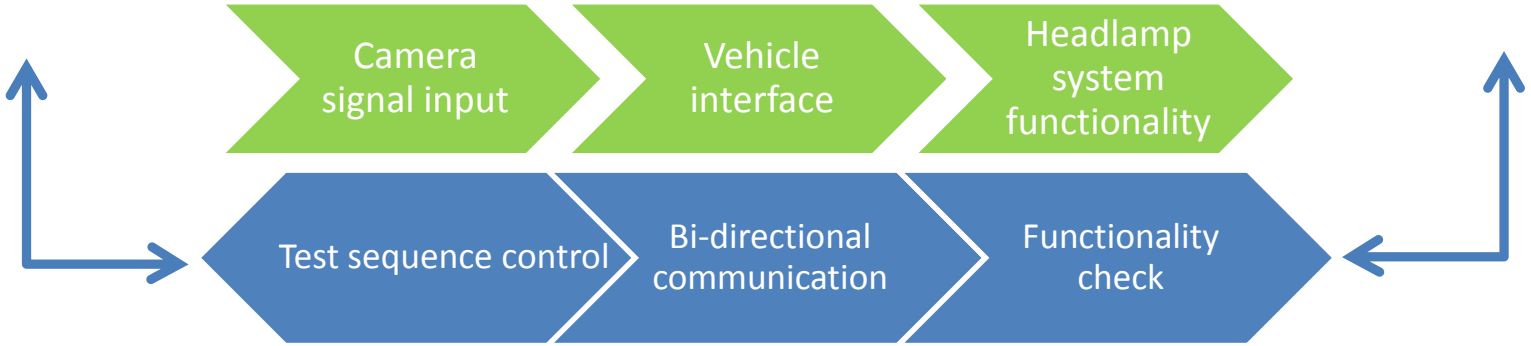
- The green area on the diagram shows the light distribution. The headlamp vertical cut-off position, in increments of 0.2°, can be read on the test screen (left or right side).
- The distance to the 0° line is indicated by the red arrow. The headlamp system function should match the test sequence control input signals.



Relevant Setting Range

NOTE: there is no manual adjustment possible!

Functional headlamp testing



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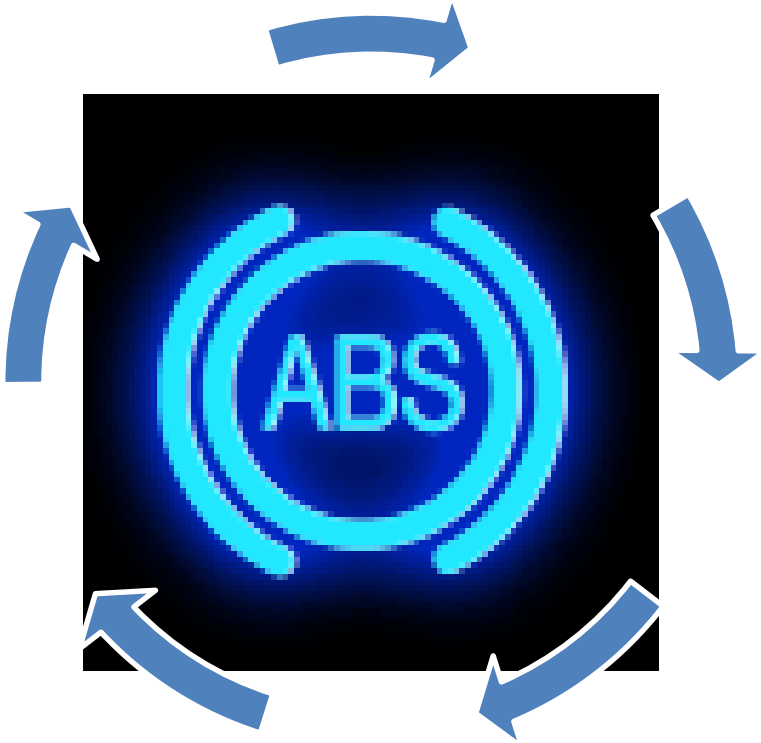

Interactive ABS testing

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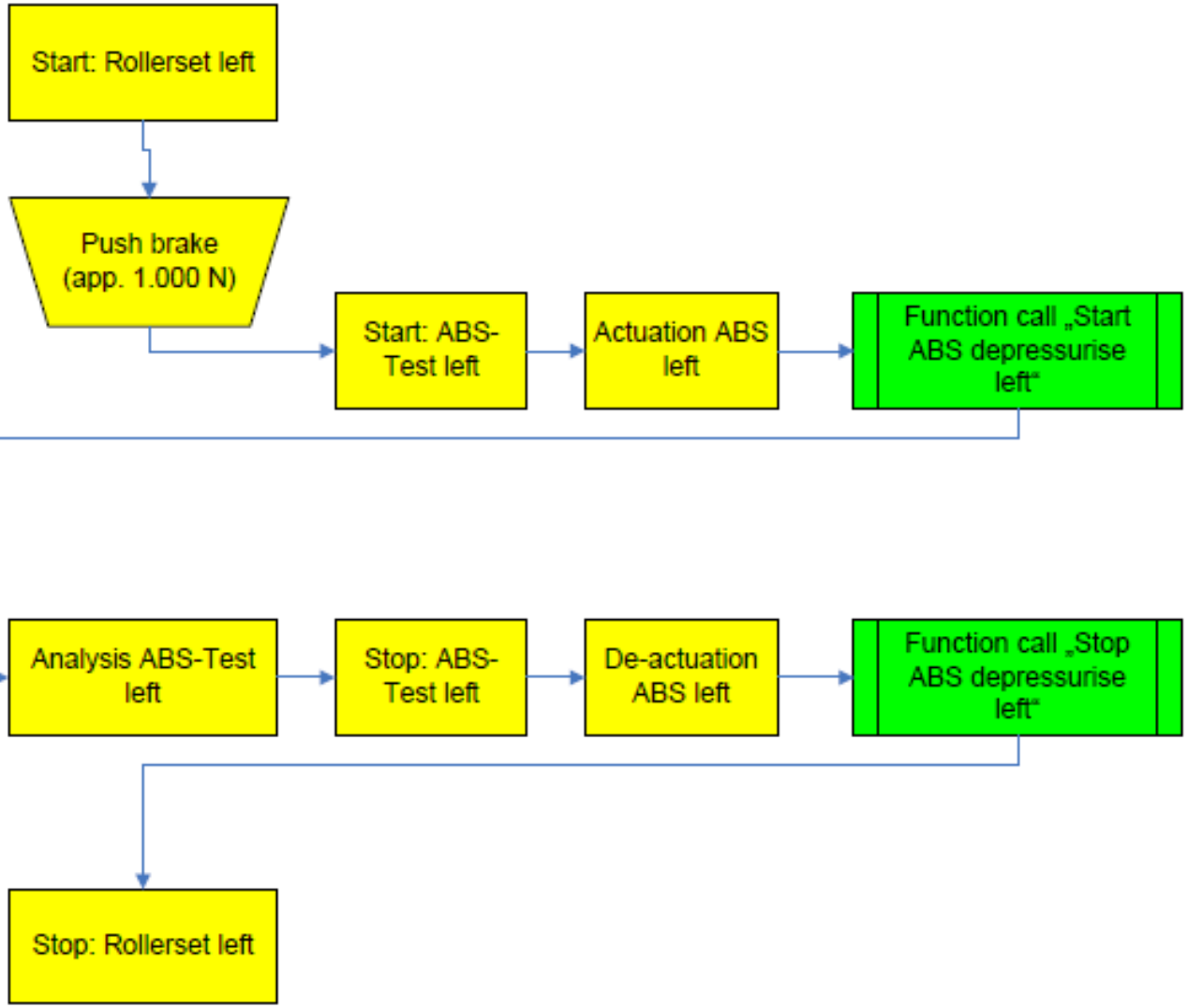
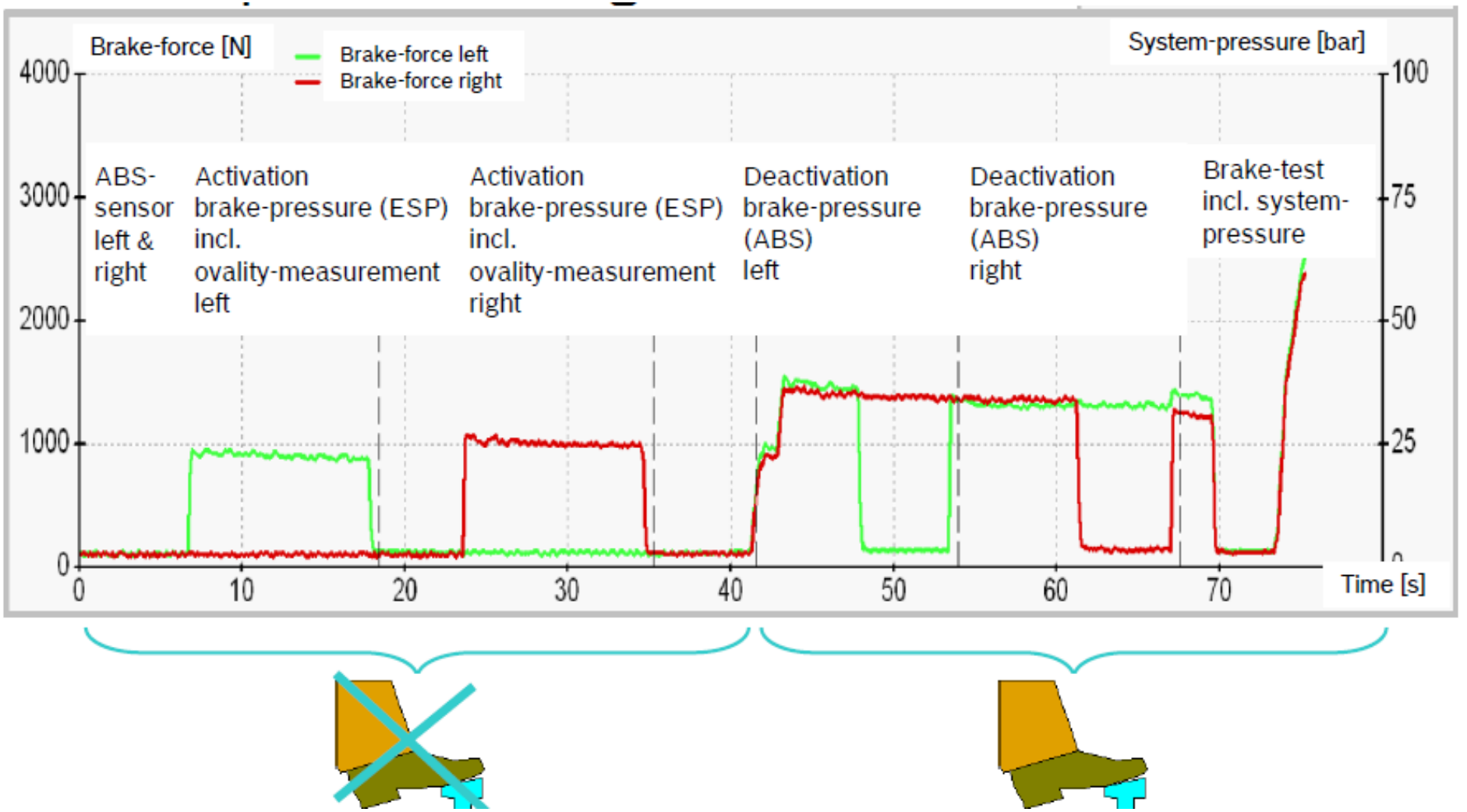
Interactive ABS testing - flowchart



Interactive ABS and brake test sequence



So what is needed for functionality testing?

- Direct communication with the vehicle to control the on-board ECSS with off-board assessment (brake tester, headlamp tester, eCall receiver…)
- PTI test method that is quick, accurate and automated wherever possible.
- Vehicle specific technical information from the vehicle or ECSS manufacturer to create a PTI database.
- Automatic and sequential testing of all the vehicle's safety systems.

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And finally…….

- **EGEA NET for 'plug and play' test equipment communication**

  EGEA are developing a network communication standard that can be used to integrate PTI test equipment and coordinate test results as well as supporting secure communication to test authority/national databases.

- **Electronic summary of test**

  By automating the test sequence, the PTI test can include more advanced test methods, greater objectivity and enhanced PTI productivity.

- **Test report transmission to national results databases**

  Support cross-border verification of PTI test certificate validity.

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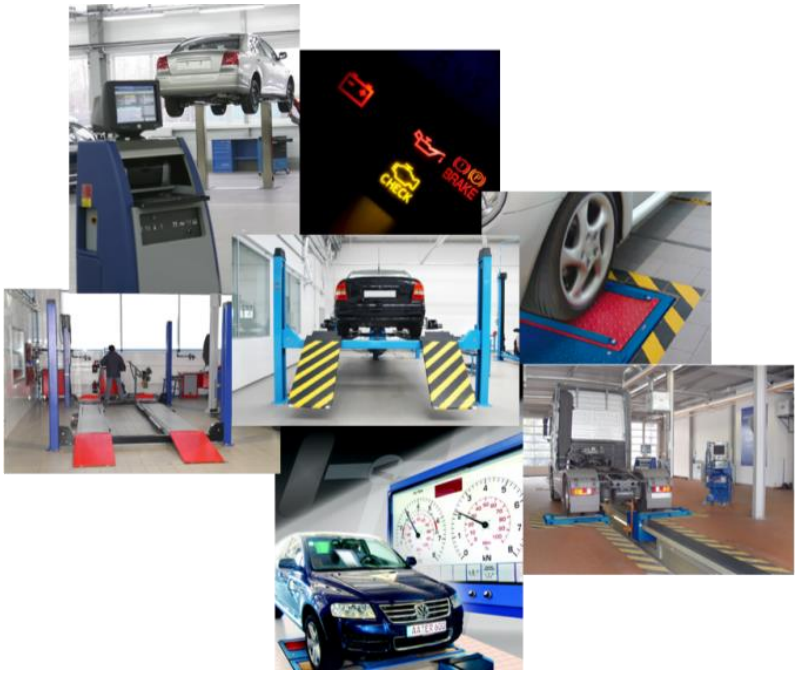
Thank you!



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EUROPEAN GARAGE EQUIPMENT ASSOCIATION

Question 1:

How important do you think this is for the future of emission testing?

Answer Choices:

A. Highly Important

B. Moderately Important

C. Less Important

D. Not Important at All

Question 2:

How quickly do you think that OBD will provide an effective alternative to tailpipe testing?

Answer Choices:

A. It already is

B. Within one (1) year

C. Within five (5) years

D. Within ten (10) years

E. Not for the foreseeable future

Question 3:

How important is this concern?

Answer Choices:

A. Highly Important

B. Moderately Important

C. Less Important

D. Not Important at All

Question 4:

Do you think that electronic systems are more or less reliable after 5 years than mechanical ones?

Answer Choices:

A. Much more reliable

B. Generally more reliable

C. About the same

D. Generally less reliable

E. Much less reliable

Refreshment Break

15:00 – 15:45

PLEASE RETURN PROMPTLY FOR SESSION 1 OF THE WORKSHOPS AND DISCUSSION FORUM