EMIS Hearing, Brussels

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1 Diesel Pollutants

Emission		Effect
Particulate Matter	**Soot/ PAH**	Cancer
Carbon Monoxide	CO	Blocking Oxygen Transport of Blood (Carboxyhemoglobin)
Carbon Dioxide	CO_2	Greenhouse Gas
Nitrogen Monoxide	NO	similar CO (Methemoglobin)
Nitrogen Dioxide	**NO_2**	Smell, Irritation of Respiratory Tract, „Acid rain“, Catalyzing Ozone and PAN
Sulphour Oxides	SO_x	„Acid Rain“, Irritation of Respiratory Tract
Aldehydes	**R-COH**	Smell
Water	H_2O	
Noise		Insomnia Cardiac/Circulatory Diseases

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1 Diesel Pollutants

Emission		Reason
Particulate Matter	**Soot/ PAH**	Cold/Insufficient Combustion
Carbon Monoxide	CO	Cold/Insufficient Combustion
Carbon Dioxide	CO_2	Carbon
Nitrogen Monoxide	NO	High Peak Temperature
Nitrogen Dioxide	**NO_2**	High Peak Temperature
Sulphour Oxides	SO_x	Sulphour
Water	H_2O	Hydrogen
Noise		Combustion Pressure Peak, Mechanical Noise, Elektrostriction

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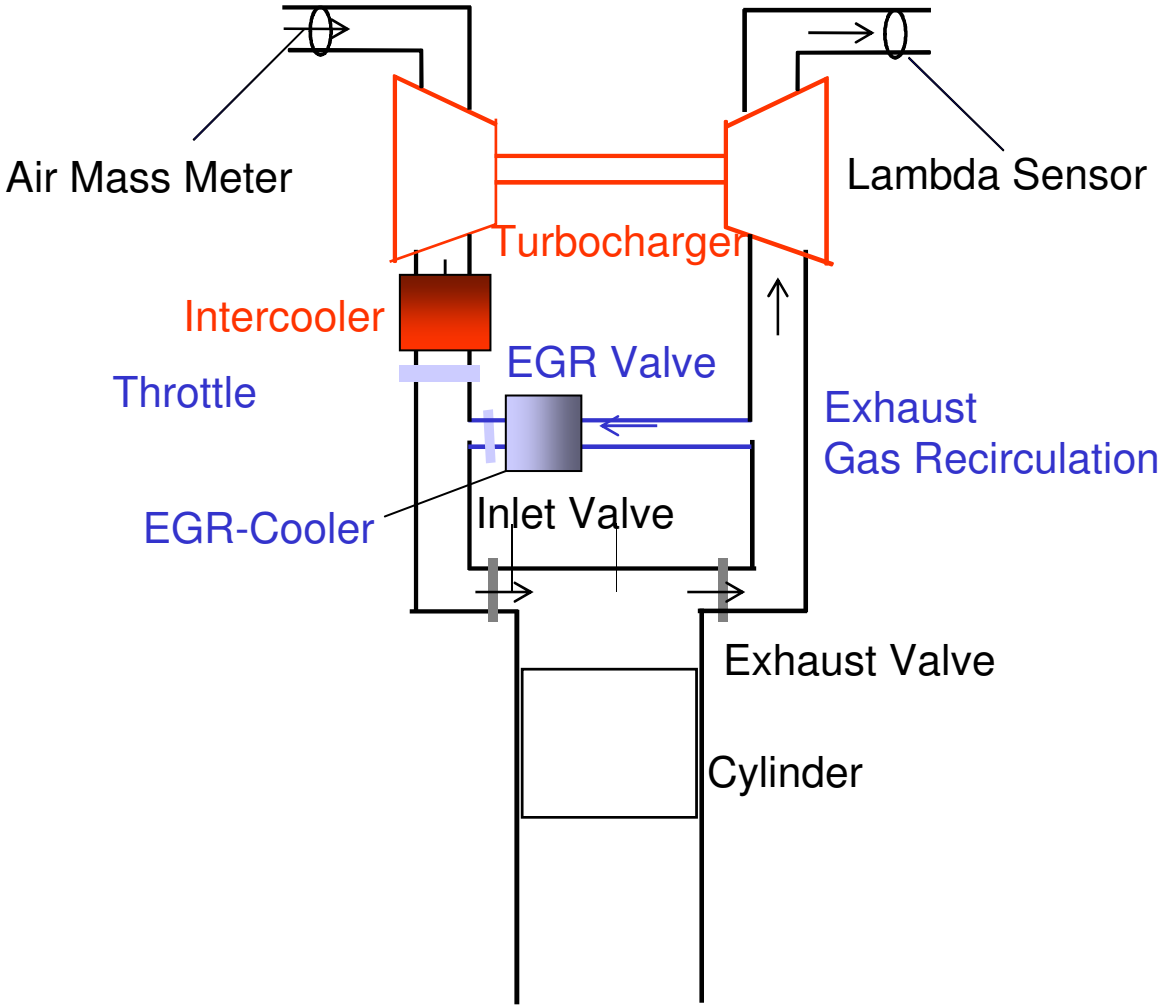
2 Countermeasures

EGR:
„Exhaust Gas Recirculation”

EGR Rate too small:
→ NOx

EGR Rate too high:
→ PM



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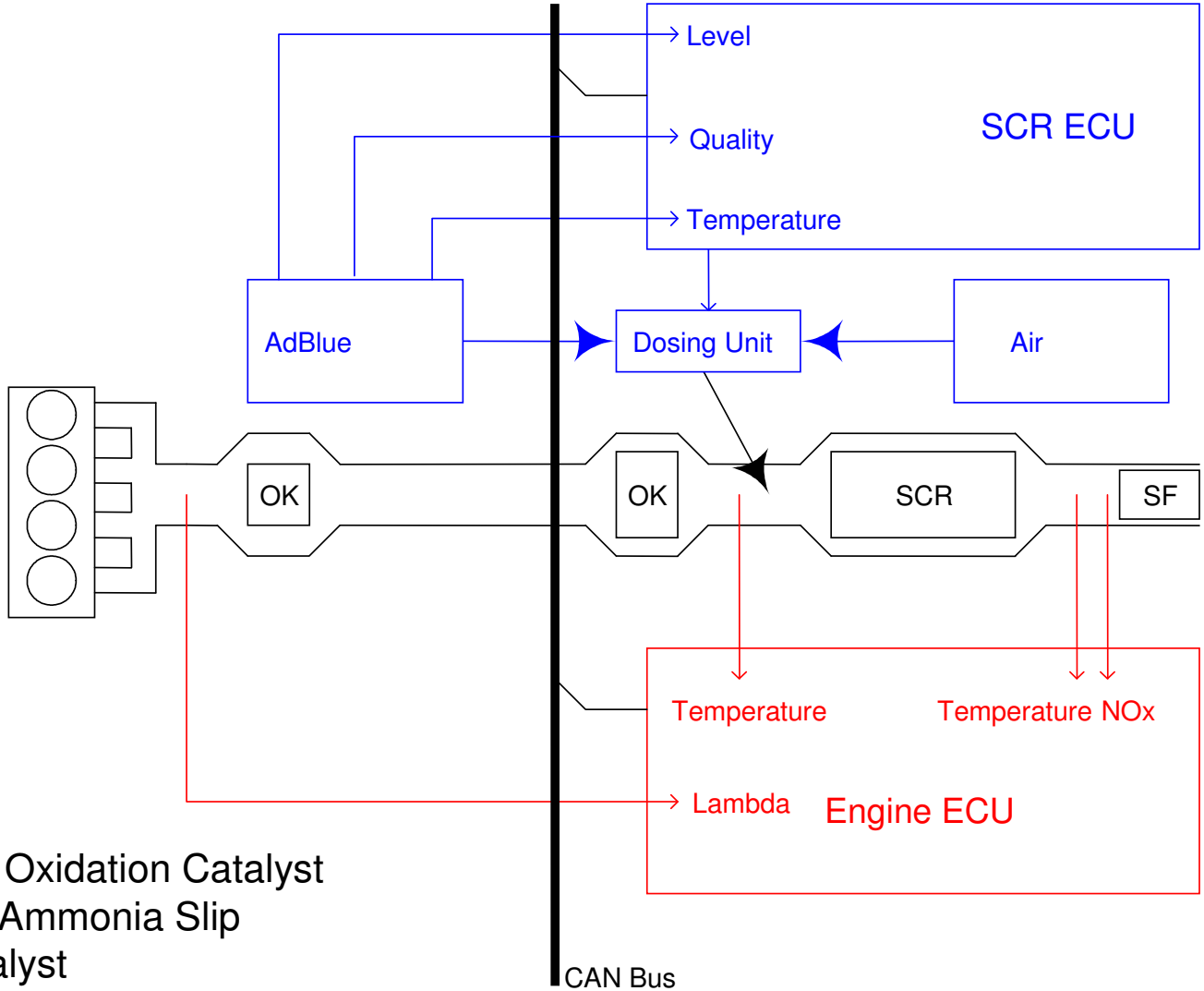
2 Countermeasures

SCR:
„Selective Catalytic Reduction”

alternative cheaper solution

LNT:

Lean NOx Trap



OK: Oxidation Catalyst
SF: Ammonia Slip Catalyst

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3 „**Engine Protection**“ and Possible Misuse

Principle Hazard of EGR:
Soot and Condensate →
Clog EGR Cooler and
Valve, PM Pollution

Principle Hazard of SCR:
Overtemperature →
Ammonia Slip
(if Extreme
→ Thermal Destruction)

Strong Suspicion of Defeat Device:

- Hard switching instead of smooth map based transition
- Switching limits put closely around values which occur in NEDC
- …

Clear Evidence of Defeat Device:

- Cycle timers
- Exhaust gas treatment switched of when not driven wheels stand or
- …

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4 Improvement

EGR:

- Accurate Dynamic Control
- EGR Sensors
- Improved Lifetime of Air Mass Meter
- EGR Cooler Bypass
- More Resistant Materials/Construction
- Low Pressure EGR
- Internal EGR

SCR:

- Temperature Resistant Material
- Slip Catalyst
- NOx Sensor

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Thank You.

Questions?

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