



Focus Event: Effect- and toxicity-based assessment of exhausts
Empa, March 16, 2018

Road vehicles on earth

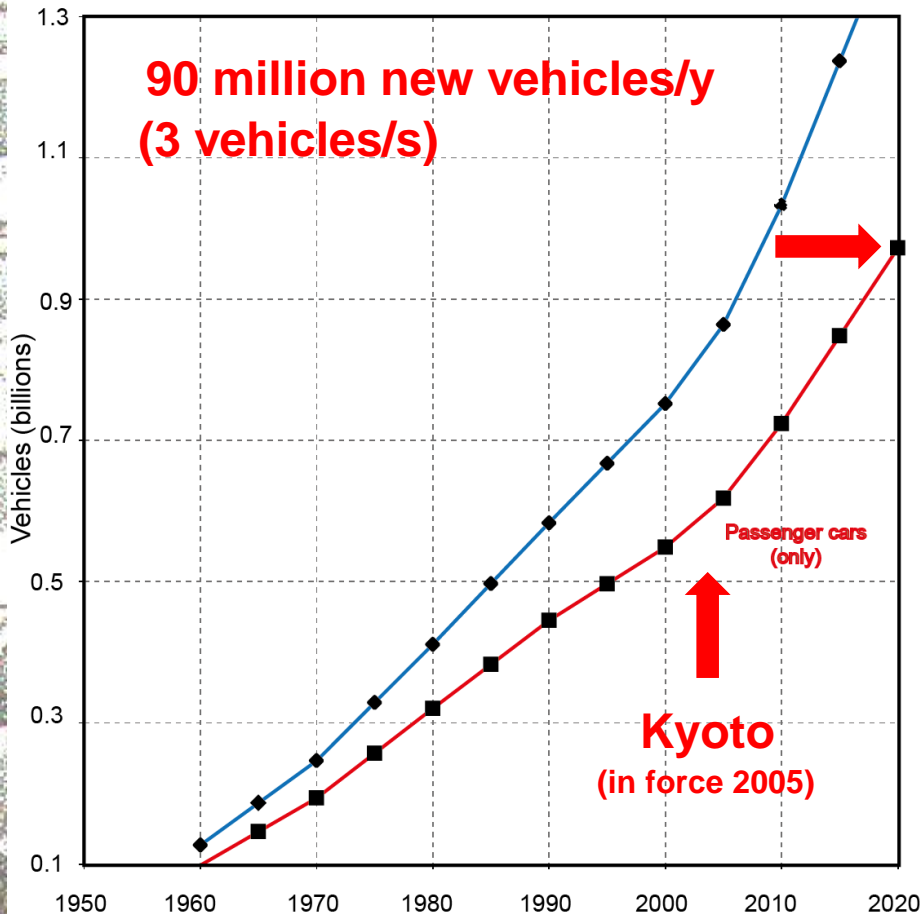
From 0.1 to 1 billion in 60 years

(3800 as I spoke, 37'000 this morning)

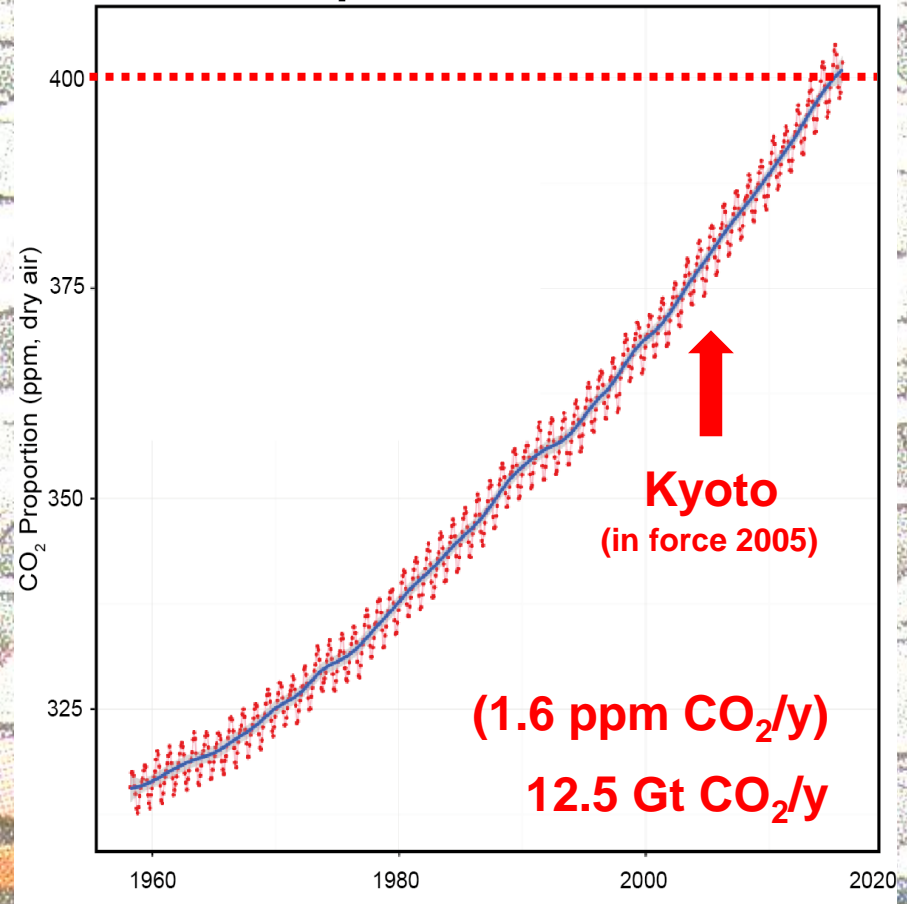
(10 x)

From 300 to 400 ppm in 60 years

World vehicle population

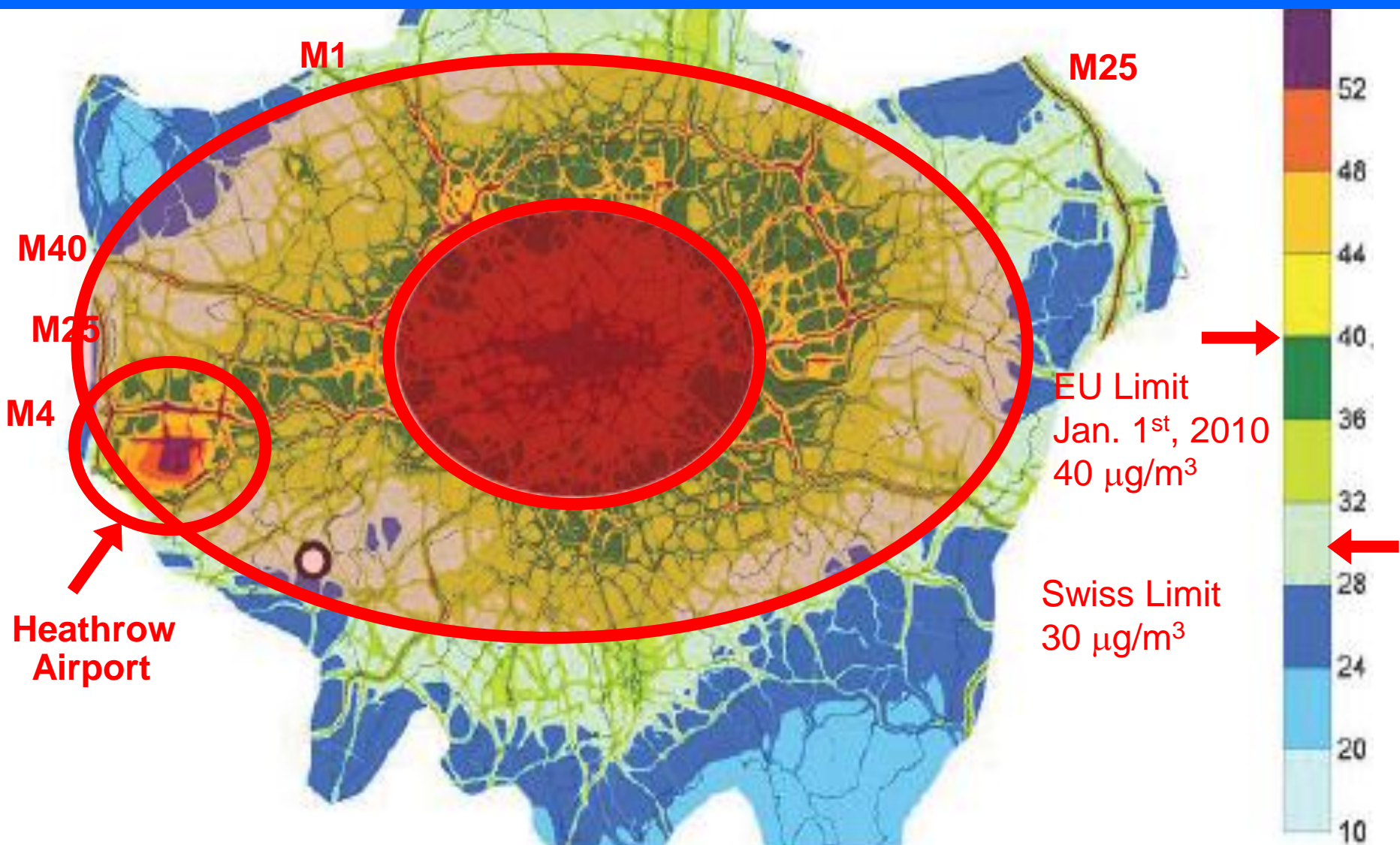


Atmospheric CO₂ Concentration (Mauna Loa, monthly mean)



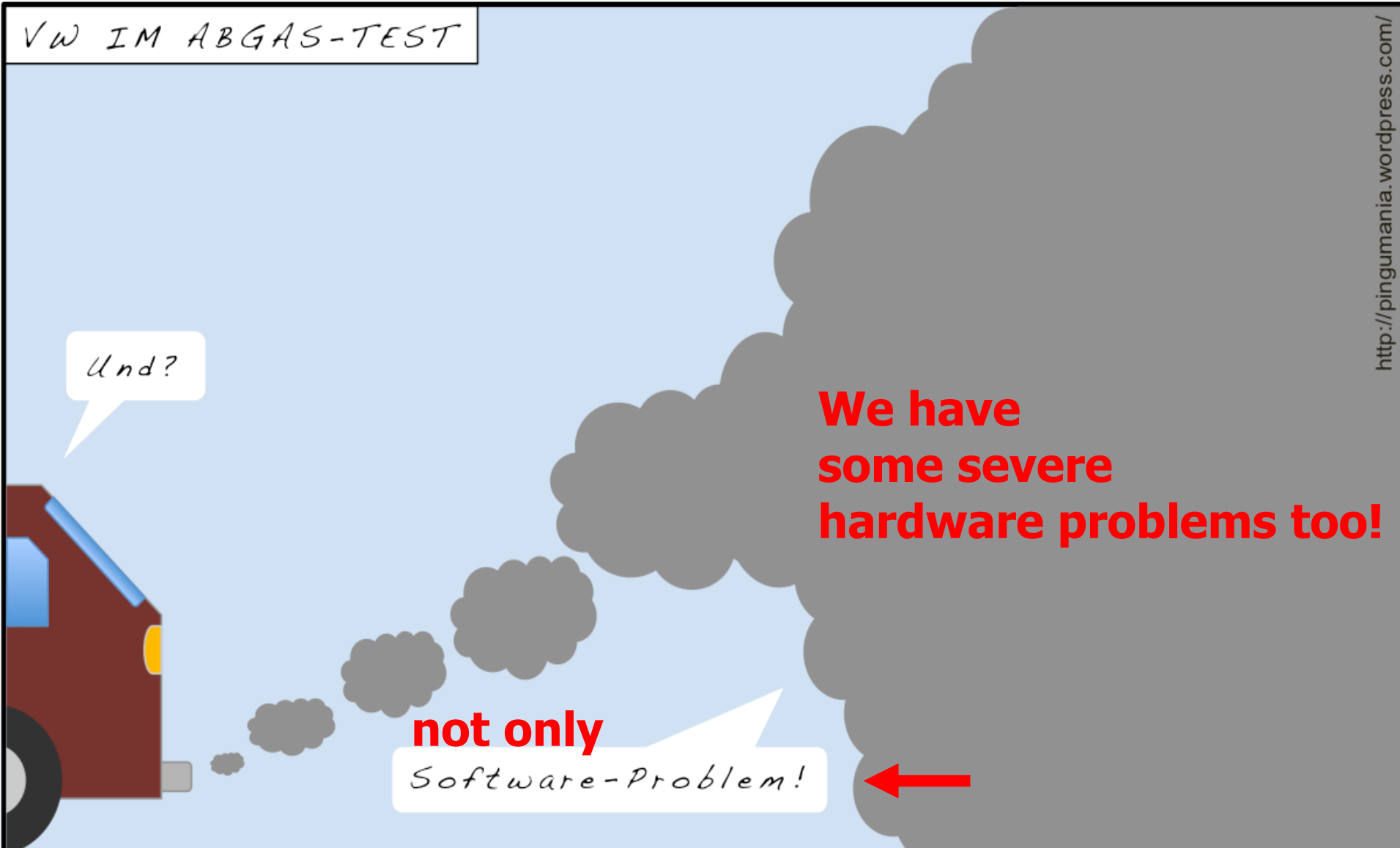
10^9 vehicles x 10^4 km/y x 200 g CO₂/km = additional 2 Gt CO₂/y

Mean annual NO₂ levels: City of London



From a Swiss perspective, the Brexit did not solve the problem!

Blue Technology: Not green enough yet



The sooting problem

VERT approved filters are BAT, both for diesel and gasoline vehicles



Combustion exhausts are toxic cocktails

Many ways to get intoxicated, mostly chronic diseases, only CO kills quickly



toxic?

Acute toxicity: - CO, reactive nitrogen compounds (RNCs)

Chronic toxicity: - oxidative stress

- inflammation

- chronic obstructive pulmonary disease

Genotoxicity: - mutations

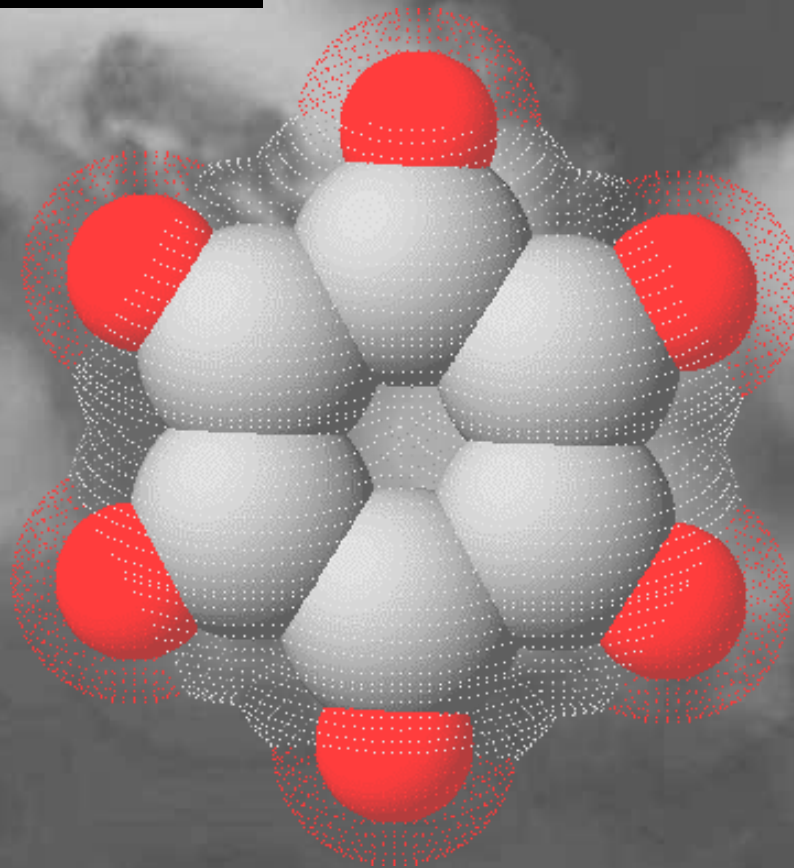
- cancer

How toxic are combustion exhausts, what can chemical analysis tell us?

Adverse health effects of combustion exhausts

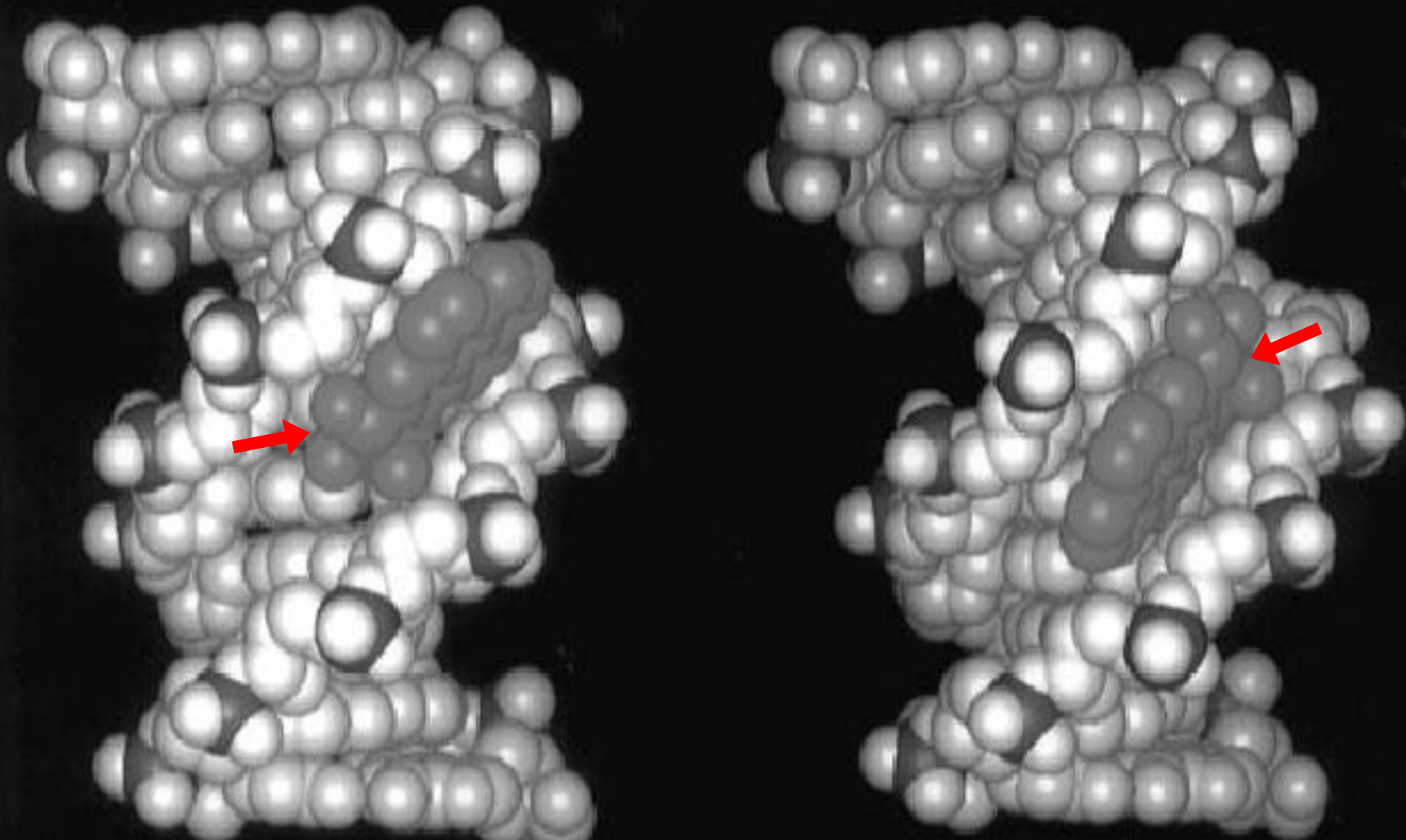
Benzene, carcinogenic fuel and exhaust constituent

Problem: benzene toxicity



Ambient air EU limit Jan. 1st, 2010, 1 $\mu\text{g benzene}/\text{m}^3$

Carcinogenesis from benzo(a)pyrene



EU ambient air limit Dec. 31st, 2012, 1 ng benzo(a)pyrene/m³

Diesel and GDI nanoparticles act as Trojan horses for genotoxic compounds

Problem: Trojan horse effect

- Nanoparticles penetrate cell membranes (alveoli, placenta, blood cells) acting like a Trojan horse

Trojan horse, Harbour of Canakkale, Turkey



Combined chemical and cell culture tests are even more powerful

Take-home message 2:



Effect and toxicity-based legislation, both at the source and in the ambient



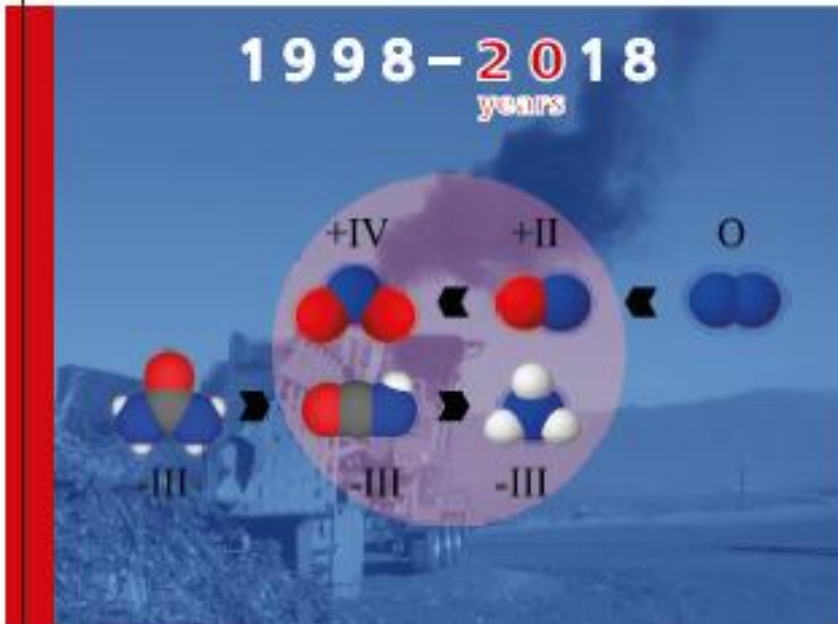
If we dare to expose miners to non-treated diesel exhausts for decades, we don't need animal tests



Take-home message 3

20 years of VERT emission control certification

Lifelong BAT for emission control of in-use and OE-vehicles and PTI



Empa, Dübendorf, Überlandstrasse 129
Thursday, March 15, 2018, from 9:00 to 17:15

Registration by e-mail: ttm.a.mayer@bluewin.ch



This was it,
the 9th VERT Forum



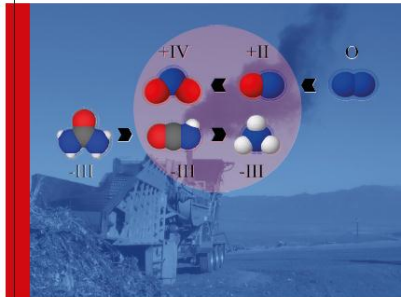
10th VERT Forum, March 14, 2019!



8th VERT FORUM

Combined particle filter and deNO_x-technologies

Will blue technology be green enough in the future?



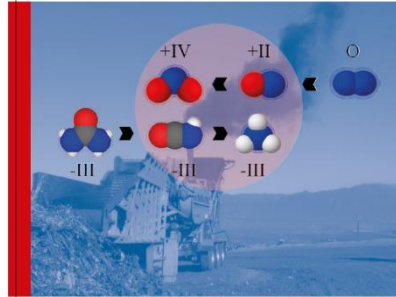
Empa, Dübendorf, Überlandstrasse 129
Friday, March 17, 2017, from 9:00 to 17:00

Registration by e-mail: ttn.a.mayer@bluewin.ch

7th VERT FORUM

Filter and deNO_x-technologies:

Efficient for both, diesel and gasoline direct injection vehicles



Empa, Dübendorf, Überlandstrasse 129
Friday, March 18, 2016, from 9:00 to 17:00

Registration by e-mail: ttn.a.mayer@bluewin.ch

6th VERT FORUM

Particle Filter Technologies

both for diesel vehicles and gasoline direct injection (GDI) vehicles

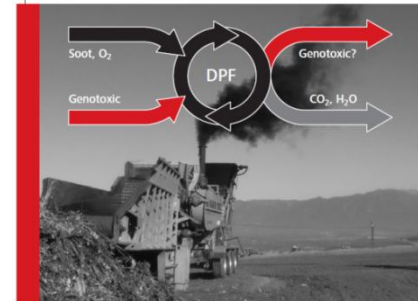


Empa, Dübendorf, Überlandstrasse 129
Friday, March 20, 2015, 8.30am – 4.30pm

5th VERT FORUM

Evolution of Diesel Particle Filter and deNO_x Technologies

Catalysts at Work



Empa, Dübendorf, Überlandstrasse 129
Friday, March 21, 2014, 09.00–17.00

preliminary

4. VERT FORUM

Advanced Diesel Particle Filter- and deNO_x-Technologies

Impact of Biofuels

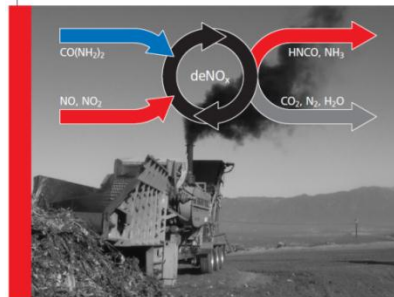


Empa, Dübendorf, Überlandstrasse 129
Friday, March 22, 2013, 09.00–16.30

3. VERT FORUM

Diesel Particle Filters meet deNO_x Technologies

Opportunities and Challenges

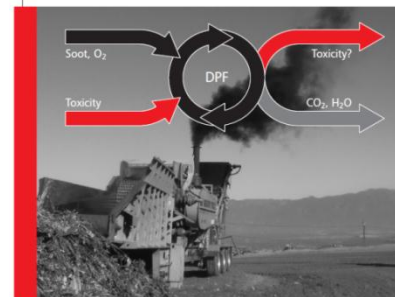


Empa, Dübendorf, Überlandstrasse 129
Thursday, March 22, 2012, 09.00–16.30

2. VERT FORUM

Diesel Particle Filter Technologies

Opportunities and Future Challenges



Empa, Dübendorf, Überlandstrasse 129
Friday, March 25, 2011, 09.00–16.30

1. VERT Forum

Challenges and Opportunities of BAT Retrofit Particle Filters



Empa, Dübendorf
Überlandstrasse 129
Friday, March 19, 2010
09.00–16.30

FOCUS EVENT

Effect- and toxicity-based assessment of exhausts

Advanced and reliable hazard assessment tools for the implementation of new technology



This was it,
the 2nd Focus Event

Empa, Dübendorf, Überlandstrasse 129
Friday, March 16, 2018, from 9:00 to 17:00

Registration by e-mail: ttm.a.mayer@bluewin.ch



3^{id} Focus Event, March 15, 2019!

preliminary



FOCUS EVENT

Effect- and toxicity-based assessment of exhausts

Advanced and reliable hazard assessment tools for the implementation of new technology



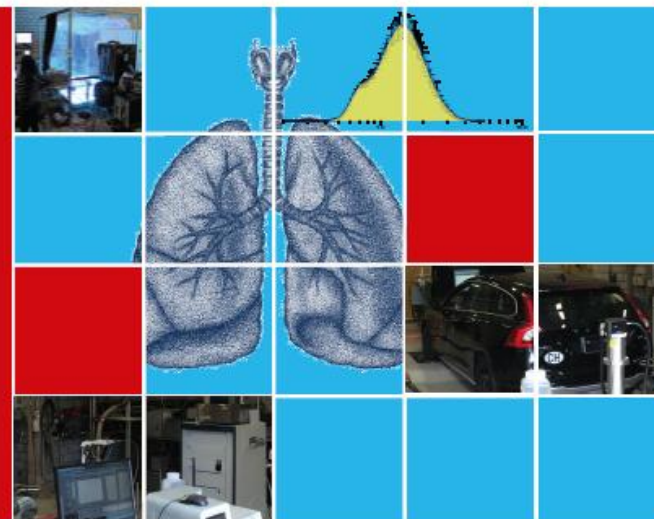
Empa, Dübendorf, Überlandstrasse 129
Friday, March 16, 2018, from 9:00 to 17:00

Registration by e-mail: ttm.a.mayer@bluewin.ch

FINAL GASOMEP MEETING

Gasoline-direct injection vehicles

Impact of filters and fuels on emissions of nanoparticles, genotoxic compounds, metals and secondary organic aerosols



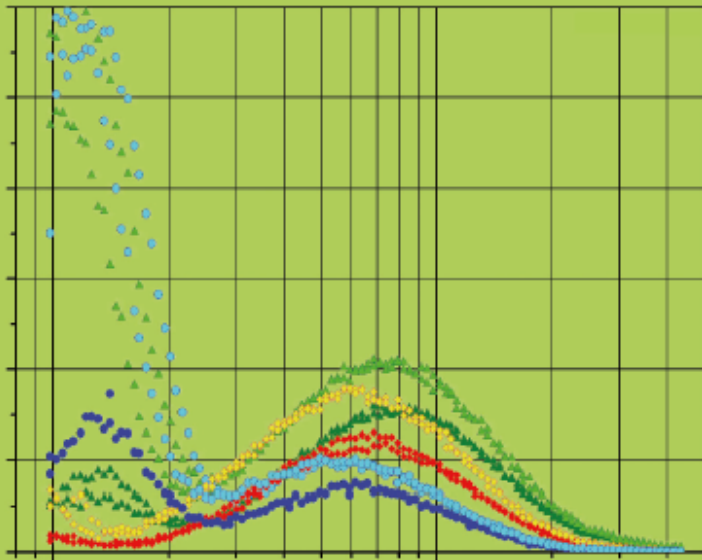
Empa, Dübendorf, Überlandstrasse 129
Thursday, March 16, 2017, from 9:00 to 14:00

Registration by e-mail: ttm.a.mayer@bluewin.ch

Invitation and call for papers to the

22nd ETH-Conference on Combustion Generated Nanoparticles

Focus Event:
Emissions of in-use vehicles:
Quality and control



June 18th – 21st, 2018
ETH Zurich, Switzerland
www.nanoparticles.ch



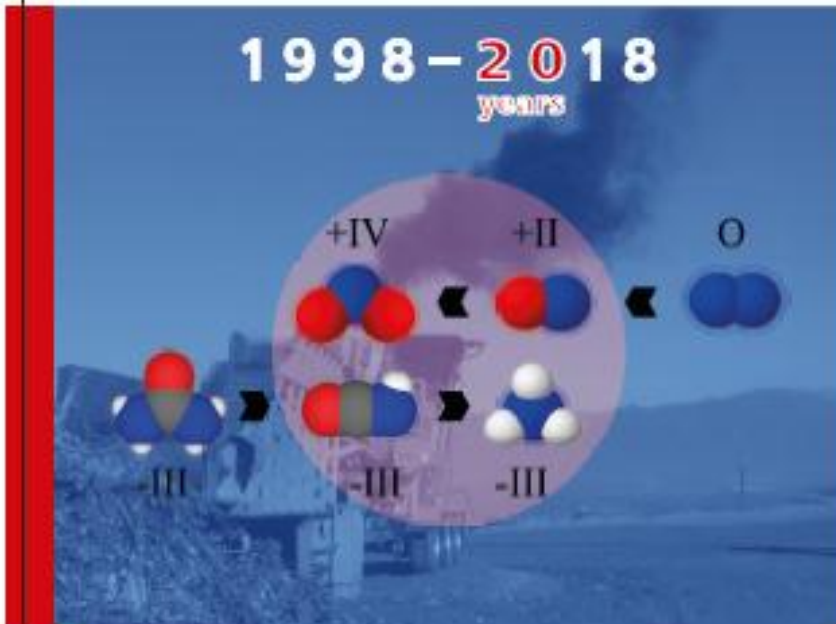
Reminder:
the next CGN conference
June 18-21, 2018
Deadline March 23, 2018



10th VERT Forum, March 14, 2019!

20 years of VERT emission control certification

Lifelong BAT for emission control of in-use and OE-vehicles and PTI



Farewell
and see all of you
again
next year
March 14-15, 2019
at Empa

Empa, Dübendorf, Überlandstrasse 129
Thursday, March 15, 2018, from 9:00 to 17:15

Registration by e-mail: ttm.a.mayer@bluewin.ch

preliminary

