A Policy Maker's Views On PM Pollution

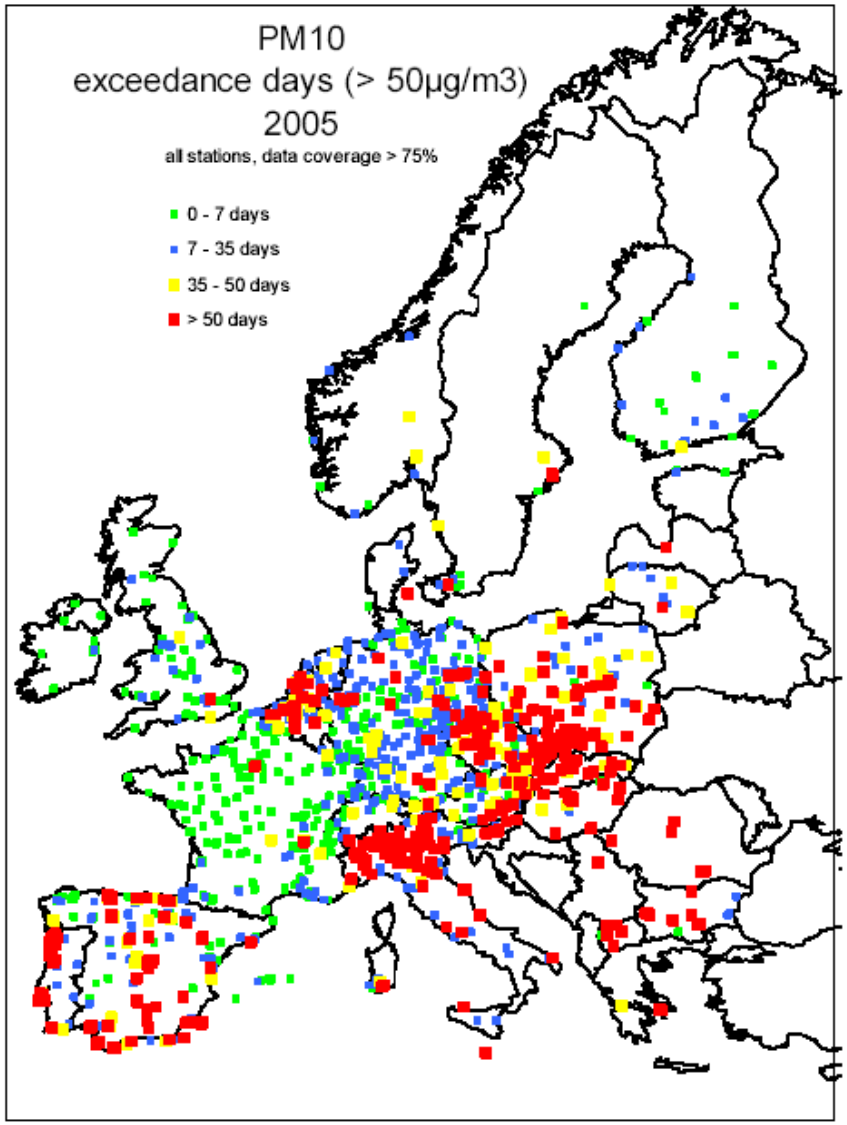
- **The problems:**
  - health effects
  - PM burden
- **Efficient abatement measures?**
- **Where is smoking gun?**
- **Possible ways forward**

COST633 Meeting, Brussels

The problem: PM serious threat to human health

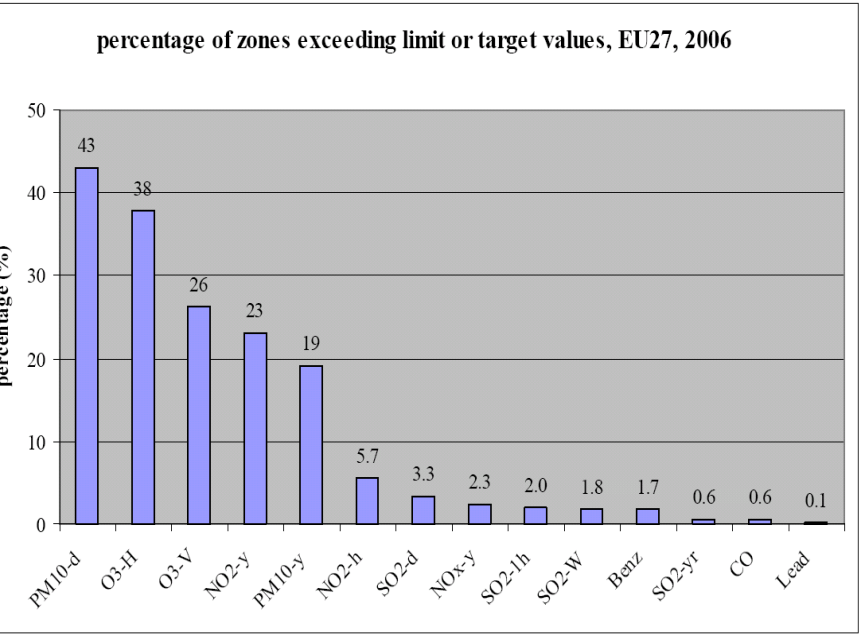
- Short term: 0.6 % increase of mortality per 10 µg/m³ PM10 (daily mean) (APHEA 2, 2001, 2003)
- Long term: 6 % increase of mortality per 10 µg/m³ PM2.5 (annual mean) (WHO, 2005)
- No threshold identified (or below 10 µg/m³)
- CAFE baseline (2000): about 350.000 premature deaths annually

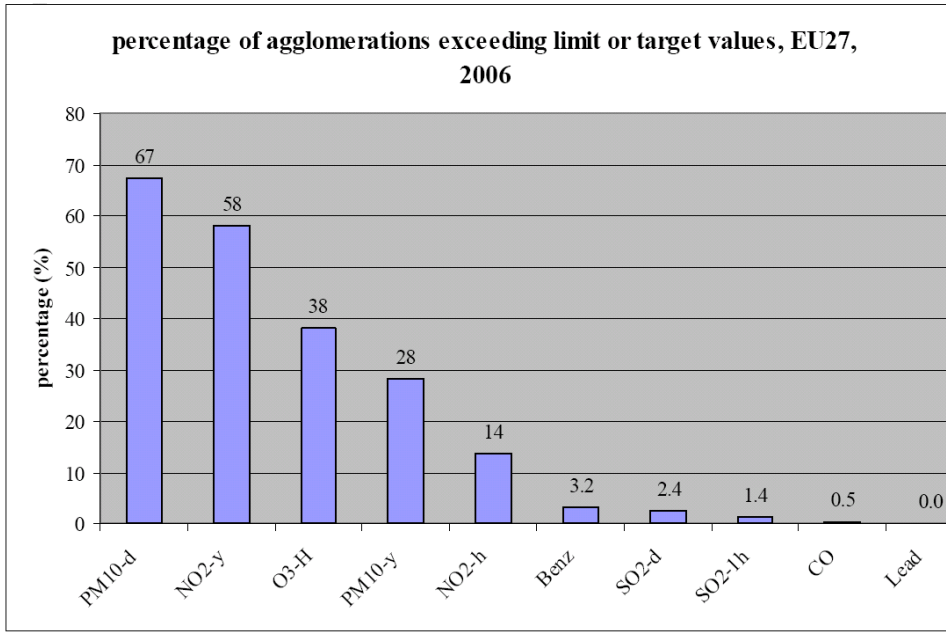
Further action necessary!



Data from AIRBASE, all types of stations

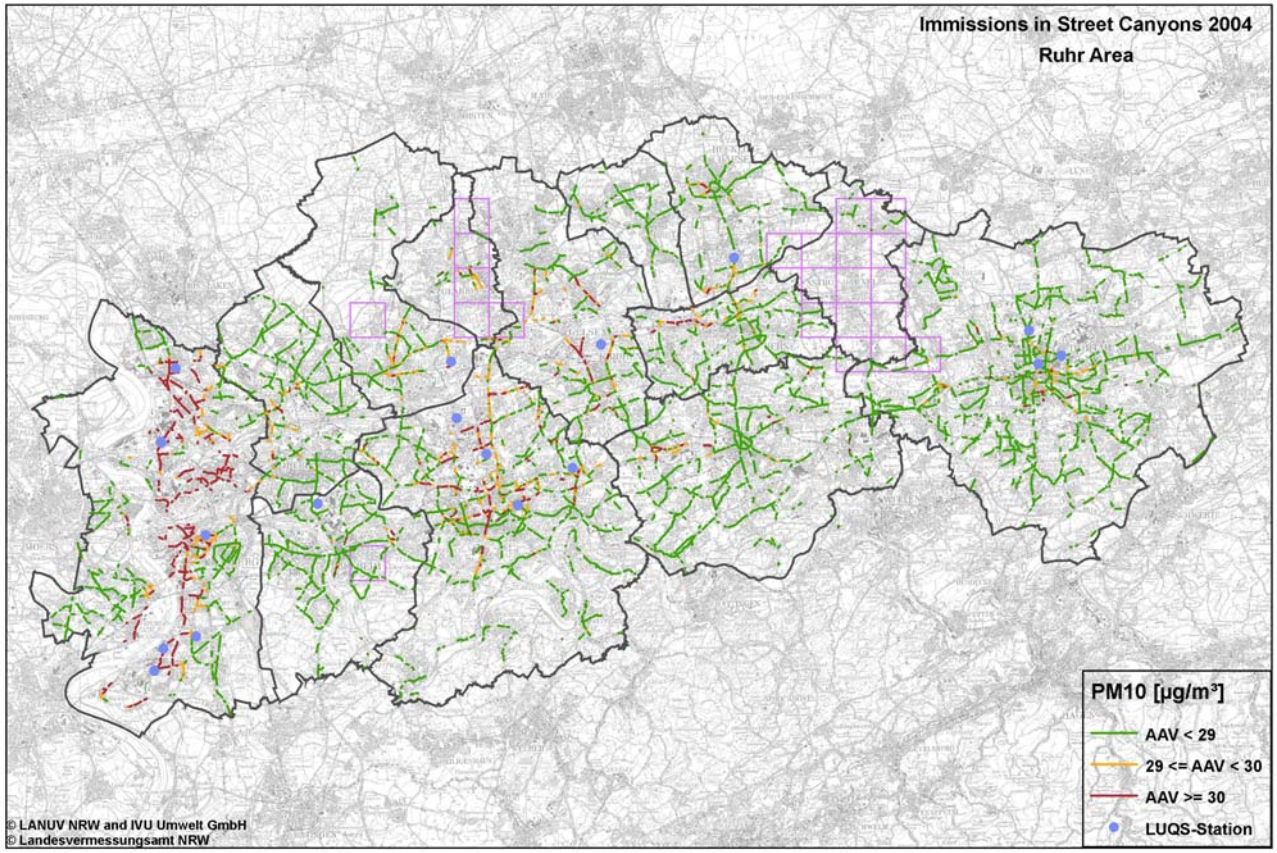
The situation 2006 (ETC/ACC, 2007)



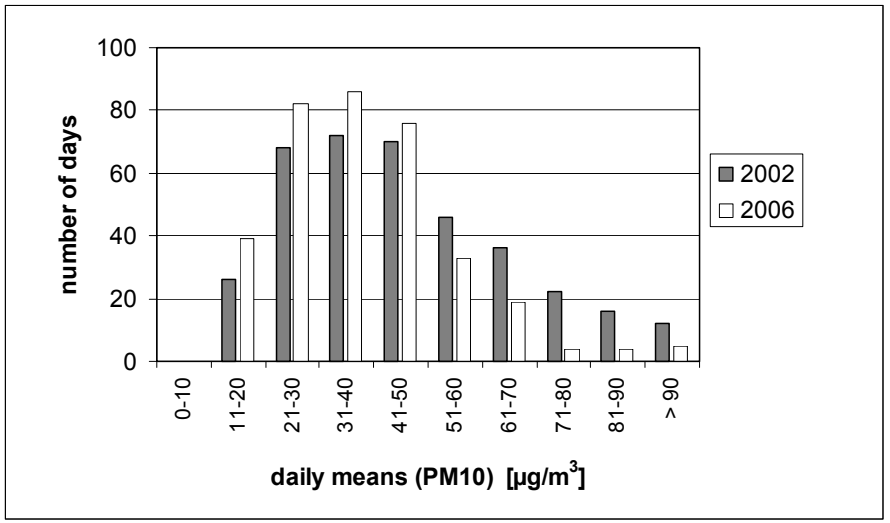


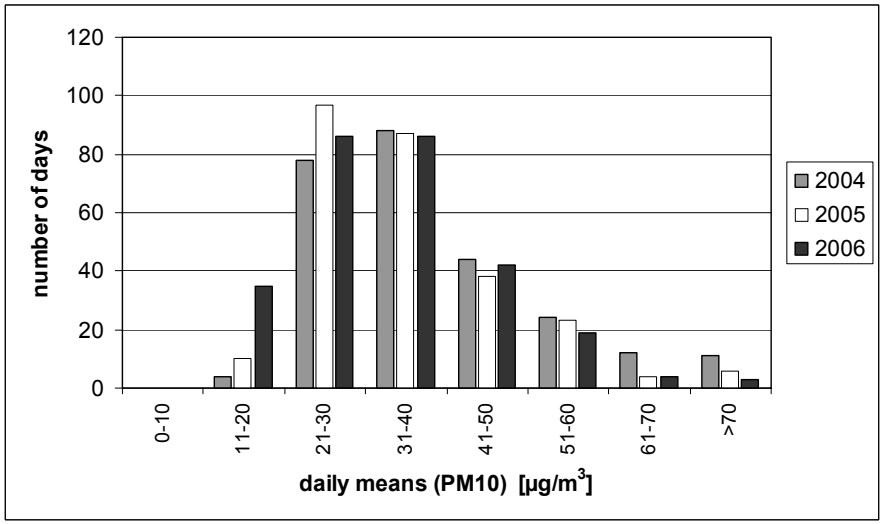
⇒ **Far off the mark!**

Modelled PM10 exceedances near busy streets, Ruhr region



What can be achieved by local abatement measures?





Steel mill:
PM10 (annual mean) -15 %
PM10 (days in exceedance) -50 %

Traffic:
PM10 (annual mean) -10 %
PM10 (days in exceedance) -40 %

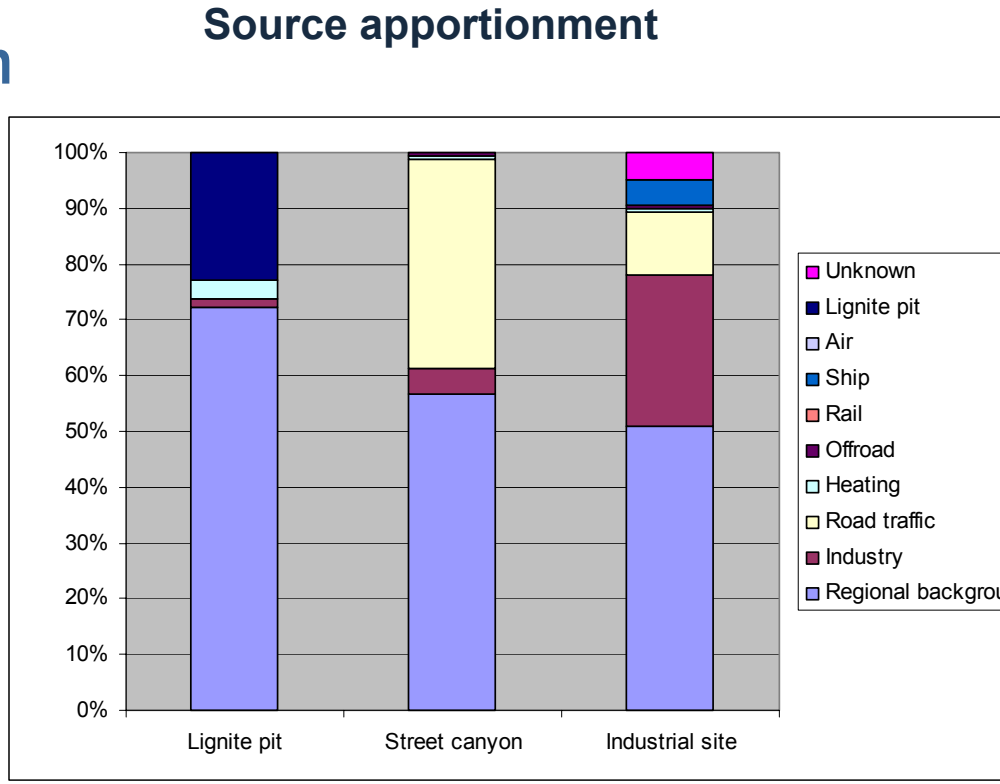
PM10 abatement costly and difficult

- Effects of local (regional) abatement actions limited (5-15 %
- Strong political resistance (e.g. traffic restrictions)
- Necessary: 30 % reduction and more (no threshold identified!)
- Should we concentrate more on hot spots or on background concentrations?
- High PM background levels in many parts of Europe (50-60 %)

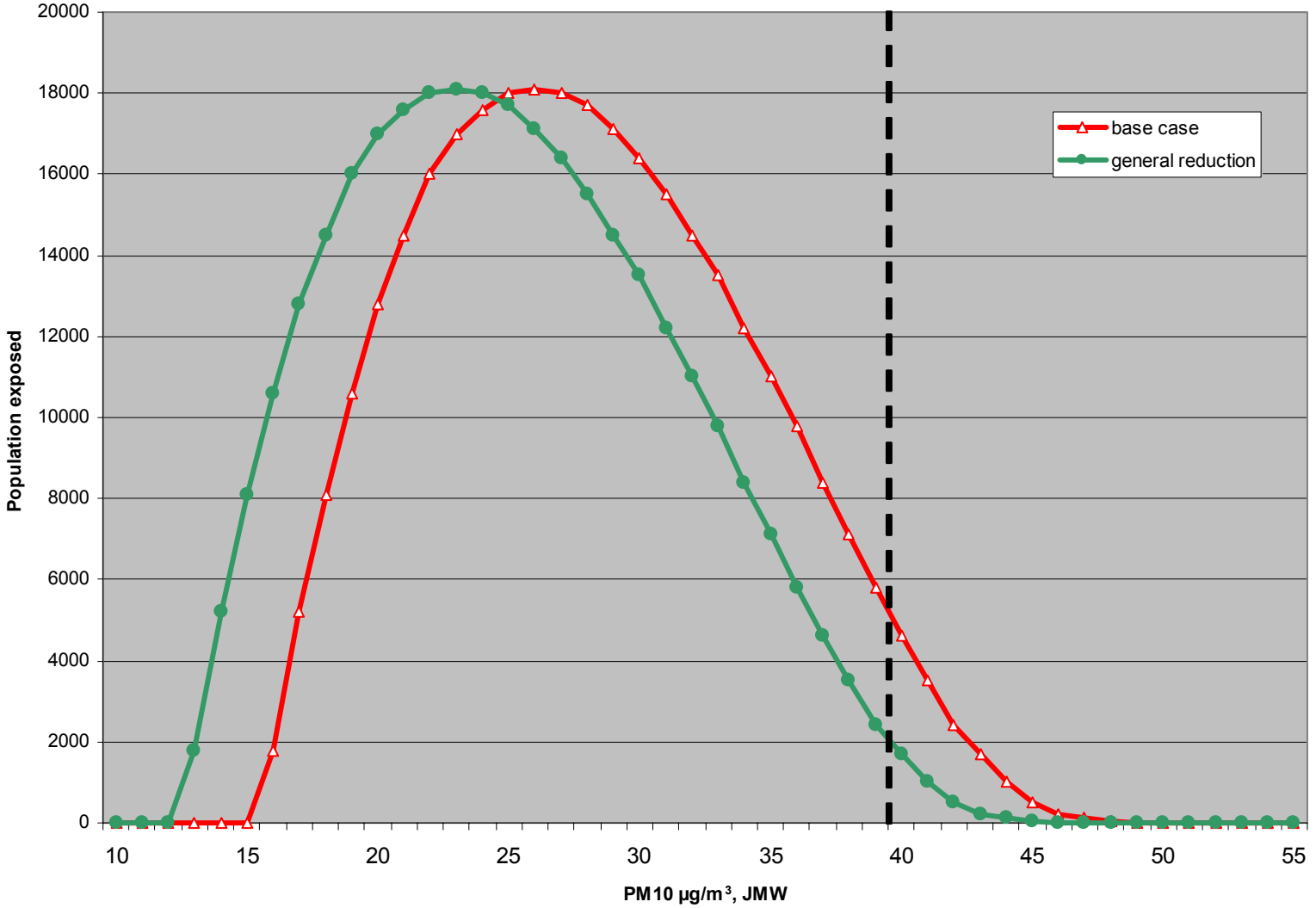
Abatement measures must be cost efficient:
- adress the important sources (⇒ source apportionment)
- target the PM metrics (⇒ mass?) most relevant for health

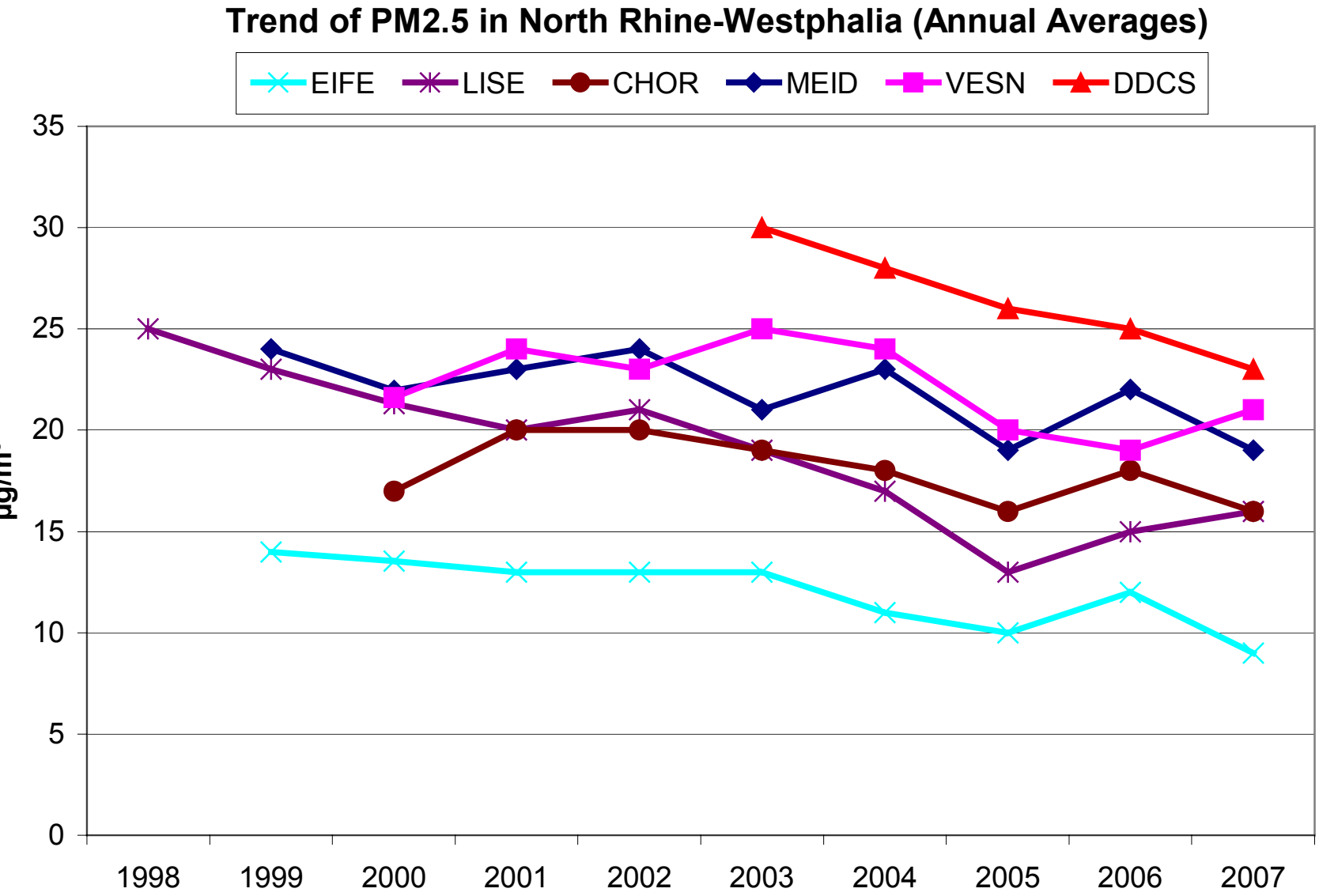
How coming to grips with high PM background?

- Source apportionment
- EC wide stringent emission reduction legislation *(level playing field, equivalent time horizon with AQ legislation)*
- New policy instruments: PM2.5 exposure reduction (background)
  - best practices?
  - advice from Commission?



LV approach vs. background reduction for pollutants without threshold




Trend of PM2.5 in North Rhine-Westphalia (Annual Averages)
EIFE
LISE
CHOR
MEID
VESN
DDCS
35
30
25
20
15
10
5
0
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007

Different particle composition in Europe – differ also the health effects?

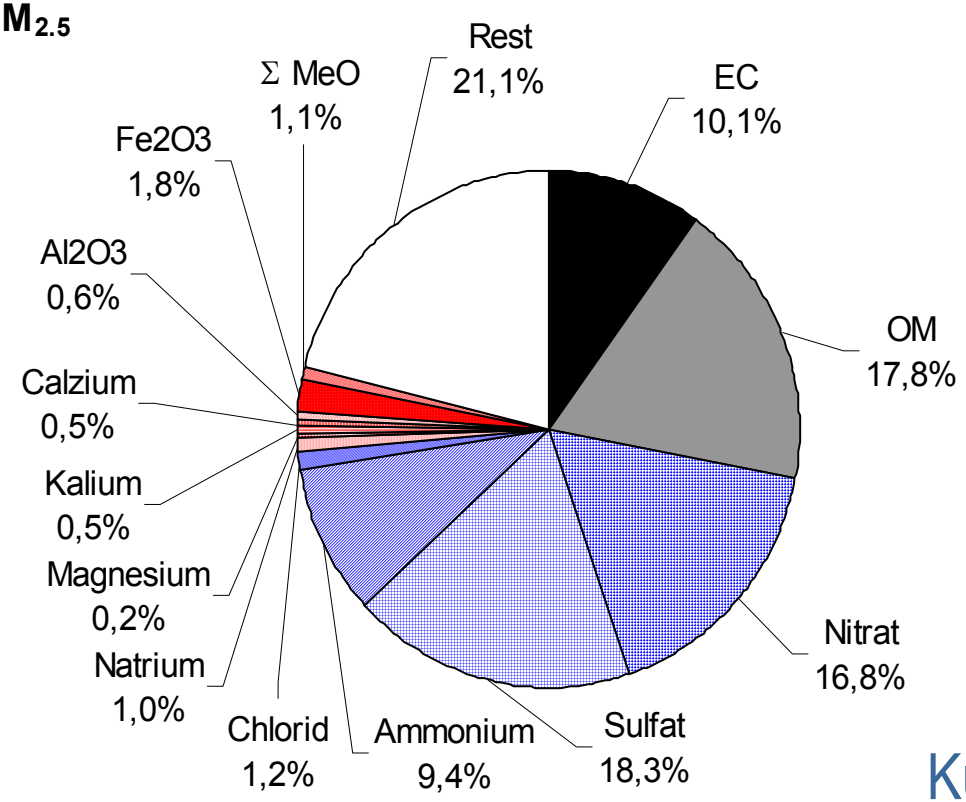
- Higher share of mineral PM in the south
- NO_3^-/SO_4^{2} decreases from west to east and north to south
- OC/sec. inorg. PM increases from south to north east (EMEP, 2007)
- High gradients of particle numbers near sources

Variety of particles and chemical composition in Europe – where goes the buck? (1)

Bulk analysis, Duisburg (UB)

Gesamtmesszeitraum

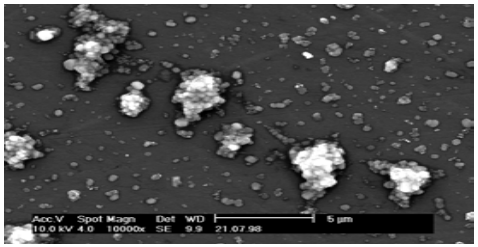
UNI, $PM_{2.5}$



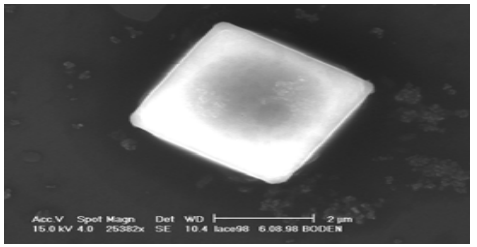
Kuhlbusch et al., 2002

Variety of particles and chemical composition in Europe – where goes the buck? (2)

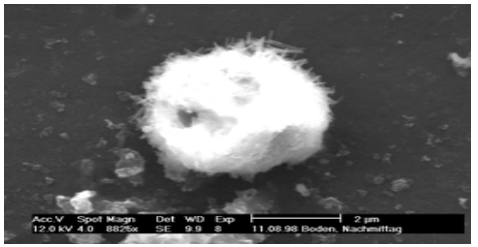
„Zoo“ of single particles by electron spectroscopy



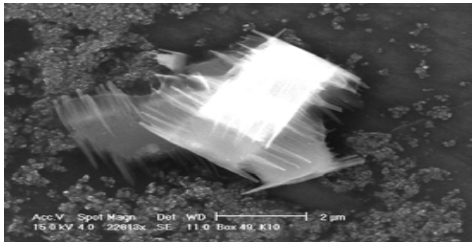
Ammoniumsulfat



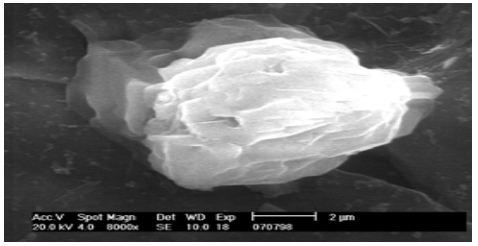
Seesalz



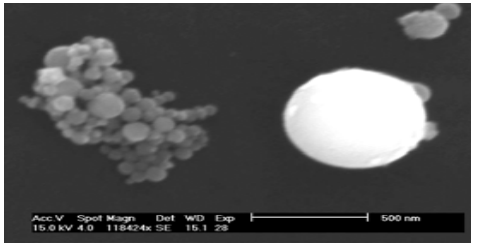
Karbonat



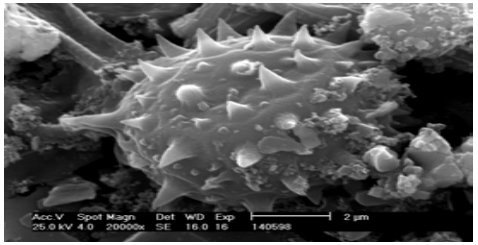
Kalziumsulfat



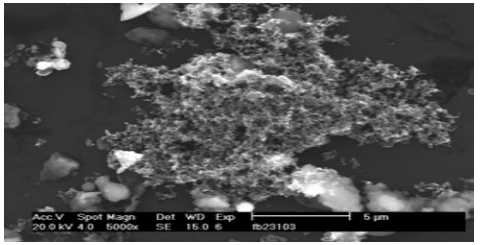
Silikat



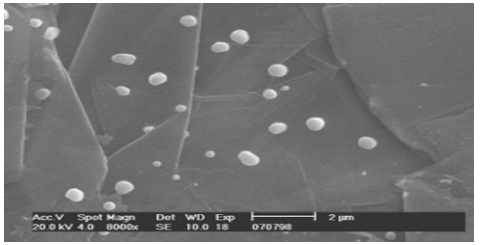
Metalloxid



Biologisches Material



Ruß



Ruß/Sulfat

Die Aufnahmen wurden uns freundlicherweise von Herrn Dr. Ing. M. Ebert vom Institut für Umweltmineralogie der TU-Darmstadt zur Verfügung gestellt

Where is the smoking gun?
(should be known by rev., 2013)

PM10

PM2.5

PM1.0

UFP

Particle numbers

Particle surface

?

Oxidative (reactive) surface

OC

EC

Black smoke

Heavy metals

SO_4^{2-}

NO_3^-

NH_4^+

The way forward – some ideas (1)

- European supersites (urban background!)
  - *Monitor particle metrics, physical properties and chem. composition as completely as possible*
  - *Reference points for health effects studies, for source apportionment and model validation*
  - *Cooperation with EMEP (rural)*

The way forward – some ideas (2)

- Health effects studies with carefully designed exposure assessment in different parts of Europe
  - *Characterize particle metrics, composition etc. as completely as possible*
  - *Take into account spatial variability (combination of monitoring and modelling)*
  - *Adress groups at higher risk (e.g. residents near busy roads or certain industrial facilities)*
  - *Take into account, if possible, other routes of exposure (commuting, indoor)*

Results needed in 2013!

The way forward – some ideas (3)

Caveat

Change of PM metrics

- *Only, if based on sound science*
- *Complete chain from emissions to health effects must be considered*
- *Longer policy cycles needed:*
  - *Large investments in monitoring networks and emission inventories*
  - *Trustworthiness of abatement measures*

Political danger:

• „If our knowledge is so limited, there is no need to take costly action“

The way forward – some ideas (4)

- Synergies with other environmental stressors:
  - Environmental (traffic) noise (Dir. 2002/49/EC) *(CE Delft (2007): 50.000 premature deaths in EC per year by cardiovascular deseases)*
  - *Air Quality plans and strategic noise mapping (partly) – have the same data base*
  - *Action plans have similar measures*
  - Synergies (e.g. energy conservation) and trade offs (e.g. wood combustion) with climate change

Thank you for your attention!