

# THE AIR IN KRAKOW

PROBLEM, IMPACTS, REASONS, SOLUTIONS

[WWW.KRAKOWSKIALARMSMOGOWY.PL](http://WWW.KRAKOWSKIALARMSMOGOWY.PL)

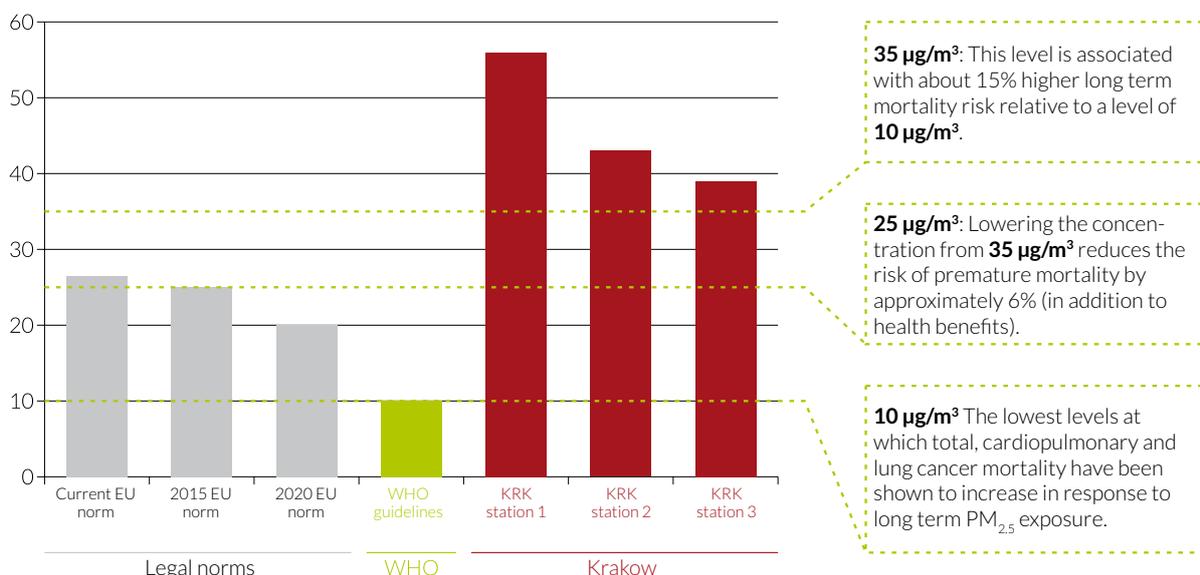


# THE PROBLEM

Krakovians breathe the most polluted air of all European cities. The limit values for particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>), benzo[a]pyrene and nitrogen dioxide are regularly exceeded in the city. Pollution with particulate matter and carcinogenic benzo[a]pyrene seriously violates state and EU provisions as well as the guidelines of the World Health Organisation (WHO).

In 2012 the urban background monitoring station in Krakow noted 120 days when limit values for PM<sub>10</sub> were exceeded – the highest concentrations reached 500% of the limit value.

## The average annual concentrations for PM<sub>2.5</sub>, measured by air quality monitoring stations in Krakow in 2011, compared with legal requirements and WHO guidelines.



Source: Own analysis

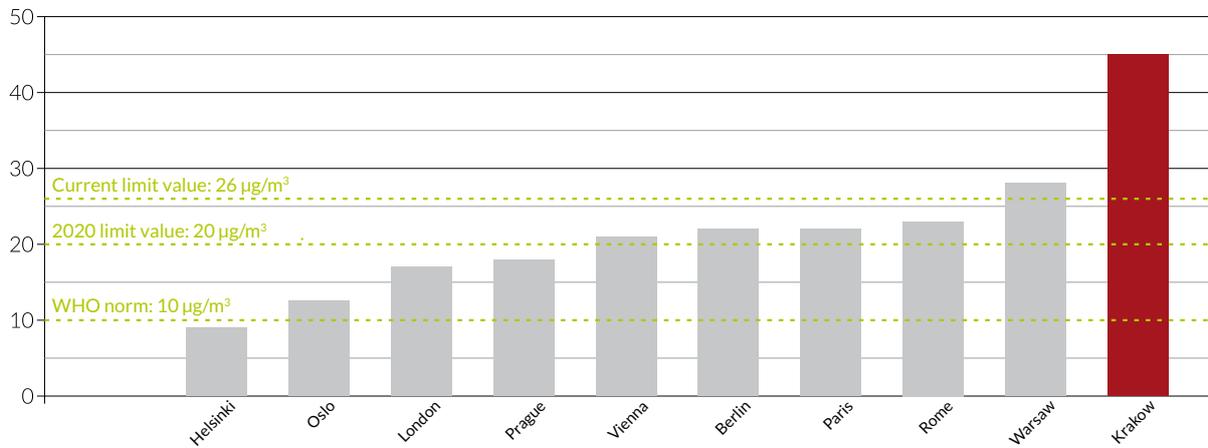
Source: World Health Organisation, Air Quality Guidelines

Note: The data comes from the monitoring stations of the Regional Environmental Protection Inspectorate: [www.krakow.pios.gov.pl](http://www.krakow.pios.gov.pl). KRK1 – traffic pollution station, KRK2 – industrial pollution station, KRK3 – urban background station. In 2012, the average annual concentrations amounted to: 35 µg/m³ at KRK3, 38 µg/m³ at KRK2, no data available for KRK1.

The current limit value for PM<sub>2.5</sub> equals 26 µg/m³, taking into consideration a margin of tolerance during the transition period, i.e. by 2015.

The scale of particulate matter pollution is much more serious in Krakow than other EU cities. High concentrations of PM<sub>2.5</sub> are particularly dangerous. Finer particles pose a larger threat to human health, as they penetrate deep into the lungs, then into blood vessels and finally on to various organs and tissues, contributing to the development of different diseases, e.g. cancers and heart attacks.

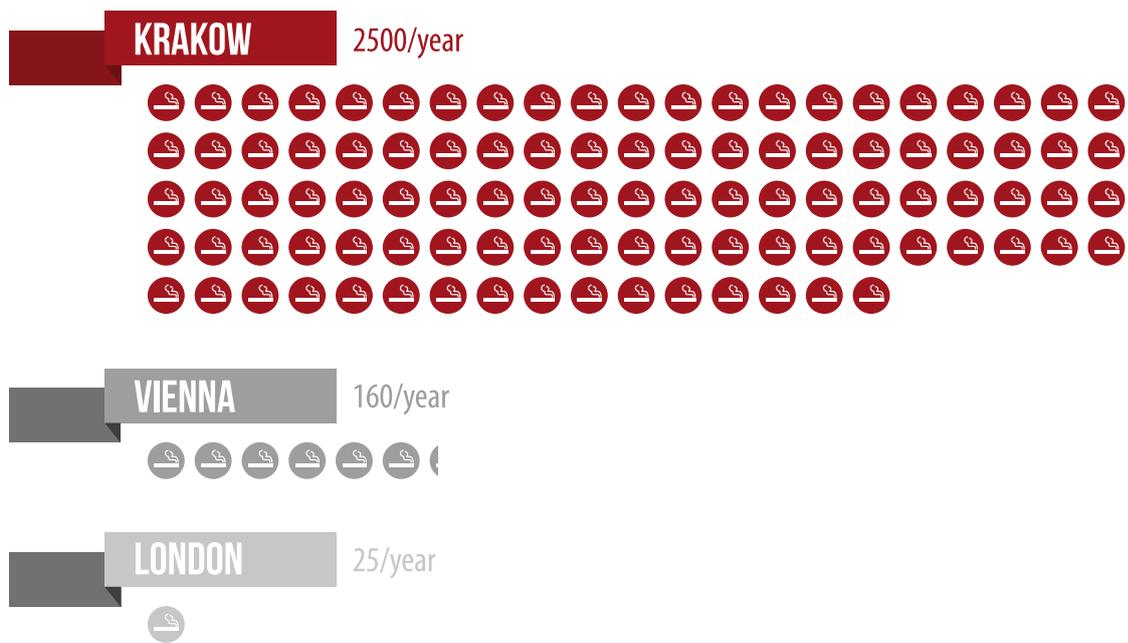
**Pollution with particulate matter (PM<sub>2.5</sub>) in selected European cities. Annual average PM<sub>2.5</sub> concentrations in 2011 (µg/m<sup>3</sup>)**



Source: our own analysis based on the data from: [http://www.eea.europa.eu/themes/air/interactive/pm2\\_5](http://www.eea.europa.eu/themes/air/interactive/pm2_5) (averages for all monitoring stations in a particular city).

Krakow's concentrations of the carcinogenic and mutagenic benzo[a]pyrene remain alarmingly high and often exceed the EU guidelines specified in the CAFE Directive (2008/50/EC), where the target value for average annual concentrations of benzo[a]pyrene is set at 1 ng/m<sup>3</sup>.

**The amount of benzo[a]pyrene that Krakovians breathe in with air is comparable to active cigarette smoking.**



Source: Calculator prepared by Krakow Smog Alert, including data sources.

Just by breathing Krakow's air, the city's inhabitants inhale each year the same amount of benzo[a]pyrene as when smoking 2500 cigarettes annually.

The annual mean benzo[a]pyrene concentrations in Krakow are over 100 times higher than in London!

The annual mean benzo[a]pyrene concentrations in selected European cities.



The value considered safe by WHO



Source: our own analysis, based on data from the European Environment Agency and state environmental monitoring.

Even in Northern Italy, which is considered a heavily polluted region, benzo[a]pyrene concentrations are around ten times lower than in Krakow. In Milan they amount to less than 1.2 ng/m<sup>3</sup>, in Torino 0.7 ng/m<sup>3</sup>, while in Venice less than 1.8 ng/m<sup>3</sup>. The scale of exceedances is, therefore, much more serious in Krakow and the whole region of Małopolska. The main causes of this situation are surface sources, i.e. individual solid fuel stoves, furnaces and boilers.

# IMPACTS

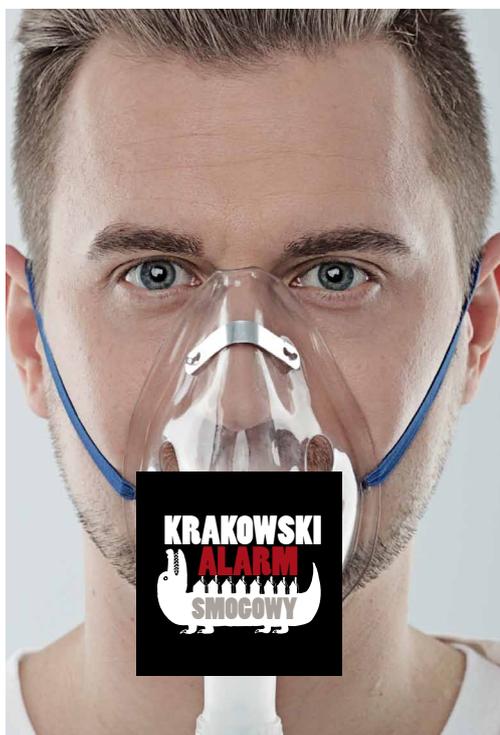
The health impacts of exposure to high air pollutant concentrations have been thoroughly analysed and documented in numerous medical and epidemiological research studies conducted all over the world. They include long and short term effects, such as:

- premature death, in particular due to diseases of the cardiovascular system,
- cardiovascular complications, including heart attacks and brain strokes,
- impeded development of lungs, chronic diseases of the respiratory system, e.g. asthma in children,
- cancers,
- negative neonatal impacts, e.g. increased mortality of newborns, low birth weight.

The elderly and children are among the most vulnerable groups. Research conducted in Krakow proves that children of women exposed to high air pollutant concentrations are born lighter and shorter and are more susceptible to diseases. Moreover, air pollution has a real impact on the intellectual development of Krakow's children<sup>1</sup>.

Research also proves that particulate matter pollution in Krakow results in several hundred premature deaths annually (from 300 to over 600). These deaths could have been avoided or their number could have been substantially reduced if Krakow's air conformed to WHO norms or even to the less stringent EU norms.

**The improvement of Krakow's air quality would mean saving several hundred lives a year**



**NO SMOGING PLEASE**

Krakow's air  
is exceptional.

Each year it kills  
400 city inhabitants.

Say NO  
Sign the Petition

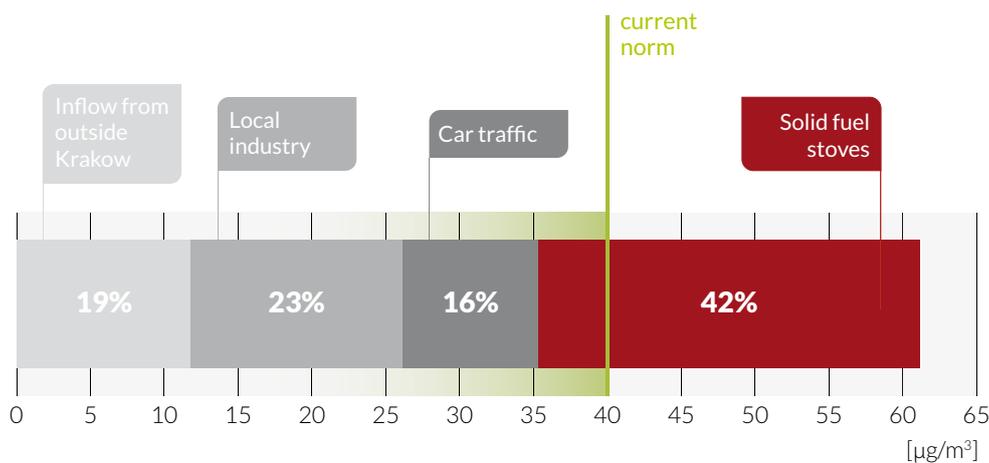
[www.nosmoging.pl](http://www.nosmoging.pl)

<sup>1</sup> Wiesław Jędrychowski, Renata Majewska, Elżbieta Mroz, Elżbieta Flak i Agnieszka Kiettyka: *Oddziaływanie zanieczyszczeń powietrza drobnym pyłem zawieszonym i wielopierścieniowymi węglowodorami aromatycznymi w okresie prenatalnym na zdrowie dziecka. Badania w Krakowie.*

# CAUSES

Solid fuel boilers, stoves and furnaces used in households constitute the biggest cause of air pollution with particulate matter (PM<sub>10</sub>, PM<sub>2.5</sub>) and polycyclic aromatic hydrocarbons (e.g. benzo[a]pyrene).

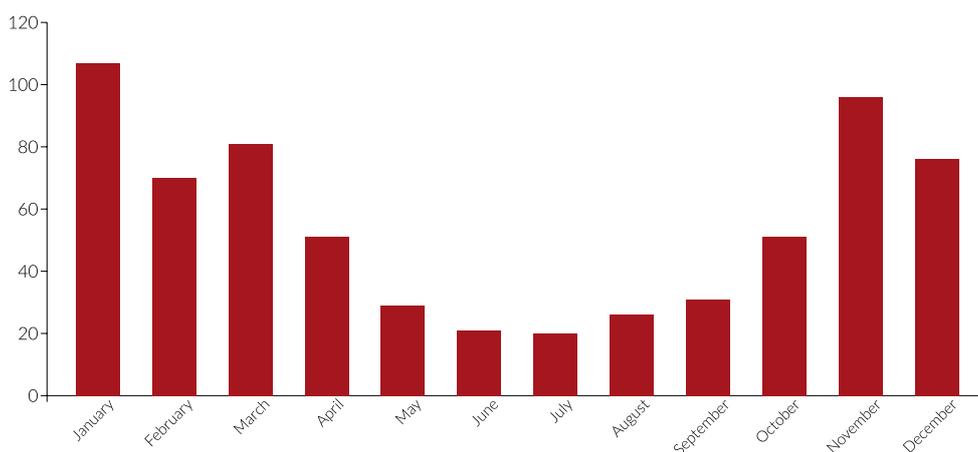
## The share of respective emission sources in annual average concentrations of PM<sub>10</sub>



Source: Our own analysis based on the Air Quality Programme for the Voivodship of Małopolska (Marshal's Office, Draft, December 2012)

## Seasonal changes in particulate matter pollution (PM<sub>10</sub>).

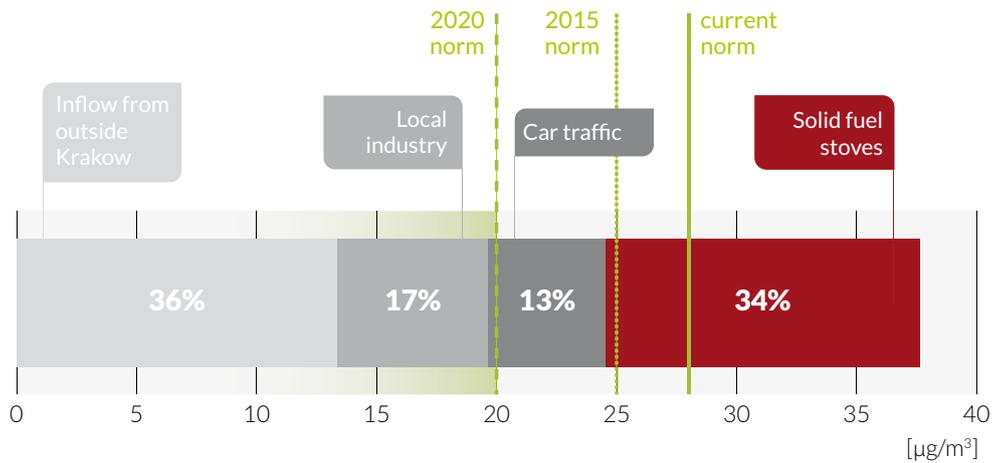
PM<sub>10</sub> concentrations at the urban background station in Krakow in 2011 (average monthly values, µg/m<sup>3</sup>)



Source: [www.krakow.pios.gov.pl](http://www.krakow.pios.gov.pl)

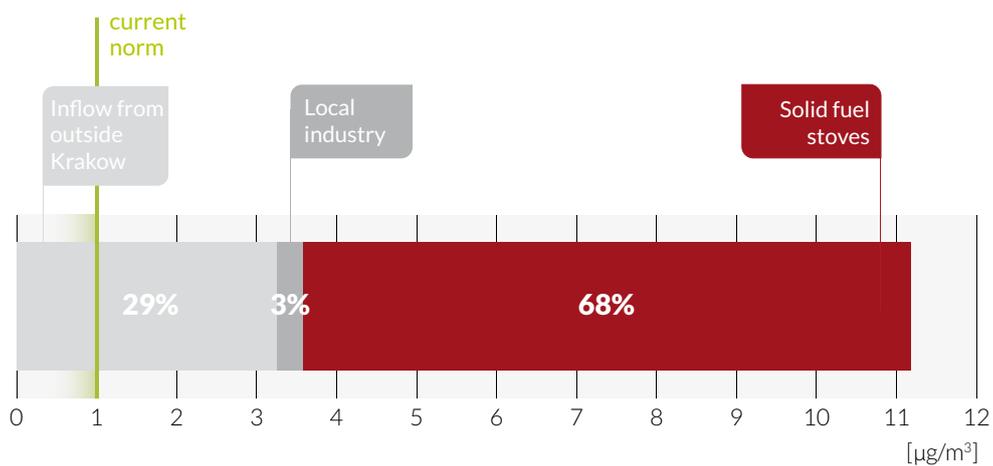
Air pollution in Krakow is much lower outside the heating season. The air is cleanest in the warmest months (May, June, July, August).

### The share of respective emission sources in the annual average concentrations of PM<sub>2.5</sub>



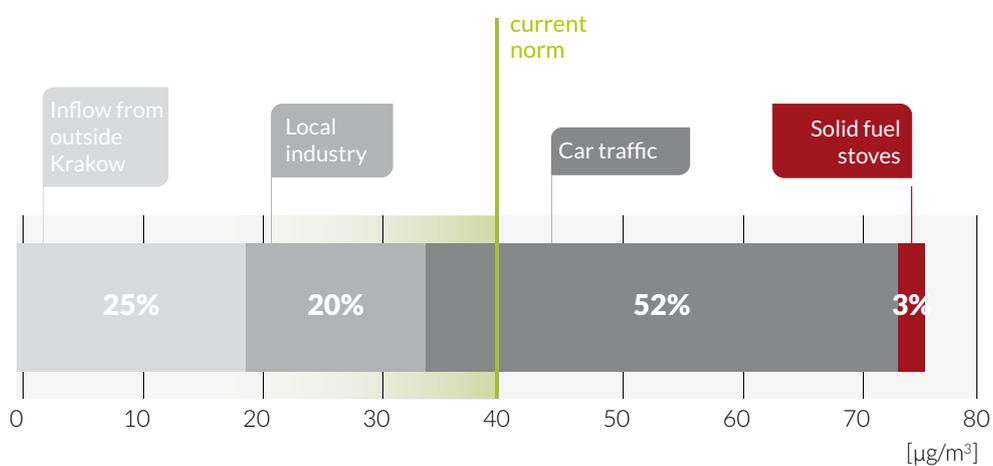
Source: Our own analysis based on the Air Quality Programme for the Voivodship of Małopolska (Marshal's Office, Draft, December 2012)

### The share of respective emission sources in the annual average concentrations of benzo[a]pyrene



Source: Our own analysis based on the Air Quality Programme for the Voivodship of Małopolska (Marshal's Office, Draft, December 2012)

### The share of respective emission sources in the annual average concentrations of NO<sub>2</sub>



Source: Our own analysis based on the Air Quality Programme for the Voivodship of Małopolska (Marshal's Office, Draft, December 2012)

# SOLUTIONS

According to analyses conducted for the needs of the Air Quality Programme for the Małopolska Voivodship, if the current and future air quality norms are to be respected in Krakow, the city has to ban all solid fuels from individual heating sources<sup>2</sup>.

Pursuant to Article 96 of the Environmental Protection Law Act, such a ban can be introduced by means of a resolution adopted by the Regional Parliament of the Małopolska Voivodship.

Although a solid fuel ban is an indispensable measure, other actions have to be implemented too, if the air in Krakow is to conform with legally binding norms. These include the reduction of emissions from line sources (car traffic) and industrial sources. The inflow from neighbouring municipalities also has to be curbed.

Clearly, a solid fuel ban cannot be introduced overnight. Therefore, Krakow Smog Alert, in its petition to the Regional Parliament, has asked for a transition period of several years, to allow the necessary time to develop district heating and adjust heating installations in households.

This time horizon cannot be too long, however, as otherwise it will not stop people installing new emission sources in their households (it should not exceed four years). Solid fuel stoves are being installed in old houses as well as new, as their owners switch to coal heating, aggravating the already serious problem of air pollution. Installation of a new coal boiler pays off in 2-4 years.

Therefore, there is a risk that without a ban, the programmes that provide funds for the reduction of low-stack emissions from the household sector will be ineffective. Meanwhile the air quality will not improve, and on the contrary, it may even deteriorate.

The public opinion research conducted by CEM Market and Public Opinion Research Institute shows that as many as 85% of the respondents support banning coal from household heating stoves in Krakow. For 90% of Krakovians air pollution is a serious and personal problem<sup>3</sup>.

Air quality improvement measures constitute a priority for the inhabitants of Krakow. In an opinion poll conducted for Radio Krakow, 52% respondents stated that the EU funds for 2014-2020 should be spent on reducing air pollution.

## CONTACT

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[www.krakowskialarmsmogowy.pl](http://www.krakowskialarmsmogowy.pl)

[www.facebook.com/KrakowskiAlarmSmogowy](https://www.facebook.com/KrakowskiAlarmSmogowy)

<sup>2</sup> Expert analysis on the possibility of the introduction of a solid fuel ban in Krakow. Atmoterm S.A., 2010.

<sup>3</sup> CATI research conducted by CEM Market and Public Opinion Research Institute for Krakow Smog Alert on 22-23 January 2013, on a randomly selected sample of 400 adult inhabitants of Krakow.