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NRMM, an International Perspective

halter management ltd

Urs Halter

- Managed bus company & BL dealership in Switzerland
- Introduced modern DPF technology into Switzerland
- First independent long-term tests with mobile DPFs
- First Bus with combined DPF & SCR
- Chaired international environmental bus group
- Independent consultant on emission control

Similarities between London and Switzerland:

Similarities between London and Switzerland:

HSBC UBS

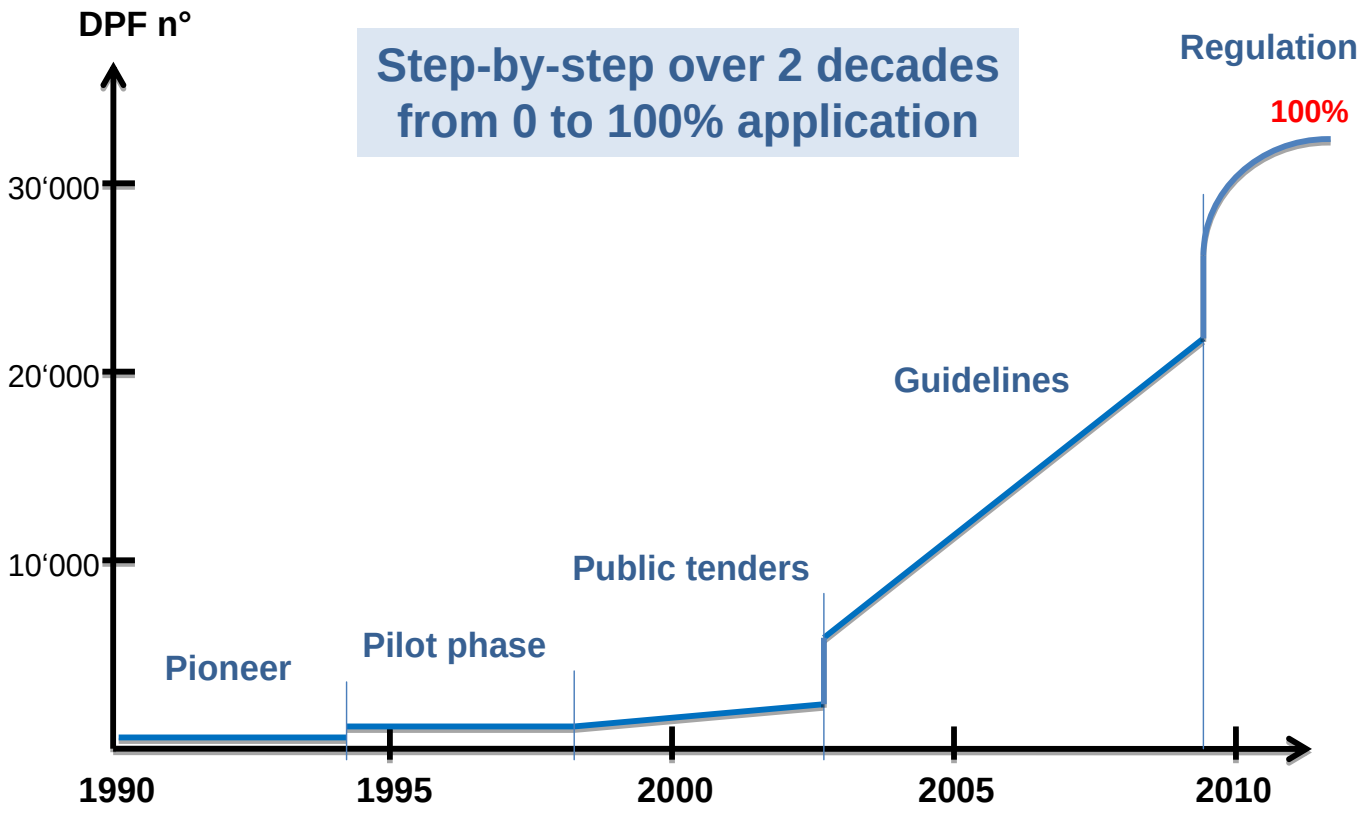
Population	
8,5 Mio	8,4 Mio
None local background	
~37%	~37%

Similarities between London and Switzerland:

Legislation

Guidance / By-Law	
GLA	Federal Government
Execution	
Boroughs (36)	Cantons (26)

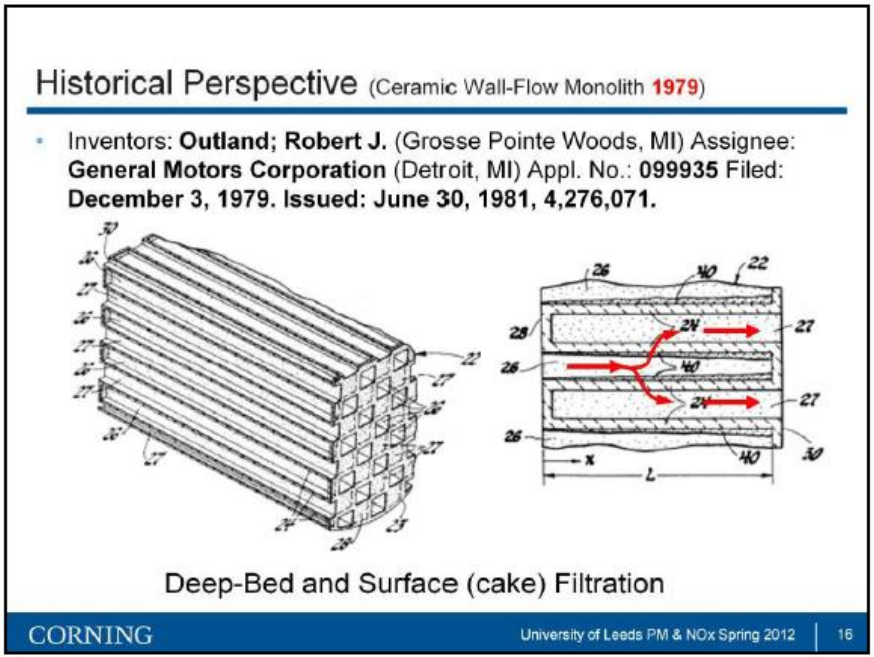
DPF Retrofit of Construction Machines Switzerland



Pioneer Phase (1990 – 1995)

- 1987 WHO classifies PM as probably being carcinogenic
- First Diesel Particulate Filters developed
- Swiss Government allowed use of DPFs provided no secondary emissions

1979

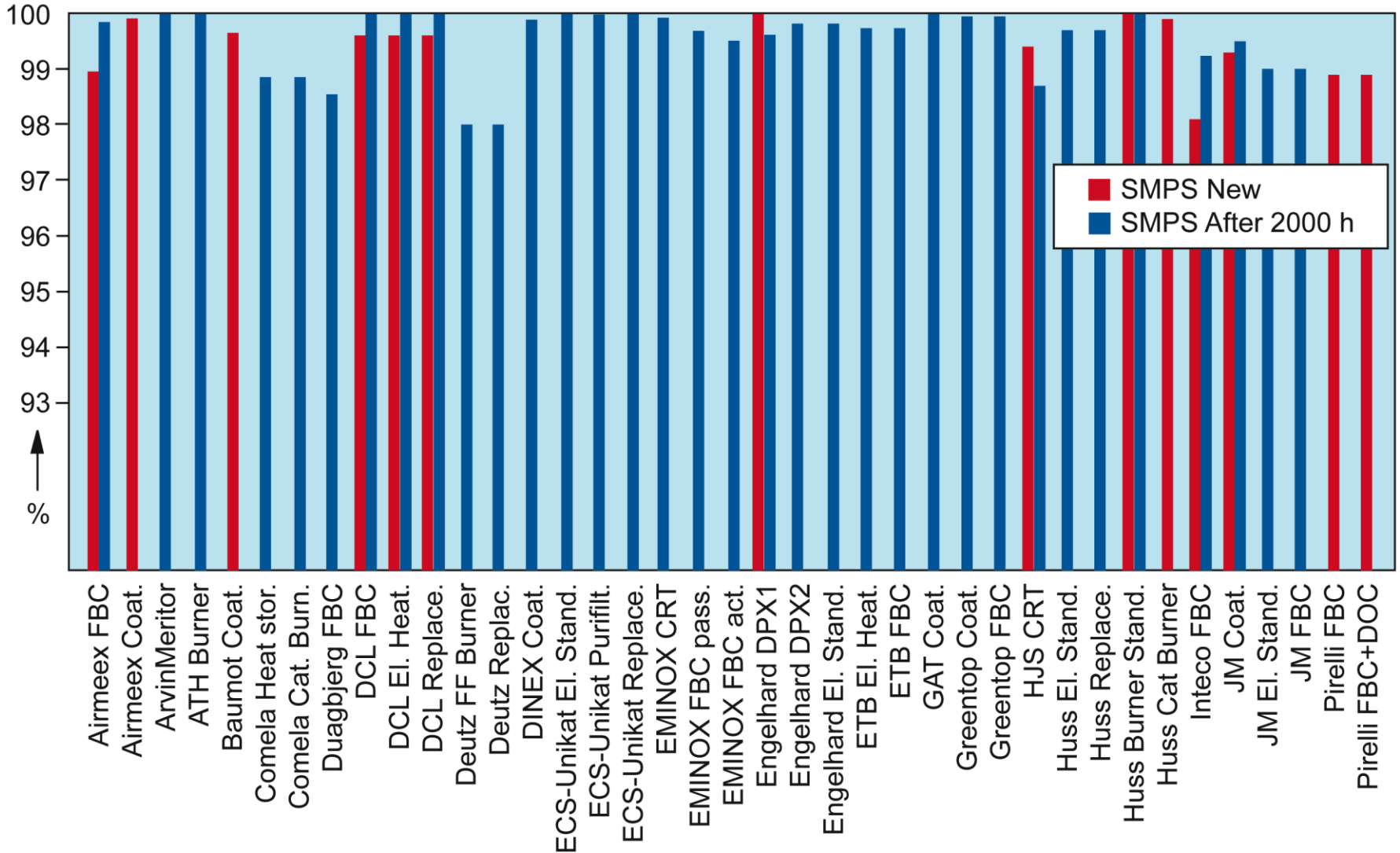


Pilot Phase (1994 – 2002)

- 1991 Busses in Zurich & Geneva retrofitted
- 1994 first fork lifts (indoor)
- 1994-1998 CH, G, AU joint occupational research

  > **VERT** (Verification of Emission Reduction Technology)

VERT: average reduction 98.6%, 25% > 99.8%



Public Tender (2002 – 2008)

- 2000 tunnel construction (planning started 1993)
- Large construction sites (Zurich Airport, pipeline etc)
- In January 2002 all underground construction sites DPFs become mandatory

Regulation

Neue Eisenbahn Alpentransversale NEAT

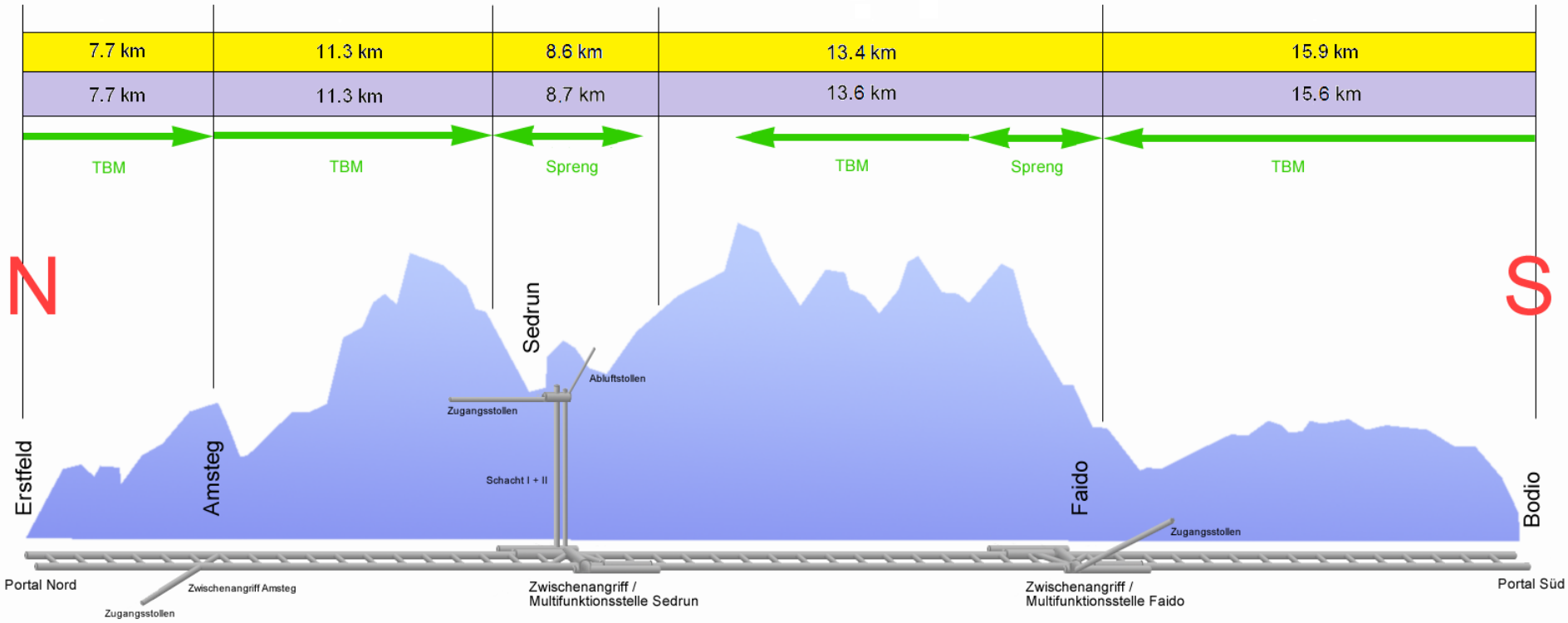
Gotthard-Basistunnel

zwischen Erstfeld UR und Bodio TI, Schweiz
Länge: 57 km - Bauzeit: 1993 - 2017

Stand: 13. Dezember 2009

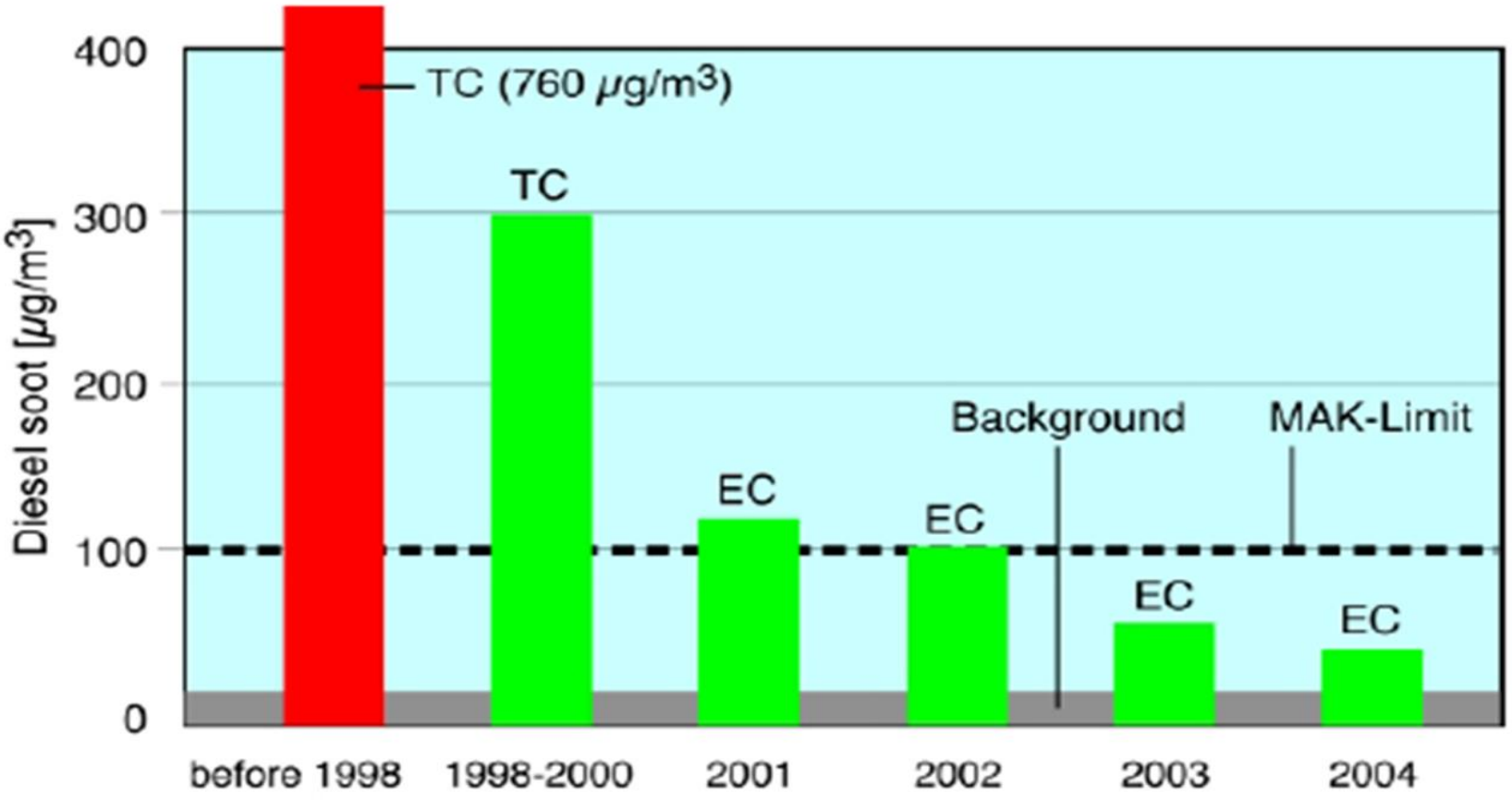
Oströhre

Weströhre



Regulation

Improvement of Air Quality in Swiss Tunneling



Regulation

1983 Federal Environmental Protection Act (EPA)

EPA Art. 1 Aim

[1] *This Act is intended to protect people, animals and plants, their biological communities and habitats against harmful effects or nuisances and to preserve the natural foundations of life sustainably, in particular biological diversity and the fertility of the soil.*

[2] *Early preventive measures must be taken in order to limit effects which could become harmful or a nuisance.*

EPA Art. 2 Polluter pays principle

Anyone who causes measures to be taken under this Act must bear the costs.

Legal Background

- September 2002 Federal Office for the Environment (FOEN) issues **Guideline** for Construction Sites:
  - all machines >37 kW
  - all urban and large non-urban sites
  - efficiency > 95% on numbers 20-300 nm

- 2008 Government enacts **By-Law** on Air Pollution Control
  - All machines >37 kW
  - 18-37 kW (old and new)
  - Efficiency >97% on numbers 20-300 nm

DPF Retrofit in Switzerland

Year	Fuel Sulfur ppm	Retrofits total	Retro-fitters	Failures % p.a.	VERT DPF
1988	2000	100	2	> 10	-
1992	2000	350	2	> 10	-
1995	500	500	3	> 10	5
1998	500	900	8	10	16
2000	350	2'500	12	8	23
2002	50	4'900	7	3	8
2003	50	6'500	11	2	22
2005	50	11'500	21	<2	30
2007	50	17'500	26	<2	50
2010	10	25'000	30	< 2	71
2012	*10*	*35'000*	*30*	*< 1*	*80*

Today there about 50,000 retrofitted DPF are operational in Switzerland

ABGAS-WARTUNGSDOKUMENT

FICHE D'ENTRETIEN DU SYSTÈME ANTIPOLLUTION

DOCUMENTO SULLA MANUTENZIONE RELATIVA AI GAS DI SCARICO

Diesel (Baumaschinen)

CH

① Fahrzeugdaten / Données du véhicule / Dati del veicolo

② Messbedingungen / Conditions de mesure / Condizioni di misurazione

Sollwerte des Herstellers / Valeurs du constructeur / Dati del costruttore

3 Kontrollwerte / Indications de réglage / Indicazioni di regolazione

4 Rauchemissionswerte / Valeurs des émissions de fumée / Valori delle emissioni di fumo

5 Bestätigung / Attestation / Attestazione

Monitoring & Fines

- Controls are delegated to Cantons
- Inspectors check at random base (5 %)
- Inspectors check papers and smoke
- Non functioning filters must be replaced within two days
- Fines for non compliance are CHF 2000-8000 (GBP 1,500-6,000) depending on machine size

Current Legislation for Construction Equipment:

Switzerland	
Austria	
Germany	Berlin, Bremen
	Baden-Würtemberg
California	
UK	London

EU Legislation:

Stage	Engine power [kW]	Type approval	Vehicle registration	NOx [g/kWh]	HC + NOx [g/kWh]	PM [g/ kWh]
I	130-560	01.01.1998	01.01.1999	9.2		0.54
II	130-560	01.01.2001	01.01.2002	6.0		0.20
III A	130-560	01.01.2005	01.01.2006		4.0	0.20
III B	130-560	01.01.2010	01.01.2011	2.0		0.025
IV	130-560	01.01.2013	01.01.2014	0.4		0.025

VERT recognised in:

Switzerland
Germany
Netherlands
London LEZ

Austria
USA: CARB, NY
Italy

Santiago de Chile
Colombia: Bogota
Israel: Telaviv
Iran: Teheran

Canada
Denmark
China: Beijing

Factors for Success:

- Selecting the right DPF (application, cycle, fuel, lub oil etc)
- Training & instruction (VERT tools available)
- Positive approach & attitude
- Monitoring & cleaning
- Electronic Filter On-board Control

Thank you!

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