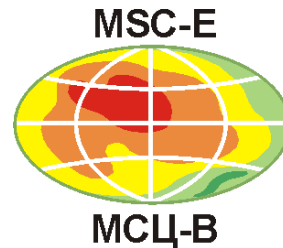


Emission and pollution trends of BaP (1990-2015), contribution of main source categories with emphasis on domestic combustion

Sergey Dutchak

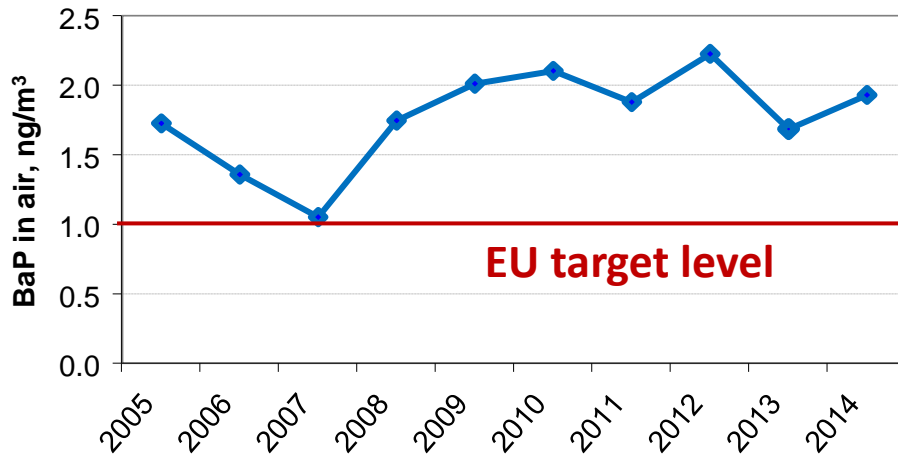
EMEP/Meteorological Synthesizing Centre - EAST



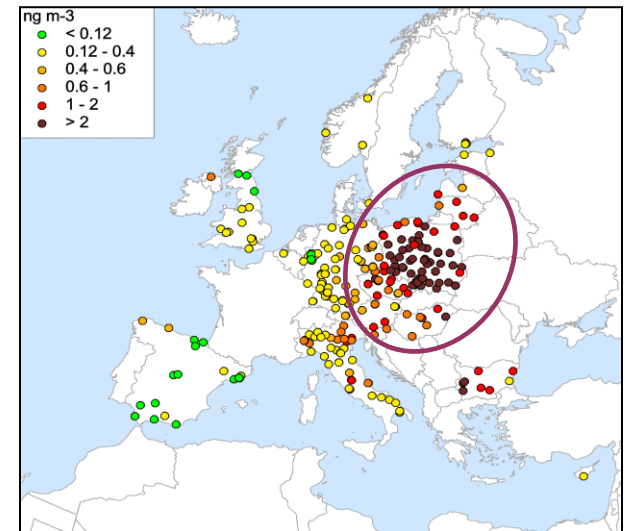
Pollution trends of BaP in the EMEP region (2005-2015)

Protocol on POPs
Article 9 REPORTING

EMEP shall provide information on the long-range transport and deposition of persistent organic pollutants



Mean levels of BaP in air measured at background, suburban, and urban sites



EEA AirBase measurements of BaP

At **35% of stations** annual mean BaP air concentrations were **above the EU target level** 1 ng/m³

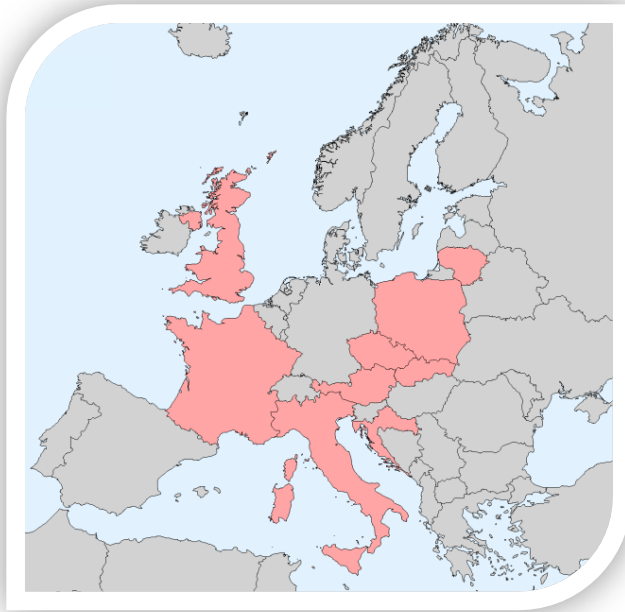
Exceedancies of BaP air quality standards

POP Protocol

Article 8 RESEARCH, DEVELOPMENT AND MONITORING

(f) An effects-based approach which integrates appropriate information ... on measured or modelled environmental levels, pathways, and effects on human health and the environment, for the purpose of **formulating future control strategies ...**

EU



Exceedance of **EU target level 1 ng/m³** -
9 countries (AirBase, 2015)

WHO



Exceedance of **WHO reference level 0.12 ng/m³** - 16 countries (AirBase, 2015)

Protocol requirements for emission data

Protocol on POPs

Article 9 - REPORTING

Each Party within the geographical scope of EMEP shall report . . . information on the levels of emissions of persistent organic pollutants."

ANNEX III

SUBSTANCES REFERRED TO IN ARTICLE 3

Polycyclic aromatic hydrocarbons (PAHs): For the purposes of emission inventories, the following four indicator compounds shall be used: **benzo(a)pyrene**, benzo(b)fluoranthene, benzo(k)fluoranthene, and indeno(1,2,3-cd)pyrene.

ANNEX V

Major stationary sources of PAH emissions:

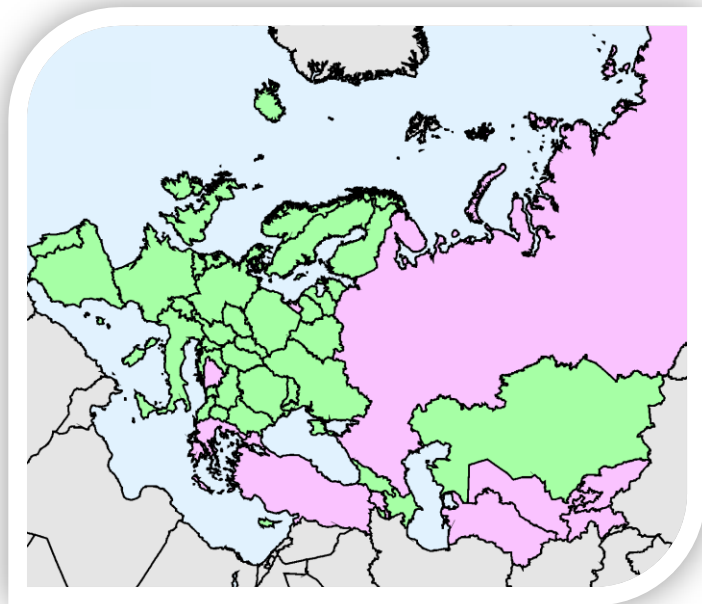
- Domestic wood and coal heating (**Residential combustion**)
- Open fires such as refuse burning, forest fires and after-crop burning
- Coke and anode production
- Aluminium production
- Wood preservation installations

Available BaP emission data (2005-2015)

Protocol on POPs Article 9 - REPORTING

Each Party within the geographical scope of EMEP shall report . . . information on the levels of emissions of persistent organic pollutants."

Official emission data

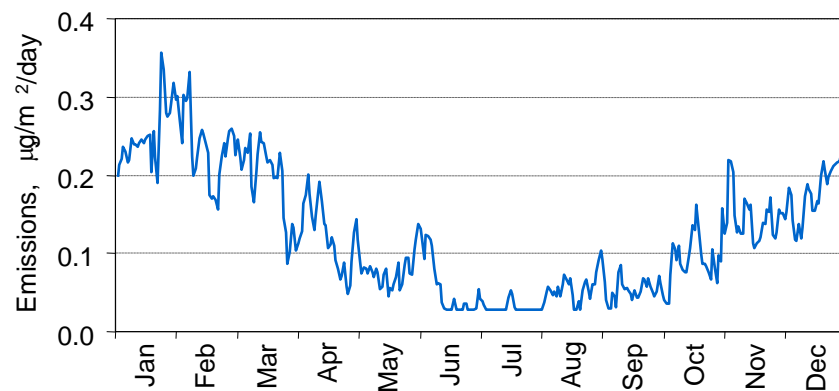


 Sectoral emission data - 42 countries

 No data - 9 countries

Required emission parameters:

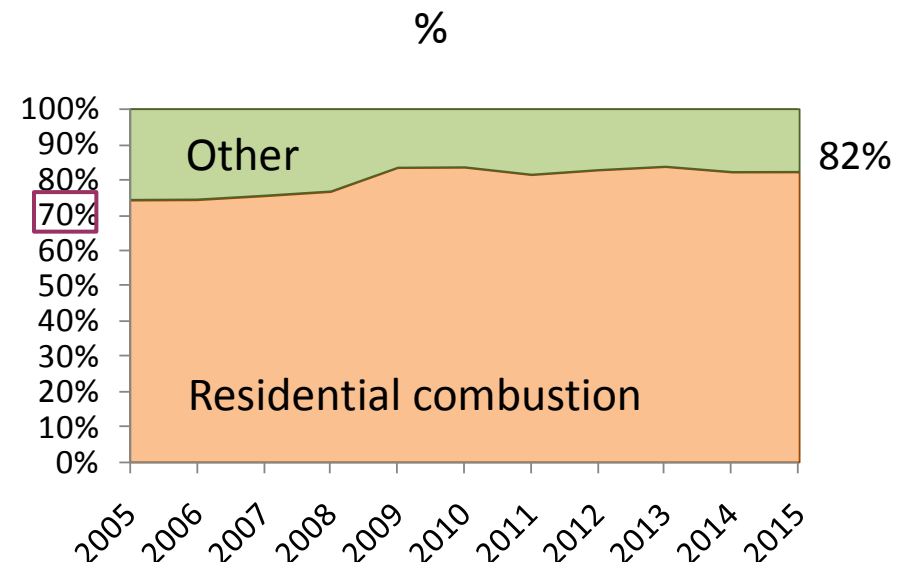
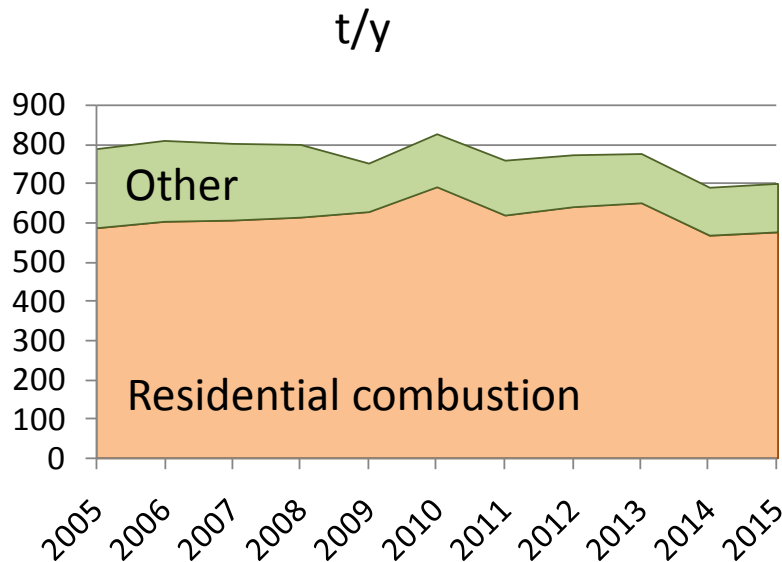
- Gridded emissions ($0.1^\circ \times 0.1^\circ$)
- Seasonal variations
- Vertical distribution
- Global emissions



Seasonal variation of BaP emissions

PAH (BaP) emissions from main source categories in the most of EMEP countries

PAH emissions by sectors



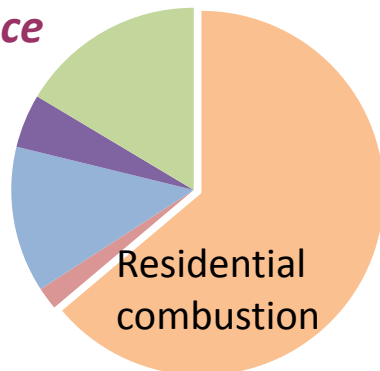
- Residential combustion – the largest contributor of PAH emissions (> 70%)
- Emissions of residential combustion are **almost stable** during the last decade (2005-2015)

BaP emissions from different source categories

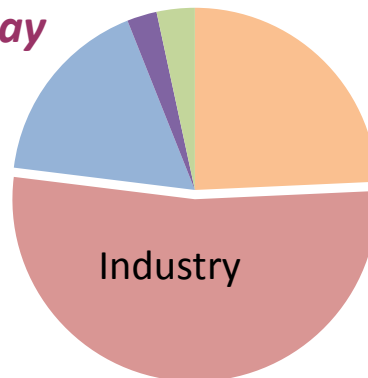
Fraction of emissions from residential combustion, 2015

Countries	BaP, %
Belgium	87
Czech Republic	97
Germany	97
Hungary	97
Poland	80
United Kingdom	90
....	~ 70

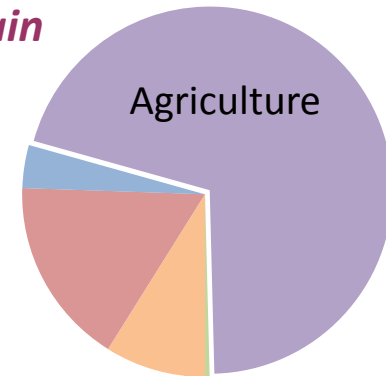
France



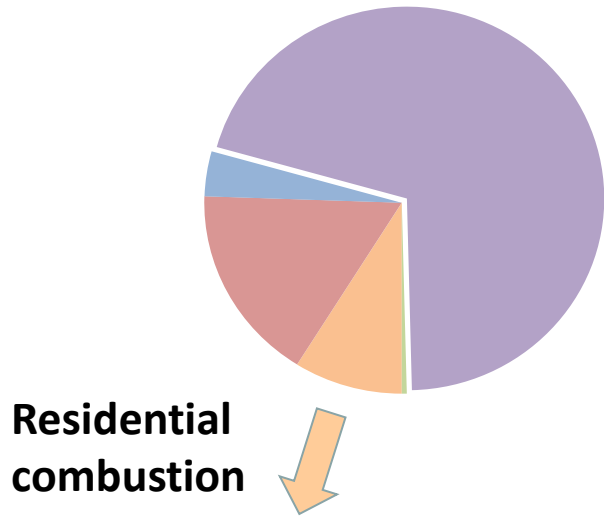
Norway



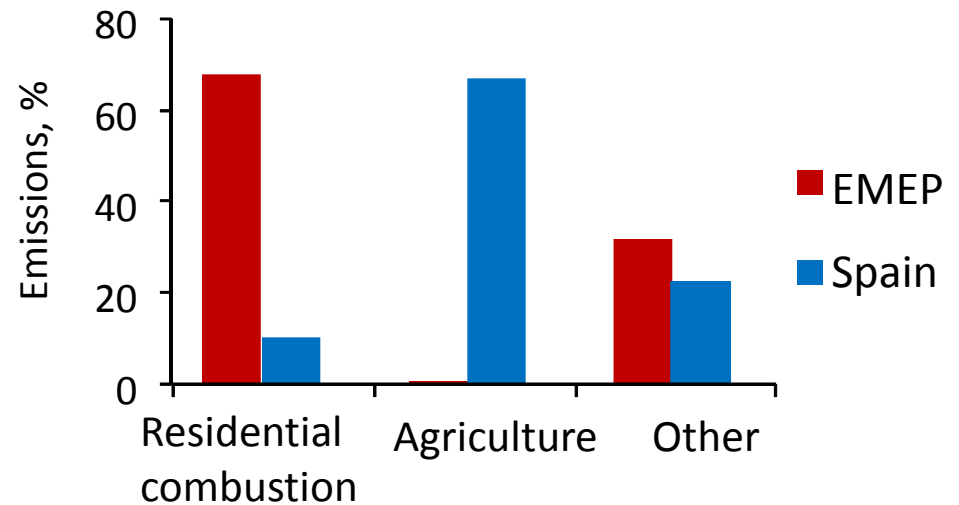
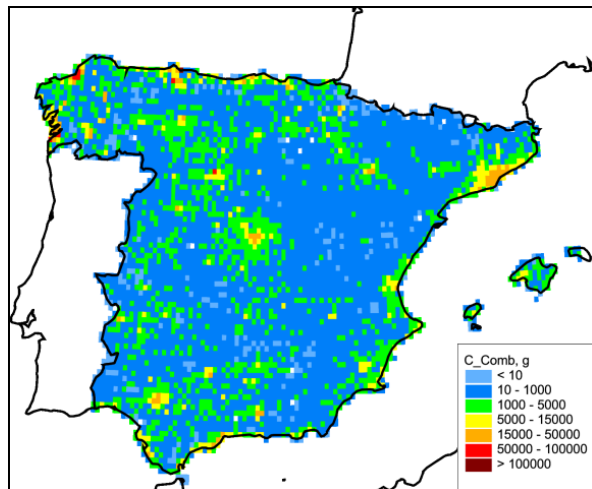
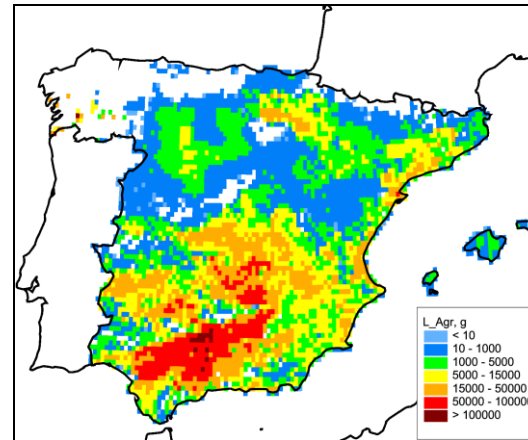
Spain



Peculiarities of PAH (BaP) emissions in Spain: recent inventories - 2017

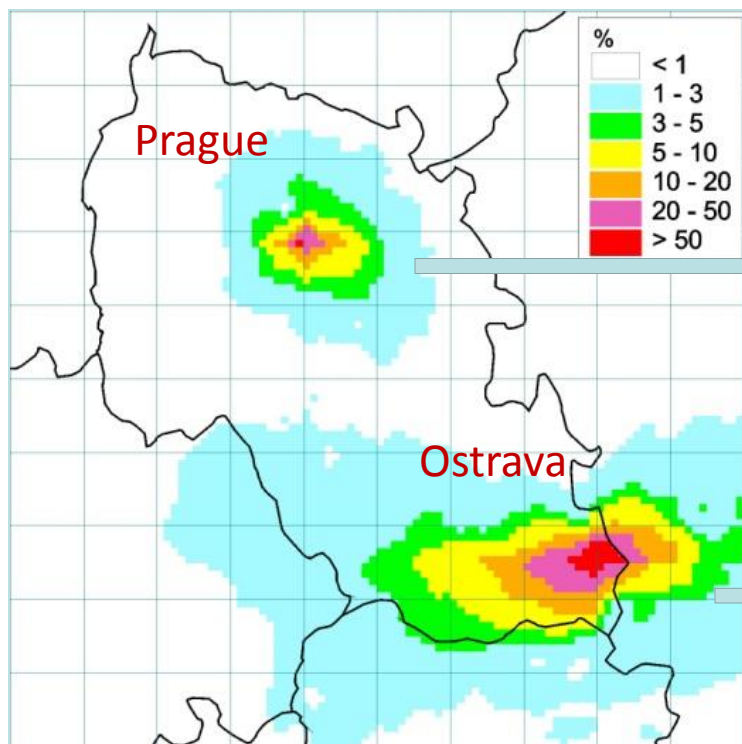


Agriculture

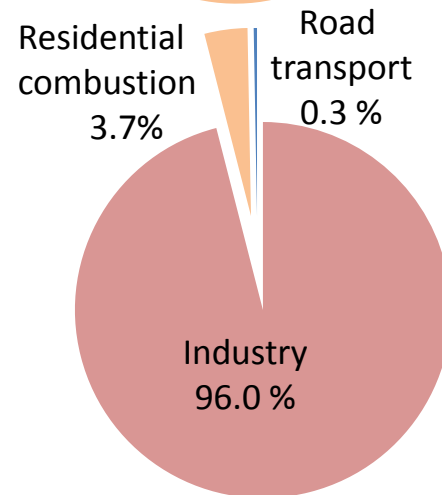
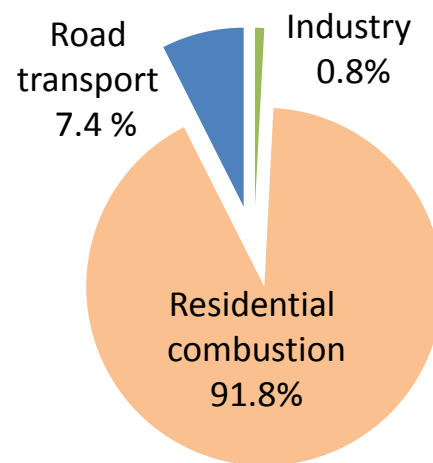


Pollution of cities by BaP from different source categories – Czech Republic

Main sector of BaP emissions in Czech Republic – Residential combustion (97 %)



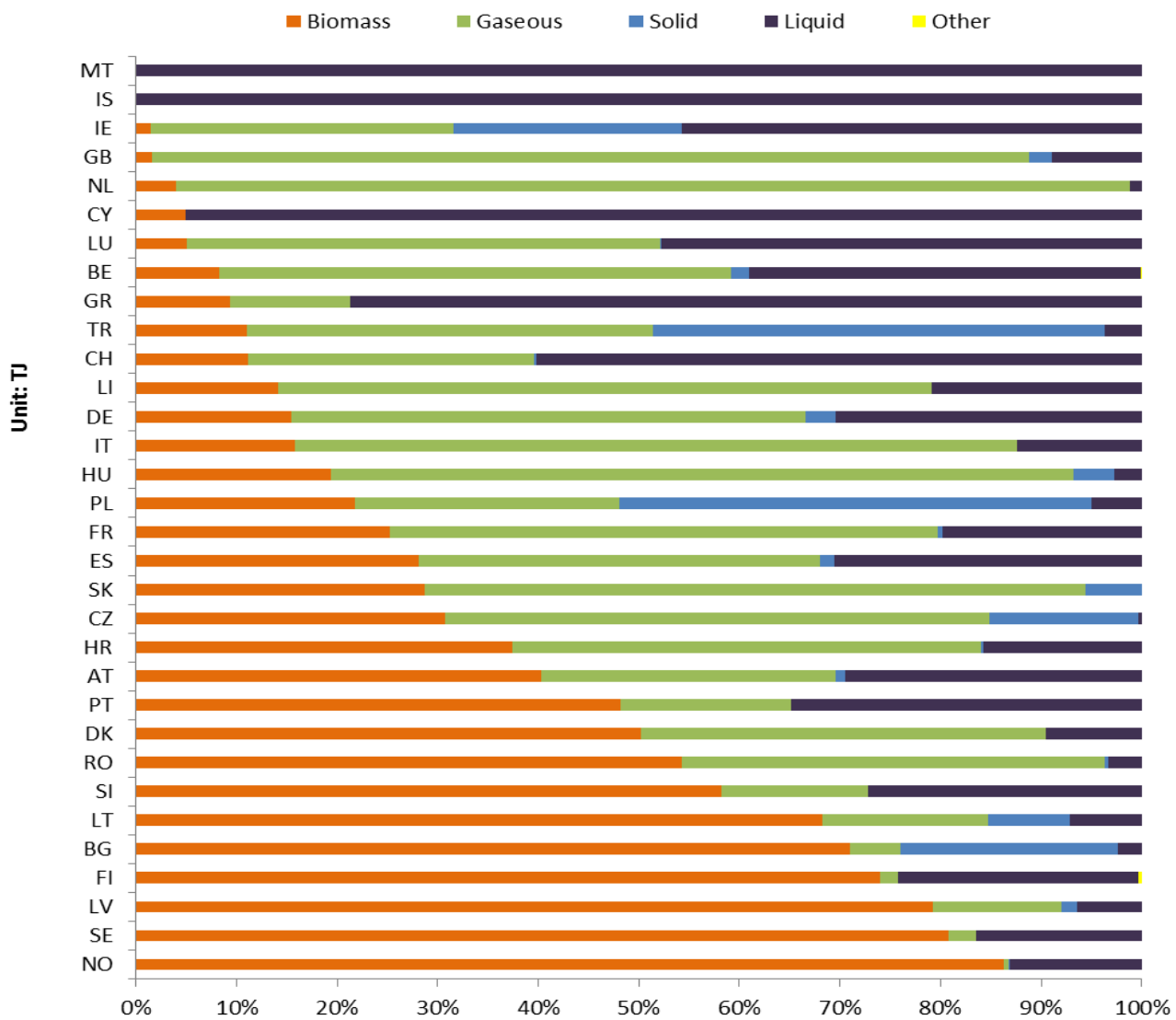
BaP air concentrations



BaP emission from sectors

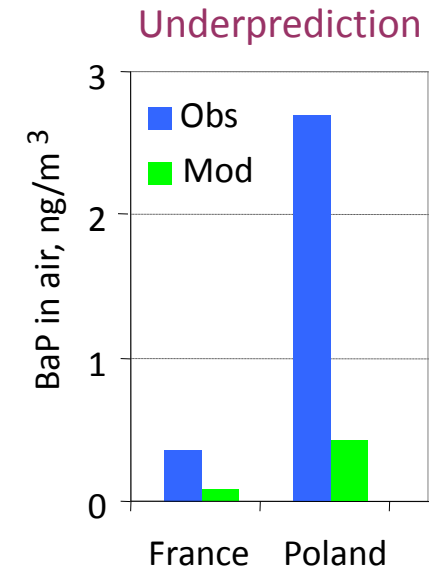
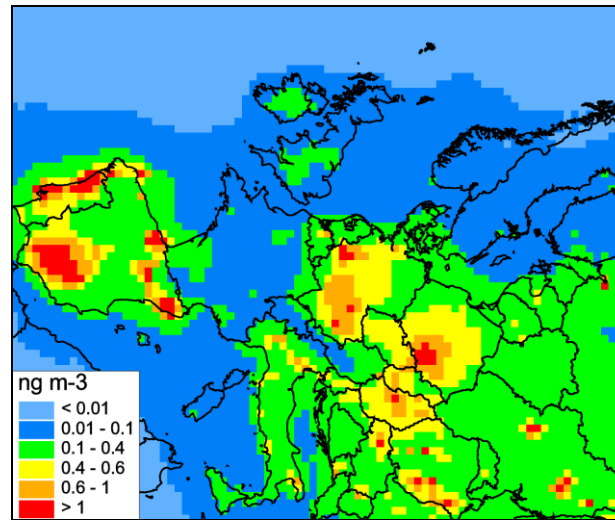
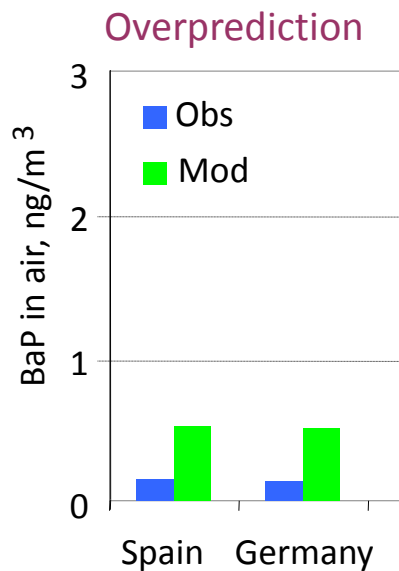
Residential combustion

Fuel consumption per fuel type in 2012



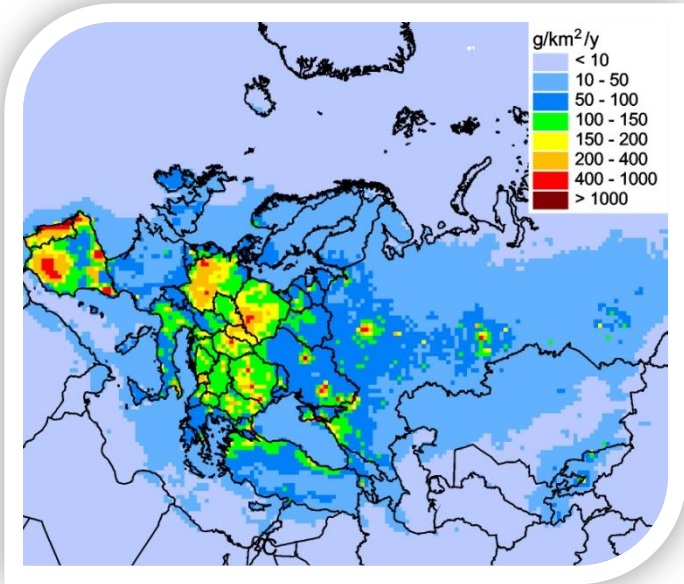
Uncertainties of emission data

BaP pollution in the EMEP countries:
discrepancies between modelling and measurements



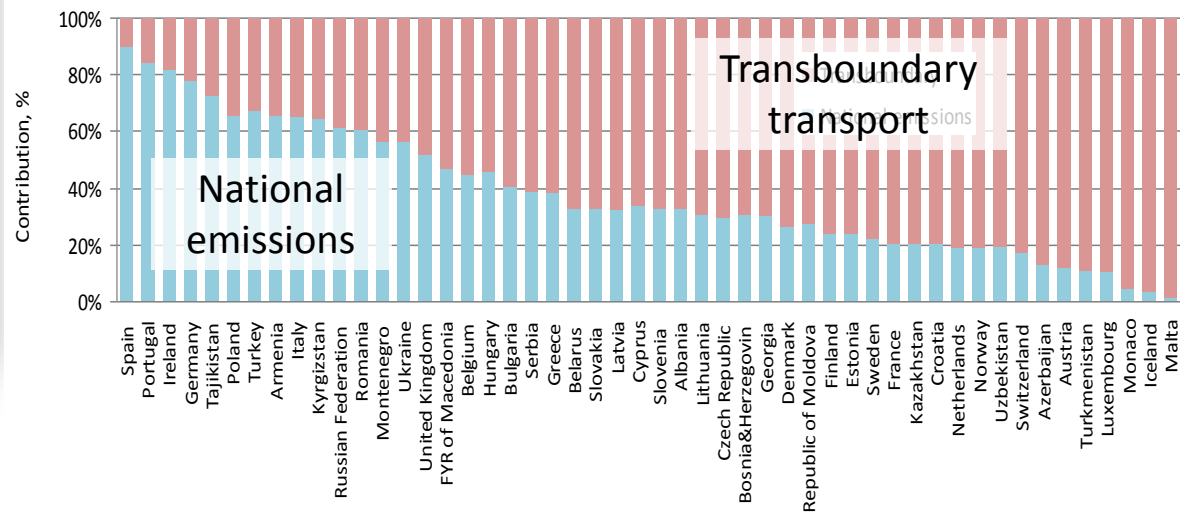
- Germany: “the PAHs emissions in the inventory are likely to be **overestimated**” (*DE IIR, 2017*)
- “**Underestimation** of BaP emissions of France”
CHIMERE modelling study (*Florian Couvidat, TFMM meeting, 2017*)

Transboundary transport of PAH pollution



PAH deposition in 2015

PAH deposition to EMEP countries



For about 70% of the countries contribution of transboundary fluxes exceeded contribution of national emissions to deposition

Future emission activities

Report Air quality in Europe – 2016

3.2 Air pollutant emissions from residential combustion

In European emission inventories, combustion of fuels within the residential sector is the major source of primary **PM2.5** and **PM10**, as well as **BC** and **BaP** emissions, contributing 56 %, 40 %, 46 % and 71 % to emissions, respectively.

Integrated Assessment of Black Carbon and Tropospheric Ozone, UNEP and WMO 2011

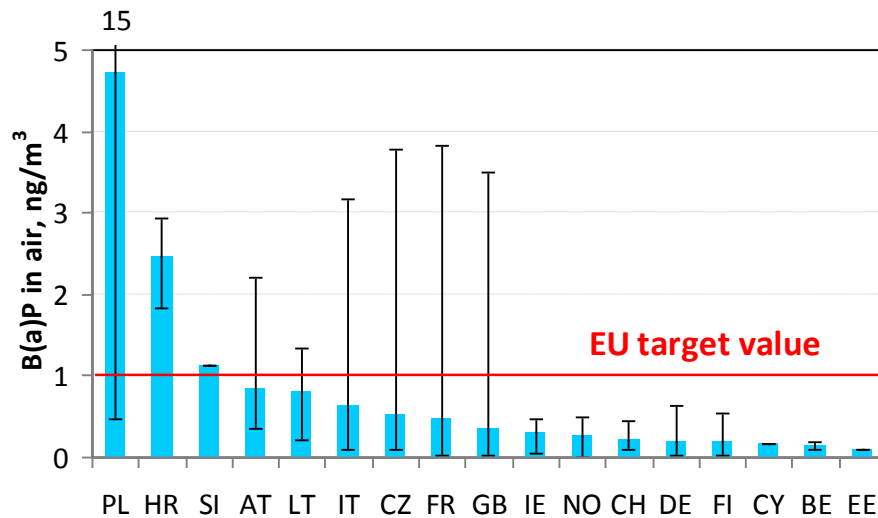
Key findings (emission projections up to 2030)

Without implementation of measures beyond current and planned regulations, emissions of BC, OC and carbon monoxide (CO) are projected to **remain relatively constant to 2030**.

Emissions from **residential biomass combustion** are expected to become even more important in the future than they are today.

Remarks

Protocol on POPs came into force in 2003, but levels of pollution by BaP are still higher than EU target value in many countries



About 35% of sites showed increasing concentrations in period 2005-2015 (> 300 sites)

Protocol on POPs - Article 10

3. The Parties shall review the sufficiency and effectiveness of the obligations set out in the present Protocol. Such reviews will take into account the best available scientific information on the effects of the deposition of persistent organic pollutants, ... and the fulfillment of the obligations on emission levels.

Future work

Report of the ad-hoc Policy Review Group of experts (WGSR)

B. Maximizing the impact of the Convention and its Protocols

Updating the amended Protocols (POPs ...):

Task Force on Techno-economic Issues (TFTEI) explore to what extent the Protocol on POPs could be further developed with respect to UPOPs, especially on PAHs, and explore whether and which stricter measures could be recommended for the UNECE region

Draft 2018–2019 workplan (Steering Body to the EMEP)

1.1.3.1 Analysis of effectiveness of implementation of Protocol on POPs	Contribution to evaluation of stricter measures for mitigation of BaP pollution levels; analysis of trends, key sources and projections Report in 2019	MSC-East in support to <i>TFTEI</i>
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