Dilemmas and policy challenges for air quality management in Europe

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PM2.5 up to 185 $\mu g/m^3$
Air pollution is the largest environmental risk factor for human health in Europe

Annual mean PM2.5 concentrations in 2014

Percentage of population living in areas exceeding the WHO guideline values

- **PM$_{2.5}$**: 87-93%
- **PM$_{10}$**: 61-83%
- **O$_3$**: 97-98%
- **NO$_2$**: 8-12%
- **BaP**: 85-91%
- **SO$_2$**: 36-37%

Notes: The red and dark red dots indicate stations reporting concentrations above the EU annual target value (25 μg/m$^3$) indicate stations reporting values below the WHO AQG for PM$_{2.5}$ (10 μg/m$^3$). Only stations with > 75% of valid data in the map.

Source: EEA, 2016a.
There are large differences among countries in economic wealth and pollution.
There are large differences in sectoral emissions, already applied emission controls, and costs.

Source: GAINS/IIASA for 2005
There are large differences in the contributions of different sources to ambient PM2.5

Netherlands

- Households
- Primary PM: Traffic
- Sec. PM: Traffic + agri
- Sec. PM: Industry + agri
- Primary PM: Industry
- Natural

Poland

- Households
- Primary PM: Traffic
- Sec. PM: Traffic + agri
- Sec. PM: Industry + agri
- Primary PM: Industry
- Natural

Source: IIASA GAINS

WHO guideline
## EU air quality management structure

<table>
<thead>
<tr>
<th>Institutions</th>
<th>Scale (km)</th>
<th>Responsibilities</th>
</tr>
</thead>
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<tr>
<td>Europe-wide (EU)</td>
<td>~1500</td>
<td>• Air Quality Limit Values (uniform)</td>
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<tr>
<td></td>
<td></td>
<td>• Uniform, source-specific emission limit values (BAT)</td>
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<td></td>
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<td>• National emission ceilings</td>
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<tr>
<td>National governments</td>
<td>200-1000</td>
<td>• Transposition into national laws</td>
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<tr>
<td>City administrations</td>
<td>20-50</td>
<td>• Licensing</td>
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<td>• Air quality monitoring</td>
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<td>• Air quality management plans</td>
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<td></td>
<td></td>
<td>• Local short-term action plans</td>
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</tbody>
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Key messages

• Air pollution is still the largest environmental risk factor for human health in Europe; the majority of population is exposed to levels above the WHO health guidelines for PM2.5 and ozone.

• There are large differences across Europe in
  – ambient PM2.5 levels,
  – economic wealth,
  – emission densities,
  – sectoral contributions to PM2.5 precursor emissions,
  – already implemented controls and costs for further measures.

• Because of the long-range transport of PM2.5, cities cannot achieve effective reductions on their own.
谢谢

Thank you!

http://gains.iiasa.ac.at