



A drastic reduction in the emissions of new vehicles has been achieved over the last 20 years, with the introduction of strict worldwide regulations for reduction of all exhaust emissions. In this context also, PTI (Periodic Technical Inspections) schemes have to follow the development of modern vehicle technology. PM as well NOx as measurement now seems due for a further stage of development.

Both pollutants (PM and NOx) are reduced by complex exhaust after-treatment systems and engine internal solutions. High vehicle emission rates are often a result of component aging, component failure, or generally poor maintenance. There has also been an increasing in the tampering of emission systems over the last years to avoid high repair costs. PTI emission tests allow a quick and reliable evaluation of the whole emission related systems to determine whether in-service vehicles conform to their design emission levels. PTI emission test requirements and thresholds have not kept pace with development in vehicle technology and type approval procedures (especially for Euro 5 and 6). Updates to the legislation, instruments and procedures are therefore necessary.

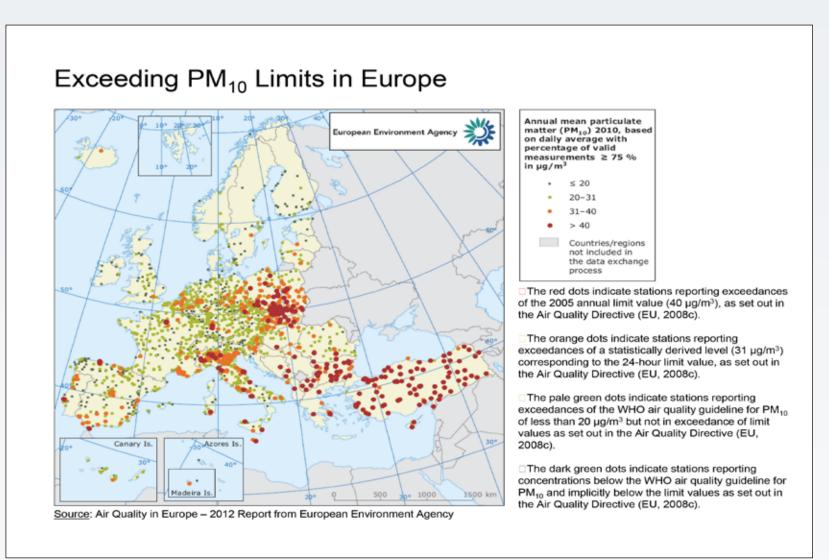
Keywords: PM, NOx, Air Quality, OBD, Vehicle Emission Testing, Diesel and Petrol/Gasoline Emissions, Non-Road Emissions

Exposure Levels in the EU

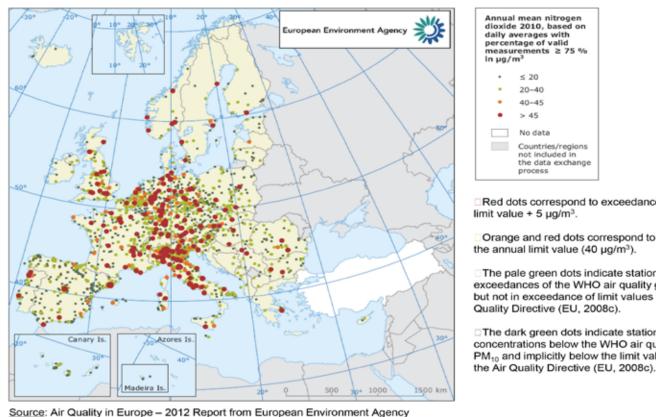
Source: Air Quality in Europe - 2011 Report from European Environment Agency

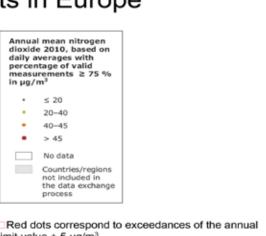
Percentage of the urban population in the EU exposed to air pollutant concentrations above the EU and WHO reference levels (2008-2010)

Pollutant	EU reference value	Exposure estimate (%)	WHO reference level	Exposure estimate (%)
PM _{2.5}	Year (20)	16-30	Year (10)	90-95
PM 10	Day (50)	18-21	Year (20)	80-81
0,	8-hour (120)	15-17	8-hour (100)	> 97
NO ₂	Year (40)	6-12	Year (40)	6-12
BaP	Year (1 ng/m ³)	20-29	Year (0.12 ng/m ³)	93-94
50 ₂	Day (125)	< 1	Day (20)	58-61
co	8-hour (10 mg/m³)	0-2	8-hour (10 mg/m³)	0-2
°b	Year (0.5)	< 1	Year (0.5)	< 1
C ₆ H ₆	Year (5)	< 1	Year (1.7)	7-8
Colour coding of exp	posure estimates fraction of urban	population exposed to conc	entrations above the refere	nce levels:
	< 10 %	10-50 %	50-90 %	> 90 %
	Europe – 2011 Report from European		European Enviro	nment Agency



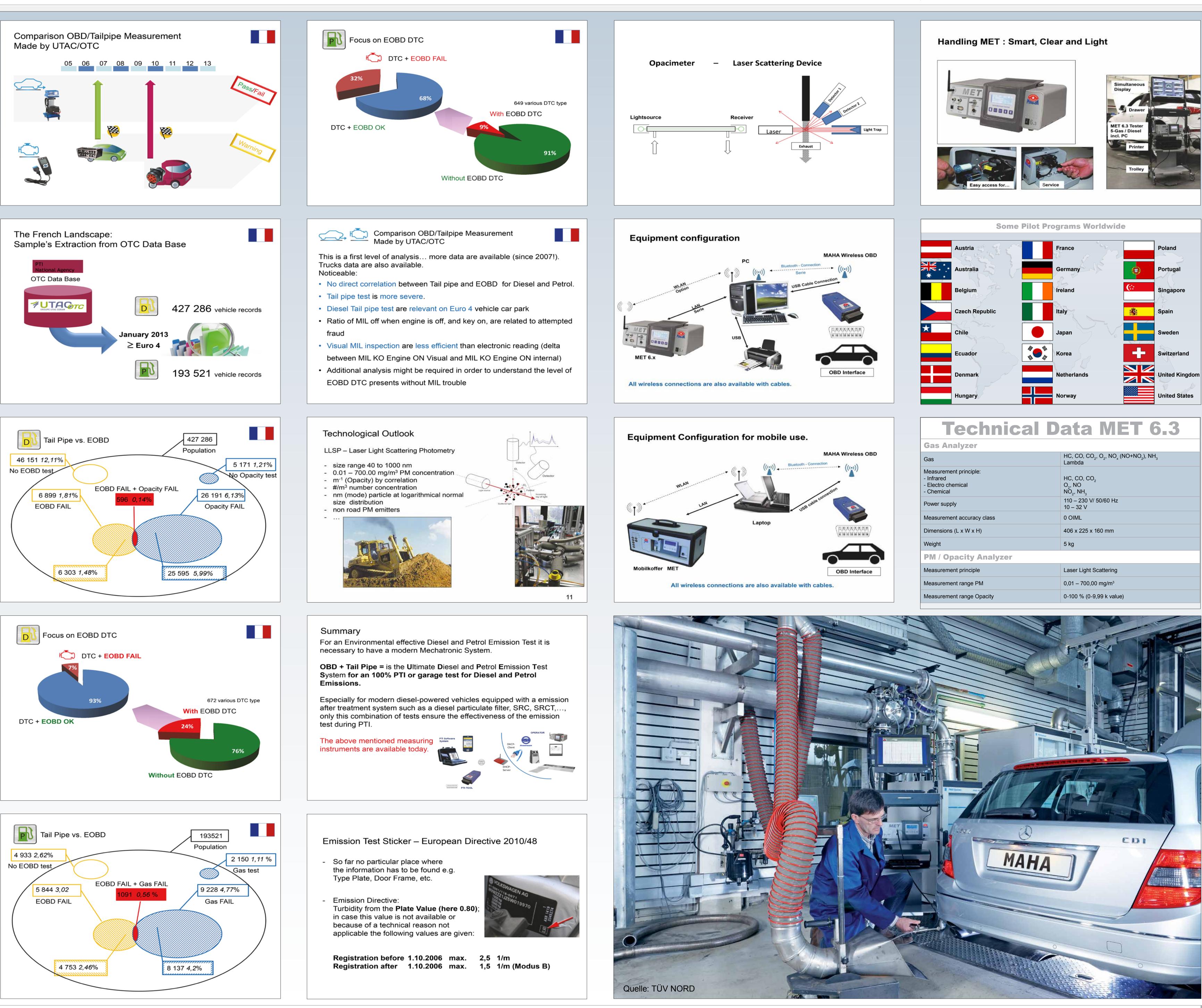
Exceeding NO₂ (Nitrogen Dioxide) Limits in Europe





limit value + 5 µg/m³. Orange and red dots correspond to exceedances of the annual limit value (40 µg/m³). The pale green dots indicate stations reporting exceedances of the WHO air quality guideline for NO2

but not in exceedance of limit values as set out in the Air Quality Directive (EU, 2008c). The dark green dots indicate stations reporting concentrations below the WHO air quality guideline for PM10 and implicitly below the limit values as set out in



OBD vs. Tailpipe Testing - Future Test Options for Emission Control Systems of Modern In-Use Vehicles





Some Pilot Programs Worldwide					
	Austria	France	Poland		
*	Australia	Germany	Portugal		
	Belgium	Ireland	Singapore		
	Czech Republic	Italy	Spain		
*	Chile	Japan	Sweden		
	Ecuador	Korea	Switzerland		
	Denmark	Netherlands	United Kingdom		
	Hungary	Norway	United States		
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iecinical D				
Gas Analyzer				
Gas	HC, CO, CO ₂ , O ₂ , NO _x (NO+NO ₂), NH ₃ Lambda			
Measurement principle: - Infrared - Electro chemical - Chemical	HC, CO, CO ₂ O ₂ , NO NO ₂ , NH ₃			
Power supply	110 – 230 V/ 50/60 Hz 10 – 32 V			
Measurement accuracy class	0 OIML			
Dimensions (L x W x H)	406 x 225 x 160 mm			
Weight	5 kg			
PM / Opacity Analyzer				
Measurement principle	Laser Light Scattering			
Measurement range PM	0,01 – 700,00 mg/m³			
Measurement range Opacity	0-100 % (0-9,99 k value)			

