

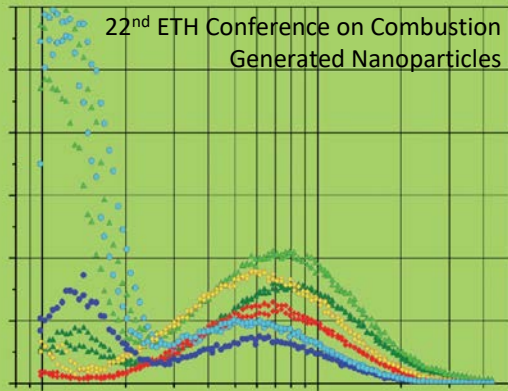
Emission of In-Use Vehicles: Quality and Control

Focus Event

Emission of In-Use Vehicles:
Quality and Control

Gloor Beat	AWEL, Switzerland	<i>Diesel Particle Filter Failure Statistics of a Swiss In-Use Fleet</i>
Friedrich Axel	DUH, Germany	<i>Diesel DeNox-System Failures and Manipulations</i>
Müller Gerhard	CITA	<i>Loaded Tests for Petrol and Diesel Engines</i>

Kadijk Gerrith	TNO, Netherlands	<i>New Periodic Technical Inspection: Concept for DPF Proven and Ready to Introduce</i>
Czerwinski Jan	AFHB, Switzerland	<i>New Periodic Technical Inspection Approaches for DeNOx-Systems</i>
Peeters Weem Hens	RDW, Zwolle Netherlands	<i>Legislation Must be Adapted on EU-Level and on Member-State Level</i>



Outline

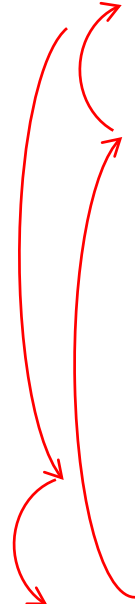
- Introduction
- Problems
- Solutions
- Legislations

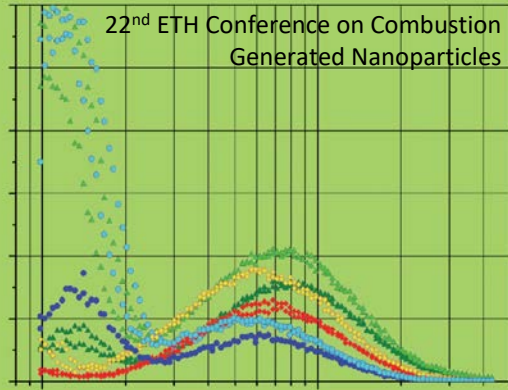
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History

Focus Event

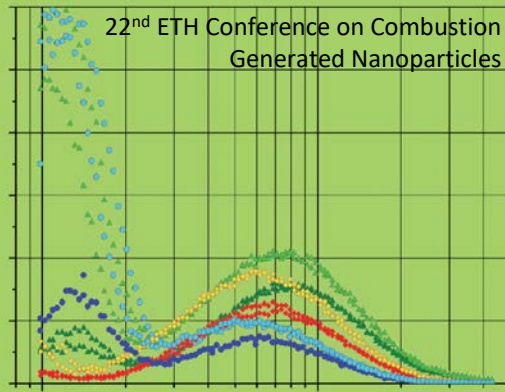
Emission of In-Use Vehicles:
Quality and Control

- World wide introduction of emission limits (different limits in different regions)
 - **3-way-catalyst introduction**
 - **DPF introduction**
 - **SCR/LNT introduction**
 - **GPF / 4-way-catalyst to be introduced**
- Periodical technical inspection
 - **In Switzerland separate for exhaust gas**
 - **Performed by garage / repair shop using recognized test procedure (not by authority)**
 - **Different test procedures for different types of combustion engine and vehicle age**

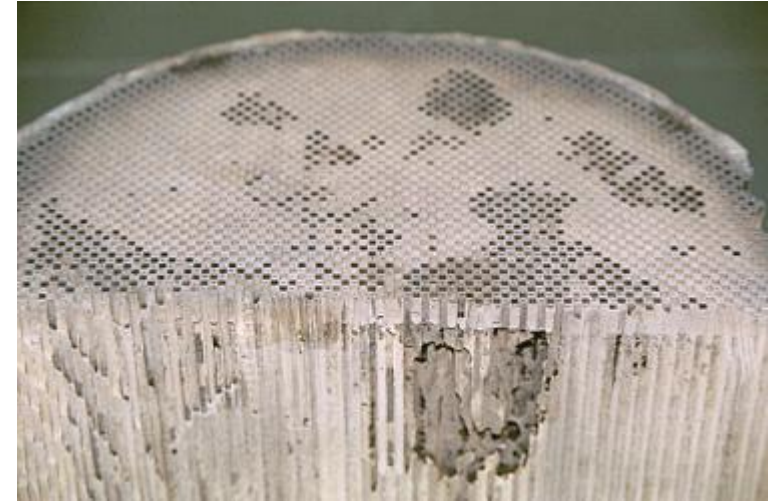
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Emission of In-Use Vehicles:
Quality and Control

Quality Control Problems



- Maintenance
 - **Maintenance / replacement of filter / catalyst is costly for the operator**
 - **PTI tests not adequate for all types of exhaust gas aftertreatment systems**
 - **OBD (On Board Diagnostics) are developed to be able to identify malfunction**
 - **Aftermarket for OBD «killers» developed**



1)

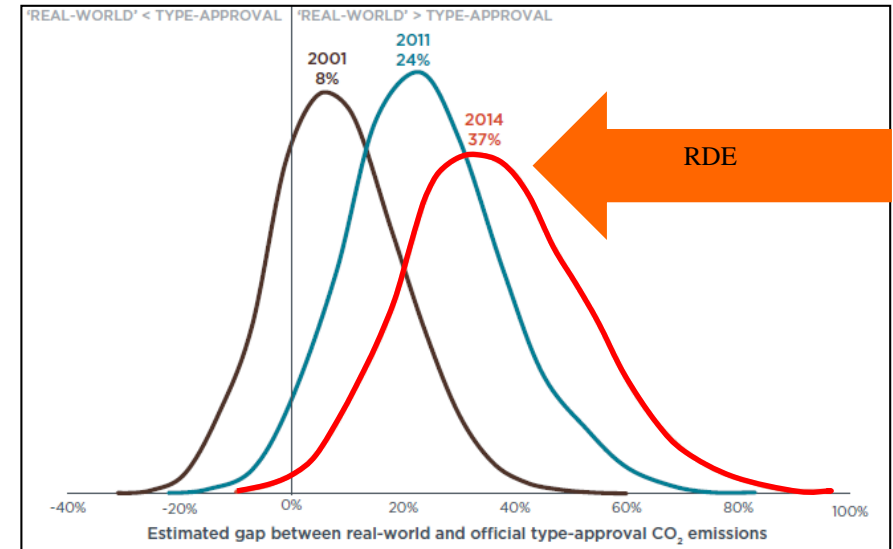
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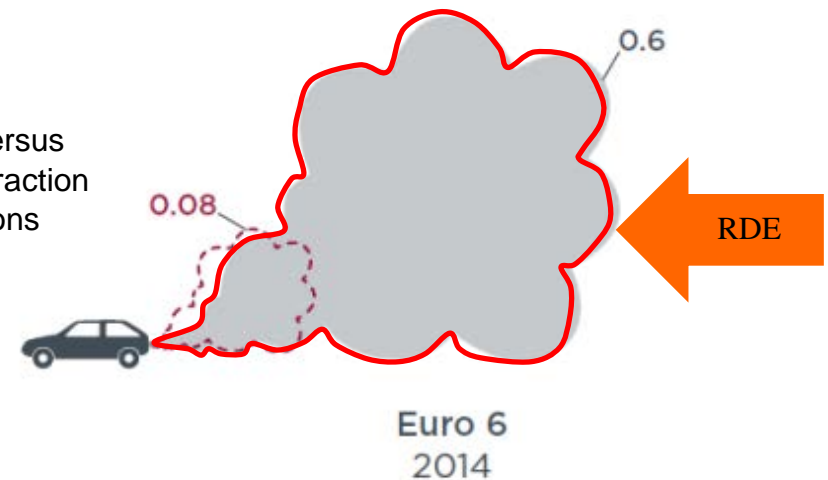
Real World Emissions

Relative emissions (in comparison to type approval emissions) have been increasing in the last two decades

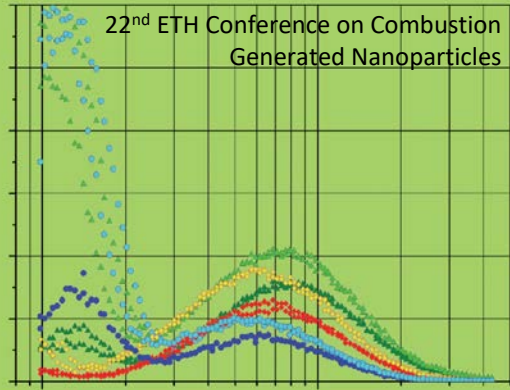
Real driving emissions (RDE) is the legislative approach to reduce real emissions again



Typ approval NO_x emissions versus real world NO_x emissions as fraction of EU3 real world NO_x emissions



Euro 6
2014



Manipulation or Malfunction?

- Manipulations:

Emission

- NO_x
 - SCR / LNT

Manipulator

OEM (Automotive)
Operator (HD)

Driving force

Stringent emission legislation
Operation cost

- PM/PN

- Filters

Operator

Cost / power output

- HC/CO

- Catalyst

Operator

Cost / power output

Consequence:

OBD has been thought as a viable solution for catalyst, DPF and SCR / LNT failure, but the vehicle might hide the malfunction

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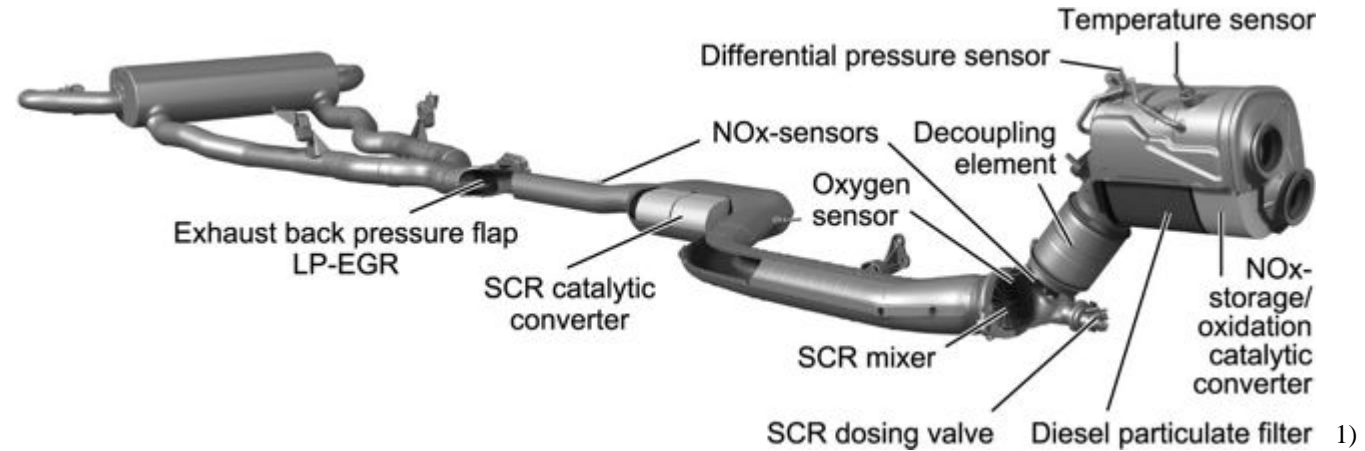
22nd ETH Conference on Combustion
Generated Nanoparticles

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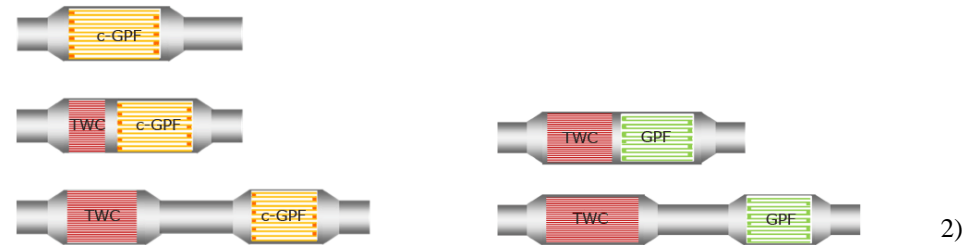
State of the Art Exhaust Gas Aftertreatment

- Diesel



- NOx reduction strategy depends on operating condition EGR / SCR / LNT

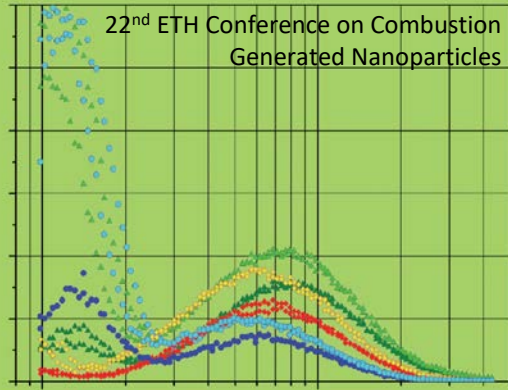
- Gasoline



- Current operating strategy does not allow correct operation under high engine load

1) Dieselnets

2) A. Joshi, et al, 15th Hyundai Kia International Powertrain Conference, Seoul, Korea, 27th–28th October, 2015



Focus Event

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Focus Event Questions

- What is the severity of the problems (manipulations and malfunctions)?
- What are the measures to eliminate these problems?