

Seven key messages regarding Diesel Particle Filters (DPF)

- 1) **Background / motivation:** Diesel engines emit enormous quantities of particulate matter (PM). Most diesel particles are very small. These **ultrafine particles (nanoparticles)** cause severe adverse effects on human health and are **the major cause of air pollution**. Moreover, the main component of diesel particles is black carbon (BC). Following recent scientific understanding, **black carbon is possibly the second-most significant global warming pollutant after carbon dioxide** and ahead of methane. Therefore, the reduction of diesel particle emissions (nanoparticles and BC) is of top environmental priority, and results in both improvement of air quality and mitigation of climate change.
- 2) **Best solution:** For more than two decades, **Diesel Particle Filter (DPF)** systems are the best available technology (BAT) to reduce emissions of ultrafine particles from diesel engines. High quality DPF systems easily achieve emission reductions of ultrafine particles of 99% and even more (in particle number).
- 3) **The good operation of DPF systems is widely demonstrated worldwide and in all types of applications** (buses, heavy duty trucks, passenger cars, off-road vehicles such as construction machines, locomotives, ships and stationary engines for power generation). Worldwide > 30'000 construction machines, > 80'000 fork lifts, > 100'000 trucks and buses are retrofitted, and millions of new passenger cars and new trucks in the US and Europe, Korea, Japan and China operate with DPF. **All-important Low Emission Zones (LEZ) in the European Union promote DPF applications** for buses of public urban transport as well as for municipal services' vehicles. **In the case of Switzerland, almost all city buses with diesel engines are equipped with DPFs** (retrofitted or acquired equipped from the bus suppliers) and new Euro V buses are voluntarily bought DPF equipped. **DPF systems are also mandatory for construction machines** > 18 KW; ships, stationary engines and for all Diesels underground. Nearly all locomotives are also retrofitted with DPF.
- 4) **The cost-effectiveness of DPF systems is outstandingly attractive.** In several countries the cost-effectiveness of DPF systems and programmes has been evaluated. Generally it is in the range of 1:4 or even better; meaning that for each Euro invested, four or more Euros are saved, mainly in health costs. In other words, with such attractive cost-effectiveness, governments should feel urged to develop policy frameworks encouraging DPF use.
- 5) **The Particle Number (PN) criterion is state-of-the-art to evaluate / measure ultrafine particle emissions or DPF filtration efficiencies. In also will be the criterion of the future and already approved Euro emission standards.** Ultrafine particles are nearly weightless; therefore the conventional gravimetric measurement methods are not appropriate. In the case of European Emission Standards for Light Duty Vehicles (LDV), the PN criterion will be introduced in 2011 with Euro 5+, for HDV with Euro VI in 2013, thus in practice all new on-road vehicles will need DPF equipment.
- 6) **In terms of PN, even the newest Euro engines (up to Euro V) without filter and also CNG buses have very significant ultrafine particle emissions, very significantly (>100x) above old engines retrofitted with DPF. The retrofit of existing Heavy Duty Vehicles and the acquisition of new engines equipped voluntarily with DPFs are therefore a top priority measure of clean air management.**
- 7) **Best DPF quality is guaranteed by the VERT certification.** The VERT certification is Swiss-based, evaluates filtration efficiency, and thoroughly controls possible secondary emissions and tests endurance. Due to the strictness of rules, VERT certified systems are used in mining and tunnel constructions. Up to 2010, more than 50 DPF systems of international manufacturers have been approved by VERT. Please directly refer to the VERT Filter List and to www.vert-certification.eu.