RDE

Real Driving Emissions

for Light-Duty Vehicles

City access restrictions

Adrian Clenci

President of Society of Automotive Engineers of Romania (SIAR)

Director of Department Automobiles and Transports, University of Pitesti, Romania

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Structure of the presentation

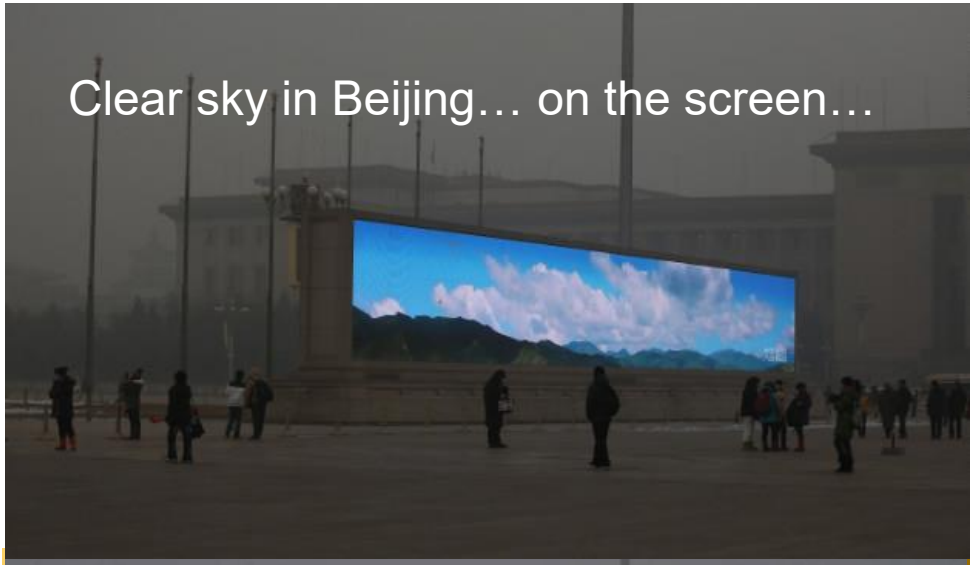
Introduction.

Real Driving **Emissions**

Conclusions

Real Driving Emissions for LDV. City access restrictions

INTRODUCTION. *Tailpipe emissions. Effects…*



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Real Driving Emissions for LDV. City access restrictions

INTRODUCTION. *Tailpipe emissions. Effects…*

Human health impact

https://www.theatlantic.com/photo/2015/03/beijings-toxic-sky/386824/

« Yong Xiaoyan wears a nose mask as she works at her office in Beijing on December 11, 2014. The office worker said she has used the mask every day since she found out she was pregnant and was concerned that Beijing's air pollution could harm her baby… »

Real Driving Emissions for LDV. City access restrictions

INTRODUCTION. *Tailpipe emissions. Effects…*

2020/2025 – no Diesel engine in Paris / Hamburg…?

TRANSPORT & ENVIRONMENT

The beginning of the end for the infernal combustion engine

By Greg Archer, clean vehicles director

Newsweek

WORLD U.S. PODCASTS OPINION CULTURE SPORTS TECH & SCIENCE

PARIS IS CHOKING. TRAFFIC CONGESTION AND GRIDLOCK BLAMED.

Paris joins Athens, Madrid and Mexico City in banning diesel by 2025.

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Real Driving Emissions for LDV. City access restrictions

INTRODUCTION. *Tailpipe emissions (PM10, PM2.5; NO_x). Effects…*

« Clean Air » sticker information – Crit'Air

Paris *implemented a LEZ.* ***Lyon*** *started an odd/even number plate traffic scheme which was substituted on November 2017 by differentiated traffic scheme according to the pollution alert*

http://urbanaccessregulations.eu/countries-mainmenu-147/france

https://www.certificat-air.gouv.fr/simulation

Green environmental badge for fine particles / Diesel restriction zones or blue environmental zones

Hamburg *and* ***Stuttgart*** *already set diesel restriction zones*

https://www.umwelt-plakette.de/en.html
https://www.blaue-plakette.de/en.html

http://urbanaccessregulations.eu/countries-mainmenu-147/germany-mainmenu-61

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Real Driving Emissions for LDV. City access restrictions

INTRODUCTION. *Rationale of the exposé*

City access restrictions
Why?

Pollution level too high
Why?

Urban transportation
PC, LDV (& HDV)

Assessment of
PC & LDV pollution
Where and how?

at chassis dyno
in lab conditions
(standardized & repeatable tests)

enough?

No

in real world conditions
RDE via PEMS
(statistical probability)

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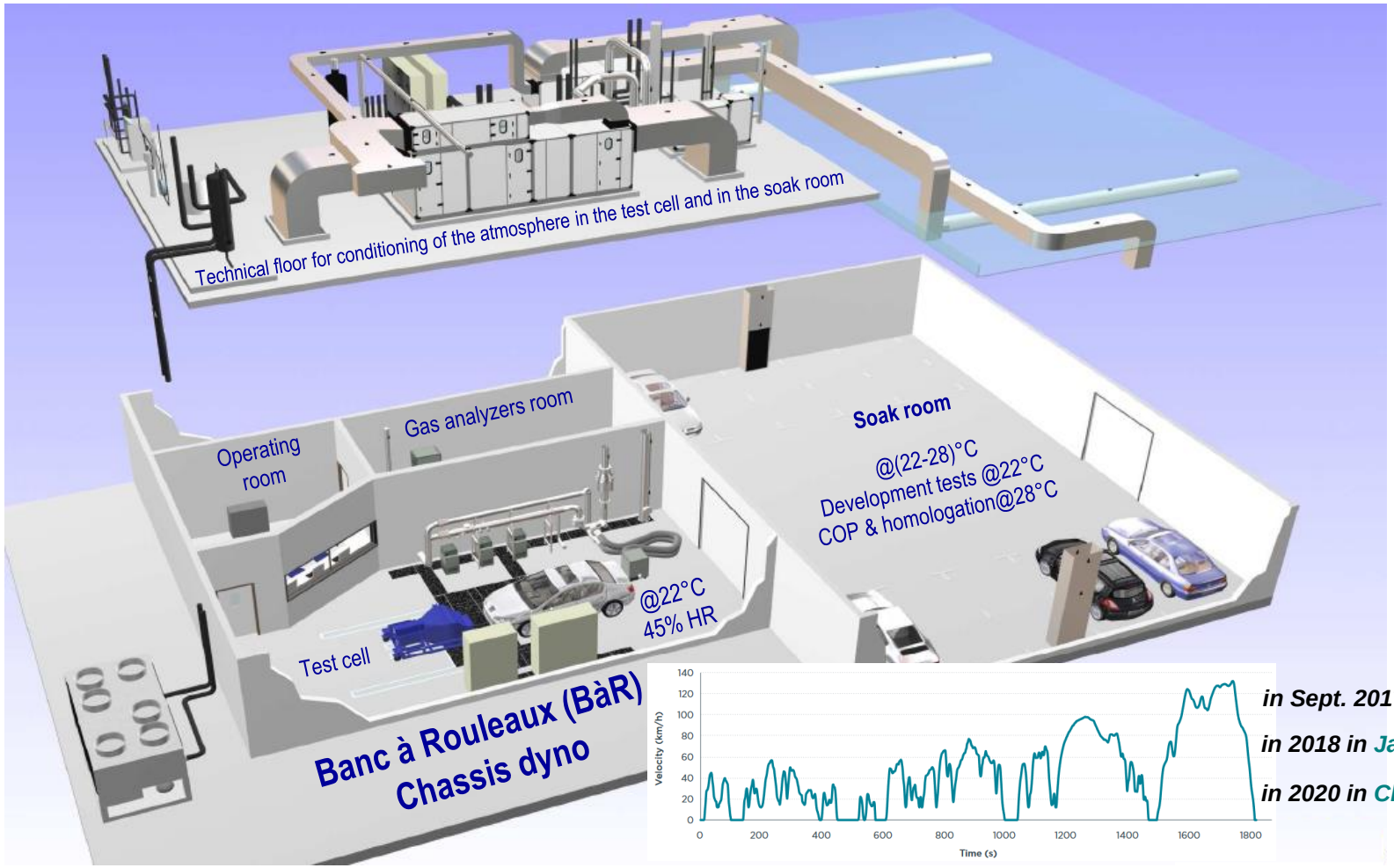
Real Driving Emissions for LDV. City access restrictions

INTRODUCTION. *Homologation. Where and how ?...*

How are the tailpipe emissions measured?...



in Sept. 2017 in Europe

in 2018 in Japan

in 2020 in China

...in lab conditions...

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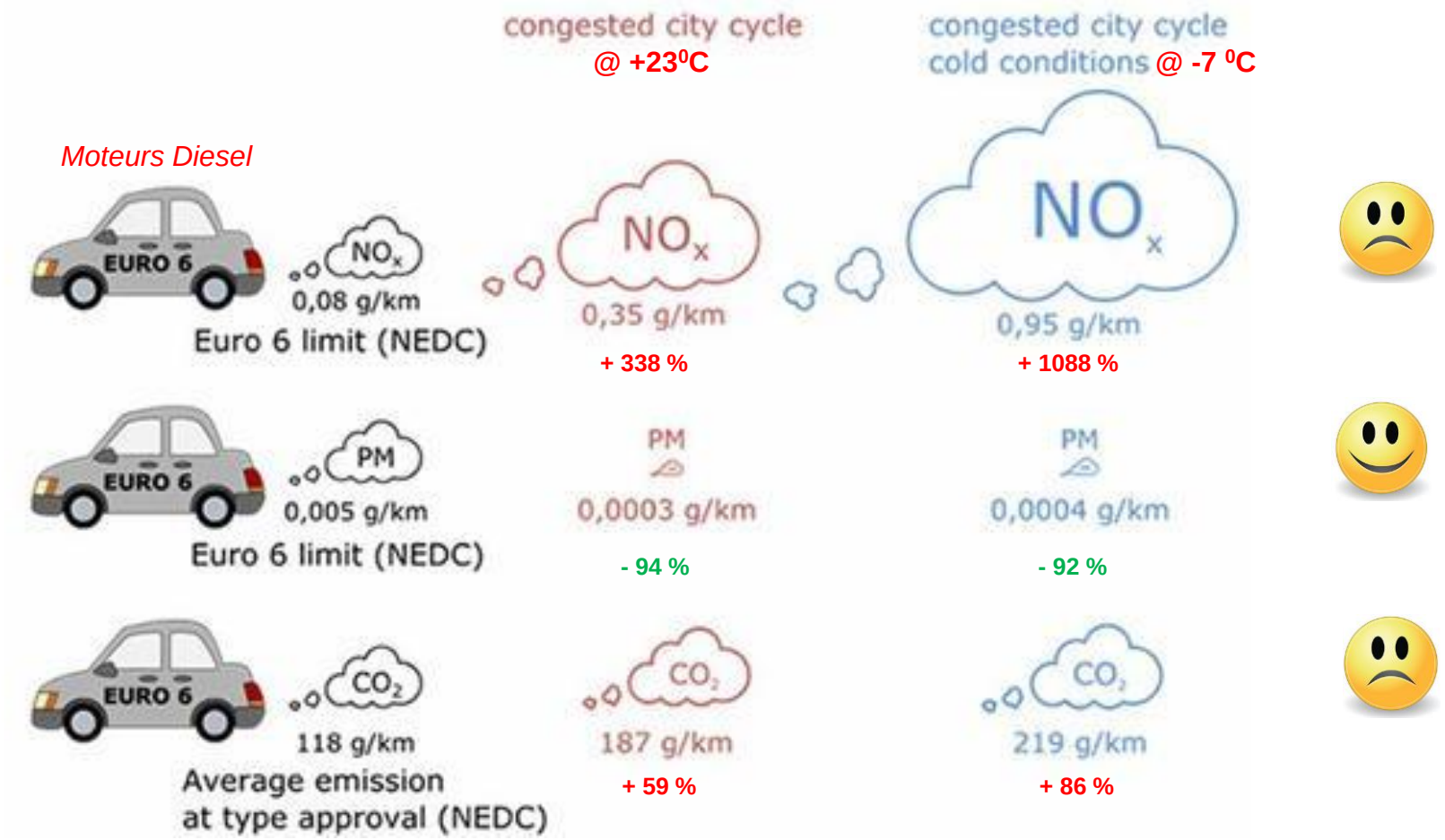
Real Driving Emissions for LDV. City access restrictions

INTRODUCTION. *Real driving emissions vs. chassis dyno emissions*

The real NO_x and CO_2 emissions of a diesel engine are higher than the ones measured at chassis dyno



Source: Institute of Transport Economics Norwegian Centre for Transport Research www.toi.no

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Real Driving Emissions for LDV. City access restrictions

INTRODUCTION. *Real driving emissions vs. chassis dyno emissions*

« Mind the Gap »

Take the road on the chasis dyno

Take the chassis dyno on the road

NEDC → WLTC

RDE via PEMS

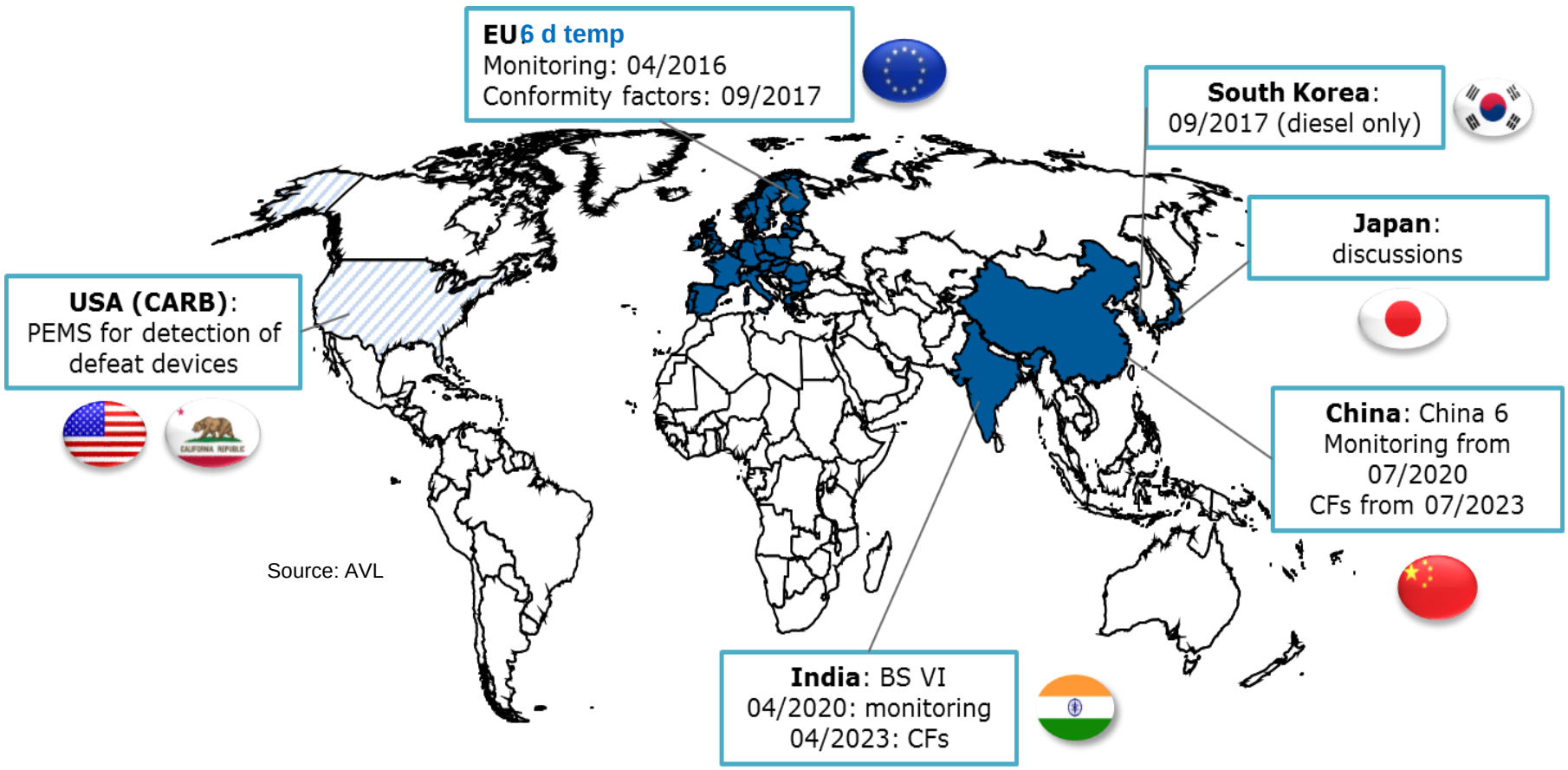
In-Service Conformity (EU) / In-Use Compliance Testing (US) with Portable Emissions Measurement Systems (PEMS) → In-Use Legislation

Homologation = Standardized and repeatable tests at chassis dyno + Real Driving Emissions

Real Driving Emissions for LDV. City access restrictions

RDE. *A change of paradigm in the development. The situation worldwide*

***The stake:** the sanitary risks → human health*



Source: AVL

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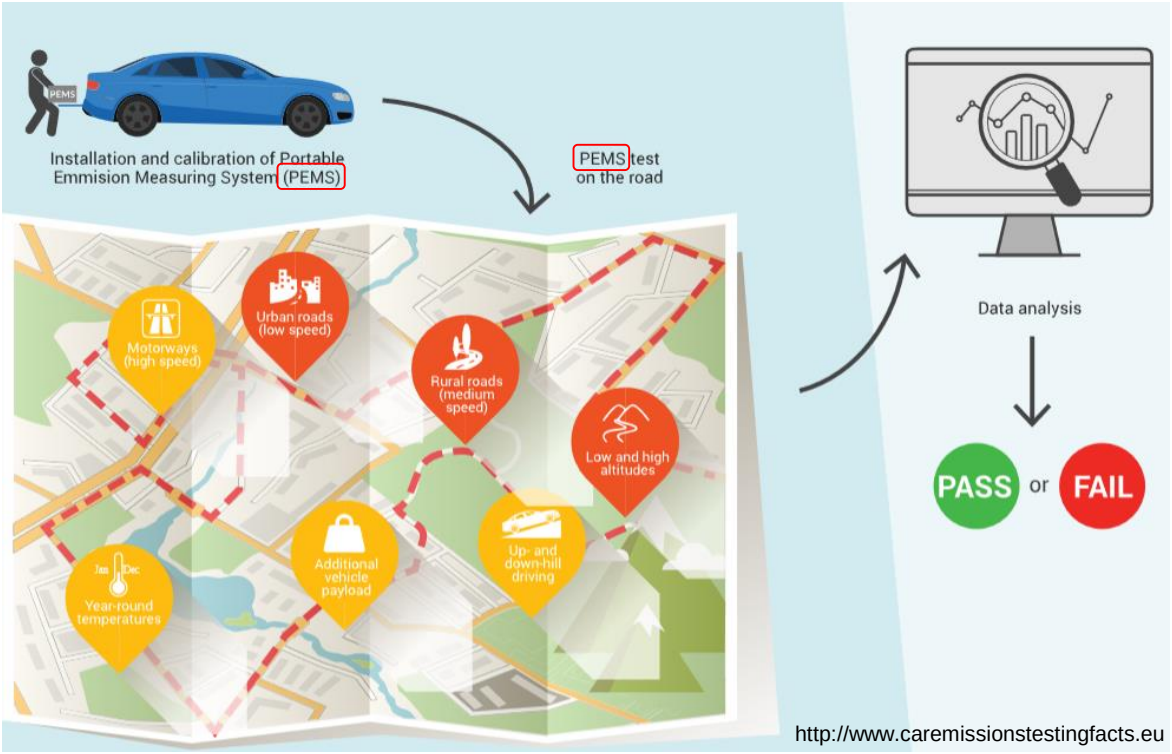
RDE. *What is the RDE test?*



(EU) 2016/427

RDE = "EMISSIONS OF A VEHICLE IN NORMAL USE"

Not-to-exceed factor: $NTE_{polluant} = FC_{polluant} \cdot FT(p_1, p_2, \ldots) \cdot EURO6$

Measured emissions in RDE for LDV= PN, CO, CO_2, NO, NO_2

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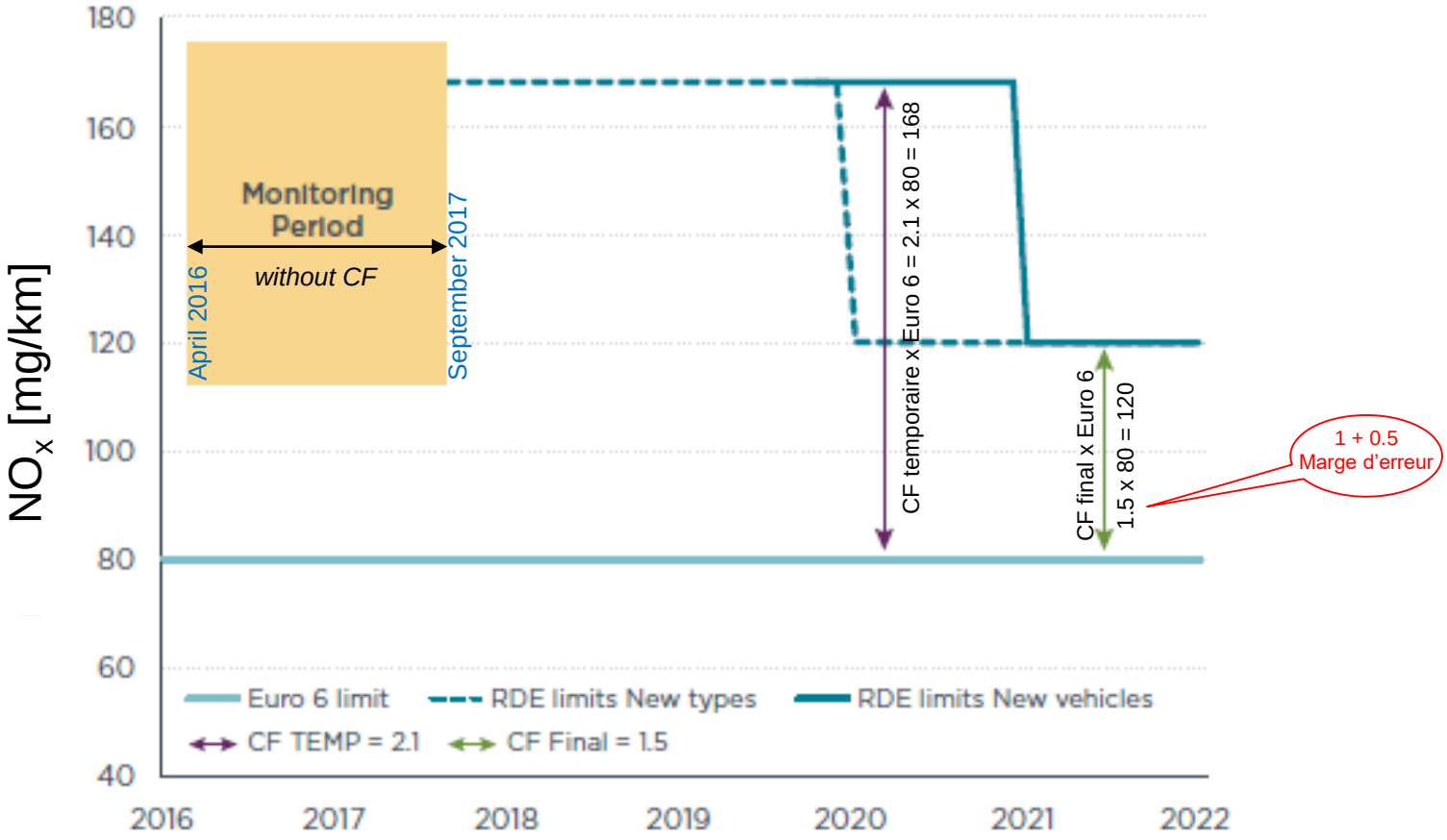
RDE. *Conformity factor*

Not-to-exceed factor: $NTE_{polluant} = CF_{polluant} \cdot TF(p_1, p_2, \dots) \cdot EURO6$



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RDE. *Gas PEMS & PN PEMS at University of Pitesti, Romania*

Source:
Renault Technologie Roumanie
&
University of Pitesti

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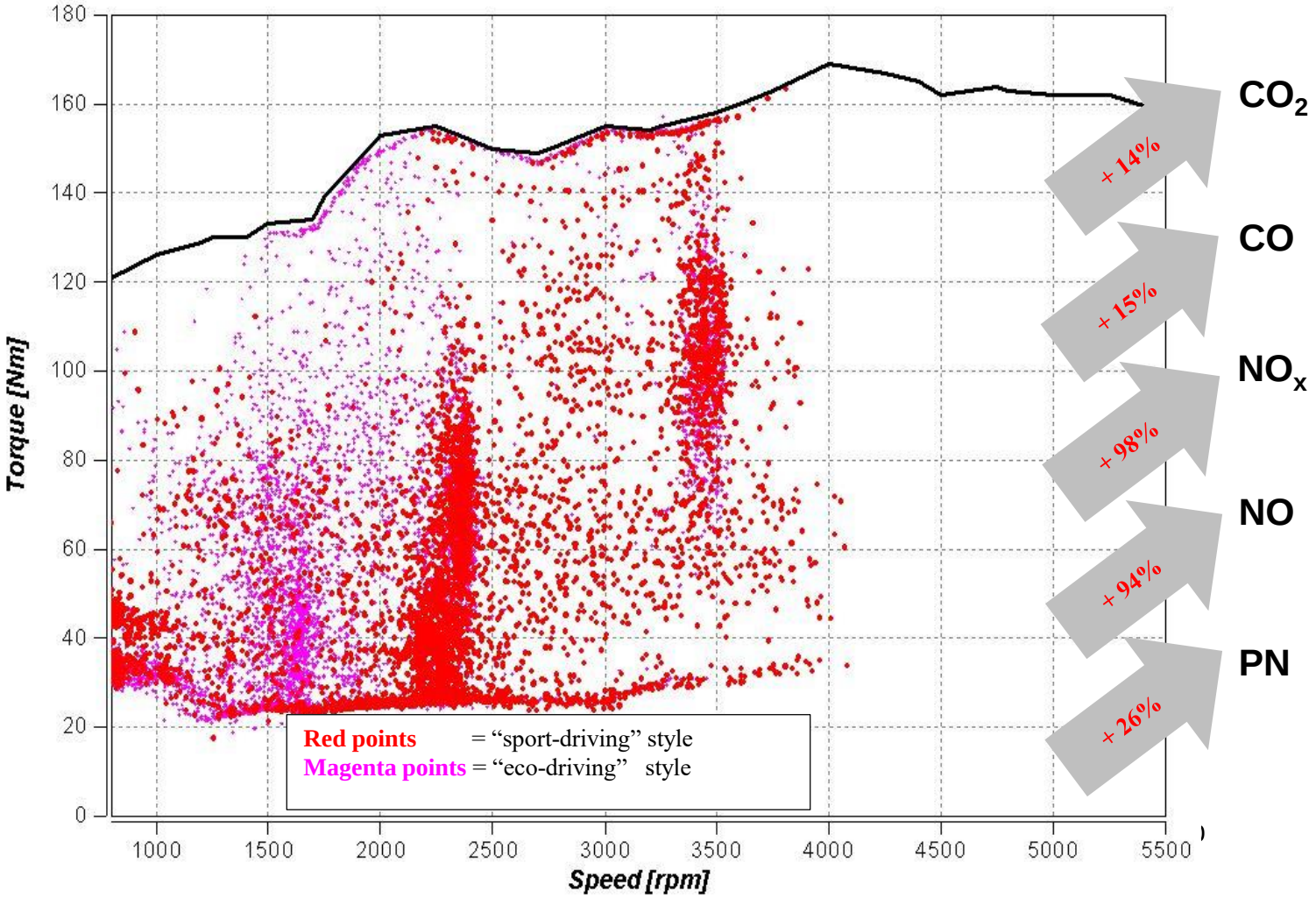
Real Driving Emissions for LDV. City access restrictions

RDE. *The influence of the driving style on the RDE*



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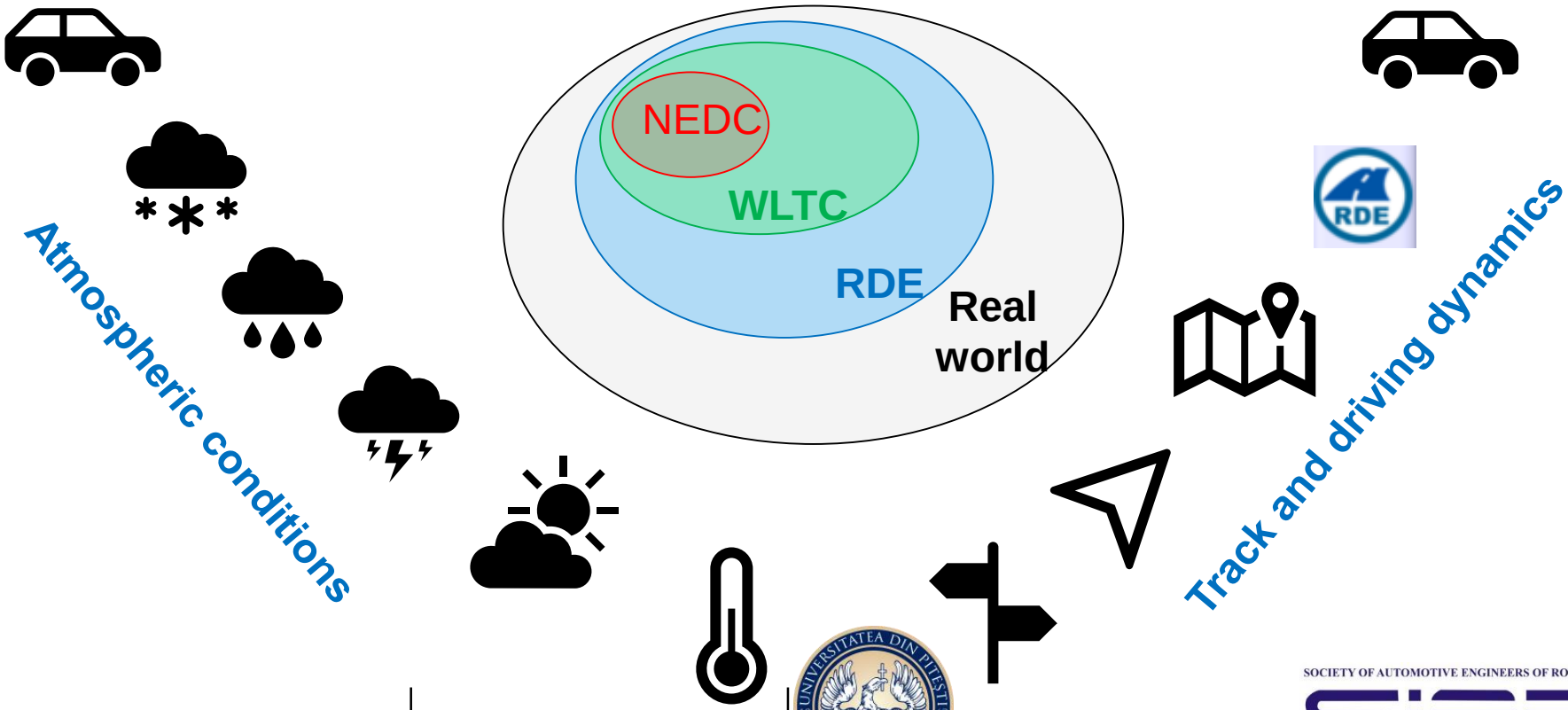
CONCLUSIONS

The challenges

How can real traffic be brought in the homologation procedure; consequently, how can the non-repeatable feature of the real world be handled?

(RDE covers a large part of the real world operation but obviously not everything)



Contact

Adrian CLENCI, Professor
University of Pitesti, Romania
Departement Automobiles and Transport
E-mail: adrian.clenci@upit.ro, adrian.clenci@lecnam.net