Swiss, European and Joint Efforts to Prevent Ultrafine Particle Emissions

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Giovanni D’Urbano
Swiss Federal Office for the Environment (FOEN)
Two Key Principles of Environmental Protection in Switzerland

Polluter pays principle:
Anyone who causes measures to be taken under the provisions of this law shall bear the costs.

Precautionary principle:
Irrespective of existing pollution, emissions shall be limited by early preventive measures as much as technology and operating conditions will allow, provided that this is economically acceptable.
Swiss Environmental Legislation calls for **Best Available Technology**!

The Federal Council stipulates by ordinance the **air quality and emission limit values** for assessing harmful effects or nuisances.

→ Ordinance on Air Pollution Control ([OAPC](#))
Diesel Soot as Carcinogen

International Agency for Research on Cancer (IARC) classified diesel engine exhaust as carcinogenic to humans (12 June 2012).

Diesel soot is classified as carcinogen in the Swiss Ordinance on Air Pollution Control (OAPC) since 1998.

Emissions of carcinogens as diesel soot have to be minimized (imperative to minimize) using the best available technology.

Main sources:
On- and non-road diesel engines.
1994: Start of a pilot and research project of Suva, together with FOEN and accident insurances of Germany and Austria.
Swiss Air Pollution Control Requirements for Construction Machinery - From Retrofit to OEM

Machines on Construction Sites

Retrofit

OEM (original equipment manufacturer)

Retrofit

97% efficiency
20-300nm

1x10^{12}#/kWh
NRSC
NRTC

FOEN list for:
- Engine Types
- Retrofit Systems

http://www.bafu.admin.ch/filterlist

Particle Number (PN) Testing to Date:
10 accredited (ISO/IEC 17025) testing laboratories recognised by FOEN.
98 engine families (927 engine types) covering 21 to 446 kW.
Action Plan 2006: Measures

For several diesel source categories (passenger cars, buses of public transport, construction machinery, ships, locomotives, heavy duty vehicles) solutions to limit diesel particle emissions with efficient filters are already implemented or envisaged.
Cooperation and Harmonization

UNECE

Working Groups on Vehicle Regulations WP.29/GRPE PMP, REC, WLTP, NRMM, ...

Cooperation

Autonomous Implementation

Joint Research

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Particle Number in different Applications

Light duty, diesel and gasoline (Euro 5/6)

Heavy duty (Euro VI) and non-road (Stage V)

In future?

Motorcycles

Brake and tyre wear

Source: JRC

Source: EMPA

Figure 1: Schematic of the experimental set-up

WLTP Worldwide Harmonized Light Vehicles Test Procedure

Source: JRC

Figure 1: WLTP Cycle for Class 3 Vehicles
Future Harmonization with EU Stage V

Land-based NRMM (CI <56kW & Engines >56kW)

- Scope of Directive 97/68/EC
- Additional in new NRMM proposal

<table>
<thead>
<tr>
<th>CI engines &lt; 56kW &amp; Engines &gt;56kW</th>
<th>Directive 97/68</th>
<th>New NRMM proposal</th>
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<tbody>
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<td>Engines P &gt; 560 kW</td>
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- Limit values in line with US legislation
- Limit values more stringent than US legislation

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Thank you for your kind attention and we wish you all a fruitful and successful conference.
In case of questions:

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