

Milan and Lombardy: analysis and perspectives on air quality and the impact of wood burning

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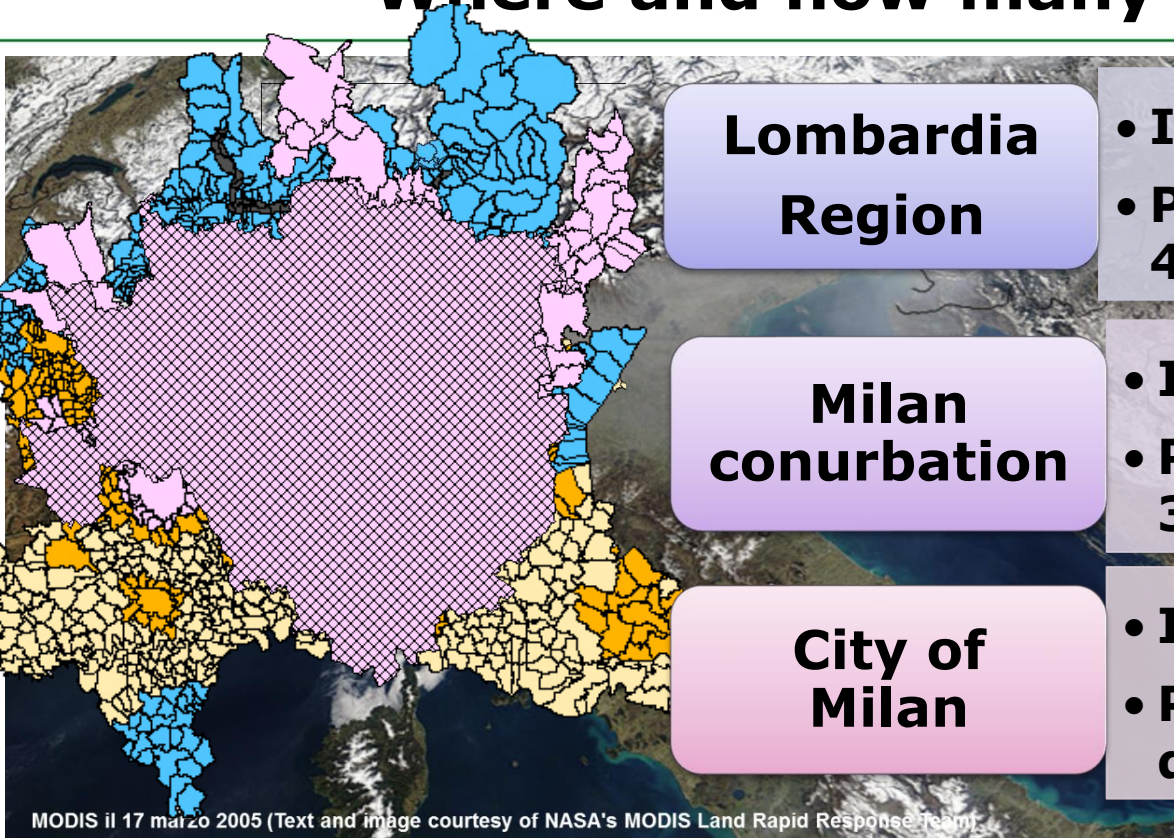
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Pioneering better air quality in European Cities

Bruxelles, 7th May 2019

Milano and Lombardia: Where and how many



Lombardia Region

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

Milan conurbation

- Inhabitants: 3,6 milion
- Population density: 3141inab/km²

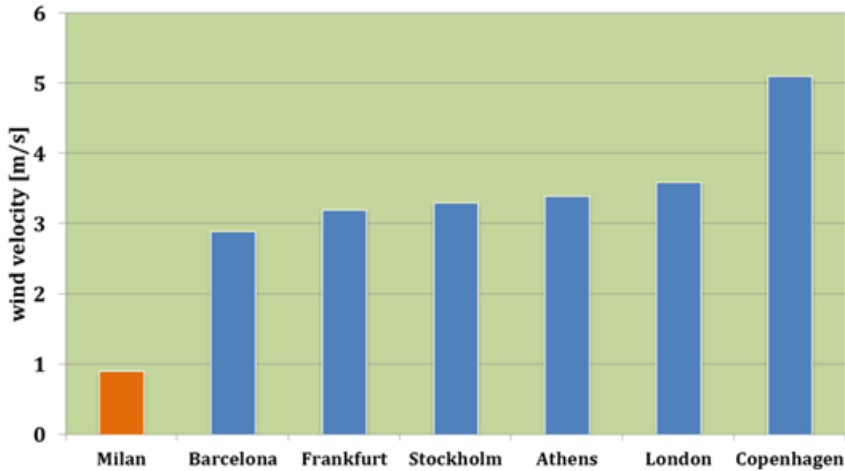
City of Milan

- 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

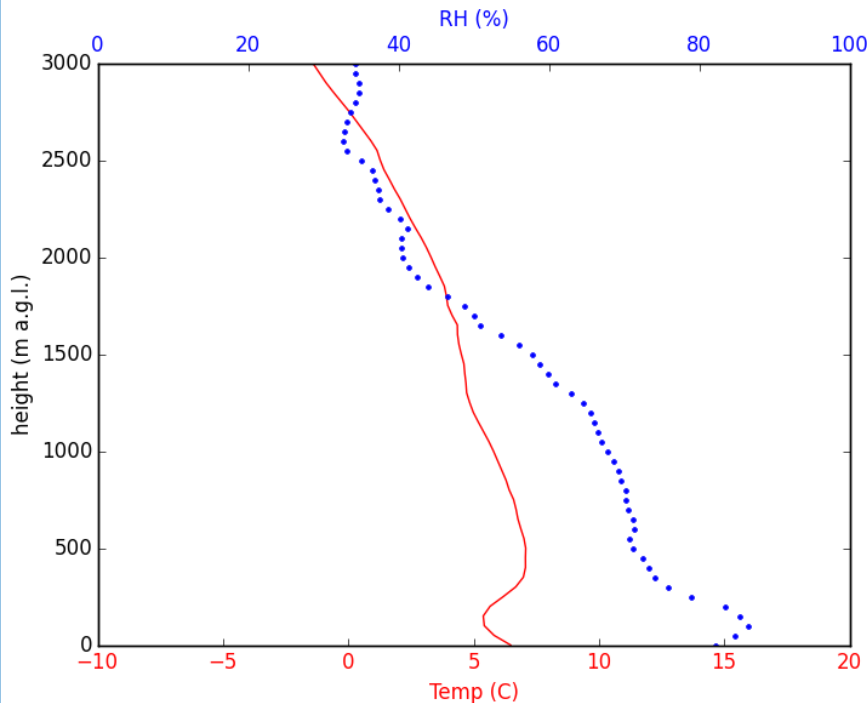
Meteorological conditions often adverse to air pollution dispersion

Wind velocity



Lack in wind

comparison 20 years annual average wind



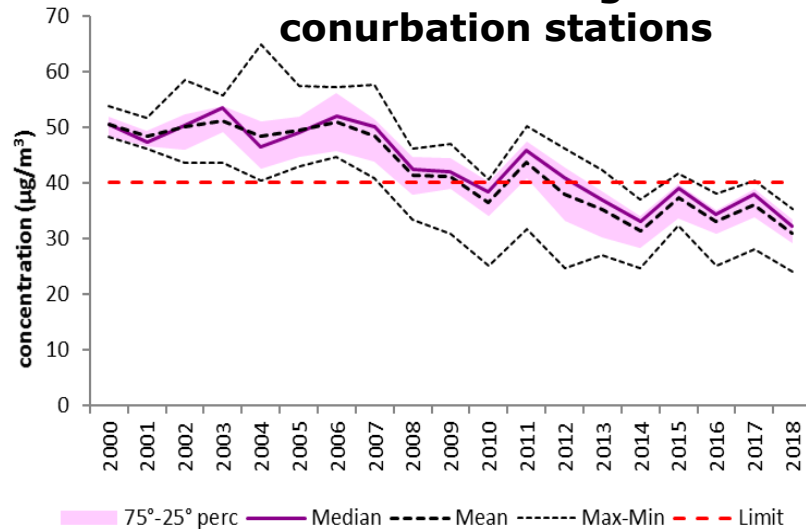
Frequent very stable thermal conditions

MI-Linate December 2015
Monthly mean temperature and humidity at 12:00 GMT

Air Quality

Concentrations are decreasing but

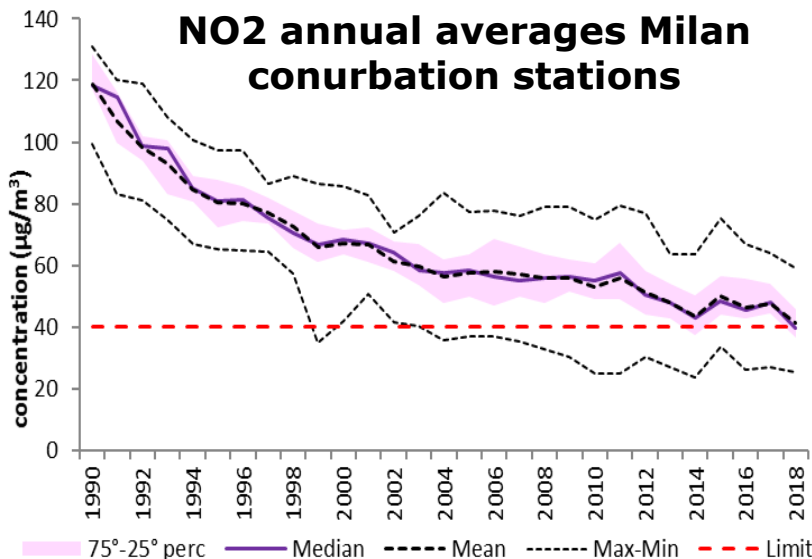
PM10 annual averages Milan conurbation stations



- Widespread **PM10** daily limit exceedances (42-79 in Milan in 2018)

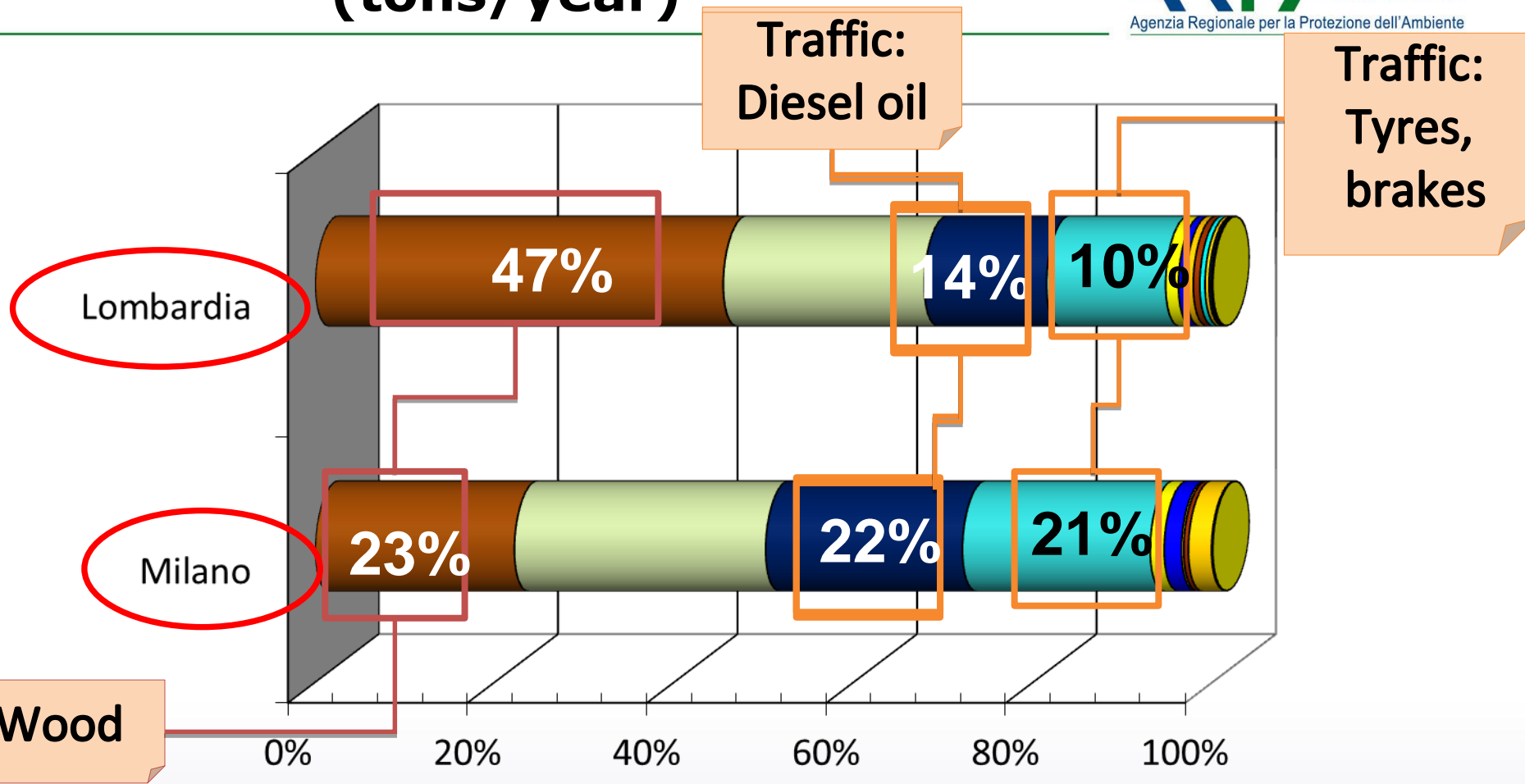
- **NO2** annual limit exceedances, especially in traffic stations (2018 worst annual mean 59 $\mu\text{g}/\text{m}^3$)

NO2 annual averages Milan conurbation stations



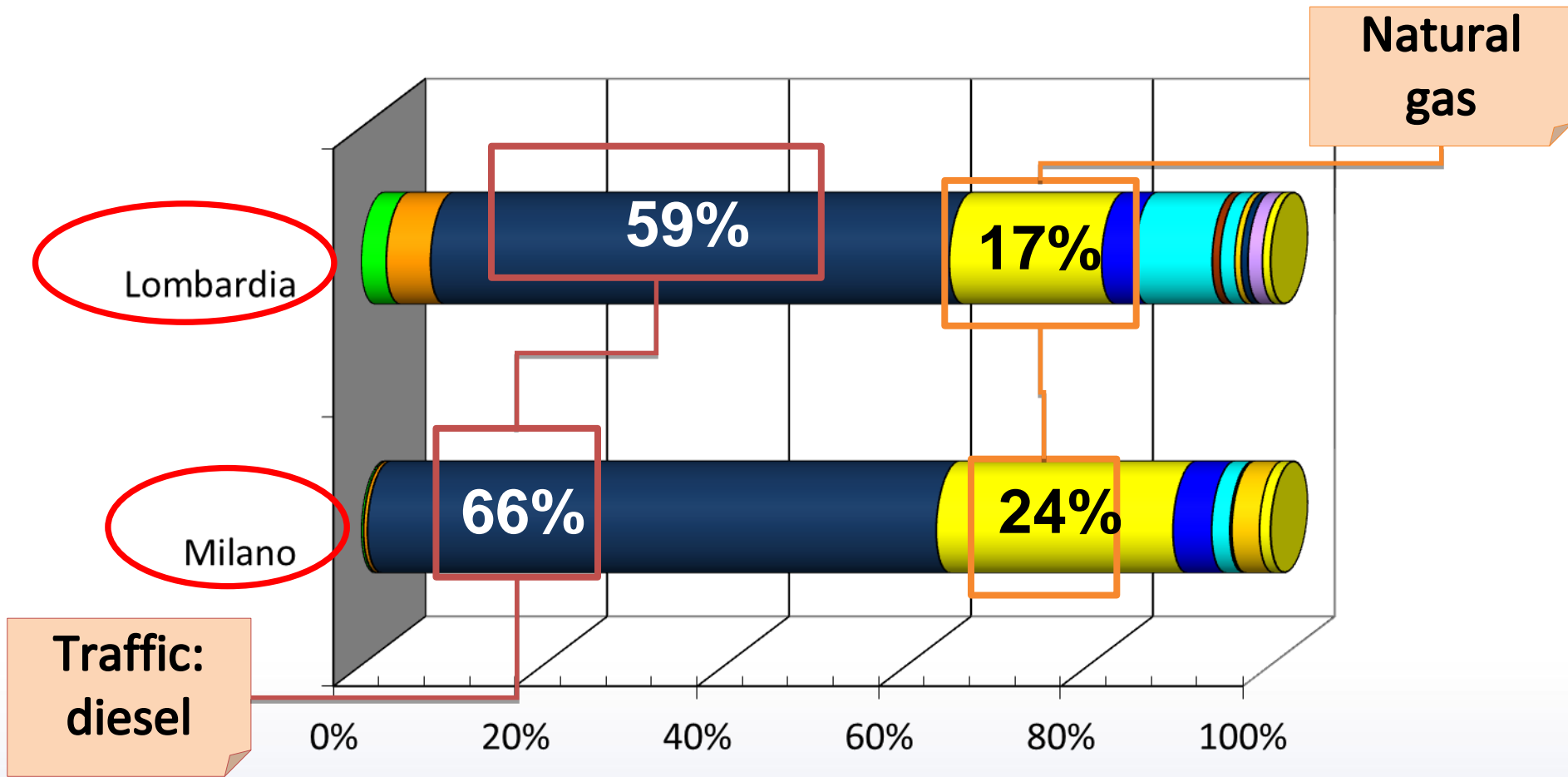
- **B(a)P** standard non achieved where wood burning is more diffuse(outside downtown)
- Widespread exceedances of both health and vegetation **Ozone** protection standards (above all leeward of the town)

Primary PM10 emissions by fuel (tons/year)



- wood
- without fuel
- diesel
- tyres and brakes
- natural gas
- petrol
- other
- fuel oil
- refinery gas
- gas oil
- coal
- kerosene
- LPG

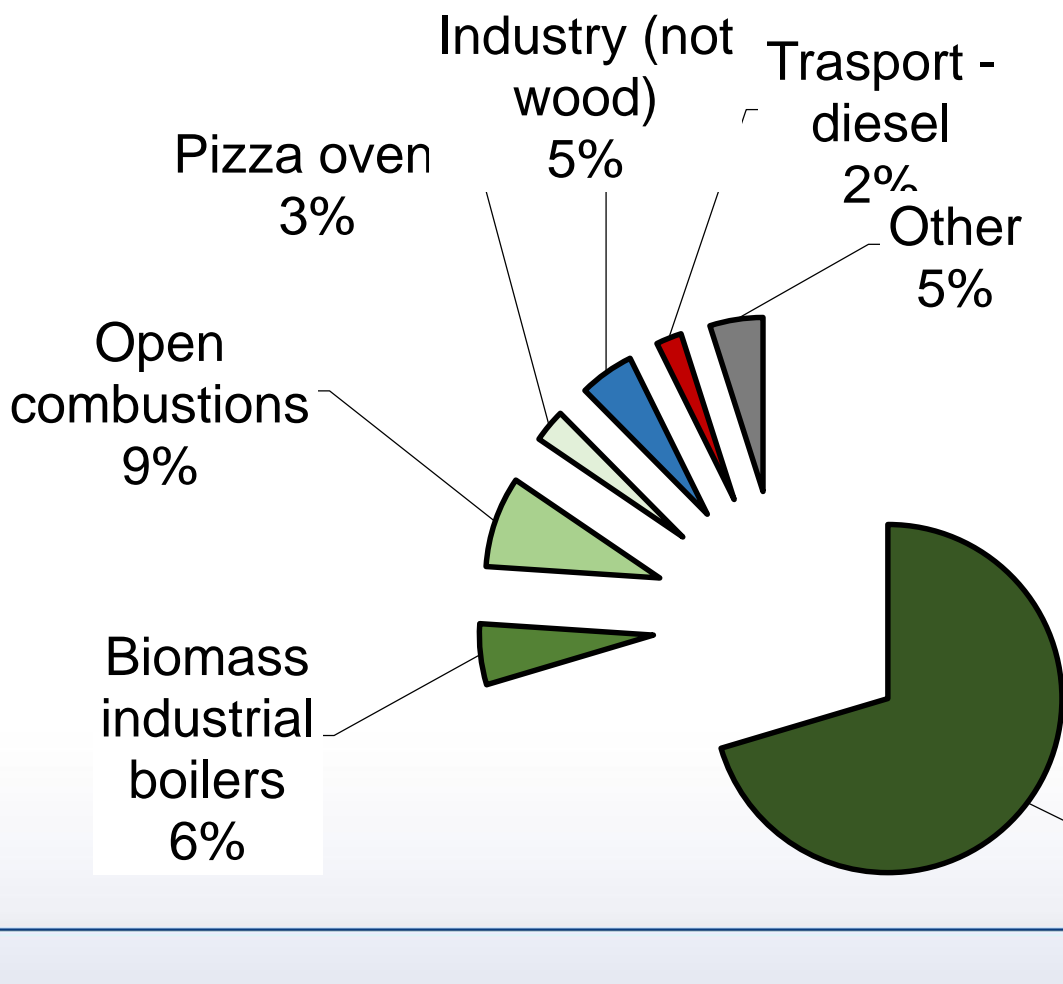
NOx emissions by fuel (tons/year)



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

Lombardia region



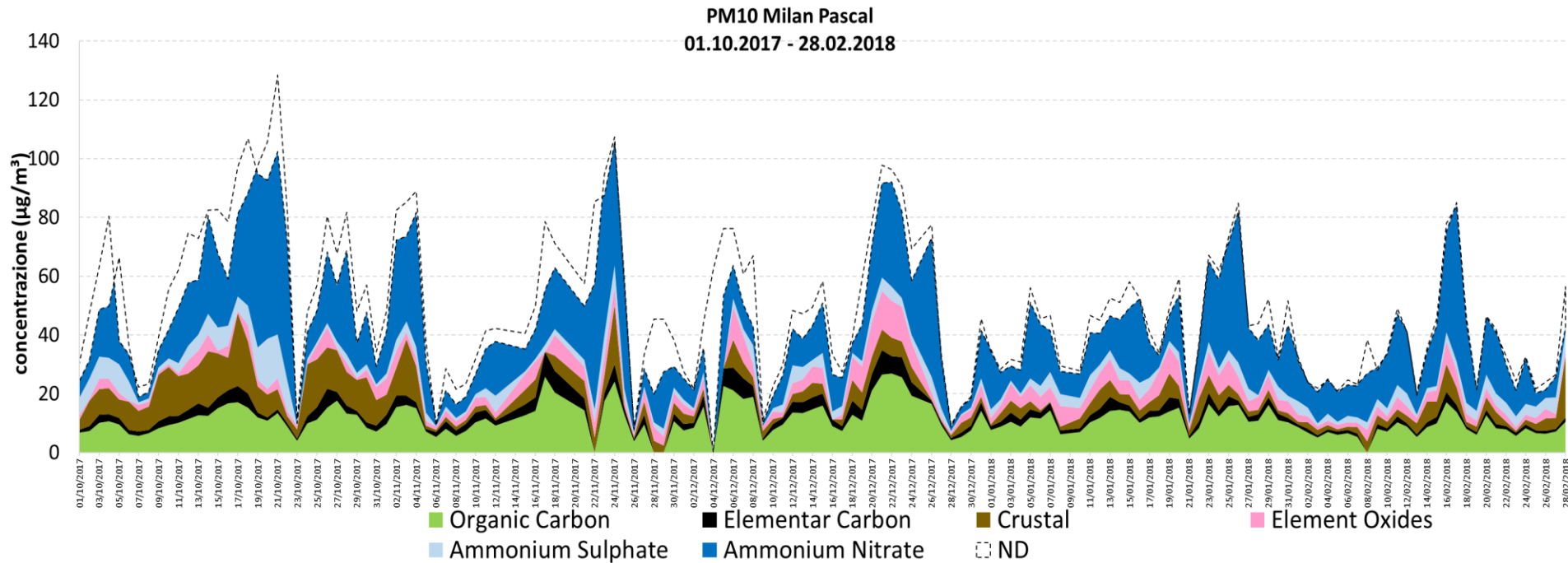
Wood combustion for domestic heating is the first source of BaP

Wood combustion is important also from a toxicological point of view

Wood Stoves and fireplaces
70%

Milan PM composition

Urban background station annual average



- The scale of secondary PM is the whole basin
- Local actions alone are not very effective for secondary PM
- It is necessary to limit precursors emissions, s.a. NO_x in basin and NH_3 , too

PRIA: Regional plan of actions on air quality

TRANSPORT AND MOBILITY

40 measures

- Big LEZ: limitations up to euro 3 diesel cars
- Area C (an area in which you pay to enter) in Milan centre
- Bikes and car sharing
- 2 new underground lines
- Highway speed limits reduction (under study)

STATIONARY SOURCES

37 measures

- Promotion of energy efficiency and rational use of energy
- Wood combustion rules and limitations
- Industrial plants and waste treatment: BAT and limitations to resettle of new plants

AGRICULTURAL AND BREEDING SECTOR

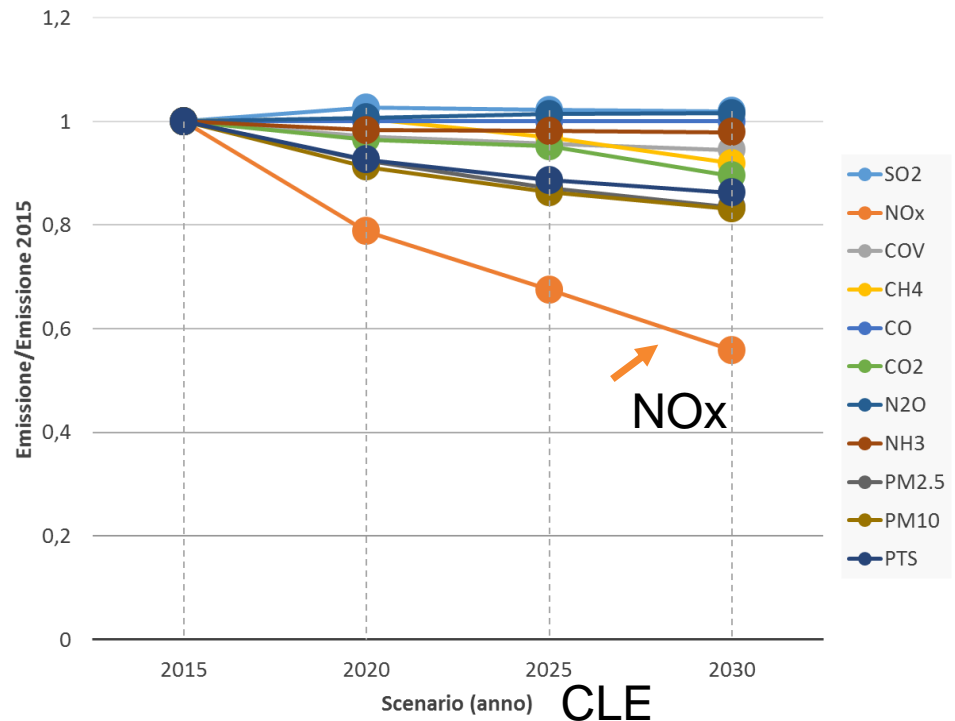
14 measures

- Anaerobic digestion of manure and direct injection in the field

Emission reductions Scenario - 2015

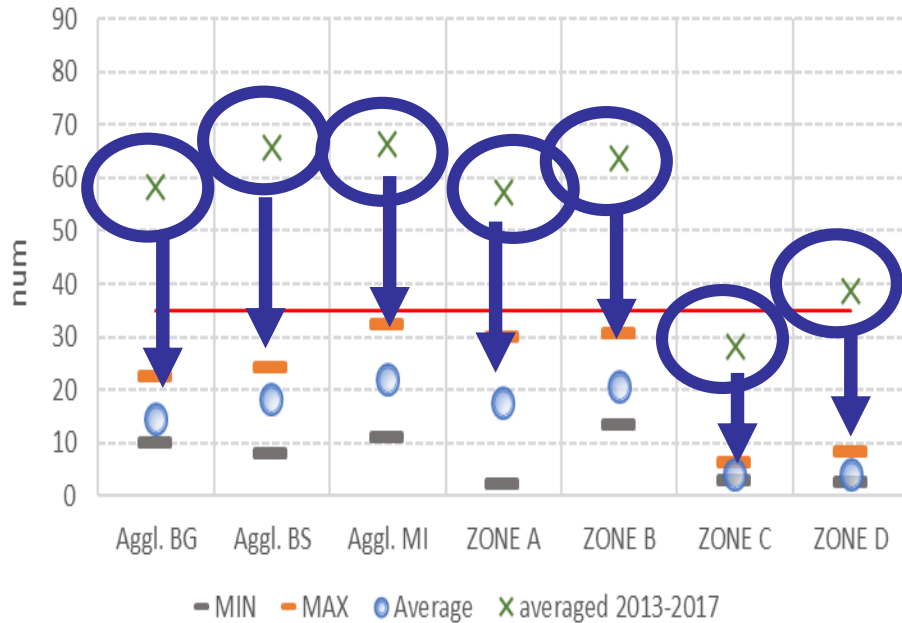
	NOx	VOC	CO	NH3	PM2.5	PM10
CLE 2020	-21%	-3%	0%	-2%	-8%	-9%
CLE 2025	-32%	-4%	0%	-2%	-13%	-14%
Update Regional Air Quality Plan PRIA	-38%	-7%	-25%	-26%	-48%	-44%

- To maintain the forecasting of NOx levels, it is very important that Euro6 diesel cars (and trucks) will register really the awaited decrease in NOx tailpipe emissions
- In the decrease of PM10 and PM2.5 emissions due to PRIA, it is very important the contribution of the measures related to wood burning

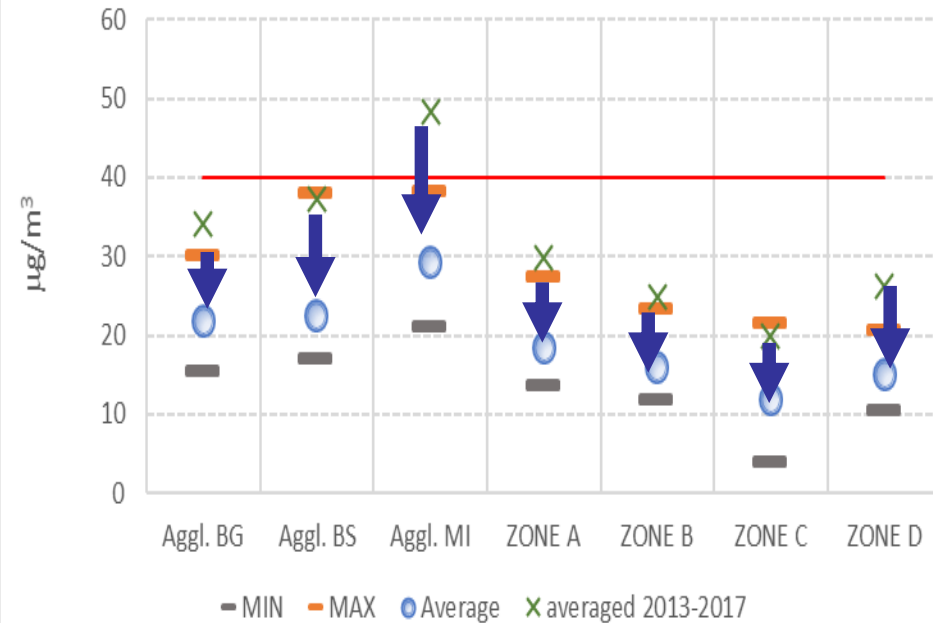


PM10 and NO2 concentrations foreseen With updated regional air quality plan

PM₁₀ exceedances with Air Quality Plan



Annual average NO₂ with Air Quality Plan



In 2025 a full respect of standards for PM and NO2 UE standards is foreseen

The Regulation of wood burning in Lombardia

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

- Different PM₁₀, NO_x, 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

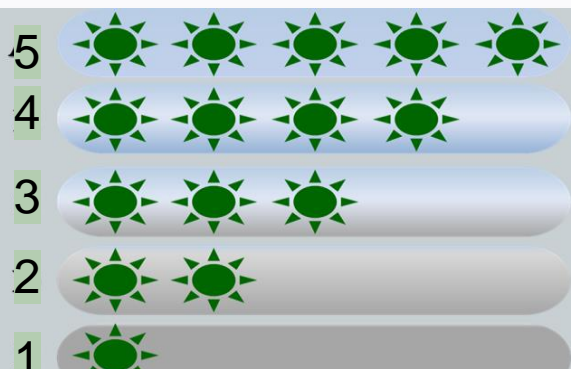
- Wood burning is forbidden from 15.10 to 15.4 in stoves and fireplaces with a yield <63% or CO emissions > 0,5% (ref. 13% O₂) from 2006
- The requirements for new stoves are step by step more ambitious in terms of number of stars required: 3 stars from 1.10.18 and 4 stars from 1.1.20
- Progressive ban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

Key implementation challenges

Cultural – INFORMATION is a KEY FACTOR

- 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 - technological:

- Methods to measure PM emissions must represent real emissions to avoid another.. Dieselgate also in this field.
- It is necessary to go on in developing products really compatible with air quality

Scientific publications and workshops, conferences ...

Presence in public meetings organized by municipalities or NGO or sectorial associations

Communication to public

- Brochures
- Advertising campaigns (also by web):
 - http://ita.arpalombardia.it/ita/legna_come_combustibile/
 - <http://www.lifeprepare.eu/index.php/comunicazione-sullutilizzo-della-biomassa/>

**Brucia bene la legna.
Non bruciarti la salute.**



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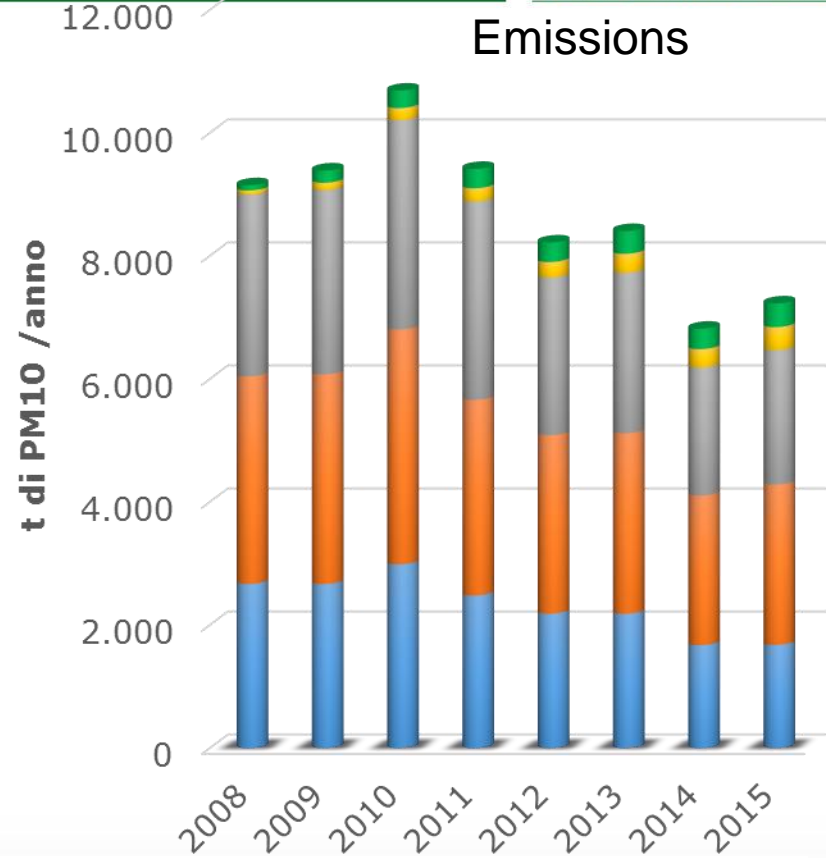
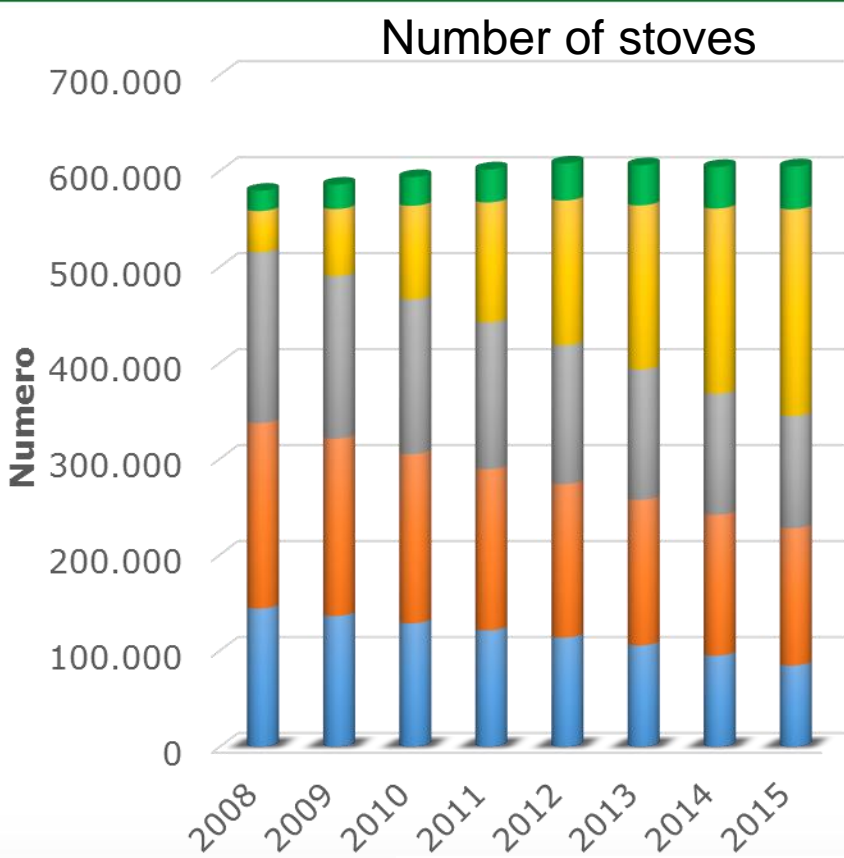
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Number of wood stoves <35 kW vs. emissions



- 2.2.9 Innovative 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**

Signs of hope



DIA
ente

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 merita dell'aria. Il carbonio è legno, che è invece un vero amico dell'ambiente. Perché utilizza esclusivamente energia rinnovabile, egualmente sostenibile, che diversamente bruciata produce fumi che contribuiscono all'effetto serra e di più, tossici, nocivi, inodore e perfettamente assimilabili dal nostro organismo e dagli esseri viventi in genere. In questo ga...

presenti in natura. È di molto inferiore a quelle prodotte dalla combustione del gasolio e del gas, che emettono polveri sottili (particolato) presenti nei combustibili dall'organismo, come dimostrano studi effettuati dalla Neurologia di Modena, accettata da riviste scientifiche nei campi della ricerca sulle polveri sottili, da Thomas Nussbaumer Institute di Basilea, Agnola, Istituto di Zurigo, da Oltreoceano (Associazione Energia Legno)...

Sistema Patentato, da Inhaber Schutzrecht (EMPA) (Svizzera), da Ignard Chimique (Svizzera) (Svizzera) da Inhaber Schutzrecht (Associazione Energia Legno)...

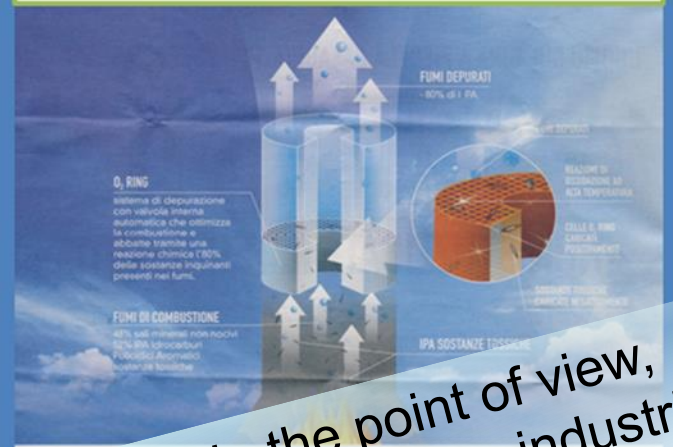
contenuto altamente ecologico? Particolare, anche in questo dettaglio. Perché la salute dell'ambiente sta a cuore a tutti noi.

Roberto Piccoli

PALAZZETTI
IL CALORE CHE PIACE ALL'ANIMA

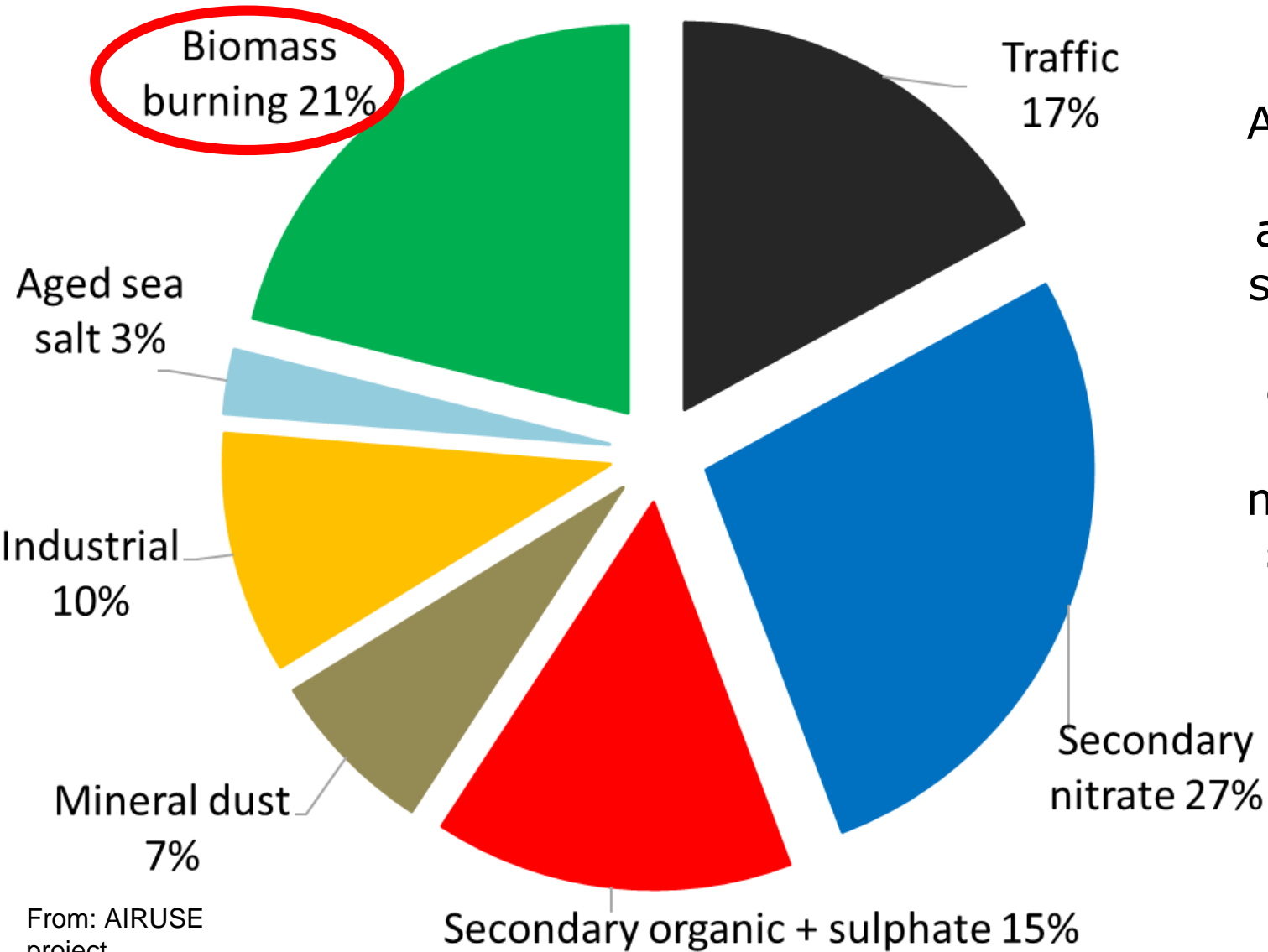
Corsera, 17-02-2006

After The right way to not pollute with wood



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

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