

# Emission Upgrade Programs and Best Available Emission Reduction Technologies

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Created to eliminate particle emissions  
from internal combustion engines (ICE)  
by means of best available technology

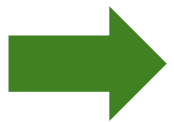
## ○ WHO repeats dramatic warning:

- 9 out of 10 people breath 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



## ○ 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 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 **EMISSION UPGRADE** to Best Available Technology  
NOT retrofit to an acceptable level



## 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 than first fit
- Closed Crankcase Ventilation to avoid BlowBy Gas-Emission
- Low Ash lubrication oils
- Nanoparticle cabin filters
- Engine management upgrade Kits
- Repowering
- ...



## Existing Tool Box for Emission Upgrade

### What we can achieve today

- > 99 % Reduction of carcinogenic nanoparticles
- > 95 % Reduction of NO<sub>x</sub> and NO<sub>2</sub>
- > 90 % of Blow By Gas Emissions
- HC and CO are practically eliminated
- PN **10 times x lower than the ambient air** on the road – these vehicles are reducing nanoparticles (soot and metals)



## ○ 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
- **Fleet – Upgrade an Absolute Must to Clean Urban Air**