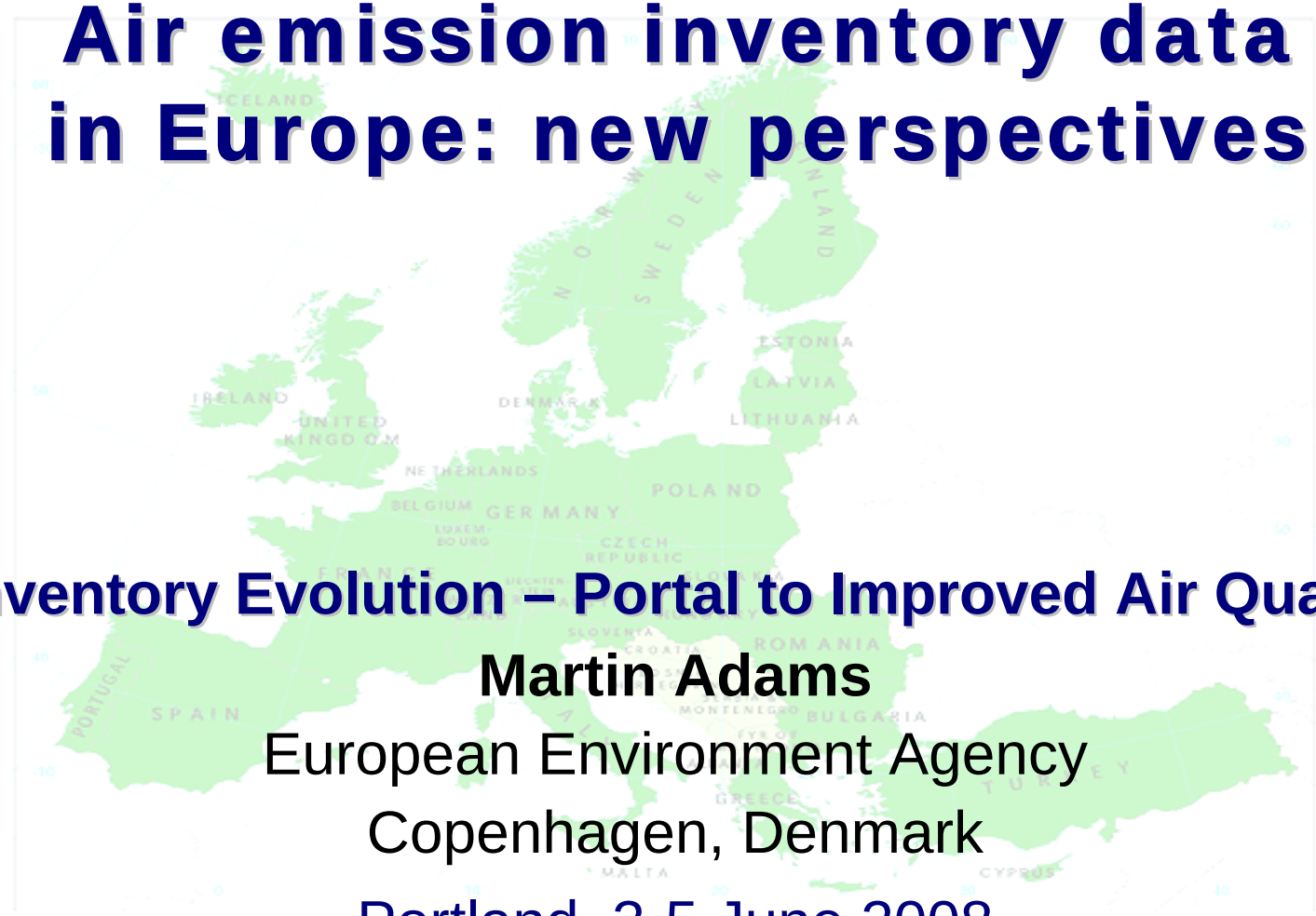
Air emission inventory data in Europe: new perspectives



'Inventory Evolution – Portal to Improved Air Quality'

Martin Adams
European Environment Agency
Copenhagen, Denmark

Portland, 3-5 June 2008

The European Environment Agency (EEA)

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Objectives

Present a snapshot of various aspects concerned with officially-reported air emissions data in Europe:

- Existing information: officially-reported air emissions data (national inventory and facility data)
- Recent initiatives to improve the quality of the available data
- Illustration of applications in which European emissions data are used – links to air quality.

Existing information

National emission inventories

1. The National Emission Ceilings Directive (2001)

- Covers emissions of SO_2, NO_x, NMVOCs and NH_3
- Member States report annual inventory data for the year X-1 and X-2) and projected emission estimates for the year 2010.
- NECD sets pollutant-specific and legally-binding emission ceilings (limits) for each country to be met by 2010.
- Ceilings designed with the aim of broadly meeting specific interim environmental objectives to improve the protection of the environment and human health against harmful effects from acidification and ozone.

Existing information

National emission inventories

2. UNECE Convention on Long-Range Transboundary Air Pollution (LRTAP)

- Covers 51 Parties including the European Community, Russia, Canada and the USA
- Reporting of pollutants is defined in separate Reporting Guidelines: annual emissions of SO_x, NO_x, NH_3, NMVOC, CO, particulate matter ($PM_{2.5}$, PM_{10}, TSP), heavy metals (Pb, Cd, Hg plus As, Cr, Cu, Ni, Se, Zn) and POPs (17 POPs)
- Reported using the Nomenclature for Reporting (NFR) source nomenclature closely resembles IPCC CRF nomenclature

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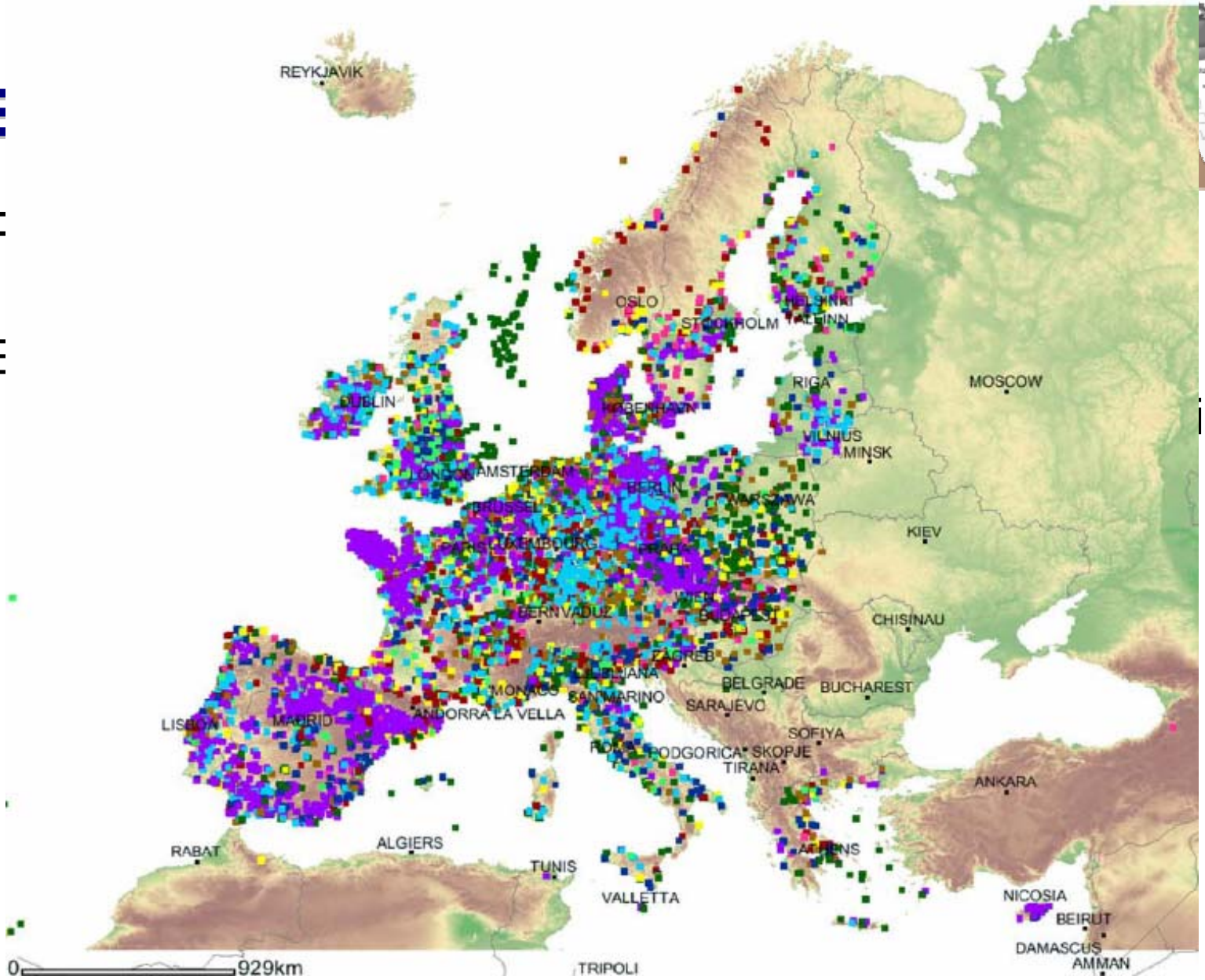
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Recent initiatives to improve inventory data quality - 1

In 2007, an expanded emission inventory review process was agreed to under the LRTAP Convention

Three stages of the annual review:

- Stage 1: initial checks of timeliness, format and completeness;
- Stage 2: checks of additional aspects of inventory 'quality' - consistency and comparability of data, scope of recalculations etc;
- Stage 3: In-depth reviews of selected national inventories performed by a centralised team of emission experts.
- www.emep-emissions.at

Recent initiatives to improve inventory data quality - 2

Update & revision: EMEP/CORINAIR Guidebook

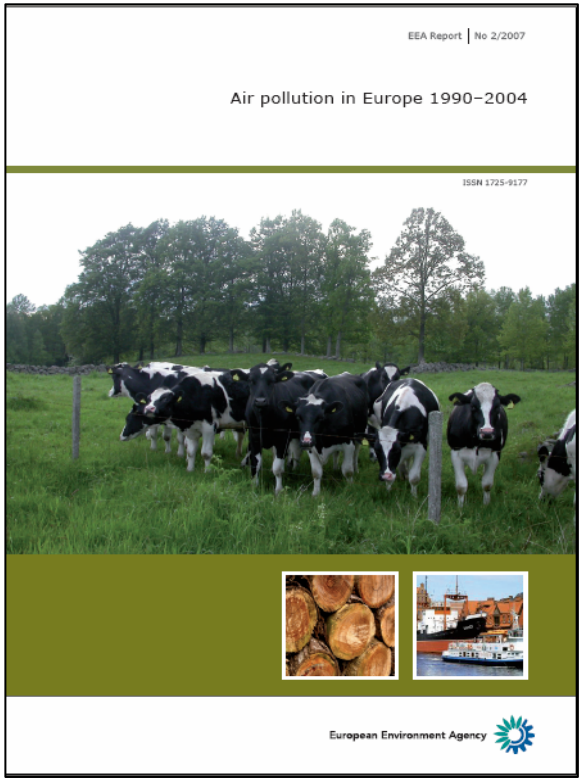
- Guidebook for compiling emission inventories in order to comply with the requirements of specific legal obligations (default methods, EFs etc)
- Drives inventory improvement, reflects new scientific & methodological insights, and supports policy making
- Sector-specific guidance by NFR source categories; source descriptions (including abatement technologies), guidance on methodological choice (including decision trees) and tier-based emission methods
- Publication of updated version due late 2008; reports.eea.europa.eu/EMEPCORINAIR5/en

Uses of inventory data – monitoring progress to policy targets

- NECD sets pollutant-specific and legally-binding 2010 emission ceilings (limits) for each country for the 4 NEC pollutants.
- Reported emissions and projections are used to annually assess progress towards ceilings
- 15 Member States indicate they will miss at least 1 of their 4 ceilings
- The emission ceiling for NO_x is the most difficult for many Member States to meet; 13 (of 27 MS) anticipate missing.

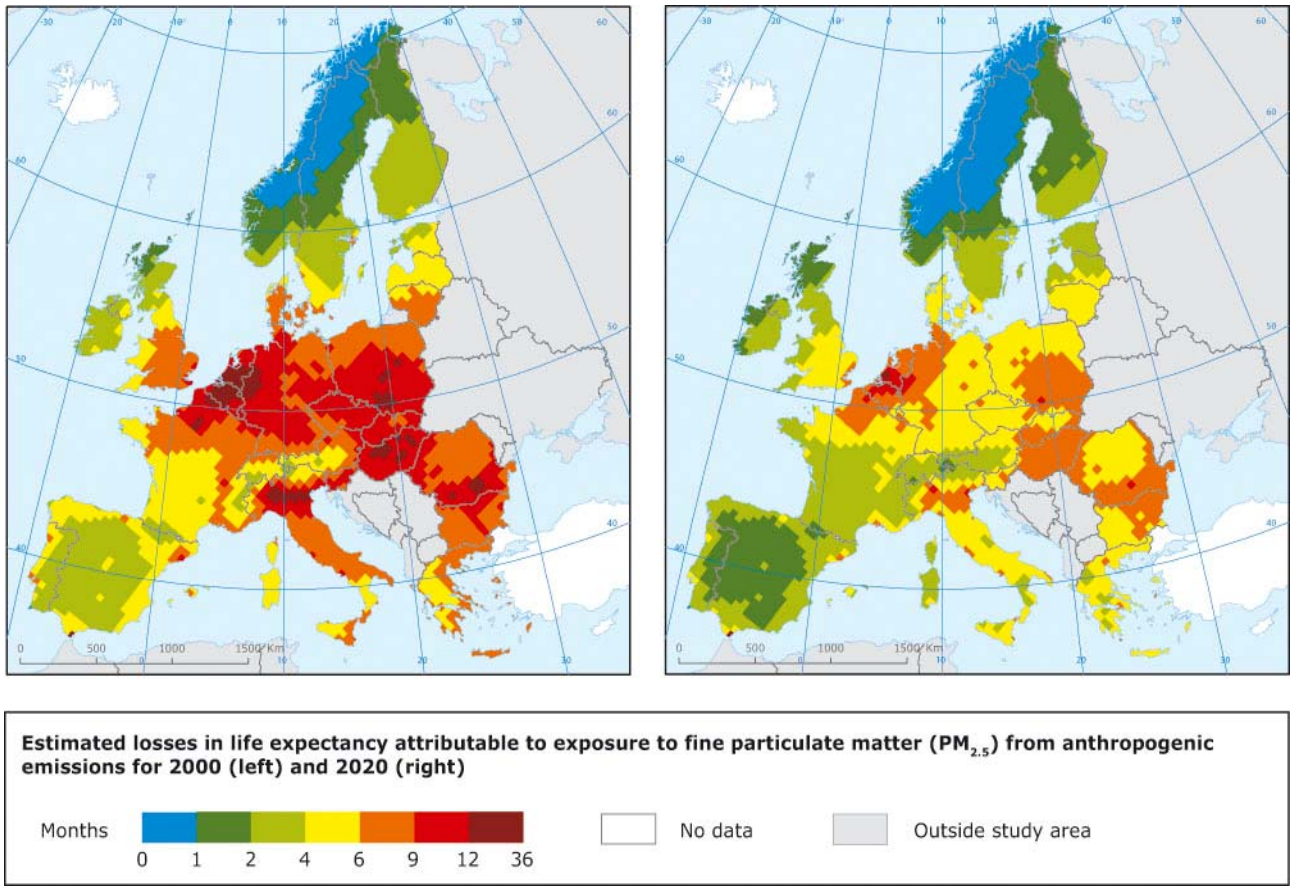
Uses of inventory data – assessments and links with AQ

An illustration of the types of applications in which air emissions data are used in the European context



- Assesses changes in reported emissions & impacts of current air quality levels on human health and eco-systems in Europe
- Looks at the effectiveness of various policies and measures in reducing emissions
- Covers 32 countries

Health Impacts of airborne particles - $PM_{2.5}$



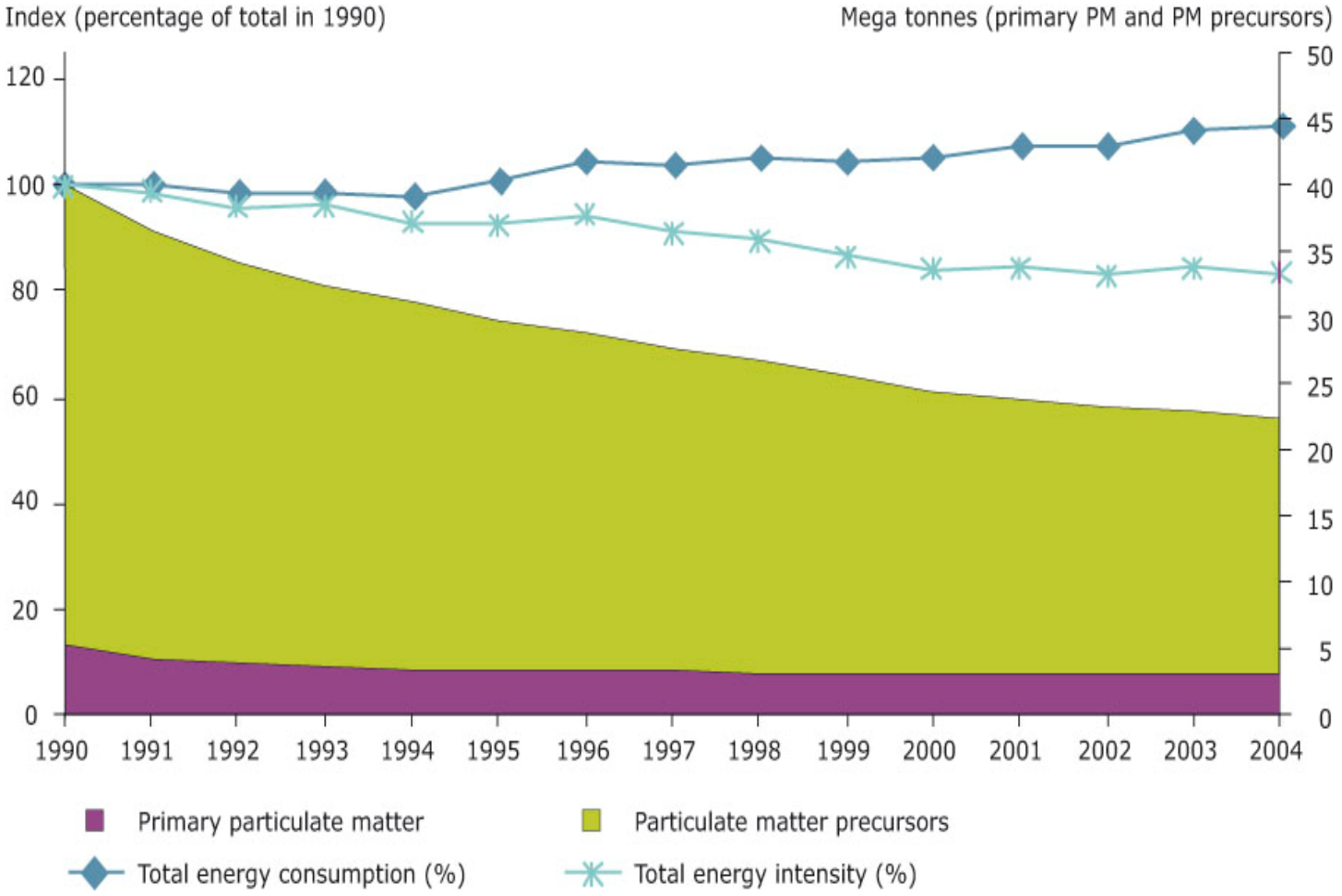
EU: $PM_{2.5}$ and ground-level O_3 presently causes the premature deaths of almost 370,000 citizens p.a.

Reduces average life expectancy by an average of 9 months.

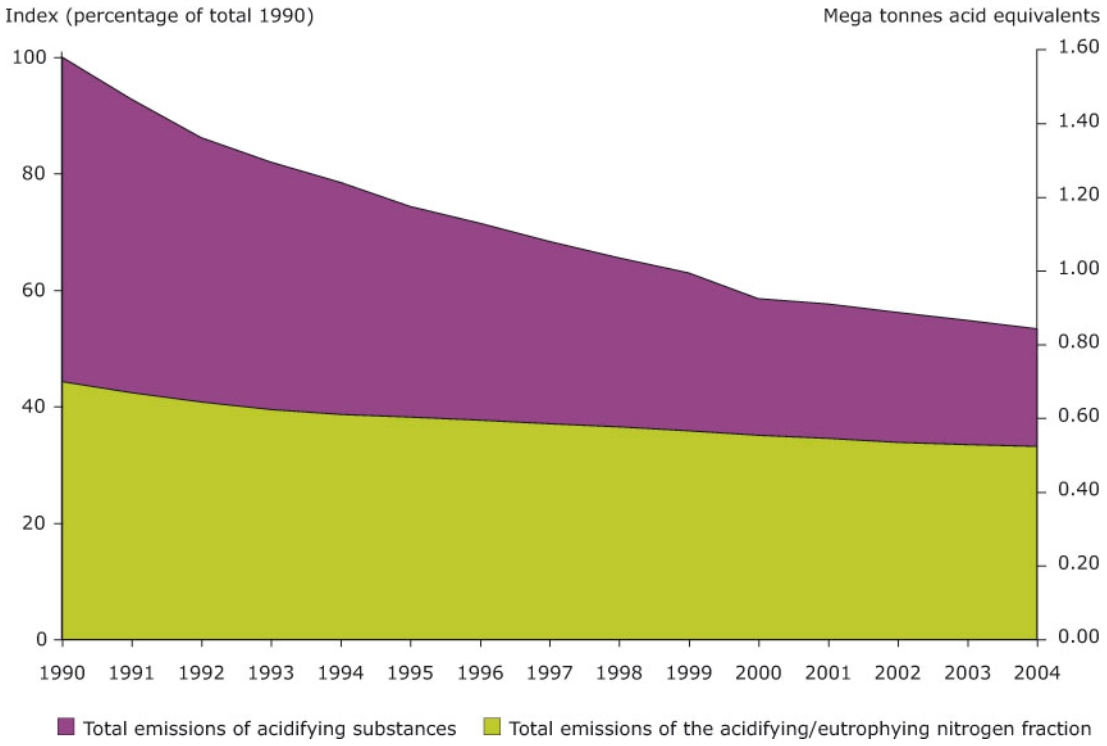
Loss of life expectancy may be up to 2 years.

Emissions of primary and secondary PM_{10} 1990-2004

- Primary and secondary emissions declined by 45%
- SO_2 and NO_x remain important contributors to total PM_{10} formation



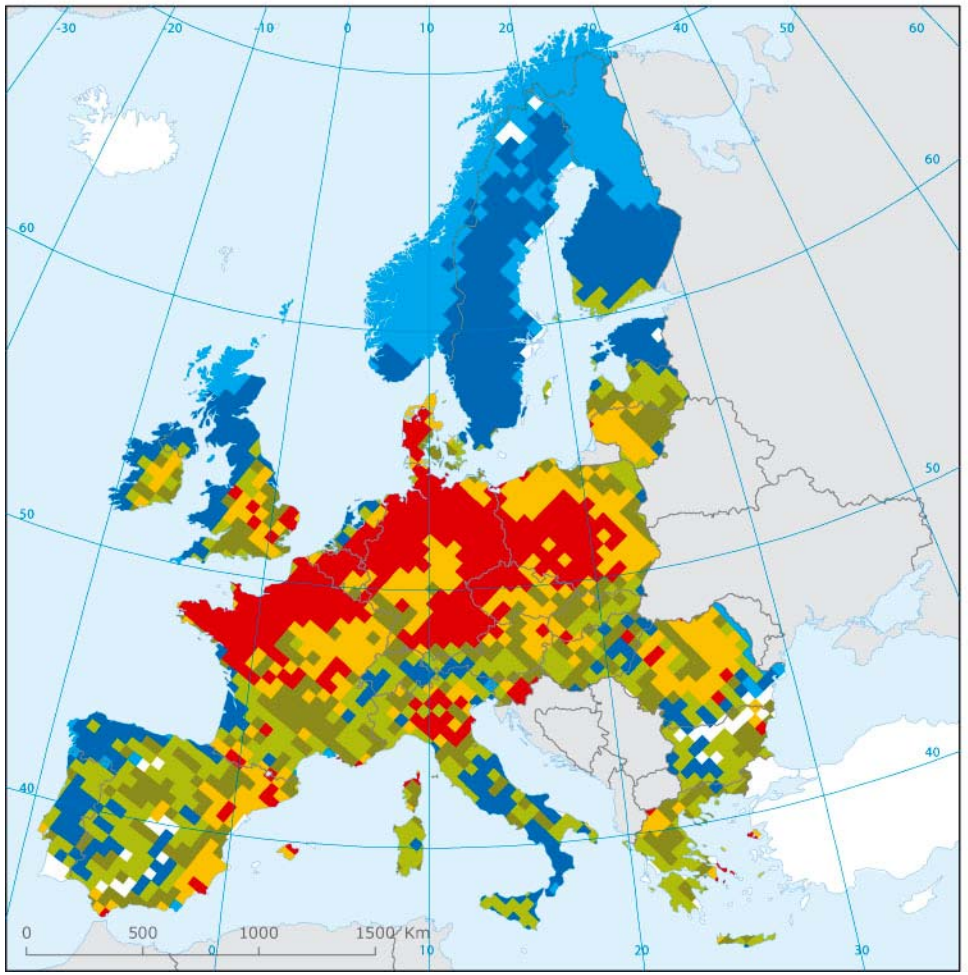
Emissions of acidifying substances 1990 to 2004



- Emissions of acidifying substances declined substantially, by 50%
- As can be seen, this was mainly due to falling SO_2 emissions
- However, over the same period, acidifying and eutrophying nitrogen fraction (NH_3 plus NO_X) stayed broadly unchanged

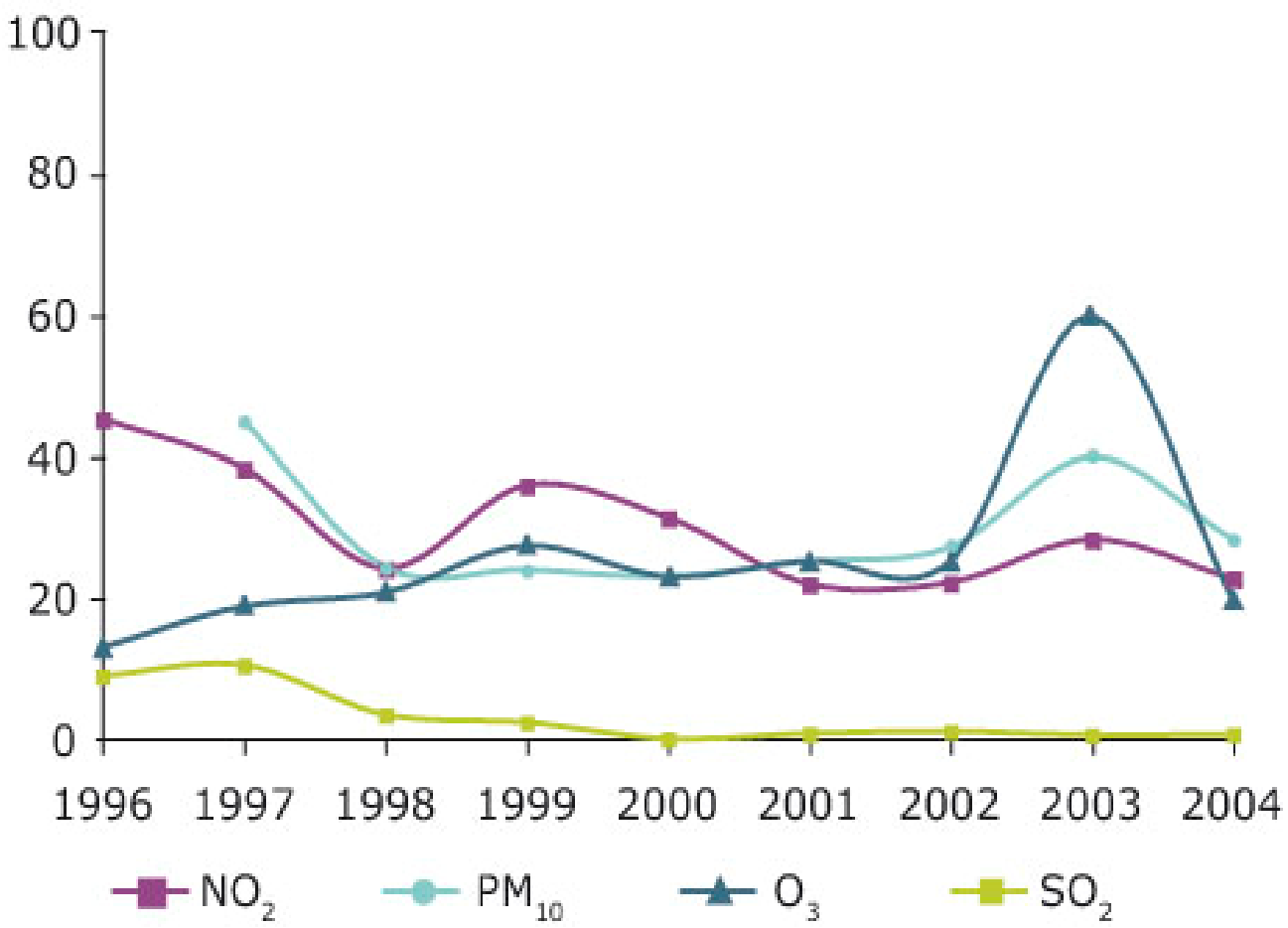
Ecosystems: critical load exceedences of nutrient nitrogen

- Nitrogen and sulphur deposition can lead to long-term effects on ecosystems
- Declining sulphur emissions have led to major fall in deposition
- Nitrogen still a problem



Health: % of Europe's urban population potentially exposed to pollution levels over AQ limits / targets

- Most significant now for ozone (O_3) and particles (PM_{10})
- SO_2 declining
- Ozone has both human health and ecosystem impacts
- PM health impacts are significant…



But why are levels of some key pollutants still rising?

- Levels of pollutants like ozone and PM_{10} can be partially explained by weather conditions- e.g. the 2003 ‘heat wave’ summer
- Climate change may increase frequency of such incidents in the future
- High temperatures, reduced precipitation and stable weather can also impact pollution conditions
- Other possible causes could include pollution from natural sources and long-range transport

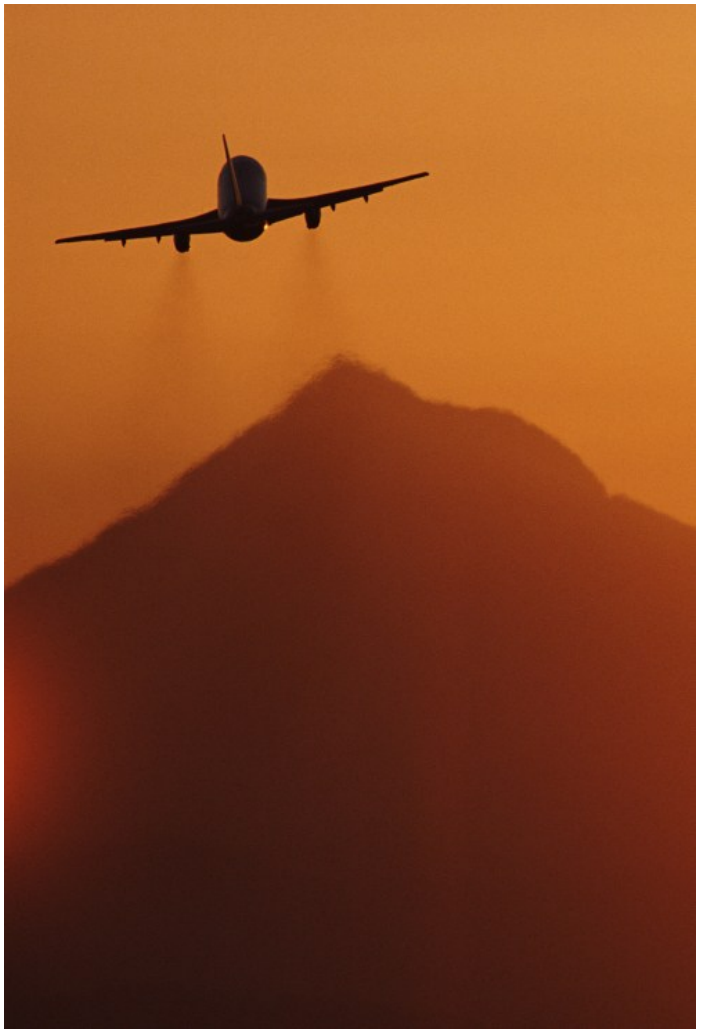
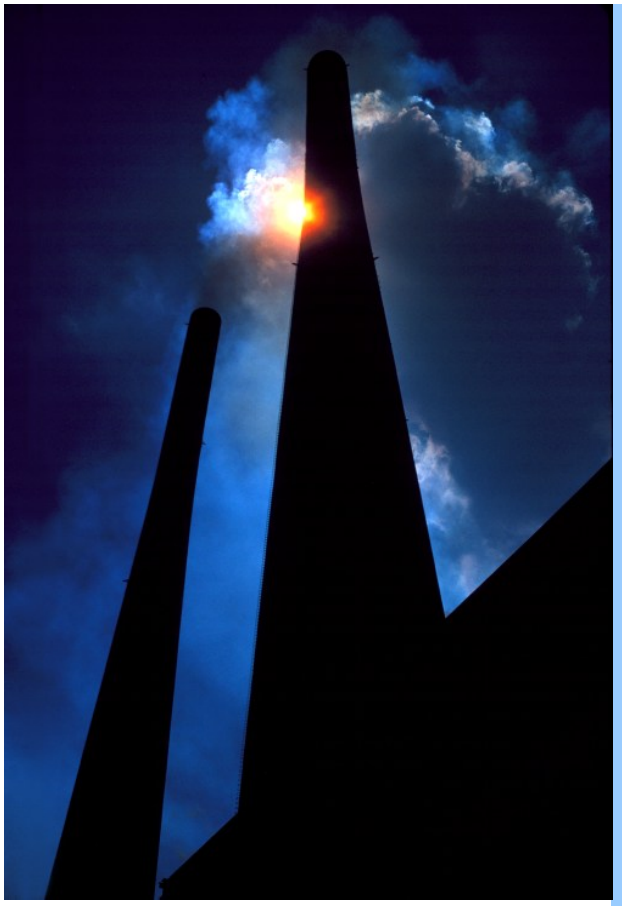


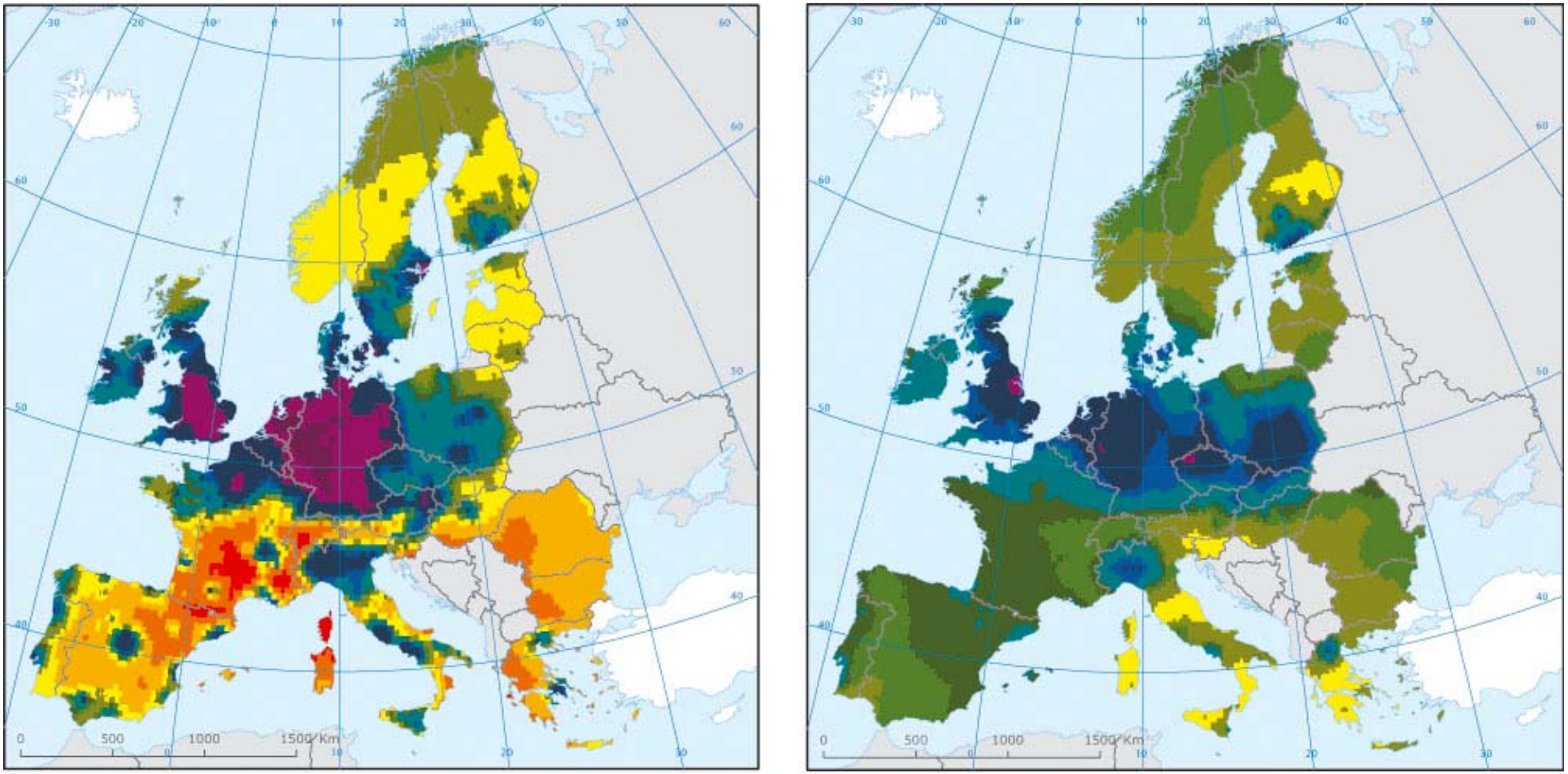
Image by PhototDisc

Many EU-based emission control measures in Europe…



• National Emission Ceiling (NEC) Directive	SO_2, NO_x, NMVOC, NH_3
• Large Combustion Plant (LCP) Directive	SO_2, NO_X, dust
• IPPC Directive	'overall environmental performance'
• EURO standards 1992 for cars, HGV etc	NO_X CO HC+ NO_X PM
• Directive on liquid fuel sulphur content	SO_2
• Directive on quality of petrol & diesel fuels	Pb, SO_2
• Emission limits- non road mobile engines	NO_x and PM
• Waste Incineration Directive	Total dust, TOC, HCL, HF, heavy metals, dioxins furans SO_2 CO
• VOC Stage 1 Directive	VOCs
• Solvent Emissions Directive	VOCs

These have been some policy successes



Modelled decreases in ozone concentrations in year 2003 due to the European road vehicle emission standards (left) and the Large Combustion Plant Directive (right)

µg/m³ -5 -4 -3 -1 -0.5 -0.1 0 0.1 0.3 0.6 1.5 2

No data

Outside study area

Conclusions

- Summary of main air emissions official reporting obligations for European countries – national emission inventories and facility data
- Recent international initiatives to improve the quality of the reported data:
  - joint EMEP/EEA emission inventory review process
  - substantial revision and update of the EMEP/EEA Air Pollutant Emission Inventory Guidebook
- Examples of uses of reported emissions data in Europe:
  - assessing progress in meeting legal commitments;
  - uses of data to inform on emission trends and air quality impacts at a regional European scale

Thank you for your attention!

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