

# Impacts of biodiesel on air pollutant emissions and air quality

## Northern Portugal case study



I. Ribeiro | P. Cascão | A. Monteiro | M. Lopes | R. Tavares | J. Figueira de Sousa | A.I. Miranda | C. Borrego

# The BIOG AIR project

Impacts of biomass to energy chain on air quality and Portuguese climatic policy



1. Characterization of biomass to energy chain

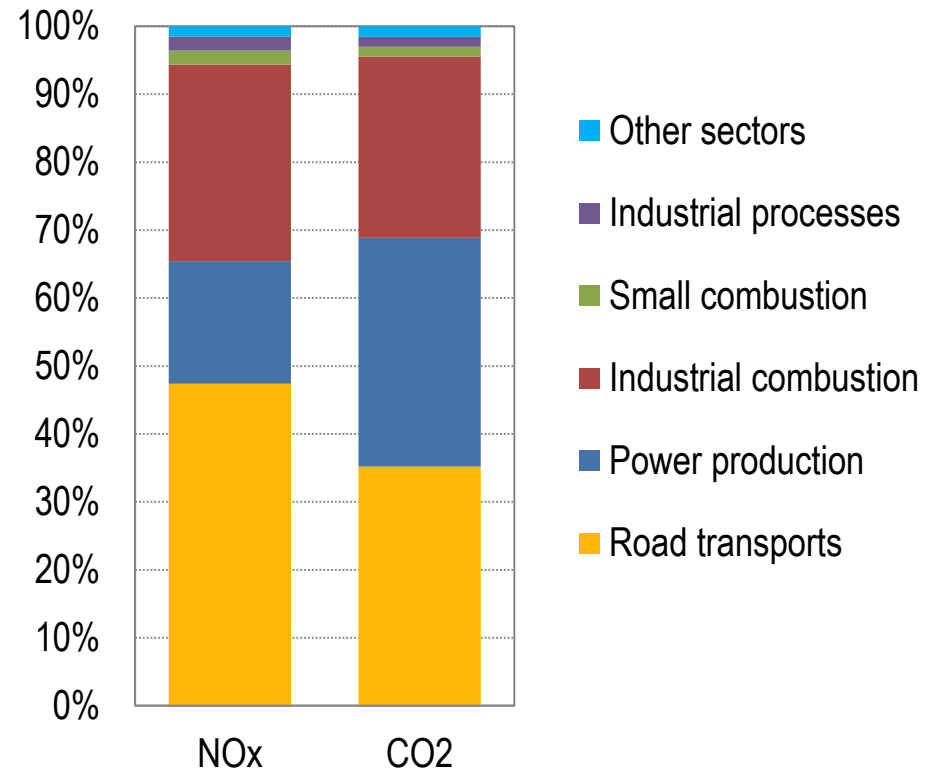
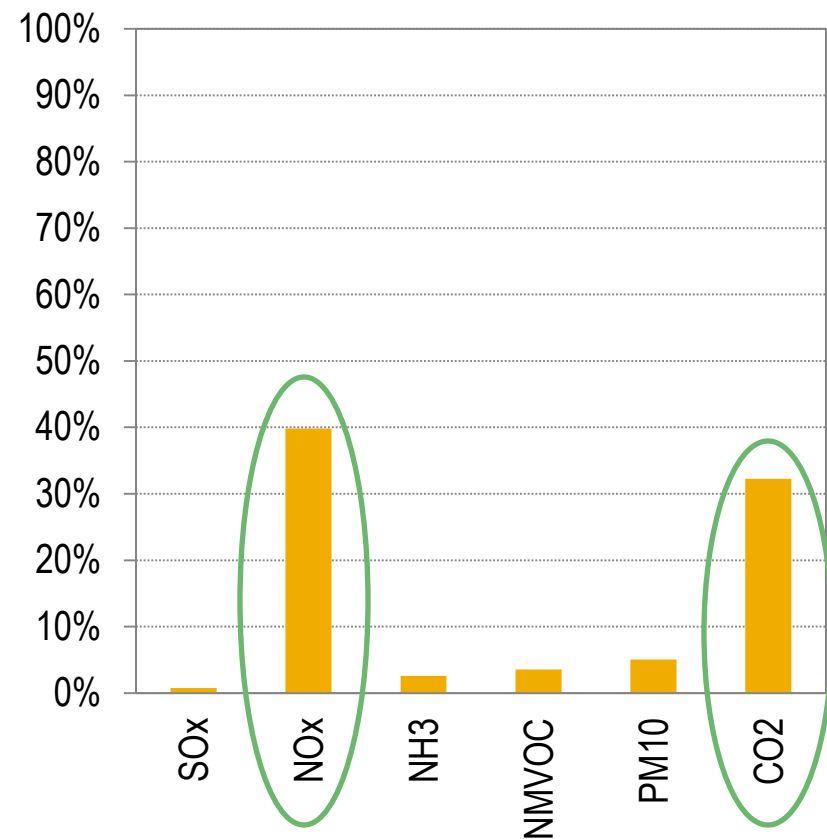
2. Emission scenarios development

3. Air quality assessment

[www.ua.pt/gemac/biogair](http://www.ua.pt/gemac/biogair)

# Motivation

## Weight of road transport in total emissions



# Motivation

Kyoto Protocol | ECCP

Climate Change

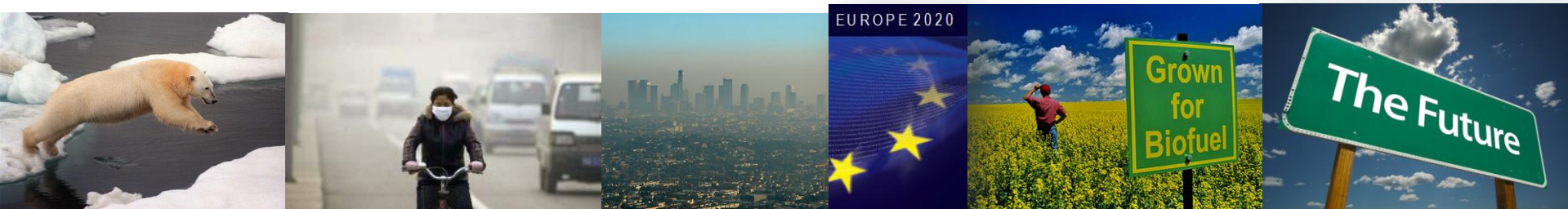
RED | RoadMap 2050

Energy

CAFE

Air quality

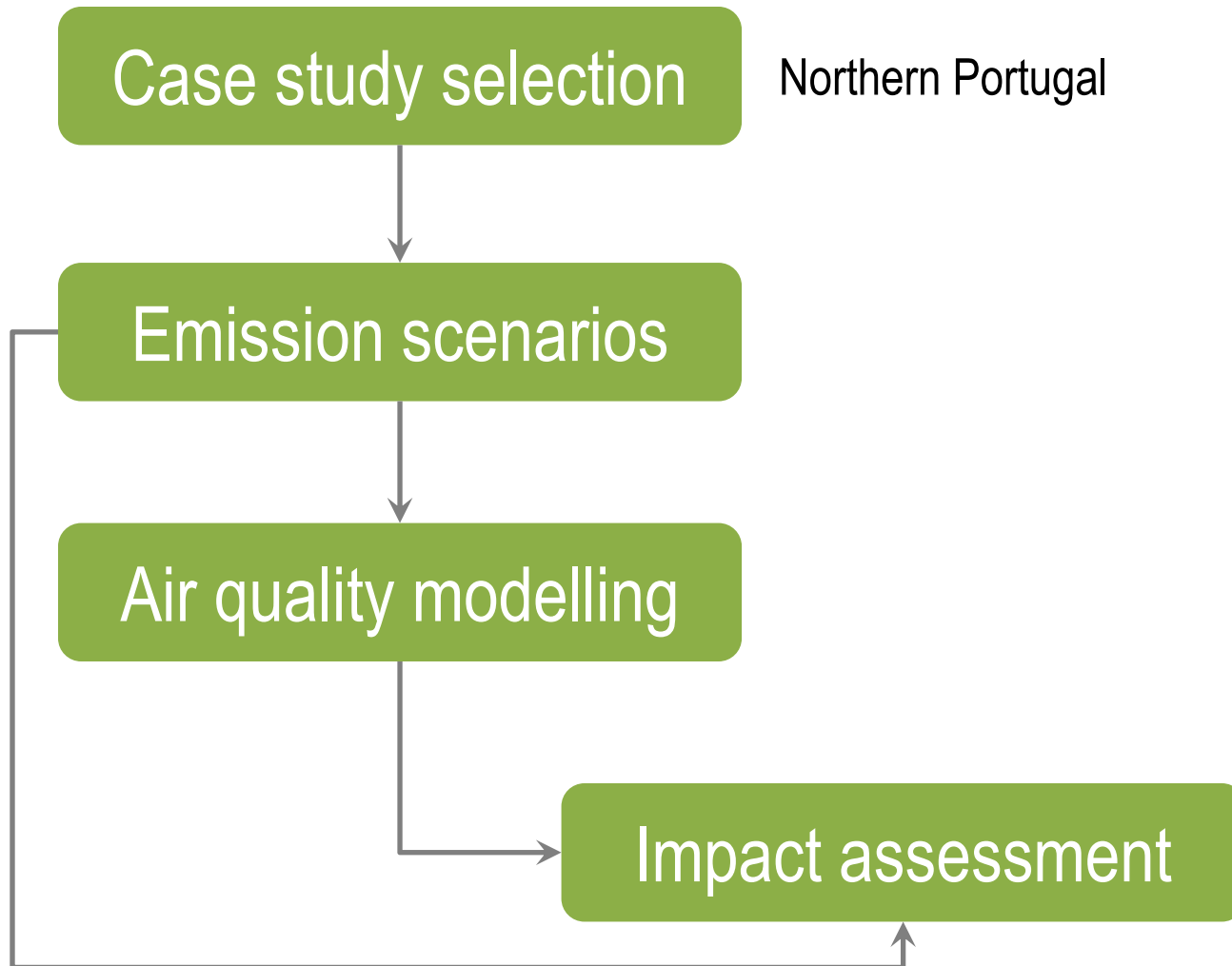
- **GHG** emissions reduction by 2050 in **transport sector**: [-67 ; -54]%  
Road Map 2050
- Share of **biofuels** in transport petrol consumption by 2020: **10%**  
REDirective
- Reduction **air pollution** levels: effects on **human health**  
CAFE



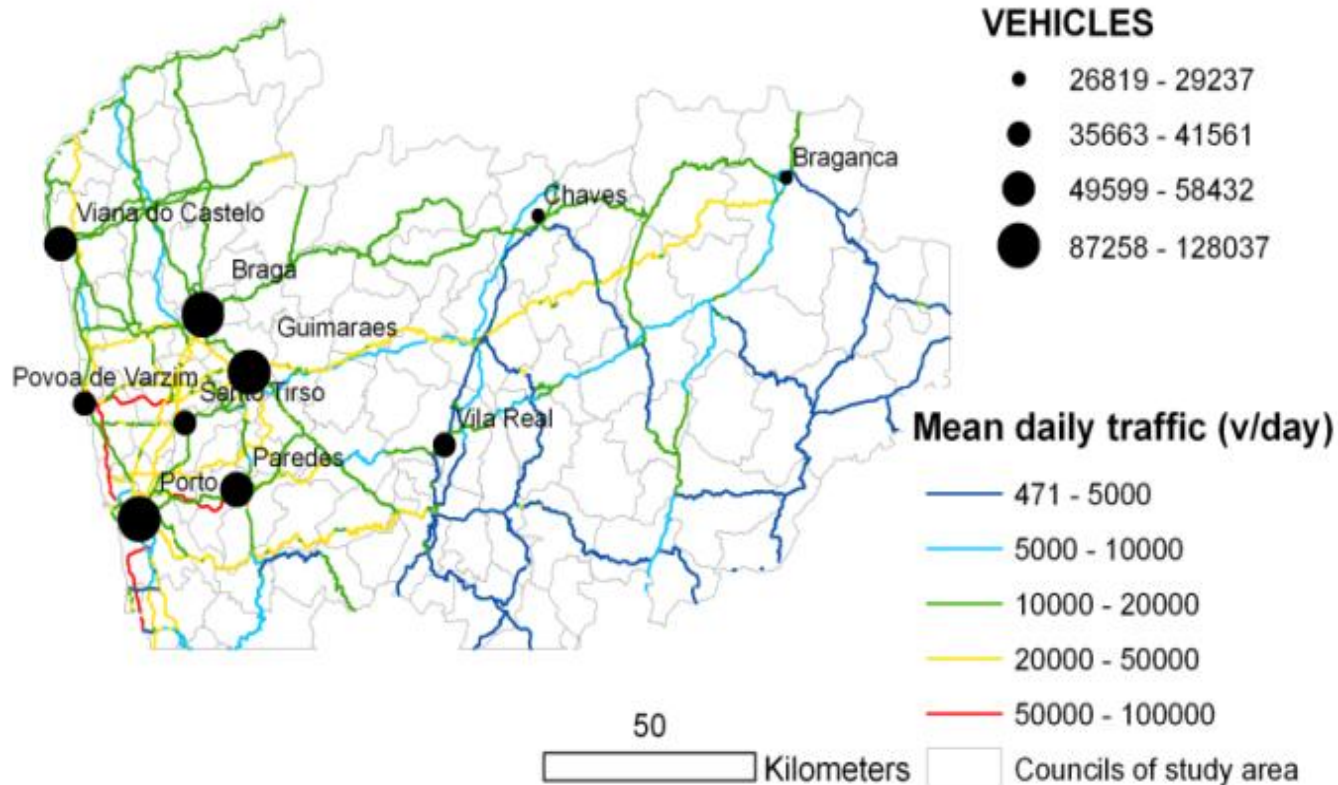


Does **biodiesel** use  
promote **impacts** on  
**emissions** and **air quality**?

# Methodology



# Case study: Northern Portugal



- 24% of Portugal's **area**
- 35% of Portugal's **population**
- 32% of Portugal's **vehicle fleet**
- **Coast:** urban and industrial areas
- **Inland:** rural area, small cities/villages, aging population.

# Scenarios definition

**B0**

**the reference situation:**

- No biodiesel incorporated in diesel (B0)

**B10**

**on the way to RED (2009/28/CE) target:**

- Use 10% biodiesel blend (B10)

**B20**

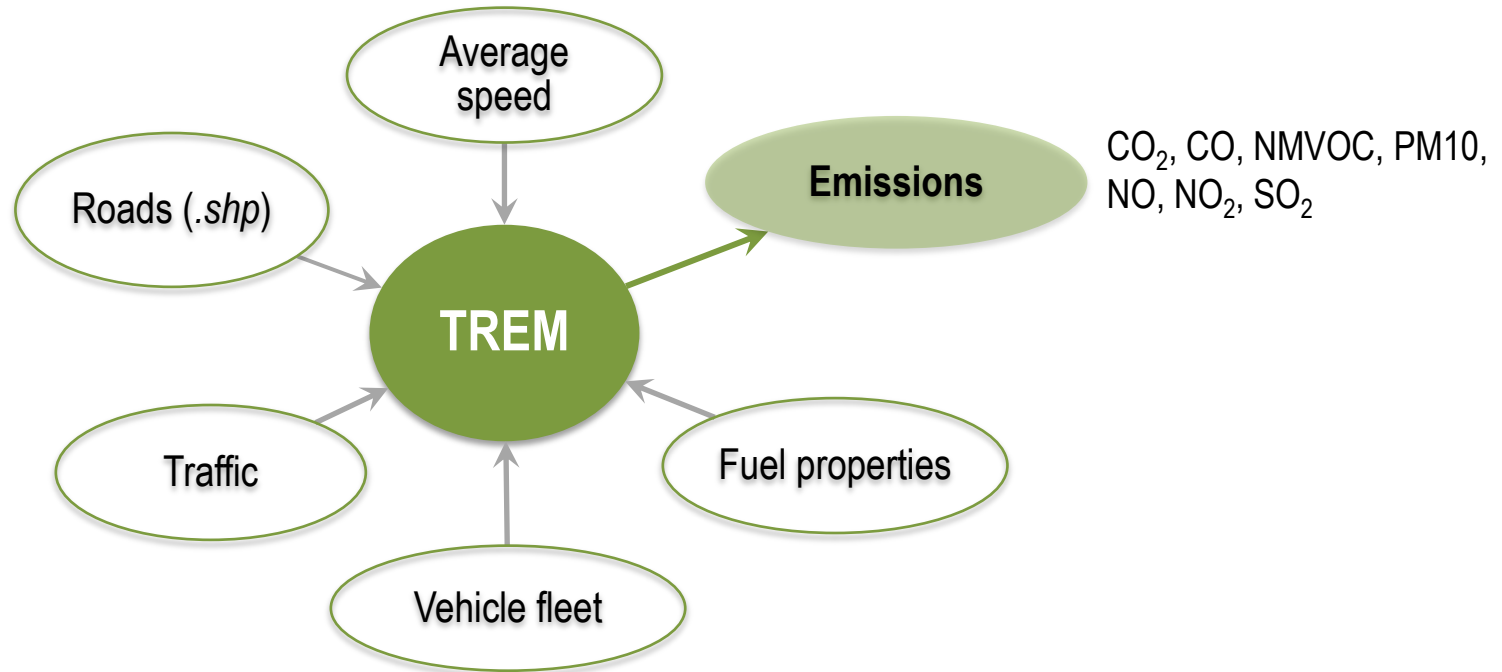
**a more challenging target (RED) :**

- Use 20% biodiesel blend (B20)



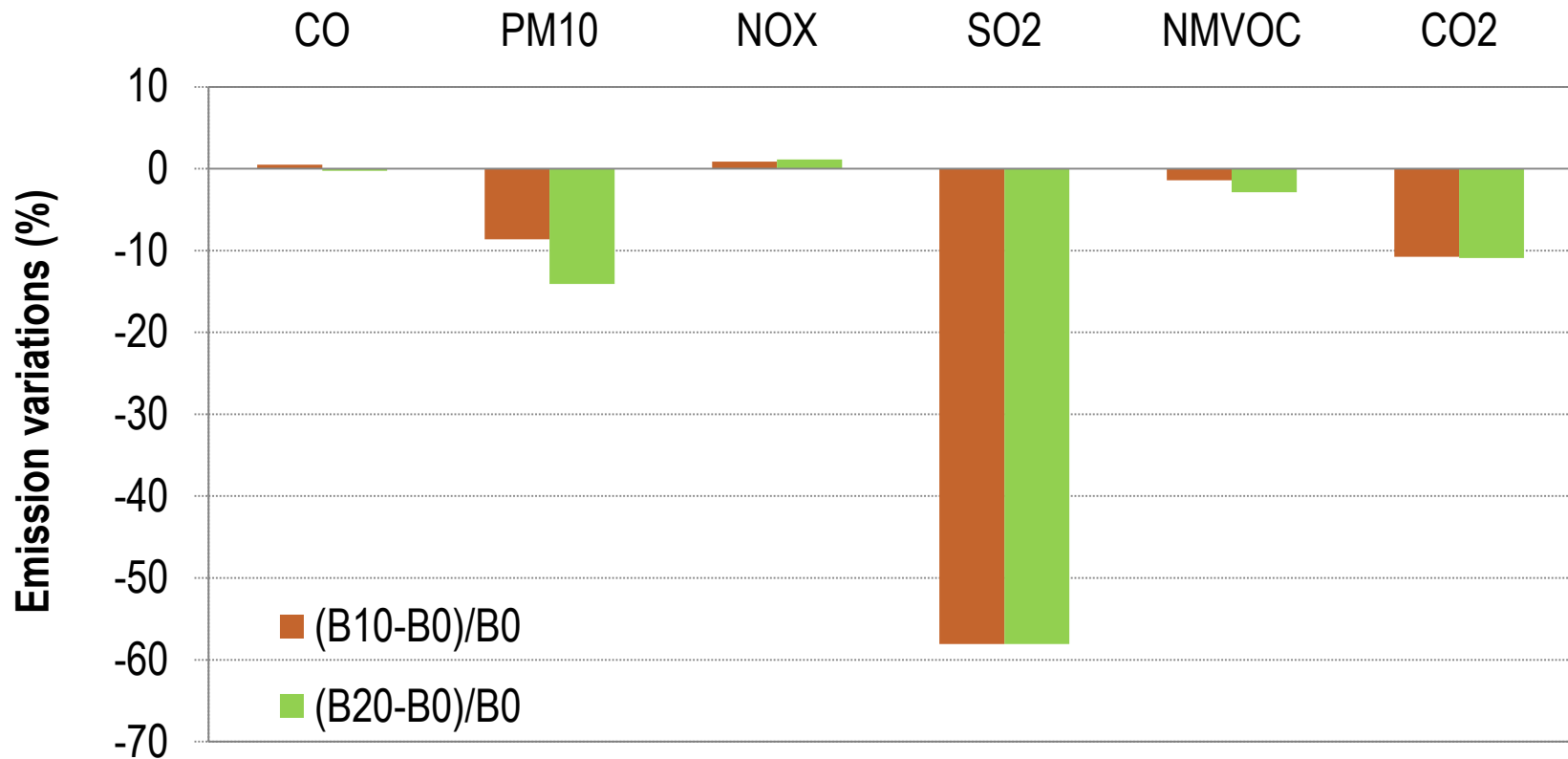
# Emission estimation – TREM

## Transport Emission Model for line Sources



# Emission estimation – TREM

Emission variations from road transport  
(**target** scenarios - **reference** scenario)

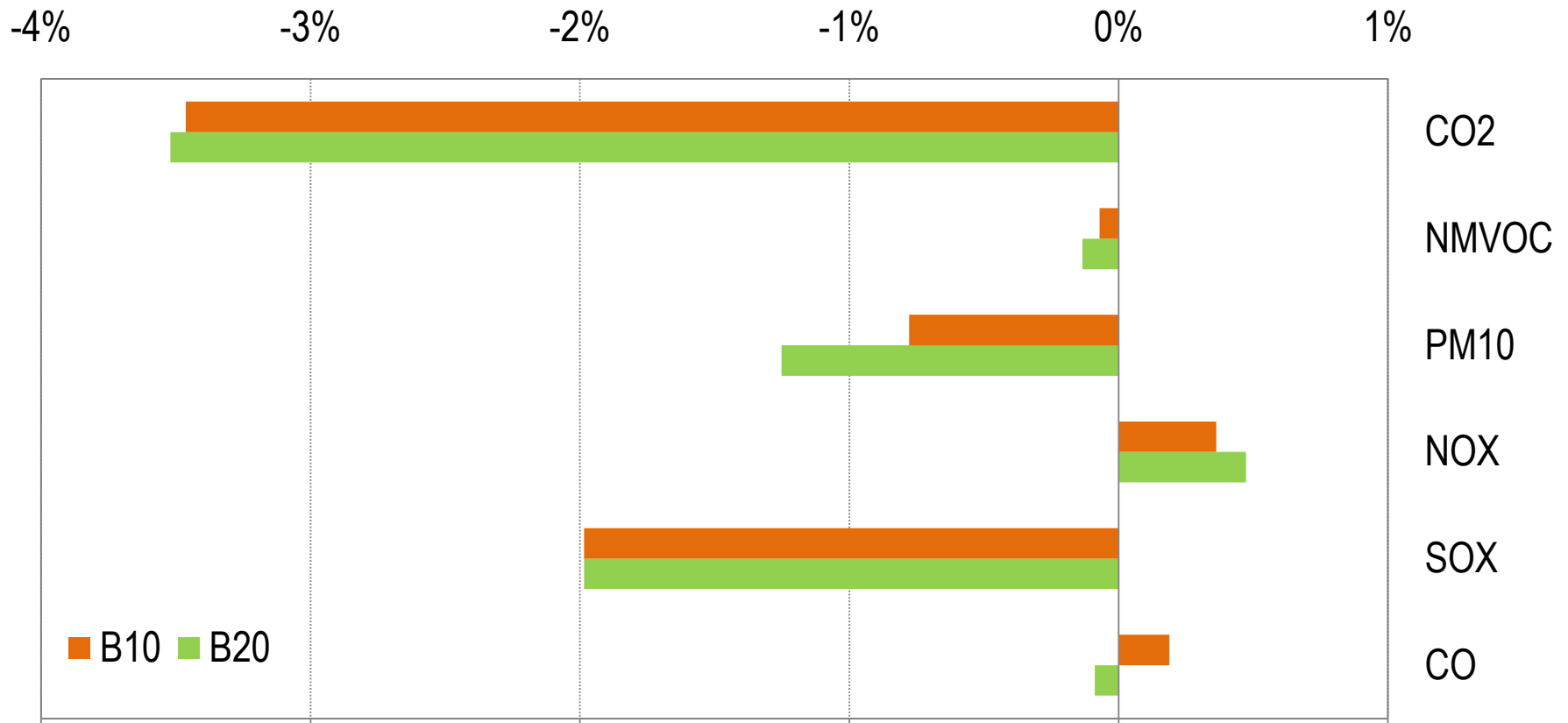




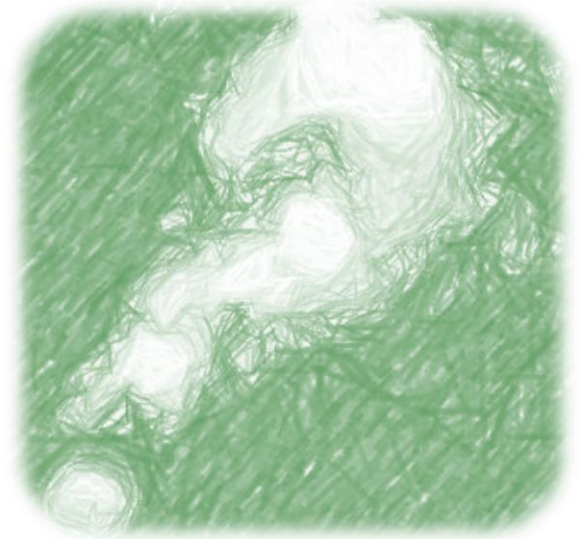
What do these variations  
mean in total emissions?

# Emission variations

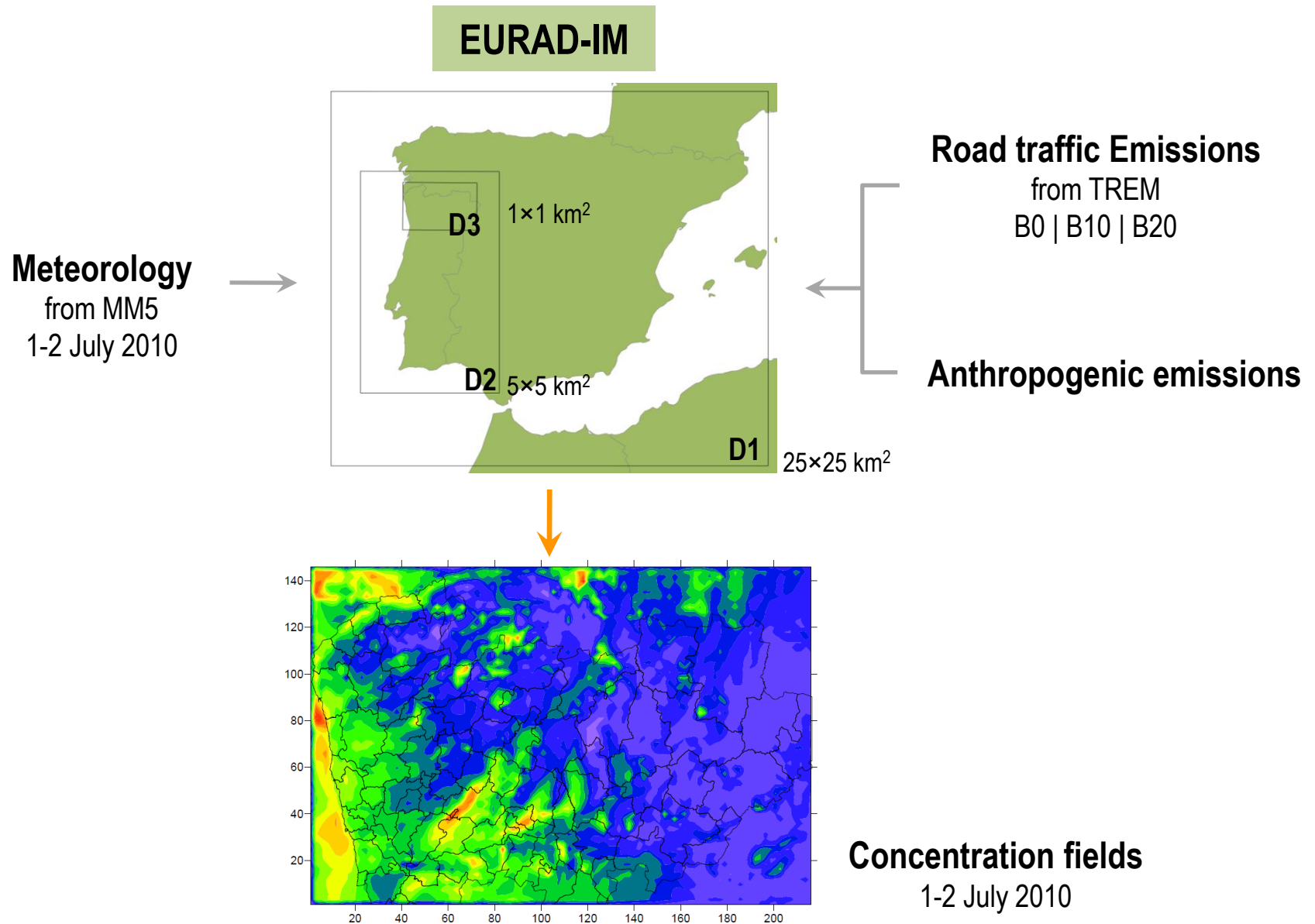
What do **emission variations** provided by B10 and B20 mean in **total emissions**?



Could these emission  
reductions affect air quality?



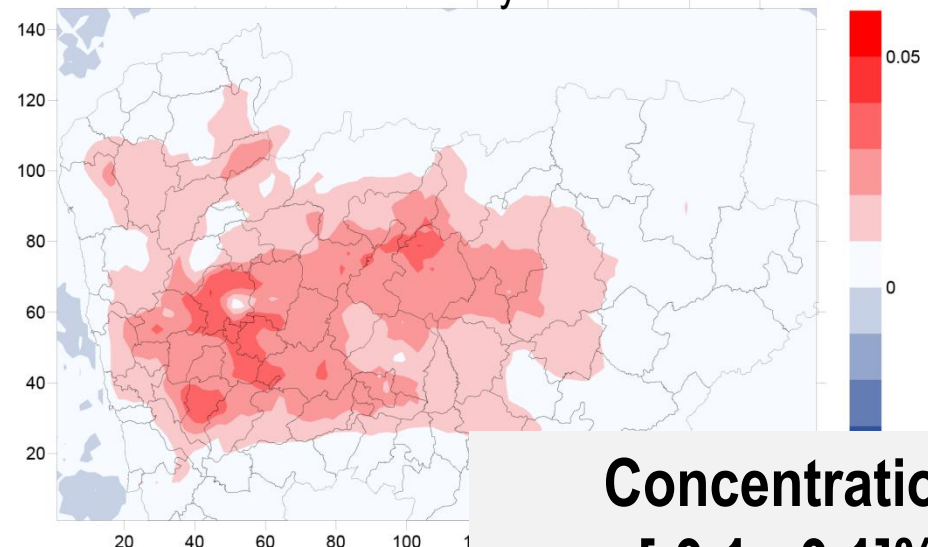
# On the way to Air Quality... modelling approach



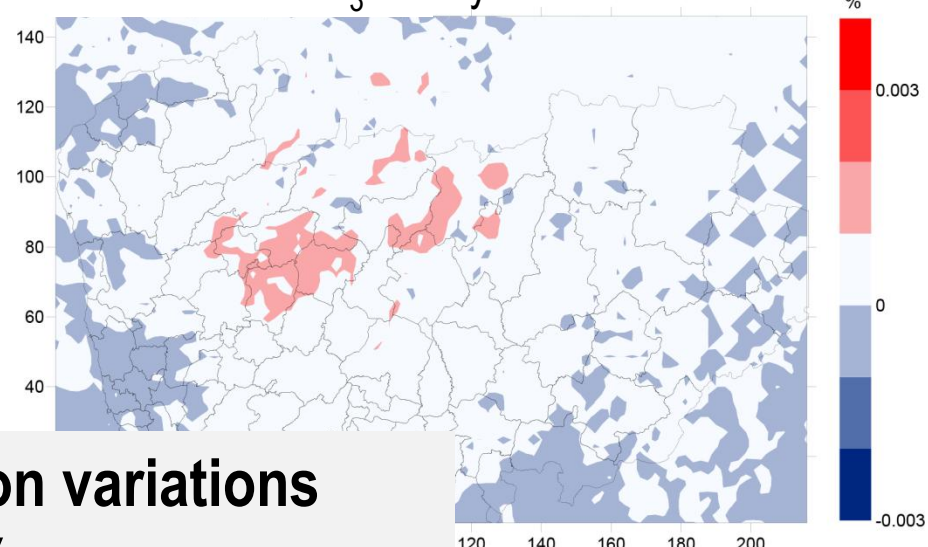
# Impacts on air quality

$$\Delta\% = \frac{B20 - B0}{B0}$$

NO<sub>x</sub> – daily mean



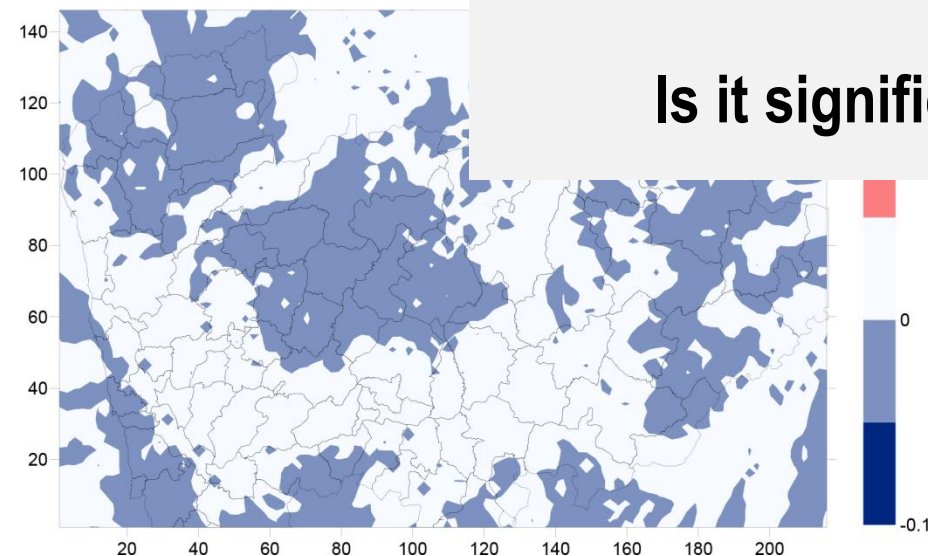
O<sub>3</sub> – daily max.



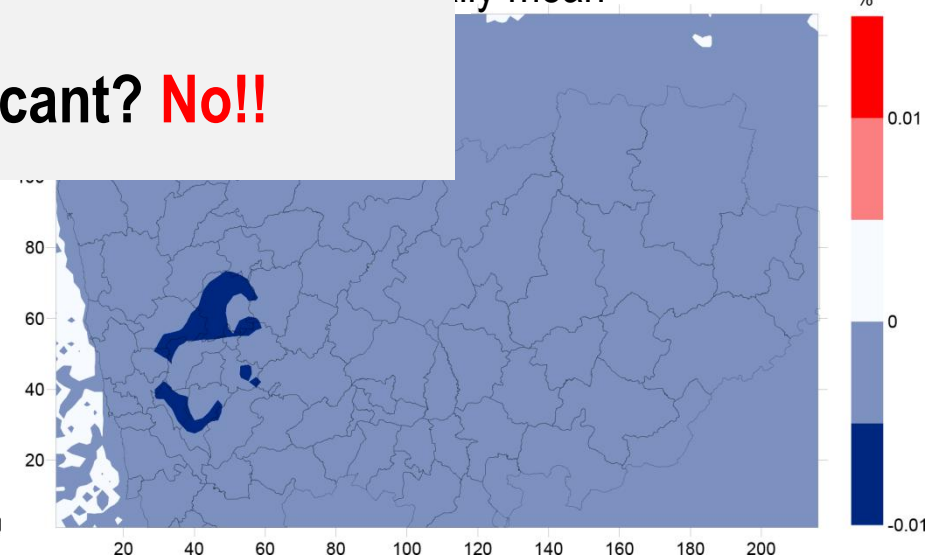
**Concentration variations  
[-0.1 ; 0.1]% at maximum**

**Is it significant? No!!**

PM<sub>10</sub> – daily mean



PM<sub>2.5</sub> – daily mean



## Final remarks

- The biodiesel use in road transport **provide minor variations** on atmospheric pollutant emissions and no changes on air quality patterns;
- The biodiesel use can help to decrease GHG emissions (**climate change policy**);

---

**What** does biodiesel use mean in terms of **economic impact**?

**Will be worth** all the **political pressure** to promote biodiesel use?

---

For that, analyze all **biodiesel chain**, especially raw material transportation and biodiesel production will be important to understand the **real impact** of biodiesel in **Portugal**, in terms of **environment** and **socio-economic** issues.



# Thanks for your attention!

I. Ribeiro | P. Cascão | A. Monteiro | M. Lopes | R. Tavares | J. Figueira de Sousa | A.I. Miranda | C. Borrego

[ilavrador@ua.pt](mailto:ilavrador@ua.pt)

University of Aveiro, Portugal

<http://www.ua.pt/gemac/biogair/>

