

Keynote
ECT 2019

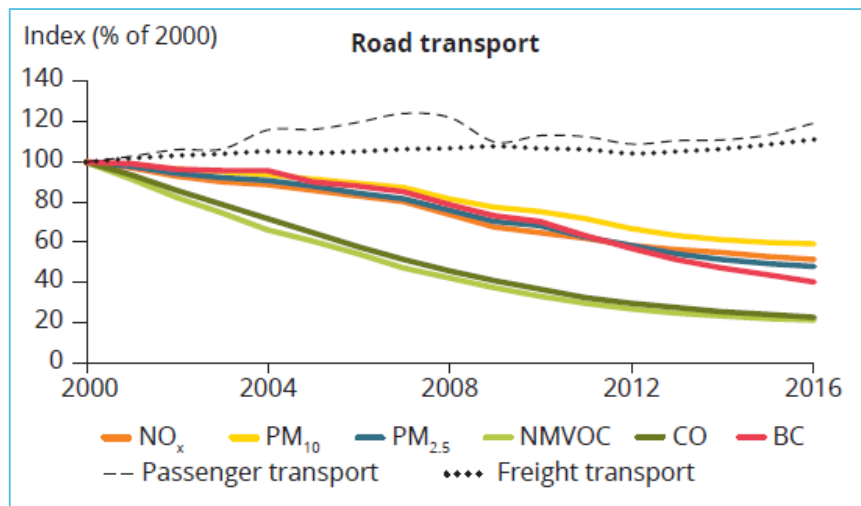


***Real-Driving Emissions (RDE): Key
to improve urban air quality***

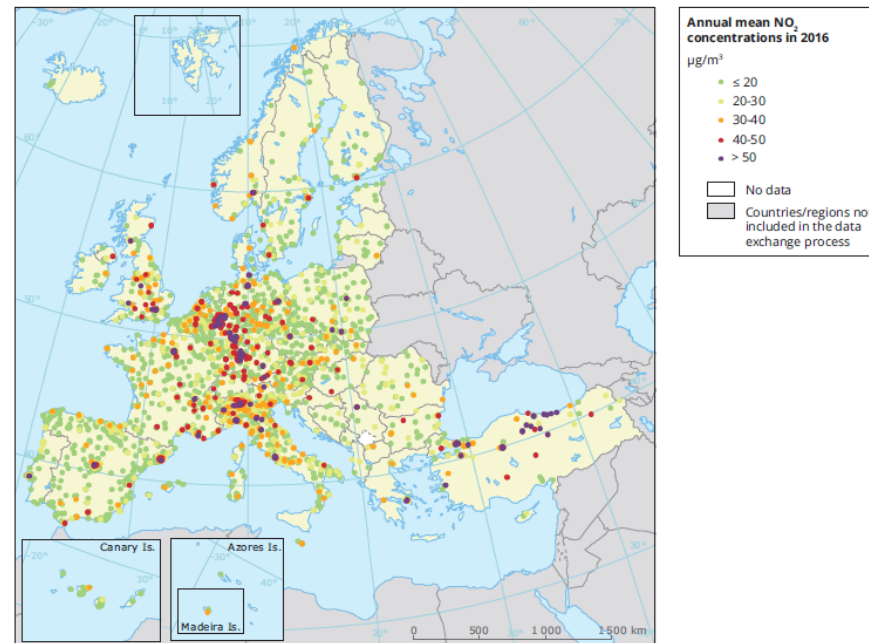
Wilfried Mueller,
Pune, November 15, 2019

EU Air Quality has improved over the years

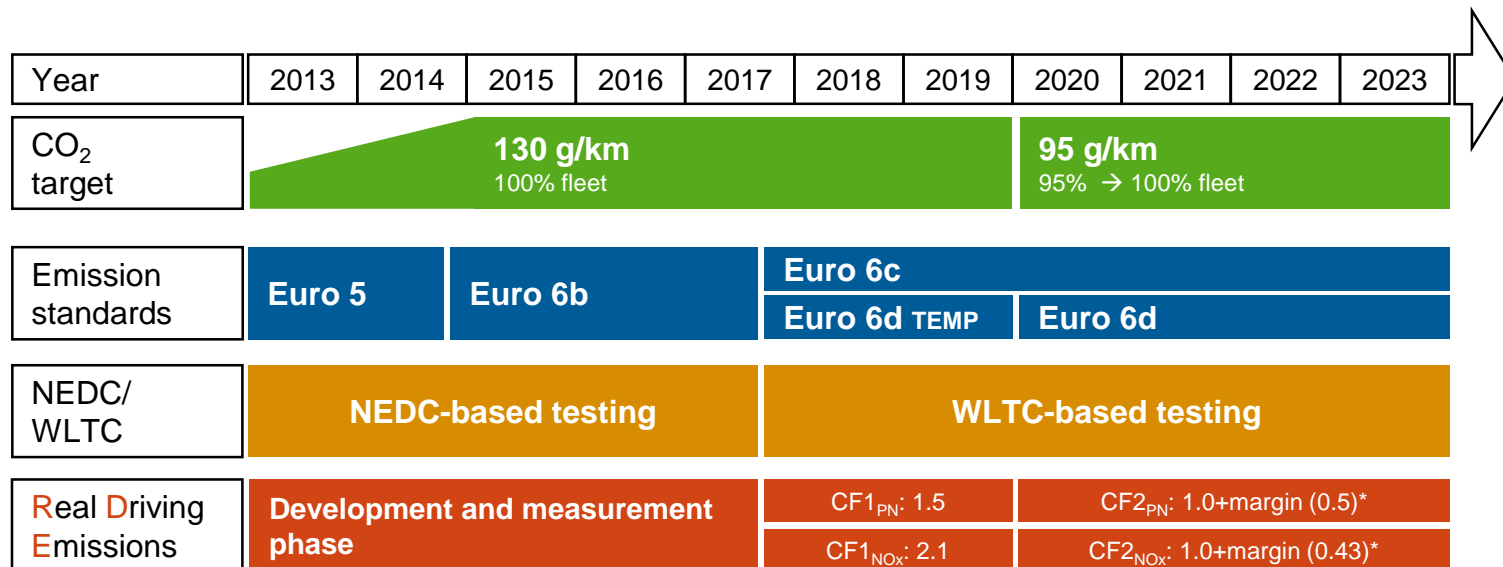
But further efforts are needed



Source: European Environment Agency (EEA)



EU Emission Legislation Roadmap



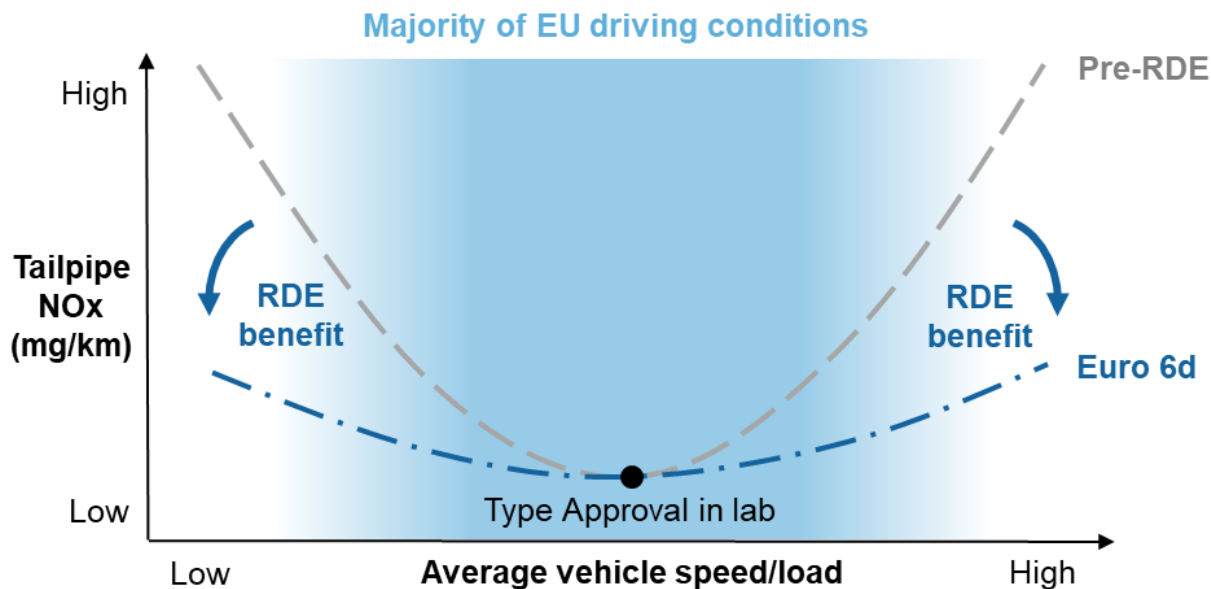
All dates: New type approval PC

* annual review and revision as a result of the improved quality of the PEMS procedure or technical progress

RDE Improved Real-World NOx-Emissions

RDE entered into force on 1 September 2017 with Euro 6d-temp type-approval

RDE requirements ensure that emissions are controlled over wider range of driving conditions

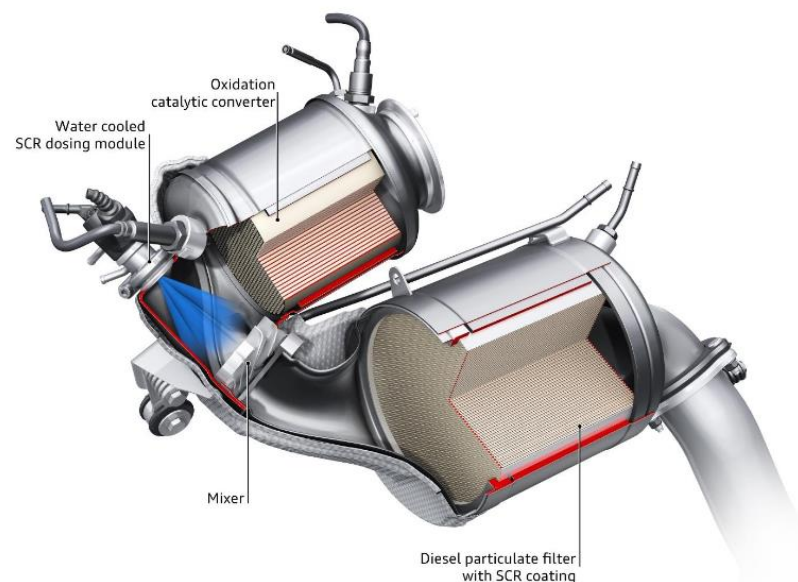


Light-Duty-Diesel Emissions Control Technology Evolution

Towards combination of technologies in a compact design for RDE compliance



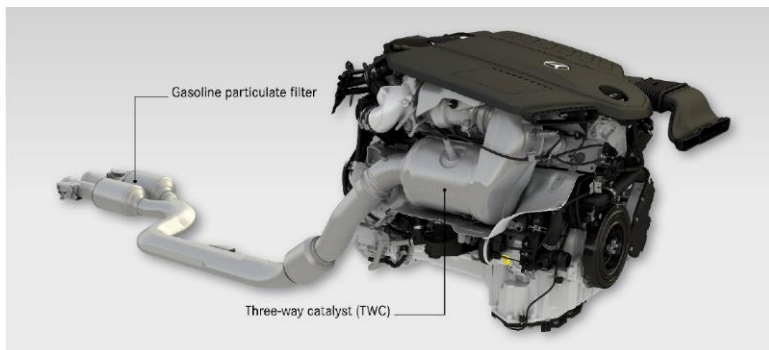
Source: Hyundai – Vienna Motor Symposium 2019



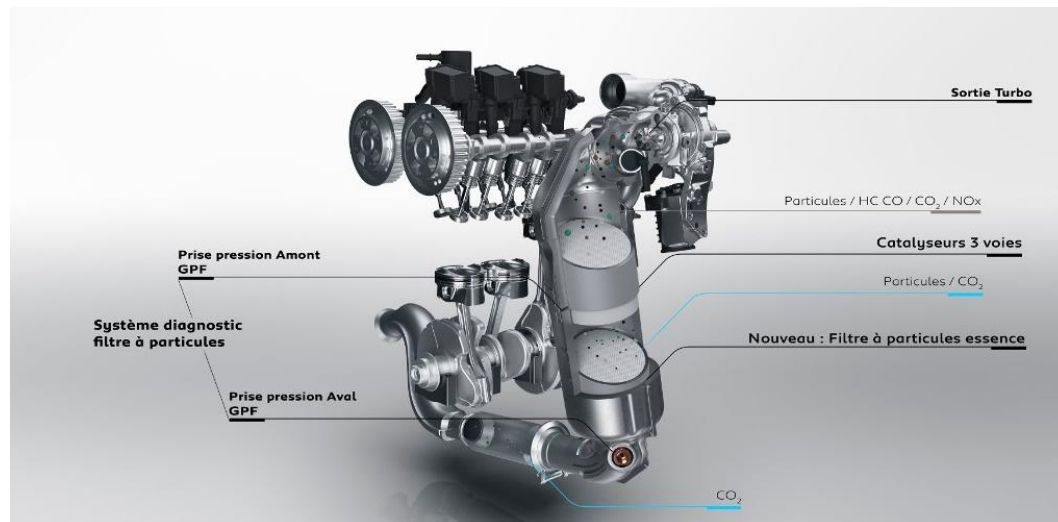
Source: Audi – Vienna Motor Symposium 2019

Light-Duty-Gasoline Emissions Control Technology Evolution

Introduction of particulate filters on cars with direct injection to meet the RDE requirements



Source: Daimler – Vienna Motorensymposium 2017



Source: Peugeot – 308 press release 2017

RDE: Real-Driving Emissions

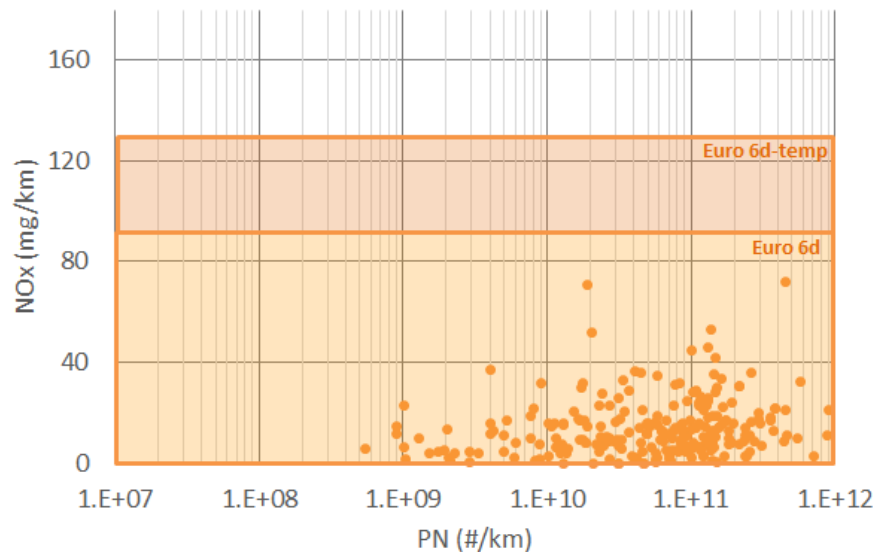
GPF: Gasoline Particulate Filter

TWC: Three-Way Catalyst

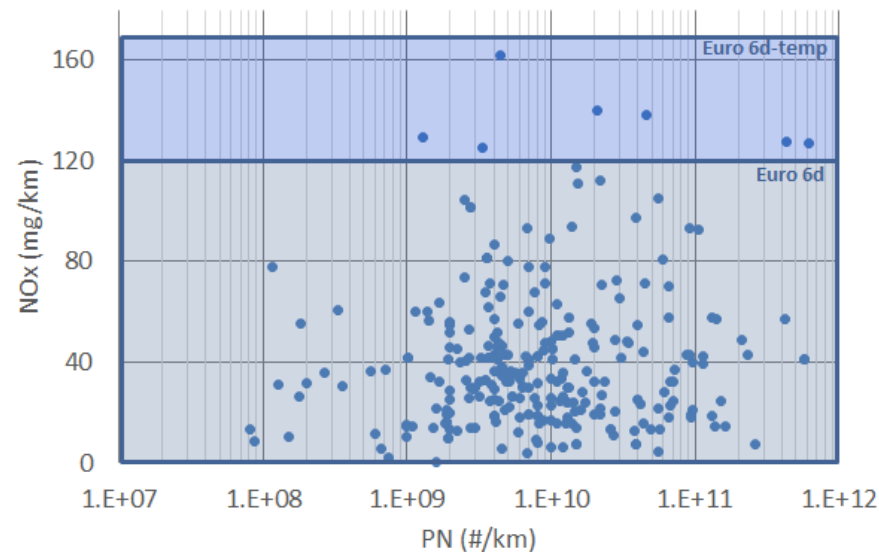
Emissions of EU6d-temp Vehicles well within Standards

Urban RDE emissions within Not-To-Exceed limits

Petrol cars



Diesel cars



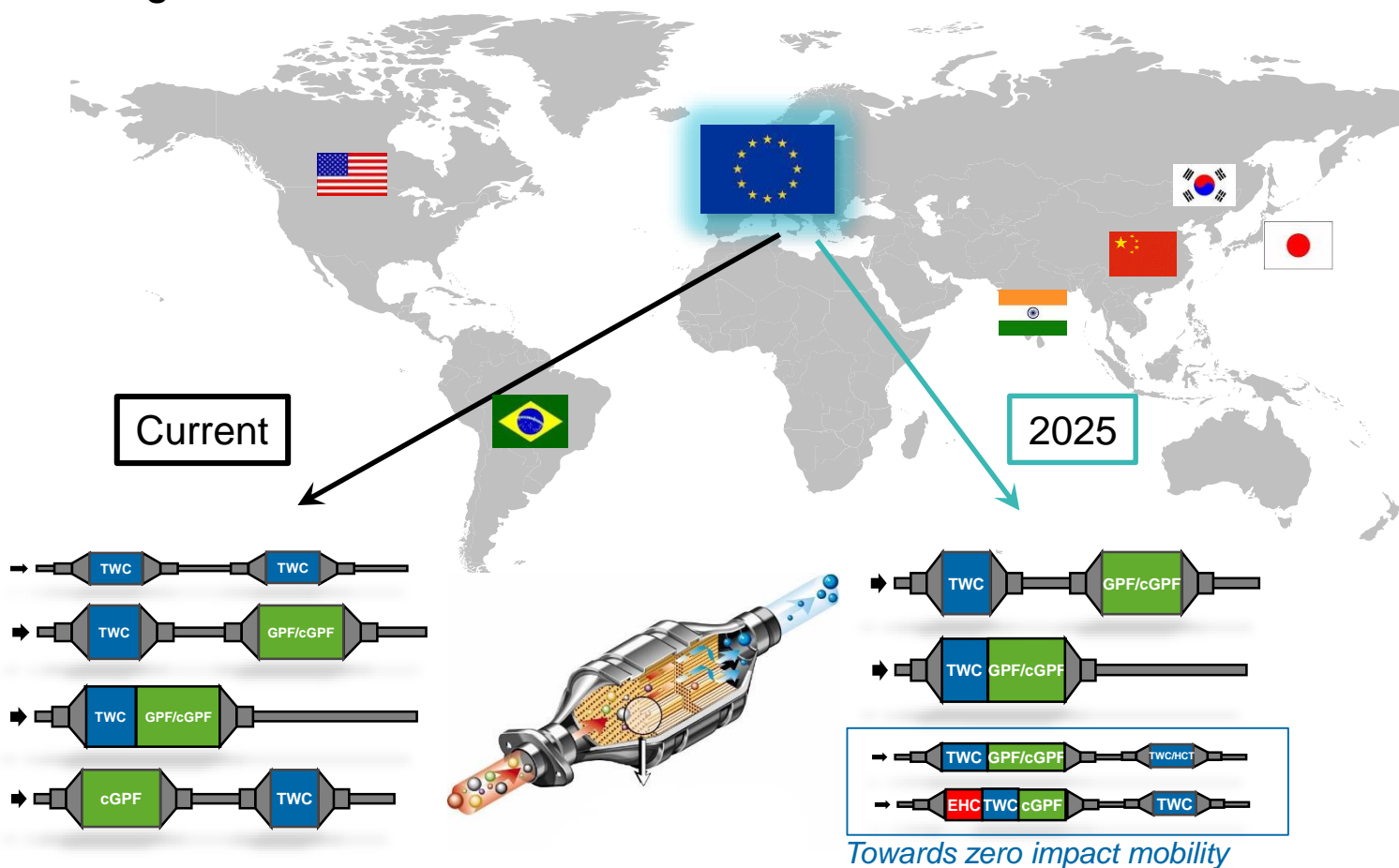
Source: PEMS results and maximum declared values from ACEA RDE database consulted on 18 October 2018

Outlook Beyond Euro 6

BS 6

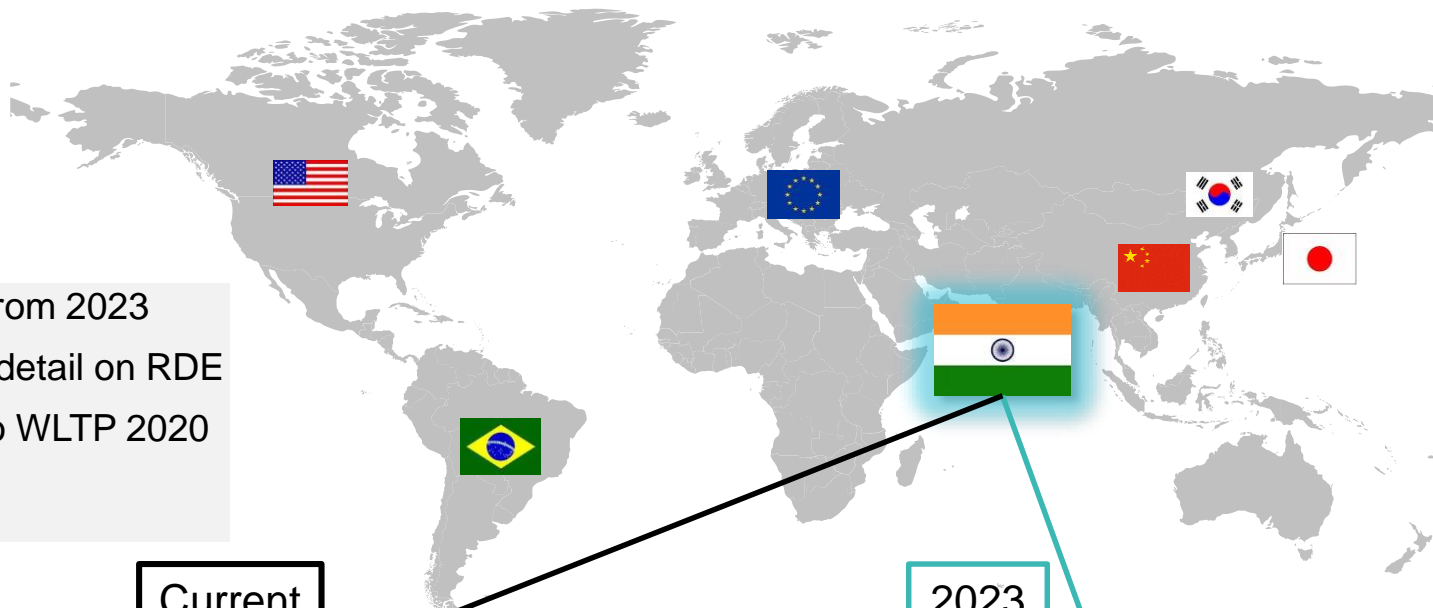
Regional System Trends – Gasoline Europe

No preconditioning in WLTP and PN measurement in fresh state

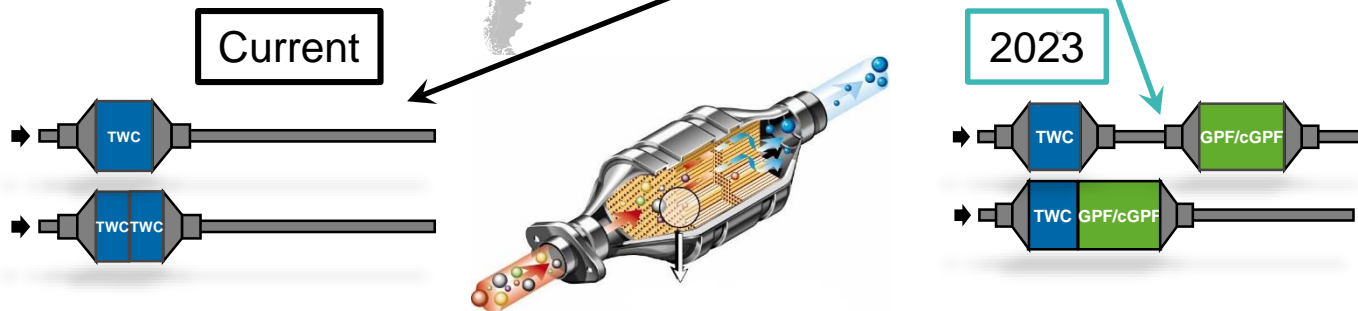


Regional System Trends – Gasoline India

GPF in 2023 – **not finalized** in RDE yet



BS VI2 with RDE from 2023
 - Aug 2018 more detail on RDE
 - from NEDC90 to WLTP 2020



State-of-the art cGPF Product Innovation...

..... to meet legislative and OEM requirements



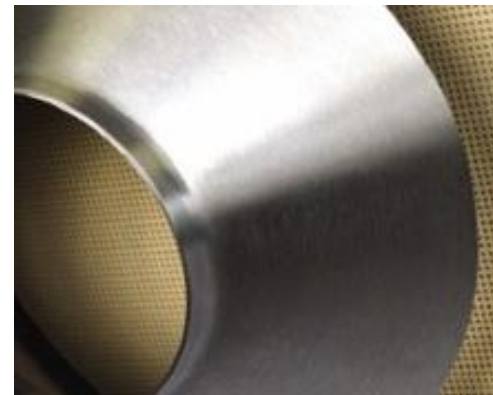
Upcoming Legislation

- Worldwide increasing fuel efficiency regulations
- Stringent emission limits
- Stringent OBD criteria
- WLTP implementation
- Real-Driving-Emissions



Effect on Gasoline Vehicles

- Growing share of GDI's
- Implementation of cylinder deactivation, VVT, Start/Stop
- Less fuel enrichments
- Higher mass flows
- Higher peak exhaust temperatures



Requirements for Future GPFs

- High temperature stability
- Better CO-/NO_x-activity
- Dynamic OSC
- Easy to diagnose
- Backpressure
- Light-Off
- Filtration Efficiency

Diesel: AECC-IPA-IAV

Ultra-Low NOx Emissions Diesel Demonstrator

Objective: demonstrate consistent low NOx emissions

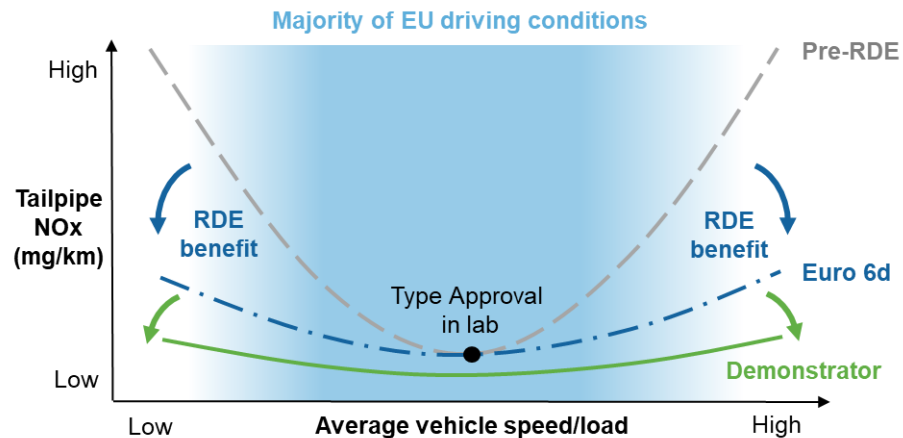
Low speed/load
e.g. city driving



High speed/load
e.g. motorway driving



Transients



Vehicle and Powertrain Characteristics

- **Vehicle: Renault SCENIC**

C-segment

1700 kg

- **Drivetrain**

Manual gearbox, 6-speed

48 Volt mild-hybrid

- **Engine**

1.5l, 4-cylinder, 2-valve

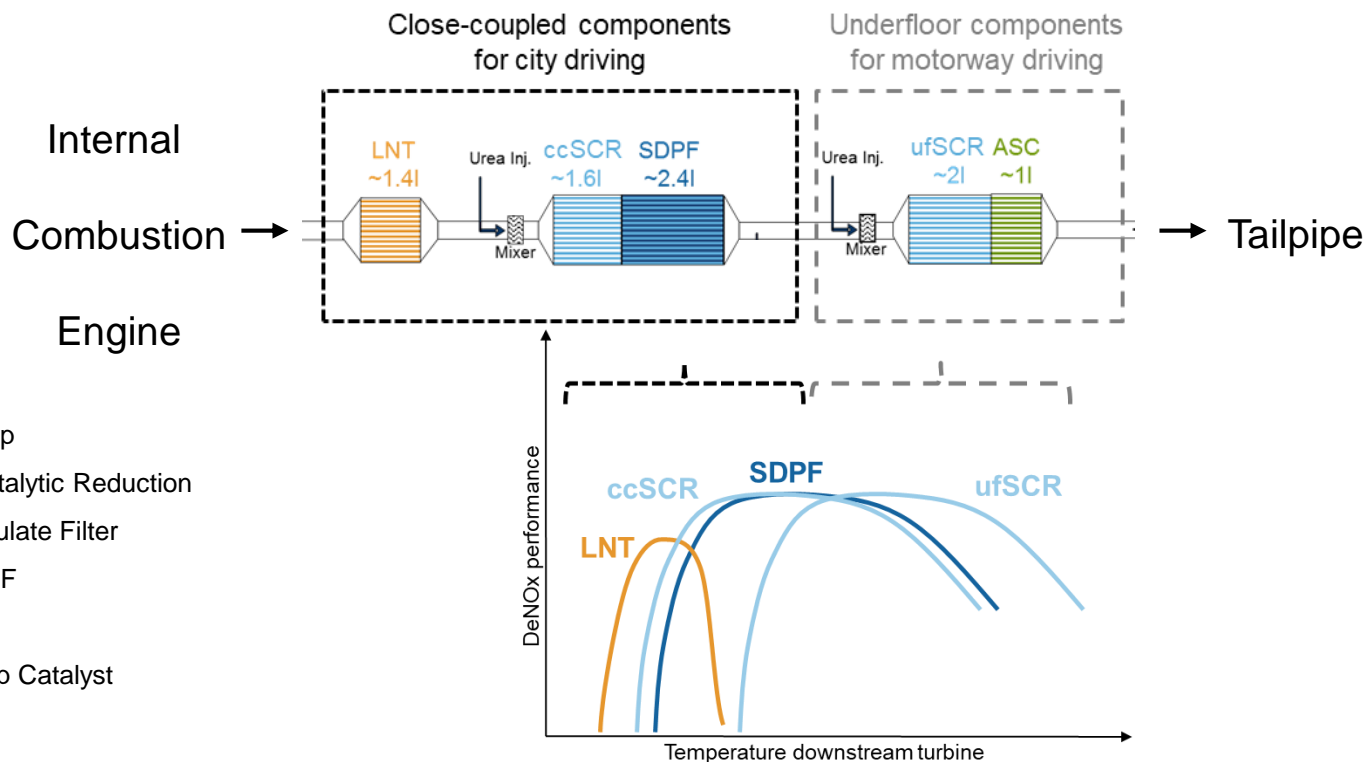
Exhaust Gas Recirculation (EGR)

- **Euro 6b type-approval (LNT + DPF)**



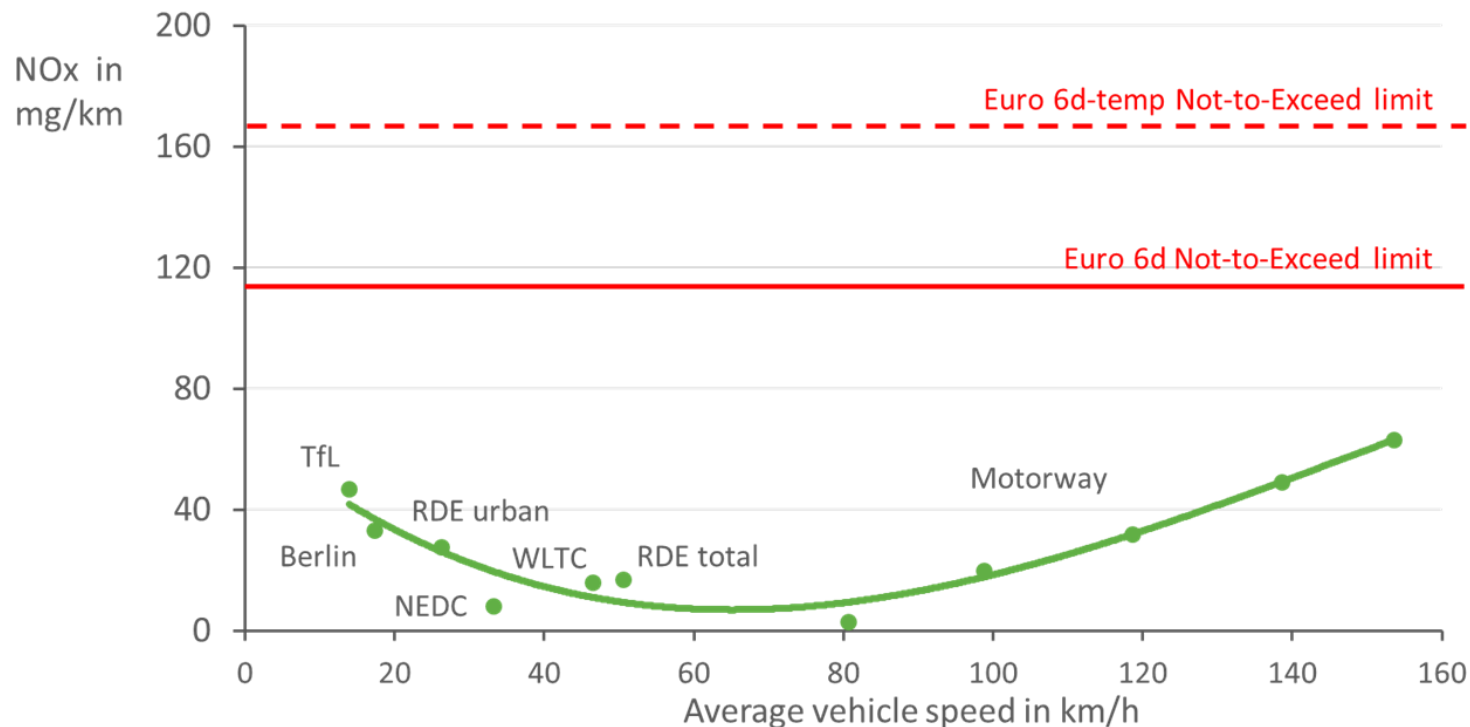
Emissions Control Technologies on Demonstrator Vehicle

LNT + dual-SCR to cover wide range of driving conditions



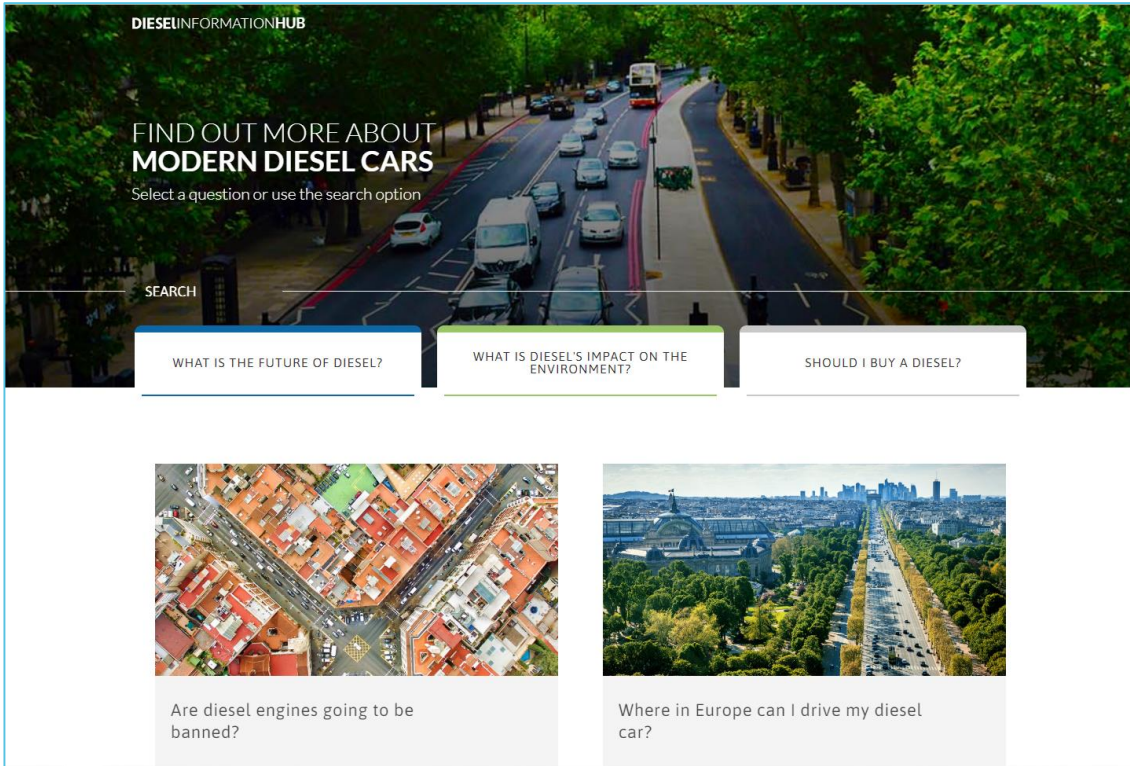
- cc: close-coupled
- LNT: Lean NOx trap
- SCR: Selective Catalytic Reduction
- DPF: Diesel Particulate Filter
- SDPF: SCR on DPF
- uf: underfloor
- ASC: Ammonia Slip Catalyst

Consistent Low NOx Emissions Were Achieved



Diesel Information Hub: a fact-based source on modern diesel

<https://dieselinformation.aecc.eu>



The screenshot shows the Diesel Information Hub website. At the top, it says "DIESELINFORMATIONHUB". Below that, the main heading is "FIND OUT MORE ABOUT MODERN DIESEL CARS" with a subtext "Select a question or use the search option". There is a search bar labeled "SEARCH". Below the search bar are three question cards: "WHAT IS THE FUTURE OF DIESEL?", "WHAT IS DIESEL'S IMPACT ON THE ENVIRONMENT?", and "SHOULD I BUY A DIESEL?". Below these are two more question cards with corresponding images: "Are diesel engines going to be banned?" (with an aerial view of a city street) and "Where in Europe can I drive my diesel car?" (with an aerial view of a city street lined with trees).

DIESELINFORMATIONHUB

FIND OUT MORE ABOUT
MODERN DIESEL CARS
Select a question or use the search option

SEARCH

WHAT IS THE FUTURE OF DIESEL?

WHAT IS DIESEL'S IMPACT ON THE ENVIRONMENT?

SHOULD I BUY A DIESEL?

Are diesel engines going to be banned?

Where in Europe can I drive my diesel car?

Conclusions

Advanced aftertreatment systems will play a key role in improving urban air quality.

A new era for vehicle emissions control in Europe started in September 2017 with introduction of RDE and WLTP (Euro 6d).

This legislative ambition and technological progress drove the introduction of combustion engine vehicles that are cleaner than ever before.

Modern, combustion engine-powered vehicles with advanced aftertreatment systems play a key role in further improving urban air quality.





materials for a better life

Thank you for your attention!