GlobEmission Workshop
Doha Qatar, 24-25 November 2015

A Benchmarking Tool to screen and compare bottom-up and top-down emission inventories

- Kees Cuvelier, ex European Commission JRC
- Participants WG2 Fairmode

Developed in the frame of Fairmode

- **http://fairmode.jrc.ec.europa.eu/**

- Principles of the Emission Tool
- Some applications

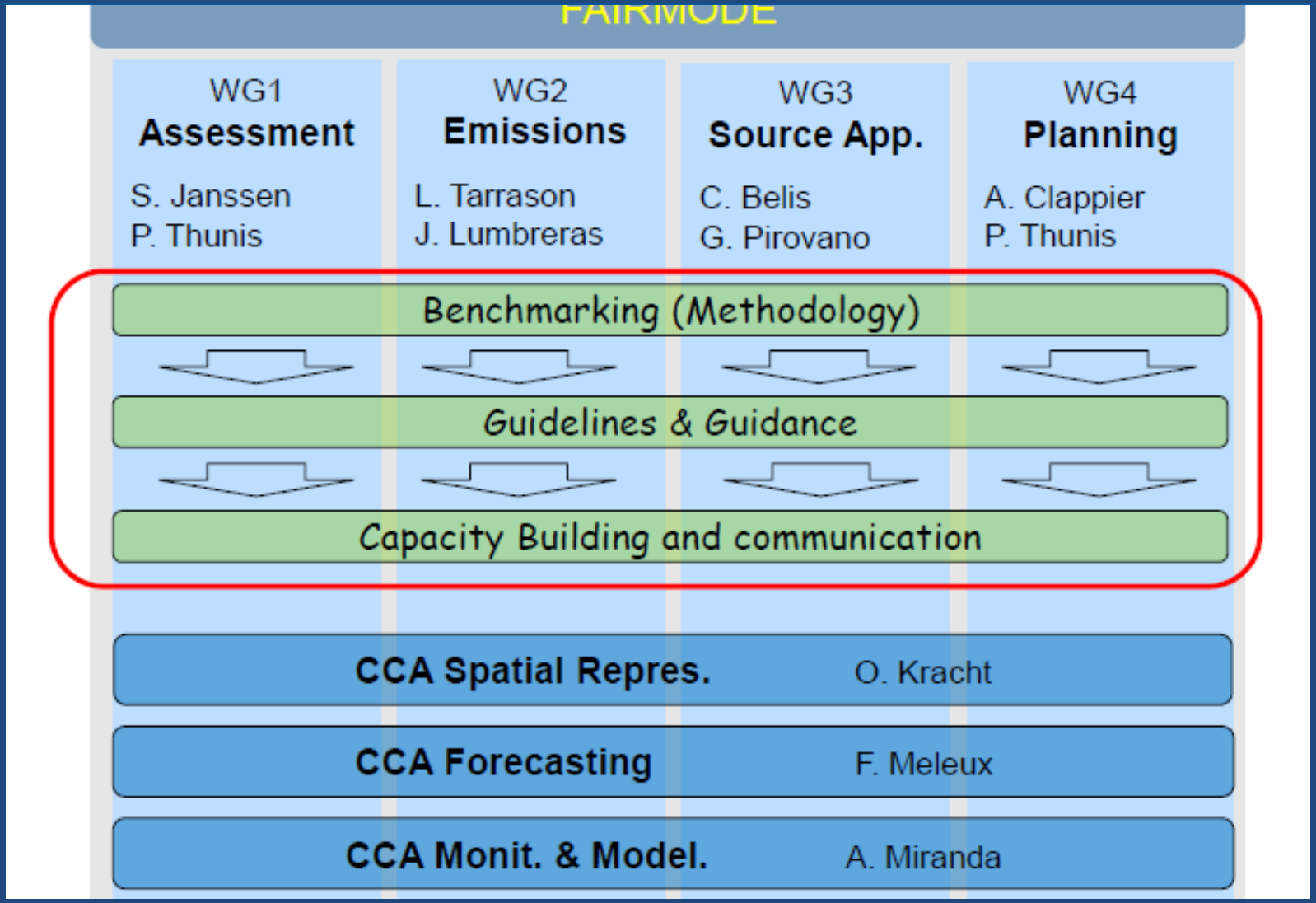
- The Forum for Air quality Modeling (FAIRMODE) was launched in 2007/10 as a joint response initiative of the European Environment Agency (EEA) and the European Commission Joint Research Centre (JRC). The forum is currently chaired by the Joint Research Centre.

- Its aim is to bring together air quality modellers and users in order to promote and support the harmonized use of models by EU Member States, with emphasis on model application under the European Air Quality Directives.

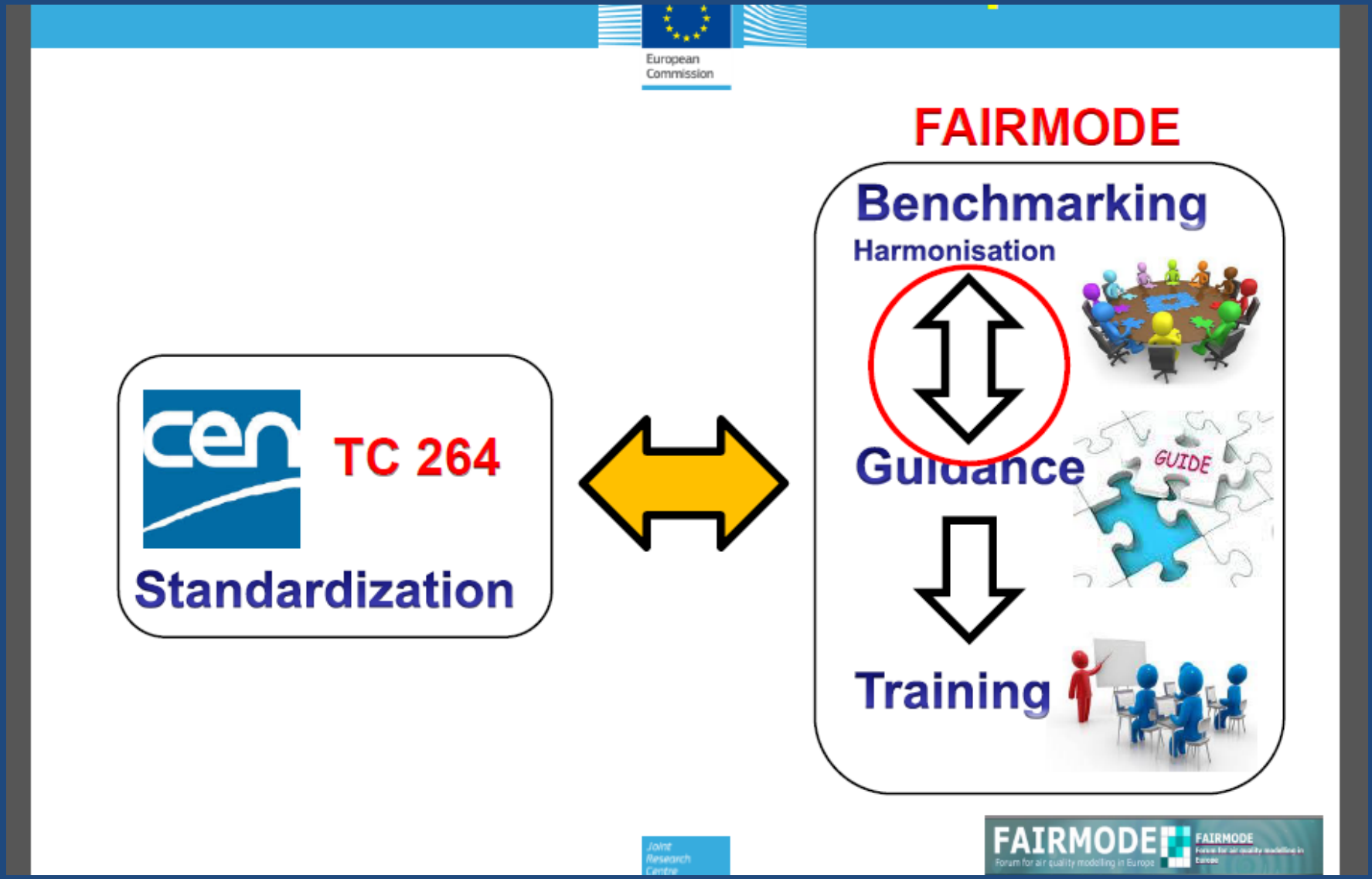
- A yearly plenary meeting aimed at participation of national, regional and local policy makers;

- Technical meetings dedicated to model experts to develop and agree on common methodologies, carry out actual benchmarking and establish good procedures and guidance.

Fairmode Activities and Structure



Fairmode working structure



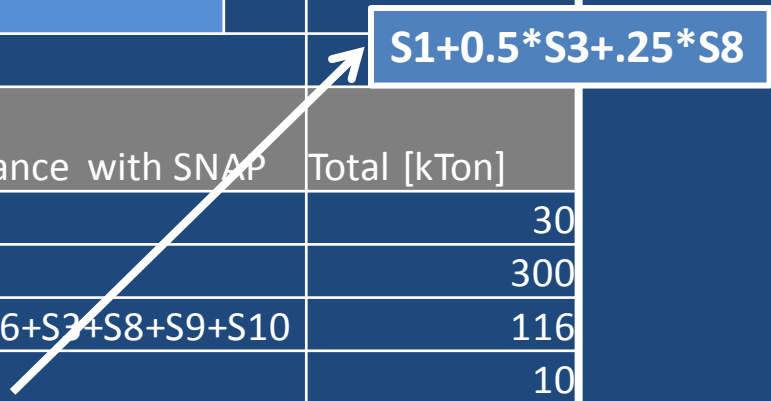
EMIS_Benchmark visualization tool

- EB User input file – BUP emissions
- EB input files
- Diagram types
- Examples of Diagrams (… from the Tool)
- Remarks

User input file: BU_POVALLEY_info.csv

Shape	0	Region				
lon	-0.16	3.29	3.55	0.1		
lat	40.36	40.21	42.4	42.4		

2006				
#Species	BU sectors abbreviation	BU sectors nomenclature	Correspondance with SNAP	Total [kTon]
NOx	DOM	Domestic	S2	30
NOx	TRA	Traffic	S7	300
NOx	zOTH	Others	S1+S4+S5+S6+S3+S8+S9+S10	116
PM25	DOM	Domestic	S2	10
PM25	TRA	Traffic	S7	11
PM25	zOTH	Others	S1+S4+S5+S6+S3+S8+S9+S10	12
VOC	DOM	Domestic	S2	25
VOC	TRA	Traffic	S7	140
VOC	zOTH	Others	S1+S4+S5+S6+S3+S8+S9+S10	350
END				



EB input files:

- Gridded TopDown emission inventory for the 7 main pollutants
  - MACC2/3-TNO (years 2000-2011) 7x7km
  - EC4MACS (year 2009) 7x7km
  - JRC (year 2010) 7x7km => 1x1 km => 100x100m

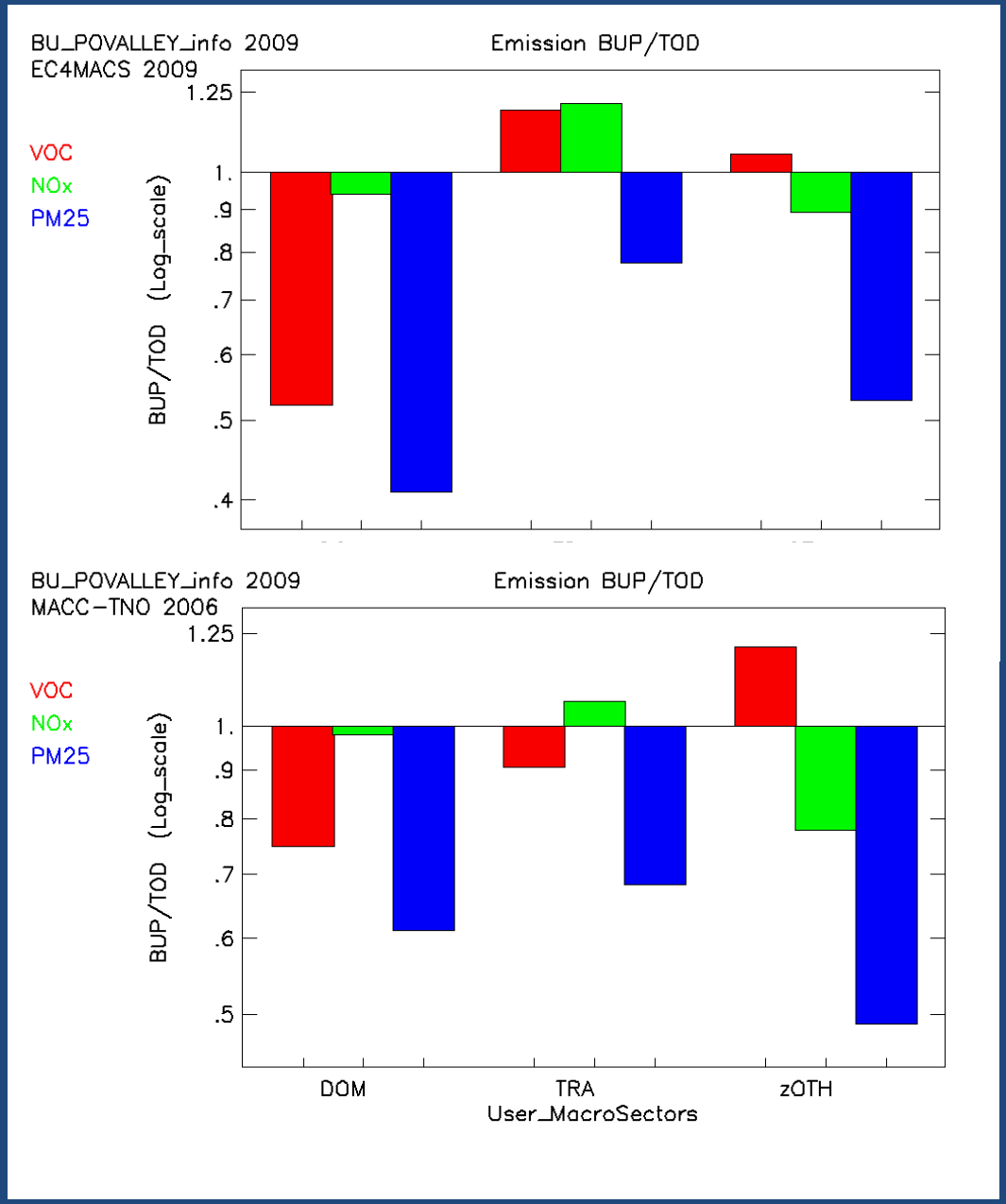
  ➔ SNAP1 - SNAP10, and SNAP7.1 - 7.5
- IIASA SNAP-Level1 country emissions for 7 main pollutants
- Gridded Population file
  - INERIS Pop inventory 1x1 km
- Shape files (predefined)
  - 39 Country shape files
  - 428 Region shape files
  - 477 City shape files
- Pre-processed emissions (10 SNAP, 7 Pollutants) on each Country/Region/City …. For use in the ranking diagram

Diagram types

- BUP/TOD BarPlot for each User MS and each POL
- BUP and TOD Ratios Pol1/Pol2 compared to IIASA_CR
- BUP(Pol1/Pol2) vs TOD(Pol1/Pol2)
- Diamond diagram
- Per capita emission ranking for C/R/C - based on the predefined shape files
- BUP/IIASA and TOD/IIASA – only for Countries

Example: PO Valley BarPlot

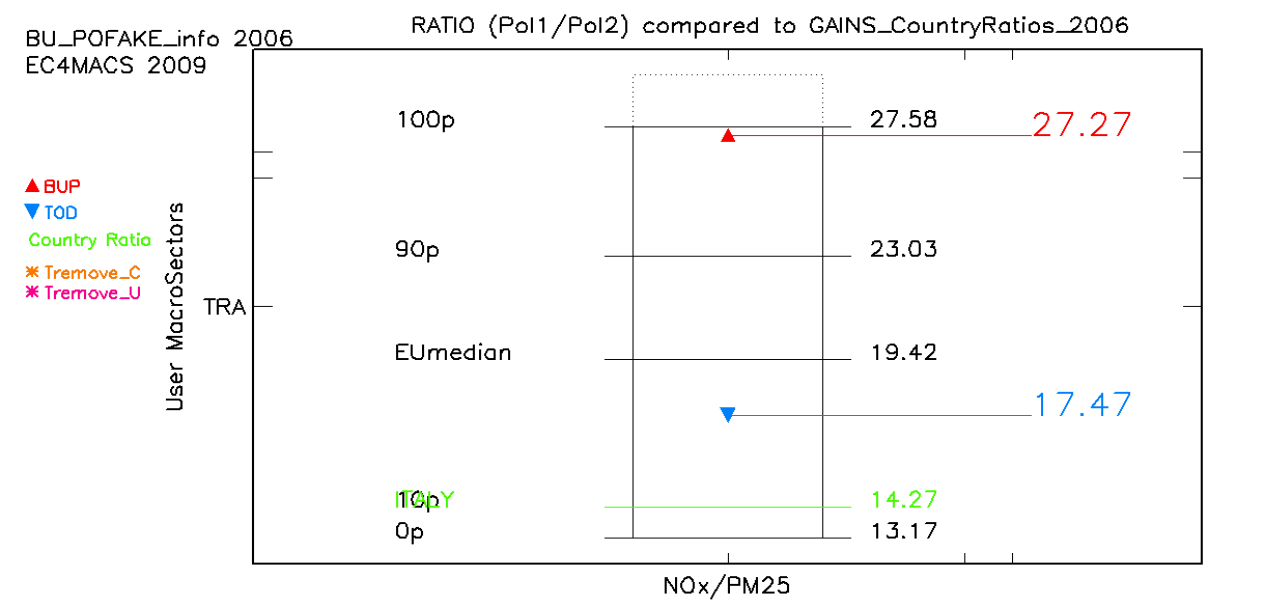
EC4MACS



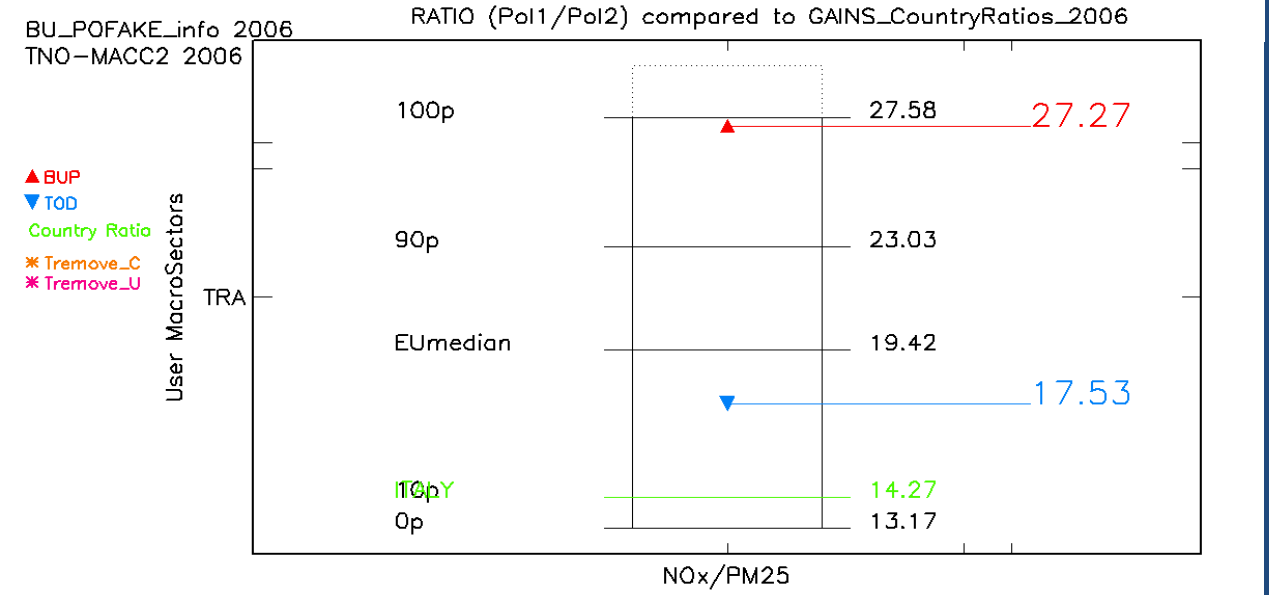
MACC-TNO

Example: PO Valley RatioPlot

EC4MACS



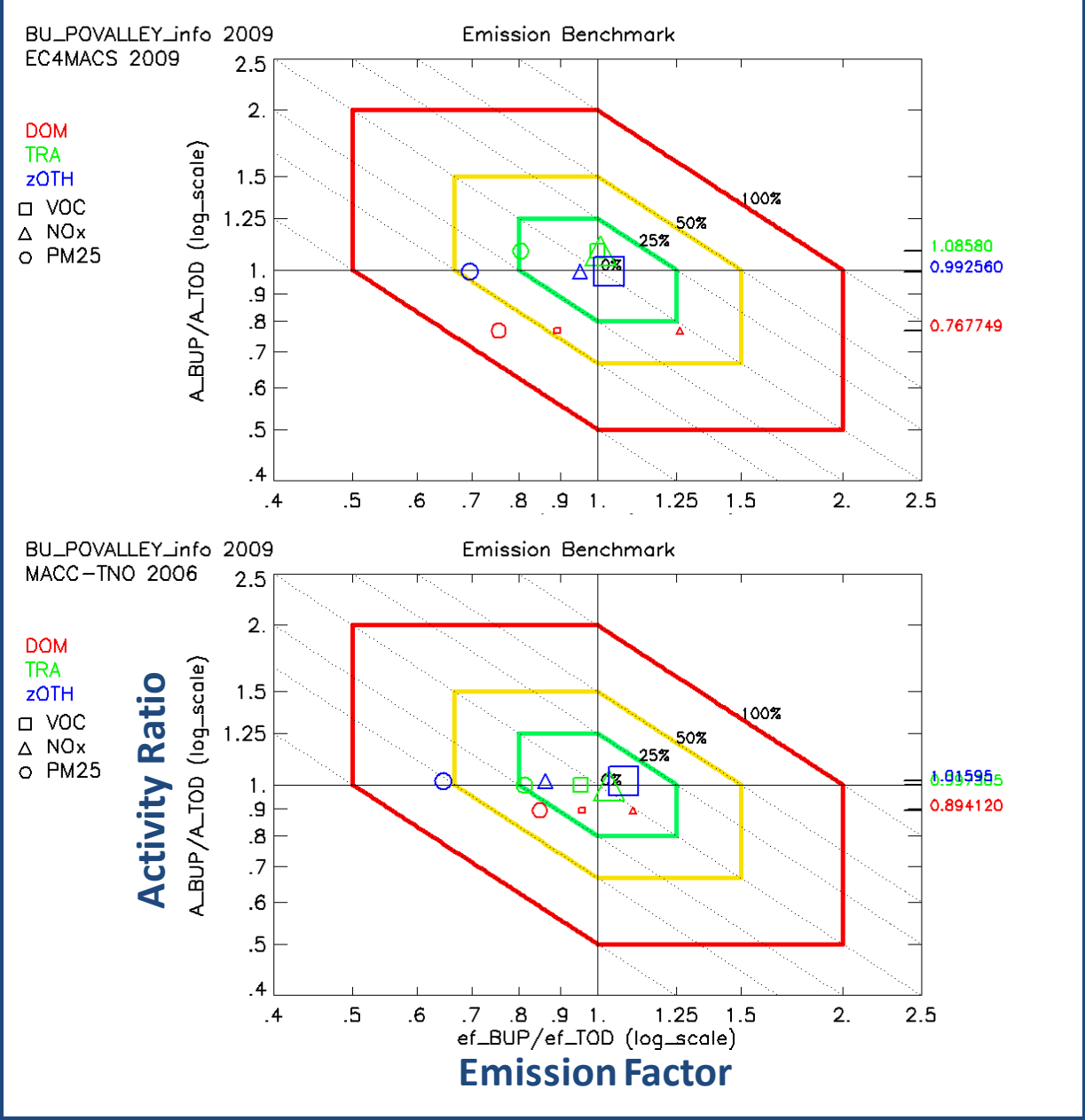
MACC-TNO



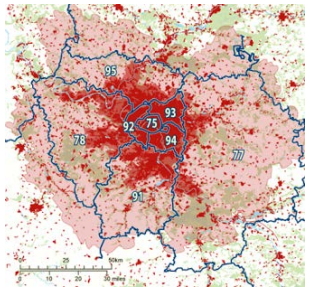
Example: PO Valley Diamond diagram

EC4MACS

MACC-TNO



City



Region

$$\left\{ \frac{E_{TD}^{m^u,p}}{pop} \right\}$$

$$\left\{ \frac{E_{TD}^{m^u,p}}{pop} \right\}$$

Difference
TD - BU

The chosen city has per capita Emission larger than 80% of EU cities and overestimates by 25% the TD value.

50%

25%

-25%

-50%

25%

50%

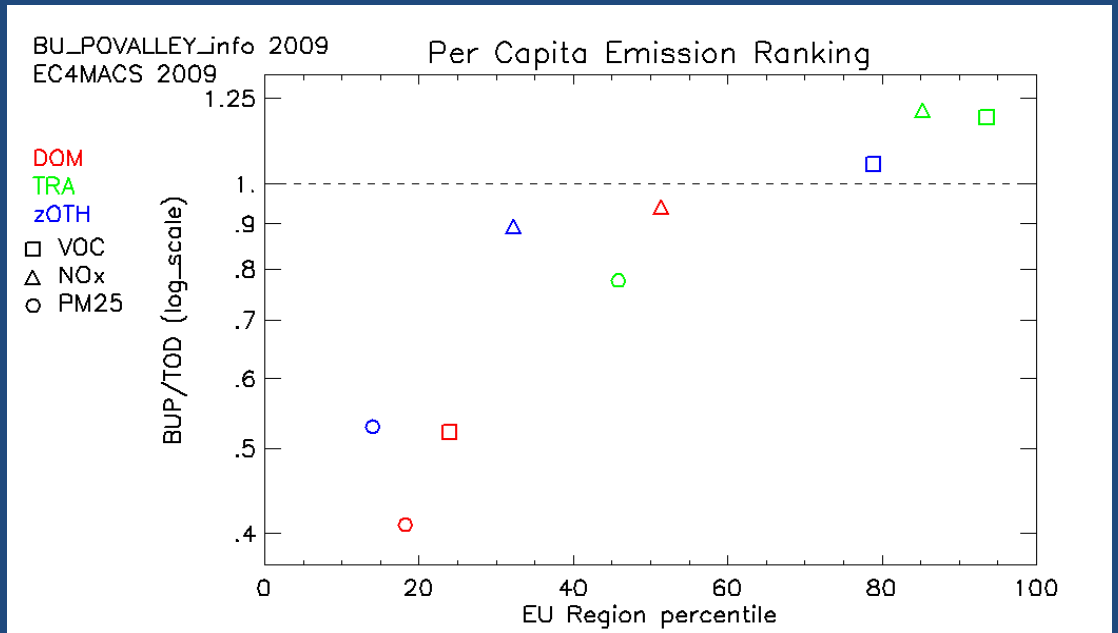
75%

EU city/Region percentile

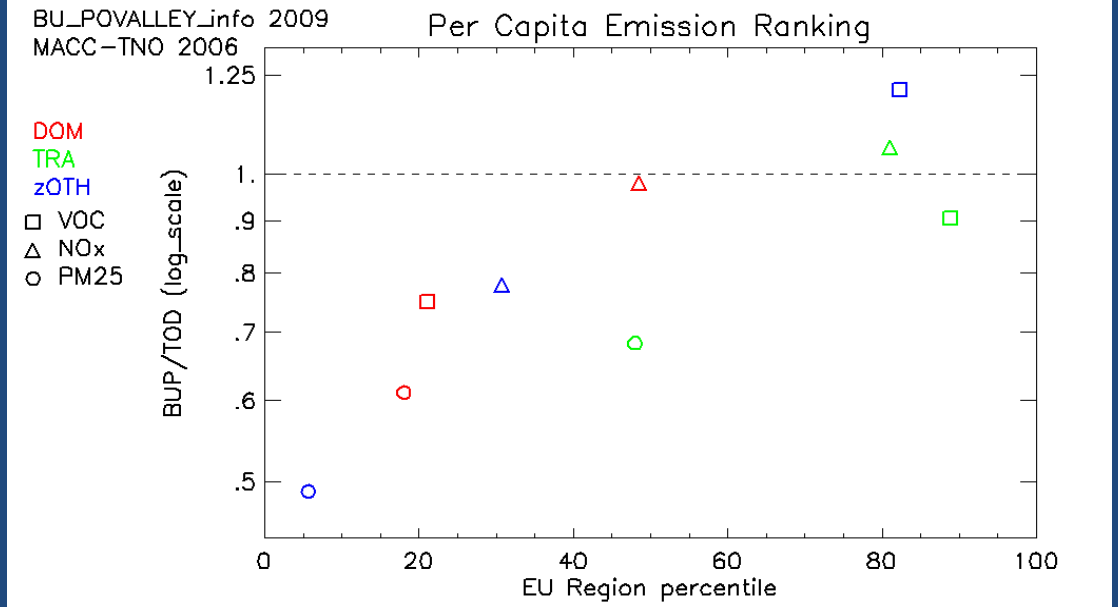
Again symbol can be made color (sector) and shape (pollutant) specific

Example: PO Valley

EC4MACS

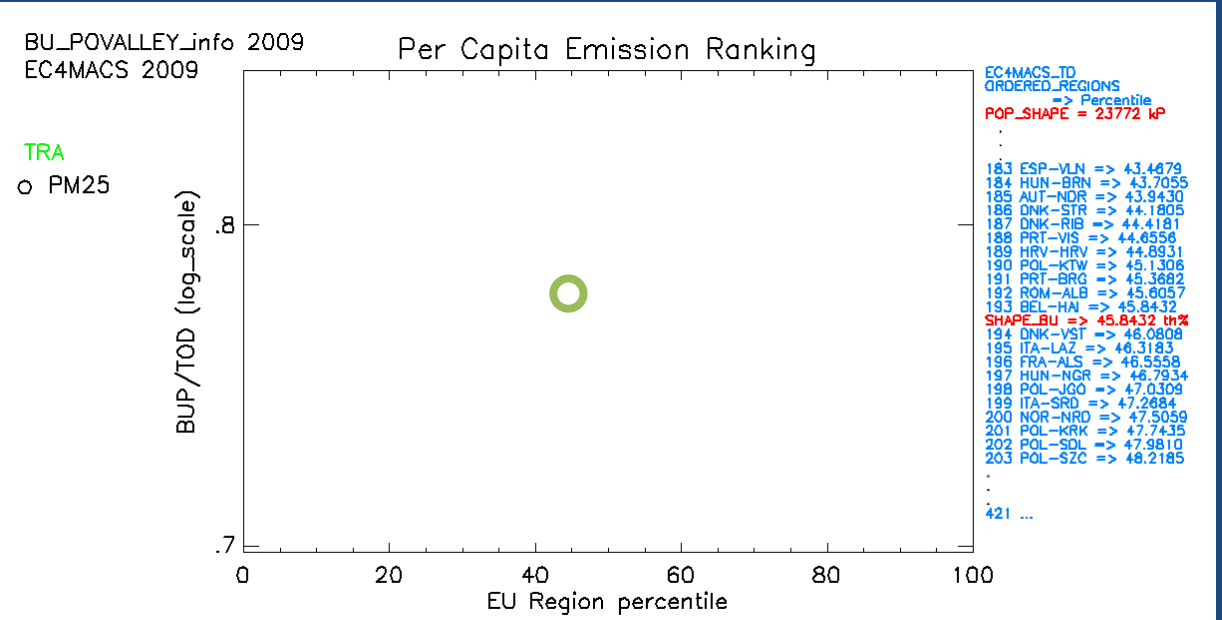


MACC-TNO

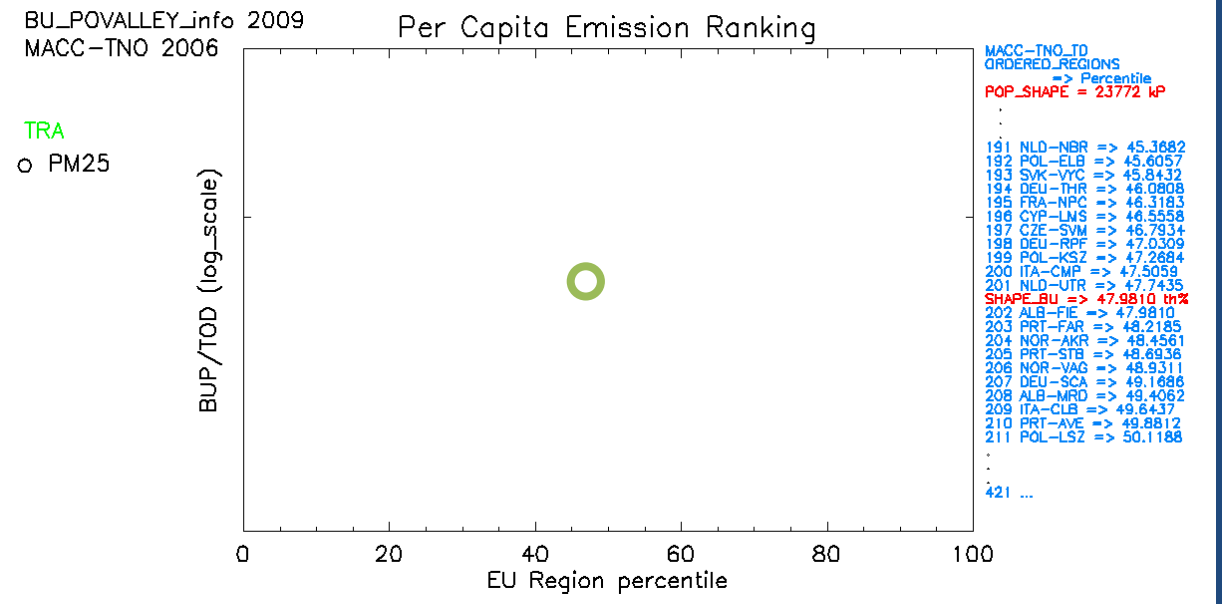


Example: PO Valley

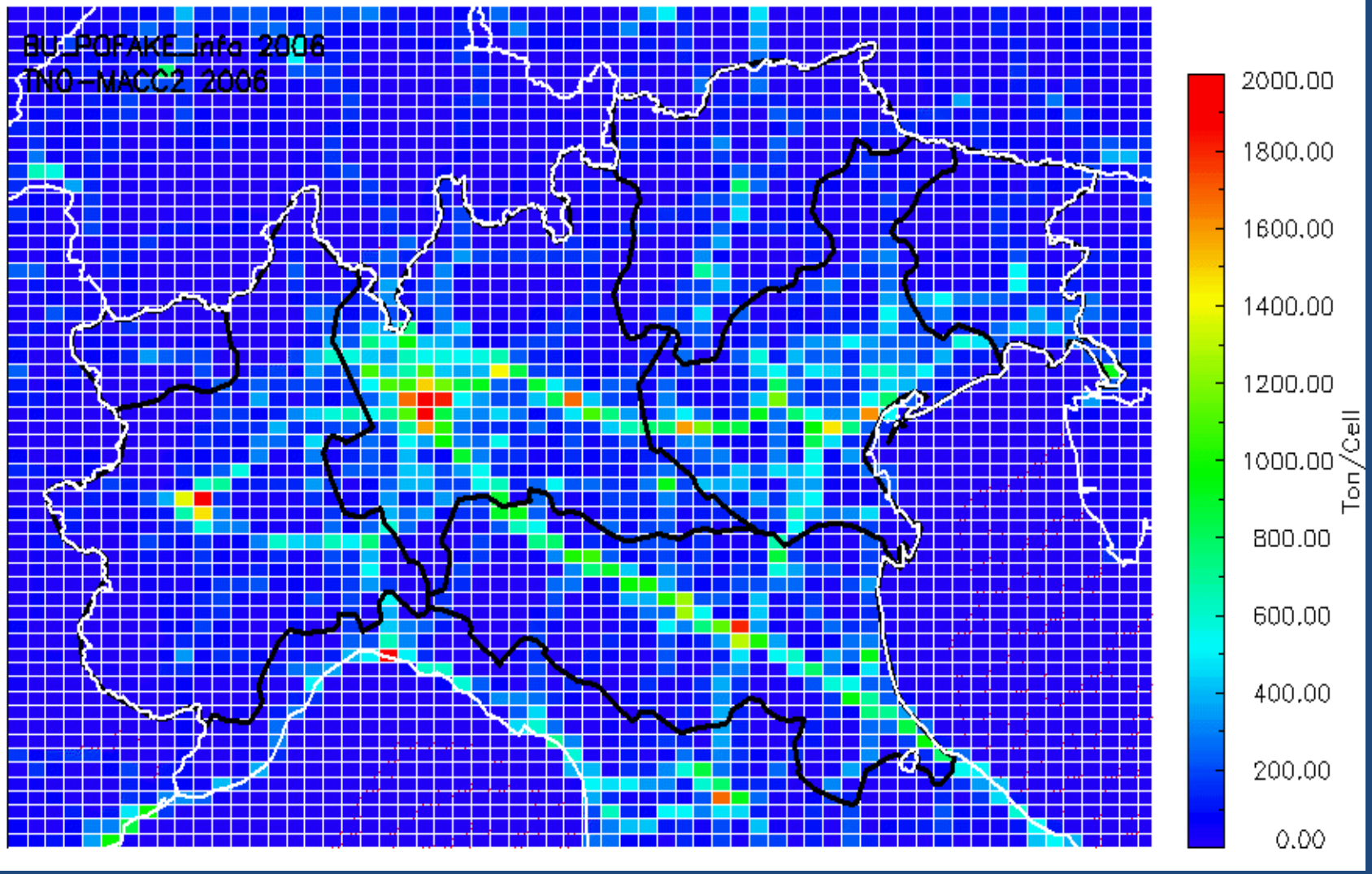
EC4MACS



MACC-TNO



Example: PO Valley



Tool has been applied to

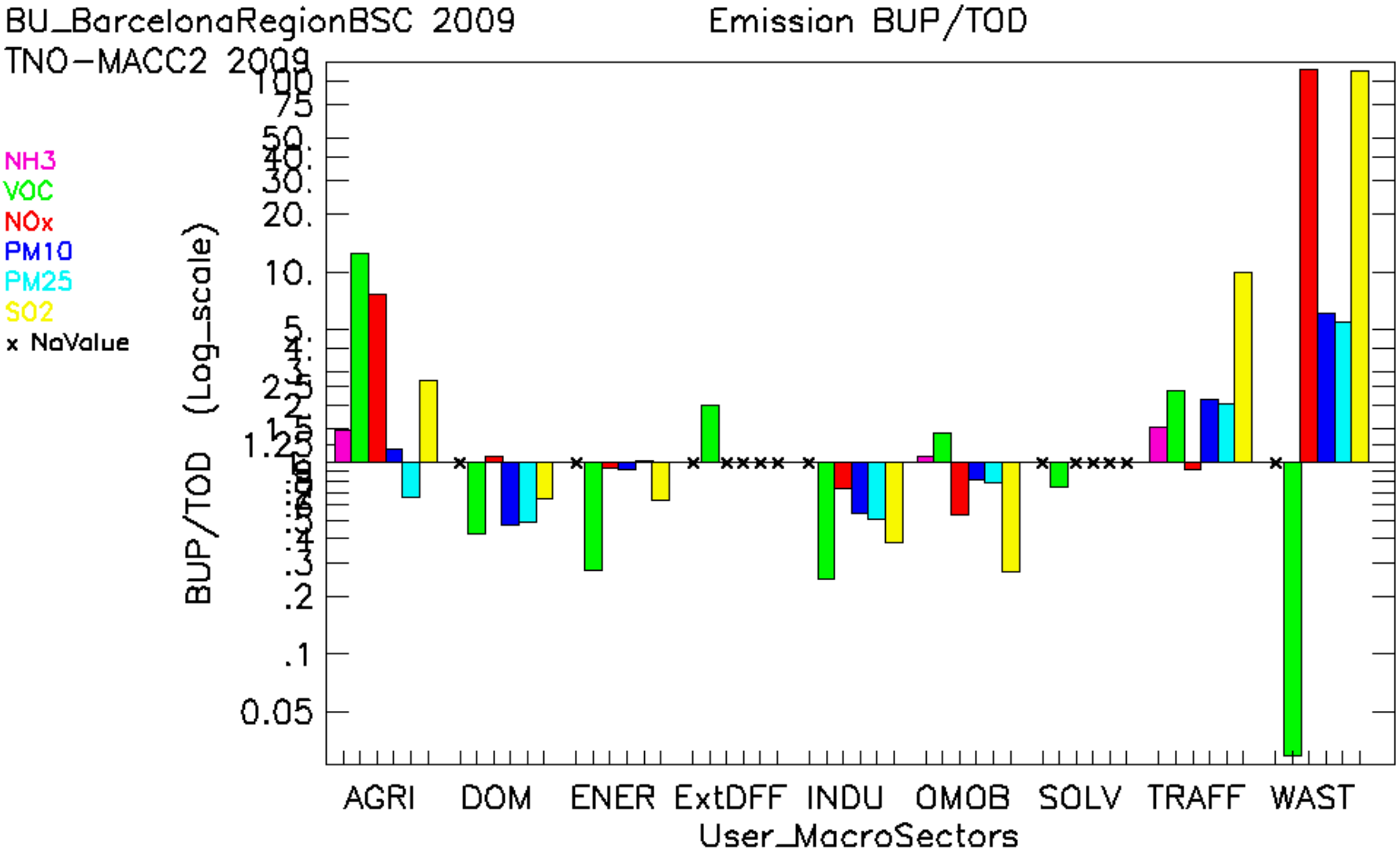
BOTTOM-UP

8 cities:
Antwerp
Barcelona
London
Lisbon
Milan
Oslo
Porto
Sofia

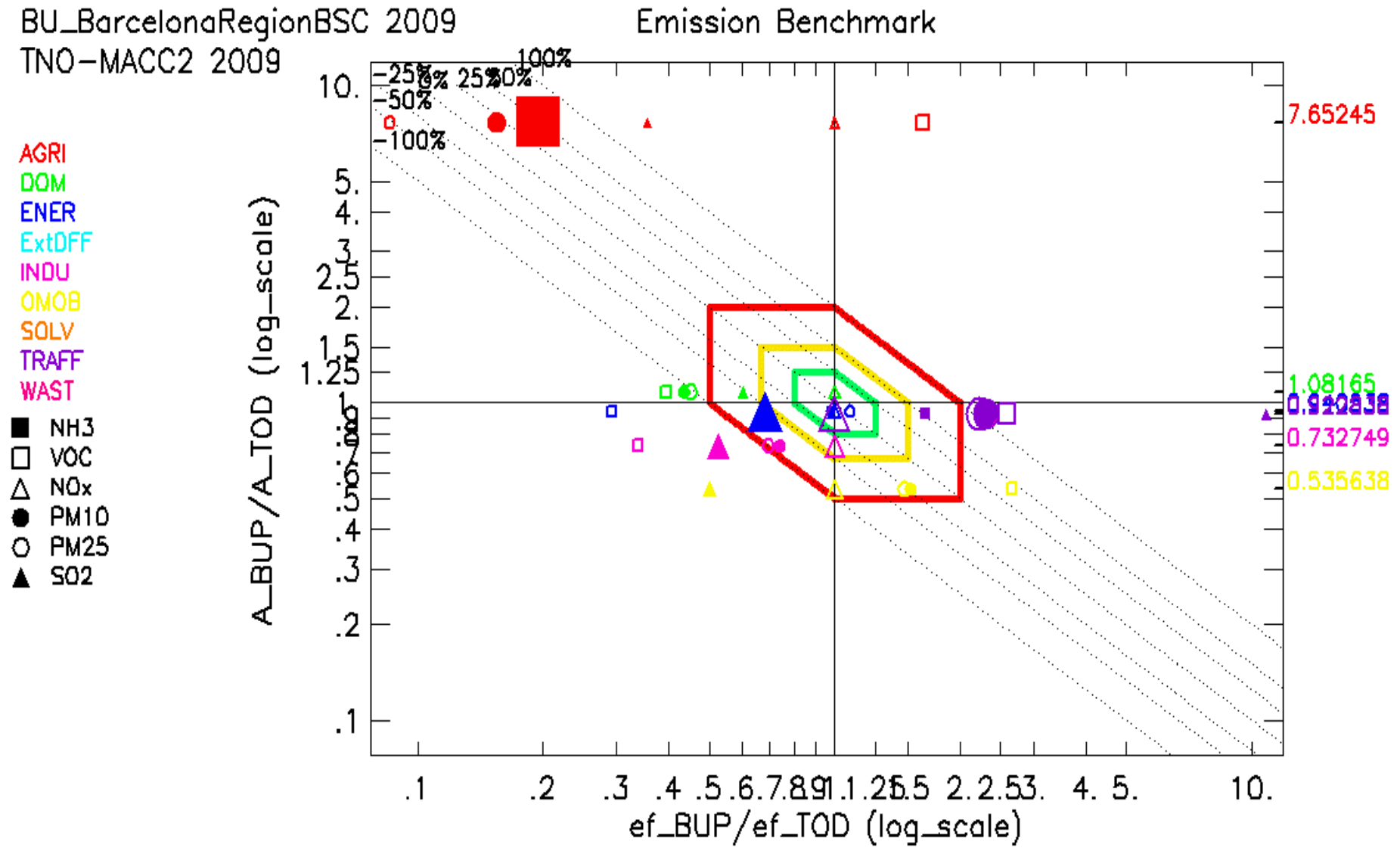
5 regions:
Alsace
Antwerp Prov.
Catalonia
Flanders
Po Valley
Strasbourg

10 countries: in EU

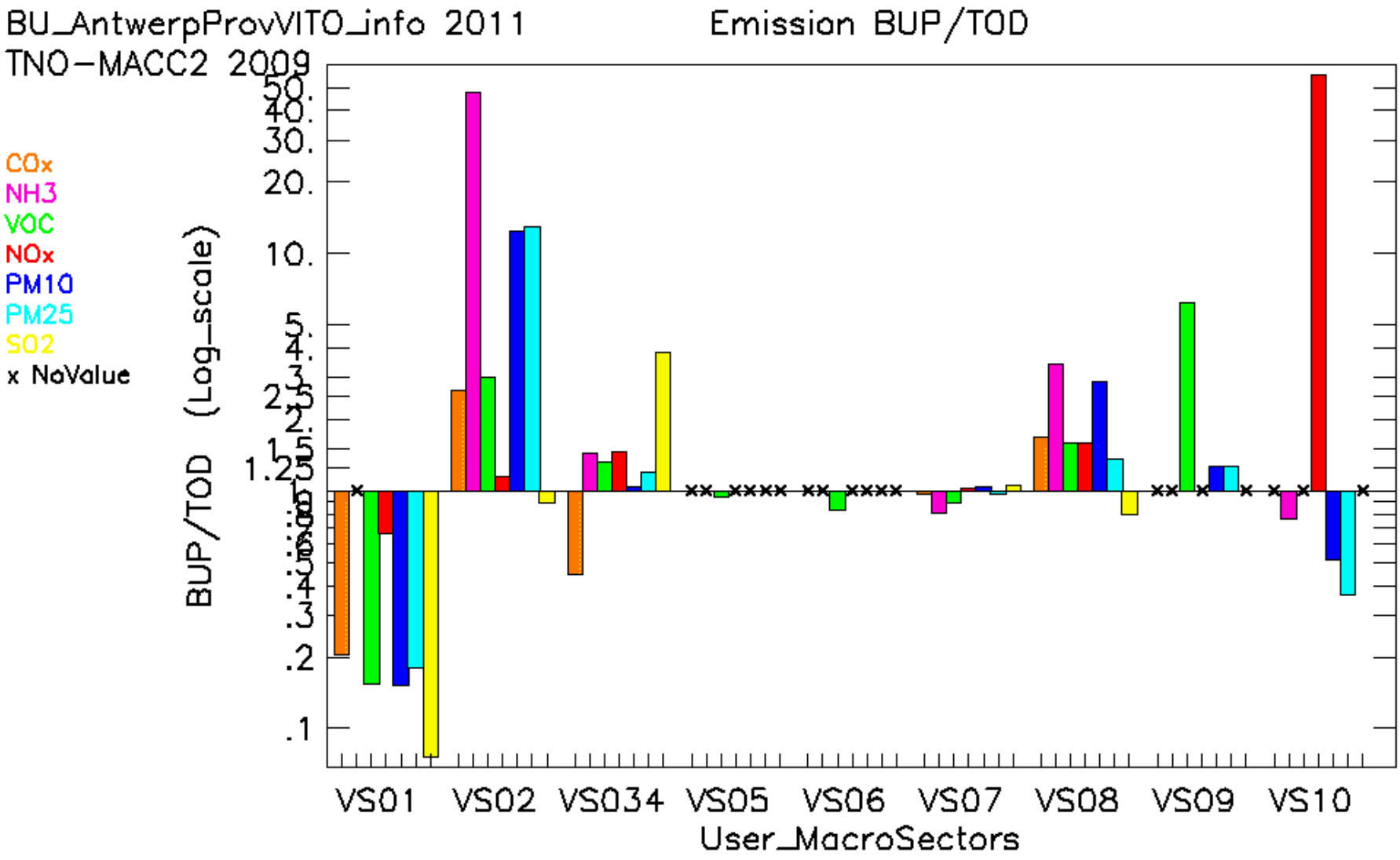
Barcelona Region



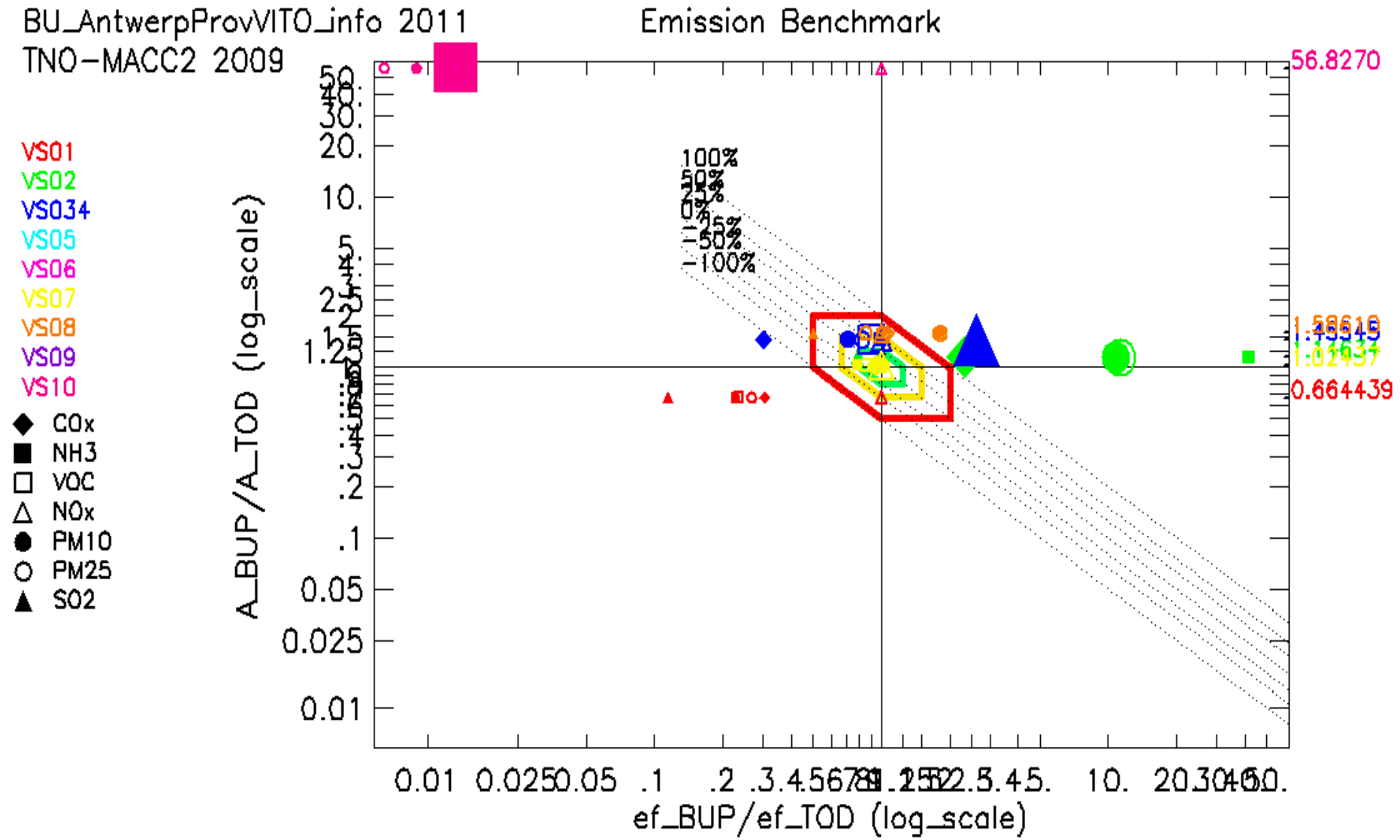
Barcelona Region



Antwerp Province

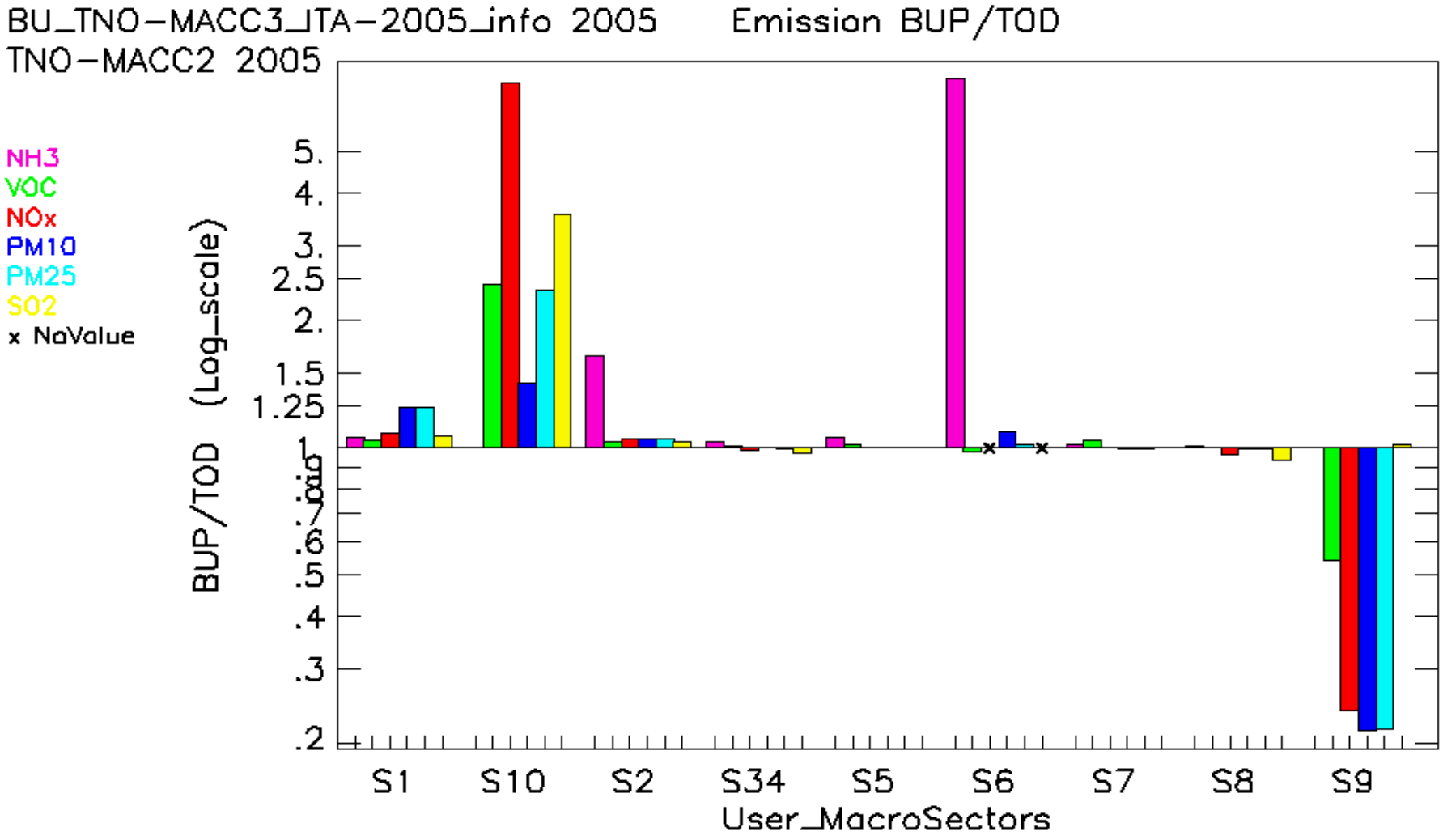


Antwerp Province



TOD vs TOD ➡ MACC2 vs MACC3

Italy



Summary

- Tool for screening and comparing Emission inventories: TOD vs BUP, TOD vs TOD
- Shows the basic characteristics of inventories Graphical representations, Data dumps
- Easy to install (after download: 1-click) idl based – no license needed
- Windows, Linux, and Mac versions
- Easy to use

Publications:

A benchmarking tool to screen and compare bottom-up and top down emission inventories

M. Guevara[1], S. Lopez-Aparicio[2], C. Cuvelier[3], L. Tarrason[2], A. Clappier[4] and P. Thunis[5]

A novel approach to screen and compare bottom-up vs. top-down emission inventories

P. Thunis[1], B. Degraeuwe[1], C. Cuvelier[2], M. Guevara[3], L. Tarrason[4] and A. Clappier[5]

WebSite:

http://fairmode.jrc.ec.europa.eu/

Register – Tool freely available