Wood burning: impact on air quality in Lombardy

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SOFAIR
European Air Quality Conference 2019
Sofia, 12th April 2019
Milano and Lombardia: Where and how many

Lombardia Region
- Inhabitants: 9.9 million
- Population density: 419 inhab/km²

City of Milan
- Inhabitants: 1.3 million
- Population density: 7,272 inhab/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 *(42-79 in Milan in 2018)*

- **NO2** annual limit exceedances, especially in traffic stations *(2018 worst annual mean 59 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)

<table>
<thead>
<tr>
<th>Fuel Type</th>
<th>Lombardia</th>
<th>Milano</th>
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<tbody>
<tr>
<td>Wood</td>
<td>23%</td>
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<td>Without fuel</td>
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<tr>
<td>Diesel</td>
<td>47%</td>
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<tr>
<td>Tyres and brakes</td>
<td>10%</td>
<td>21%</td>
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<tr>
<td>Fuel oil</td>
<td>14%</td>
<td>22%</td>
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<tr>
<td>Petrol</td>
<td>10%</td>
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<td>Gas oil</td>
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<td>Other</td>
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<td>Coal</td>
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<td>Refinery gas</td>
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<td>LPG</td>
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<td>Natural gas</td>
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<tr>
<td>Tyres and brakes</td>
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</table>
Wood combustion for domestic heating is the first source of BaP.

Wood combustion is important also from a toxicological point of view.

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

Lombardia region

- Wood Stoves and fireplaces: 70%
- Industry (not wood): 2%
- Pizza oven: 5%
- Open combustions: 9%
- Biomass industrial boilers: 6%
- Trasport - diesel: 5%
- Other: 5%

Guido Lanzani
Sofia, 12° April 2019
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
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
Number of wood stoves <35 kW vs. emissions

Number of stoves

<table>
<thead>
<tr>
<th>Year</th>
<th>Traditional open fireplaces</th>
<th>Traditional close fireplaces</th>
<th>Traditional stoves</th>
<th>Pellets stoves</th>
<th>Innovative stoves</th>
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<tbody>
<tr>
<td>2008</td>
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Emissions (t di PM10/anno)

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But a lot must still be done!

Thank you for your attention
Благодаря за вниманието
Signs of hope

Before
Wood doesn’t pollute

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

La legna.

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

Corsera, 26-05-2011
Also the results of source apportionment studies confirm that wood combustion is one of the most important sources of PM.
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 ...

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