Europe’s air is a lot cleaner than it was when the European Union (EU) and its Member States started introducing air quality and pollution prevention and control policies about half a century ago. European and national policies and local actions have been able to curb pollution from transport, industry and the energy sector.

Despite this progress, the EEA’s annual Air quality in Europe assessments consistently show that air pollution still poses a danger to human health and the environment. Air pollution levels in many of Europe’s cities still exceed both the EU’s legal limits and the World Health Organization’s (WHO’s) guidelines for the protection of human health. The tragic consequence of this is that, according to the EEA’s estimates, every year about 400 000 Europeans die prematurely because of poor air quality.

Air pollution is the number one cause of premature deaths from environmental factors in Europe but it also has considerable economic impacts. It increases medical costs and reduces economic productivity due to the ill health of workers. Air pollution also harms soil, crops, forests, lakes and rivers. Pollutants even damage our houses, bridges and other built infrastructure.

Moreover, the negative impacts of poor air quality are not equally distributed across society. A recent EEA report showed that air pollution, as well as extreme temperatures and noise, disproportionately affect Europe’s most vulnerable citizens, especially in Europe’s eastern and southern regions. In addition to overall improvements, targeted action is needed to better protect vulnerable groups.

COVID-19 and air pollution

A decrease in many societal and economic activities during the pandemic led to a decrease in emissions and subsequent levels of certain air pollutants. For example, the use of vehicles declined during lockdowns and this led to lower nitrogen dioxide concentrations in many cities across Europe.

Exposure to air pollution is associated with cardiovascular and respiratory diseases — both health conditions known to increase susceptibility to COVID-19 and negatively influence prognosis. Some non-peer-reviewed articles have suggested links between air pollution and high COVID-19 mortality rates, for example in Italy and the United States, but further epidemiological research is required to clarify possible causal associations.

Find out more in EEA post corona planet platform

Deeply rooted, systemic problems

Particulate matter (PM), nitrogen dioxide (NO_2) and ground-level ozone (O_3) are the pollutants that cause the greatest harm to human health and the environment in Europe. The main sources of these pollutants are road transport, domestic heating, agriculture and industry.

In cities, where about three out of four Europeans live, road transport is often the main source of air pollution, especially because cars emit pollutants at the ground level, close to people. In parts of Europe, domestic heating with wood and coal is the most important source of harmful pollutants. Unfortunately, these emissions also increase during winter months when weather conditions often prevent pollutants from dispersing.

What is common to the sources of air pollutants is that they are deeply rooted in our societies' core systems of mobility, energy and food production and consumption. These same systems are not only the main sources of air pollutants, but also the root causes of the climate crisis and the rapid loss of biodiversity.

How we move people and goods around, how we generate heat and electricity, and how we produce and consume our food are, in many ways, the foundations of our current way of life. This is why changing these systems is not easy. In many cases, it requires us to reconsider the way we have built our societies and the way in which we live our lives.

Win-win solutions for cleaner air

The EEA has worked together with a number of European cities in a pilot project to better understand the challenges to improving air quality at the local level. The 10 cities that participated in the pilot project have, for example, expanded district heating, promoted cycling, lowered speed limits and issued congestion charges to improve local air quality. Other successful initiatives include relocating industrial facilities, modernising household stoves and boilers, using cleaner fuels for heating, switching to cleaner buses and trams, and introducing low-emission transport zones.

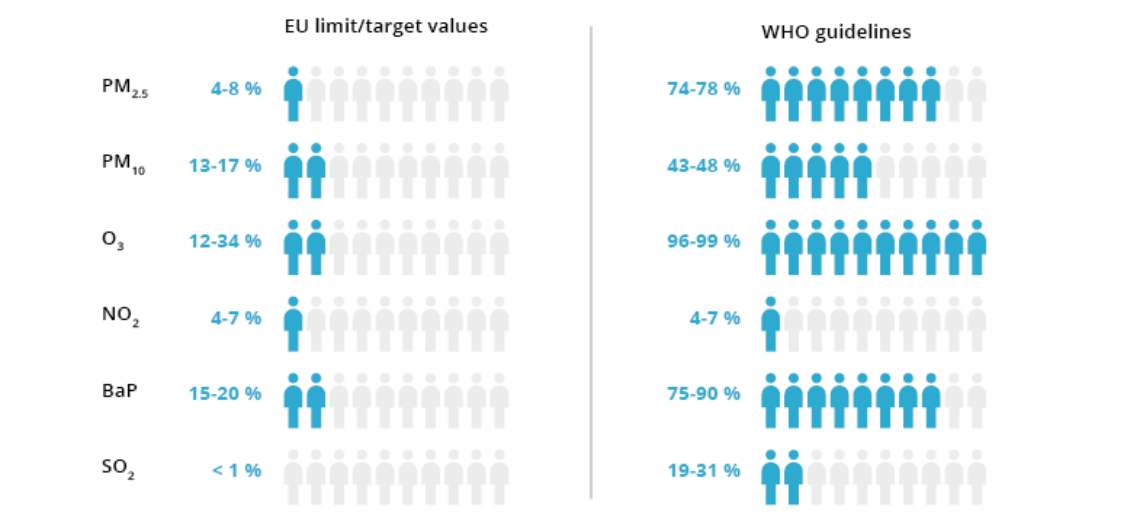
These measures reduce local air pollution and often noise, and they improve residents' quality of life. Moreover, the same actions cut greenhouse gas emissions and, in many cases, save money. Still, the same cities also reported important challenges, especially in engaging with citizens and making the political case for measures to improve air quality.

For best results, local and regional actions go along with effective national and EU policies that often offer substantial co-benefits in reducing greenhouse gas emissions and air pollution at the same time. These co-benefits can be achieved by, for example, improving energy efficiency and greening the mobility system.

Air quality problems in Europe's cities

Almost all Europeans who live in cities are exposed to air pollution that exceeds the levels set in the World Health Organization's (WHO's) guidelines for clean air. Air pollution is the greatest environmental health hazard in Europe and globally.

Share of the EU urban population exposed to air pollutant concentrations above EU and WHO reference values in 2016-2018



Main air pollutants and their effects on human health

Particulate matter (PM) is emitted from many sources and is one of the most harmful pollutants to human health. It penetrates sensitive regions of the respiratory system and can cause or aggravate cardiovascular and lung diseases as well as cancers.

Ground-level ozone (O3) is an air pollutant that affects human health, vegetation and materials. Ozone is formed when other pollutants react with sunlight.

Nitrogen oxides (NOx) and **sulphur oxides (SOx)** are emitted from fuel combustion, such as from power plants and other industrial facilities. They contribute to acidification and eutrophication of waters and soils. In the air, they can cause health problems, such as airway inflammation and reduced lung function.

Organic pollutants, such as **Benzo(a)pyrene (BaP)**, are emitted from fuel and waste combustion, industrial processes and solvent use. Substances such as hexachlorobenzene (HCB),

polychlorinated biphenyls (PCBs) and polycyclic aromatic hydrocarbons (PAHs) can have a range of harmful effects on human health and ecosystems.

Heavy metals, such as lead and mercury, are toxic to ecosystems. They are mainly emitted from combustion processes and industrial activities. As well as polluting the air, they can build up in soils and sediments, and bio-accumulate in food chains.

Ammonia (NH3) is emitted mainly from agriculture and contributes to both eutrophication and acidification of waters and soils.

Source: EEA report - Healthy environment, healthy lives; EEA infographic.

People demand clean air

A recent report by the European Court of Auditors noted that citizens can play a key role in pushing for better air quality. To inform citizens, the EEA gives access to near-real time data and statistics about air quality. The EEA and the European Commission have also built an online tool, the European Air Quality Index, which allows citizens across Europe to check current air quality where they live, work or travel. The index is calculated with hourly data from more than 2 000 air quality monitoring stations across Europe and also provides health-related information and recommendations.

People are increasingly interested in the quality of the air they breathe, with some citizens taking steps to measure their local air quality themselves through citizen science. The EEA is working together with the European Network of the Heads of Environmental Protection Agencies (EPA Network) on a project called CleanAir@School, which involves having children, parents and teachers measure pollutant concentrations around schools.

The schools that participate in the project measure nitrogen dioxide concentrations with simple low-cost devices, placing one sampler beside the road in front of the school and one in a less polluted area, such as the grounds behind the school. The project aims to raise awareness of traffic as a source of air pollution and encourage parents to shift away from bringing their children to school by

car.

Towards zero air pollution

Local-, regional-, national- and EU-level actions and policies with binding targets have improved air quality in Europe for the benefit of its citizens and the environment. More and more people across the world are demanding similar progress. Reducing the number of deaths and illnesses from air pollution is one of the targets of the Sustainable Development Goals that aim to ensure healthy lives and promote well-being. A similar target is included for sustainable cities and communities. Like the other goals, achieving this would bring massive global benefits, including increased productivity and reduced medical costs.

The actions that are necessary to cut air pollution, both in Europe and globally, are largely the same actions that are necessary to address the climate crisis and stop the degradation of nature. We need to fundamentally change and decarbonise our systems of production and consumption, especially those related to mobility, energy and food.

Find out more

Air pollution: www.eea.europa.eu/themes/air

SOER 2020, Chapter 8 on air pollution: www.eea.europa.eu/publications/soer-2020/chapter-08_soer2020-air-pollution/view

European Air Quality Index: www.eea.europa.eu/themes/air/air-quality-index

Related content

News and articles

Article

COVID-19 and the environment: explore what we know

[https://www.eea.europa.eu/post-corona-planet/explore]

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Air quality and COVID-19

[https://www.eea.europa.eu/themes/air/air-quality-and-covid19/air-quality-and-covid19]

Related infographics

Infographic

Air quality problems in Europe's cities

[https://www.eea.europa.eu/signals/signals-2020/infographics/air-quality-problems-in-europe-s-cities/view]

Related publications

Publication

Healthy environment, healthy lives: how the environment influences health and well-being in Europe

[https://www.eea.europa.eu/publications/healthy-environment-healthy-lives]

Publication

Assessing air quality through citizen science

[https://www.eea.europa.eu/publications/assessing-air-quality-through-

citizen-science]

Publication

Air quality in Europe 2019

[https://www.eea.europa.eu/publications/air-quality-in-europe-2019]

Publication

Europe's urban air quality — re-assessing implementation challenges in cities

[https://www.eea.europa.eu/publications/europes-urban-air-quality]

Publication

Unequal exposure and unequal impacts

[https://www.eea.europa.eu/publications/unequal-exposure-and-unequal-impacts]

See also

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EEA Signals 2020: Towards zero pollution in Europe

[https://www.eea.europa.eu/signals/signals-2020-towards-zero-pollution]

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Chapter 08_SOER2020. Air pollution

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