

Wood burning impact on air quality in Lombardy: analysis and perspectives

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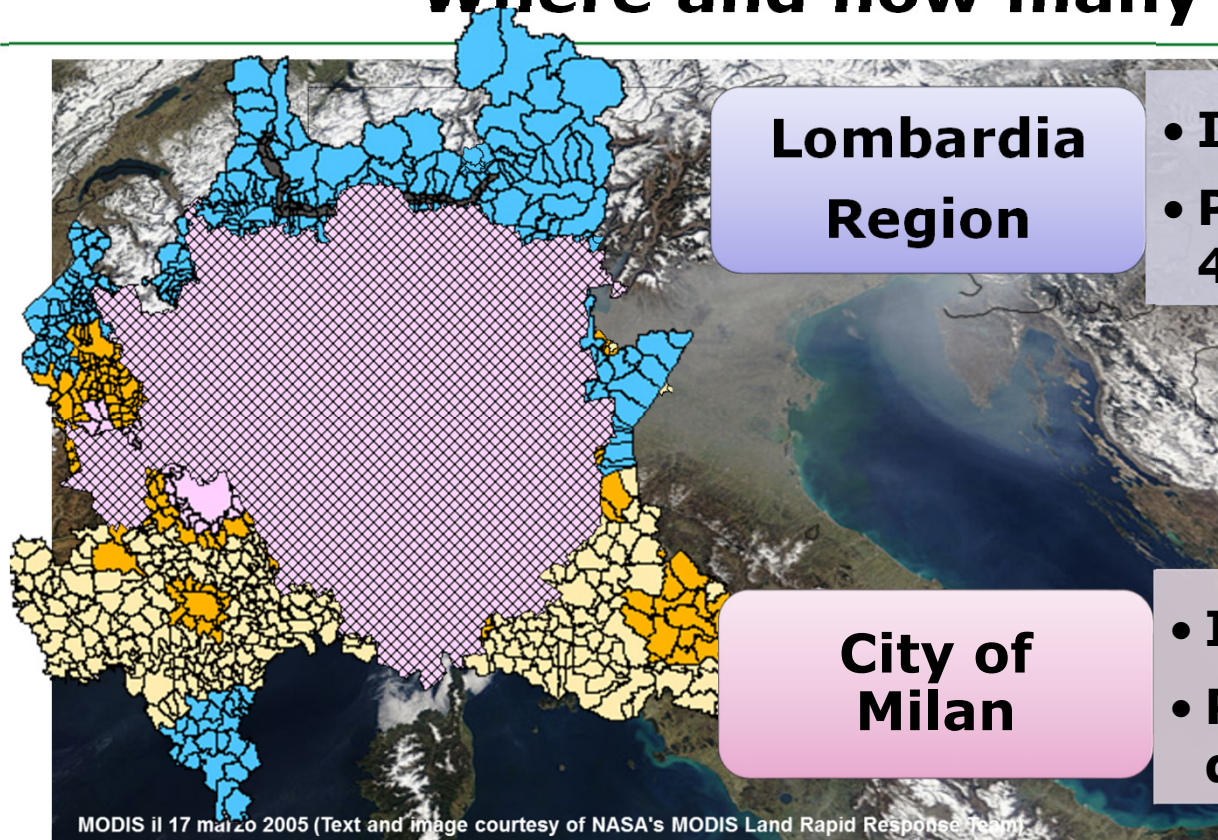
Arpa Lombardia

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5th EUSALP Action Group 9 meeting

Bolzano, 21th March 2018

Milano and Lombardia: Where and how many



Lombardia Region

- **Inhabitants: 9,9 milion**
- **Population density: 419inab/km²**

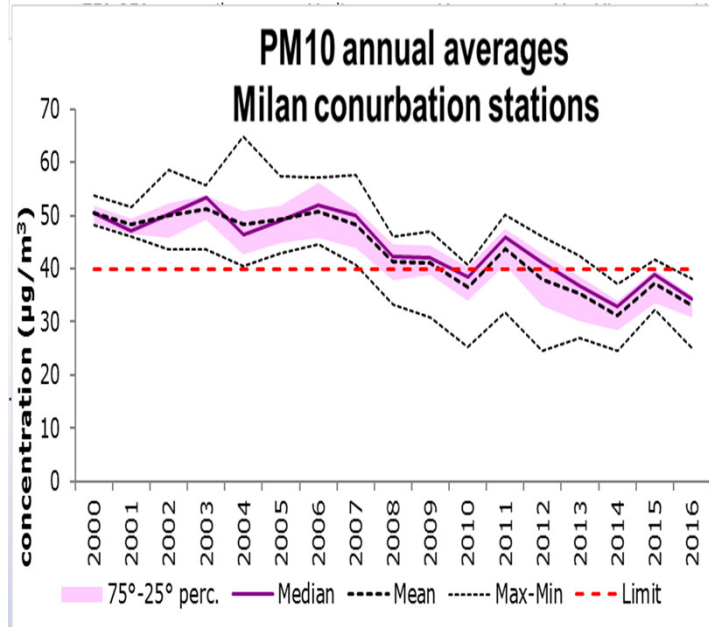
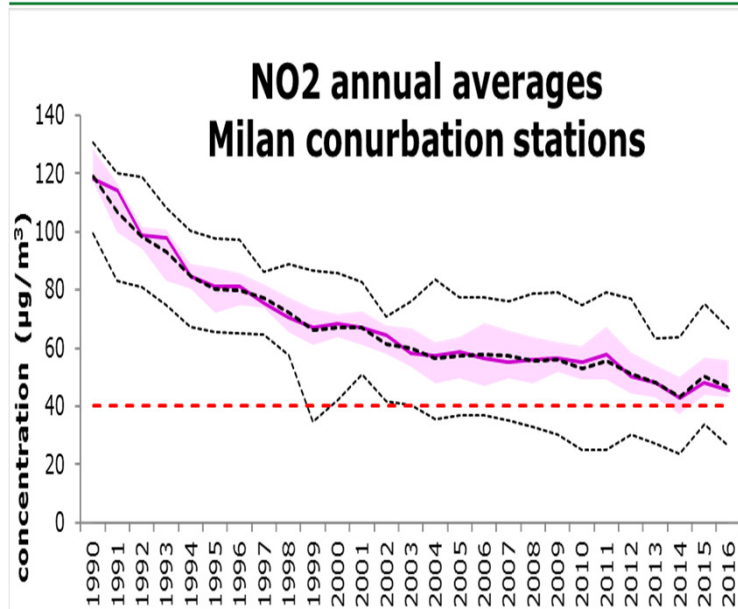
City of Milan

- **Inhabitants: 1,3 milion**
- **Population density: 7.272inab/km²**

- Po Valley: closed by mountains exceeding 2500 m a.s.l. on three sides (highest peaks exceeding 4000 m a.s.l.)
- Meteorological conditions often adverse to air pollution dispersion

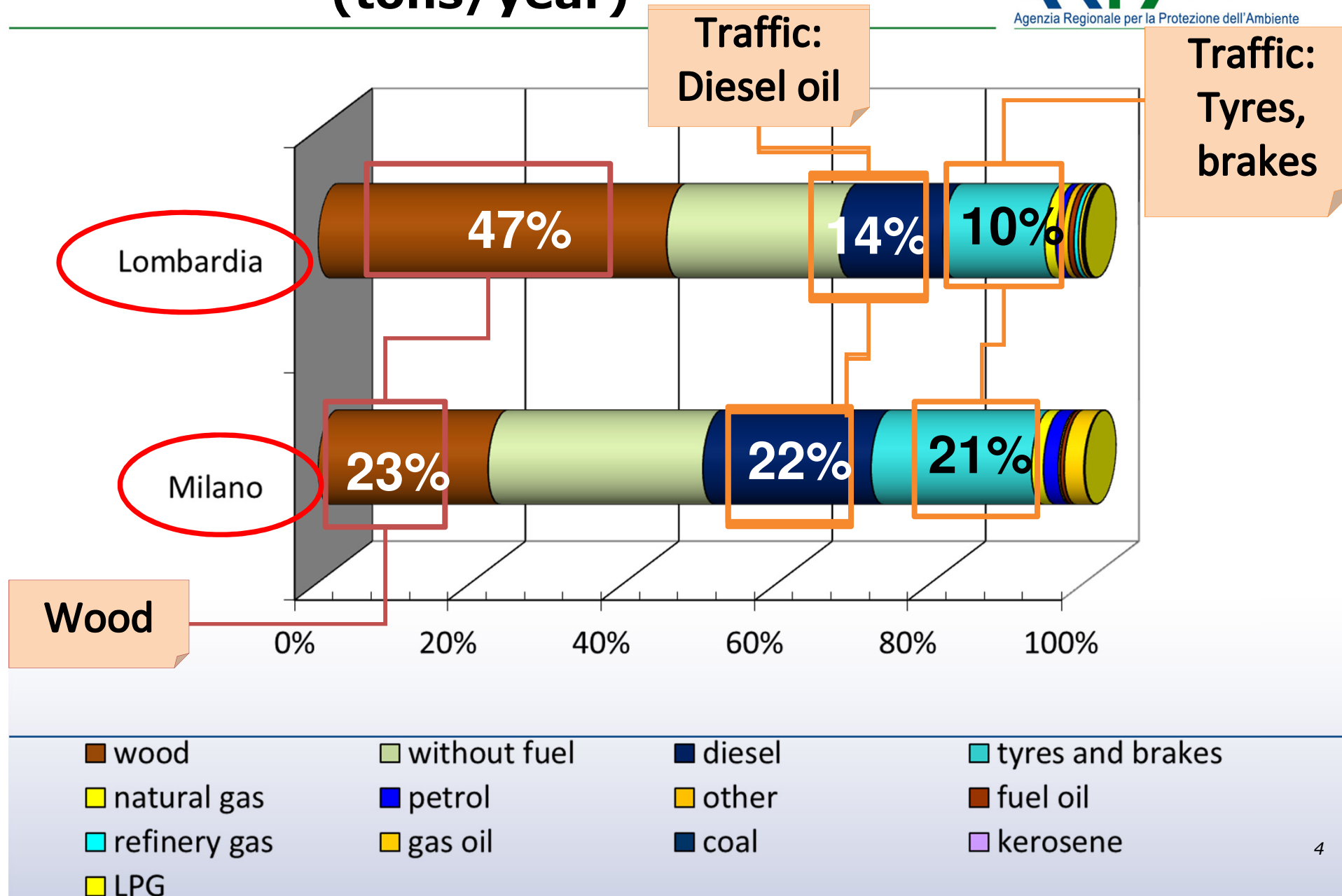
Air Quality

Concentrations are decreasing but



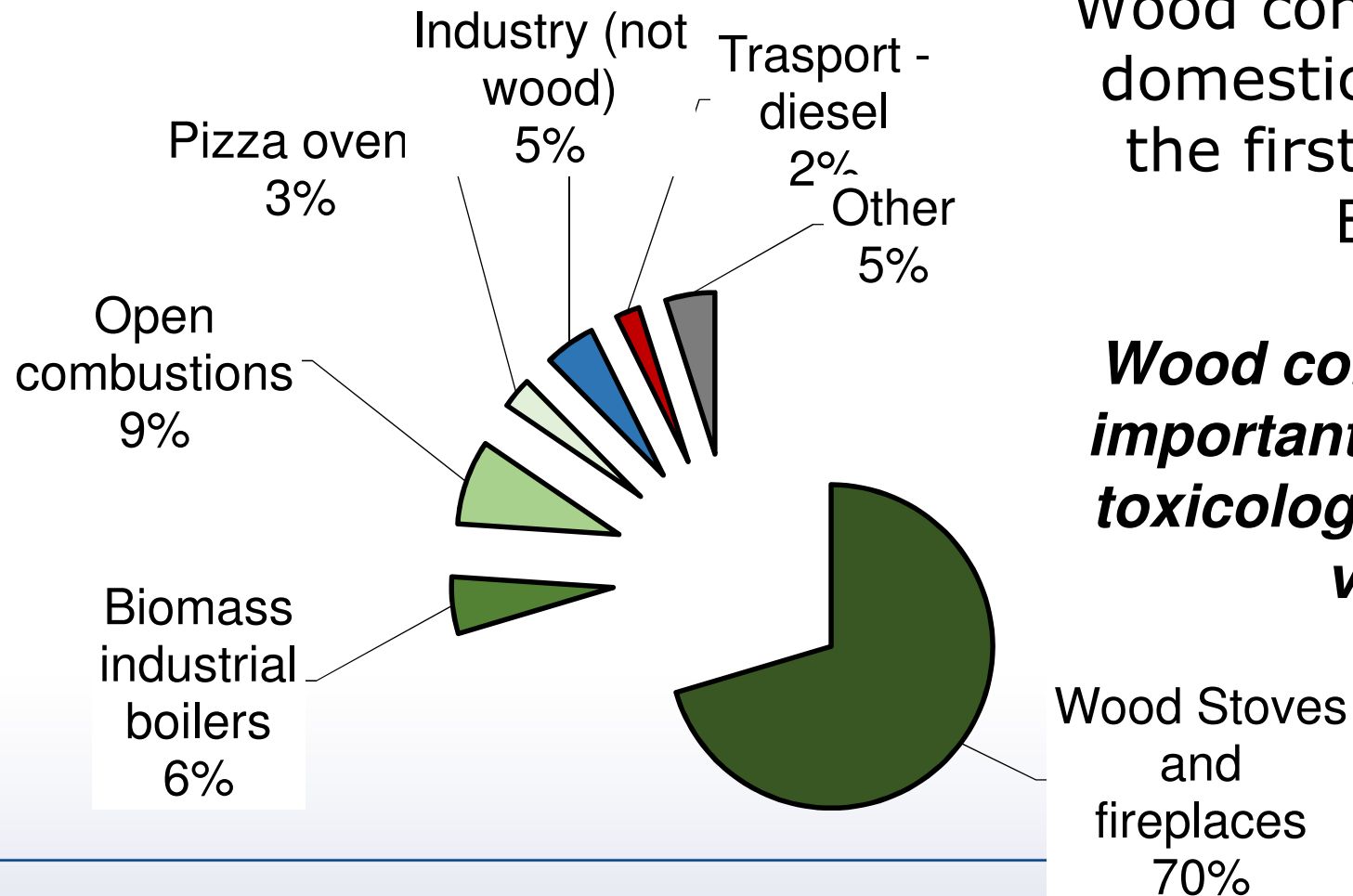
- Widespread **PM₁₀** daily limit exceedances (82-97 in Milan 2017)
- **NO₂** annual limit exceedances, especially in traffic stations (2017 annual mean in Milano up to 64 µg/m³)
- **B(a)P** standard non achieved where wood burning is more diffuse(outside downtown)
- Widespread exceedances of both health and vegetation **Ozone** protection standards (above all leeward of the town)

Primary PM10 emissions by fuel (tons/year)



B(a)P emissions by fuel (tons/year)

Lombardia region

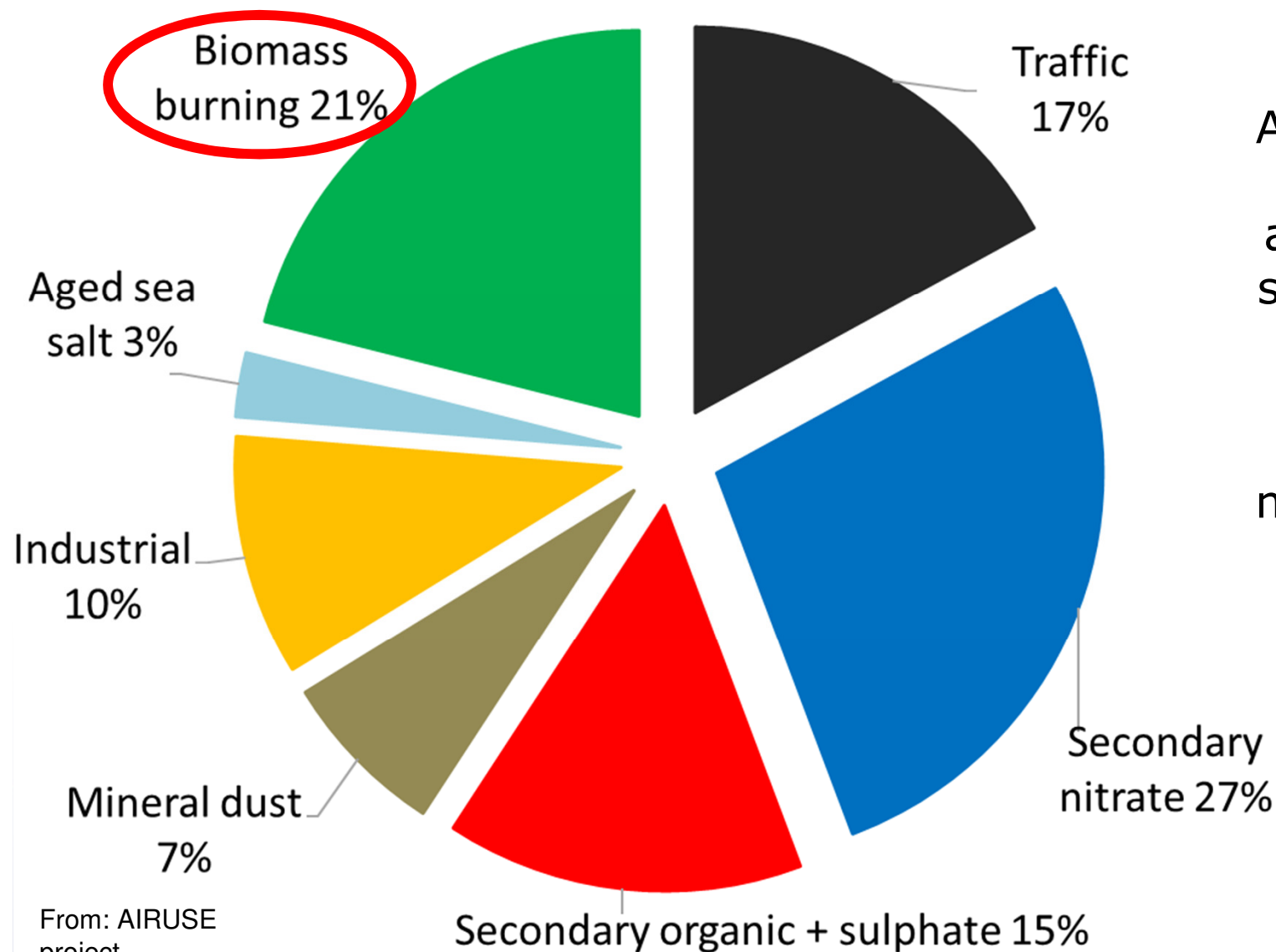


Wood combustion for domestic heating is the first source of BaP

Wood combustion is important also from a toxicological point of view

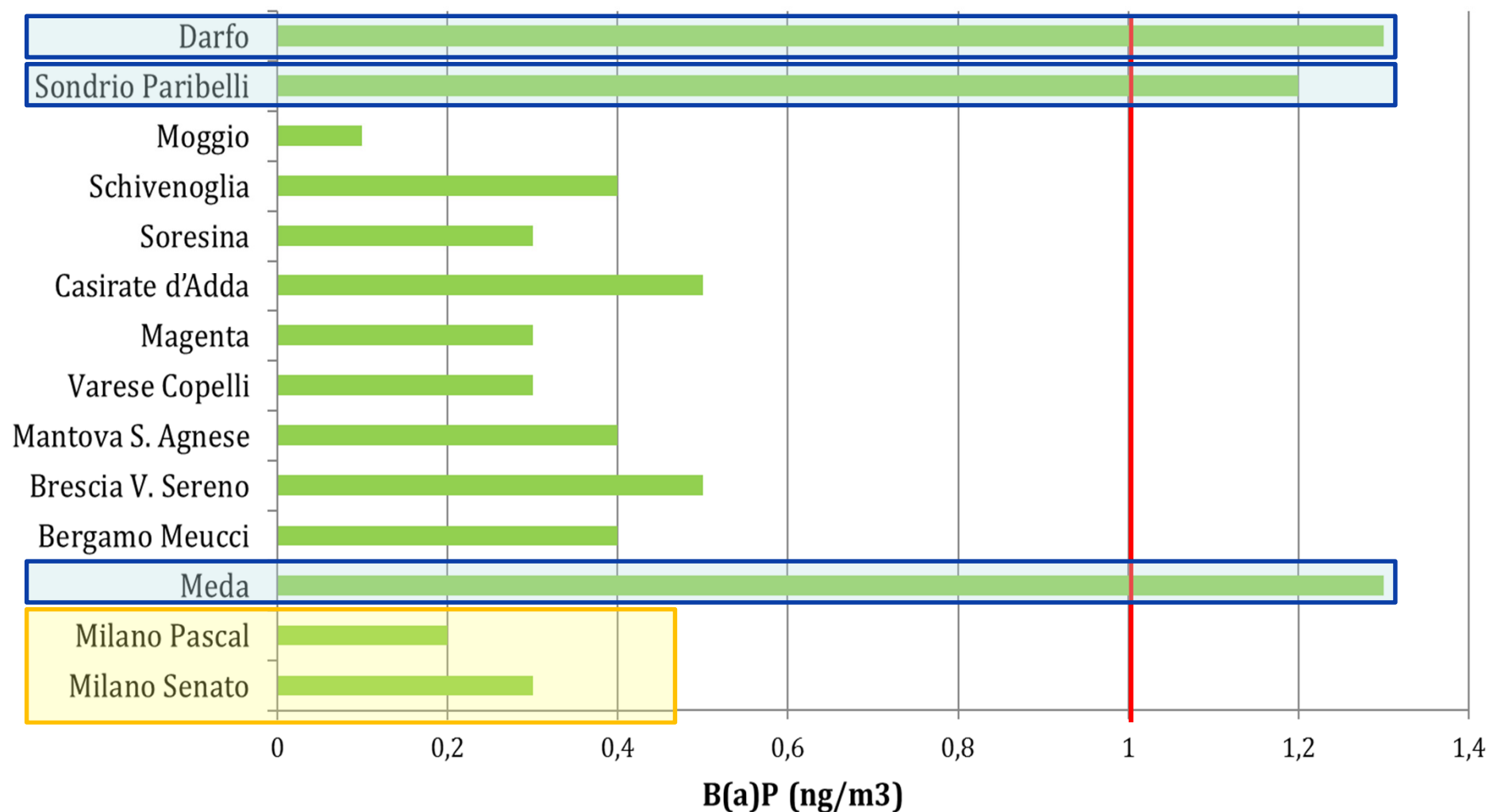
PM10 source apportionment

Milano Annual average



Also the results of source apportionment studies confirm that wood combustion is one of the most important sources of PM

B(a)P in Lombardia 2016 averages



The exceedings of the BaP standard are not measured in Milano downtown but in the stations where wood combustion is more widespread (valleys and suburbs)

The Regulation of wood burning in Lombardia

Identification of different emission classes of stoves and incentives for substitution of the worst ones

- Different PM10, NOx, CO and OGC classes of emissions are defined for wood stoves and fireplaces
- Incentives to substitute the worst stoves with better performing ones

Rules on maintenance and control

- Regulatory measures for stoves and fireplaces regarding their maintenance and control: they must follow the same rules of all the other heating domestic systems and be registered in Regional census database

Rules for installation and use of the stoves and fireplaces step by step more ambitious

- Wood burning is forbidden from 15.10 to 15.4 in stoves and fireplaces with a yield <63% or CO emissions > 0,5% (ref. 13% O2) from 2006
- The requirements for new stoves are step by step more ambitious in terms of number of stars required: 3 stars from 1.10.18 and 4 stars from 1.1.20
- Progressive ban of the already installed stoves of the less performing classes, starting during high pollution episodes

The Regulation of wood burning in Lombardia

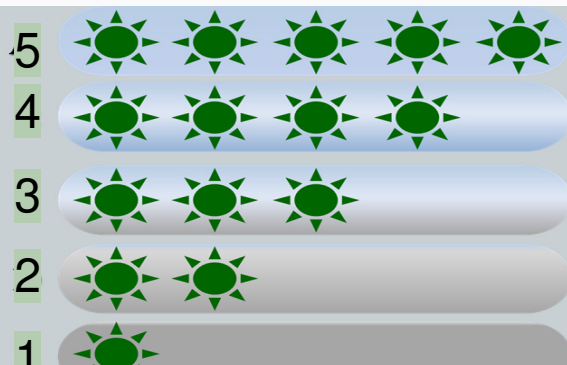
Identification of emission classes

- Different PM10, NOx, CO and OGC classes of emissions for wood stoves are defined
- It is the base for policies of bans and incentives
- It is the base to stimulate technological development

5 stars = in someway future but achievable and already present on the market in some cases

4 stars = the best currently present in the market

3 stars = actual market with good performances (equivalent to ecodesign levels of 2022)



Italian Decree 2017.11.7 n. 186

Regulation of wood burning in Lombardia

Step by step stricter requirements for the installation of new stoves

- From 1.10.2018 only 3 stars stoves can be installed
- From 1.1.2020 only 4 stars stoves can be installed

Progressive ban of the use of the most emitting stoves

- From 2006 stoves must have at least a yield >63% and CO emissions < 0,5 % (13% O₂)
- From 1.10.2018 only 2 stars stoves can be used
- From 1.1.2020 only 3 stars stove can be used

Limitation of the use of non-BAT wood stoves during high pollutions episodes

- From 2016 during high pollution episodes only stoves with at least 3 or 4 stars stoves (depending on the duration of the episode) can be used

Regulation of wood burning in Lombardia



Rules on maintenance and control

- Regulatory measures for stoves and fireplaces maintenance and control
- Census and mandatory registration of new and existing appliances

Goal: regulating small (<35 kW) domestic heating appliances fueled by woody biomass to limit impact on air quality that must follow the same rules of other domestic heating systems in terms of maintenance and control and must be registered in the regional census of domestic heating system.

Opportunities:

- More SAFETY in small stoves and fireplaces → LESS domestic INCIDENTS
- Less OUTDOOR EMISSIONS but also INDOOR POLLUTION
- Sector development: new WORK opportunity
- ENERGY SAVING and ECONOMIC for population (less biomass burned)
- With DB of all existing installations: possibility of incentives for substitution of oldest appliances

Information

Scientific publications and presence in workshops, conferences, projects ...

- Communication activities in Life PREPAIR project is an example

Communication to public

- Brochures
- Advertising campaigns
- Websites
(http://ita.arpalombardia.it/ita/legna_come_combustibile/)

Presence in public meetings

- Organized by municipalities or NGO or sectorial associations

Key implementation challenges

Cultural:

- Wood burning is seen as “bio” “green” “environmental friendly”
- Mass media are often skeptical
- People don't appreciate the impact of this source on air quality and health, so it is difficult to implement actions

Legal:

- In Italy it is very difficult to control inside private houses (the best way of action is to work on the rules for new appliances)

Economical:

- Now heating by wood costs half than by methane or light oil

Technical:

- Methods to measure PM emissions must represent real emissions to avoid another.. Dieselgate also in this field

Technological:

- It is necessary to develop new products really compatible with air quality

Signs of hope



Before Wood doesn't pollute

Presidente Formigoni, qual è la cosa che scalda, non inquina, si rinnova e fa risparmiare?



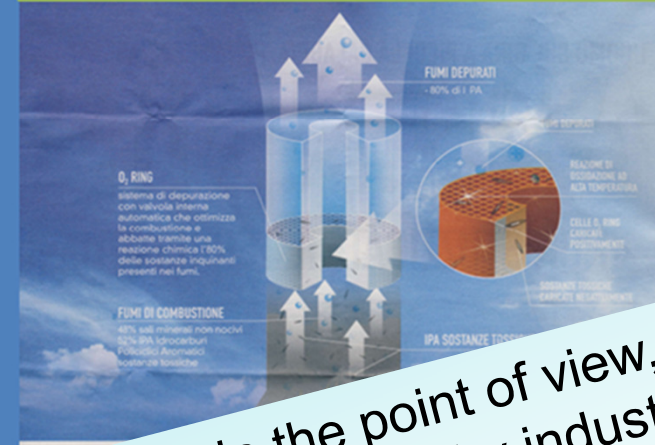
La legna.

La Regione Lombardia ha individuato un'idea vincente: la legna, il combustibile a legno, che è invece un vero amico dell'ambiente. Perché utilizza esclusivamente energia rinnovabile, è ecologicamente sostenibile, che chimicamente bruciata produce polveri che contengono soltanto sali di potassio, sodio, calcio, boro, magnesio e perfettamente assimilabili dal nostro organismo e dagli ecosistemi in generale, in quanto già presenti in natura. È di molto inferiore a quelle prodotte dalla combustione del gasolio e del gas, che emettono infatti numerosi inquinanti presenti nei combustibili fossili. La legna, inoltre, è un combustibile sicuro che sopprime i rischi di incendio e non genera alcun tipo di inquinamento. Per questo, la Regione Lombardia ha deciso di promuovere la legna come principale combustibile per il riscaldamento domestico. La legna è un combustibile sicuro che sopprime i rischi di incendio e non genera alcun tipo di inquinamento. Per questo, la Regione Lombardia ha deciso di promuovere la legna come principale combustibile per il riscaldamento domestico.

PALAZZETTI
IL CALORE CHE PIACE ALLA NATURA

Corsera, 17-02-2006

After The right way to not pollute with wood



A change in the point of view,
a new opportunity got by industries

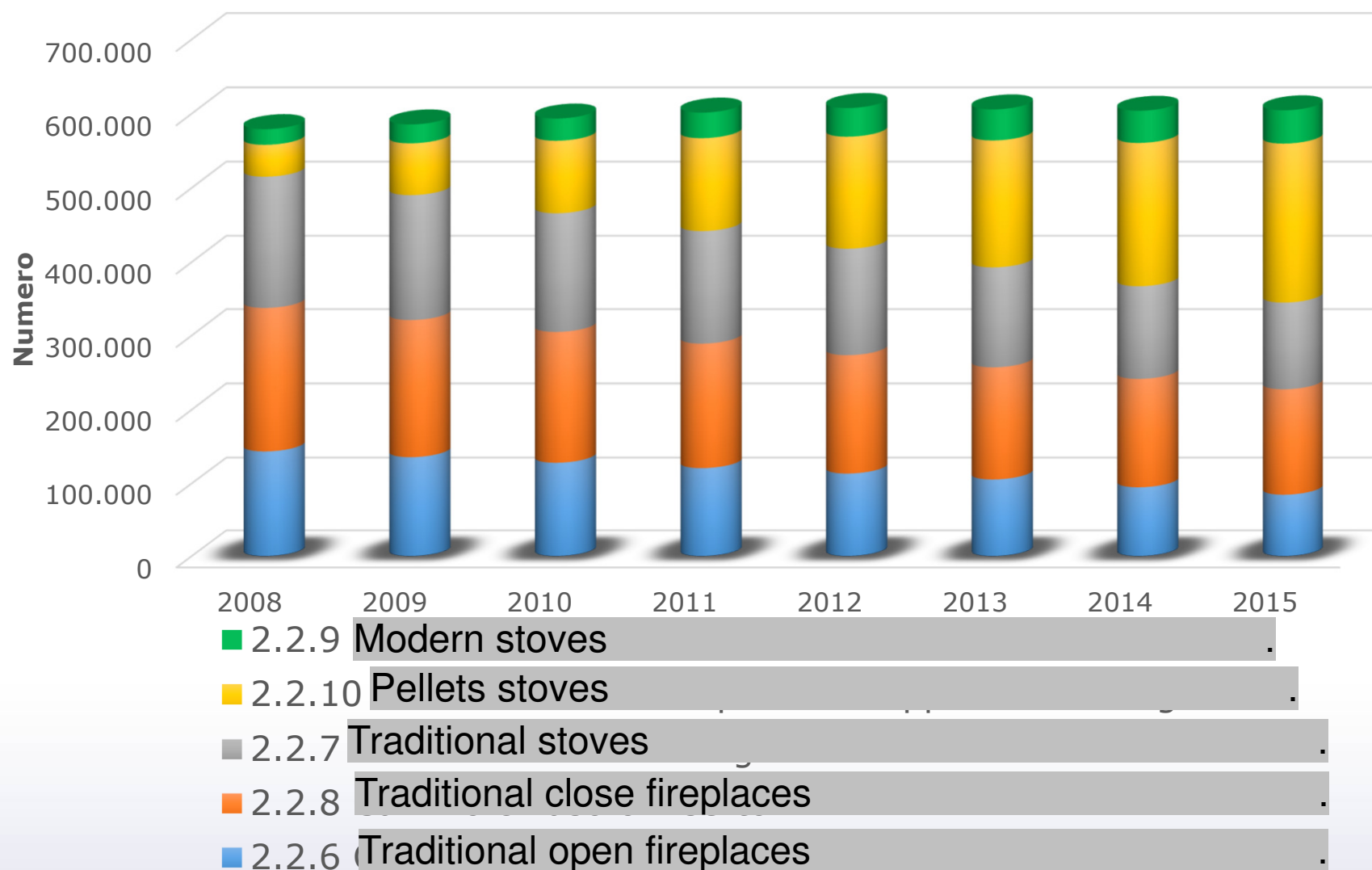


La combustione della legna produce fumi composti per il 48% da sali minerali non nocivi e per il 52% da IPA (Idrocarburi Policiclici Aromatici), sostanze tossiche; il sistema O-Ring riduce drasticamente l'emissione in atmosfera di queste sostanze inquinanti.

PALAZZETTI
IL CALORE CHE PIACE ALLA NATURA

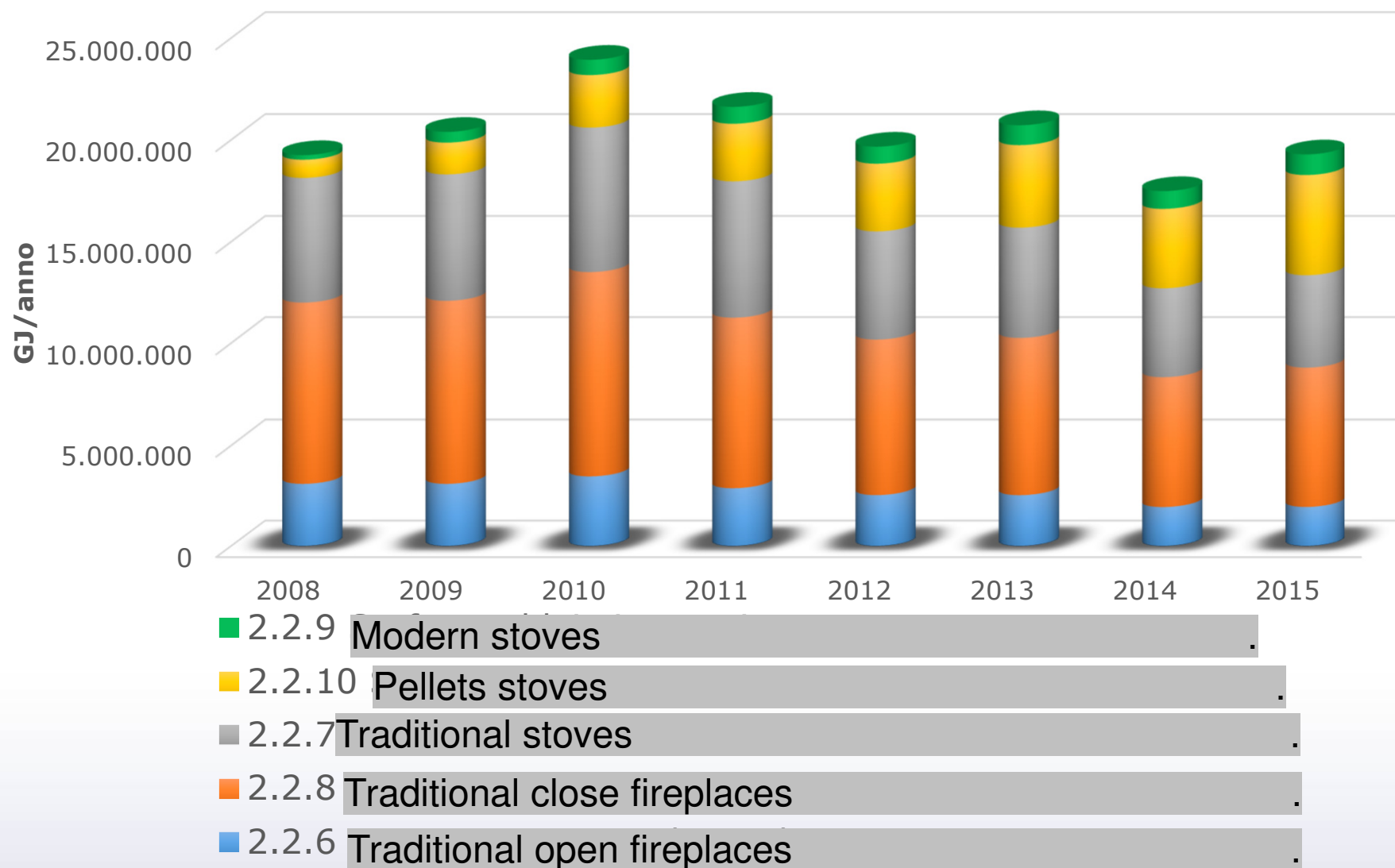
Corsera, 26-05-2011

Number of appliances <35 kW in Lombardia (evaluation)



Metodologia: Integrated methodology for assessing domestic wood burner municipal share - A. Marongiu, E. Angelino, M. Moretti, Air Quality 2016 Milano

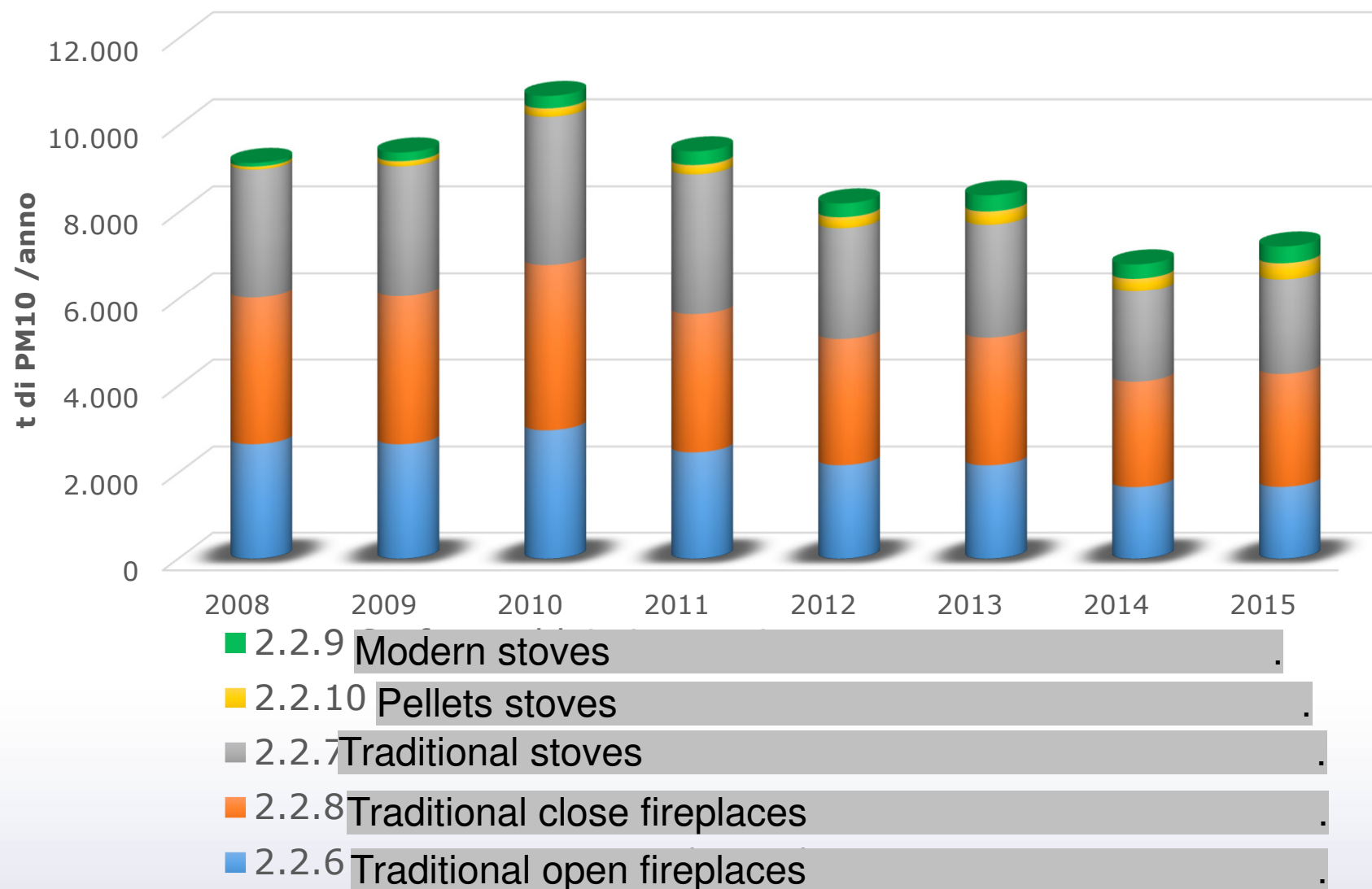
Energy obtained by wood in different appliances in Lombardia



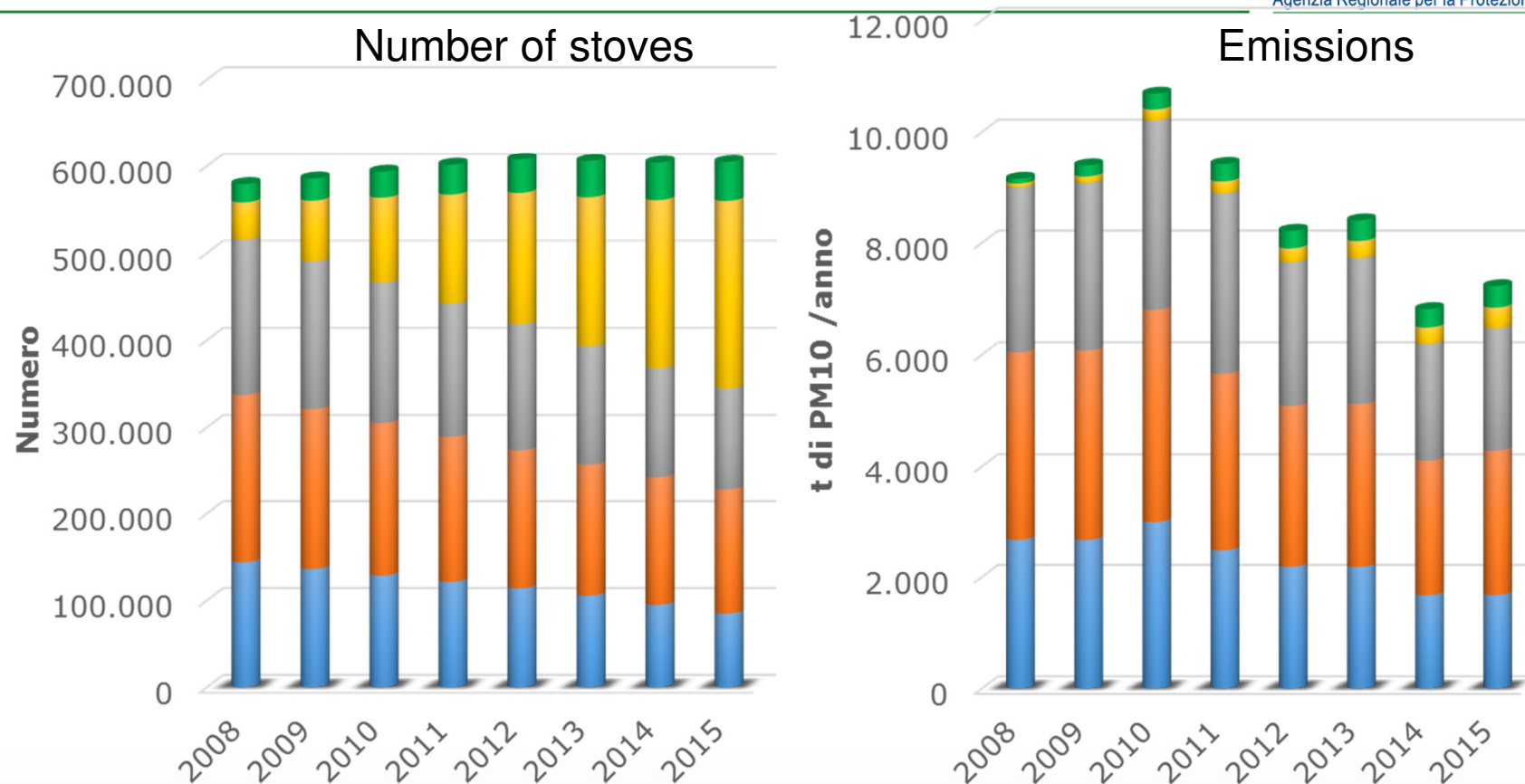
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Metodologia: Integrated methodology for assessing domestic wood burner municipal share - A. Marongiu, E. Angelino, M. Moretti, Air Quality 2016 Milano

Emissions by wood stoves and fireplaces <35 kW



Number of wood stoves <35 kW vs. emissions



- 2.2.9 Modern stoves
- 2.2.10 Pellets stoves
- 2.2.7 Traditional stoves
- 2.2.8 Traditional close fireplaces
- 2.2.6 Traditional open fireplaces

But a lot must still be done!



**Thank you for
your attention**