

SUB23nm PARTICLE NUMBER FILTRATION.

USING STATE OF THE ART GASOLINE PARTICULATE FILTER TECHNOLOGY.



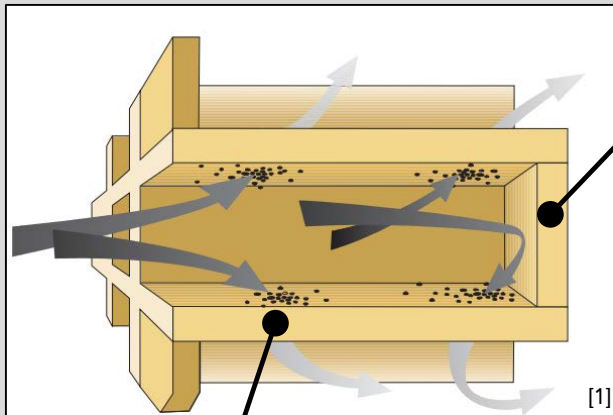
BMW AG | 25.10.2019
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**BMW
GROUP** THE NEXT
100 YEARS 



RECAP: GASOLINE PARTICULATE FILTER TECHNOLOGY. FUNCTION AND PARTICLE CAPTURE MECHANISMS.

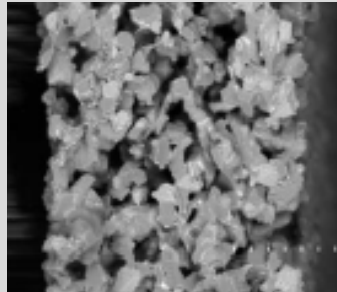
Gasoline Particulate Filters (GPF):



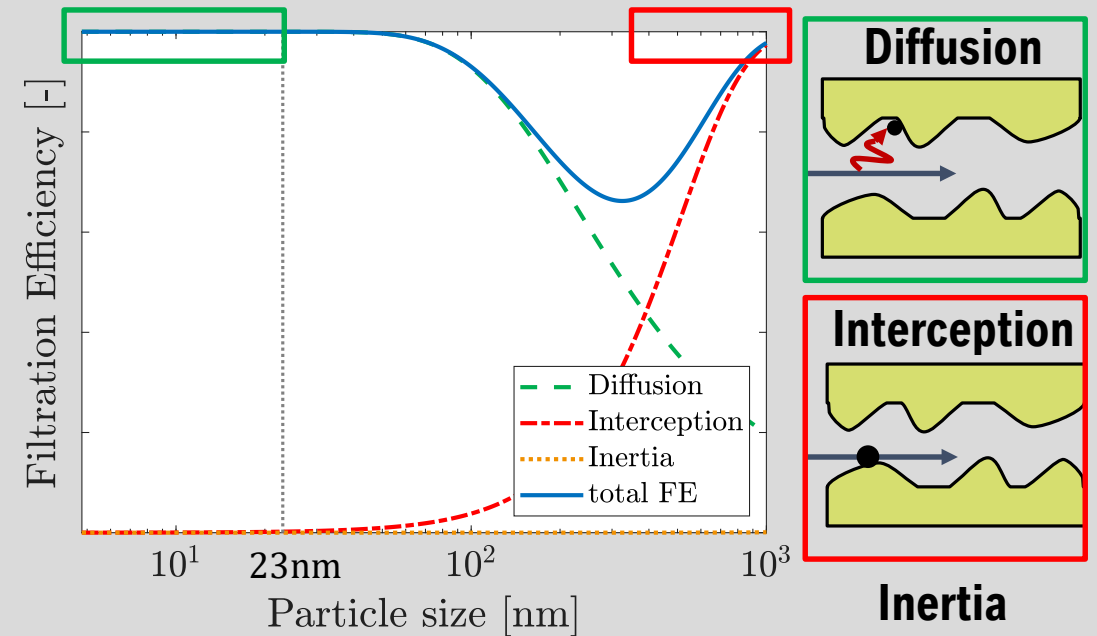
The GPF channels are plugged to force the gaseous flow through the porous wall.

[1]: source: Corning Inc.
<https://www.greencarcongress.com/2018/06/20180626-corning.html> [21.10.2019]

The porous wall has a mean pore size of $9\ \mu\text{m}$, thus it is 400 times bigger than a sub 23nm particle.

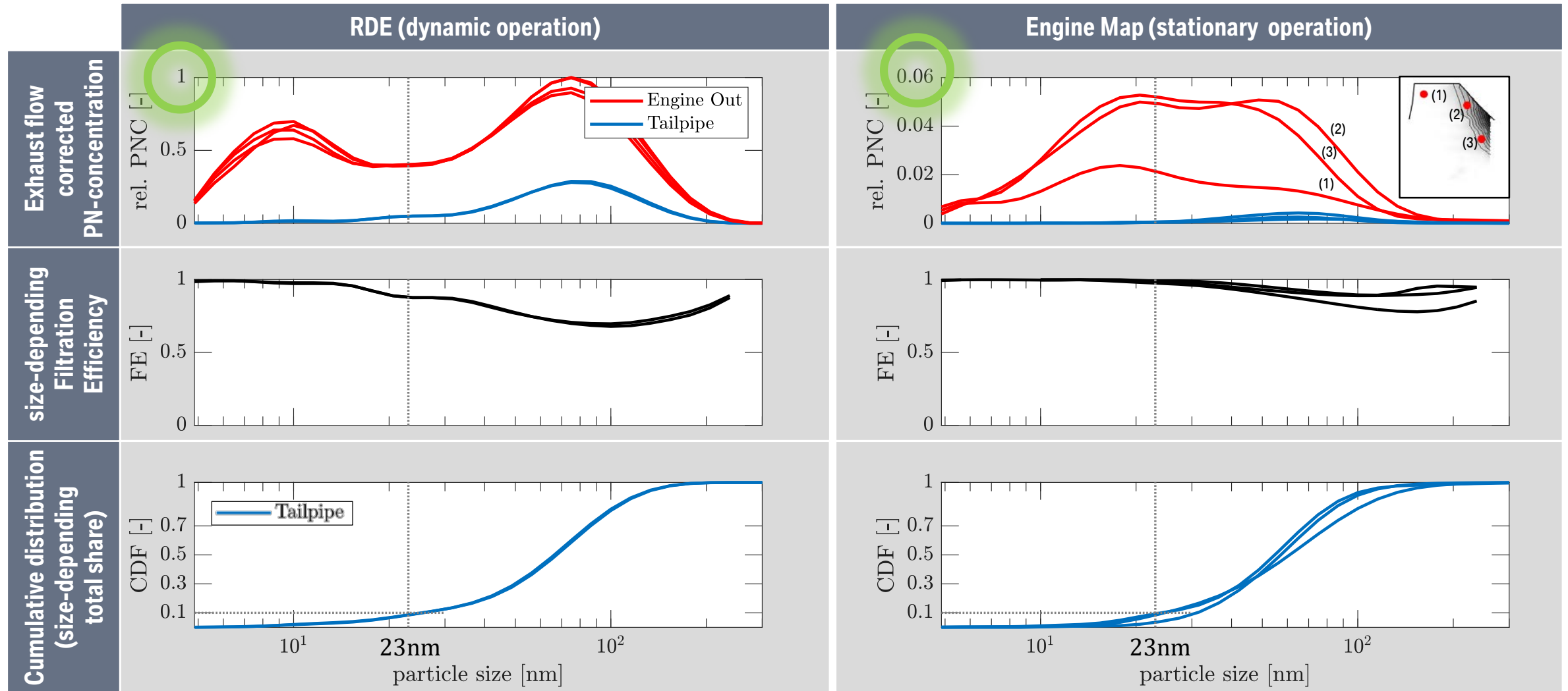


Particle Capture Mechanisms:



Diffusion is the **main pathway** of particle capture in a GPF and it is more **efficient** with **smaller particles**.

TAILPIPE SUB23nm PARTICLE NUMBER EMISSIONS. USING STATE OF THE ART GASOLINE PARTICULATE FILTERS.



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CONCLUSIONS:

State-of-the-Art Filter technology (DPF & GPF) significantly reduce over-all exhaust-PN-emissions under a very broad range of operation conditions, however there are still challenges ahead and optimization required.

- Due to the working principle of filters, emission of sub23nm is over-proportionally reduced.
- The implementation of EURO 6d (RDE) does already address the sub23nm topic to a large extend.
- There is no urgent need to change the current measurement approach and legislation.
- Calibration and measurement technology can be adapted and tested before implementation.

PROPOSAL FOR NEXT STEPS:

- Definition of a calibration procedure that is covering all exhaust-PN-emission measurement technologies.
- Define suitable sampling and measurement systems, based on the findings of the Horizon 2020 projects and investigation of state-of-the-art emitters.
- Premature implementation of sub23nm causes cost and effort due to doubling technical equipment, lack of traceability and calibration labs.
- Sustainable and positive effect on environment and health can only be achieved with fully-developed vehicle and measurement technology.