

Practical Experiences of Aerosol Inventory Preparation – European Perspective

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and Projections (EMEP/CORINAIR)

Issues

- Background and focus
- Process
 - New sources
 - Activity data
 - Emission factors
 - Size distribution
 - Chemical speciation
 - Technology information
- Illustrative results
- Plans for further work

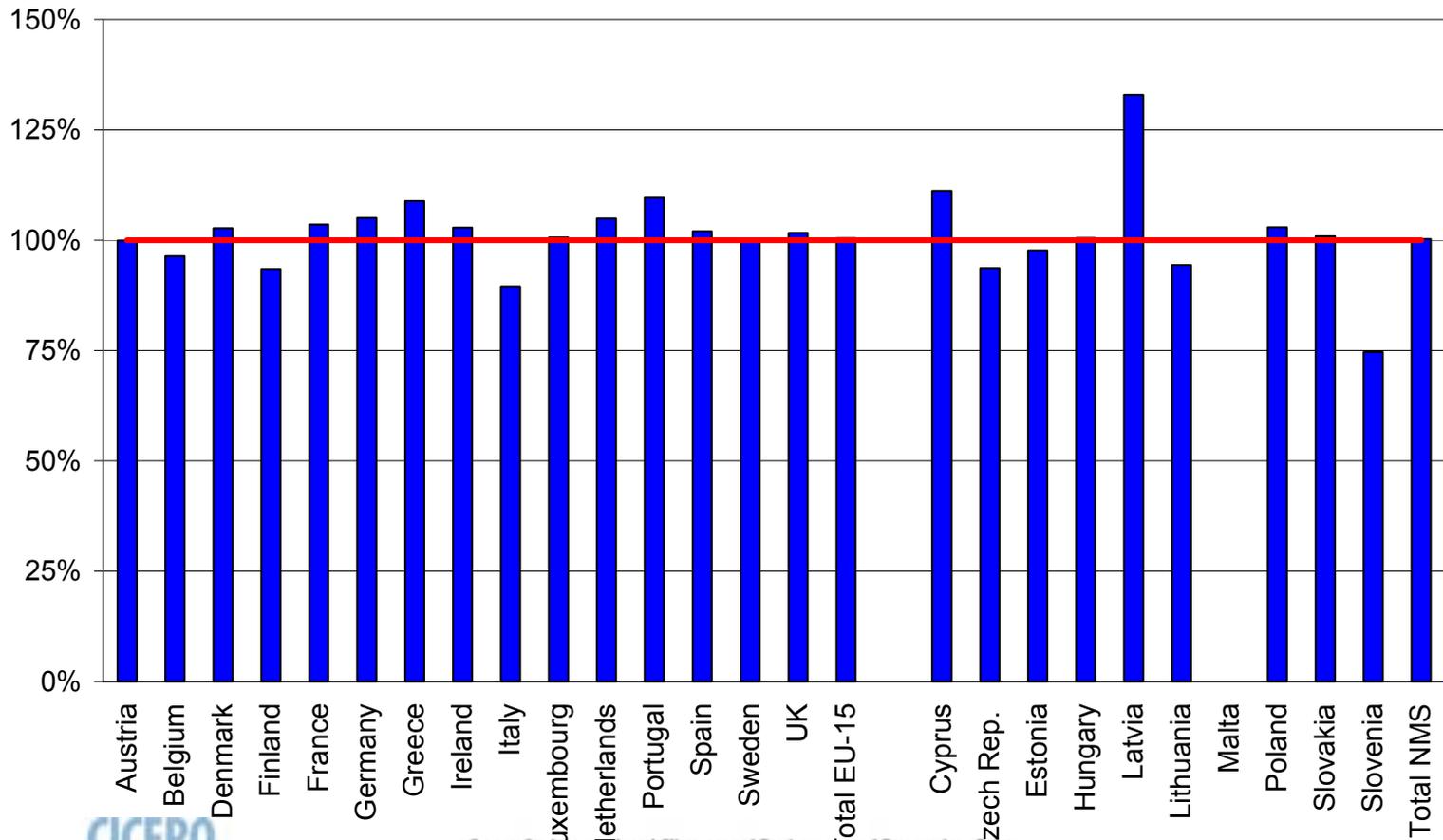
Background and focus (1)

- Stronger focus on effects of aerosols, in particular health effects, over the last years
- Health impacts from particulate matter at a center of the strategy developed within the European Clean Air for Europe programme (CAFE);
- During the revision of the National Emission Ceiling (NEC) Directive the Commission is carefully looking into how a ceiling would be established for PM_{2.5} emissions in 2015
- Currently main focus is on particle mass by size (PM₁₀, PM_{2.5}); Data on chemical speciation (e.g. BC and OC) is considered as useful information, but have been of second priority so far; *used for modeling purposes only*

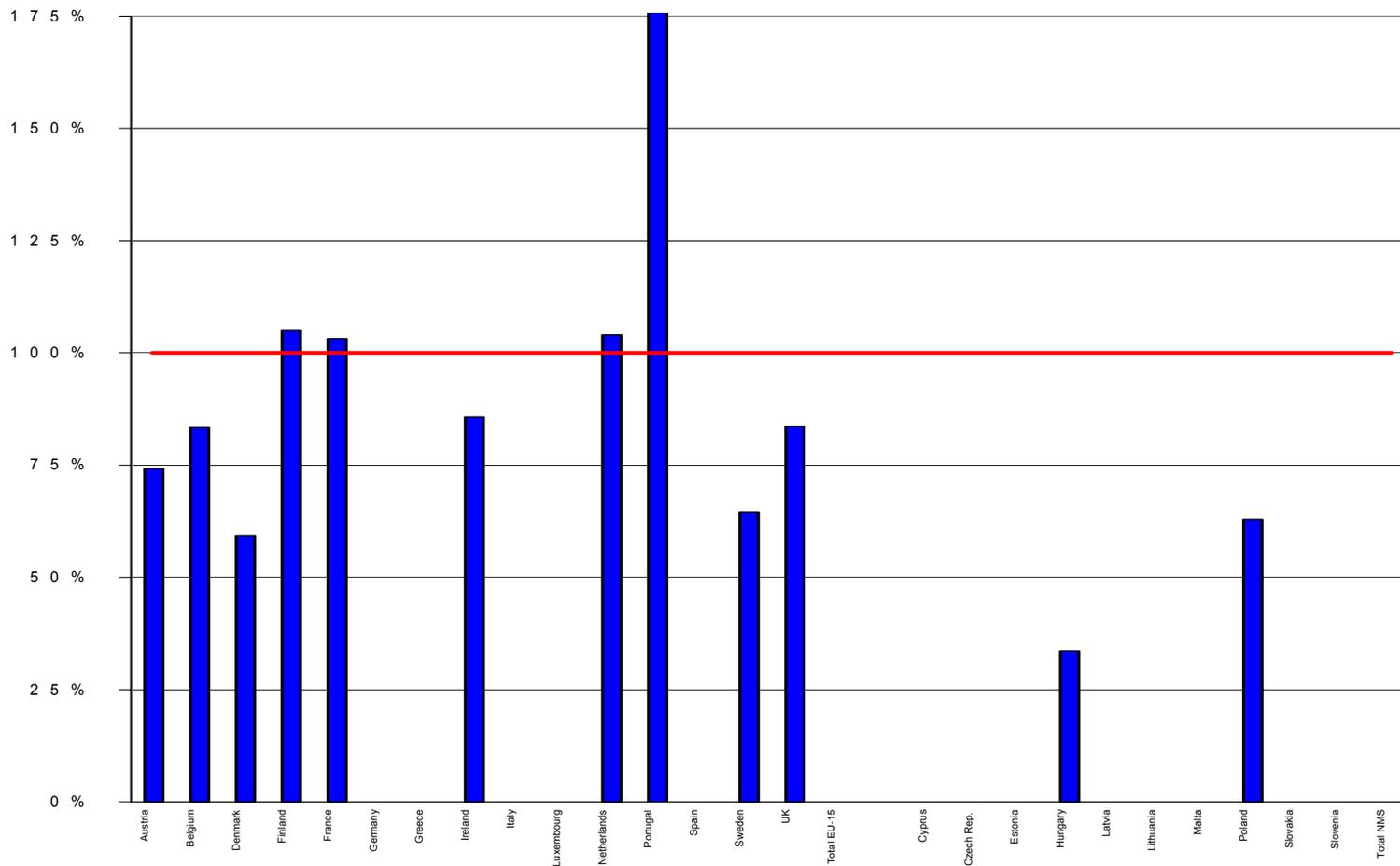
Background and focus (2)

- Convention on Long Range Transboundary Air Pollution (LRTAP) will follow the EU approach
 - Establishment of a UNECE PM Expert Group
- Demand for complete and validated emission inventories
 - Initiated methodology work
 - EMEP/Corinar Emission Inventory Guidebook
 - Datasets for modeling (atmospheric and integrated assessment)
 - Establishment of a PM Task Group under TFEIP to review the immediate requirements of modellers
- Requirement for reporting of PM₁₀ and PM_{2.5} annual emissions introduced recently within the Convention (although not linked to obligations); *good response from many countries*

RAINS emission estimates for VOC vs. national inventories, 2000



RAINS emission estimates for PM_{2.5} vs. national inventories, 2000



New sources (1)

- The Emission Inventory Guidebook covers largely the same sources as the IPCC Guidelines
 - Less focus on forest and land-use emissions
 - Sources not relevant in Europe are not included
- Natural PM emissions (wind blown dust, sea salt, volcanoes, biomass burning, pollen) will be addressed in the NatAir project (EU 6th Framework Research programme)
- A number of PM sources are missing in reporting formats and guidelines; several of them, however, relevant only for coarse particles

New sources (not described in current guidance)

- Road non-exhaust (road, brake and tyre wear)
 - (is described in EMEP/Corinair) Of BC/OC relevance
- Landfills (is described in IPCC, mainly coarse)
- Animal houses and crop production
- Heavy construction works
- Wood products (sawmills, particle-/fiberboard, plywood)
- Coal production, handling and storage
- Mineral ore mining processes (incl. handling and storage)

Activity data

- For most sources, existing data can be used, however
 - Need for additional information on combustion technology and management
- Special attention needed for small scale combustion of coal and biomass; *residential use of coal declines in Europe while further increase in biomass consumption projected*
 - ‘Inventory’ of combustion technology
 - Non-commercial biomass consumption ‘statistics’
- Data required for the ”new” sources are often not available from national statistics

Emission factors (1)

- Highest priority for updating the Guidebook are
 - Small-scale and industrial combustion (BC/OC relevant)
 - Processes in iron and steel industries
 - Off-road sources (BC/OC relevant)
 - Residential waste combustion (BC/OC relevant)
 - Burning of agricultural residues (BC/OC relevant)
 - Some "new sources"
 - (for some sources updates are not needed)
 - Validation of factors across UNECE area
- Literature review
 - Emission factors/shares, size distribution and chemical speciation are not always available from the same source of information
- More measurements
 - Needed for majority of sources and various geographical regions

Emission factors (2)

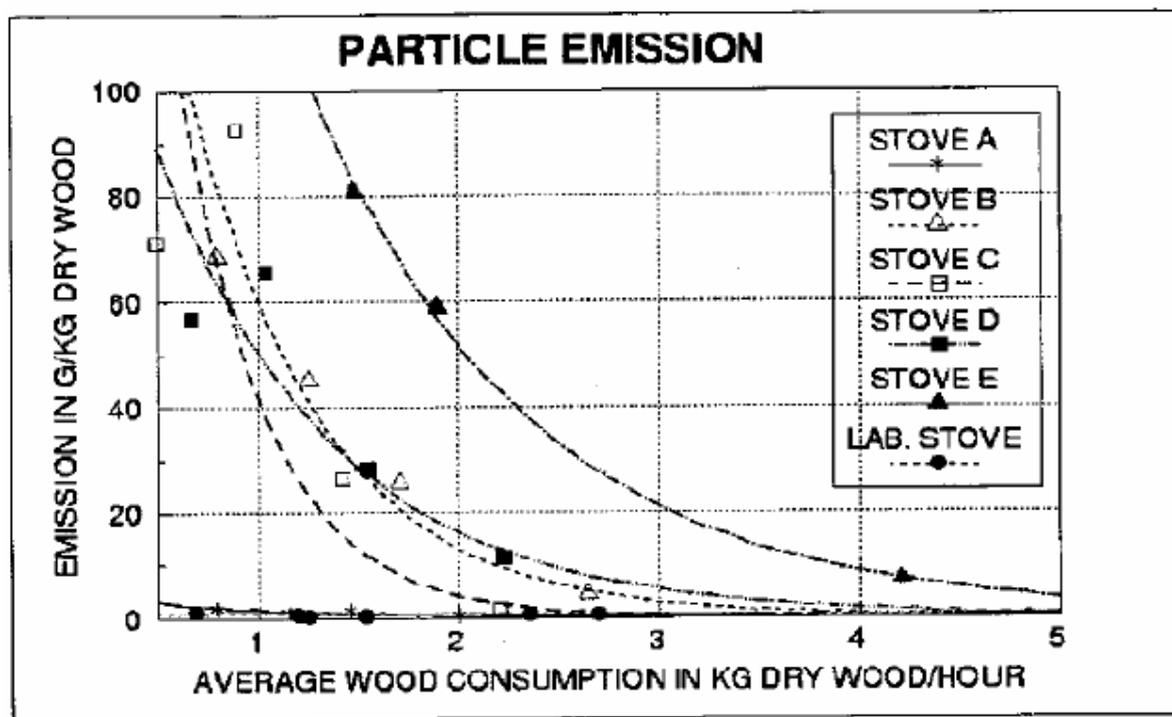
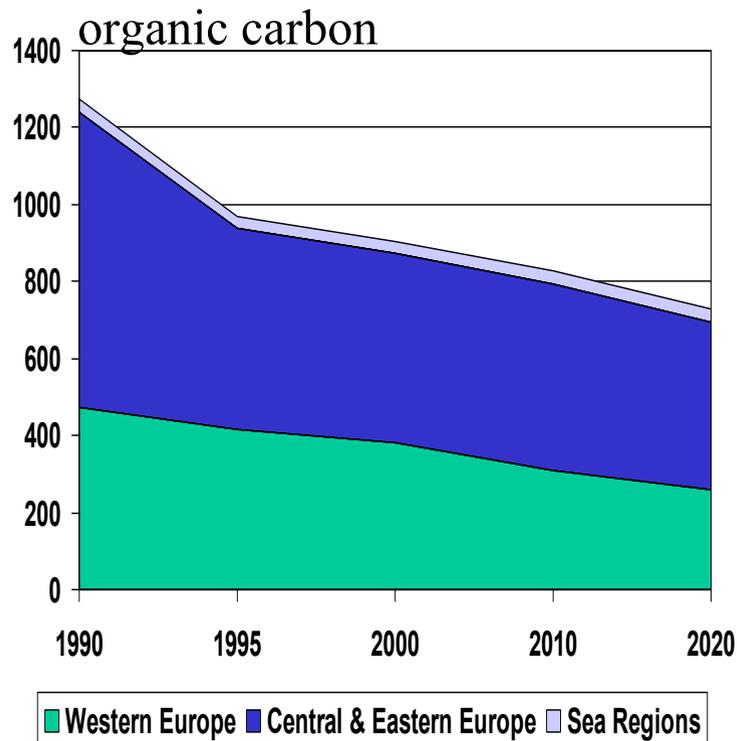
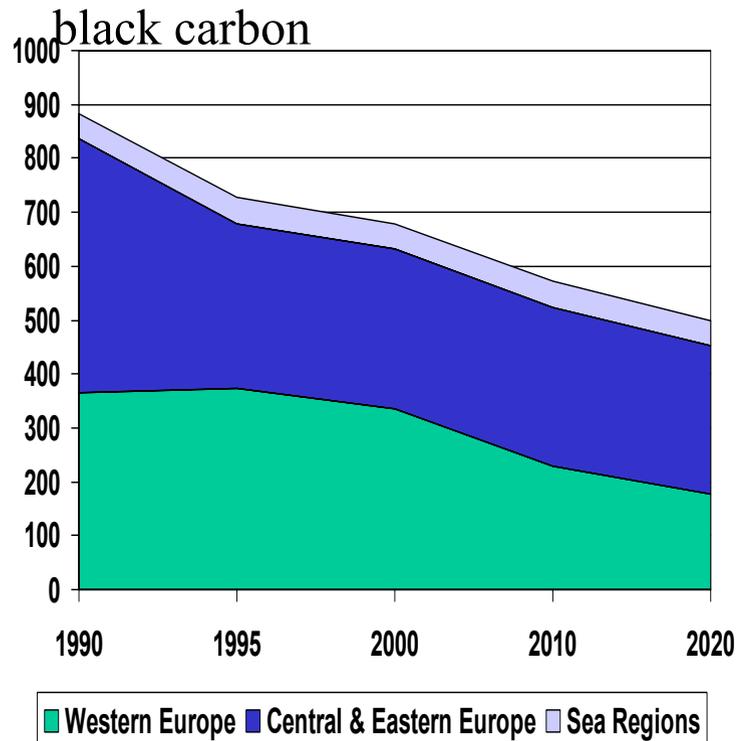


Figure 12. PM emission of 6 wood fired stoves. Dependency of wood consumption rate. A: catalytic stove, B-D: old stoves, E: open fireplace (Haakonsen and Kvingedal, 2001).

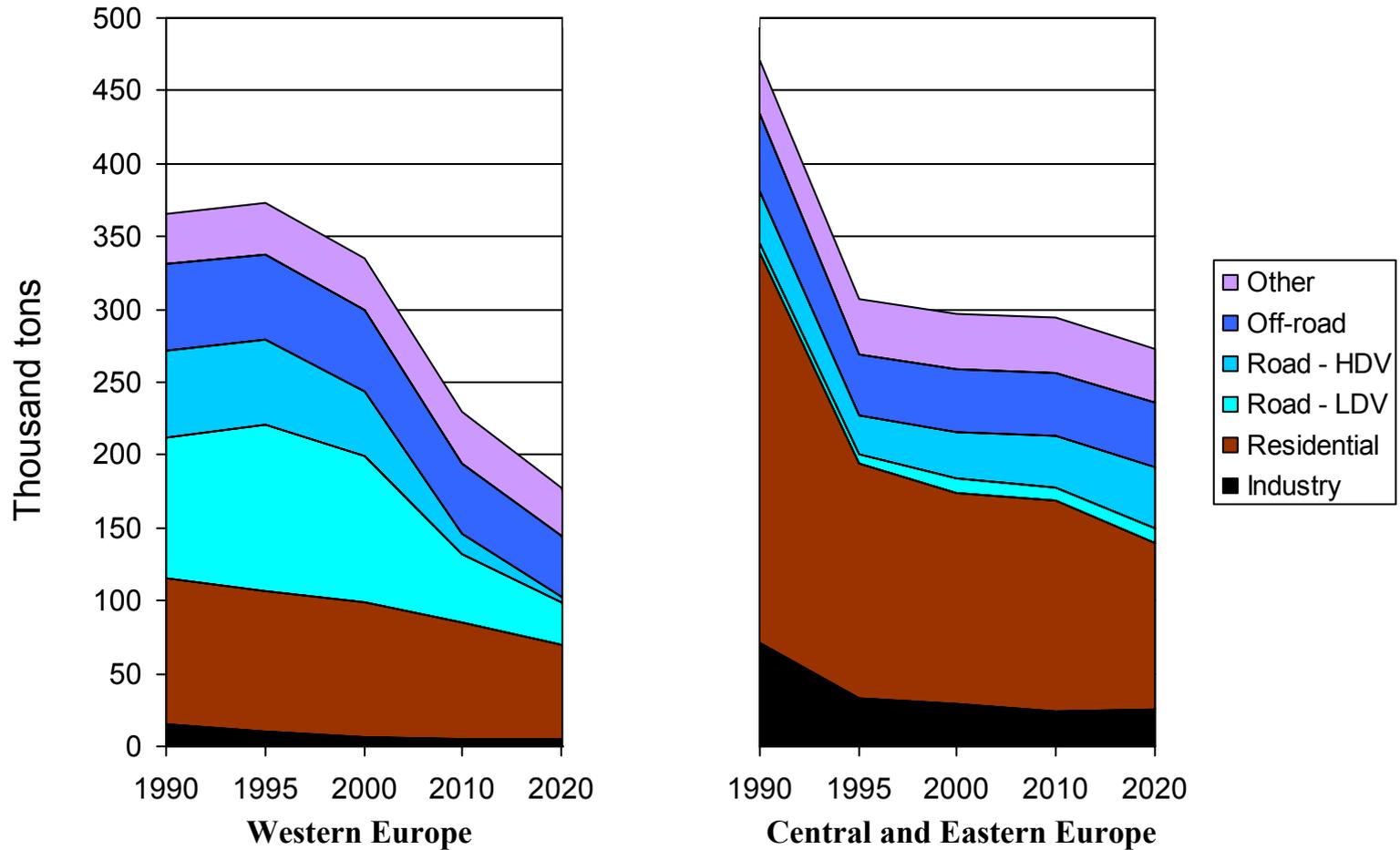
BC, OC emissions in Europe (by region)

RAINS (IIASA) Current Legislation Scenario [Gg], Klimont et al., in preparation



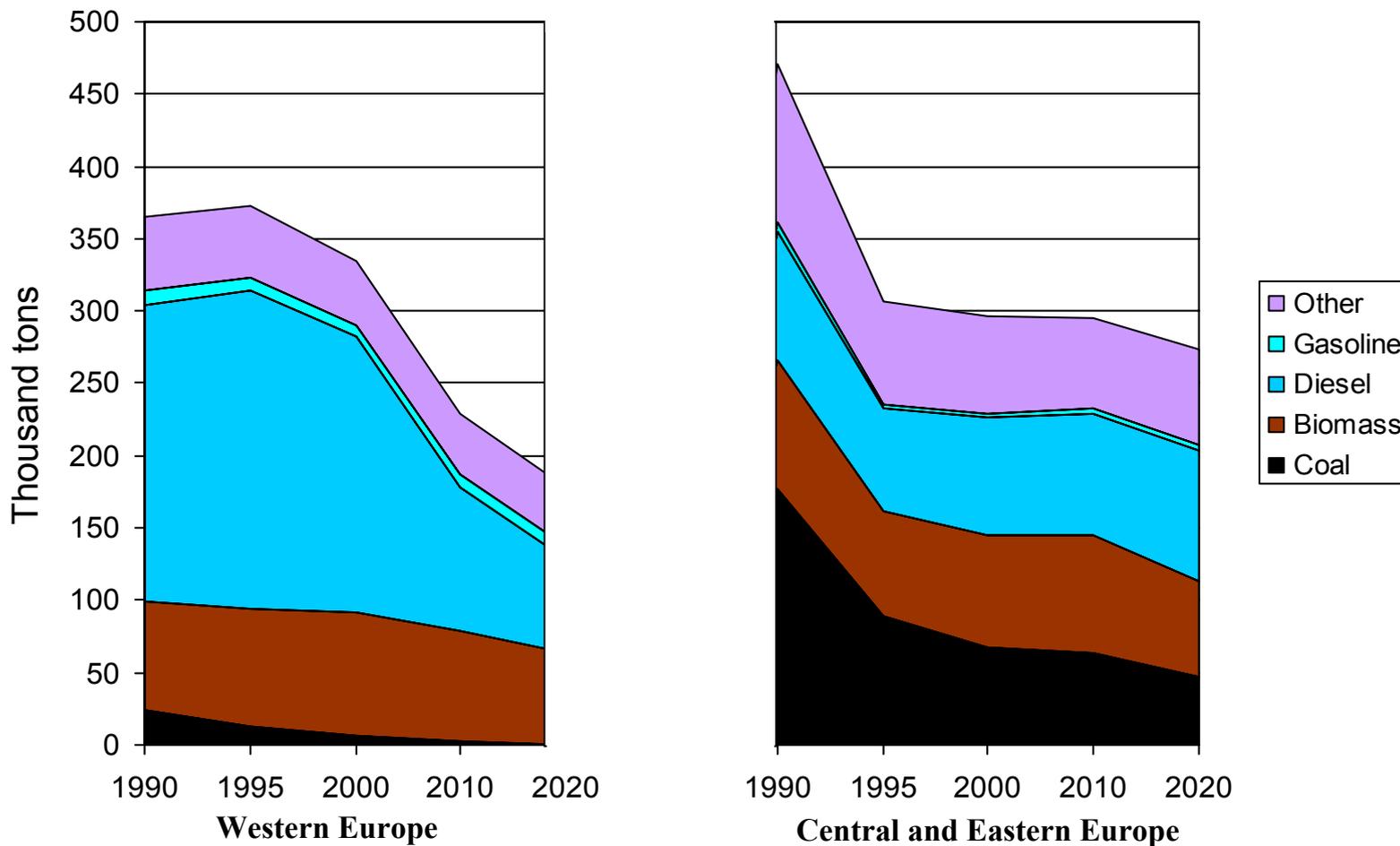
Black carbon emissions in Europe (by sector)

RAINS (IIASA) Current Legislation Scenario [Gg], Kupiainen and Klimont, in preparation



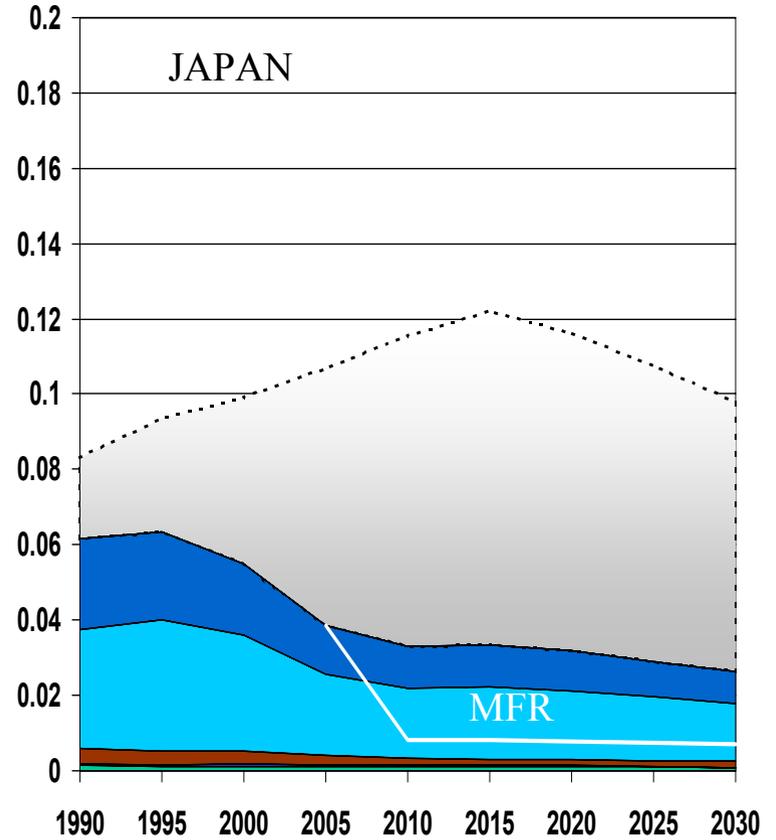
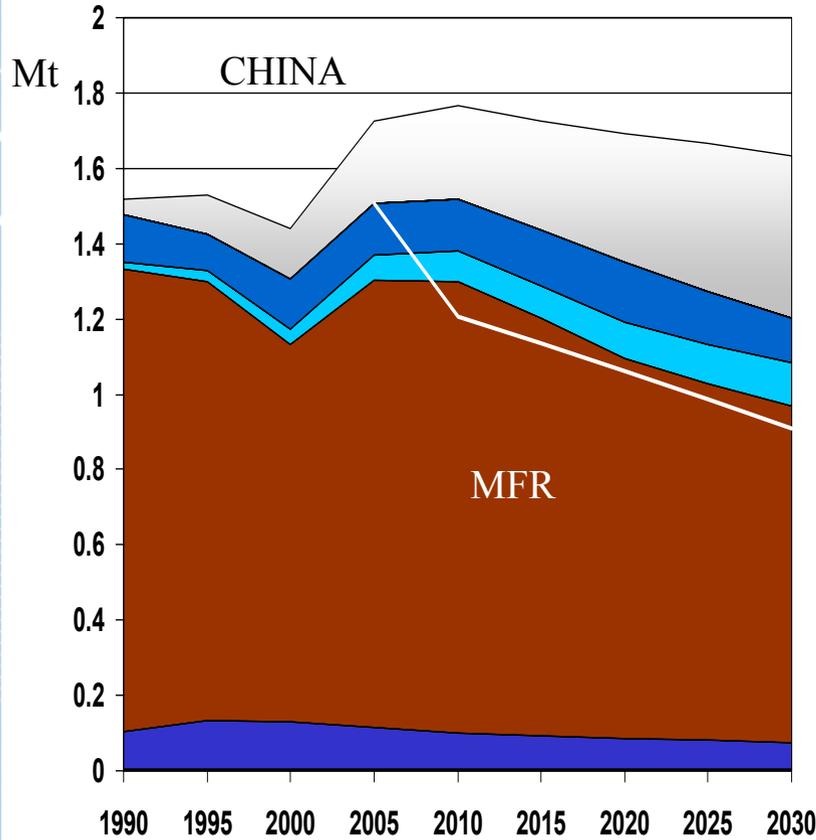
Black carbon emissions in Europe (by fuel)

RAINS (IIASA) Current Legislation Scenario [Gg], Kupiainen and Klimont, in preparation



BC emissions projections for China and Japan

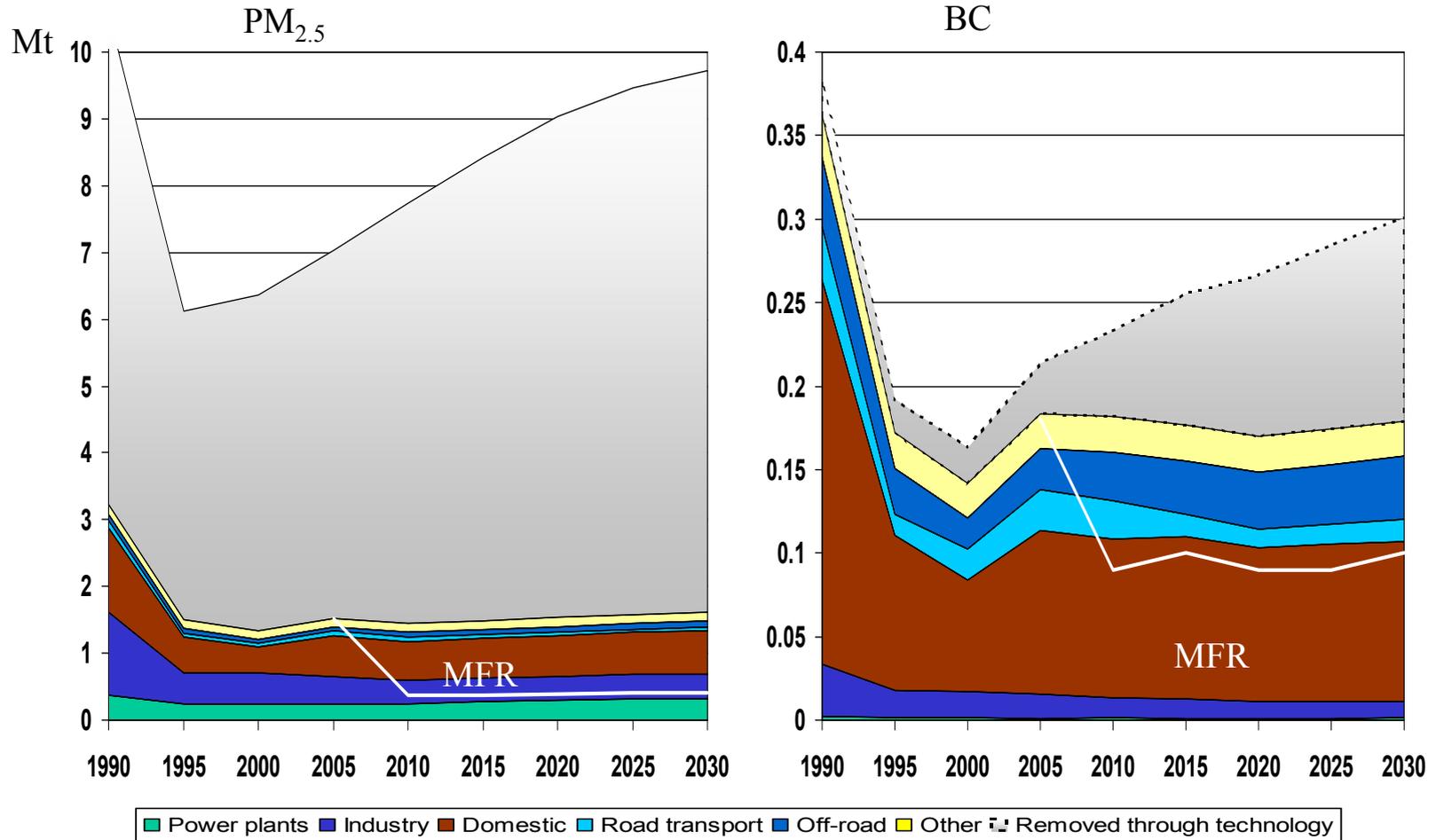
RAINS Current Legislation Scenario [Tg], Klimont et al., in preparation



■ Power plants
 ■ Industry
 ■ Domestic
 ■ Road transport
 ■ Off-road
 ■ Other
 ■ Removed through technology

PM_{2.5} and BC emissions projections for Russia

RAINS Current Legislation Scenario [Tg], Klimont et al., in preparation



Conclusions and plans for further work

- To a large extent PM inventories can be produced using the same methodologies as other pollutants, but
 - There are additional sources
 - To achieve acceptable accuracy, more information is needed about combustion technologies; *Data on chemical speciation are often not available from the same studies as the size speciation and emission factors*
- Need for more measurements
- Working to improve methodology guidance over the next years
 - New resources may become available; *driven by the current policy debate*
 - *EC research initiative* to know more about the chemical speciation may take place in the years to come