

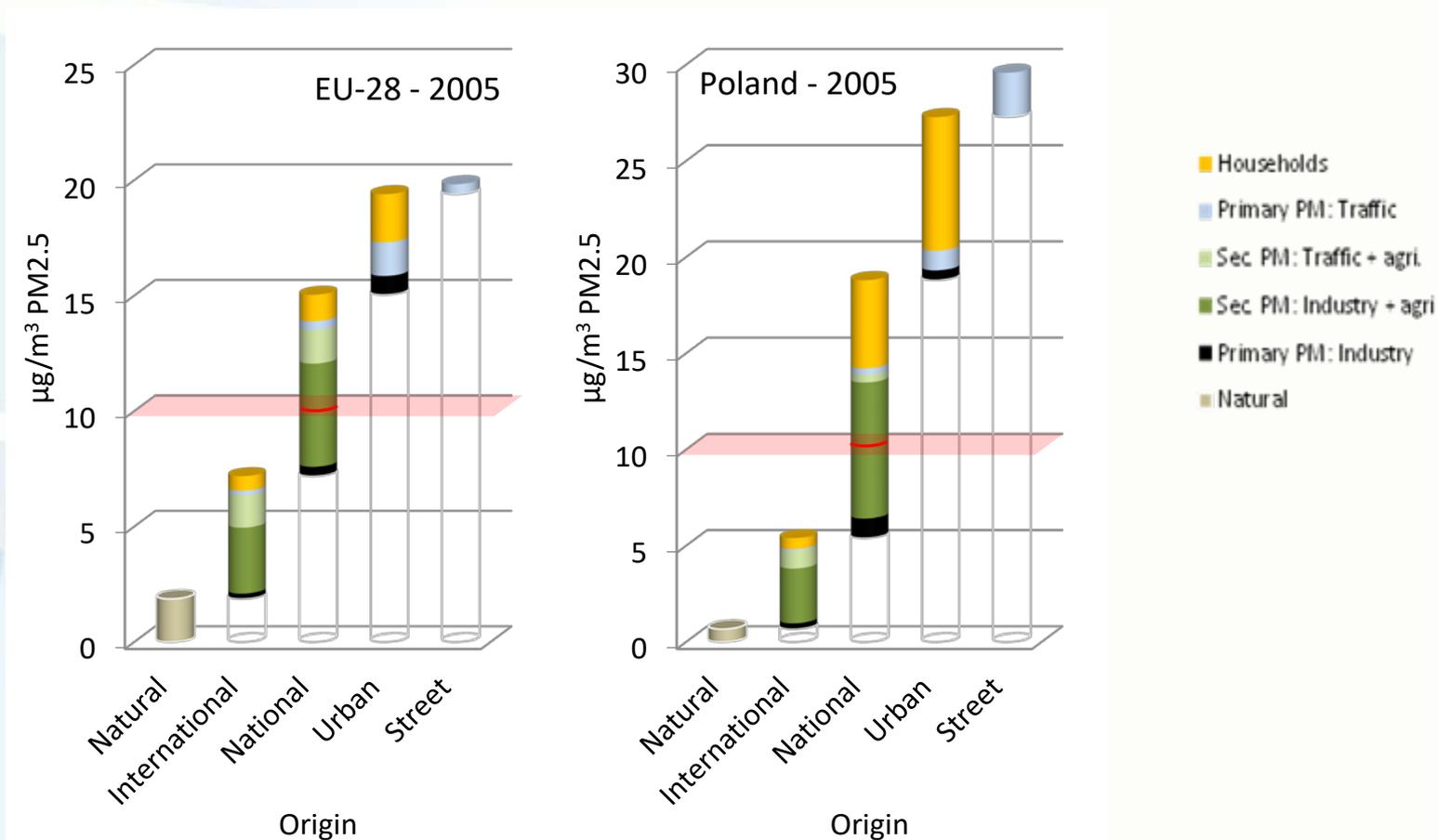
# Emissions from wood/solid fuel burning in the UNECE region

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56<sup>th</sup> session of the WGSR  
Thematic session on solid fuel residential heating as a source of  
the air pollution & short-lived climate forcers

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# Sources of PM<sub>2.5</sub> at the urban traffic stations in 2005

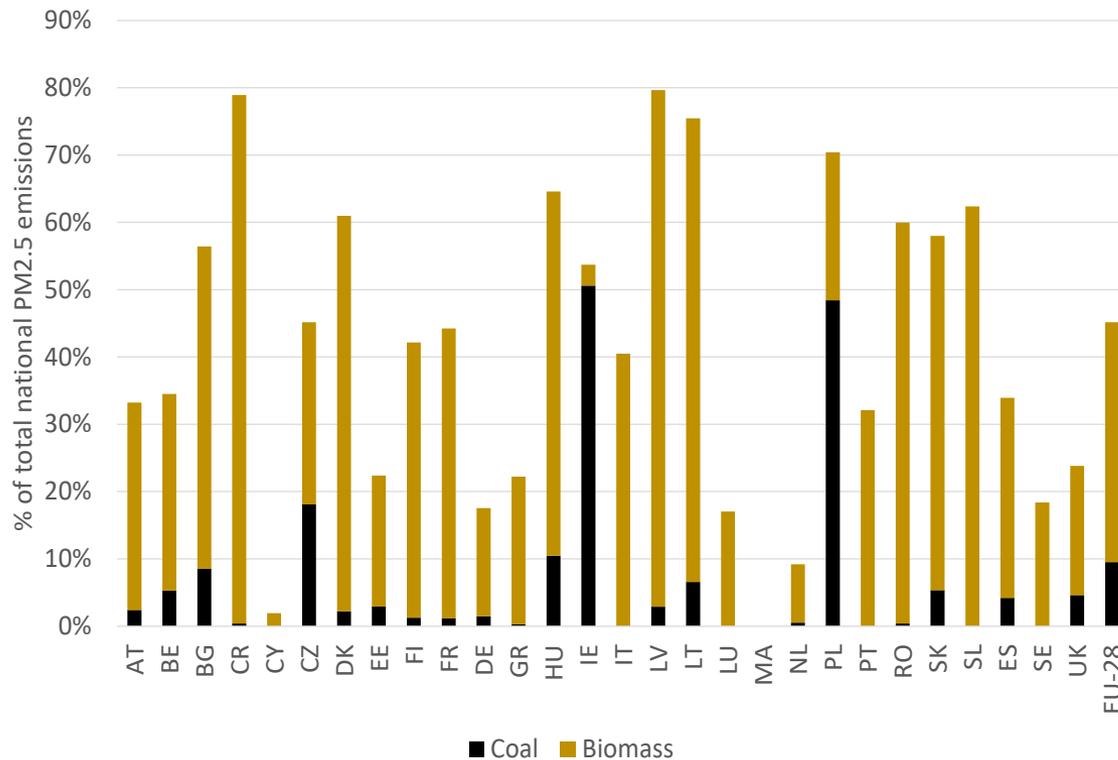


Source: Amann et al. (2018)

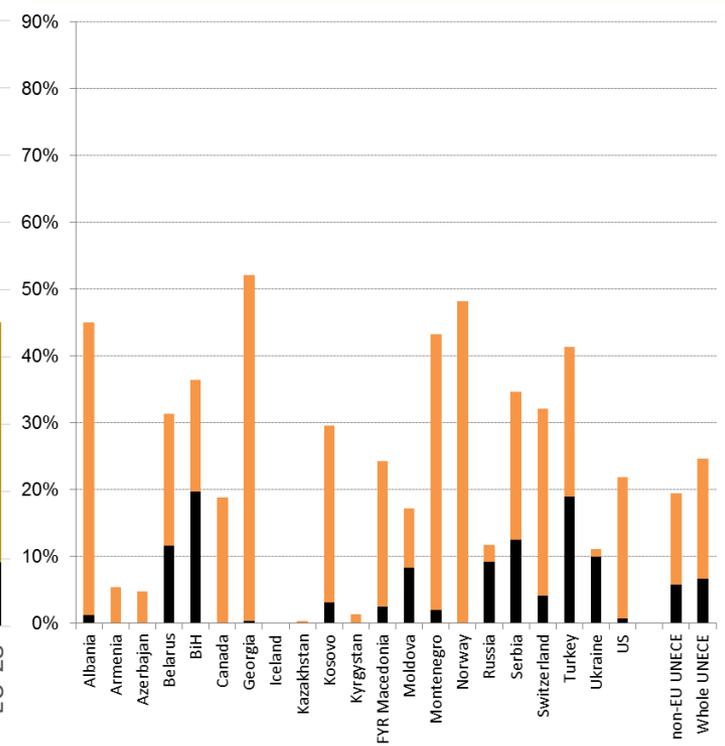
**Note:** These graphs present the contributions from different emission sources to ambient PM<sub>2.5</sub>, for the urban traffic stations that provided for 2009 sufficient data to the AIRBASE database of the European Environment Agency (EEA). The presentations follow the analysis presented in the TSAP Report #12 (Kiesewetter and Amann, 2014)

# Percentage of total national PM2.5 emissions from combustion of coal and biomass in household sector in 2005

## EU-28



## Non-EU UNECE countries

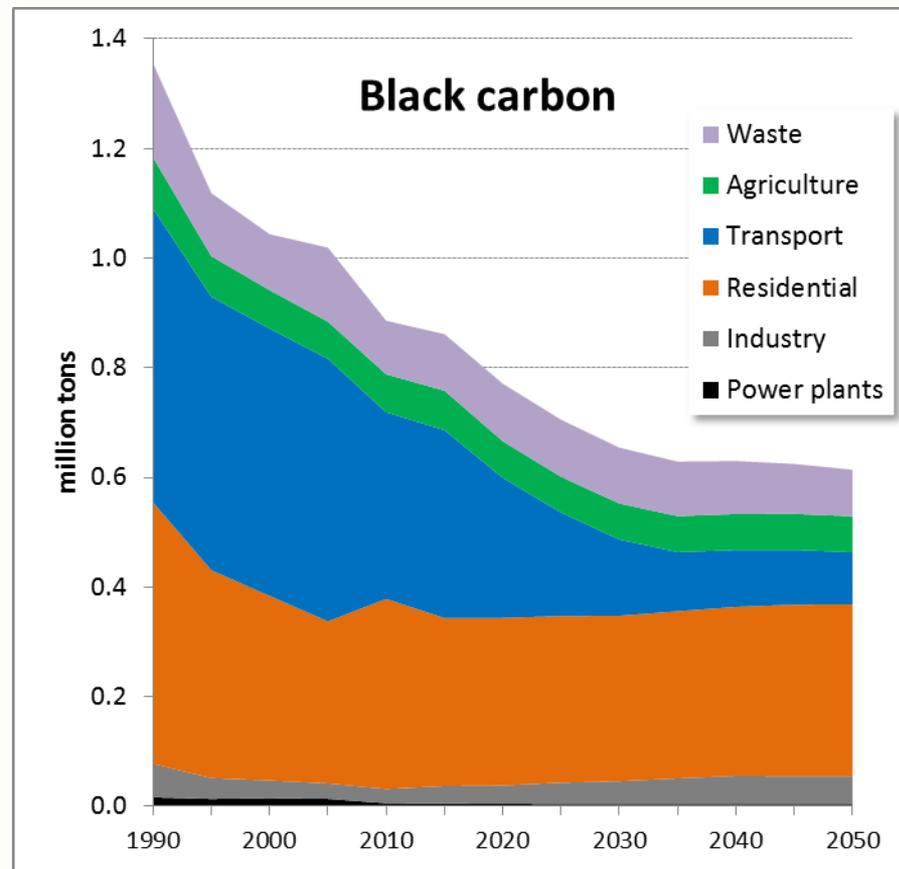
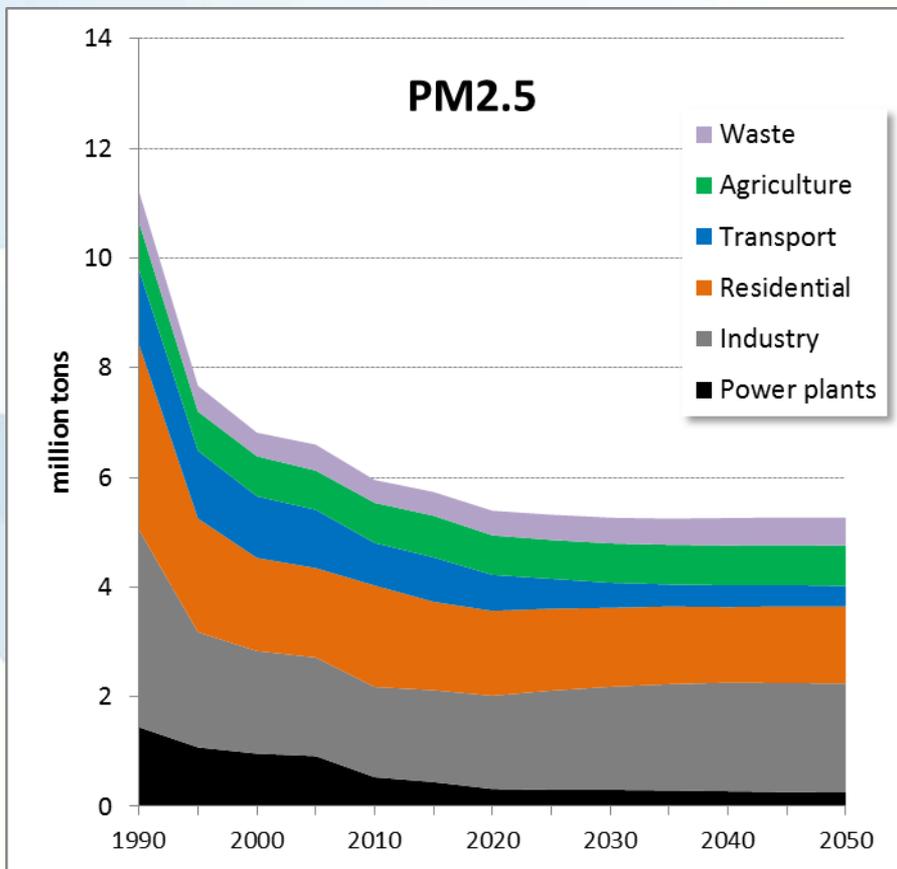


Source: Amann et al. (2018); GAINS model

Sources: Klimont et al. (2017); IEA (2016); GAINS model

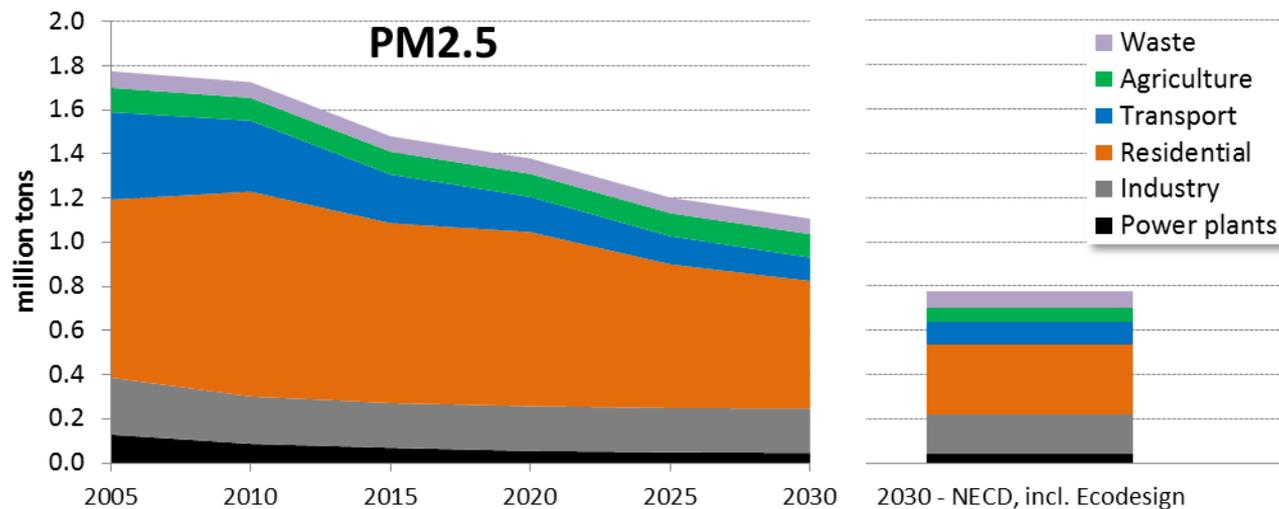
# PM2.5 and BC emission source structure and trends in the UNECE region

*Current legislation scenario, excluding Ecodesign*



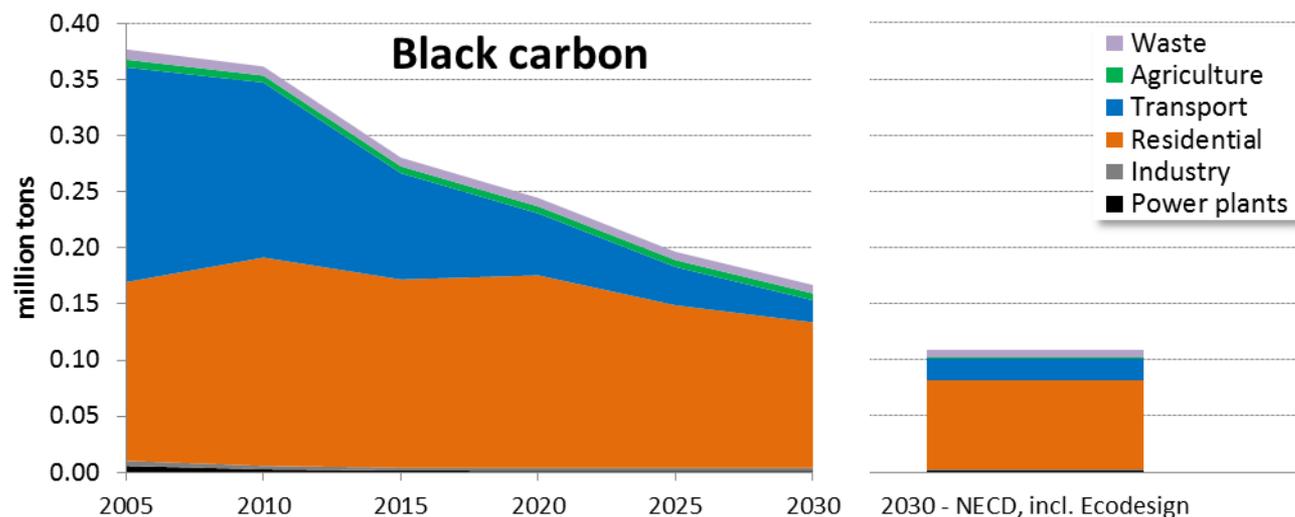
Sources: GAINS model; Klimont et al (2017); IEA, 2016

# Compliance with the NEC Directive brings significant reductions with key contribution from the Ecodesign



This will bring the WHO guideline of 10 micrograms PM2.5 into reach in most EU countries.

Source: Amann et al. (2017)



# 'Good practice' examples

- **Awareness raising:**
  - Environmental labeling (e.g., Blue Angel – Germany, Nordic Swan Ecolabel, EU Ecolabel, TCO Certified – Sweden, The Austrian Ecolabel)
  - Public education – Italy
  - Awareness campaigns – Austria, Switzerland, Germany, Denmark
  - The 'Smoke-man' campaign – Czech Republic
  - The Interreg project PMinter – Austria and Slovenia
  - 'Club of professionals of wood heating systems' – Région Grenobloise, France
- **Provision for proper installation and maintenance**
  - Inspection and maintenance – Germany, Zurich
- **Emission standards**
  - Regional and Federal stringent standards - Germany
- **Financial incentives**
  - For energy efficient technologies (Austria), replacement of solid fuel boilers (Czech Republic), 'Prime Air Bois' - Vallée de l'Arve (France)
- **Bans**
  - Wood stoves – Italy; coal –Ireland; solid fuels – Poland

# Case studies (selected examples)

- **Ireland/Dublin – Ban of bituminous coal for household heating**
  - From Sept 1990 use of coal banned in Dublin
  - 25 other cities followed
  - Estimated impact: Monitoring data shows decline of PM10, estimated 350 fewer premature deaths
  - From 2018 expected to be nationwide
- **Italy/Lombardy – Wood burning in small appliances**
  - Since 2002 several regulations addressing solid fuel burning (emissions, efficiency, fuels)
  - Estimated impacts: By 2014 65% reduction in PM10 emissions from household heating
  - From 2020 bans to install older type fireplaces and stoves
- **Poland/Cracow – Ban of solid fuels**
  - From Sept 2019 banning solid fuels, mandating replacement of coal-fired stoves, expand city's gas distribution network and modernize district heating
  - Estimated impacts: not assessed yet

Source: Amann et al. (2018)

# Knowledge gaps

- The current reporting of PM within LRTAP is inconsistent (filterable/condensable PM); TFEIP and its Expert Panels work towards developing procedures for harmonization
- Poor historical estimates translate into poor scenarios:
  - Activity data (region- and sector-specific fuel-technology distribution)
  - Emission factors (including impact of mitigation measures on PM and BC)
- Effectiveness of current and future policies (enforcement)
- Assumptions about feasibility of mitigation

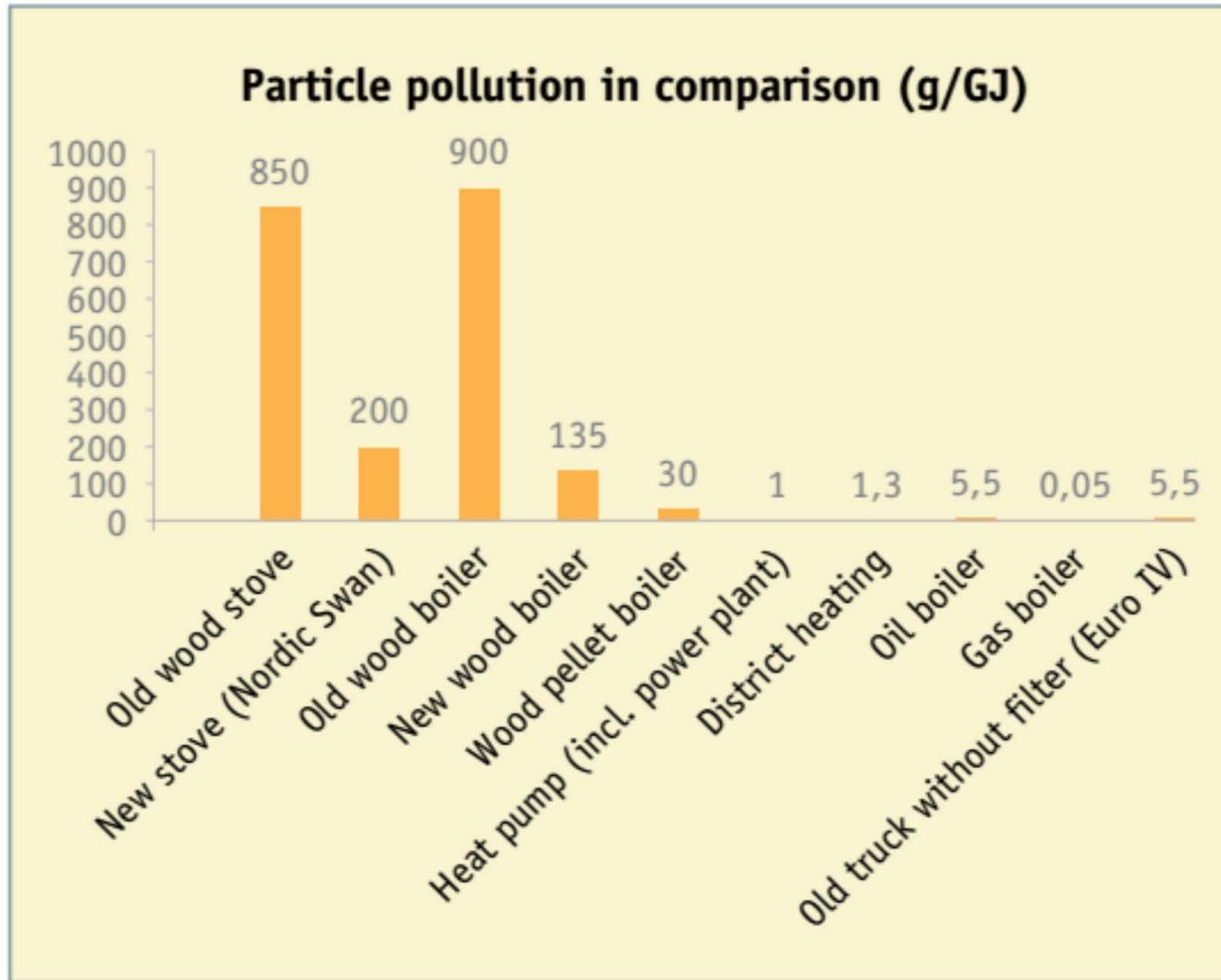


Figure 5: Particle pollution (PM<sub>2.5</sub>) of different heat sources compared with a diesel truck (data from Denmark). | Sources: Helge Rørdam Olesen, DCE, University of Aarhus, Denmark.

# Summary

- Residential heating contributes nearly 50% of total PM<sub>2.5</sub> emissions in the EU-28 and 30% in the whole UNECE area, with important regional variability and increasing trend;
- Residential heating emissions of PM<sub>2.5</sub> and its precursors are key contributors to ambient PM<sub>2.5</sub> exposure;
- Residential heating emissions mostly from biomass and coal combustion;
- Official reporting has been producing more data (for PM and BC from residential combustion) but significant uncertainties remain;
- Residential heating is a key source of black carbon in the UNECE region (nearly 40% in 2015); with declining emission from diesel engines it becomes by far the most important source in most countries;
- Black carbon contributes to climate warming but it is not emitted alone, organic carbon emissions are cooling the atmosphere but when deposited on snow and ice contribute to positive forcing;
- Effective mitigation measures (including various incentives) exist and most recent air pollution legislation in the EU and few other countries is expected to employ them...monitoring and enforcement is key;

# References

Reports available from the **Clean Air Outlook** site:

[http://ec.europa.eu/environment/air/clean\\_air/outlook.htm](http://ec.europa.eu/environment/air/clean_air/outlook.htm)

- Amann *et al.* (2017) *Progress towards the achievement of the EU's air quality emission objectives*. Report under Specific Agreement 11 under Framework Contract ENV.C.3/FRA/2013/00131 of DG-Environment of the European Commission
- Amann *et al.* (2018) *Measures to address air pollution from small combustion sources*. Report under Specific Agreement 11 under Framework Contract ENV.C.3/FRA/2013/00131 of DG-Environment of the European Commission

Other sources:

- Klimont *et al.* (2017) Global anthropogenic emissions of particulate matter including black carbon. *Atmospheric Chemistry and Physics* 17 (14): 8681-8723. DOI:10.5194/acp-17-8681-2017
- IEA (2016) WEO-2016 Special Report: Energy and Air Pollution. International Energy Agency, Paris.

