A convenient perspective: Making Climate and AQ protection a common goal

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AirMonTech, 4-6 March, 2013

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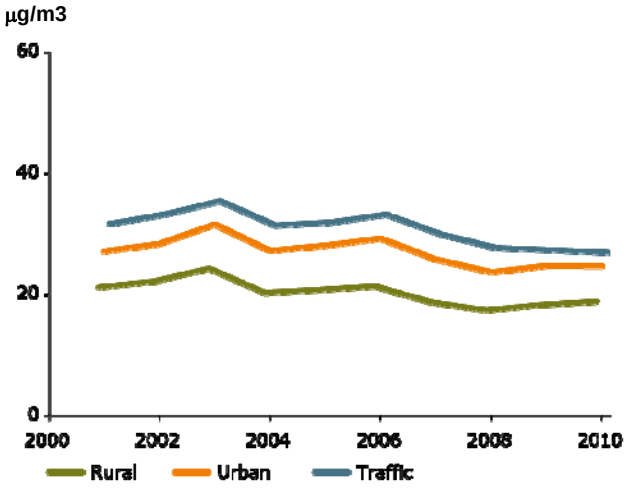
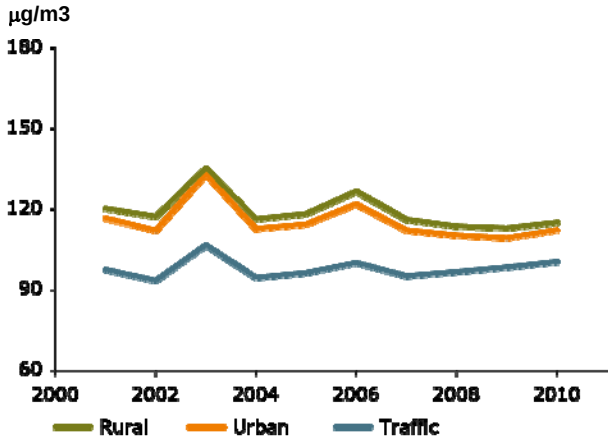
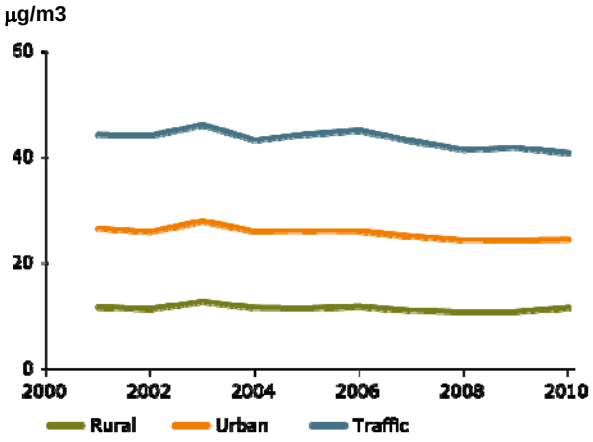
Concentration trends in the EU for major pollutants



PM10
slow decrease



Ozone
no clear trend



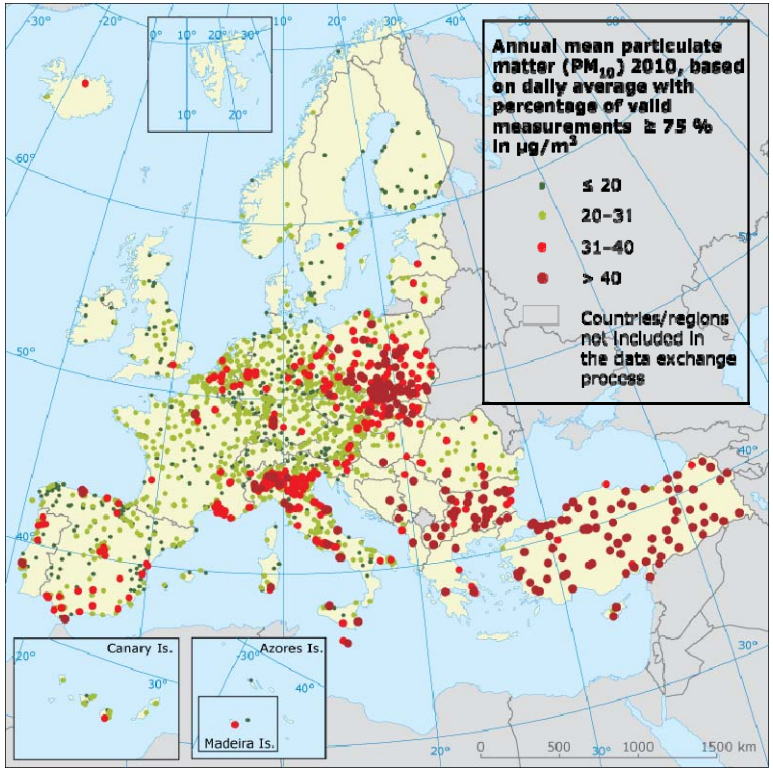
Nitrogen dioxide
slow decrease

Air pollution is (still) a significant problem

"Around 420,000 premature deaths per year in the EU in 2010, attributable to air pollution" - Environment Commissioner Janez POTOČNIK, 8 January 2013

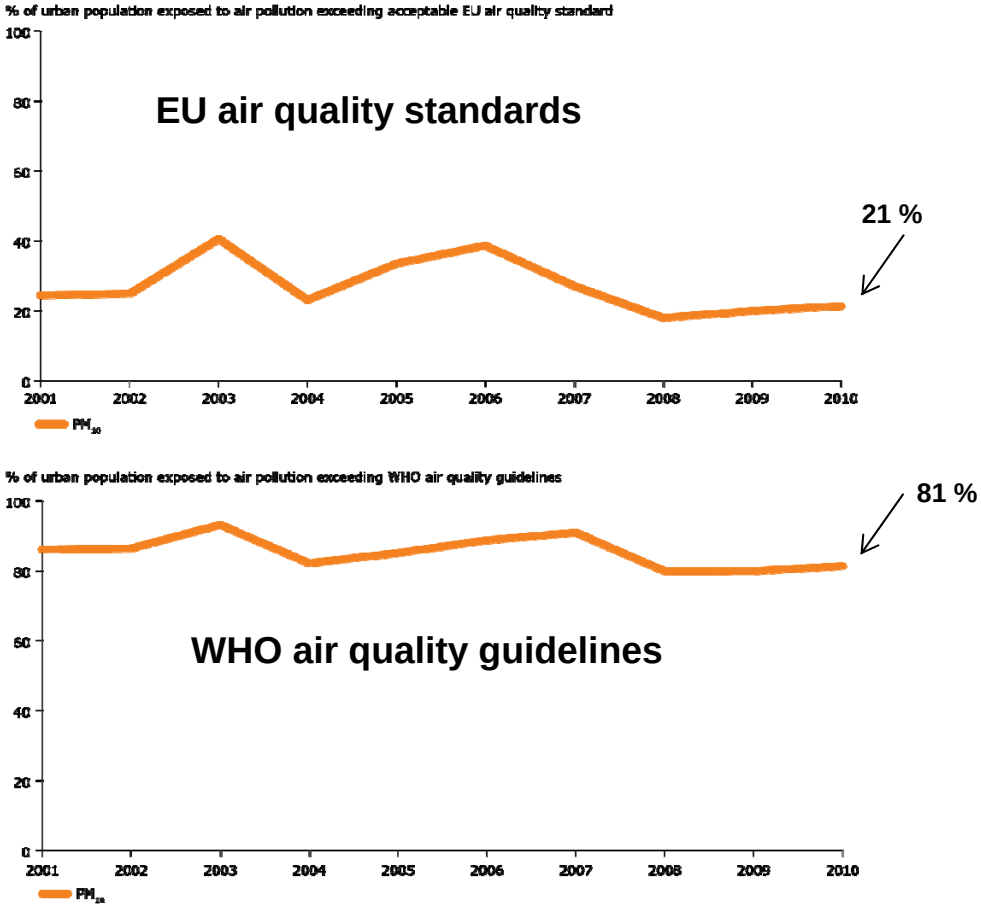
Particulate matter

PM10 concentration

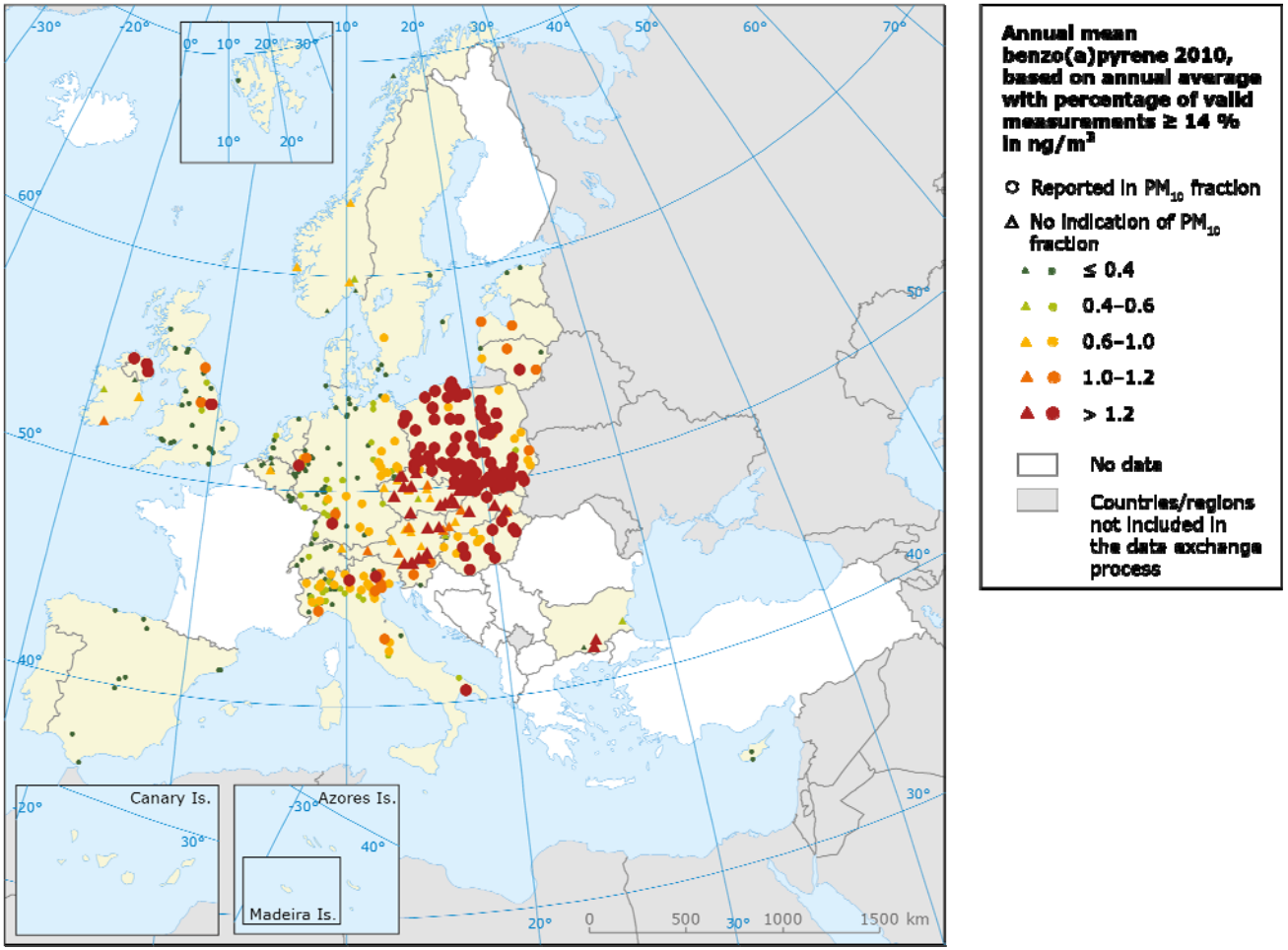


In red: above EU limit values

Percentage of the EU's urban population exposed to PM10 exceeding



Benzo(a)pyrene



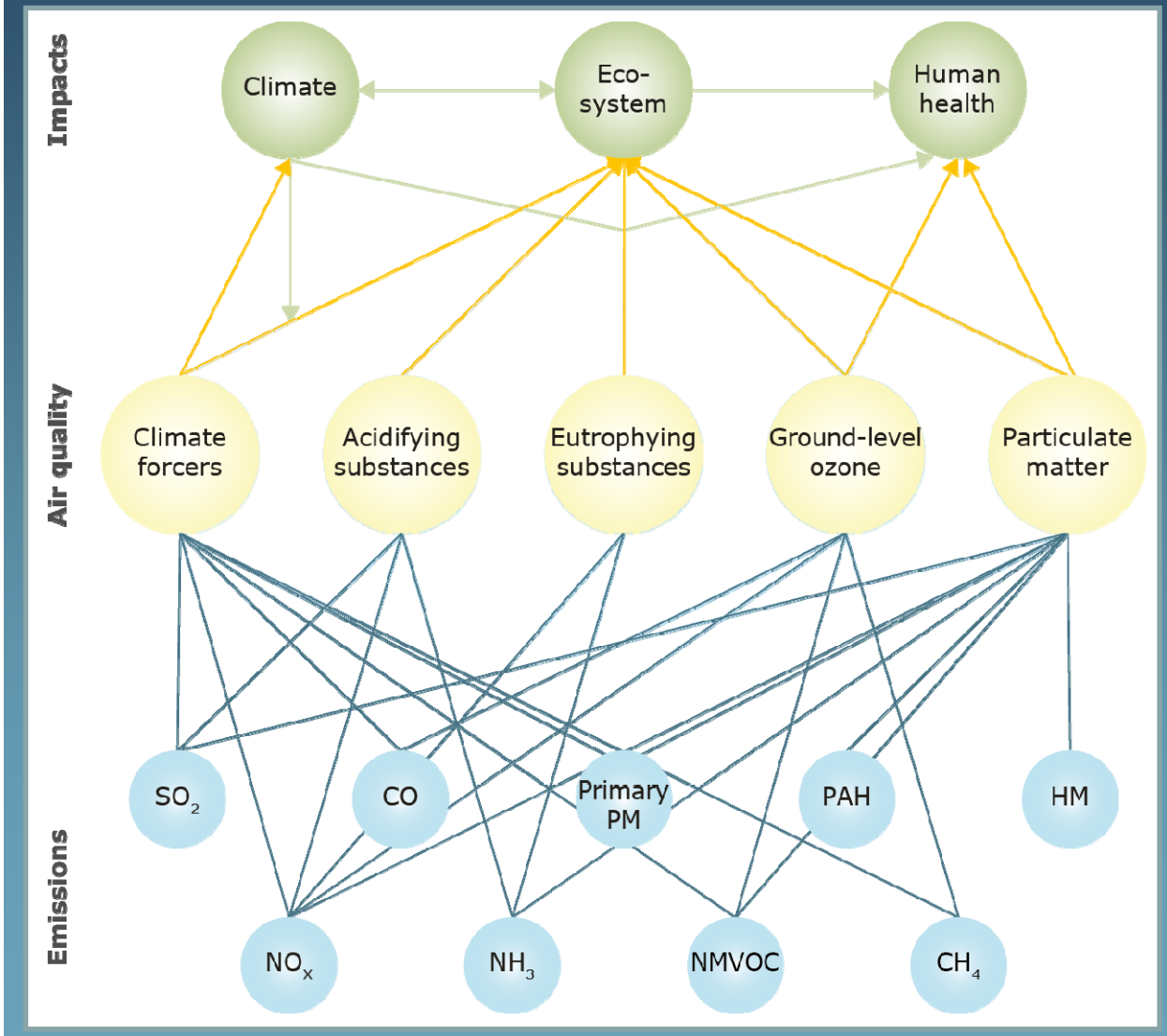
Annual mean benzo(a)pyrene 2010, based on annual average with percentage of valid measurements ≥ 14 % in ng/m³

- Reported in PM_{10} fraction
- No indication of PM_{10} fraction
- ≤ 0.4
- 0.4–0.6
- 0.6–1.0
- 1.0–1.2
- > 1.2
- No data
- Countries/regions not included in the data exchange process

In dark orange and red: above EU target value to be met by 2013

The same coin principle: sources, atmospheric processes and impacts are linked

The environment experiences air pollution and climate change in an integrated manner; policies, science and impact studies do not always reflect this.



- sulphur oxides (SOx)
-
- nitrogen oxides (NOx)
- carbon monoxide (CO)
- ammonia (NH3)
- particulate matter (PM)
- non-methane volatile organic compounds (NMVOC)
- polycyclic aromatic hydrocarbons (PAH)
- methane (CH4)
- heavy metals (HM)

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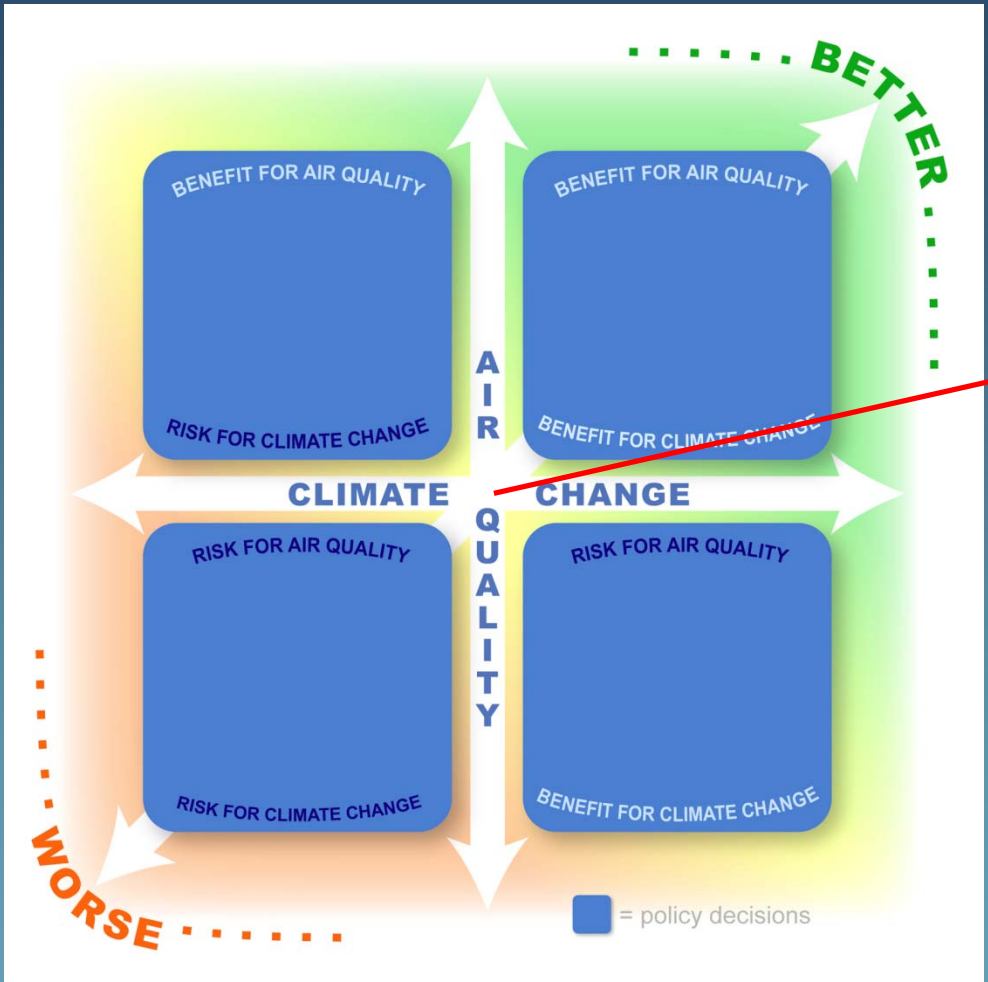
The challenge is to identify co-benefits and limit trade-offs of AQ and CC policy



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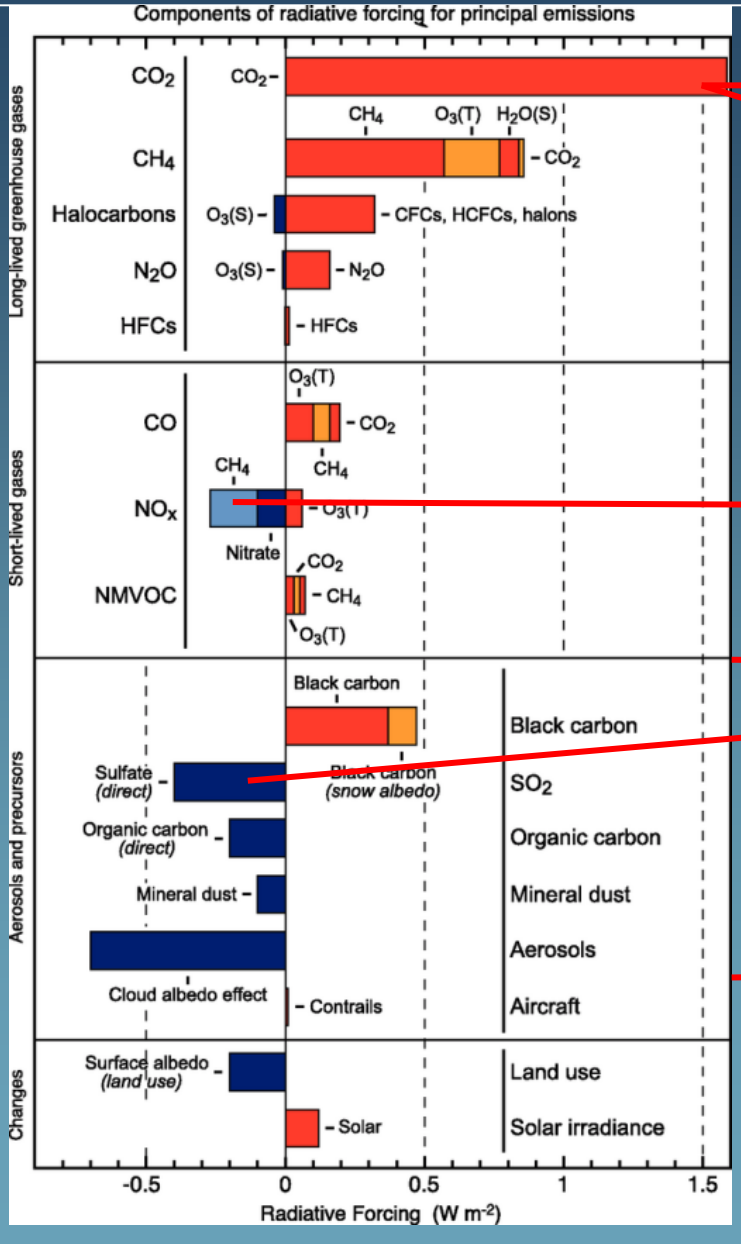
Ambient Air Quality Directives and National Emissions Ceilings

UN ECE convention on Long-range Transboundary Air Pollution

UNFCCC

Source IGBP (2012)

Greenhouse gases and air pollutants: a complicated story



Fossil fuel consumption ↓:
CO_2 ↓, NO_x ↓, PM ↓, SO_2 ↓, etc

Biofuel fuel consumption ↑ :
Surface albedo?, emissions ?

NO_x emissions ↓, lifetime CH_4 ↑, O_3 (T) ↑?

SO_2 emissions ↓, Radiative forcing ↑

PM emissions ↓, ? different PM composition

IPCC AR4 (2007) Figure 2.21. Components of RF for emissions of principal gases, aerosols and aerosol precursors and other changes. Values represent RF in 2005 due to emissions and changes since 1750. (S) and (T) next to gas species represent stratospheric and tropospheric changes, respectively.

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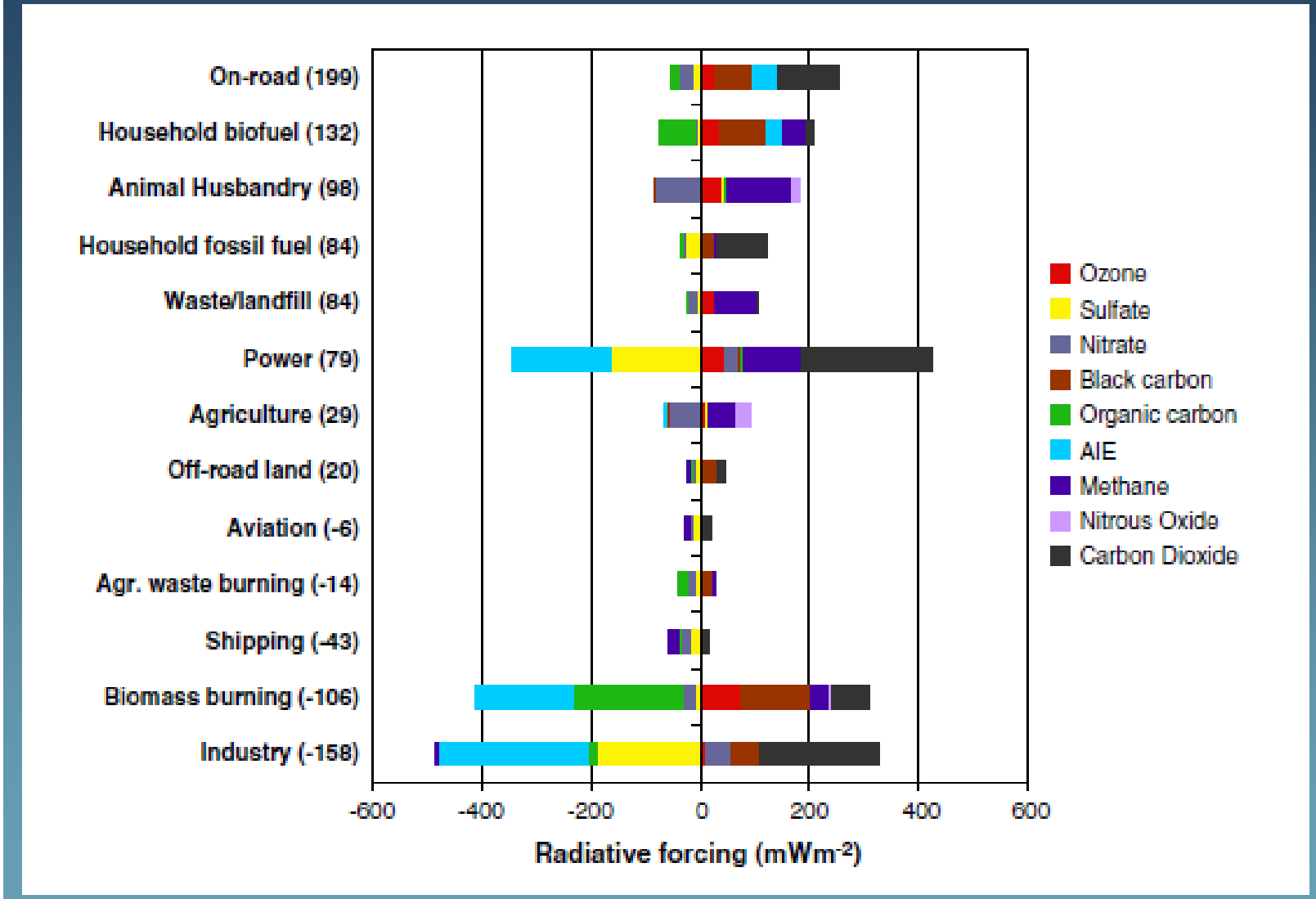
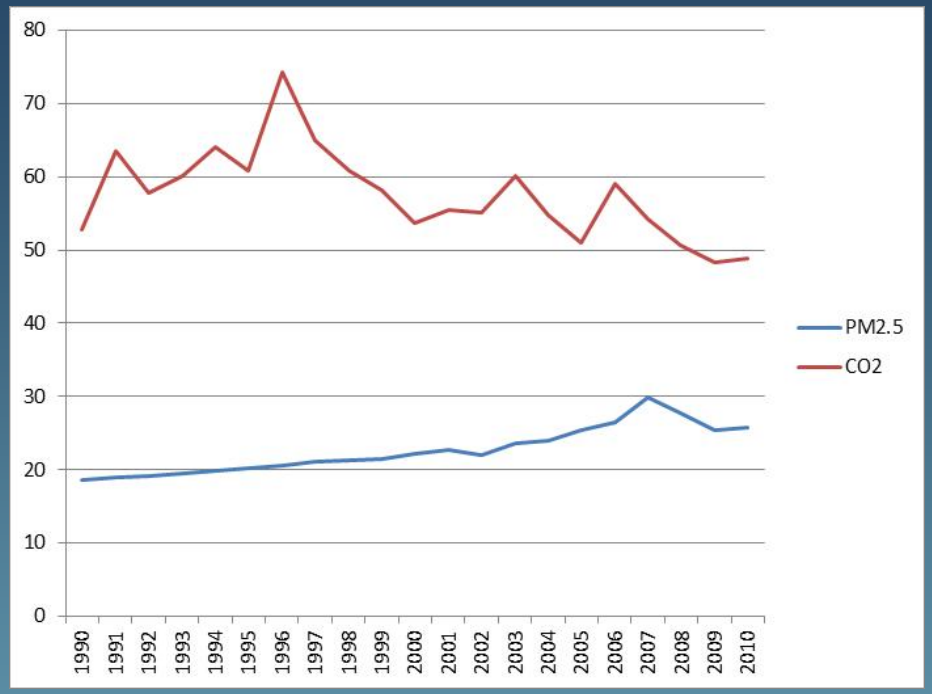
Radiative forcing (RF) attributed to various pollutants and their indirect effects (AIE). Projection for the year 2020

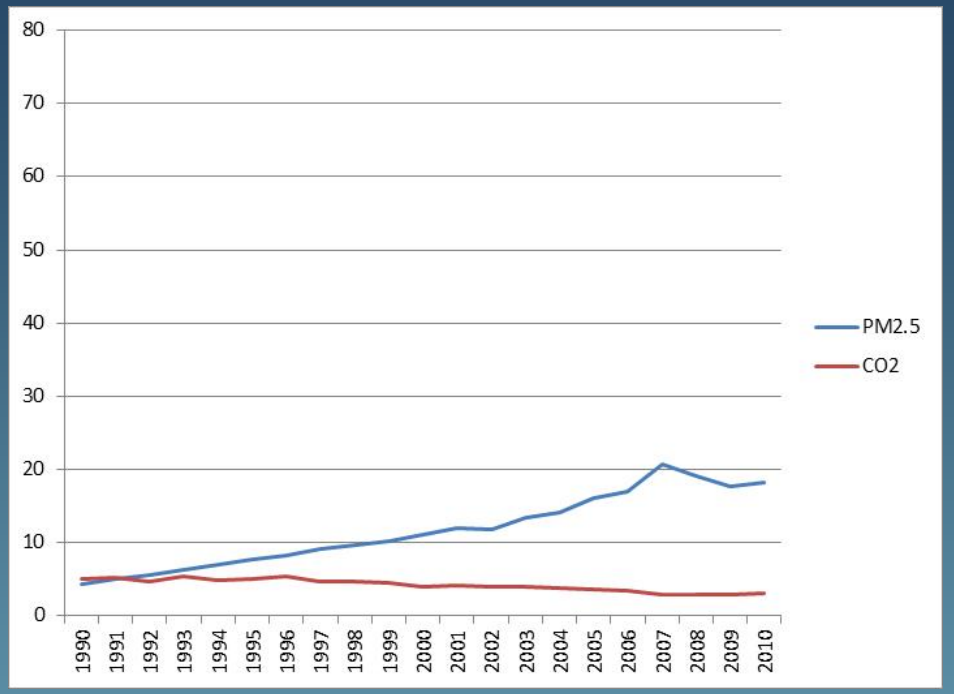


Source: Unger et al, 2010

Discussion: are there penalties/co-benefits of current mitigation policies



DK: CO2 emission (Tg) and PM2.5 (Gg)
All emissions sources excl. LULCF



DK: CO2 emission (Tg) and PM2.5 (Gg)
Residential emissions only

Source: reported national data taken from EEA data viewers

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Knowledge base on integration of air quality and climate change is increasing

Examples of proposed mitigation measures with measures that make sense in Europe:

Methane (CH_4)

•Extended recovery and utilization, rather than venting, of associated gas and improved control of unintended fugitive emissions from oil and gas production

•Separation and treatment of biodegradable municipal waste through recycling, composting and anaerobic digestion as well as landfill gas collection with combustion/utilization

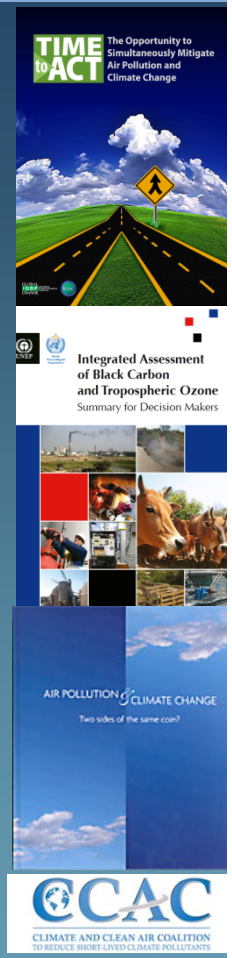
•Control of livestock emissions, mainly through farm-scale anaerobic digestion of manure from cattle and pigs

Black Carbon (BC)

•Diesel particle filters for road and off-road vehicles

•Pellet stoves and boilers, using fuel made from recycled wood waste or sawdust, to replace current wood-burning technologies in the residential sector in industrialized countries

•Ban of open field burning of agricultural waste



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Success of air quality and climate change policies depends for example on:

1.Reduction/increase of co-emitted species when specific sector emissions are addressed

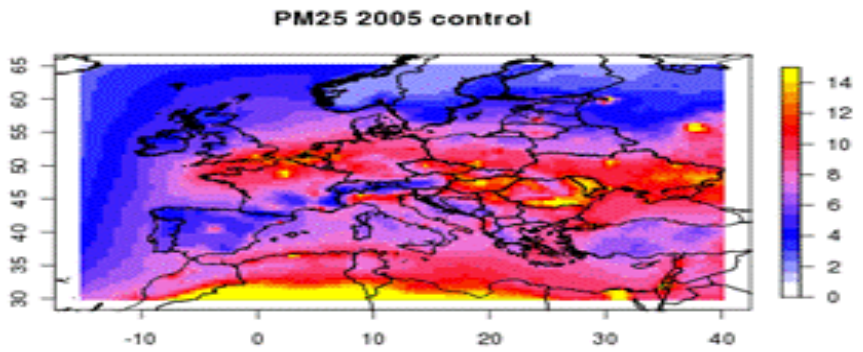
2. The impact of emission mitigation measures on net radiative forcing

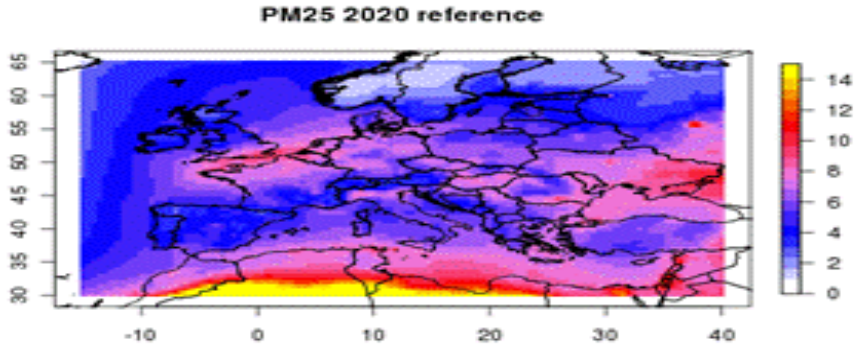
3. The impact of climate policy on air quality

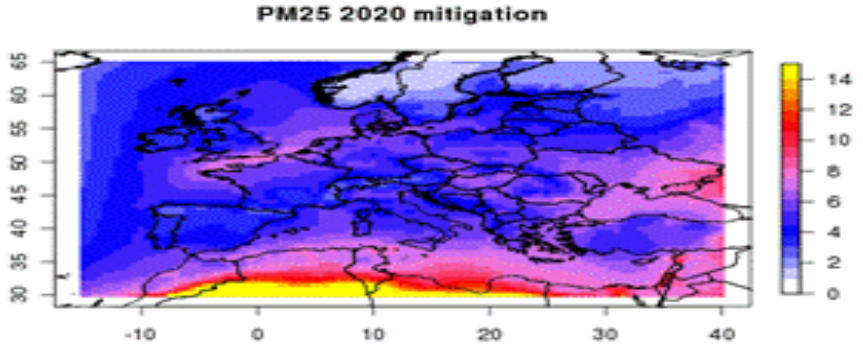
4. The impact of future meteorological conditions on air quality and emissions

- EEA data viewers of officially reported AP and GHG emission inventories
- IPCC (2007) graph on radiative forcing of atmospheric compounds
- EEA CLIM006 indicator
- EEA/ETC-ACM model simulations of air pollution and greenhouse gas scenarios

The impact of climate policy on air quality (ETC/ACM 2012)







Annual average maps of PM2.5 (µg/m3) modelled with CHIMERE using Global energy assessment emission scenarios (GEA, Riahi et al., 2012)

Present day emissions and PM2.5 concentrations

2020: Global emissions include all current implemented and planned air quality policies and climate policies

2020: global emissions include all current implemented and planned air quality policies and in addition includes further climate policies leading to a stabilization of global warming to not more than 2 degrees in 2100

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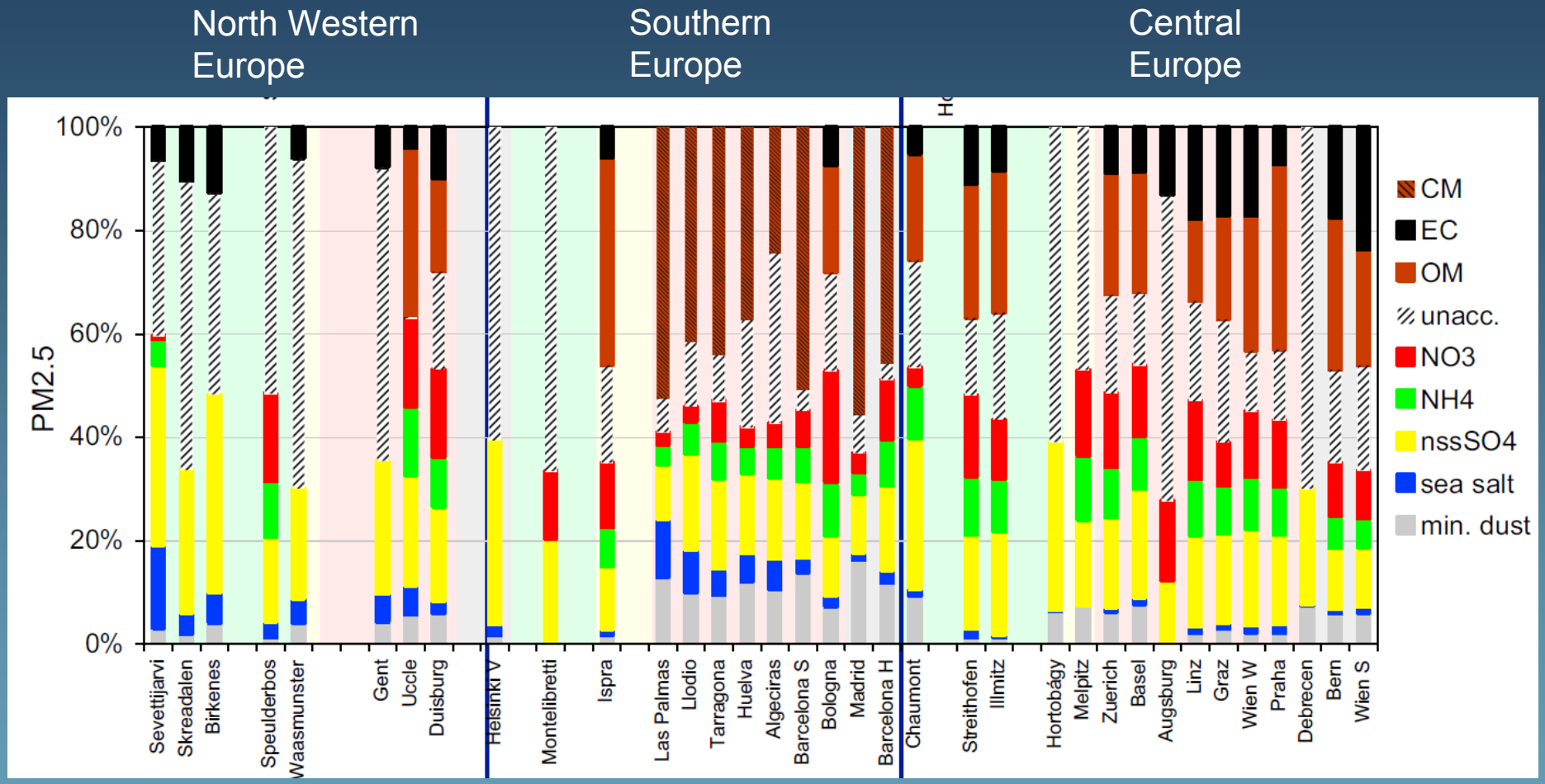
$PM_{2.5}$ mean annual chemical composition at sites



Green (rural background), Yellow (near city)
Rose: (urban background), grey: (kerbside).
Note that not all the constituents were measured at each site
Source: Putaud et al. (2010)

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Speciation of PM is largely missing in AirBase

We cannot for instance address the BC issue. We have one station in Malta and several stations in Germany mainly from 2010 and nothing prior to 2008

Challenges of integrating AP and CC and (EU) policymaking

- Complex topic in understanding, flexibility of policies, ensuring environmental integrity, explaining this to member states, citizens and EU policy makers.
- Policy supporting reporting/monitoring is currently focused on thematic legislation.
  - workload to support thematic legislation is increasing
  - Small steps on integration being made (BC in LRTAP)
- Different scales of successful policy making (global (CO_2), regional/local (PM/BC)
- How to combine/streamline information on both GHG and AP emissions and how to compare climate/air quality/impacts

Integrative approaches to climate change and air pollution

There is already a wealth of information available, the challenge is to combine this in a scientificly sound manner that enables effective policy support:

- highlight potential co-benefits (e.g. cost savings)
- Identify potential trade-offs (unwanted effects, inefficient policy)
- do not cause inaction by complicating things to much
- “come down to earth” from global assessments to local impact and action
- Observation based knowledge needs extra information on aerosol composition (emissions and atmospheric concentrations)

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Thank you

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Can we ”control” CC and AP in an integrated manner?