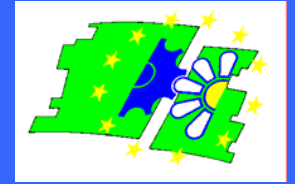




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# Fine particles in the framework of the CAFE Programme

Air pollution control overcomes national borders –  
25<sup>th</sup> anniversary of the signing of the Convention on Long Range Transboundary Air Pollution

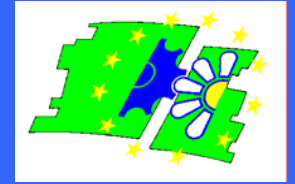
International Symposium, Rathaus Schöneberg, Berlin  
8th and 9th of November 2004

Matti Vainio  
Clean Air and Transport Unit



# Outline

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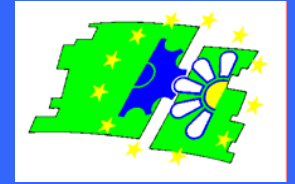


- **CAFE and the Thematic Strategy on Air Pollution**
- **What have we learned about PM during the CAFE process?**
- **Possible measures to reduce primary and secondary PM emissions**
- **Countdown to the adoption**



# Thematic Strategy on Air Pollution

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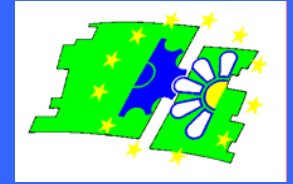


- It is a coherent and integrated policy that is consistent with other actions including climate, soil, urban and water protection.
- It assesses progress in addressing Health & Environment.
- Objectives for Thematic Strategy on Air Pollution:
  - *‘achieving levels of air quality that do not give rise to significant negative impacts on and risks to human health and the environment’;*  
(Art 7.1. of 6th EAP)
  - *‘no exceedence of critical loads and levels for acidification or eutrophication’*
- **It is planned to be adopted by the Commission in May 2005**



## Clean Air For Europe (CAFE) process underpins the Thematic Strategy

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- **CAFE provides the technical basis required for the strategy**
  - emissions, effects, forecasts, etc.
- **It's key principle is transparency and stakeholder participation**
  - the results are more robust & accepted
- **Launched May 2001 & still ongoing**
  - significant financial and human resources deployed



# 3 Pillars of CAFE

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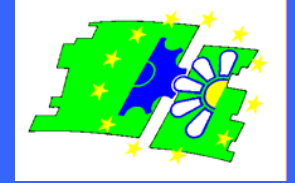


- **Scientific knowledge**
  - Independent health advice from WHO
  - Latest scientific knowledge of ecosystem effects from Convention of Long Range Transboundary Air Pollution
- **Integrated Assessment Modelling (IAM)**
  - Cost-effective solutions for multi-pollutant/multi-effects (human health and environment)
- **Cost-Benefit Analysis**
  - Peer-reviewed methodology



# What is the progress & problems up to 2020?

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## •Some emission trends

- Sulphur dioxide (SO<sub>2</sub>) - 67%
- Nitrogen oxides (NO<sub>x</sub>) - 43%
- Volatile Organic Compounds (VOCs) -44%
- Ammonia (NH<sub>3</sub>) - 3%

## •Health impacts

- e.g. premature death from exposure to particulate matter (PM) in ambient air

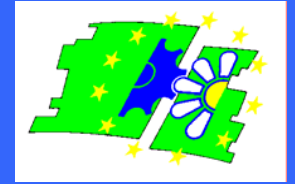
## •Ecosystem impacts

- Acidification, eutrophication and ozone damage



# Health impacts of air pollution remain problematic

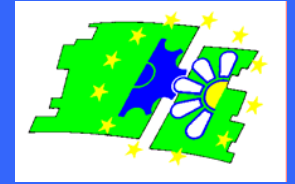
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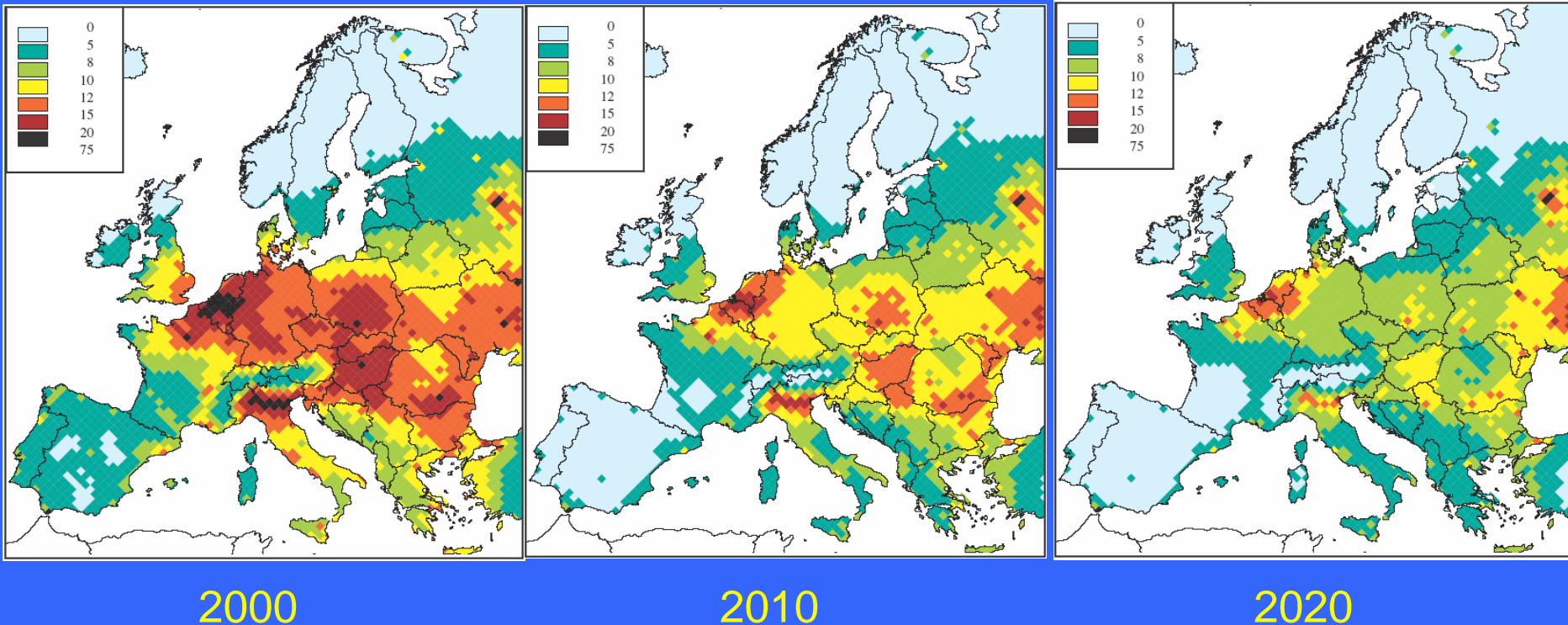
- **Based on latest advice from WHO and emission projections it is evident that:**
  - **No safe level for human exposure to particulate matter**
    - Smaller particles may be more damaging
  - **Today, about 100,000 people die every year prematurely due to exposure to particulate matter in Europe**
    - Currently average life expectancy is shortened by about 9 months in the EU, in some Member States up to 1 to 2 years
  - **By 2020 life average expectancy is shortened still by about 5 months**



# While concentration of PM 2.5 is improving, major problems remain up to 2020



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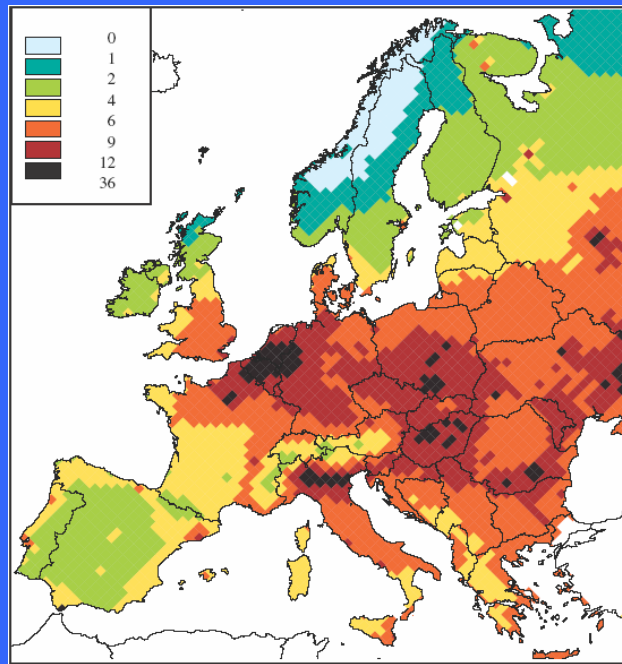
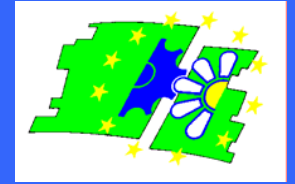


Rural concentrations, annual mean [ $\mu\text{g}/\text{m}^3$ ]  
from known anthropogenic sources excluding sec. org. aerosols  
Average of calculations for 1997, 1999, 2000 & 2003 meteorology

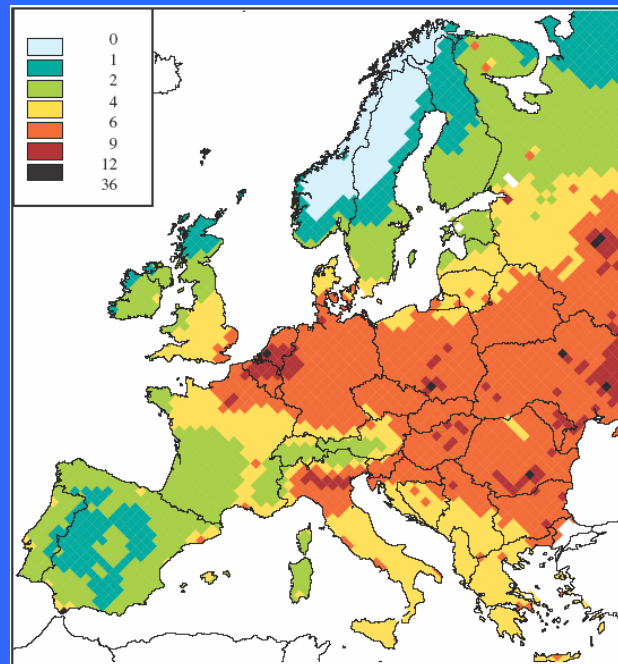


# Loss in life expectancy attributable to anthropogenic PM2.5 [months]

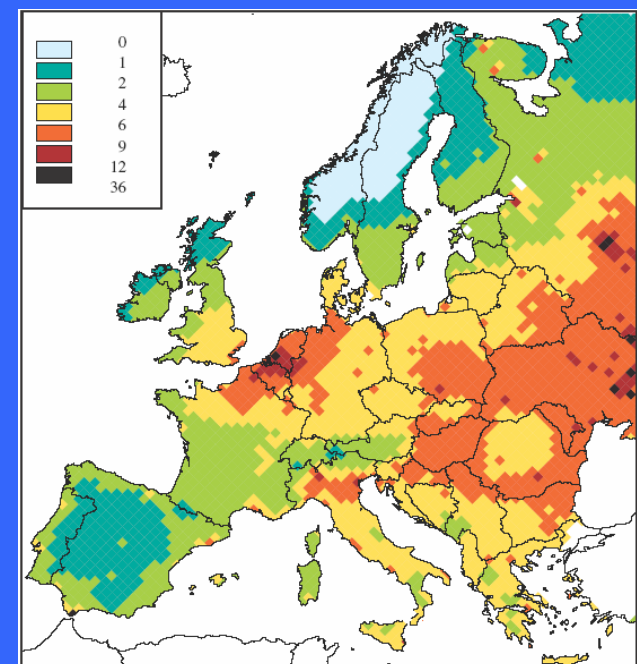
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2000



2010



2020

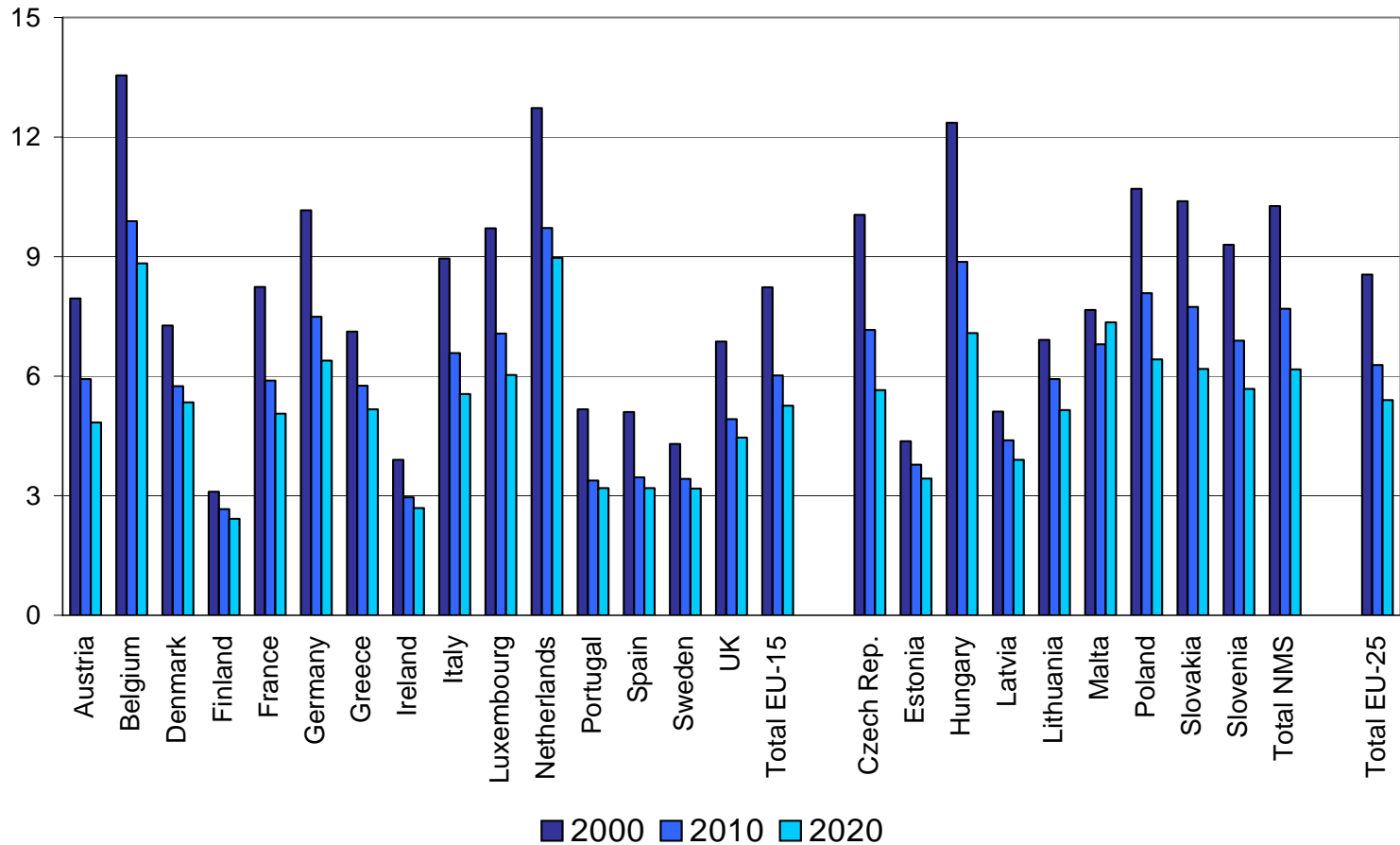
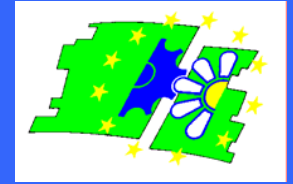
Loss in average statistical life expectancy due to identified anthropogenic PM2.5  
Average of calculations for 1997, 1999, 2000 & 2003 meteorologies

Source: CAFE Baseline, RAINS (2004)



# Loss in life expectancy in months attributable to anthropogenic PM2.5

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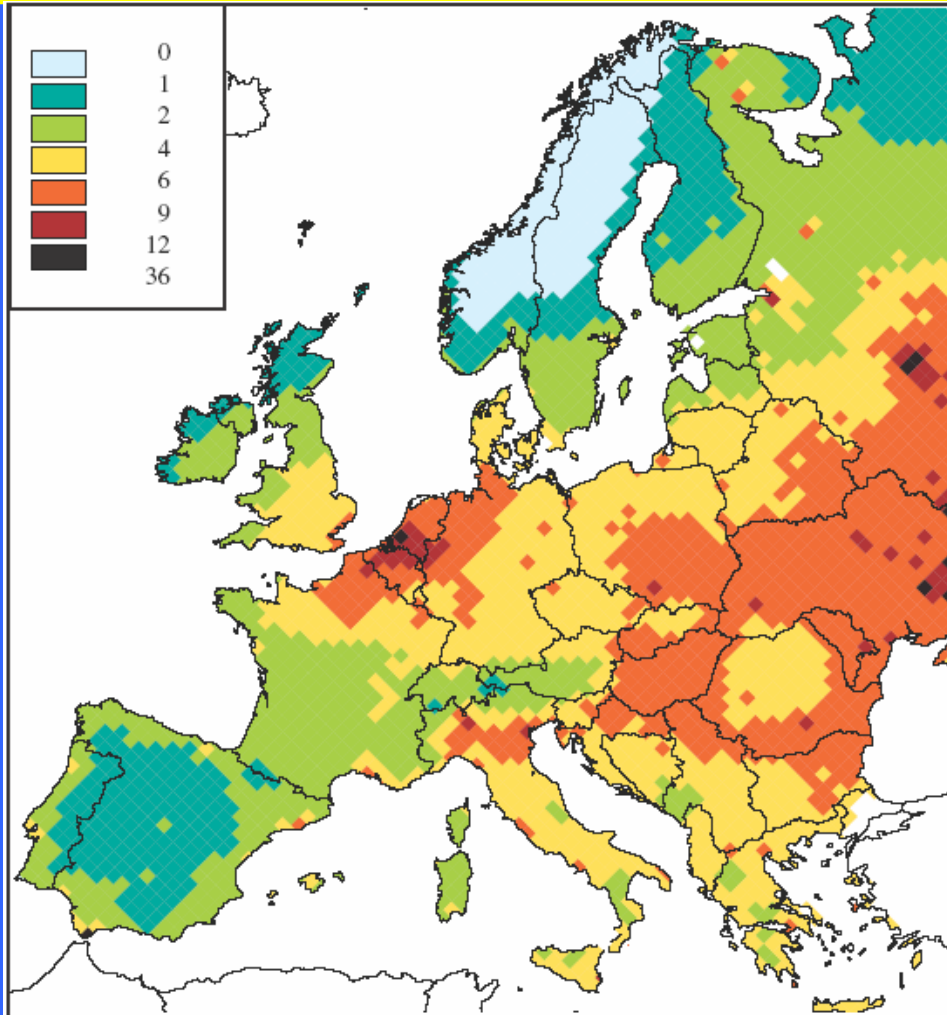
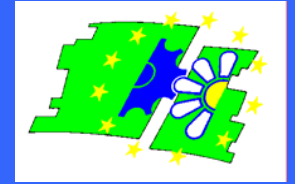


Source: CAFE Baseline, RAINS (2004)



# Loss in life expectancy 2020 attributable to anthropogenic PM<sub>2.5</sub> [in months]

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Despite emission reductions up to 2020, **about 5 months** of average statistical life expectancy is projected to be lost due to PM

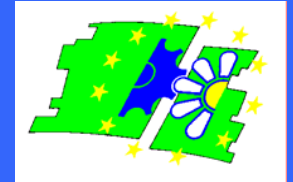
Loss in average statistical life expectancy due to identified anthropogenic PM<sub>2.5</sub>  
Average of calculations for 1997, 1999, 2000 & 2003 meteorology

Source: CAFE Baseline, RAINS (2004)



# Summary of health evidence for CAFE

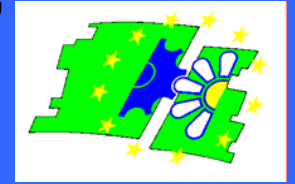
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- **Fine particles are key focus in the CAFE programme**
  - As a public health hazard PM is as important as road accidents
- **No evidence of threshold for PM**
  - i.e. no “safe” limit value
  - Linear dose-response function has been established for PM<sub>2.5</sub>
- **Certain chemical components as well as fine and ultra fine particles are contributing to toxicity**
  - but no quantification is possible with present knowledge
- **PM Position Paper: a limit value between 12 and 20 micrograms per cubic meter should be considered (US has 15 micrograms for urban background concentrations)**



# Findings of “Plans and Programmes” workshop Sept 2004



European Commission - DG Environment

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- **Widespread unattainability PM10 and NO2 in urban areas**
  - Plans or programmes are called for
- **High “European” or “national” background concentrations limit effectiveness of local measures**
  - but sometimes they seem to also serve as excuse for inaction
- **Inadequate evaluation whether proposed measures will actually reduce emissions**
  - also monitoring implementation was vaguely addressed



# Other PM findings

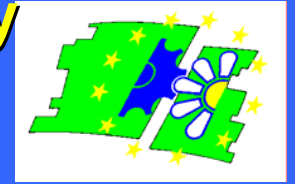
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- **A higher share of the coarse fraction of PM is “local” (e.g. re-suspension) while PM<sub>2.5</sub> tends to be more “regional”**
- **Emission inventories of anthropogenic PM<sub>10</sub> and PM<sub>2.5</sub> are not yet as developed as in the case of SO<sub>2</sub> and NO<sub>x</sub>.**
  - However, given that secondary particles are formed from sulphur and nitrogen, the inventory problem concerns mainly the primary fraction of PM.
  - How big an issue is the inventory uncertainty?
- **Proposal have been made to use a population weighted PM<sub>2.5</sub> concentration index as an additional tool to reduce PM exposure.**
  - Very relevant indicator and needs to be considered carefully.
  - But technically and legally likely to be complex (i.e. assigning a relevant population to each measuring station)
  - If feasible, likely to be complementary to the air quality limit values.
- **Whatever PM<sub>2.5</sub> limit value is proposed, it needs to be made clear where it is applicable.**



# Possible measures to reduce primary and secondary PM emissions



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## Better regulation

- **Revision of Air Quality Framework and Daughter Directives**
  - Including the introduction of PM2.5 limit value
- **Revision of National Emissions Ceilings Directive (in 2006)**
  - Possible inclusion of anthropogenic primary PM2.5 emissions ceilings

## Possible transport measures

- **Emission standards for new passenger cars (Euro 5) and heavy duty vehicles (Euro 6)**
- **Reduction of emissions from existing vehicles**
- **Including environmental element to infrastructure charging in road transport**
- **Reduction of atmospheric emissions from ships and aviation**

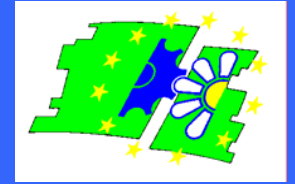
## Possible other measures

- **Reduction of emissions from small combustion sources**
- **Better insulation of buildings (indirect emissions reduced)**



# Countdown to the adoption

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- **Consultation with stakeholders on optimisation scenarios – environmental targets (ongoing)**
- **Discuss outline Thematic Strategy with stakeholders (Nov 2004)**
- **Public consultation (Dec 2004 – Jan 2005)**
- **Discuss main elements of Thematic Strategy with stakeholders (Feb 2005)**
- **Adoption by Commission (May 2005)**

**More information:**

**[europa.eu.int/comm/environment/air/cafe/index.htm](http://europa.eu.int/comm/environment/air/cafe/index.htm)**