

A Window of Opportunity to save hundreds of thousands of lives in Europe

Summary Points

The European Public Health Alliance (EPHA) considers these points to be crucial to having ambitious Ambient Air Quality Directives that put health at the centre:



The **Ambient Air Quality Directives should fully align with the World Health Organization guidelines (2021) everywhere in the EU by 2030 at the latest**, greatly reducing related morbidity and mortality in Europe, and saving many times more money than is spent on air pollution control. **Air pollution causes significant health, wellbeing, social and economic burden in Europe, and is the biggest environmental threat that Europeans face.** Estimated economic damage from air pollution in Europe is up to EUR 853 billion annually. The potential health and financial savings from decreasing exposure to air pollution are dramatic. Savings outweigh costs by at least 6:1 even based on the lowest, conservative estimates in the most stringent control scenarios.



Putting in place strong limit values is a proven method to reduce air pollution burden and create necessary motivation for pollution control. **Legally binding limit values should be implemented, in keeping with the World Health Organization guidelines (2021).** This should include ground-level ozone, as a limit value, and not a target value.



Air pollution measurement and monitoring are crucial for assessing risk, damage and control measures. Direct measurement is able to capture data not fully captured by modelling alone. **A comprehensive, dense network of air pollution monitoring stations should be ensured**, including 'supersites', that also take into account the vulnerabilities and exposures of the local population. Access to justice for affected individuals should be straightforward and proactive.



The current impact of air pollution is significant and largely preventable, and there is a public health, as well as environmental, **need to act quickly.** There are large co-benefits to implementation and target reaching of other European Union policies. A swift legislative process with clear steps and milestones should be put in place, reflecting the urgency to act.



Air pollution affects health, wellbeing, and economy both within and outside of the borders of the Union. European Union financial and technical support for air pollution prevention in the European region (including in Western Balkans, Turkey and Eastern Europe, include EU Candidate countries such as Ukraine and Moldova) should be established, both as a means to reach the goals of air pollution control, but also as part of the wider European Union strategy for the European neighbourhood.

The Threat

Air pollution is a major global threat to health and wellbeing. The World Health Organization (WHO) estimates that 6.7 million premature deaths are due to air pollution globally per year, with 4.2 million of these related to outdoor (ambient) air pollution (WHO, 2022). In Europe, people died prematurely primarily due three pollutants: fine particulate matter, nitrogen dioxide and ozone. Fine particulate matter (abbreviated to PM_{2.5}) accounted for 238,000 of these deaths (EEA, 2022). Air pollution is the most significant environmental threat to health that Europeans suffer (EEA, 2022). The cost incurred in Europe every year from the effects of air pollution on society, governments, health systems, agriculture and infrastructure is shocking; up to EUR 853 billion annually for the EU, [according to the European Commission itself](#). We are faced with a public health emergency from air pollution. According to the European Environment Agency's (EEA) annual report on "[Air Quality in Europe](#)", in 2020, 96% of the EU's urban population was exposed to concentrations of fine particulate matter above the WHO guideline level of 5 µg/m³.

Premature deaths in 2020 attributable to exposure to pollutant concentrations above the WHO guideline level (except O ₃ above 70 µg/m ³)			
Geographical scope	PM _{2.5}	NO ₂	O ₃
EU - 27	238,000	49,000	24,000
European regions	275,000*	64,000	28,000

PM_{2.5}: particulate matter – NO₂: nitrogen dioxide – O₃: ozone
 EU – 27: the 27 Member States of the European Union. European regions: 41 countries (including EU – 27) *Turkey is not included in the PM_{2.5} estimations. Source: EEA Health impacts of our air pollution in Europe, 2022 (data 2020)

Outside of mortality, air pollution also causes morbidity, through a range of air pollution-related disease and conditions. Air pollution can affect nearly every system of the body, and evidence continues to mount on the far-ranging pathology of polluted air. The EEA estimated that in 2019 chronic obstructive pulmonary disease (COPD) related to PM_{2.5} air pollution was responsible for 175,702 years lived with disability (YLDs) in 30 European countries. Type 2 diabetes mellitus related to nitrogen dioxide (NO₂) pollution was responsible for 175,070 YLDs in 31 countries. Hospital admissions for lower respiratory tract infections related to acute ozone (O₃) exposure were numbered at 12,253 people in 23 countries (EEA, 2022).

From a medical point of view, air pollution has widespread effects through the whole body, and has been associated with ischaemic cardiac disease, stroke, chronic obstructive pulmonary disease (COPD), asthma (including development of new asthma in children), infectious respiratory disease (including COVID-19), multiple cancers including lung, bladder, brain and breast, dementia, worsened mental health, insulin resistance and type 2 diabetes, preeclampsia and gestational diabetes, impaired cognitive development in children, decreased fertility and increased hospital admissions and emergency presentations (Jovanovic Andersen, 2022).

The sources of air pollution in Europe are numerous. Combustion-based transport accounts for a large, preventable proportion of pollution and health effect. Residential heating and cooking systems are still largely dependent on fossil fuels, damaging human and planetary health. Agriculture and industry contribute significantly. Atmospheric conditions, including hotter weather, catalyse reactions to create higher health burden. Also, as air is not confined to one jurisdiction or state, trans-boundary pollution from regions neighbouring the European Union does also contribute to the status of air within the EU; supporting these regions to implement policies for better air quality will have trickle effects, benefitting EU citizens, putting less strain on global public health.

[Research commissioned by EPHA](#) has quantified the relative contributions of transport, and heating and cooking respectively to health-related costs to society due to air pollution. EPHA found that EUR 29 billion per year are due to outdoor pollution from heating and cooking in homes, of which 94% are caused by direct emissions from the combustion processes (Kortekand et al., 2022). This figure does not take into account the damage to health by the indoor air pollution caused by these processes, which also has a significant impact on health inside of Europe. People spend large amounts of time indoors, and not only are there unique indoor air quality risks that affect health, but the ambient, outdoor air quality also dictates the state of indoor air quality. Meanwhile, [an earlier study](#) placed the annual costs of road air pollution in the EU at between EUR 67 and EUR 80 billion (CE Delft, 2018).

More action and effort are needed to drastically decrease the health, wellbeing and social effects of air pollution in Europe, and the EU now has an opportunity to do this with the revision of the Ambient Air Quality Directives (AAQDs).

The revision of the Ambient Air Quality Directives: a unique and unmissable opportunity

In October 2022, the European Commission presented [a Proposal for a revision of the Ambient Air Quality Directives](#). This came just after the WHO published updated guidelines on air pollution limit values in 2021, based on scientific consensus and rigorous examination of the available global evidence on air pollution. Despite the release of the expert WHO guidelines though, these weren't translated into EU policy in the AAQD proposal. The latest revision of the AAQDs does not push for the highest level of health and wellbeing or economic benefit. Instead, it aims for a semi-ambitious middle ground, a middle ground where more can be done to save lives and prevent disease in Europe, but is not. Key elements are missing, and more ambitious measures are needed to meet the health-based guidelines of the WHO within the legislation of the AAQDs.

The benefits of reducing air pollution in Europe are substantial, and multi-sectoral. Assessments by the Commission predict that action on air pollution (depending on the level of commitment in different policy scenarios) could reduce premature mortality from PM_{2.5} air pollution by between 38% and 53%. For NO₂, these reduction predictions are between 12% and 20%. The predicted effect on GDP in different policies scenarios is an increase of between 0.26% to 0.44% (European Commission, 2022), with a net projected economic benefit of between EUR 29 billion and EUR 123.6 billion per year (depending on the level of policy ambition and estimation level). Air pollution control will save many times more money than is spent on damages. Savings outweigh costs by at least 6:1 even based on the lowest, conservative estimates in the most stringent control scenarios.

The policy and related Impact Assessment Reports all point to one message; action on air pollution will bring a significant net benefit to the health and wellbeing of population of Europe and will positively benefit the economy. Predictions and modelling show that the more action that is taken and the more stringent the policy, the greater the net benefit. This speaks to the impact of strong EU legislation on air pollution and the impact that air pollution has on Europe.

EPHA believes that more action and effort are needed to drastically decrease the health, wellbeing, social and economic effects of air pollution in Europe.



“Safe” levels of air pollution exposure

A key policy action that has proven effective to reduce air pollution is to reduce the legal limit of allowable air pollution. A strong legal framework, including limit values and enforcement mechanisms, is needed. Legally binding limit values are the strictest regulations for the levels of air pollution by the EU legislation. It is the most effective type of standards for protecting everyone, especially the most vulnerable. This was outlined recently by a number of European health and environment NGOs, including EPHA members and partners in a recent [response letter](#) on the AAQDs. They will also work to spur change and innovation that may not be otherwise possible without a strong legislative deterrent to polluting.

The Commission proposes to reduce these allowable limits, but not in line with the WHO’s guidelines; pushing for air pollution to reach a standard, which will already outdated, by 2030. A response that is not in line with scientific evidence or with the voice of the health community.

EPHA believes alignment should be achieved for all pollutants included in WHO’s 2021 guidelines, namely fine particulate matter, particulate matter (PM₁₀), NO₂, sulphur dioxide (SO₂) and ozone.

Contrary to the Commission’s proposal, ground-level ozone (O₃) should be subject to a limit value and not a target value. In other jurisdictions and guidelines, ground-level ozone is treated with the same regulation as other pollutants such as PM_{2.5} and NO₂; the United States Environmental Protection Agency (EPA) standards treat ozone with similar levels of regulation to PM_{2.5} and NO₂, and the WHO guidelines on long-term (warm season) ozone also have a limit which is not different in design to PM_{2.5} and NO₂.

Air Pollution Maximum Levels (annual mean) Levels in microns (µg/m ³)				
Pollutants	2005 WHO Guidelines	Current EU AAQ directives	2021 WHO Guidelines	AAQD proposal - to be attained by 2030-01-01
PM _{2.5}	10	25	5	10
PM ₁₀	20	40	15	20
O ₃ (8-hour)	100	120	100	120
NO ₂	40	40	10	20
SO ₂ (24-hour)	20	125	40	50
CO (24-hour) (mg/m ³)		10	4	4

O₃: ozone - “**target zone**” instead of “limit value” - NO₂: Nitrogen dioxide - SO₂: Sulphur dioxide - CO: Carbon monoxide
EU AAQD: European Union - Ambient Air Quality Directives
WHO: World Health Organization

As science advances, standards should be updated. New studies and findings are highlighting new risks previously unknown around the dangers of air pollution. Emerging evidence is showing that air pollution is dangerous and levels lower than previously thought. Experts now regard there as being no safe level of air pollution exposure (Jovanovic Andersen, 2022). There are also emerging pollutants of concern, such as ultrafine particles and black carbon, which the WHO is starting to recommend be monitored, modelled and potentially regulated. While the text of the AAQDs does see a review mechanism, questions remain around the process, and length of time, that this will take. It is conceivable that future debates on AAQD revisions will have a political focus, and not a health focus. To best protect health, EPHA believes that future updates should occur through a mechanism that automatically updates and reviews the air quality legislation, speeding up its implementation.



Focusing on vulnerable people

Air pollution is harmful to everyone's health, but affects different people differently, and some groups are more sharply susceptible to the effects of air pollution exposure. Age and comorbid disease affect the level of risk that someone faces when exposed to air pollution (WHO, 2021), for instance, those already ill or medically vulnerable, children, elderly, pregnant women, and socio-economically disadvantaged people. A comprehensive definition of vulnerable and susceptible groups in accordance with the WHO is needed however, including explicit mention of health inequalities, which, in the current text, are underemphasised, considering their impact on individuals. The Commission's proposal introduces a definition of sensitive and vulnerable groups. Vulnerability factors to the health impacts of air pollution are diverse and can be cumulative.

Socio-economic status sees unequal environmental exposure between affluent and deprived populations. People on lower incomes suffer more due to housing and location (e.g. more suburban or industrial areas, near major roads), occupation, access to healthcare, access to green space and exposure to heat, all of which interact to enhance the potential for exposure and damage related to air pollution. Differential effects are also seen across different environments; the exposures seen in urban areas may have a different quality to rural areas. People living in close proximity to transport corridors, agricultural areas, resource extraction sites, areas with high density of individual biomass and fossil fuel heaters, construction sites and in more sunny areas will all have different risks and exposures that will contribute to individual risk. Other external factors also can obscure and change the quality of the risk and vulnerability that an individual may experience; recent evidence has pointed to an increased risk of adverse health outcomes from air pollution when coupled with heat, which is of particular concern in Europe's changing climate (Anenberg et al., 2020). There is also an observed racial and ethnic minority aspect which works to reinforce health disparities within a diverse society (Fairburn et al., 2019).

An important part also of the outcome of individual risk relies on health information provision and health literacy. Clear, easy-to-use air quality and health information, as well as health literacy, can help individuals to better manage their own individual risk and act when air conditions may adversely affect their health. Accurate, timely and local information on the state of the air helps risk assessment, but in its current state, there exist barriers to the provision of this information in the EU.

EPHA suggests that the revision on the AAQDs should have a larger focus on vulnerable groups, taking into account health and societal inequalities that contribute to unequal, differential outcomes, that see people disadvantaged and left behind.

Monitoring and Enforcement

For a proper understanding of pollutants dispersion, the density and representativity of monitoring stations are key. The number of people covered by a single monitoring station outlined in the AAQD proposal is not in line with the voice of the health community, including EPHA, and should be increased. The criteria for the location of sampling points should include the exposure of vulnerable and susceptible groups, which is currently somewhat lacking in the AAQDs around placement of monitoring sites, and especially around the placement of “supersites”, where emerging pollutants of concern will be monitored (which can currently be as little as one per Member State, which does not capture the risk of the most vulnerable due to averaging).

Tackling air pollution requires political will, for immediate and long-lasting health benefits. But speed is of the essence, both within the proposal, and in the implementation of the proposal. A [recent analysis by ClientEarth](#) showed that if the proposed legislation comes into force by late 2024, the earliest Member States would be obliged to establish air quality plans to achieve compliance with the new limit values would be 2028, just two years before the deadline for attaining these limit values specific in the AAQDs (ClientEarth, 2023). This is an inadequate amount of time to create, enact, and see the effects of an air quality plan, and makes timely compliance with the new limit values unrealistic. Meanwhile, each year people would continue to be exposed to unhealthy air.

Special note should be made of the new provisions in this revision for legal action for those affected by air pollution. While this is welcome, and threat of litigation should contribute to societal inertia to tackle pollution, it remains to be seen exactly how this will function, and how easy this access to justice will be. Currently, [barriers to access to justice exist throughout Europe](#) at the national level. The legal process for seeking damages due to air pollution should straightforward, tested and should not see unsustainable costs prohibiting access to justice. It should also be robust so that affected parties do not need to try and argue science or seek complex analyses to support causal effect.



Why does it matter to be ambitious, and how quickly should this happen?

The cost of air pollution is estimated to be up to EUR 853 billion annually for the EU, [according to the European Commission itself](#). This includes health costs related to premature death and diseases from air pollution, productivity losses, crop yield losses, and damage to buildings. These costs are largely preventable, and EPHA is advocating for a much stronger AAQD legislation.

On the contrary, reducing air pollution has large co-benefits for climate mitigation, energy security, and biodiversity and it increases the resilience of populations for pandemics.

Table 17 - A Comparison of policy options on level of alignment with the WHO Air Quality Guidelines (2030)

		Baseline	Policy Option I-3	Policy Option I-2	Policy Option I-1
Air Quality standard	PM _{2.5}	25 µg/m ³	15 µg/m ³	10 µg/m ³	5 µg/m ³
	NO ₂	40 µg/m ³	30 µg/m ³	20 µg/m ³	10 µg/m ³
Exposed > WHO levels	PM _{2.5}	333 million	267 million	243 million	226 million
	NO ₂	52 million	46 million	44 million	42 million
Is the standard achievable with available measures? ^(a)		For >99% of PM _{2.5} sampling points	For 99% of PM _{2.5} sampling points	For 94% of PM _{2.5} sampling points	For 29% of PM _{2.5} sampling points
Key economic impacts					
Mitigation costs	Central	0	€3.3 bn	€5.6 bn	€7.0 bn
	If corrected for 'border cell effect' ^(b)	0	€1.0 bn	€5.1 bn	€7.0 bn
Gross benefits	Low ^(c)	0	€32.4 bn	€41.8 bn	€45.0 bn
	High ^(d)	0	€93.8 bn	€121.4 bn	€130.8 bn
Net benefits	Low ^(c)	0	€29.0 bn	€36.2 bn	€37.9 bn
	High ^(d)	0	€90.4 bn	€115.7 bn	€123.6 bn
Benefit-cost ratio	Low ^(c)	-	10:1	7.5:1	6:1
	High ^(d)	-	28:1	21:1	19:1
Net GDP impact		+/- 0%	+ 0.26%	+ 0.38%	+ 0.44%
Key health impacts ^(e)					
Annual premature mortality compared to 2020 / baseline	Due to PM _{2.5}	-56.3%	-73.1% -38% vs baseline	-77.9% -49% vs baseline	-79.5% -53% vs baseline
	Due to NO ₂	-80.9%	-83.3% -12% vs baseline	-84.0% -16% vs baseline	-84.7% -20% vs baseline

^(a) This analysis assesses technical feasible reductions only and does not include assumptions on fundamental changes in economic activity, dietary patterns, technological breakthroughs or major shifts in our energy systems.

^(b) If 'border cell effects' were excluded in the analysis, mitigation costs (and benefits) would be lower (see section 8.2, Box 6).

^(c) Based on VPLY (value of a life year), i.e. damage cost calculations based on the potential years of life lost.

^(d) Based on VSL (value of statistical life), i.e. damage cost calculations based on how much people are willing to pay for a reduction in their risk of dying from adverse health conditions.

^(e) Note this study calculates health impacts only above the WHO Air Quality Guidelines levels. However, pollution levels below these levels may have some health effects, even though the WHO has not quantified them. Also see box 5.

(European Commission 2022)

The science is clear as researchers underline that air pollution is harmful at much lower levels than previously thought. There is no safe level of air pollution, and every year that passes allowing air pollution to continue to cost hundreds of thousands of lives in Europe. Everyone is at risk. The socioeconomic dimension of air pollution highlights the inequity in health and exposure.

Considering these factors, and the significant health and environmental damage caused to Europe every year through air pollution, it is imperative that strong, robust and stringent controls are enacted across the region with the urgency this public health emergency deserves.

The revision of the Ambient Air Quality Directives gives a rare opportunity to transform the air we breathe, the health burden we accept, and the environmental damage caused by pollution.

This will have co-benefits for the European approach to environmental policy in the coming years, including the Zero Pollution Action Plan and the Green Deal. Importantly, full WHO alignment in this policy will also work with EU health policies, initiative and recommendations, some of which state explicitly in their wording that their success is dependent on the AAQDs, such as the Beating Cancer Plan. Reducing environmental pollution will be integral to reducing the cancer burden faced in Europe.

No European health or environment policy can be fully successful while air pollution continues at such damaging levels, and the European Public Health Alliance is advocating for Ambient Air Quality Directives to fully align with the World Health Organization limit values by 2030. This is especially relevant as newly emerging evidence continuously shows a greater impact of air pollution than previously thought, and the significance of exposure even at lower, “safe” levels. There is a window currently open, and this window can allow Europeans to breathe cleaner air and live more healthy, long, and equal lives. It is a window that should not be allowed to close without taking the opportunity for fresh air.

Given the large health, social and environmental costs we all suffer each day and year, EPHA is pushing for an ambitious policy to be put in place urgently.

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