Fleet – Upgrade an Absolute Must to Clean Urban Air

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Agenda

- Motivation background facts
- New technologies versus emission upgrade
- Emission Upgrade tool box and its achievable results
- Economic evaluation
- Conclusion
What does VERT® stand for?

- Non-profit organization to eliminate particles and harmful substances from internal combustion engines
- Certification of diesel particle filters with Best Available Technology (VERT® filterlist)
- International membership out of manufacturers of DPF and SCR systems, testing devices, substrate producers, chassis builders, engine manufacturers and others
- Acting as partner of Megacities to support and execute pollution reduction programs from road traffic and nonroad
- 20 years of experience in diesel particulate filter technology

VERT® is a Trade Mark
for Emission Control Devices based on Best Available Technology
WHO repeats dramatic warning:

- 9 out of 10 people breathe polluted air

- 7 mio. death every year by fine particles

- Many of the world's megacities exceed WHO's guideline levels for air quality by more than 5 times
Air pollution | Effects from road traffic

Global trends in vehicle-kilometers travelled (VKT) and early deaths from vehicle-related fine particle exposure

- VKT growth overcomes benefits of current policies by 2020
- Much lower limits on vehicle emissions would save more than 200,000 premature deaths in 2030 (equivalent to a 75 percent reduction)
- Action is most urgently needed
- First fit and retrofit

Source of data: ICCT Study 2012; OECD Report 2016
Air pollution | Effects from road traffic

Annual early deaths under current and possible enhanced policies
Countries: China & India

Effects and options
- India and China are the two most populous countries
- Without enhancing low emission technology plus filters for UFP China and India could see 110,000 early deaths p.a.
- Huge financial burden to the society
- Current actions are not stringent enough

Source of data: ICCT Study 2012
UFP= Ultrafine Particles
We need to do more | Two Options

- Develop and market introduction of alternative drive and mobility concepts
- Upgrading of existing fleets with best available technologies to highest emission standards
New technologies and concepts

- Electromobility
- Hybrids
- Fuel cells
- Other alternative drives
- New Mobility Concepts (reduce cars)
- New Metropolitan Living Concept (reduce logistics)
- Buy new Busses and sell old one to other EU Countries

needed but takes decades to get remarkable effects
Upgrading existing Fleets

- Upgrading our fleets to best available technology
  - onroad
  - non-road
  - marine fleet
  - stationary applications
- We talk about to Best Available Technology
  NOT retrofit to an acceptable level
Upgrading existing Fleets

- It is a joint approach
  - Engine manufacturers
  - Equipment manufacturers
  - Technology Providers
  - Political Frameworks

- We can achieve tremendous improvement by doing it jointly
Existing Tool Box for Emission Upgrade

- High efficient Particle Filters for CI and SI engines
- Catalysis for Reduction of CO, HC, PAH
- DeNOx Systems more efficient then first fit
- Closed Crankcase Ventilation to avoid BlowBy Gas-Emission
- Low Ash lubrication oils
- Nanoparticle cabin filters
- Engine management upgrade Kits
- Repowering
- ...

Exis<ng Tool Box for Emission Upgrade
Existing Tool Box for Emission Upgrade

What we can achieve today

- > 99 % Reduction of carcinogenic nanoparticles
- > 95 % Reduction of NO$_x$ and NO$_2$
- > 90 % of Blow By Gas Emissions
- HC and CO are practically eliminated
- PN

on the road – these vehicles are reducing nanoparticles (soot and metals)
Existing Tool Box for Emission Upgrade

What we can achieve today

- NRMM -> to Emission level Stage V
- Upgrade EURO III, IV, V and EEV buses to Emission level better than EURO 6/EURO VI
- Upgrade passengers cars to EURO 6 level even under real driving conditions
- City Busses NOx reduction even under specific low temperature driving cycles
- ...
One truck without filter is emitting as much as ...
One truck without filter is emitting as much as 100 trucks with filter.
Emission Upgrade

It is worth the money?

OECD statements on economical consequences

- Health care cost due to air pollution in 2015 estimated with 21 billion USD
- Health care cost due to air pollution in 2060 estimated with 176 billion USD
- Equivalent to apr. 1% GDP by 2060
100 Mio. Diesel Particle Filters already installed

The success of 100 Mio. Particle Filters already installed

- 100,000 km travelled distance @ 0.025 g soot/km
- Collected soot
- Health Cost per kg soot = 400 €
- Correlates with > 100 billions EUR saved health-cost
Results of BAT introduction

- Introduction of 100 mio. DPF worldwide
  Light and heavy duty vehicles and construction machinery

- Example Zurich: 550 mio. CHF saved
  2010 1.5 bn. CHF health cost expenses related to PM10
  2015 0.95 bn. CHF

- Reduction of Elemental Carbon
  NEAT tunneling project: 1998 = 760 µg/m³ TC
  2004 < 50 µg³ EC due to filter technology
Conclusion

- Emission Upgrade of the existing fleet is the most cost efficient, fast and innovative method to increase air quality tremendously.
- To be successful a joint approach between the stakeholders are mandatory.
- The Emission Upgrade “Tool Box” is available and proved.
- Emission Upgrade Technology for In-Use fleets and machines is a realistic vision of Best Available Technology for high polluted areas.
VERT – the think-tank for UFP reduction

Challenging the industry for innovation in emission reduction is an engine for European industrial success and competitive advantage ...

Thank you for your attention!

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