



Modena 4/04/2019

L'impatto sulla salute dovuto all'inquinamento dell'aria

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AIR POLLUTION – THE SILENT KILLER



Every year, around
7 MILLION DEATHS
are due to exposure
from both outdoor
and household air
pollution.

Air pollution is a major environmental risk to health. By reducing air pollution levels, countries can reduce:



Stroke



Heart
disease



Lung cancer, and
both chronic and acute
respiratory diseases,
including asthma

REGIONAL ESTIMATES ACCORDING TO WHO REGIONAL GROUPINGS:



● **Over 2 million**
in South-East Asia Region

● **Over 2 million**
in Western Pacific Region

● **Nearly 1 million**
in Africa Region

● **About 500 000**
deaths in Eastern Mediterranean Region

● **About 500 000**
deaths in European Region

● **More than 300 000**
in the Region of the Americas

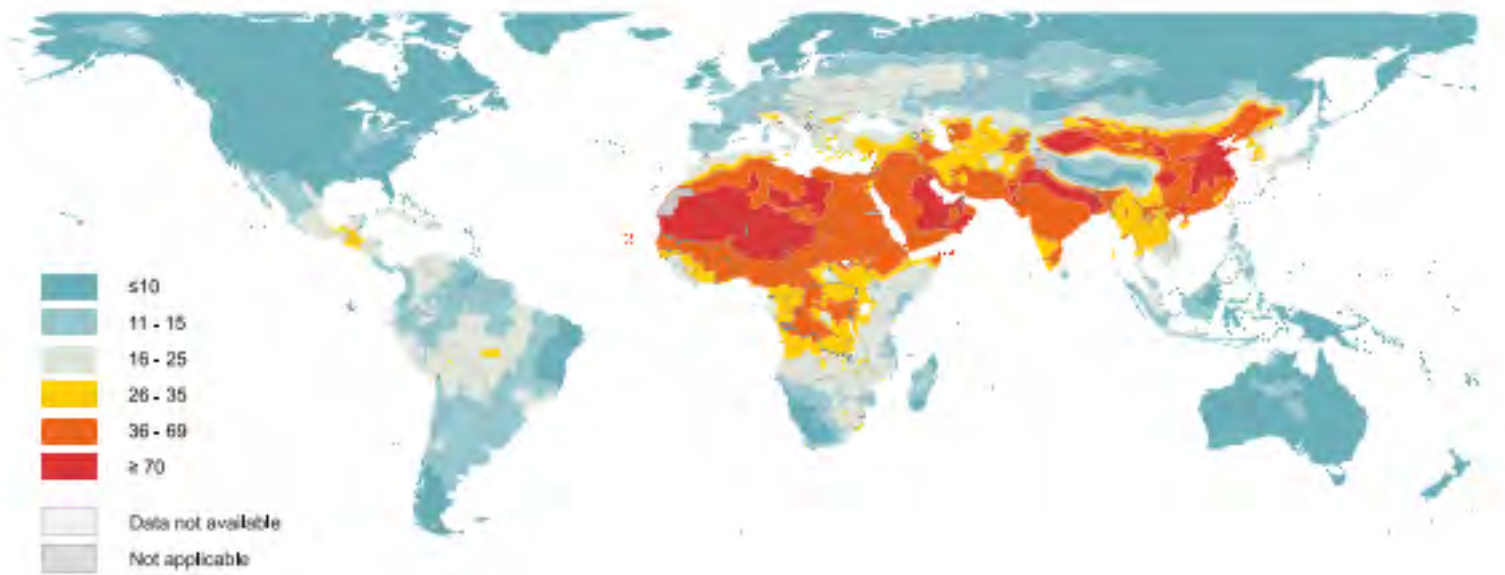
CLEAN AIR FOR HEALTH

#AirPollution



Inquinamento atmosferico da polveri: esposizione e danno

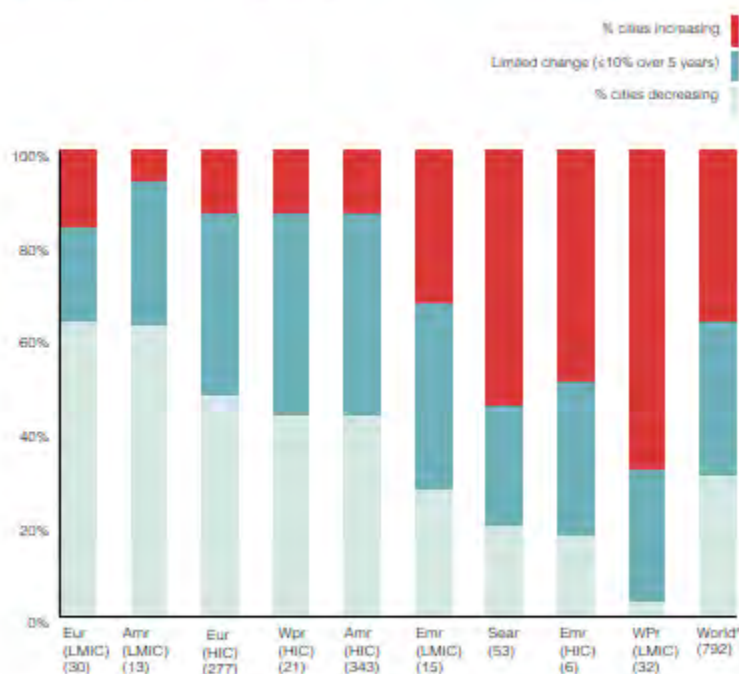
Figure 9: Global map of modelled annual median concentration of $PM_{2.5}$ in $\mu g/m^3$



$PM_{2.5}$: Fine particulate matter of 2.5 microns or less.

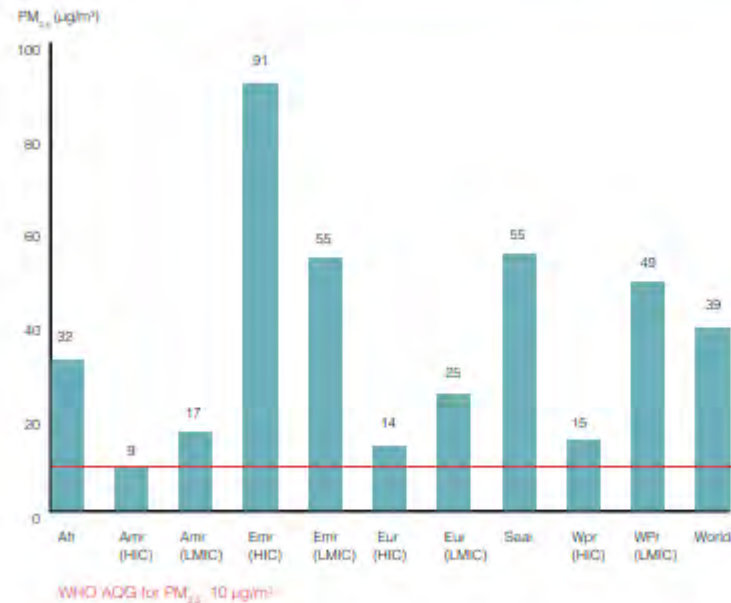
Percentuale di città nelle quali il valore medio annuo di PM_{2,5} è aumentato o diminuito nel periodo 2008-2013 nelle diverse aree del mondo

Figure 7: Percentage of cities¹ with increasing and decreasing PM_{2,5} or PM₁₀ annual means over a five-year period (mostly 2008–2013), by region.



Amr: Americas; Emr: Eastern Mediterranean; Eur: Europe; Sear: South-East Asia; Wpr: Western Pacific; LMIC: Low- and middle-income countries; HIC: high-income countries.¹ The number of cities is indicated in bracket. * The world figure is regional population-weighted.

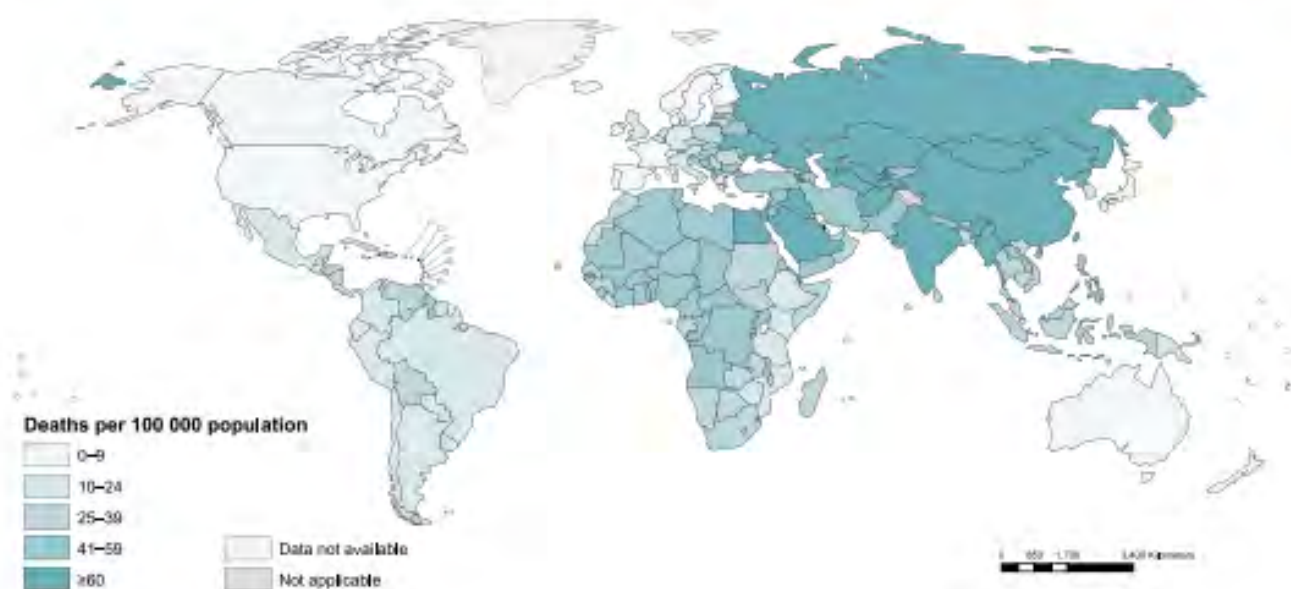
Figure 10: Annual median exposure to ambient (outdoor) mean annual concentration of PM_{2.5} in µg/m³, by region - urban and rural population, 2014



Afr: Africa; Amr: Americas; Emr: Eastern Mediterranean; Eur: Europe; Sear: South-East Asia; Wpr: Western Pacific; LMIC: low- and middle-income countries; HIC: high-income countries; PM_{2.5}: particulate matter with an aerodynamic diameter of 2.5 µm or less. WHO AQG: WHO Air Quality Guidelines.

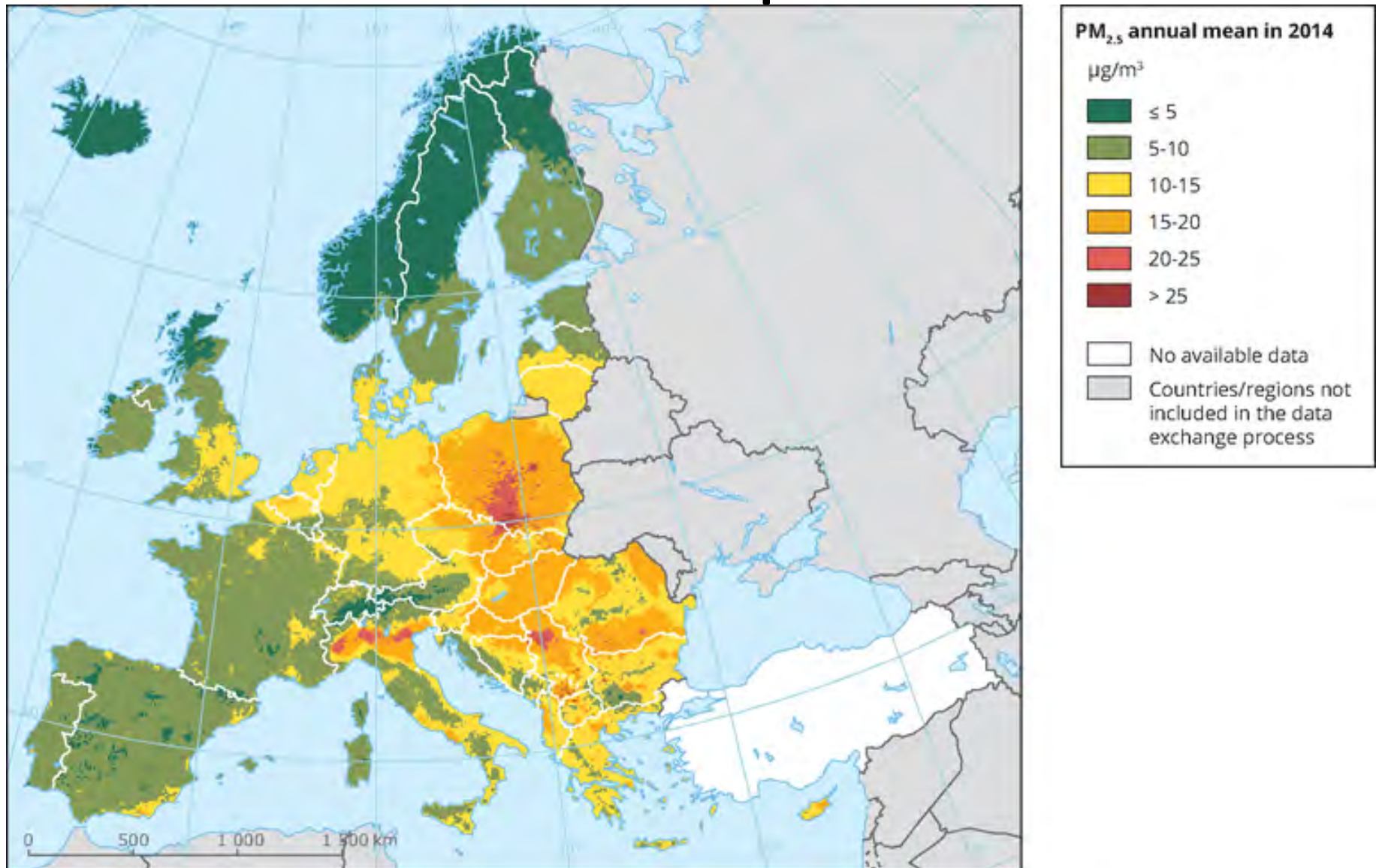
Conclusione: ridurre l'inquinamento atmosferico è possibile.

Figure 18: Age-standardized deaths per 100 000 capita attributable to AAP in 2012, by country



AAP: Ambient air pollution

Il confronto europeo e italiano



Premature deaths attributable to PM2.5, NO2 and O3 exposure in the EU-28 and total Europe, 2015

		PM 2,5		NO ₂		O ₃	
	Populati on (1 000)	Annual mean (a)	Prematu re deaths (b)	Annual mean (a)	Prematu re deaths (b)	SOMO3 5 (a)	Prematu re deaths (b)
Italy	60 796	18.5	60 600	24.9	20 500	6 860	3 200
EU-28	506 030	13,9	391.000	18,9	76.000	4.250	16.400
Total	538.278	14,1	422.000	18,8	79.000	4.310	17.700

Quanto sono preoccupanti questi dati?

EU urban population exposed to harmful levels of air pollutant concentrations in 2012–2014, according to:

	EU limits/target values	WHO guidelines
PM _{2.5}	8–12 % 	85–91 % 
PM ₁₀	16–21 % 	50–63 % 
O ₃	8–17 % 	96–98 % 
NO ₂	7–9 % 	7–9 % 
BaP	20–24 % 	88–91 % 
SO ₂	<1 % 	35–49 % 

Confronto fra i valori limite di alcuni inquinanti della Direttiva UE e delle linee guida OMS

Air Quality Directive				WHO guidelines	
Pollutant	Averaging period	Objective	Comments	Objective	Comments
PM _{2.5}	One day			25 µg/m ³ (*)	99 th percentile (3 days/year)
PM _{2.5}	Calendar year	Limit value, 25 µg/m ³		10 µg/m ³	
PM ₁₀	One day	Limit value, 50 µg/m ³	Not to be exceeded on more than 35 days per year.	50 µg/m ³ (*)	99 th percentile (3 days/year)
PM ₁₀	Calendar year	Limit value, 40 µg/m ³ (*)		20 µg/m ³	
O ₃	Maximum daily 8-hour mean	Target value, 120 µg/m ³	Not to be exceeded on more than 25 days per year, averaged over three years	100 µg/m ³	
NO ₂	One hour	Limit value, 200 µg/m ³ (*)	Not to be exceeded more than 18 times a calendar year	200 µg/m ³ (*)	
NO ₂	Calendar year	Limit value, 40 µg/m ³		40 µg/m ³	

Effects of Common Air Pollutants

RESPIRATORY EFFECTS



Symptoms:

- Cough
- Phlegm
- Chest tightness
- Wheezing
- Shortness of breath

Increased sickness and premature death from:

- Asthma
- Bronchitis (acute or chronic)
- Emphysema
- Pneumonia

Development of new disease

- Chronic bronchitis
- Premature aging of the lungs



Alveoli filled with trapped air

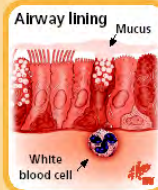
How Pollutants Cause Symptoms

Effects on Lung Function

- Narrowing of airways (bronchoconstriction)
- Decreased air flow

Airway Inflammation

- Influx of white blood cells
- Abnormal mucus production
- Fluid accumulation and swelling (edema)
- Death and shedding of cells that line airways



Increased Susceptibility to Respiratory Infection



Normal



Lung with respiratory infection

CARDIOVASCULAR EFFECTS



Symptoms:

- Chest tightness
- Chest pain (angina)
- Palpitations
- Shortness of breath
- Unusual fatigue

Increased sickness and premature death from:

- Coronary artery disease
- Abnormal heart rhythms
- Congestive heart failure

How Pollutants May Cause Symptoms

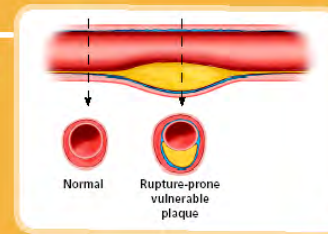


Effects on Cardiovascular Function

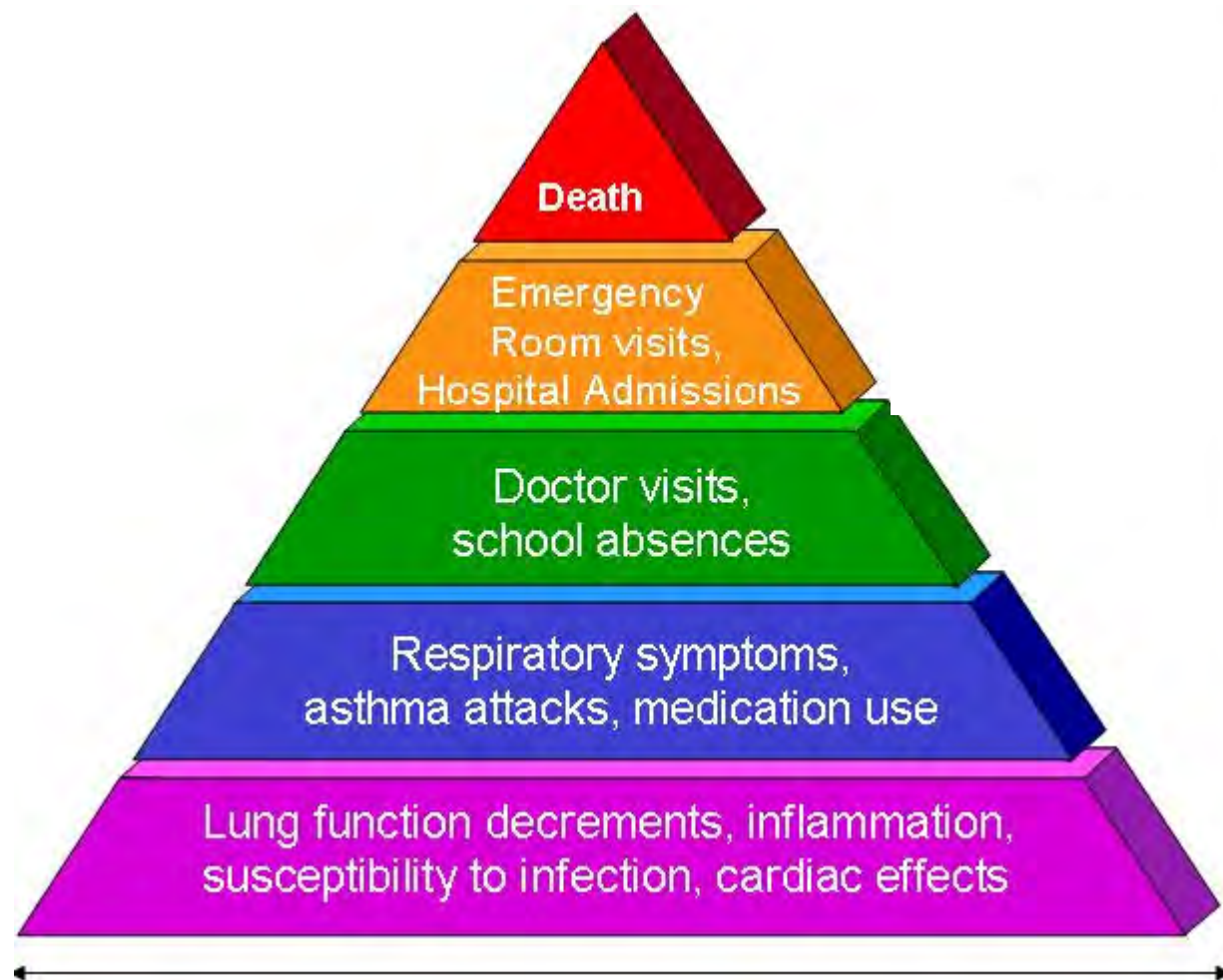
- Low oxygenation of red blood cells
- Abnormal heart rhythms
- Altered autonomic nervous system control of the heart

Vascular Inflammation

- Increased risk of blood clot formation
- Narrowing of vessels (vasoconstriction)
- Increased risk of atherosclerotic plaque rupture



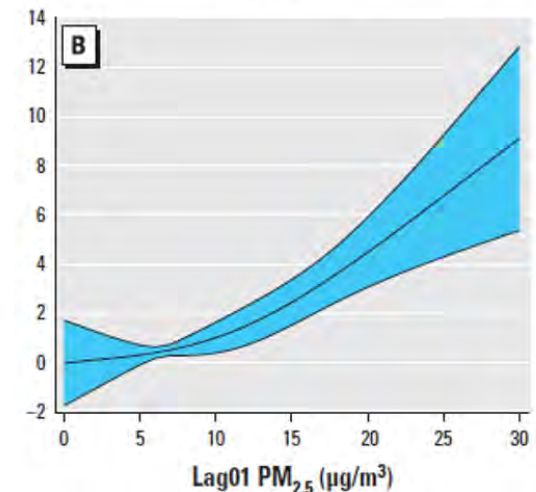
Effetti sanitari



Health effects of ambient air pollution (1)

- 91% of the world population, including children, is exposed to air pollution at unacceptable levels. Inefficient energy use in the home is a major source of ambient air pollution, particularly in low and middle-income countries
- Substantial scientific evidence from studies of short term and long-term exposure to air pollution show that it is a major contributor to disease and early death.
- Adverse effects have been demonstrated at not only high, but also low exposures – even below current WHO guidelines.
- Air pollution affects people of all ages – from birth, to young children, and through old age.
- Air pollution affects people with pre-existing diseases and less affluent: the most sensitive and vulnerable in society are most at risk.

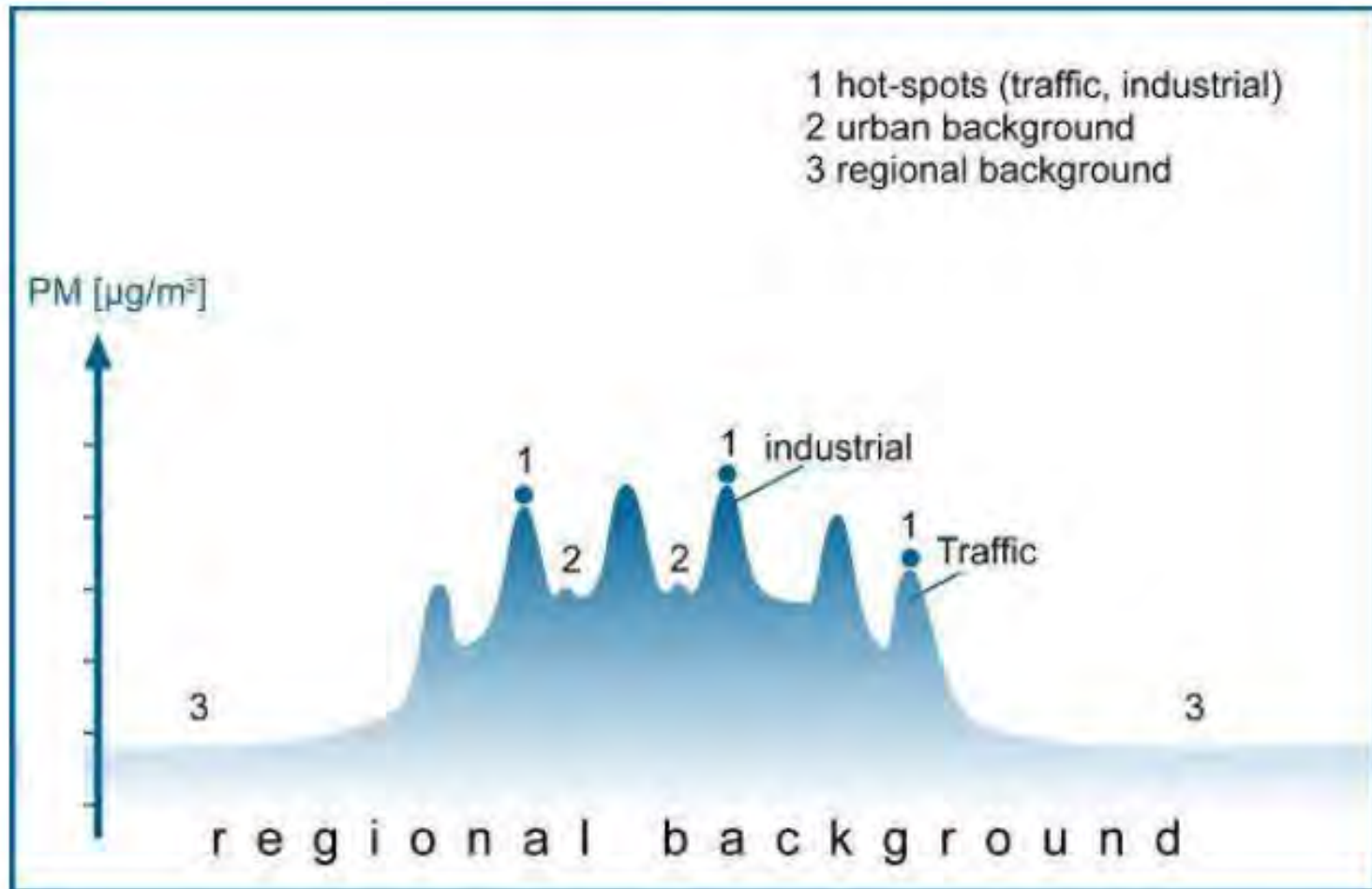
Kill People at Low Concentrations in Daily Deaths Vs PM_{2.5} in New England Metropolitan Population



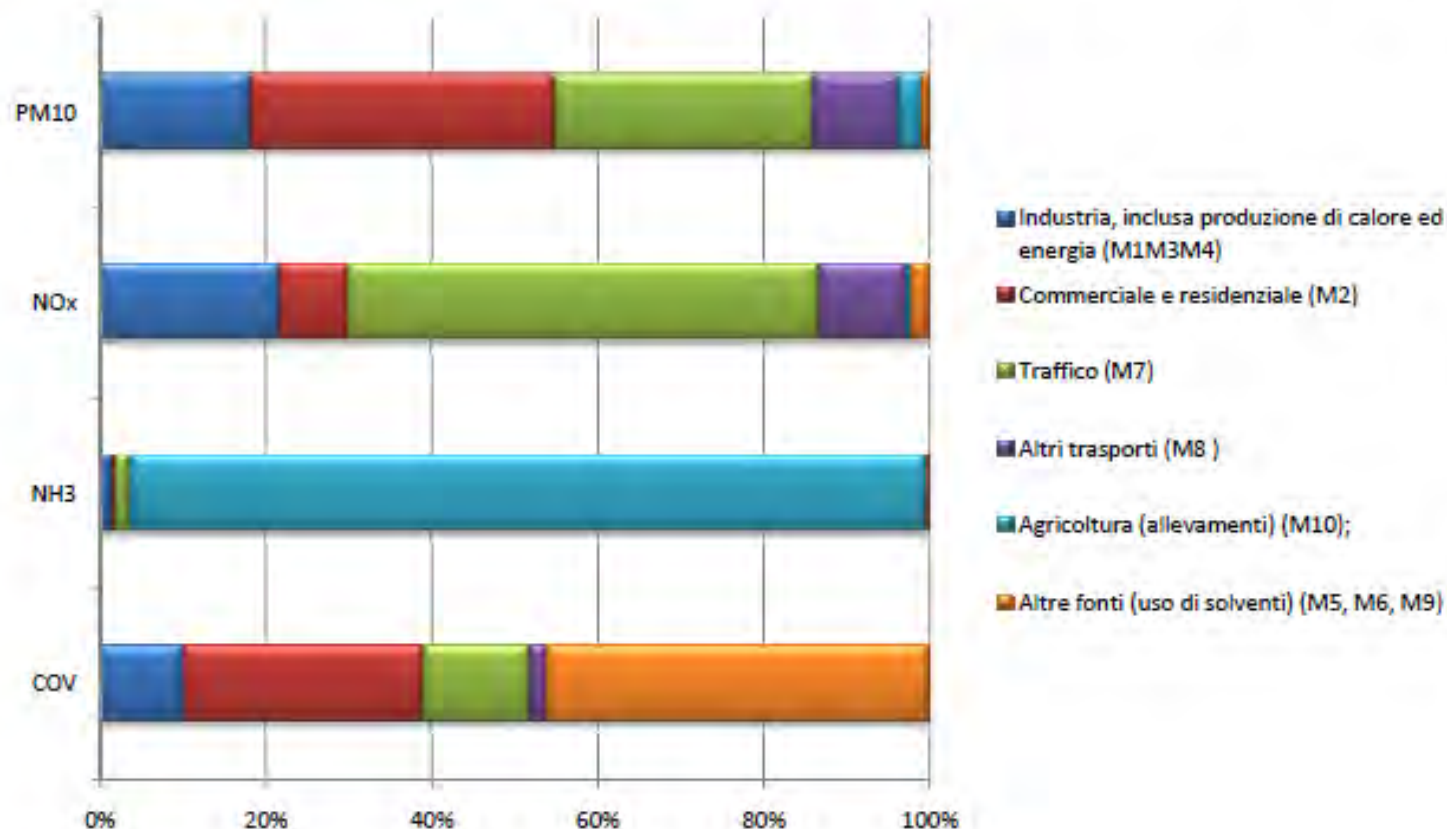
Global burden of type 2 diabetes mellitus attributable to PM2.5

- The global burden of diabetes was estimated at 1.4 million excess deaths, with 29 million years of life lost (YLLs) and 39 million YLDs in 2017
- Air pollution constitutes a major risk factor for **diabetes**, with a **larger attributable burden than tobacco or physical inactivity**. Air pollution mitigation therefore may have an important role in reducing the global disease burden from diabetes
- Approximately **one-fourth of the global burden of diabetes was attributable to air pollution**, with 18% from ambient PM2.5 and 8% from HAP

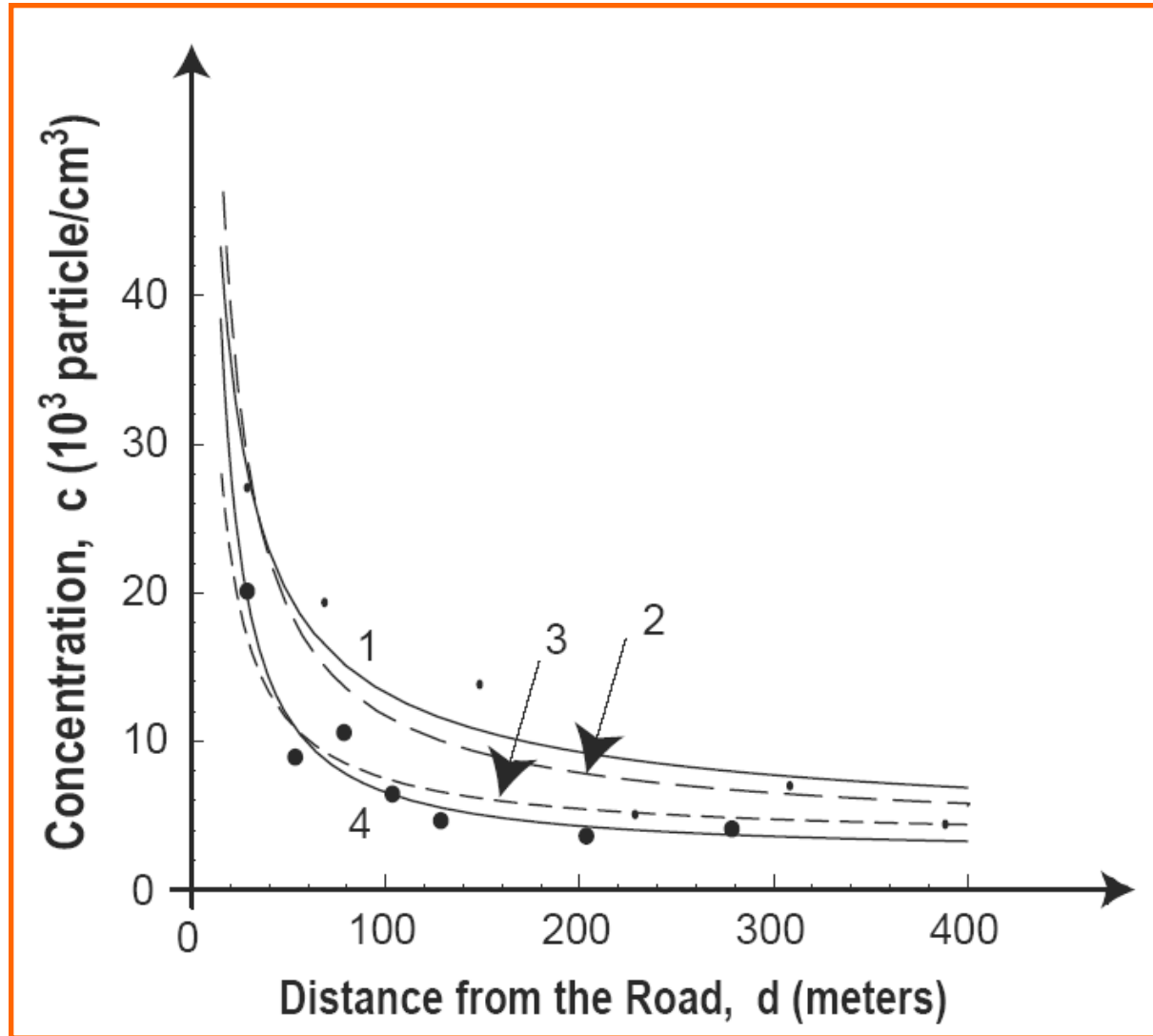
Origine dell'inquinamento



Peso relativo delle fonti inquinanti in Emilia – Romagna



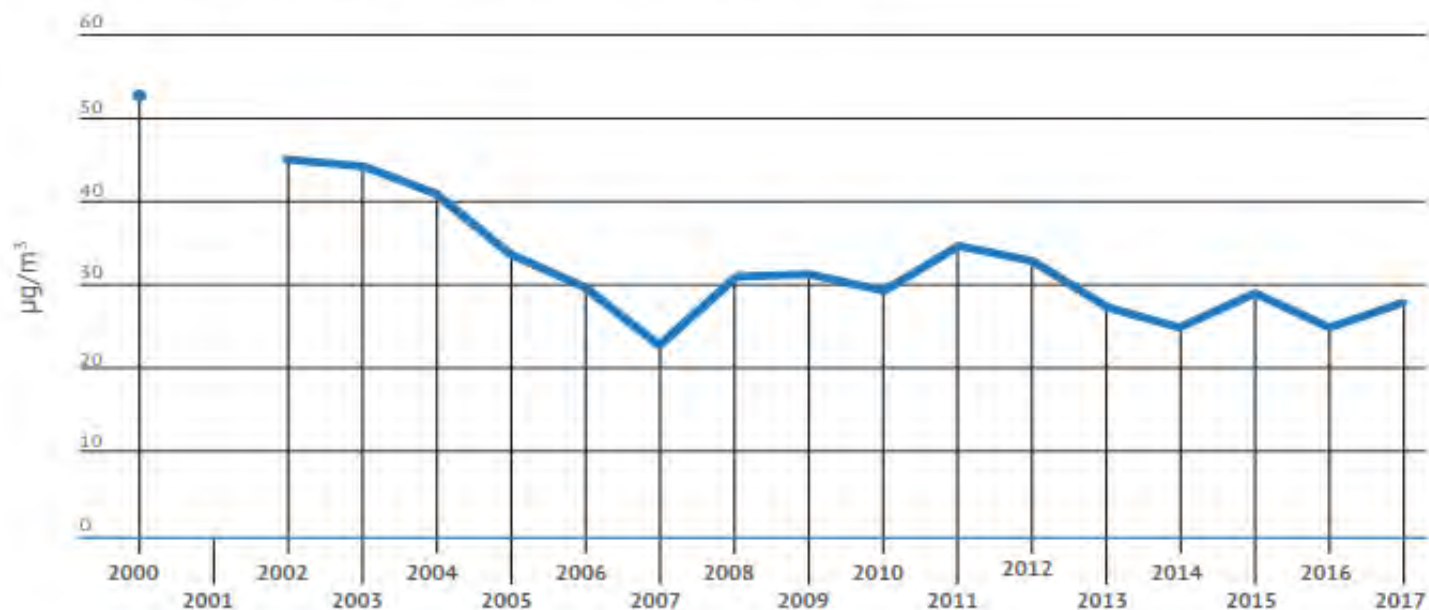
L'importanza del traffico



Alcuni dati sulla nostra regione da ARPAE

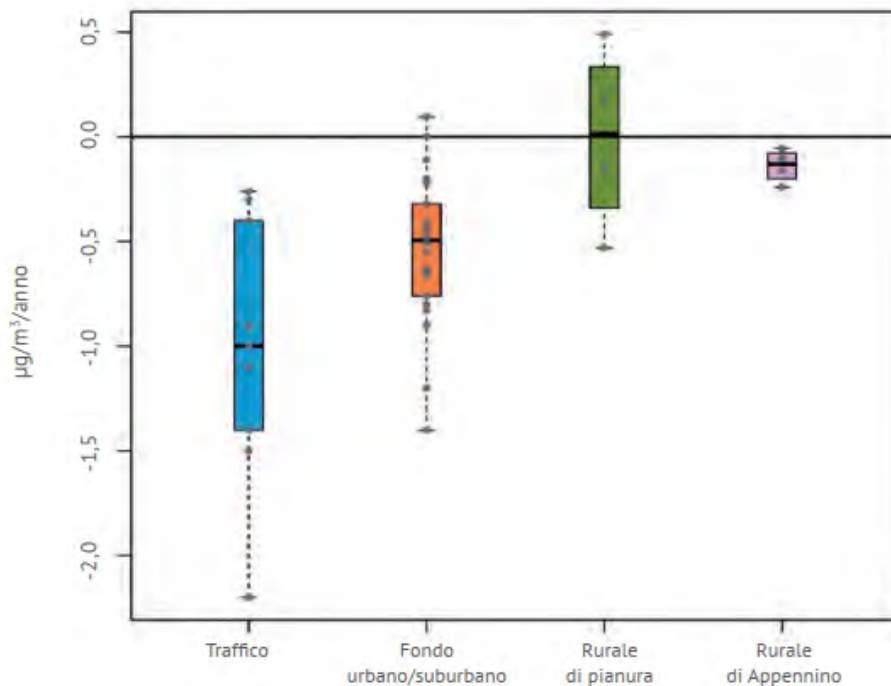
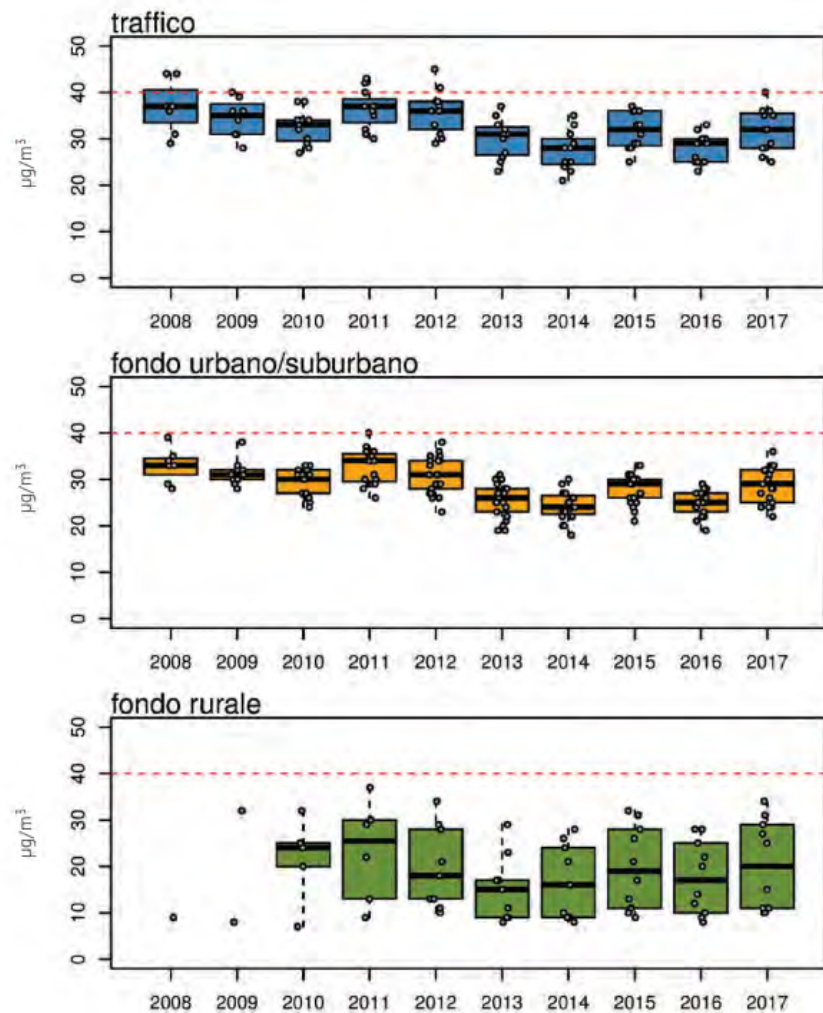
FIGURA 33

Andamento della media annua di PM_{10} nella stazione di Ravenna "Zalamella"

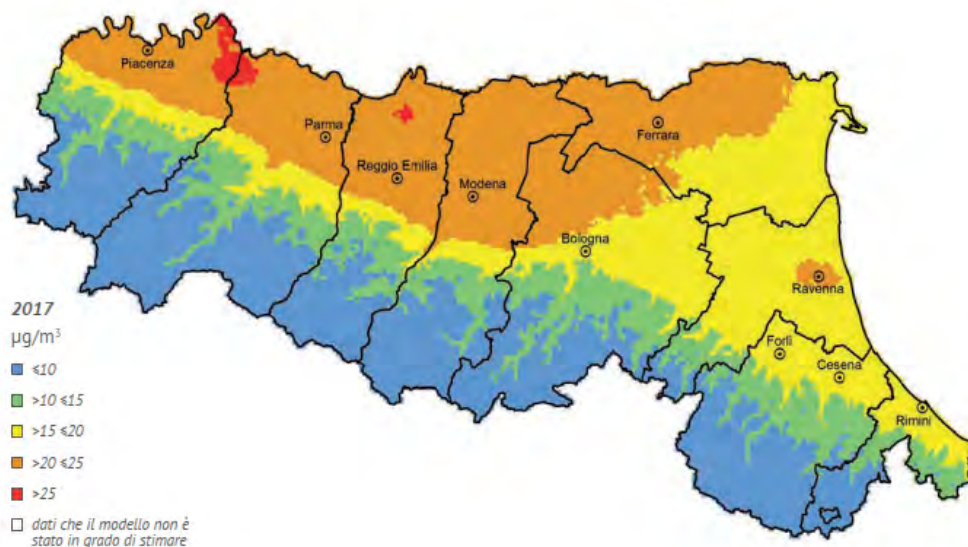
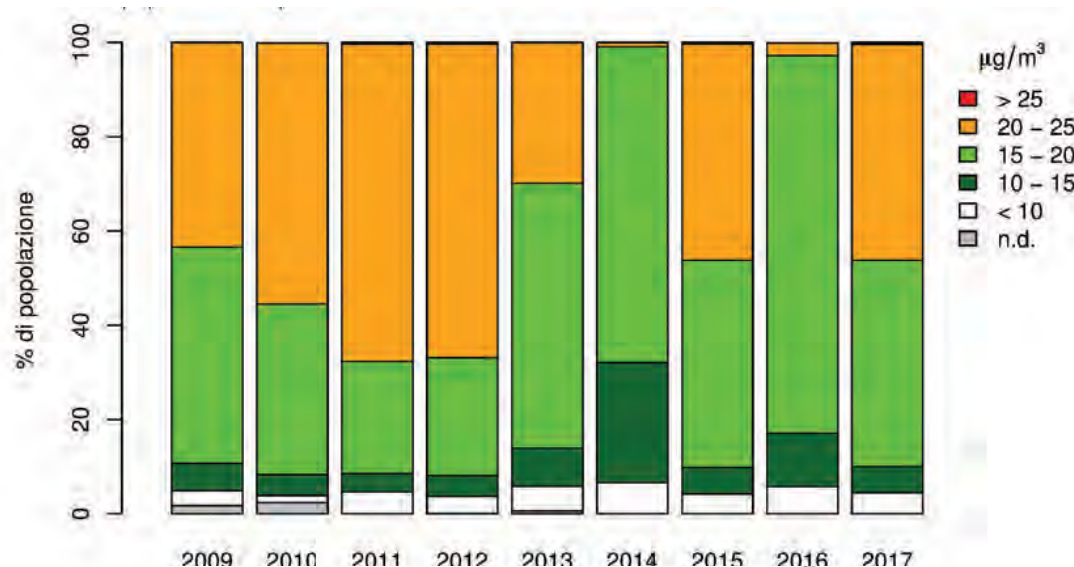


L'inquinamento da PM_{10} non è molto calato negli ultimi 10 anni

Si riduce sensibilmente nelle zone esposte a traffico,
meno nelle aree urbane mentre è stabile nella pianura



Ma quanto siamo esposti? PM2,5





In collaborazione con



Il Rapporto MobilitAria 2019

Politiche di mobilità e qualità dell'aria nelle 14 città e aree metropolitane 2017-2018

Mercoledì 17 Aprile 2019, ore 9,30-13,30
Auditorium Ferrovie dello Stato, Piazza della Croce Rossa 1 - Roma

Apertura 9.30 – 10.00

Gianluigi Angelantoni, *Presidente Gruppo Angelantoni - Vicepresidente Kyoto Club*
Gianfranco Battisti, *AD Ferrovie dello Stato. La strategia di FS per le città metropolitane**

Presentazione del Rapporto *MOBILITARIA 2019*, elaborato da Kyoto Club e CNR-IA in collaborazione con OPMUS ISFORT

Politiche di mobilità e qualità dell'aria nelle 14 città ed aree metropolitane 2017-2018

10.00-11:15

Francesco Petracchini, *CNR-IA Consiglio Nazionale delle Ricerche*
Anna Donati, *Gruppo di lavoro Mobilità sostenibile Kyoto Club*
Carlo Carminucci, *ISFORT L'andamento della Mobilità nelle 14 aree metropolitane*
Veronica Aneris, *T&E Gli obiettivi di riduzione CO2 al 2030 e al 2050 nei trasporti*
Patrizia Malgeri, *TRT Trasporto e Territorio. Scenari di impatto della mobilità elettrica nelle città*

11.15 – 12.15

Andrea Gibelli, *Presidente ASSTRA. Trasporto collettivo per la mobilità sostenibile**
Giulietta Pagliaccio, *Presidente FIAB. Diamo spazio alla mobilità ciclistica*
Massimo Marciani, *Presidente FLC. La logistica urbana del futuro*
Dino Marcozzi, *Motus-e. Verso la decarbonizzazione con la mobilità elettrica*

12:15 – 13:15 Le azioni delle città.

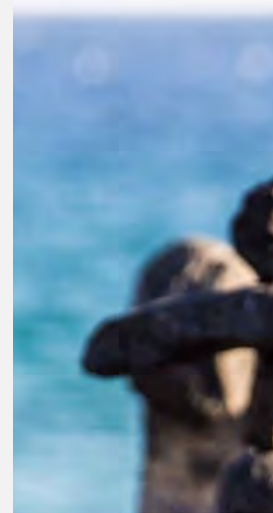
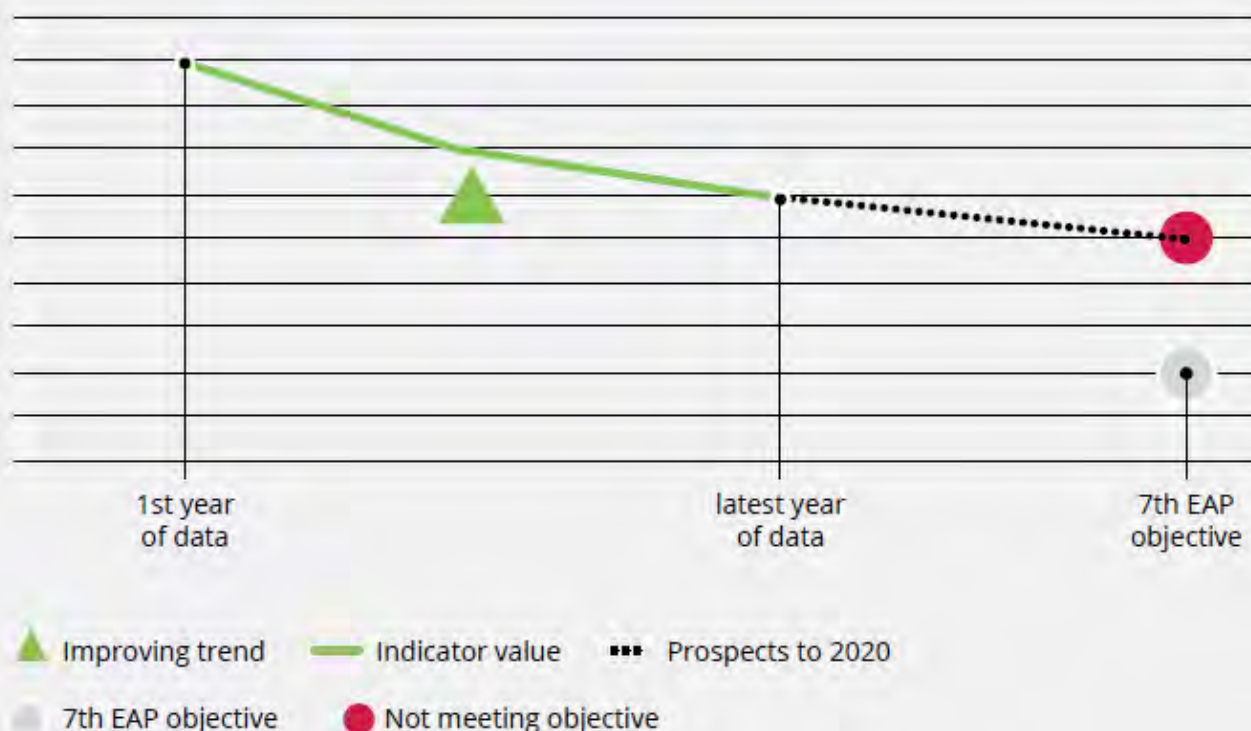
Moderata **Francesco Ferrante**, *Vicepresidente Kyoto Club*

Irene Priolo, *Assessore Mobilità Comune di Bologna*
Maria La Pietra, *Assessore Mobilità Comune di Torino*
Linda Meleo, *Assessore Città in movimento, Comune di Roma**
Stefano Giorgietti, *Assessore Lavori Pubblici, viabilità e TPL Comune di Firenze**
Marco Granelli, *Assessore Mobilità, Comune di Milano*
Mario Calabrese, *Assessore Infrastrutture e TPL Comune di Napoli*
Michele Dell'Orco, *Sottosegretario Ministero delle Infrastrutture e dei Trasporti **

**in attesa di conferma*

- **Indicative outlook for the EU meeting the selected objective by 2020:** This shows the indicative prospect of meeting the selected objective by 2020, using a traffic light system. The traffic light is green (●) if it is likely that the objective will be met, yellow (●) if this is uncertain or unclear and red (●) if it is unlikely that the objective will be met. The colours have been assigned on the basis of the available information specific to each indicator and to the corresponding selected objective. Overall, the colours were based on some combination of (1) the indicator-based trends observed over previous years; (2) the distance to target assessments (if available); (3) modelled estimates of future developments (if available); and (4) expert consideration.

A graphical example of the scoreboard methodology applied to an indicator is provided below:



European Environment Agency, 1

- While all van manufacturers respected their specific emission targets in 2017, three car manufacturers (Automobili Lamborghini, Mazda Motor Corporation and Société des Automobiles Alpine), representing together 1.4 % of all new car sales in 2017, exceeded their specific emission targets for 2017.



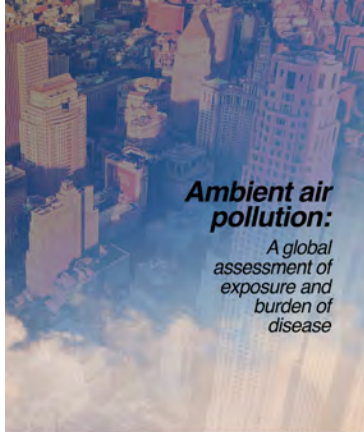
European Environment Agency, 2

- Amongst the largest automakers, **Toyota Motor Europe had the lowest average CO₂ emissions** for new passenger cars registered in 2017 (with 103 g CO₂/km). Automobiles Peugeot and Automobiles Citroen followed with (105 g CO₂/km) and (106 g CO₂/km), respectively. As in every year since vans monitoring commenced, Automobile Dacia SA was the lowest-emitting vans manufacturer (118 g CO₂/km in 2017).
- BMW AG, Renault, Daimler AG, Volkswagen together sell more than 50 % of the new electric vehicles in the market.

European Environment Agency, 2

- In December 2018, EU lawmakers reached an agreement on emission targets for the average fleet emissions of new passenger cars and light-commercial vehicles for 2025 and 2030. These targets aim to **reduce the average CO₂ emissions from new cars by 15 % in 2025 and by 37.5 % in 2030, compared with 2021 baseline levels.** For light-commercial vehicles, the targets consist of reductions by 15 % in 2025 and 31 % in 2030, relative to 2021. In February 2019, EU lawmakers also reached an informal agreement setting a 30 % reduction target for the average fleet emissions of new trucks by 2030.

Suggerimenti per chi vuole saperne di più



EEA Report | No 12/2018

Air quality in Europe — 2018 report



European Environment Agency



The Lancet Commission on pollution and health

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Executive summary

Executive summary
Pollution is the largest environmental cause of disease and premature death in the world today. Diseases caused by pollution were responsible for an estimated 9 million premature deaths in 2015—16% of all deaths worldwide—three times more deaths than from AIDS, tuberculosis, and malaria combined and 15 times more than from all wars and other forms of violence. In the most severely affected countries, pollution-related disease is responsible for more than one death in four.

Vulnerable subpopulations bear the greatest burden of vulnerability. Nearly 92% of pollution-related deaths occur in low-income and middle-income countries and, in countries at every income level, disease caused by pollution is most prevalent among minorities and the marginalized. Children are at high risk of pollution-related disease and even extremely low-dose exposures to pollutants during windows of vulnerability in utero and in early infancy can result in disease, disability, and death in childhood and across their lifespan.

Despite substantial effects on human health, the economy, and the environment, pollution has been neglected, especially in low-income and middle-income countries, and the health effects of pollution are underestimated in calculations of the global burden of disease. Pollution in low-income and middle-income countries often is associated with inadequate housing, inadequate sanitation, and

Pollution is costly. Pollution-related diseases cause productivity losses that reduce gross domestic product

(GDP) in low-income to middle-income countries by up to 25 per cent. Pollution-related disease also results in health-care costs that are responsible for 1.7% of annual health spending in high-income countries and for up to 7% of health spending in middle-income countries that are heavily polluted and rapidly developing. Wildlife losses due to pollution are estimated to amount to US\$4.6 trillion per year, 6.2% of global economic output. The costs attributed to pollution-related disease will probably increase as additional associations between pollution and disease are identified.

Pollution challenges planetary health. Electricity systems, and is intimately linked to global climate change. Fossil fuel combustion in high-income and middle-income countries and burning of biomass in low-income countries—accounts for 85% of urban particulate pollution and for almost all pollution by oxides of sulphur and nitrogen. For climate change is also a source of the greenhouse gases and short-lived climate pollutants that drive climate change. Key emitters include carbon dioxide, such as electricity-generating power plants, chemical manufacturing facilities, mining operations, deforestation, and petroleum-powered vehicles, are major sources of pollution. Coal is the world's largest polluting fossil fuel, and coal combustion is an important cause of both pollution and climate change.

In many parts of the world, pollution is getting worse. Household air and water pollution, the forms of pollution associated with profound poverty and traditional lifestyles, are slowly declining. However, urban pollution, chemical pollution, and acid pollution—forms of pollution produced by industry, nuclear electricity generation, mechanised agriculture, petroleum-powered vehicles—are all on the rise, with most marked increases in rapidly developing industrialising low-income and middle-income countries.

Chemical pollution is a great and growing environmental problem. The effects of chemical pollution on human health and the environment are becoming increasingly apparent. The production of chemicals has increased dramatically in the past few decades, and the use of chemicals has become a major part of modern life. Chemicals are used in a wide variety of products, from household cleaning products to pharmaceuticals. The production and use of chemicals have led to a significant increase in the amount of chemical waste that is generated. This waste can be harmful to the environment and to human health. Chemicals can also be used in a way that is harmful to the environment, such as in the case of pesticides. Chemicals can also be used in a way that is harmful to human health, such as in the case of asbestos. Chemicals can also be used in a way that is harmful to the environment and to human health, such as in the case of nuclear power. Chemicals can also be used in a way that is harmful to the environment and to human health, such as in the case of nuclear power.

This online publication has been searched. The searched version first appeared at <http://www.banquet.com> on Nov 2, 2017

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Position Paper

Cambiamenti climatici, salute, agricoltura e alimentazione

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La qualità dell'aria
in **Emilia-Romagna**
Edizione 2018

 Regione Emilia-Romagna