

## Technical Meeting

Zagreb, Croatia  
27-29 June 2016

## WG2 Emissions

# Improving emissions from the residential combustion sector

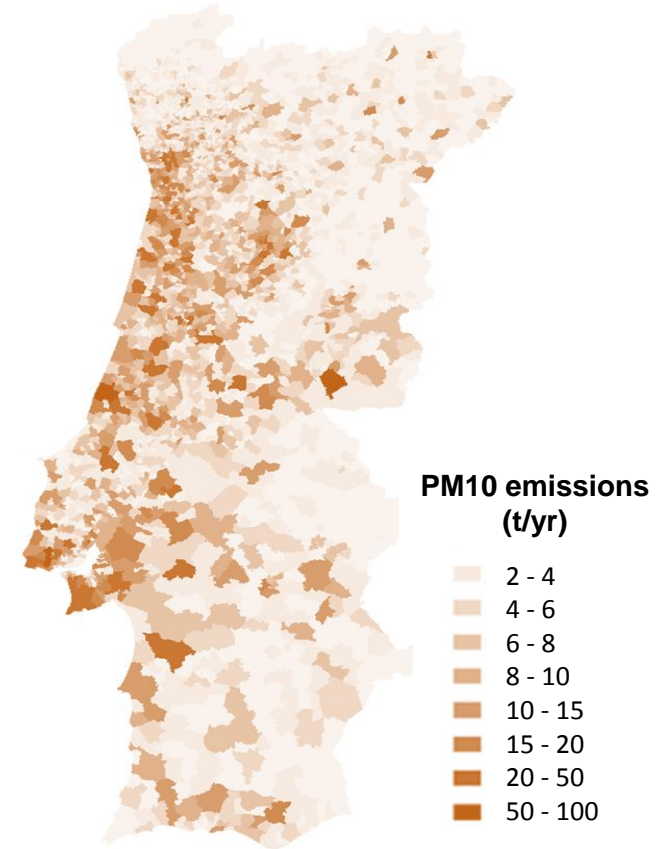
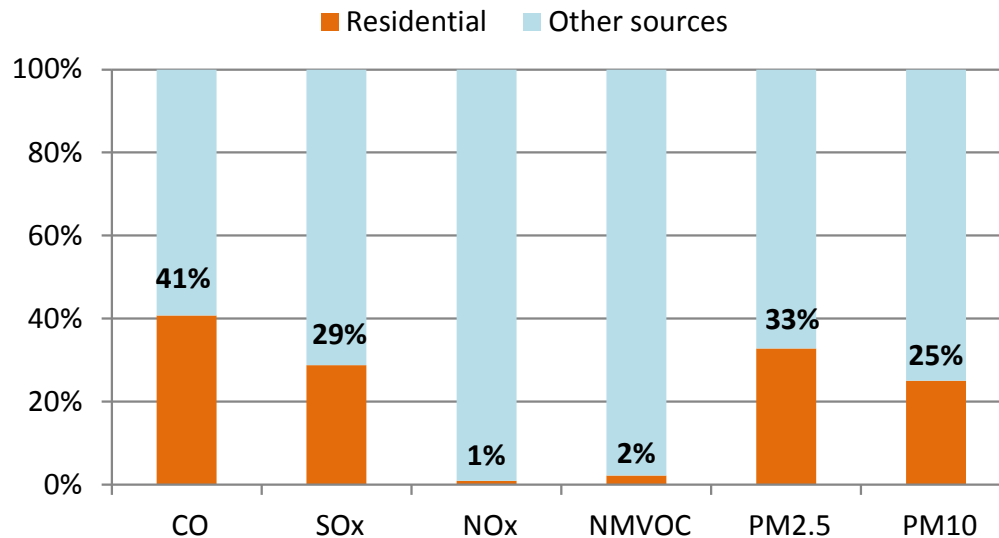
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# Motivation

## Contribution of the residential sector to the total emissions of CO, SO<sub>x</sub>, NO<sub>x</sub>, NMVOC, PM<sub>2.5</sub>, PM<sub>10</sub> for the year 2012

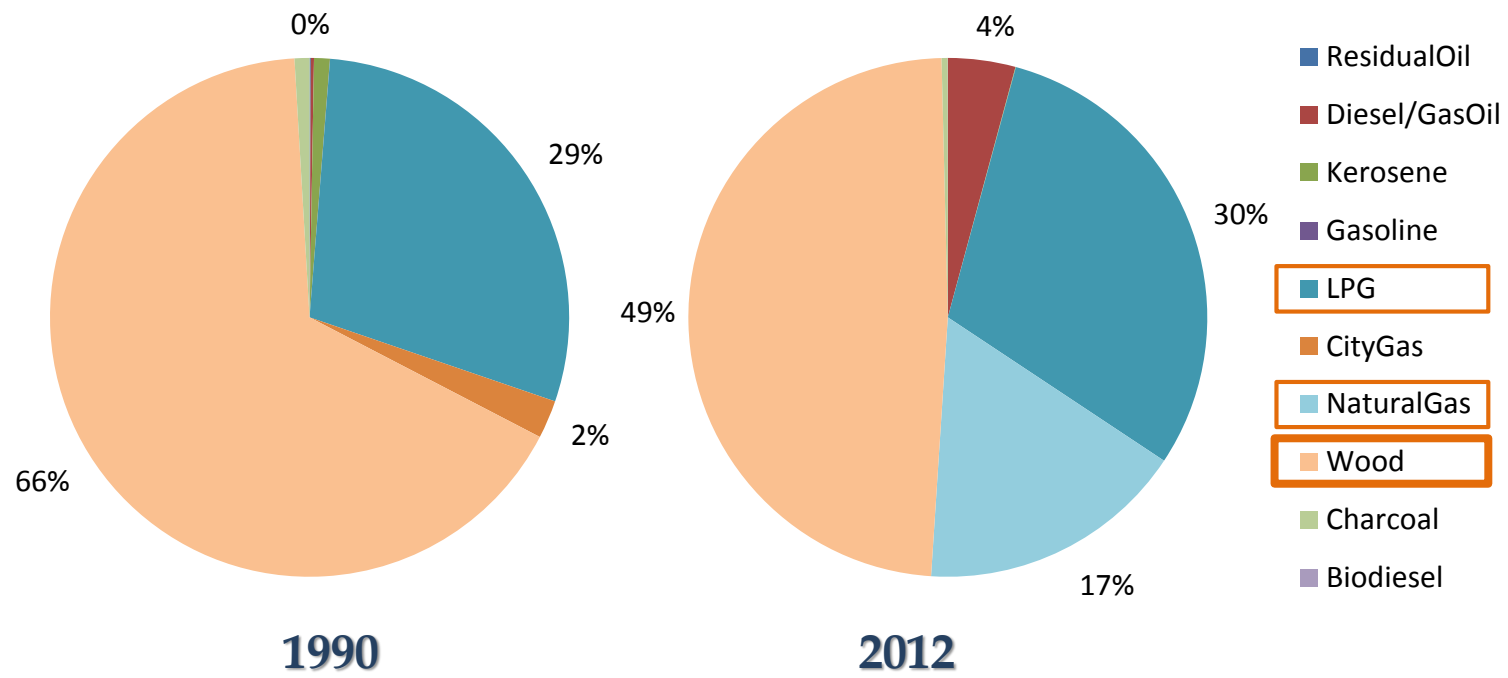


- This sector is important for some pollutants
- Emissions have been spatially distributed according to population density

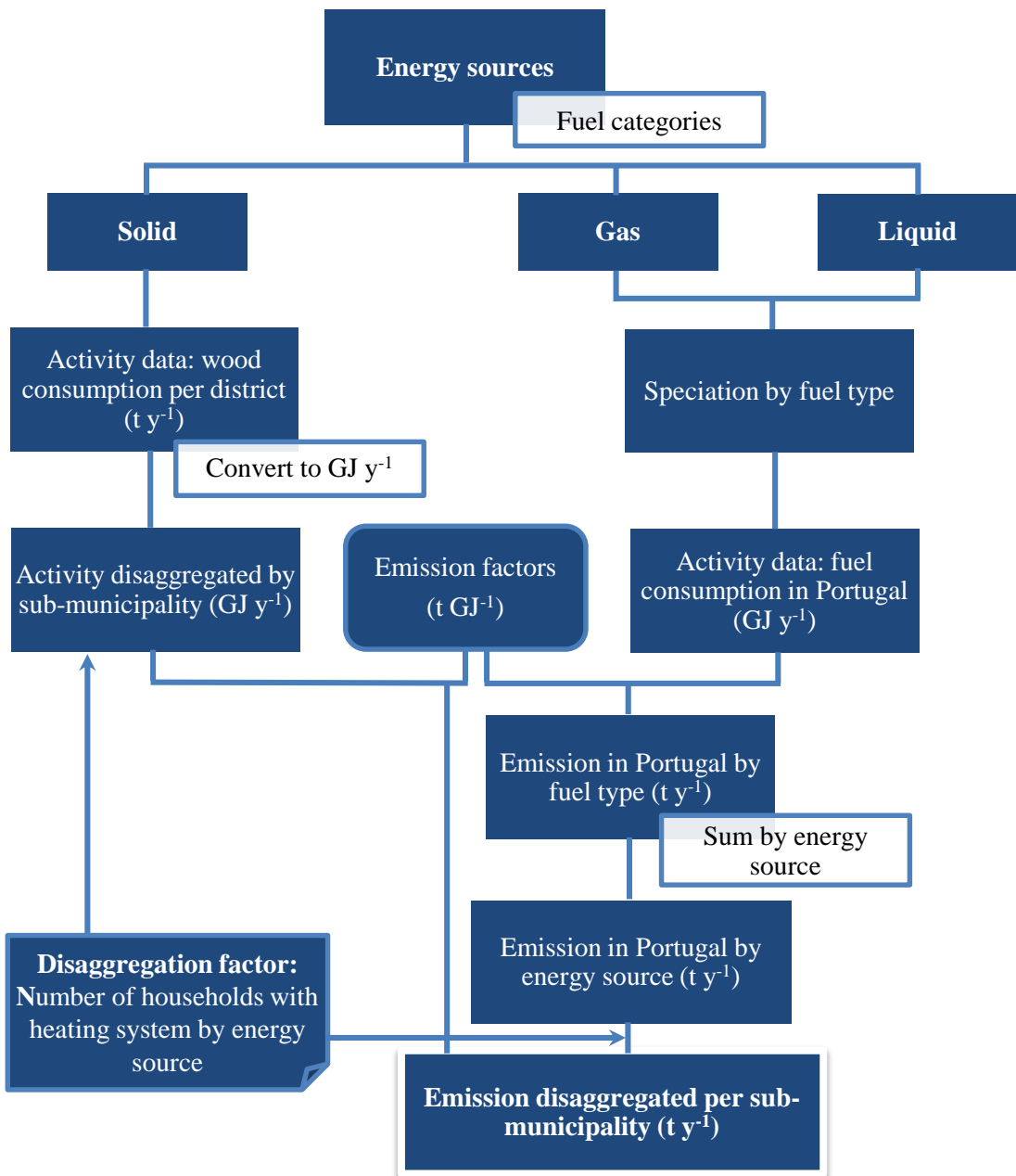
# Motivation

## Energy consumption in the residential sector

share of fuel type



# Methodology



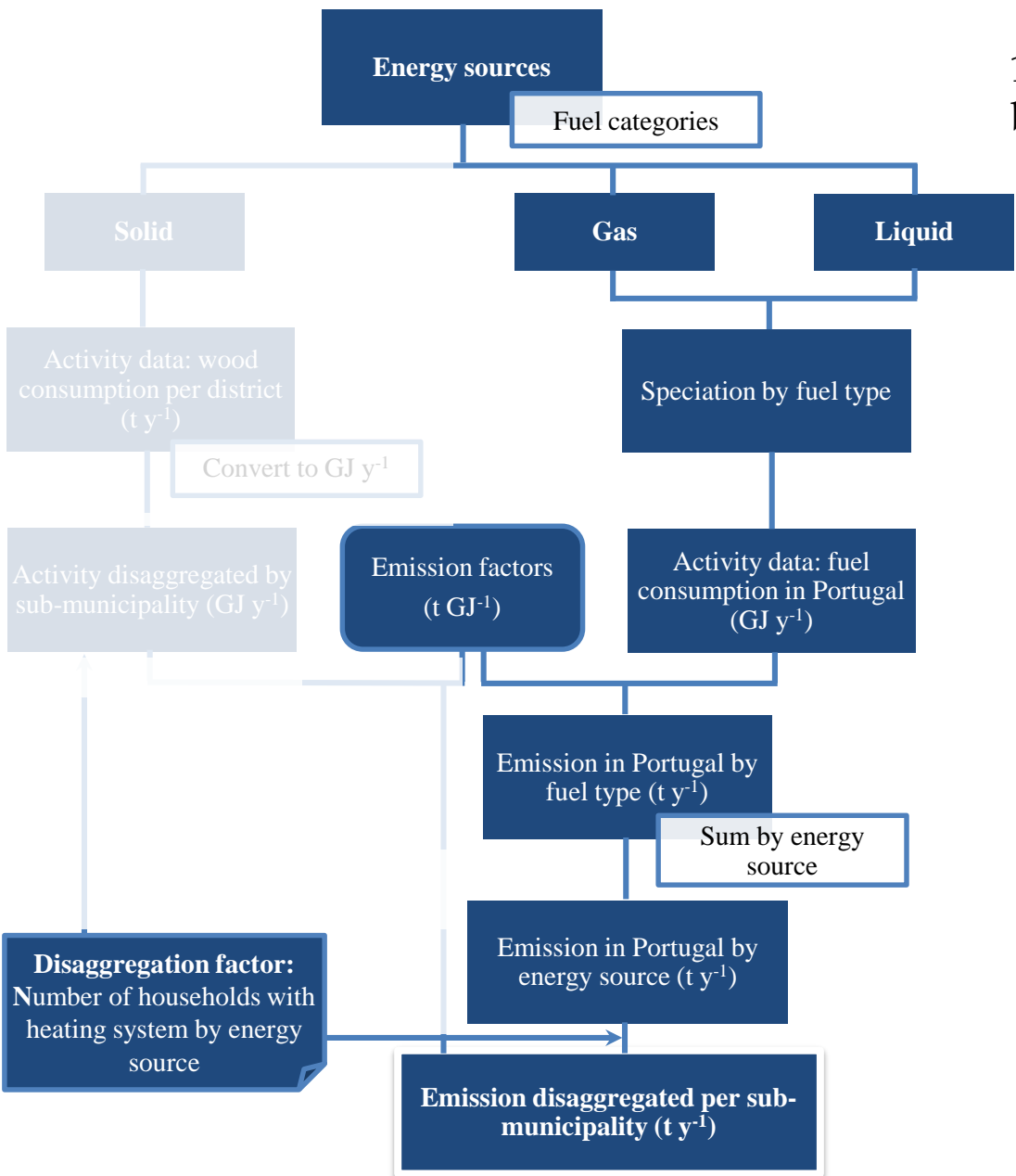
## Assumptions to disaggregate emission/activity data at the sub-municipality level:

- Residential combustion emissions are only arising from the use of heating system
- There is one heating equipment per household
- The same fuel consumption by equipment type is considered for each energy source

## Pollutants:

- PM2.5
- PM10
- NOx
- SO<sub>2</sub>
- VOCs
- CO

# Methodology



1) Total emissions per fuel type for PT, based on speciation by fuel type (f)

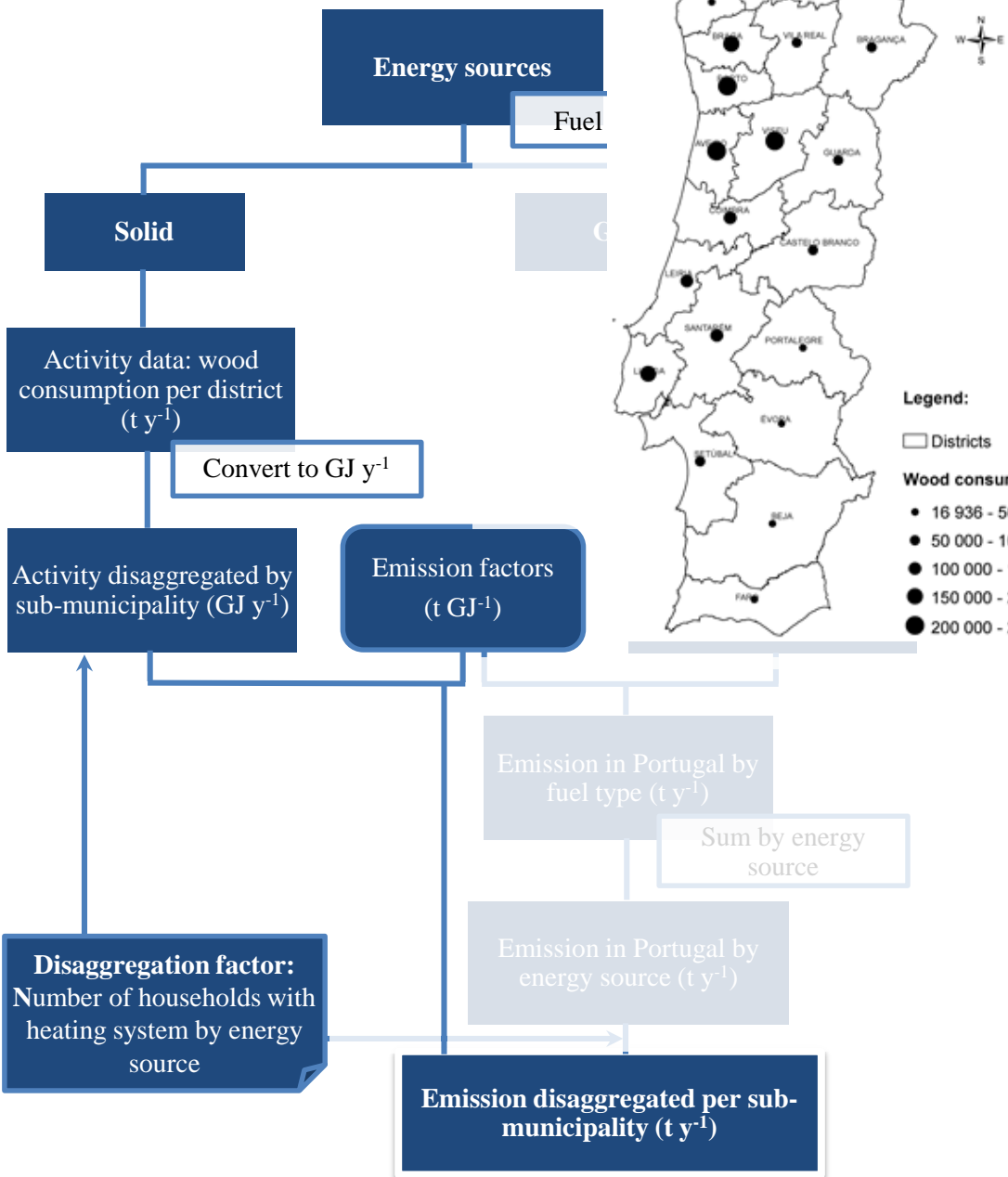
$$Em_f = Act\ data_f \times EF_f$$

2) Emissions per fuel type summed up into fuel categories - liquids and gaseous

Fuel type (f)	Category
Residual Oil	Liq
Diesel/Gas Oil	Liq
Kerosene	Liq
Motor Gasoline	Liq
LPG	Liq
City Gas	Liq
Natural Gas	Gas
Wood	Bio
Charcoal	Bio
Biodiesel	Bio

3) Emissions disaggregation by number of equipments (fed by liquid/gaseous fuels) at submunicipality level

# Methodology



1) Wood consumption converted into energy and adjusted to national total

2) Activity (wood consumption) disaggregated to submunicipality level based on wood consumption by district and nr of equipments

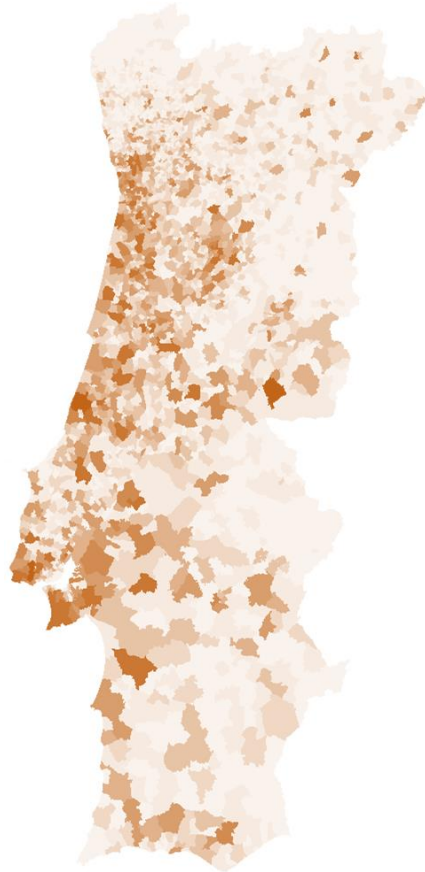
3) Recalculate emissions at submunicipality level based on EF

$$Em = Act\ data \times EF$$

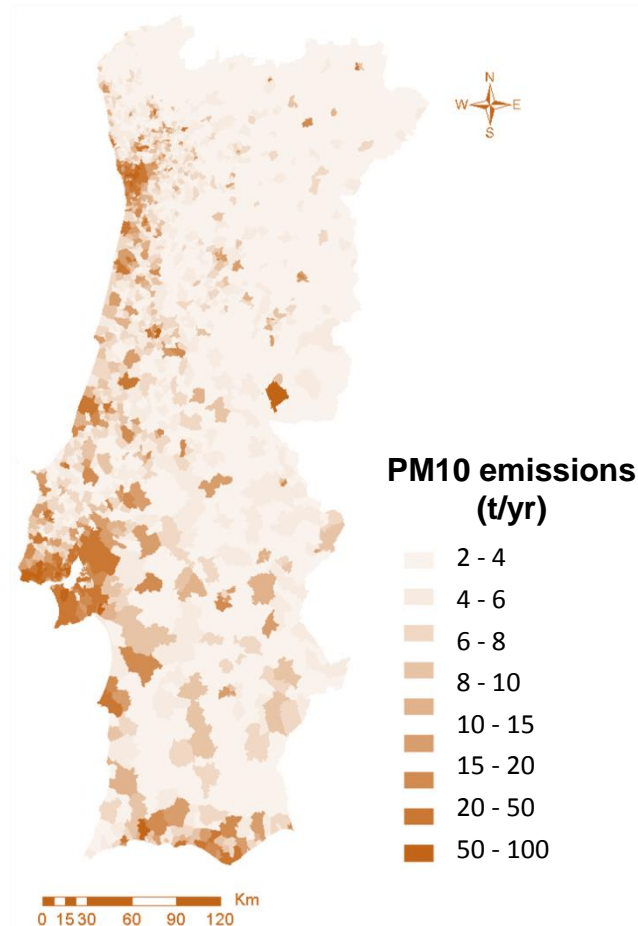
# Results

Spatial distribution of **PM10 emissions (t y<sup>-1</sup>)** from the residential combustion at submunicipality level using both approaches

**New**  
(recalculated)



**Old**  
(disaggregated by population)

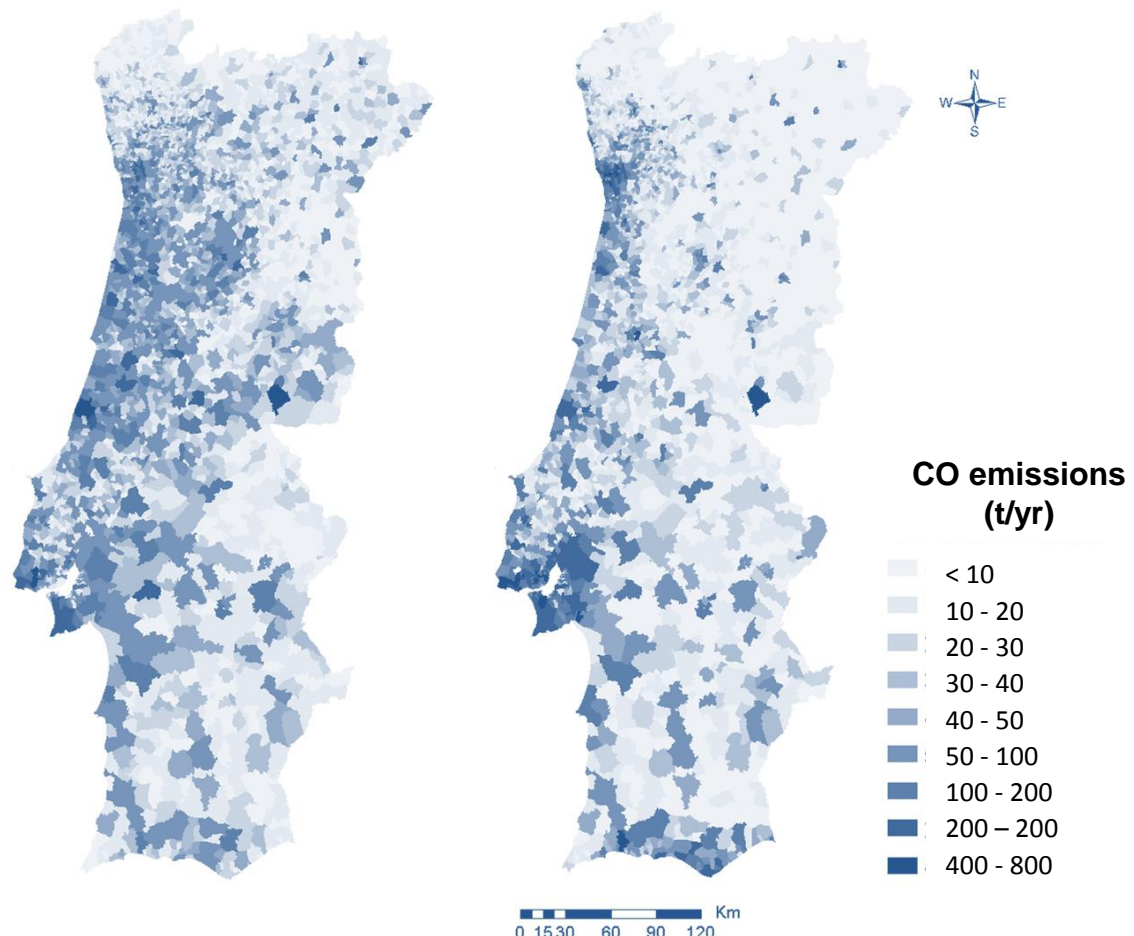


# Results

Spatial distribution of **CO emissions (t y<sup>-1</sup>)** from the residential combustion at submunicipality level using both approaches

**New**  
(recalculated)

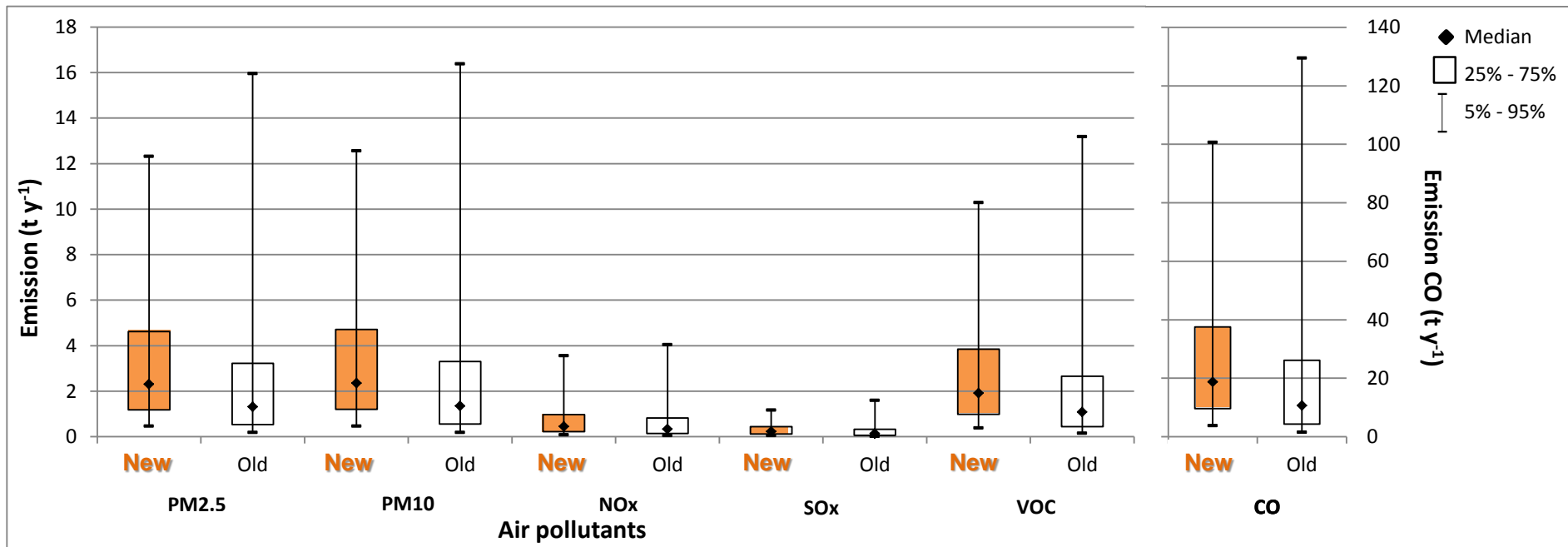
**Old**  
(disaggregated by population)





# Results

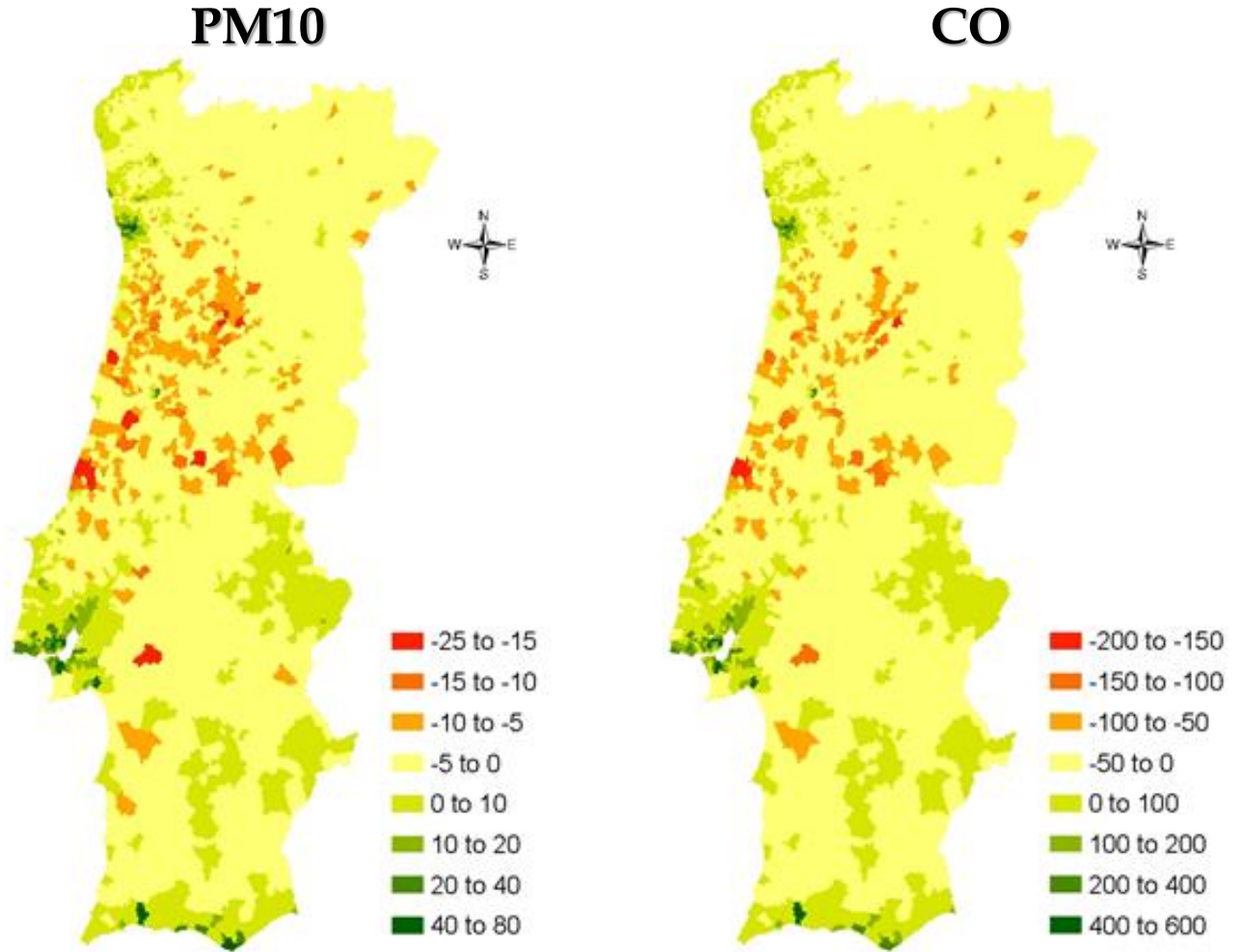
Residential combustion **emissions of all pollutants (t y<sup>-1</sup>)**  
for **both approaches** based on sub-municipality data



New approach: lower maxima (P95)  
lower minimums (P5)  
smaller ranges of values

# Results

**Absolute difference** between emissions obtained by **old and new approaches** ( $t\ y^{-1}$ ) for **PM10** and **CO** at the sub-municipality level (Old-New)



# Questions/challenges

- Is this approach a better proxy for emission disaggregation than population data?
- Are there any alternative methodologies?
- Comments/suggestions?