IMPROVING AIR QUALITY TOGETHER
LIFE IP PrepAIR: project's achievements and main results

31st May 2022
Emilia-Romagna Region
Delegation to the EU

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31st May 2022

Bruxelles

Main sources and new knowledge on emissions in the Po Valley

Elisabetta Angelino - Alessandro Marongiu

ARPA Lombardia

Settore Monitoraggi Ambientali

U.O Modellistica Qualità dell'Aria e Inventari

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Actions network during the years

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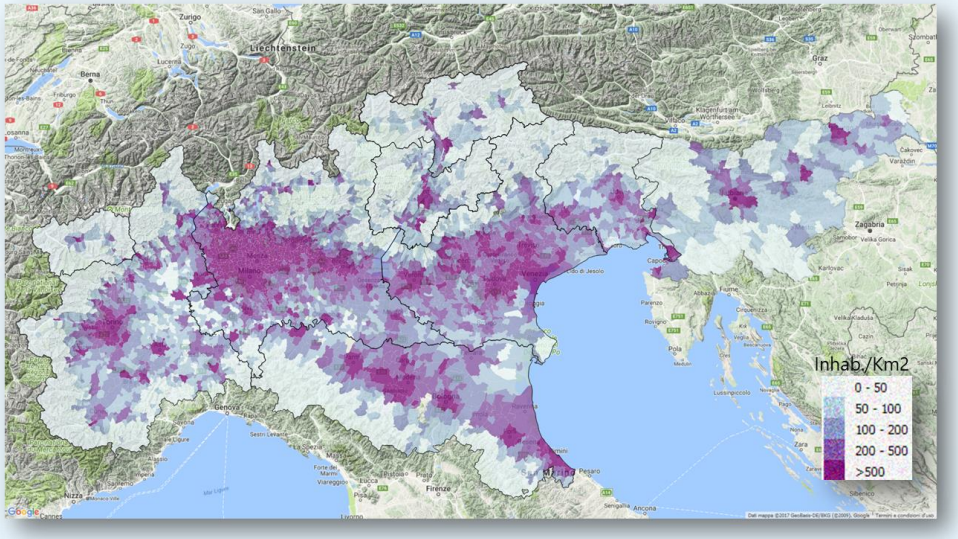
Activity in Action A1, D2 (C2)
development of a common pollutant emission dataset on the Po-basin and Slovenia (domain of 135000 Km2 and population of 28 million inhabitants).

9 different institutions involved and two updates on 2013 and 2017 completed



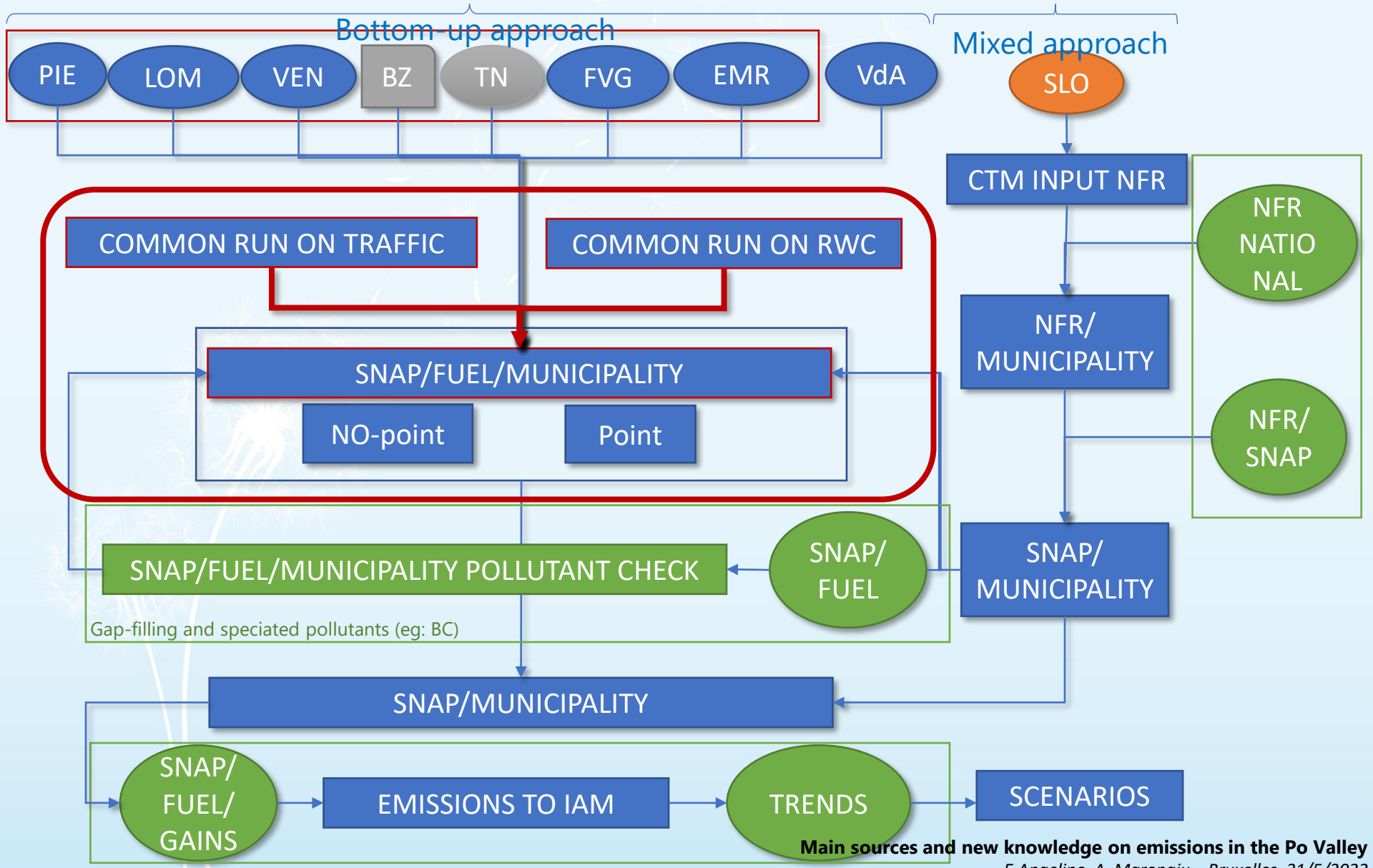
9 technicians involved in ARPA Lombardia

Alessandro Marongiu (Action Manager A1, D2), Elisabetta Angelino (Thematic Pillar), Giuseppe Fossati, Marco Moretti, Alessandra Pantaleo, Edoardo Peroni, Pierfrancesco Bonamassa, Loris Colombo, Giulia Malvestiti

17 partners contacted in the project

Monica Clemente (ARPA Piemonte), Francesca Bissardella (ARPA Piemonte), Stefania Ghigo (ARPA Piemonte), Erika Baraldo (ARPA Veneto), Silvia Pillon (ARPA Veneto), Laura Susanetti (ARPA Veneto), Giordano Pession (ARPA Valle d'Aosta), Alessandra Petrini (ARPA Friuli Venezia Giulia), Fulvio Stel (ARPA Friuli Venezia Giulia), Laura Pretto (Provincia autonoma di Trento), Elisa Malloci (Provincia autonoma di Trento), Gabriele Tonidandel (Provincia autonoma di Trento), Simona Maccaferri (ARPA Emilia Romagna), Chiara Agostini (ARPA Emilia Romagna), Rahela Zabkar (ARSO Slovenia), Damijan Bec (ARSO Slovenia), Massimo Guariento (Provincia autonoma di Bolzano)

ACTION C2 – Connection A1/D2 with D.3 and D.4 – data flow



Emissions on Po-basin and Slovenia

Emission share on year 2017 for Po-Basin and Slovenia	PM10	SO2	NOx	NH3	NMVOC	NMVOC (excl. mac 10-11)
1-Combustion in energy and transformation industries	1%	17%	7%	0%	0%	0%
2-Non-industrial combustion plants	60%	9%	11%	1%	5%	13%
3-Combustion in manufacturing industry	4%	45%	15%	0%	1%	2%
4-Production processes	3%	23%	2%	0%	4%	10%
5-Extraction and distribution of fossil fuels and geothermal energy	0%	0%	0%	0%	3%	6%
6-Solvent and other product use	3%	0%	0%	0%	23%	53%
7-Road transport	18%	1%	49%	1%	6%	14%
8-Other mobile sources and machinery	3%	3%	13%	0%	1%	2%
9-Waste treatment and disposal	0%	2%	1%	1%	0%	0%
10-Agriculture	4%	0%	2%	96%	24%	
11-Other sources and sinks	4%	1%	0%	0%	33%	

Primary emissions of PM10, NOX, NH3 - maps

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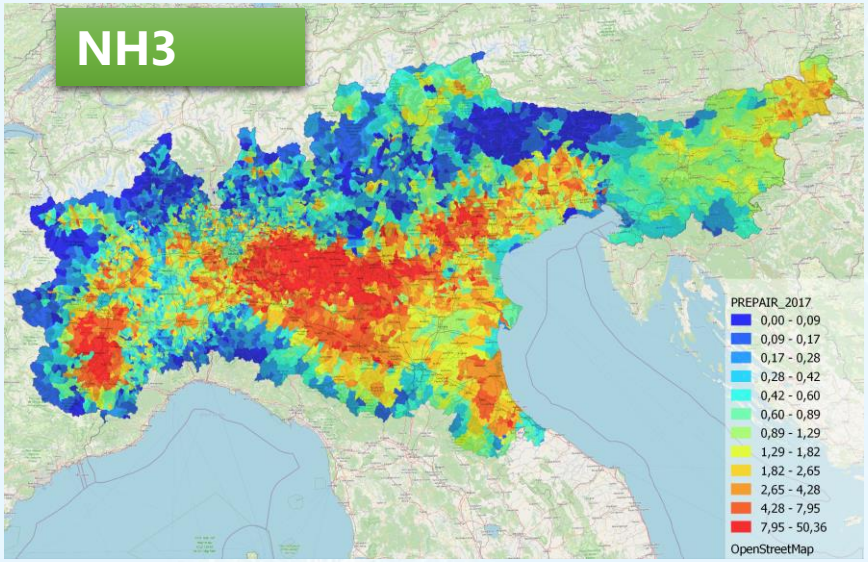
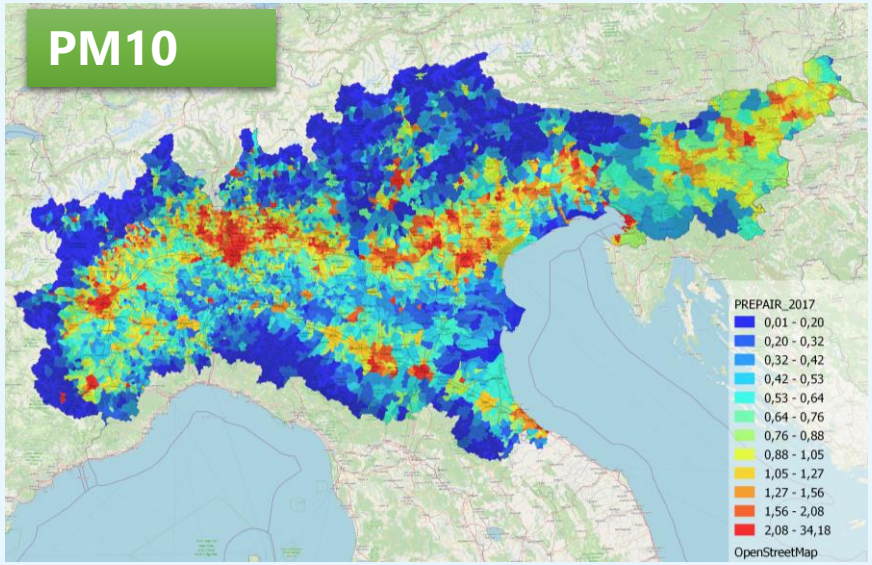
NH3

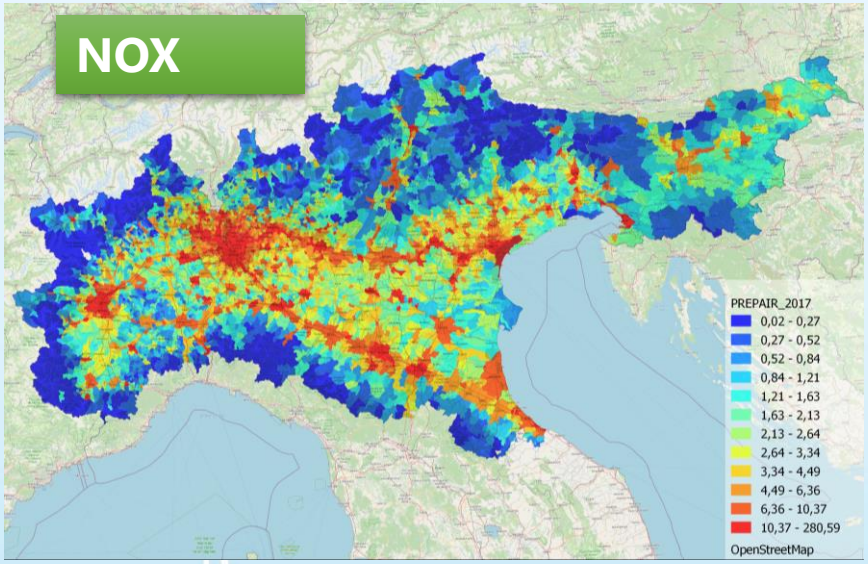


PM10



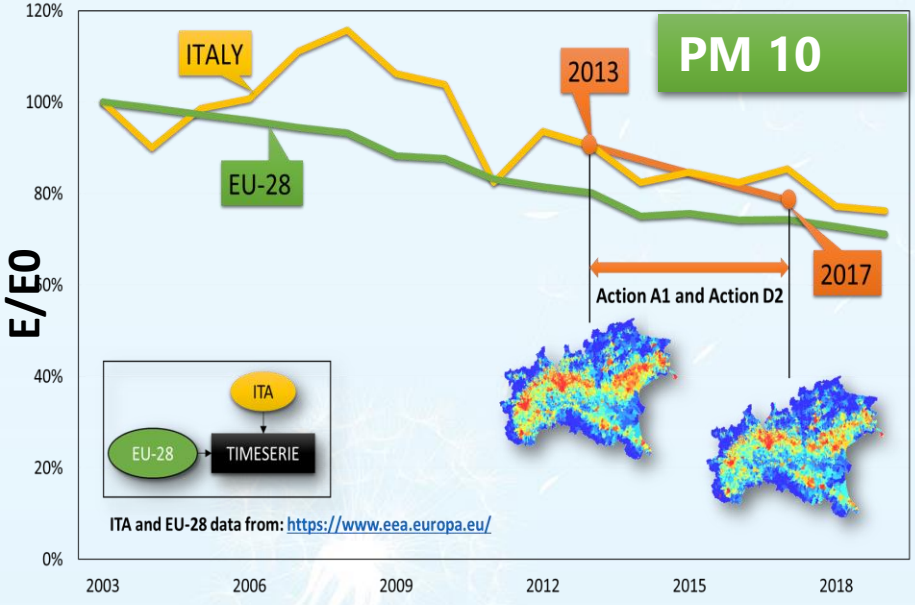
Per capita emission of PM10: **3 kg/inh/year** (Po-basin and Slovenia)

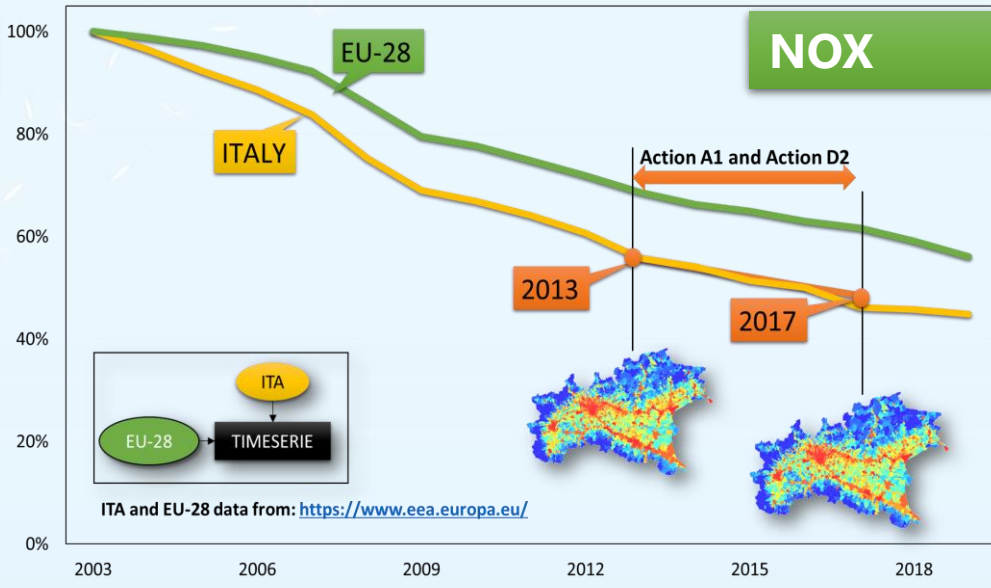
NOX

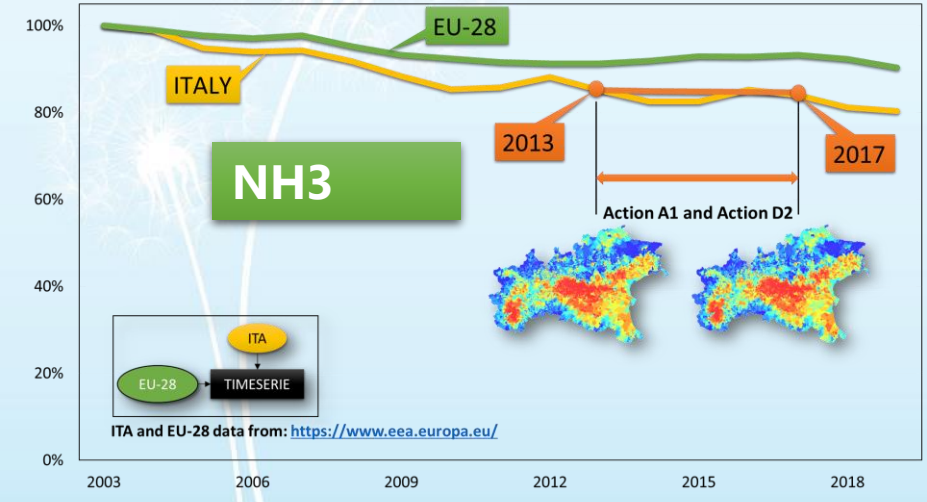


Per capita emission of Nox: **13 kg/inh/year** (Po-basin and Slovenia)

Primary emissions of PM10, NOx, NH3 Time series







ITALY

EU -28

PREPAIR emission estimates

ARPA Lo - Action D2

Year

Common run on Residential Wood Combustion (RWC) – Methodology overview

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Annual consumption

- Appliances number
- Annual specific consumption for appliance

Emission factors

- Appliance and fuel
- Real usage
- Emission standards

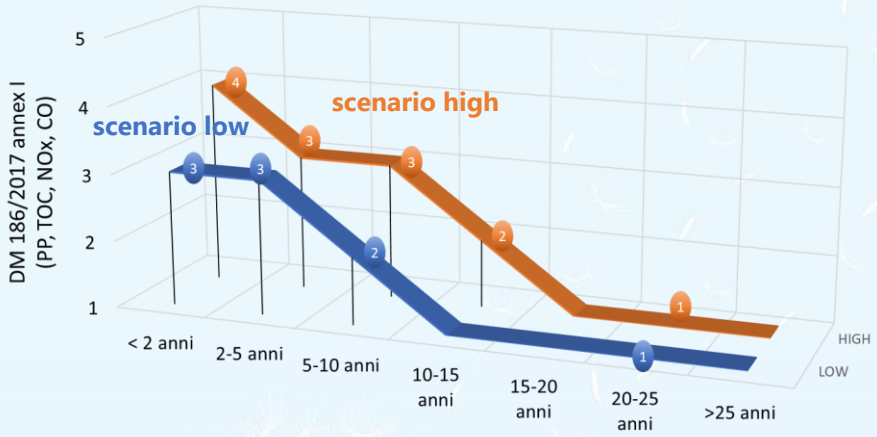
Consumption for different typology of appliances:

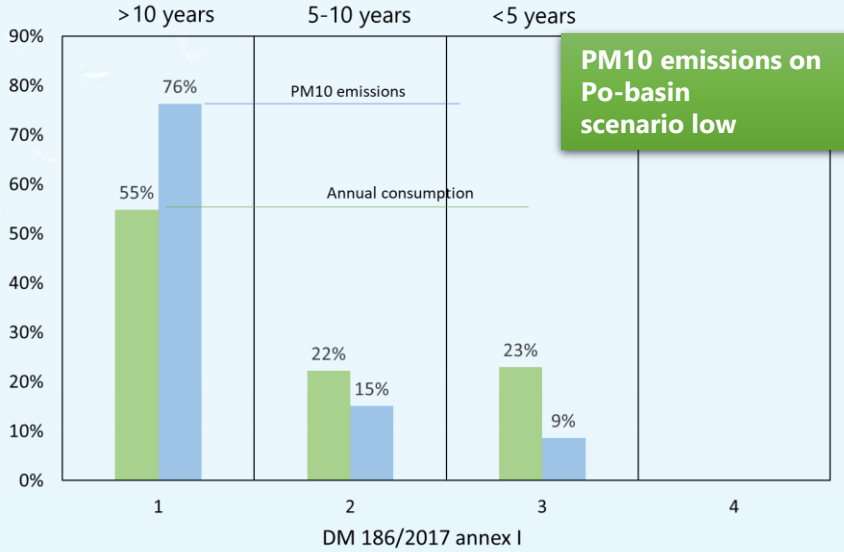
WOOD BOILER
PELLET BOILER
FIREPLACE
WOOD COOKING STOVE
PELLET COOKING STOVE
WOOD CLOSED FIREPLACE
PELLET CLOSED FIREPLACE
WOOD STOVE
MAIOLICA STOVE
PELLET STOVE
WOOD THERMOSTOVE
PELLET THERMOSTOVE

Emissions

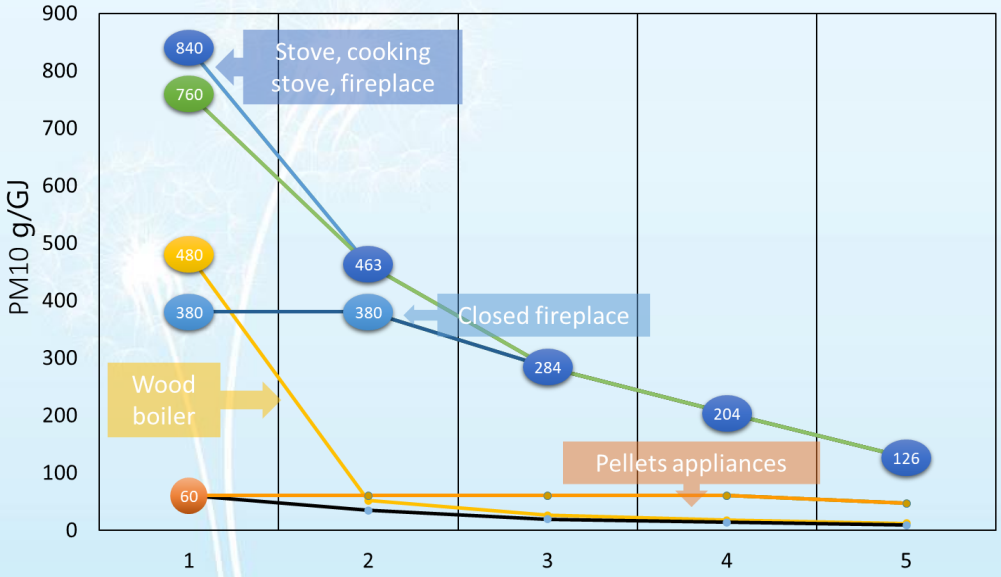
Installation year and consumption for installation years:
< 2 years / 2-5 years /
5-10 years / 10-15 years
15-20 years / 20-25 years /
>25 years

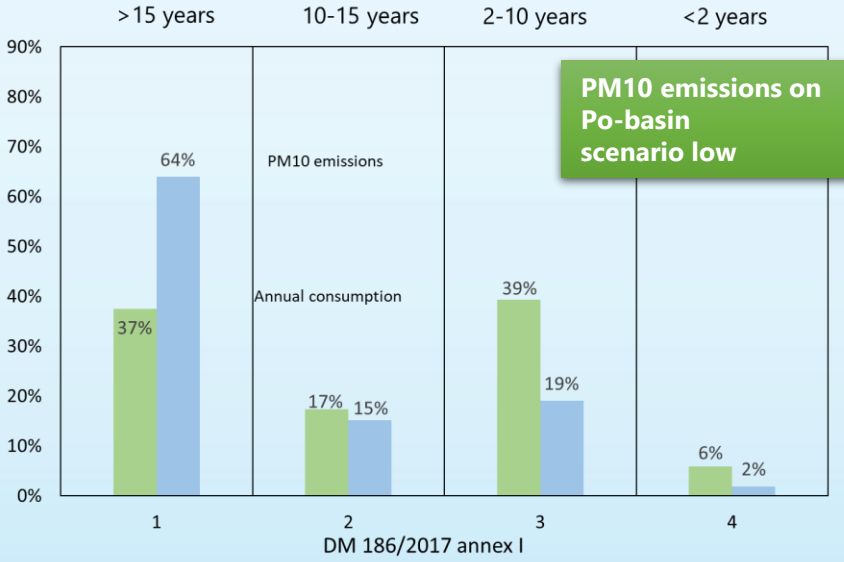
Common run on RWC – emission estimates





PM10 emissions on Po-basin scenario low





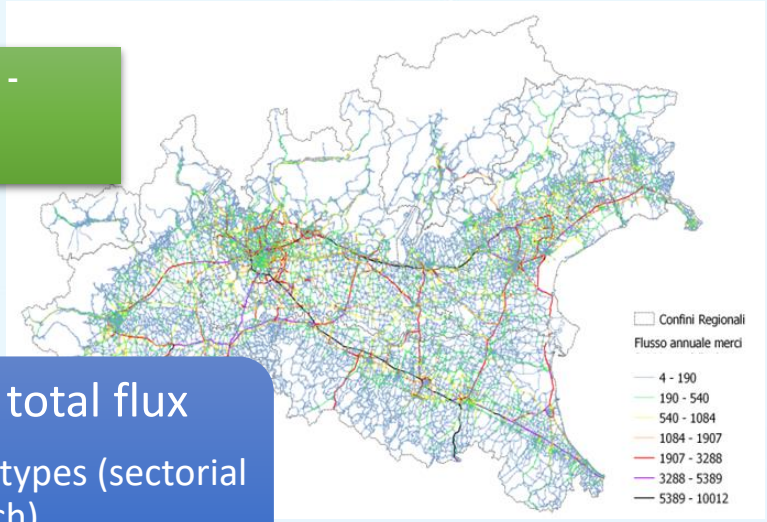
PM10 emissions on Po-basin scenario low

Main sources and new knowledge on emissions in the Po Valley

E. Angelino A. Marongiu – Bruxelles, 31/5/2022

Common run linear traffic – methodology overview

Annual traffic flow - transport of goods (X1000)



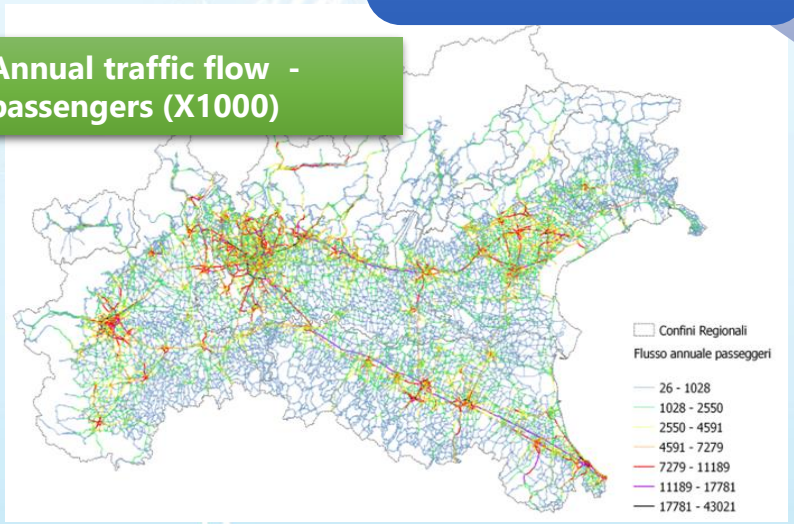
Annual total flux

- Vehicle types (sectorial approach)
- Hourly profiles
- Arches of network

Emission factors

- Fleet composition
- Vehicle specific usage
- Average velocity
- Annual mileage

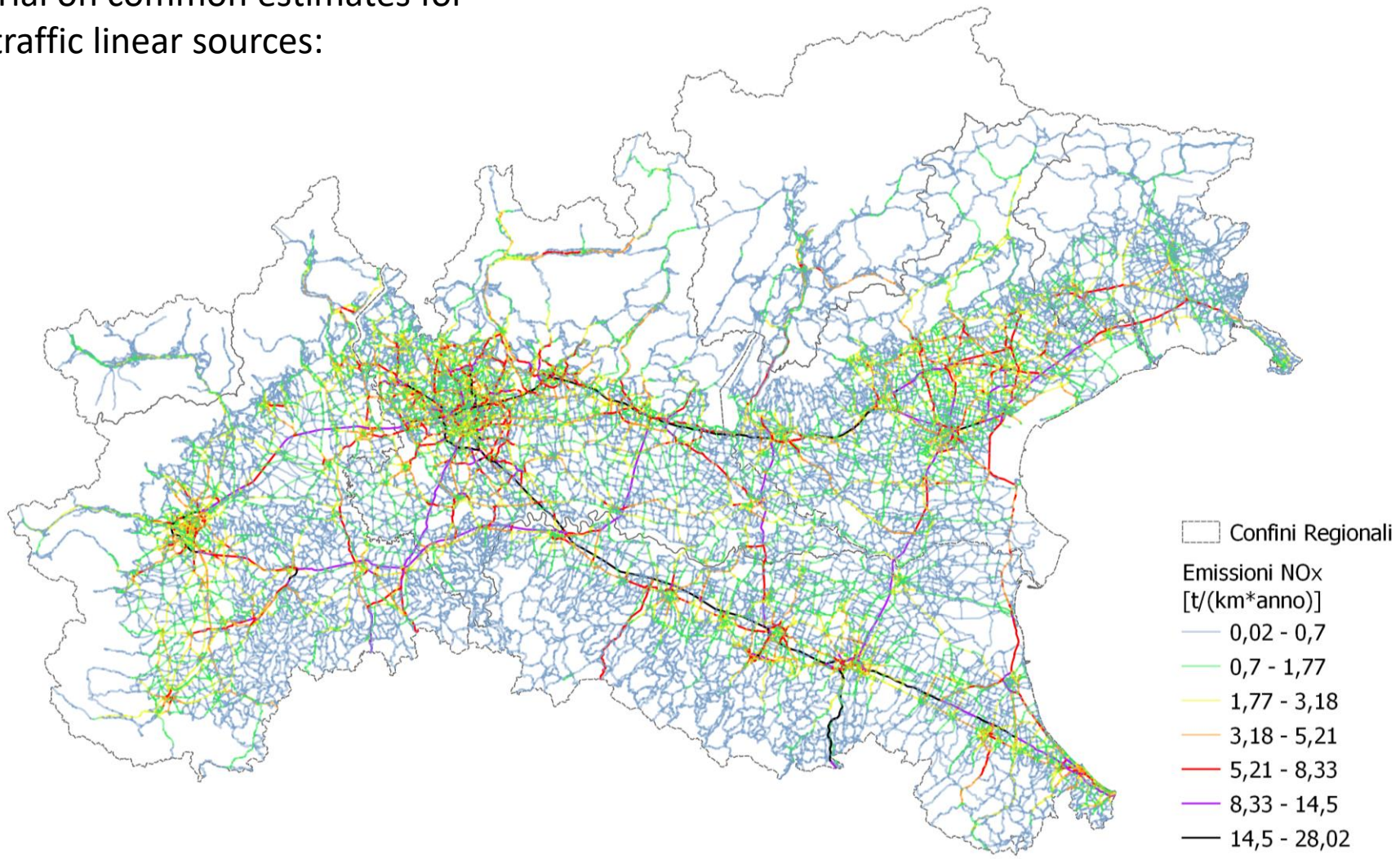
Annual traffic flow - passengers (X1000)



Emissions

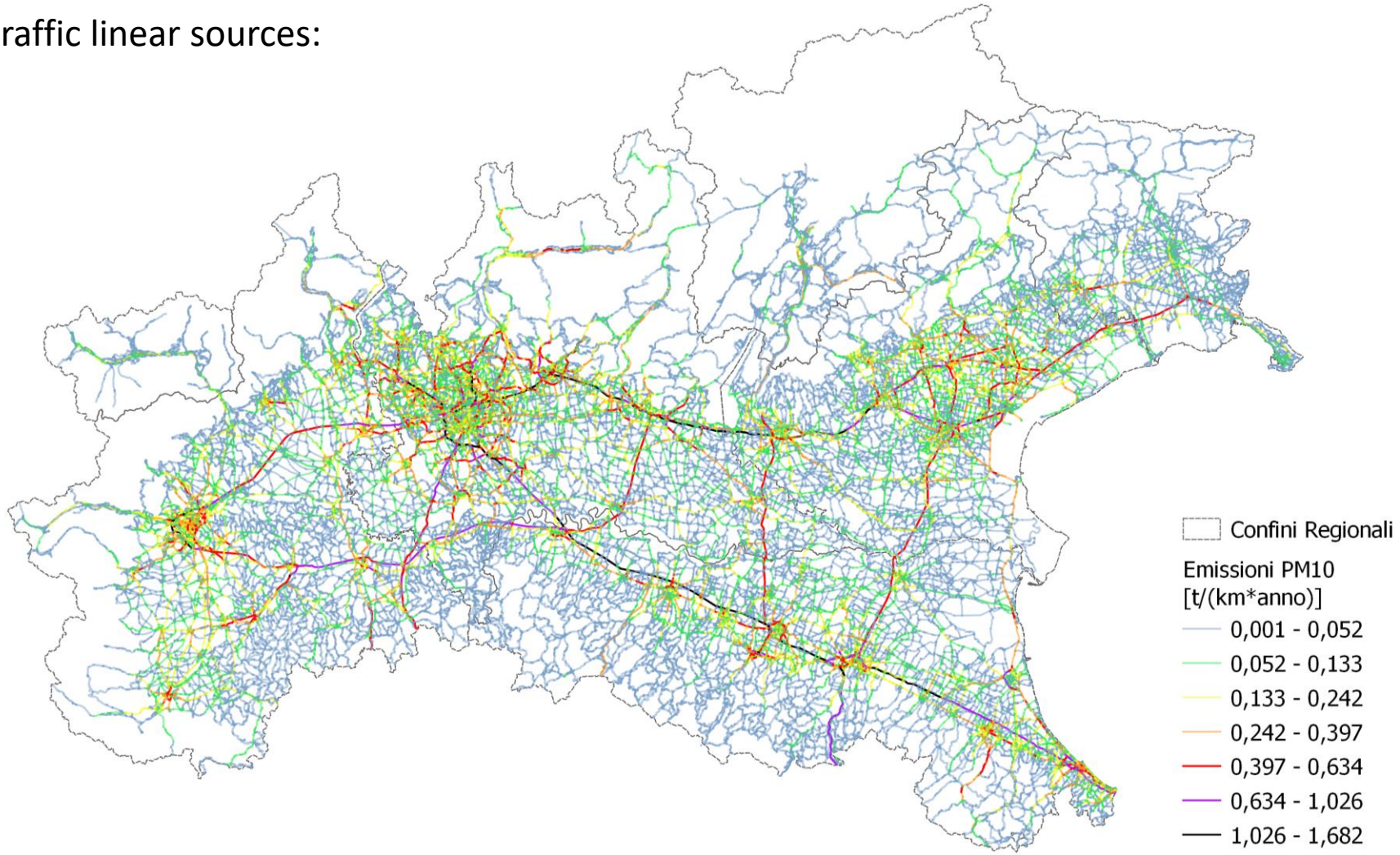
Common run linear traffic – NOx annual emission

First trial on common estimates for road traffic linear sources:



Commun run linear traffic – PM10 annual emission

First trial on common estimates for road traffic linear sources:



NH3 and the agriculture contribute

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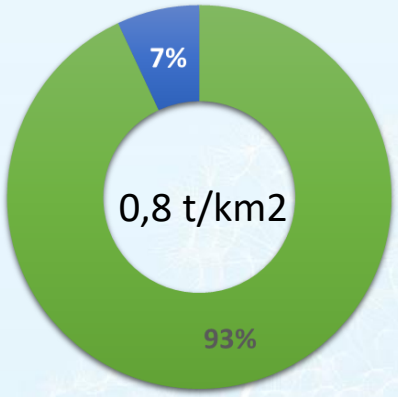
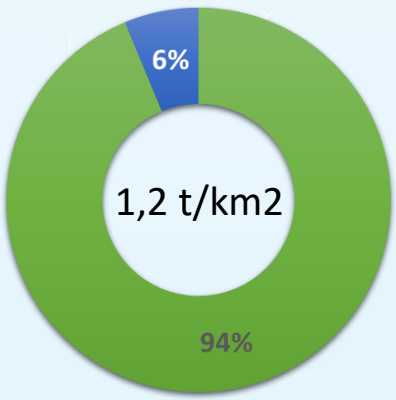
Emission Inventories – International UNECE Convention on Long-range Transboundary Air Pollution (LRTAP)

EU-28 (I)

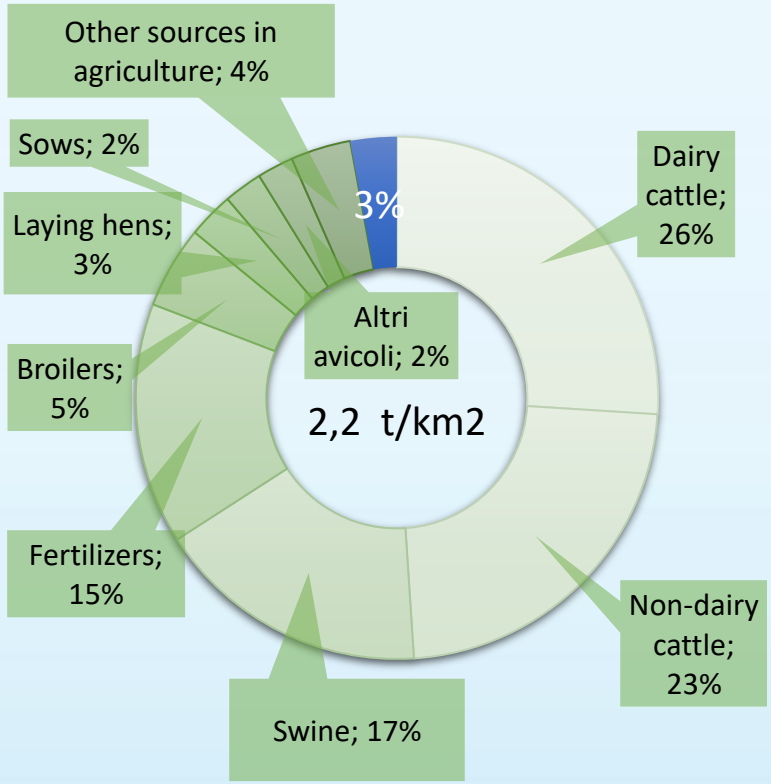


Italia



(I) con UK fino al 01/02/2020

PREPAIR project Action D2 results - % on Po Basin



Le emissioni di ammoniaca e i fattori di emissione: BAT Tool e INEMAR
Marongiu A., Malvestiti G., Angelino E., Fossati G. *Agricoltura e qualità dell'aria – Bologna 05/05/2022*

NH3 – Spatial emission distribution

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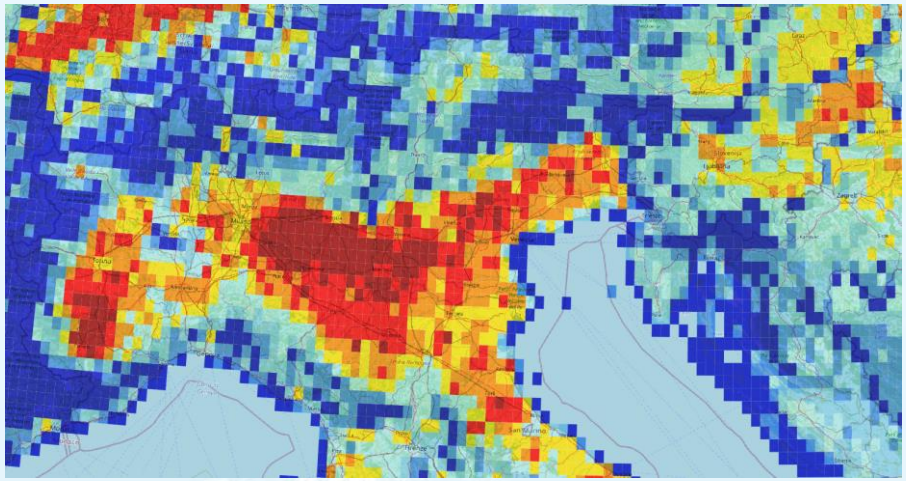
Source: EMEP CEIP
Grid 0.1 x 0.1
Top-Down emission inventory



Estimates start from annual emissions calculated at national level, spatially disaggregated at various levels, through statistical indicators (population, roads, land-use, ...).

0,000 - 0,150
0,150 - 0,310
0,310 - 0,550
0,550 - 0,970
0,970 - 1,600
1,600 - 2,690
2,690 - 5,770
5,770 - 19,298

t/km2
OpenStreet Map

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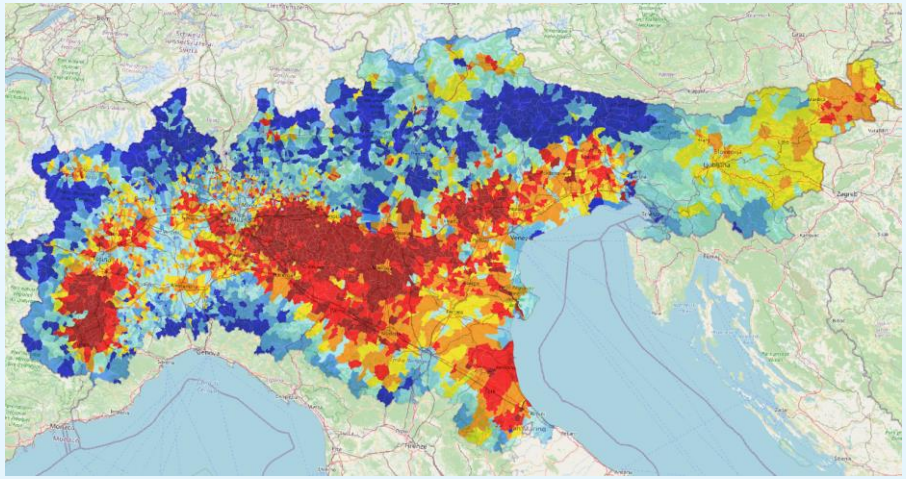
PREPAIR Action D2
Municipality level
Bottom-Up emission inventory



Estimates from the Italian regions start from local data at the municipal level or even from the specific object of the issue (which may be the route of the road or the location of the industry). Only in the case of lack of data is a breakdown applied starting from aggregated data.

0,00 - 0,15
0,15 - 0,31
0,31 - 0,55
0,55 - 0,97
0,97 - 1,60
1,60 - 2,69
2,69 - 5,77
5,77 - 49,08

t/km2
OpenStreet Map

https://www.ceip.at/the-emep-grid/gridded-emissions/nh3

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NH3 – emission estimates

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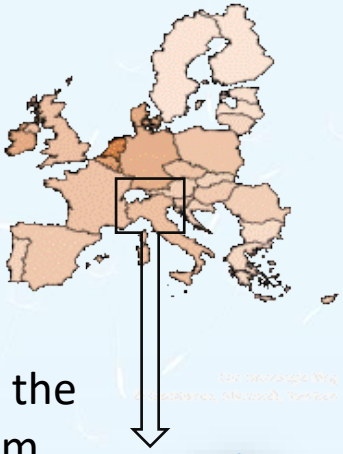
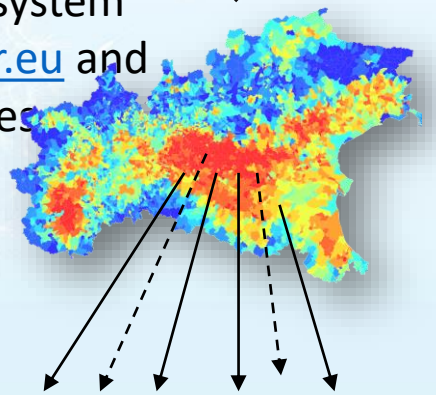
European and national scale: CLRTAP EMEP inventories



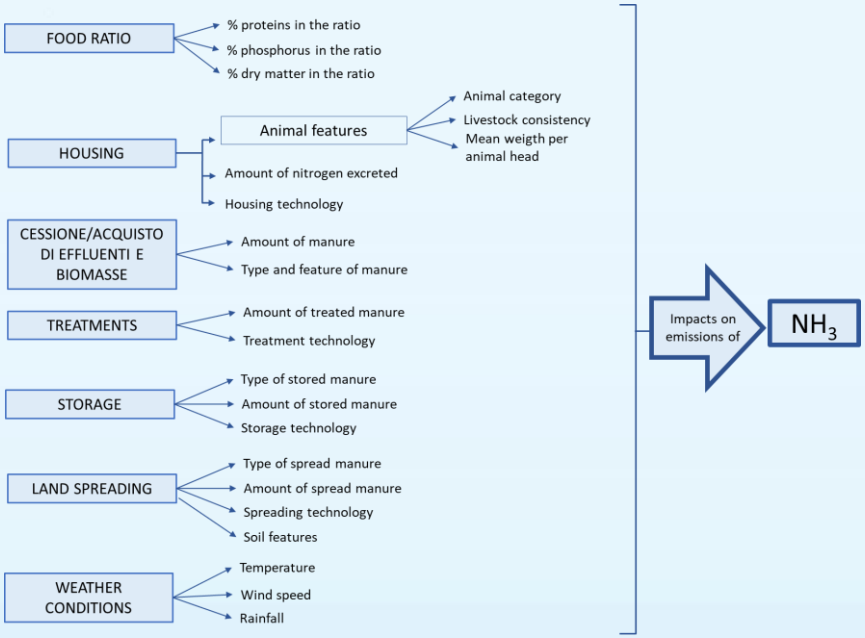
At municipalities scale on the Po basin: INEMAR system https://www.inemar.eu and local inventories



At farm scale: BAT-Tool

Total emissions [kg/anno]	=	Housing emissions [kg/anno]	+	Treatment emissions [kg/anno]	+	Storage emissions [kg/anno]	+	Spreading emissions [kg/anno]

Measurements and detailed phenomenological description



APPLICAZIONE DELLA MODELLISTICA INVERSA PER LA STIMA DEL FLUSSO EMISSIVO DI AMMONIACA IN AMBITO ZOOTECNICO
Angelino E., Malvestiti G., Marongiu A., Fossati G., Peroni E.
Ingegneria dell'Ambiente
V. 9 N. 1 (2022): VOLUME 9, NUMERO 1, ANNO 2022
https://www.ingegneriadellambiente.net/ojs/index.php/ida/article/view/391

ARPA LOMBARDIA Agenzia Regionale per la Protezione dell'Ambiente

With the contribution
of the LIFE Programme
of the European Union
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Thanks for your attention

www.lifeprepair.eu – info@lifeprepair.eu

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FLA Fondazione Lombardia per l'Ambiente