



# A BREATHABLE PLANET

**Best practices for clean air policies  
to meet NCD targets**

# Acknowledgements

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# Executive Summary

Air pollution is a leading preventable risk factor for noncommunicable diseases (NCDs). 86% of the 7.9 million deaths caused by air pollution are attributable to NCDs, with the largest burden of death and disease occurring in low- and middle-income countries (LMICs). Alongside the health impacts, air pollution imposes significant economic and social harms, estimated to cost the global economy US\$8.1 trillion each year in health costs alone. It also harms the environment, impacting ecosystems and threatening biodiversity, and contributes to the climate crisis. Reducing air pollution is therefore central to preventing NCDs and protecting human and planetary health.

Recent global commitments have recognised this imperative for action. In 2025, the World Health Assembly endorsed an updated [World Health Organization \(WHO\) road map for an enhanced global response to the adverse health effects of air pollution](#), with Member States committing to a target to halve mortality from human-caused air pollution by 2040. Within the [Political Declaration](#) adopted in December 2025, after the fourth United Nations (UN) High-Level Meeting (HLM) on the Prevention and Control of NCDs and the Promotion of Mental Health, Member States also made several commitments on how to reduce air pollution as part of efforts to tackle NCDs. These commitments signal growing recognition that clean air policies are essential to make progress on NCDs and achieve global NCD targets.

Delivering on these global commitments requires moving from recognition to implementation. Evidence demonstrates the potential of clean air policies to significantly reduce population exposure to harmful air pollutants and reduce NCD risk in the short- and long-term. National and local governments around the world are already showing leadership in implementing clean air policies – from restricting vehicle emissions, removing support to fossil fuels and preventing open waste burning, to investing in sustainable transport, expanding access to clean cooking, incentivising renewable energy and strengthening the response of health systems. These measures are already delivering strong clean air and health benefits in many countries and cities around the world, while critically also delivering environmental benefits, economic resilience and social equity.

This report identifies specific examples of clean air policies across the commitments made in the 2025 Political Declaration on NCDs and mental health, highlighting challenges, lessons learned and best practices to support governments in scaling up these measures and adopting a comprehensive package of interventions. It also provides overarching policy recommendations to ensure the effectiveness and enforcement of clean air policies. By doing so, it aims to encourage policy makers to act and implement clean air policies in light of all the recent commitments and to meet the target agreed in the WHO updated roadmap.



**86%** of the  
**7.9 million deaths**  
caused by air pollution  
are attributable to NCDs.



# Recommendations

## **PILLAR 1**

### **Establishing clear priorities for immediate action**

- Implement air quality standards in line with WHO recommendations
  - Increase investment in improving air quality
  - Maximise health co-benefits to support prioritisation
- 

## **PILLAR 2**

### **Strengthening connection between air pollution and NCD prevention**

- Strengthen integration of air pollution and climate into NCD policy and planning and health more broadly
  - Strengthen the healthcare systems' ability to respond to air pollution and NCDs
  - Strengthen public awareness on air pollution and its health risks
- 

## **PILLAR 3**

### **Seeking further alignment**

- Integrate air pollution and health considerations into national climate, development and biodiversity strategies
  - Ensure fiscal policy coherence with health and environmental objectives
  - Ensure a fair and just transition away from fossil fuels
- 

## **PILLAR 4**

### **Ensuring good governance as an essential enabling condition**

- Strengthen governance and ensure a multisectoral approach
- Promote meaningful engagement of people with lived experience and civil society organisations throughout the policymaking process
- Protect against vested interests

## CHAPTER 1

# Air pollution — turning back a global crisis



Air pollution is a global crisis, affecting us all and all that surrounds us. It is a major driver of death and debilitating disease, also deepening inequities, with devastating effects on the climate and environment. It robs us of our [human right to health](#) and [to a healthy environment](#) – yet it does not get the attention it deserves. Recent political commitments give hope that positive change is underway. With many fast-acting and cost-effective policies to reduce air pollution available, we could all be breathing easier. Strong advocacy is needed to push governments to act on commitments with bold policy action now.

## 1.1 An unequal burden

Air pollution is all around us - even those who are living in remote rural areas are exposed to at least small amounts - and 99% of us are breathing air with pollution levels that are above World Health Organization (WHO) guidelines. Air pollution threatens people's health across the life course from foetal development to old age, and potentially damages every organ and cell in the body. This causes 7.9 million deaths each year – more than one in eight deaths globally – with many millions more living with debilitating chronic diseases driven by air pollution [1].

While air pollution affects us all, it does not affect us all equally. Most air pollution deaths occur in low- and middle-income countries (LMICs) [1]. As with other major health risks, low-income and disadvantaged groups are more likely to be exposed to higher levels of air pollution and are more vulnerable to its impacts, while also being less likely to have access to quality healthcare, further compounding risks and exacerbating inequalities [2] [3] [4] [5].

For instance, sources of pollution, including industrial plants and transport corridors, are more likely to be located in low-income areas, contributing to worse air quality [6] and pushing community members into cycles of poor health and deepening poverty. Unborn babies, newborns and young children are also uniquely vulnerable<sup>1</sup>, as due to their size and breathing rate they are exposed to higher levels of air pollution. This exposure during the developmental stage of life is associated with additional risks including hindered lung growth and brain development [7].

While this harm to human health and our societies cannot be truly quantified, the World Bank estimated in 2022 that health damages caused by air pollution cost the global economy US\$8.1 trillion annually, equivalent to 6.1% of global GDP [8] (a figure which has likely grown since then), placing an immense financial burden on public systems, economies and communities worldwide.

Air pollution cannot be avoided – but it can be significantly reduced through proven, cost-effective policies. What is needed is political will to implement them.

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The World Bank estimated in 2022 that health damages caused by **AIR POLLUTION** **COST THE GLOBAL ECONOMY** **US\$8.1 trillion** annually, equivalent to **6.1% of global GDP.**



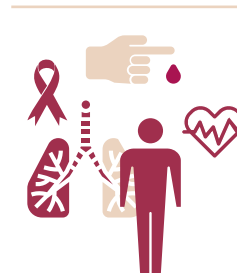
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1 For more information on the impact of air pollution across the lifecourse, please see [Royal College of Physicians. Every breath we take: the lifelong impact of air pollution. Report of a working party.](#) London: RCP, 2016.

## 1.2 Air pollution driving NCDs

Noncommunicable diseases (NCDs) cost 43 million lives each year, accounting for three out of four deaths worldwide. The most recognised NCDs include heart disease, cancer, diabetes, chronic respiratory disease and mental health conditions. However, the true burden extends well beyond these, including kidney and liver diseases, musculoskeletal conditions, neurological conditions and many more. The majority of NCDs can be prevented by tackling common risk factors: tobacco, alcohol, unhealthy diets, physical activity and air pollution [9].

Of nearly eight million deaths caused by air pollution each year, 86% of them are from NCDs.<sup>2</sup> Air pollution is the largest risk factor for deaths from chronic respiratory disease, while particulate matter is the second largest risk factor for deaths from stroke and ischaemic heart disease worldwide [1]. There is also a large amount of evidence demonstrating the role of air pollution in neurodegeneration, with the State of Global Air 2025 report tracking for the first time air pollution's impact on brain health. It reveals that in 2023, 626,000 people died as a result of dementia attributable to air pollution, and 11.6 million healthy life years were lost [1]. Air pollution is also associated with negative impacts on mental health, the immune system, and reproductive health.



**NCDs COST  
43 MILLION LIVES  
EACH YEAR, accounting  
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deaths worldwide.**

Air pollution causes NCDs and also aggravates them, with a growing body of research highlighting the specific risks faced by people living with NCDs. These are just a few of the findings:

- Air pollution can increase the severity and frequency of NCD symptoms, especially for those living with respiratory and cardiovascular diseases [10] [11], having significant impact on day-to-day life.
- Air pollution increases the risk of people with diabetes developing cardiovascular disease [12].
- For people living with cancer, air pollution can reduce the effectiveness of chemotherapy drugs and increase surgical complications, while also lowering quality of life by worsening treatment side effects and increasing fatigue [13].
- Exposure to air pollution is linked with increased use of mental health services among people recently diagnosed with psychotic and mood disorders, and increased risk of requiring an in-patient stay [14].
- Children with autism who are exposed to air pollution are more likely to be admitted to hospital for autism [15].
- Among people living with Alzheimer's, exposure to higher levels of PM<sub>2.5</sub> is associated with greater levels of cognitive impairment and more rapid symptom onset. In the US, researchers reported a 19% increased risk of worse Alzheimer's disease amyloid and tau buildup for every 1 microgram per cubic metre of PM<sub>2.5</sub> [16].

Air pollution was officially recognised in 2018 within the global health agenda as the fifth key risk factor for NCDs, adding to tobacco, alcohol, unhealthy diets and physical inactivity. In fact, it is the leading environmental risk factor, causing at least as many deaths as tobacco. And air pollution is different in one key way – while the other risk factors are considered 'modifiable' with the right tools and support, air pollution is entirely beyond individual control.

2 The remaining deaths are from communicable, maternal, neonatal and nutritional disorders, with deaths from respiratory infections and tuberculosis accounting for the majority of these. It is worth recognising the many links between NCDs and TB ([for more information on this, see here](#)), and air pollution as a risk factor of both NCDs and TB.

## Ambient and household air pollution

Both ambient (outdoor) and household air pollution harm our health and undermine NCD outcomes. Of all air pollution deaths, almost two-thirds are caused by ambient air pollution and ozone, while a third are attributed to household air pollution<sup>3</sup> [1].

Ambient air pollution refers to a range of pollutants from different sources including both natural and human-caused, such as household energy, transport, industry, agriculture. There is the strongest evidence for health impacts for particulate matter (PM<sub>2.5</sub> and PM<sub>10</sub>), ozone (O<sub>3</sub>), nitrogen dioxide (NO<sub>2</sub>), sulphur dioxide (SO<sub>2</sub>), heavy metals, and persistent organic pollutants (POPs) associated with industrial emissions, waste incineration, and combustion processes [17] [19] [20].

Major sources of household air pollution<sup>4</sup> are polluting fuels and technologies in the home used for heating, cooking and lighting [17]. There has been significant progress in recent years, with two-thirds of the global population now primarily using clean fuels for cooking in 2021, compared to just half in 2000 [21]. However, progress has been uneven and household air pollution remains a concern, with 2.1 billion people (as of 2023) still relying on polluting fuels and technologies for cooking. Household air pollution is also a major contributor to ambient pollution, with around 20% of outdoor PM<sub>2.5</sub> attributable to indoor air pollution [1] [22] [23].

*“Living in a city like Nairobi, you can sometimes see and feel the pollution before you even step out of the house. From the traffic fumes, dust from construction sites, and smoke from the kitchen or burning waste. For many people this is just part of city life, but for those of us living with heart or lung conditions, it can mean a difficult day ahead, full of fear and anxiety. As someone living with a heart condition and caregiving to a son born with congenital heart defect, I have seen how polluted air worsens our quality of life through laborious breathing, which causes fatigue, and can quickly turn a normal day into a medical concern.*

*Clean air is therefore not a luxury for us — it is a health necessity. When governments invest in cleaner transport, better urban planning, and safer energy solutions, they are directly protecting people living with NCDs. Every patient deserves the chance to breathe safely, recover well, and live a full life without their health being made worse by the air around them.”*

Evans Majau, Our Views, Our Voices Advisory Committee Member



3 IHME GBD data refers specifically to household air pollution from solid fuels.

4 Household air pollution typically refers to pollution from heating, cooking and lighting in the home. Indoor air pollution refers to a range of sources of pollutants impacting indoor air quality beyond sources of household air pollution. Damp and mould, smoke and vapour, sprays and aerosols from cosmetic and cleaning products, furniture and building materials can all affect indoor air quality [20].

### 1.3 Intertwined with sustainable development

86% of air pollution-related deaths are from NCDs; however, action for clean air remains underfunded and inadequately integrated into NCD policy and practice, hampering progress towards the Sustainable Development Goal (SDG) target 3.4 to reduce premature NCD mortality by one-third by 2030.

Action on air pollution can also support the achievement of other SDGs and SDG targets, including:



<p><b>TARGET 3-8</b></p>	<p><b>3.8 to achieve Universal Health Coverage, with air pollution being a major driver of disease and spending.</b></p>	<p><b>TARGET 3-9</b></p>	<p><b>3.9 to reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination.</b></p>
<p><b>5 GENDER EQUALITY</b></p>	<p><b>Addressing household air pollution improves health, particularly for women who are often more exposed to indoor smoke.</b></p>	<p><b>TARGET 7-1</b></p>	<p><b>7.1 to ensure universal access to affordable, reliable and modern energy services.</b></p>
<p><b>TARGET 11-6</b></p>	<p><b>11.6 to reduce the adverse per capita environmental impact of cities [17].</b></p>	<p><b>TARGET 12-4</b></p>	<p><b>12.4 to achieve environmentally sound management of chemicals and wastes, reducing their release to air, water, and soil.</b></p>
<p><b>13 CLIMATE ACTION</b></p>	<p><b>Because air pollution and the climate crisis are driven by burning fossil fuels, clean air action often aligns with climate mitigation.</b></p>	<p><b>15 LIFE ON LAND</b></p>	<p><b>Protecting ecosystems requires addressing harmful air pollutants.</b></p>

By reducing air pollution, we also reduce the economic burden it drives. This can free up resources to fund the achievement of all SDGs. In fact, research has shown that implementing fiscal policies to reduce air pollution – namely the removal of fossil fuel subsidies – would generate enough funding to achieve all SDGs in developing countries by 2030, while also preventing 1.6 million premature deaths per year (see Chapter 3.2).

## 1.4 Clean air as a human right

No one chooses to breathe polluted air when they step outside – but we are all subjected to its harms. Air pollution as a health risk is largely beyond individual control, and measures to mitigate its harms, like air filters and respirators, are not affordable or accessible for many people in the world. Yet clean air is necessary for life, health and dignity.

USEFUL RESOURCE 

In 2022, the UN General Assembly passed a [resolution recognising the human right to a clean, healthy and sustainable environment](#). The Special Rapporteur on the topic asserted the need for stronger measures to improve air quality in order for States to meet their international and human rights obligations in the latest report ([A/HRC/61/47](#)). The International Court of Justice clarified in its recent advisory opinion that given the risks that air pollution poses, States are obligated under international law to protect the environment and prevent significant harms. Businesses must also prevent risks from air pollution and respect human rights across their operations [24].

USEFUL RESOURCE 

The right to clean air or the right to a healthy environment are recognised by the constitution of many countries. The [Model policy framework for the right to clean air, climate justice and public health in Latin America](#), developed by civil society coalitions and supported by the Heinrich Böll Foundation, offers a valuable example of integrating air quality, health, and human rights within a regional governance framework. The [Santiago Declaration on Clean Air and Environmental Justice](#) also recognises clean air as a basic human right, strengthening links between health and environmental justice.



*“Breathing should be the most natural thing we do, yet in many parts of the world it has become a daily concern. In places affected by severe air pollution, something as simple as stepping outside can carry risks to health. What was once a concern mainly for parents has now become a reality for an entire generation. Young people are growing up adapting their lives around poor air quality, from wearing masks to limiting time outdoors, and even considering leaving their homes in search of cleaner air. This is not just an environmental issue, it is a matter of fairness and basic rights. Clean air should not be a privilege. It is a fundamental condition for a healthy life, and urgent action is needed to ensure that everyone can breathe safely without fear.”*

Nomundari Urantulga, Youth and lived experience advocate

## 1.5 Air pollution, the climate crisis and health

Air pollution and the climate crisis are deeply interconnected, with both crises largely driven by fossil fuels. The extraction, processing, and combustion of fossil fuels are themselves major sources of toxic air pollution. Activities such as gas flaring at oil and gas extraction sites release large volumes of particulate matter, nitrogen oxides, SO<sub>2</sub>, volatile organic compounds (VOCs), and other hazardous pollutants, exposing nearby communities to dangerous levels of air pollution.

These activities also release carbon dioxide (CO<sub>2</sub>), a major driver of the climate crisis. While it is not typically classified as an air pollutant in terms of direct health impacts, it indirectly harms human health by increasing global temperatures, which contributes to higher levels of ground-level ozone. This in turn worsens air quality. Higher temperatures also lead to more frequent and intense wildfires, which cause significant air pollution [17]. In 2024 alone, exposure to smoke from wildfires caused around 154,000 deaths [25]. In addition to wildfires, sand and dust storms are becoming more prevalent, impacting air quality and in turn health, with exposure linked to increased risk of all-cause and cardiovascular mortality [26] [27].

Like air pollution, the climate crisis affects everyone, but some populations face unique risks, including people living with NCDs. For example, heat is associated with increased mortality from NCDs such as stroke, heart disease and kidney disease. Growing evidence also links the climate crisis and exposure to extreme heat with worse mental health outcomes [28]. Weather events such as droughts and floods threaten food security, and weather events that cause power outages and infrastructure damage can also cause delays in NCD diagnosis, care and treatment [17].



**In 2024 alone,  
EXPOSURE TO SMOKE  
FROM WILDFIRES  
caused around  
154,000 DEATHS.**

USEFUL RESOURCE 

The same systems driving the climate crisis, such as dependence on fossil fuels, unsustainable food production and poorly planned urban growth, are also fuelling the rise in NCDs. By tackling these drivers, governments can deliver a triple win: cleaner air, healthier populations, and a safer climate. See WHO's [Technical Brief: Health and air quality co-benefits of climate change mitigation](#) and [The synergies of heat stress and air pollution and its health impacts](#).

*"From classrooms to communities, awareness about clean air must evolve into a movement that inspires action and accountability. Schools play a pivotal role in shaping young minds, instilling not only knowledge but also responsibility towards the environment and health. When students understand the impact of air pollution on their well-being, especially its link to noncommunicable diseases, they become powerful advocates for change. This awareness must extend beyond school walls, engaging families and communities in adopting sustainable practices such as reducing emissions, conserving energy, and supporting green initiatives. Collective action, driven by informed choices, can create healthier environments for all. Clean air cannot remain a distant ideal discussed in lessons; it must become a shared mission lived through everyday actions. By nurturing this mindset early, we empower a generation that does not just speak about change but actively leads it, ensuring a safer, healthier future for all."*

Seema Bali, Our Views, Our Voices Advisory Committee Member



## 1.6 Making the clean air transition

Air pollution has come into the spotlight in recent years due to its interlinkages with the climate crisis, but it's actually been a major health and environmental problem for centuries. As a result, decades of evidence have shown the success of policies to reduce emissions, protect health and deliver additional benefits.

In 1956, the UK introduced the Clean Air Act to tackle air pollution following the Great Smog<sup>5</sup>, which granted local authorities the mandate to restrict emissions. As a result of these efforts, particle pollution reduced by 67% over the following 10 years [29]. In 1990, Hong Kong introduced a restriction on the sulphur content in fuel oil used in power plants and motor vehicles which led to a 45% reduction in ambient SO<sub>2</sub> levels, as well as reducing the annual rate of total deaths by 2.1%, respiratory deaths by 3.9% and cardiovascular deaths by 2% over five years [30].

This kind of improvement to health and air quality within five to ten years is impressive, but air pollution interventions can produce benefits in a matter of months. Ahead of the 2008 Olympics, the Government of China implemented several measures to reduce air pollution, including restrictions on factory emissions, a coal-to-gas transition for residential heating and industrial processes, expansion of renewable energy resources and regulations on the transportation sector. This resulted in a reduction in air pollution concentration by up to 62% during the Olympics, and within just two months of this reduction, asthma-related physician visits reduced by 58%, and a reduction in cardiovascular mortality was also observed [31] [32]. China has been successful at reducing air pollution overall – since the government declared a “war on pollution” in 2014, pollution has dropped by 40.8 percent. This reduction has translated to an average increase in life expectancy of 1.8 years [33].

Together with health benefits, clean air policies offer a positive return-on-investment over time, improving economic productivity and reducing healthcare spending [1]. For example, in the US, the Clean Air Act and its amendments are estimated to have produced economic benefits totalling US\$2 trillion between 1990 and 2020, an estimated benefit ratio of 30:1 [34]. Most of these benefits are attributable to reductions in premature mortality, with an estimated 230,000 premature deaths averted by 2020, in addition to preventing morbidity. Moreover, modelling conducted by the United Nations Development Programme (UNDP) as part of national investment cases in Mongolia, Ethiopia and India show positive estimated economic returns of investing in air pollution measures [35] [36] [37].<sup>6</sup>

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**PROTECTING POPULATIONS FROM AIR POLLUTION HARM IS UP TO GOVERNMENTS. Clean air interventions are shown to be cost-effective and fast-acting, but air pollution is only beginning to get the policy attention it deserves within global and national NCD responses.**

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5 The Great Smog in London in 1952 killed more than 12,000 people. It was caused by increased use of poor quality coal due to colder weather and weak economy at the time, combined with an anticyclone which trapped the coal smoke. For more information, please see <https://www.londonmuseum.org.uk/collections/london-stories/the-great-smog-of-1952/>.

6 In Ethiopia, investing in a set of air pollution control interventions would deliver a return-on-investment (ROI) of 5.7:1 over 10 years, increasing to 19.7:1 when household savings from fuel costs is considered. In Mongolia, investing in replacing coal-fuelled stoves with electric and gas has an ROI of 4.8:1 over 31 years. In India, investing in shifting industries to cleaner fuels had the highest ROI, with an ROI of 9.99:1 and 8.55:1 in Gurugram and Amritsar respectively.

*“Living near the brick kilns<sup>7</sup> in Sudan, the smoke was so thick you could practically taste it. I was in a really tough spot; managing multiple NCDs—respiratory, metabolic, and mental health conditions—and I knew I needed to stay active to stay well. But how do you go for a walk when the air feels like it’s doing you more harm than good? Air pollution affects everyone, but when you’re already balancing more than one chronic condition, it’s especially hard. It feels like the environment is working against your recovery.*

*Moving away was a total game-changer for me. The difference was night and day; my physical health improved, and my mental state lifted the moment I had the freedom to just step outside. We need policies that realize clean air isn’t a luxury; it’s a basic requirement for anyone trying to manage their health and live a normal life.”*

Mohamed Osman, Our Views, Our Voices Advisory Committee Member

## Transitioning from fossil fuels fairly

An equitable transition away from fossil fuels to clean energy is critical for protecting health and the environment while protecting the most vulnerable. This should include carefully managing subsidy reforms to ensure affordable energy access for vulnerable populations and financial protection for workers involved in the fossil fuel industry or related sectors where job losses may occur. Increased investment must be provided to increase access to clean and renewable energy, particularly in LMICs that still bear a disproportionate burden.

Vulnerable communities and those most impacted by inequities should be engaged throughout decision-making processes, and health impact assessments should be conducted before and throughout the transition process [38] [39].



7 In Sudan, traditional red brick manufacturing involves “scove kilns,” which are temporary structures built from the raw clay bricks themselves. These kilns are fired at intense heat using wood, dung, or heavy oils to harden the clay. This “burning” process often takes place in residential areas or along the Nile, releasing dense, low-lying smoke and particulate matter directly into the local environment.

## 1.7 Recent global policy developments

In 2018, the Political Declaration of the third United Nations (UN) High-Level Meeting (HLM) on the Prevention and Control of NCDs recognised air pollution as a major risk factor, in recognition of its significant disease burden. This resulted in an important shift in the global NCD agenda, from the 4x4 approach to the current 5x5 approach.<sup>8</sup>

Since then, governments have made a number of commitments to take action to reduce the health burden caused by air pollution. At the 28<sup>th</sup> session of the Conference of Parties (COP28) of the UN Framework Convention on Climate Change (UNFCCC), the [UAE Consensus](#) included unprecedented language on the need for “transitioning away from all fossil fuels in energy systems, in a just, orderly and equitable manner”. It also called on Parties to triple renewables by 2030 and accelerate economy wide emission reduction targets in their updated nationally determined contributions (NDCs) to the Paris Agreement [40].

In March 2025, at the Second Global Conference on Air Pollution and Health in Colombia, more than 50 stakeholders made commitments to advance clean air, including 24 national and subnational governments. Later that year at the 78<sup>th</sup> session of the World Health Assembly (WHA), Member States endorsed the [updated roadmap for an enhanced global response to the adverse health effects of air pollution](#) containing the target to halve mortality from human-caused air pollution by 2040, with measures in place by 2030.

In April 2026, the First Conference on Transitioning Away from Fossil Fuels was held in Santa Marta, Colombia. The conference established three workstreams to support countries develop roadmaps, support the necessary changes in financial systems, and work on producer-consumer alignment, to facilitate the transition away from fossil fuels. A second conference will be held in Tuvalu, co-hosted by Ireland, in 2027 [41].



**The NCD prevention and control agenda has recognised AIR POLLUTION AS A MAJOR RISK FACTOR.**

### Timeline of key policy milestones

<b>2018</b>		Political Declaration of the third UN HLM on NCDs recognised air pollution as a major risk factor
<b>2021</b>		WHO air quality guidelines update
<b>2023</b>		UNFCCC COP28 (UAE consensus)
<b>2024</b>		UNEA Resolution 6/10 Promoting regional cooperation on air pollution to improve air quality globally adopted
<b>2025</b>	March	Second Global Conference on Air Pollution and Health
	May	WHO Member States endorsed updated roadmap for an enhanced global response to the adverse health effects of air pollution
	September	4 <sup>th</sup> UN HLM on NCDs and Mental Health
	November	UNFCCC COP30 including Belem Health Action Plan
	December	Political Declaration on NCDs and mental health formally adopted
<b>2026</b>	April	First Conference on Transitioning Away from Fossil Fuels
<b>2027</b>		UN HLM on Universal Health Coverage
<b>2030</b>		Sustainable Development Goals end date

8 The 4x4 approach references the focus on 4 risk factors (tobacco, alcohol, unhealthy diet and physical activity) and 4 NCDs (cardiovascular disease, cancer, diabetes, and chronic respiratory disease). The 5x5 approach signalled an expansion of scope, adding air pollution as a risk factor and mental health and neurological conditions as an NCD.

## 1.8 Moving from policy commitments to action

In light of the commitments made, including the updated roadmap on air pollution and the commitments set out in the 2025 Political Declaration on NCDs and mental health, this report aims to support and accelerate action by policy makers to implement clean air policies. It focuses primarily on the five priority areas highlighted in the Political Declaration, presenting country examples, lessons learned, key challenges, and a range of best practices, many of which deliver co-benefits for other global priorities, including climate action and sustainable development. These priority areas correspond to *Chapters 3 to 7* of this report, as outlined in the table below.

The report also presents key policy frameworks (*Chapter 2*), and spotlights additional clean air actions taken by sectors beyond government (*Chapter 8*). Finally, we provide our specific recommendations to guide policy makers (*Chapter 9*). With the evidence clear and the tools available, the priority now must be implementation at scale.

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**THE COST OF INACTION ON AIR POLLUTION IS RISING, and continued delay will be paid for in lives lost, illness, and economic damage.**

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### 2025 Political Declaration commitments

<b>→ CHAPTER 3</b> Tackling air pollution from fuels, industrial sectors, and consumer and commercial products	<i>developing, amending, and administering regulatory and non-regulatory measures to tackle air pollution from industrial sectors, vehicles, engines, fuels, and consumer and commercial products;</i>
<b>→ CHAPTER 4</b> Promoting cleaner energy solutions	<i>promoting access to affordable, clean, sustainable and less polluting solutions for cooking, heating and electricity generation;</i>
<b>→ CHAPTER 5</b> Promoting active mobility and clean transportation	<i>promoting clean, efficient, safe, accessible and expanded urban public transport options, and active mobility, such as walking and cycling;</i>
<b>→ CHAPTER 6</b> Improving waste management	<i>reducing the open and uncontrolled burning of toxic residues;</i>
<b>→ CHAPTER 7</b> Supporting resilient health systems	<i>strengthening and investing in more resilient healthcare systems, including infrastructure, service delivery and workforce capacity.</i>

We are at a pivotal moment for advocacy and action on air pollution, with numerous upcoming opportunities, as outlined in the section above. This includes the upcoming UN HLM on Universal Health Coverage in 2027, given the strain that air pollution and the associated diseases put on already overstretched health systems. It is also timely to build momentum for stronger air pollution action to address the burden of NCDs in the lead-up to the Second Conference on Transitioning Away from Fossil Fuels (2027), future UNFCCC COPs and the updating of the WHO Best Buys for NCDs, for which WHO has a mandate to develop a menu of policy options and cost-effective interventions on air pollution. These processes are opportunities to strengthen commitments and drive measurable progress. The cost of inaction on air pollution is rising, and continued delay will be paid for in lives lost, illness, and economic damage.

## CHAPTER 2

# Policy frameworks for air pollution action



Comprehensive policy frameworks are central to tackling effectively the health and economic burden of air pollution, helping ensure coordinated action and alignment across sectors, and between countries. Policy frameworks, including the adoption and enforcement of national air quality guidelines in line with WHO recommendations, provide an essential foundation for protecting public health, particularly for vulnerable populations including children, older persons, Indigenous populations, and people living with NCDs.

The 2025 Political Declaration on NCDs and mental health strengthens the case for integrating air pollution into national NCD strategies and plans, recognising the role of air pollution as a major NCD risk factor. Countries can use the WHO roadmap on air pollution target to halve air pollution attributable mortality by 2040 as a baseline measure for ambition and accountability.

## 2.1 Adoption and strict enforcement of national air quality guidelines

Recognising the harmful impact of air pollution and in addition to the roadmap, WHO has set air quality standards as a global target for governments to work towards to protect public health. First released in 1987, the guidelines have been updated periodically in line with new evidence. The guidelines were most recently updated in 2021, reducing recommended levels across the five pollutants – PM<sub>2.5</sub>, PM<sub>10</sub>, O<sub>3</sub>, NO<sub>2</sub> and SO<sub>2</sub> and adding a recommendation for carbon monoxide (CO).

The guidelines also include ambitious interim targets, offering countries a pathway to gradually meet more stringent targets [42]. Meeting the air quality standards may be a difficult task for many countries struggling with very high levels of air pollution. As such, achievement of interim targets as part of gradually improving air quality should be seen as a key indicator of advancing health.

### Summary of recommended long- and short-term AQG levels and interim targets

Pollutant	Averaging time	Interim target				AQG level
		1	2	3	4	
PM <sub>2.5</sub> µg/m <sup>3</sup>	Annual	35	25	15	10	5
	24-hour <sup>a</sup>	75	50	37.5	25	15
PM <sub>10</sub> µg/m <sup>3</sup>	Annual	70	50	30	20	15
	24-hour <sup>a</sup>	150	100	75	50	45
O <sub>3</sub> µg/m <sup>3</sup>	Peak season <sup>b</sup>	100	70	–	–	60
	8-hour <sup>a</sup>	160	120	–	–	100
NO <sub>2</sub> µg/m <sup>3</sup>	Annual	40	30	20	–	10
	24-hour <sup>a</sup>	120	50	–	–	25
SO <sub>2</sub> µg/m <sup>3</sup>	24-hour <sup>a</sup>	125	50	–	–	40
CO, mg/m <sup>3</sup>	24-hour <sup>a</sup>	7	–	–	–	4

<sup>a</sup> 99th percentile (i.e. 3-4 exceedance days per year).

<sup>b</sup> Average of daily maximum 8-hour mean O<sub>3</sub> concentration in the six consecutive months with the highest six-month running-average O<sub>3</sub> concentration.

Table adapted from [WHO global air quality guidelines 2021](#) [43]

In 2024, the EU adopted the revised Ambient Air Quality Directive (AAQD) which puts its member states on a path to meeting WHO air quality guidelines, giving them two years to transpose it into national law. This makes it one of the most progressive air quality regulatory frameworks globally. The AAQD is estimated to lead to a 55% reduction in premature deaths from air pollution and annual benefits of up to US\$ 143 billion (EUR 121 billion) across the EU [44]. In 2026, China tightened its air quality standards from 35 to 25 PM<sub>2.5</sub> µg/m<sup>3</sup> [45].

The United Nations Environment Programme (UNEP) has emphasised the importance of robust air quality governance and developing legislation as a means for air quality control. UNEP's global assessment of air pollution policies found that

in 2020, 124 countries had ambient air quality standards which were embedded in a legal instrument, an increase from 107 countries in 2016 [46]. While air quality monitoring is expanding, it is still not widely and routinely done [46]. As of 2024, 36% of countries were still not monitoring air pollution [47].

USEFUL RESOURCE



WHO has also produced guidelines for household air quality, for [selected pollutants](#), [household fuel combustion](#) and on [dampness and mould](#). Additional research is needed on the health impacts of other and emerging pollutants, including the role of microplastics.

## 2.2 Setting air quality standards in specific settings

Setting air quality standards in specific settings such as public buildings, workplaces<sup>9</sup>, schools or hospitals can provide protection for specific groups including those which may be particularly vulnerable to the impacts of air pollution.

Air quality standards in schools present an important opportunity to protect children from exposure to air pollution due to the length of time they spend there. Children are also uniquely vulnerable to the health harms of air pollution. As children's organs and immune systems are still developing, they do not have the same defence mechanisms as adults, and pollution can interfere with their long-term growth and development. Breathing in the same amount of pollution has worse impacts among children due to their smaller airway passages, which results in any inflammation causing more airway blockages, proportionately [48]. However, children often breathe in more polluted air due to having a faster breathing rate, being more likely to breathe through their mouth and being closer to the ground (and therefore closer to concentrated pollutants, especially from vehicle exhausts) [49].

1.8 billion children under the age of 15 (93%) breathe air that risks their health and development because of pollution [50]. This exposure also increases the risk of health inequalities by increasing the likelihood of developing health issues from a young age. On the other hand, clean air in schools is associated with a range of positive health benefits, including reduced chance of infectious disease transmission, reductions in asthma and respiratory symptoms, and decreases in missed school days. Improved indoor air quality in schools is also associated with increased cognitive function and test scores [48].



9 For more information on how air pollution and climate change impact workplaces, please see <https://www.ilo.org/publications/ensuring-safety-and-health-work-changing-climate>



### Boston Public Schools leading indoor air quality programme

Boston Public Schools (BPS) has installed air quality sensors in all classrooms, nurse offices and main offices, which report in real-time across six key measures of indoor air quality: carbon dioxide, carbon monoxide, PM<sub>10</sub>, PM<sub>2.5</sub>, temperature and relative humidity. Each school is also installed with a roof-top unit to provide a baseline for outdoor air [51]. The data collected through the programme is used to identify and respond to air quality issues and advocate for change, including building investment. Data is also displayed on a purpose-built dashboard in real-time to engage the entire school community [52].

The programme has led to new policies to improve air quality, including eliminating bus and vehicle idling near schools and banning the use of bleach-based and aerosol cleaning products. The programme has also partnered with Boston University School of Public Health to conduct research on the programme [51]. BPS has developed a comprehensive Indoor Air Quality (IAQ) Management Plan outlining roles and responsibilities for the BPS IAQ management and wider school community, and providing guidance on how to improve air quality and ventilation. BPS also has a Tobacco and Nicotine-Free Environment Policy, *“motivated by the philosophy that every staff person, student and visitor should have the right to breathe clean air in the school and work environment”* [53].

While the Boston Public Schools programme (*see Box above*) is ambitious and may not be feasible in all contexts, several of its strategies can still be applied. This includes opening a classroom window at four inches and opening a classroom door, which in testing provided more air changes per hour (ACH) than the air purifiers [54].

## 2.3 Integration of air pollution into national NCD strategies and action plans

Despite the recognition of air pollution as a major NCD risk factor in the 2018 Political Declaration on NCDs and mental health (*see Chapter 1.7*), integration of air pollution within NCD responses has remained slow and inadequate. Fully integrating air pollution into national NCD strategies and action plans is essential to accelerate action on clean air and ensure implementation. This should include aligning national NCD plans with the updated WHO roadmap and its target of halving mortality from anthropogenic sources of air pollution by 2040.

India was the first country to adopt a national target aimed at a 50% relative reduction in household use of solid fuels as a primary source of energy for cooking as part of its National Multi-sectoral Action Plan for NCD Prevention and Control [55]. At the Second Global Conference on Air Pollution and Health, Mongolia committed to integrate air pollution into its NCD National Action Plan.

## 2.4 Integration of air pollution into nationally determined contributions and other climate plans

Air pollution and climate change are inextricably linked. Opportunities to address climate change and air pollution together requires integrated planning but can yield significant benefits. Integrating air pollution into countries nationally determined contributions (NDCs) is one key opportunity to do this, while also providing an opportunity to strengthen multisectoral coordination due to their interdisciplinary nature.

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**Opportunities to address climate change and air pollution together requires INTEGRATED PLANNING BUT CAN YIELD SIGNIFICANT BENEFITS.**

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NDCs are five-year national climate action plans submitted by countries under the Paris Agreement, which outline how the country plans to reduce greenhouse gas emissions.<sup>10</sup> The Global Climate and Health Alliance (GCHA) have analysed these, finding that less than a third of NDCs in 2023 referred to the health impacts of air pollution, quantified the burden, or included any health sector action relating to care for pollution-attributable health impacts [56].

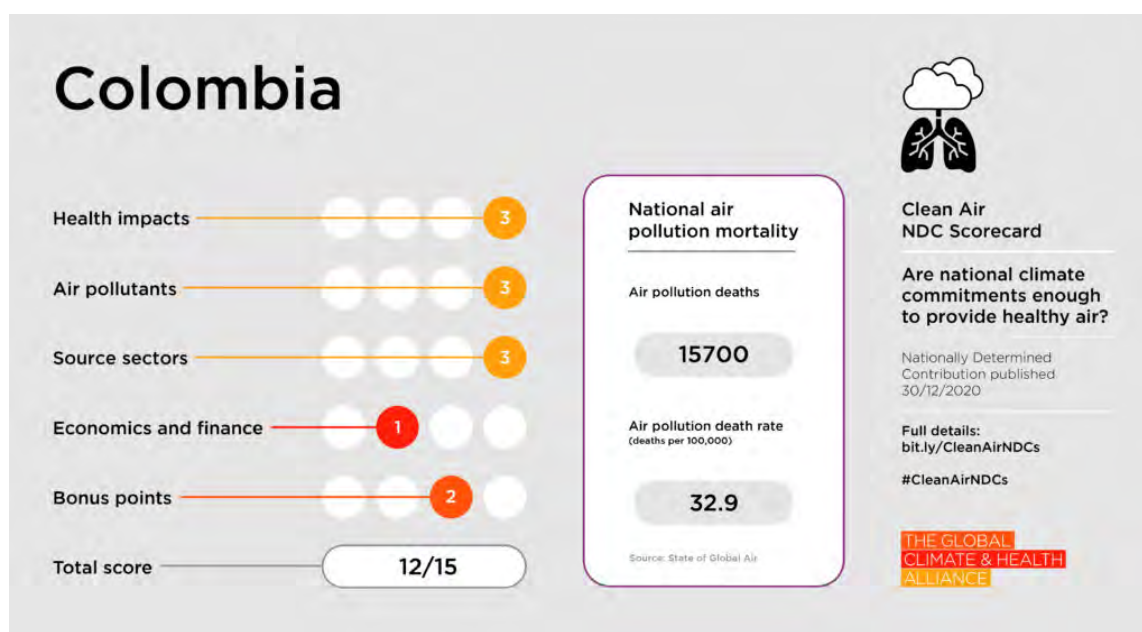
There is also an opportunity to strengthen the inclusion of air pollution into other climate policy frameworks such as National Health Adaptation Plans (NHAPs) and Long-Term Low Emission Development Strategies (LT-LEDS). This also includes ensuring NCDs are recognised as climate-sensitive health risks, as only 59% of HNAPs currently do [57]. Efforts should also be made to strengthen linkages between air pollution and health considerations within emerging Loss and Damage mechanisms under the UNFCCC.



## Colombia's nationally determined contributions

Colombia has a comprehensive NDC which recognises the importance of action to reduce air pollution and the importance of protecting health. It received a score of 12/15 on GCHA's Clean Air Scorecard (2023), the highest ranking alongside Mali. It includes reference to air pollution related inequalities and vulnerabilities and references multiple air pollutants, including a goal to reduce black carbon by 40% [56]. There are numerous benefits of integrating black carbon and other 'super pollutants' into NDCs due to their wide-reaching harms across the environment and health. Tackling black carbon emissions can have almost immediate impacts and its benefits are local, meaning action will provide tangible benefits to communities, as well as being cost-effective. As a short-lived climate pollutant, tackling black carbon can reduce global warming and help deliver on the Paris Agreement [58].

Engaging key ministers and non-government stakeholders throughout the process, including meaningful engagement with civil society and local communities, is key to building ownership and strengthening clean air action [59]. Civil society in Colombia have played a key role in putting into the country's updated NDC, as well as working collaboratively to strengthen community resilience to the impacts of the climate crisis more broadly [60].



Source: Global Climate and Health Alliance. Clean Air NDC Scorecard 2023

10 For more information on NDCs, please see <https://www.un.org/en/climatechange/all-about-ndcs>.

## CHAPTER 3

# Tackling air pollution from fuels, industrial sectors, and consumer and commercial products



Air pollution comes from diverse sources, like agriculture, waste burning, and wood-fuelled stoves, but there is no question that the biggest contributor is the burning of fossil fuels. Regulating the fossil fuel industry through bold policies is a first step that all countries need to take – now. This will require coordinated policy action, aligning fiscal measures and further regulatory action, as highlighted in the best practices below.

### 3.1 Environmental taxes

Environmental taxes, like health taxes, seek to ensure that the price of a product reflects its true cost, considering not just materials and manufacturing, but also costs to society incurred – for instance, through health harms. This helps to reduce consumption and therefore lessen health and environmental impacts.

Carbon taxes, typically implemented as excise taxes, are among the most frequently implemented environmental taxes, with 37 carbon tax programmes in place globally as of 2024 [61], in addition to other taxation approaches. For instance, Jamaica does not have a carbon tax, but as part of its Special Consumption Tax (SCT) it levies taxes on gasoline, diesel, kerosene, liquified petroleum gas (LPG) and natural gas, as well as other products including tobacco and alcohol [62]. 5% of SCT revenue from petroleum and alcohol and 20% of SCT revenue from tobacco products is earmarked to [fund Jamaica's National Health Fund Act](#) [63].

However, major gaps remain for carbon taxes. Notably, jet fuel and aviation gasoline are frequently exempt from taxation, even on short flights. This gives aviation a distinct advantage over other forms of more sustainable transport such as rail. It also disproportionately benefits high-income groups who fly more frequently, thus reinforcing income-driven inequities [64].

Beyond carbon taxes, governments can consider other fiscal policies to protect the environment, such as taxes on specific pollutants and agrochemicals, or incentivising energy efficiency of production sites and buildings. Taxes on single-use plastics are also increasingly being implemented in countries around the world. Colombia, Denmark, and Ireland all enact taxes on single-use plastic bags while countries such as Romania and Spain impose it on all single-use plastic packaging [65].

**TAXES ON SINGLE-USE PLASTICS** are also increasingly being implemented in countries around the world.



**KEY TAKEAWAY** ★

Environmental taxes, such as carbon taxes or taxes on single-use plastics or agrochemicals, can provide fiscal incentives for more sustainable, less polluting alternatives – and as a result, lower emissions.



## 3.2 Subsidy reforms on fossil fuels

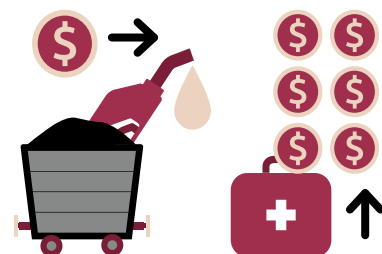
In 2022, overall subsidies on fossil fuels totalled US\$7 trillion, equivalent to 7.1% of GDP – an increase of US\$2 trillion since 2020. These are estimated to reach US\$8.2 trillion<sup>11</sup> by 2030 [66]. Implicit subsidies – the undercharging of external costs such as those to human health and the environment – account for the majority of this total [66]. However, explicit subsidies<sup>12</sup> alone, in the form of direct payments and tax breaks, reached well over US\$1 trillion in 2022. Every dollar that the G20 invests in fossil fuels causes around US\$6 in health harms alone [39].

According to the International Institute for Sustainable Development, G20 countries spend three times more on fossil fuel subsidies than renewable energy [67]. Moreover, in 2023 funding to extend to use of fossil fuels increased from US\$5.3 billion to US\$9.5 billion, totalling more than 2.5 times the amount spent on tackling ambient air pollution [68]. Removing these subsidies could prevent 1.6 million premature deaths a year and raise government revenues by US\$4.4 trillion, while also supporting the redistribution of wealth, as fuel subsidies benefit higher-income households more than lower-income ones [69].

Removing these subsidies and repurposing the funds could help fund the US\$4 trillion needed each year until 2030 to reach net-zero by 2050 [70]. In addition to this, removing fossil fuel subsidies would also generate sufficient financing to fund all SDGs in developing countries, including universal health coverage [17].

Countries have agreed to accelerate efforts to reform fossil fuel subsidies, including at COP26 and 27 [66]. At COP28, the Coalition on Phasing Out Fossil Fuel Incentives Including Subsidies was launched. The coalition, which now has 17 members<sup>13</sup>, has committed to lead by example by publishing inventories of their subsidies and removing financial incentives for fossil fuel production and consumption [71]. In April 2026, the Governments of Netherlands and Colombia co-hosted the First Conference on Transitioning Away from Fossil Fuels, including discussions on eliminating fossil fuel incentives and subsidy reform [41].

**Every dollar that the G20 invests in fossil fuels CAUSES AROUND US\$6 IN HEALTH HARMS ALONE.**



11 For comparison, in 2022 global spending on health totalled US\$9.8 trillion, or 9.9% of GDP. <https://www.who.int/teams/health-financing-and-economics/global-spending-on-health-2024>.

12 Explicit subsidies refer to when the retail price is below the fuel's supply cost while implicit subsidies refer to when the retail price does not account for external costs such as contributions to climate change, pollution and damages to health (including premature death). For more information, see <https://www.imf.org/en/topics/climate-change/energy-subsidies>.

13 Antigua and Barbuda, Austria, Belgium, Canada, Colombia, Costa Rica, Denmark, Finland, France, Ireland, Luxembourg, the Netherlands, New Zealand, Spain, Switzerland, the United Kingdom, and the Republic of the Marshall Islands.



## Subsidy reform in China and India

**Subsidy reform in China** is part of a wider move to increase the efficient use of resources and reduce air pollution to strengthen its social and economic performance. In 2016, China was one of the first countries in the G20 to participate in a voluntary peer review on fossil fuel subsidies, and compiled a roadmap and timeline for reform. As in other countries, China took advantage of low oil prices in 2014, reducing consumer subsidies (aimed at lowering prices) by more than half from US\$29 billion in 2014 to US\$13 billion in 2016. Other subsidies were also reduced, including subsidies on shale gas from CNY 0.4 per cubic metre in 2015 to CNY 0.2 in 2019. The government also created a fund of around 100 billion CNY (US\$14.5 billion) to protect vulnerable workers as a result of industrial restructuring [72] [73].



**India** has reduced subsidies across the oil and gas sector by 85% in 10 years. This included phasing out petrol and diesel subsidy reforms between 2010 and 2014. These reforms, alongside incremental tax increases, generated the fiscal space for India to strengthen electricity infrastructure and improve access and provide targeted subsidies for LPG as part of cleaner cooking alternatives under the Pradhan Mantri Ujjwala Scheme [74]. In 2024, government funding for fossil fuels was the lowest in the last five years, but still five times the size of that for clean energy. However, subsidies on clean energy are growing by 31% year-on-year, signalling government support [75].



Reforming subsidies on fossil fuels also generates fiscal space, allowing governments to increase spending on more sustainable causes and advance national social and economic priorities. For example, following subsidy reforms in Indonesia in 2014, which took advantage of the decrease in oil prices and eliminated the majority of gas and diesel subsidies by January 2015, the country saved US\$15.6 billion (IDR 211 trillion), equivalent to around 10.6% of total government expenditure. In 2015, these savings were largely reinvested to advance social welfare and infrastructure [73] [76].

Country experiences with subsidy reforms have highlighted several important lessons:

- **Develop roadmaps** to lay out strategies and actions for reforming specific subsidies, including impact analyses of the reforms [73] [66].
- **Identify windows of opportunity** which will support the reform process. For instance, several countries including India, China and Indonesia took advantage of low oil prices in 2014 to implement reforms. The lower oil prices countered the increase that resulted from subsidy removal [73].
- **Communicate reforms clearly and transparently** with consumers and key stakeholders, acknowledging any consequences such as price increases but underscoring the benefits [69].
- **Mitigate any negative effects of reform**, namely protecting vulnerable consumers and workers to avoid potential negative economic and social impacts due to price increases or job losses associated with the reform [73]. This could be through targeted cash transfers or expanding existing programmes [66].
- **Ensure accessibility and availability of electricity supply** (particularly pertinent in countries such as India where 300 million lack access to the electric grid) [73]



Fossil fuel subsidy reform is key to ensure prices reflect the true cost of fossil fuels, and ensure that public spending is used to advance population health and well-being rather than impede it. For example, through shifting spending to increase investment in clean energy (see Chapter 4.1).



### 3.3 Further regulation on fossil fuels

Beyond fiscal measures like taxation and subsidy removal, fossil fuels can be further regulated to tackle air pollution, for instance through marketing restrictions and warning labels.

#### Marketing restrictions

Restrictions on marketing have proven to be effective in reducing the consumption and harms of fossil fuels as well as major NCD risk factors, including tobacco, alcohol, and unhealthy foods. Industries use marketing not only to promote the sale and use of these health-harming products, but also to normalise them, improve corporate brands and reputational images, and deflect attention away from their role in driving health, social and environmental harms [77].

In June 2024 on World Environment Day, UN Secretary General António Guterres, called for bans on fossil fuel advertising, as with tobacco advertising, based on its threat to health [78]. The IPCC, UNEP, Cambridge Sustainability Commission on Scaling Behaviour Change and the Potsdam Institute have also highlighted the role of advertising bans to reduce emissions [79]. Advertising shapes narratives and consumer behaviour, resulting in this case in higher levels of carbon-intensive consumption. In the UK in 2022, advertising was estimated to raise an individual's average annual carbon emissions by 32% as a result of increased consumption that wouldn't have otherwise occurred [80].

One of the most common forms of fossil fuel advertising takes the form of “greenwashing”, where companies seek to create an image or perception of being “green” in order to mask the true harms that are associated with their products or activities. Analysis by Greenpeace found major discrepancies between fossil fuel company adverts for “green” energy and the representation of these in their portfolio [81]. Since 2024, there has been a notable shift away from greenwashing, instead positioning fossil fuels as essential for energy security [82]. Companies also use marketing initiatives to shift blame onto the consumer, with the concept of the “carbon footprint” devised by an advertising firm for BP to shift fault away from the industry and onto individuals [83]. Marketing can also be used to deter additional regulation. An analysis of five major US oil and gas companies’ advertising expenditure between 1986 and 2015 revealed that corporate promotional spending was most influenced by media coverage and congressional attention to climate crisis issues, with an average spend of US\$120 million per year to improve their reputation and legitimacy, and by doing so decrease the chances of additional regulations [84].

Advertising bans on fossil fuels and highly polluting products are increasingly being implemented across the world. In 2026, Amsterdam became the first capital city to legally ban fossil fuel and meat advertisements, aligning its climate and sustainable food goals [85]. In the UK, several city councils have implemented advertising bans prohibiting advertising and sponsorship of high-carbon products across council assets, with Edinburgh in May 2024 implementing restrictions across fossil fuel companies, airlines, airports, and fossil fuel powered cars [86].

**RESTRICTIONS ON MARKETING have proven to be effective in REDUCING THE CONSUMPTION and harms of fossil fuels as well as other major NCD risk factors.**





## The Hague bans fossil fuel advertising by law

In 2024, the Hague banned advertising for fossil fuels, cruise ships, fossil-fuelled cars and aviation across the city through a local ordinance. Unlike other advertising bans, the Hague's ban applies to all ad sites rather than public/council owned sites only, and is a law rather than a policy. The ban faced legal challenges, led by ANVR (a Dutch association of travel companies) and TUI (a travel company) with the Hague defending the ban with the support of Reclame Fossilvrij and Advocates for the Future [87].

In April 2025, the District Court ruled in favour of the municipality based on several key principles including that freedom of expression does not apply to commercial advertising under the Dutch constitution and the ban serves a legitimate aim and is proportionate, with public interests outweighing the financial interests of companies. The Court also ruled that it complies with the general principles of good governance, stating "The Municipality is under no obligation to refrain from measures that promote public health in order to support the future (financial) position of travel operators" [88]. In 2025, the Hague won the European Star Award as a result of the advertising ban [89].

## Warning labels

As with other unhealthy products, warning labels can serve an important role to inform about health impacts and draw attention to the true costs of fossil fuels. In 2021, Sweden was the first country to mandate fuel retailers to display "eco-labels" at the pumps, with labels providing information on climate intensity of the fuel, and the fuel's share of renewable and fossil fuel energy, as well as additional information about the retailer. Cambridge, Massachusetts was the first city in the US to implement mandatory yellow stickers on fuel pumps warning about the health and environmental impact of fossil fuels [90] [91].

The case has also been made for mandatory warnings on cooking stoves that emit high levels of air pollution. This includes gas stoves, which were estimated to cause almost 13 percent of childhood asthma cases in a 2022 study [92]. In 2025, manufacturers of gas stoves sued the State of Colorado to prevent its law requiring natural gas stoves to carry health warning labels, claiming insufficient evidence of negative health outcomes from gas stoves. Yet several of the manufacturers had included such information on their own website in the past to promote the advantages of electric and induction over gas stoves [93] [94]. In the UK, the stove industry has lobbied against public health campaigns warning about the health risks associated with wood burning stoves [95].

Advocacy for labelling should take into the account the respective needs of countries. This should include focusing initially on high-income countries that have contributed disproportionately to emissions from fossil fuels, and on major sources of greenhouse gas emissions in emerging economies. In LMICs, the focus should be on recognising the potential use of gas in the context of household energy to minimise health harms in the transition away from solid fuel, until zero-carbon alternatives are affordable and accessible [90].

**GAS STOVES  
WERE ESTIMATED TO  
CAUSE ALMOST  
13% OF CHILDHOOD  
ASTHMA CASES  
according to a  
2022 study.**



**KEY  
TAKEAWAY**

As with other unhealthy products, measures for regulating fossil fuels include comprehensive bans on advertising, promotion and sponsorship and warning labels. Such measures are necessary to ensure the public are aware of the true health risks of fossil fuels and can make informed decisions.

### 3.4 Restrictions on emissions from industrial facilities

More than 40% of the health impacts from PM<sub>2.5</sub> are estimated to come from air pollution from industrial and energy sources [96]. Emission performance standards are one of the most common approaches to addressing industrial point source emissions. In a survey conducted by UNEP, 85% of countries reported national emission performance standards in place for the industrial sector. However, the International Energy Agency (IEA) found that mandatory energy efficiency targets and standards policies covered less than 50% of total industrial energy use in most regions [46].

Restrictions on emissions from industrial facilities, rather than simply relocating them away from urban centres, is essential to protect population health and ensure environmental justice. Relocation doesn't reduce overall pollution, it just redistributes it, often to lower-income, disadvantaged and rural areas. Research indicates in countries such as the US that polluting facilities are more likely to relocate into communities with lower population density, income and educational attainment, and after relocating, grow faster and emit more pollution [97].

Alongside mandatory efficiency goals, countries are also increasingly implementing policy incentives for cleaner energy production and energy efficiency. For example, in 2014, Chile passed a law assessing taxes based on the emissions from industrial sources, with those emitting over the threshold of 100 tonnes of PM and 25,000 tonnes of CO<sub>2</sub> subject to tax [46].

More than  
**40%** of the health  
impacts from PM<sub>2.5</sub> are  
estimated to come from  
**AIR POLLUTION FROM  
INDUSTRIAL AND ENERGY  
SOURCES.**

#### COUNTRY CASE



#### China's industrial emission standards

China strengthened its industrial emission standards as one of ten measures contained in its Air Pollution Prevention and Control Action Plan (Action Plan) in 2013. The Action Plan included speeding up the revision of emission standards in key industries. China set emission standards across the following:

- **Volatile Organic Compounds (VOC):** the monitoring of VOC emissions from industrial enterprises across 78 cities by local environmental departments
- **Iron pollution standards:** Ultra-low emission standards set at 10 mg/m<sup>3</sup> for PM<sub>10</sub>, 35 mg/m<sup>3</sup> for SO<sub>2</sub>, and 50 mg/m<sup>3</sup> for NO<sub>x</sub>.
- **Power plant pollution standards:** Ultra-low emission standards not exceeding 0 mg/m for soot, 35 mg/m<sup>3</sup> for SO<sub>2</sub> and 50 mg/m<sup>3</sup> for NO<sub>x</sub>.

These standards are associated with a significant reduction in emissions of PM<sub>2.5</sub> by 07-6.5%, PM<sub>10</sub> by 1.6-2.1%, SO<sub>2</sub> by 3.3-25.2% and NO<sub>2</sub> by 2.4-5% [98].

#### KEY TAKEAWAY

Industrial facilities represent a significant source of health impacts from PM<sub>2.5</sub>. Restrictions on emissions, rather than relocation of facilities which merely redistributes harms, are crucial to protect populations, particularly the most vulnerable.

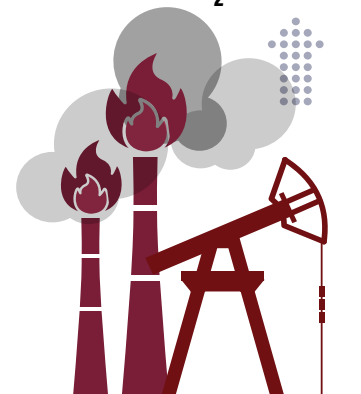
### 3.5 Elimination of gas flaring

Gas flaring refers to the practice of burning off gas when drilling for oil. According to the World Bank, there are around 10,000 gas flares alight at any one time, and the amount burnt off through gas flaring in 2022 could have powered all of East, West, Central and Southern Africa. Gas flaring can be a safety measure to reduce the pressure to avoid explosions. However, companies also do it to avoid spending money to collect and transport gas, particularly when drilling in more remote locations, known as “routine flaring” [99]. In 2021, gas flaring emitted more than 400 million tonnes of CO<sub>2</sub>. It also produces black carbon, which is associated with health harms and global warming [99]. In 2018, gas flaring cost the global economy an estimated US\$20 billion [100].

In recognition of its negative impacts, in 2015 the World Bank’s Zero Routine Flaring by 2030 (ZRF) initiative was launched. It commits countries and oil companies to halt routine gas flaring in new oil developments and end existing routine flaring as soon as possible, completely ending it by 2030 [101]. The EU has banned routine gas flaring since February 2026; however, investigations by Greenpeace have revealed persistent flaring since the ban came into effect, indicating issues with compliance and enforcement [102].

Gas flaring presents particular challenges in Nigeria, costing the national economy an estimated US\$761.6 million (N233 billion), accounting for almost 4% of the total global costs of the practice. Despite implementing a range of policies aimed at reducing gas flaring in the country, including the Nigeria Gas Flare Commercialization Programme in 2017, Nigeria has faced a number of challenges in regulating and reducing the practice [100]. In 2021, Nigeria passed the Petroleum Industry Act to overhaul its regulations, but persistent challenges, including enforcement challenges, insufficient infrastructure capacity and lack of sustained political commitment, have remained [103].

**In 2021,  
GAS FLARING  
emitted more than  
400 MILLION  
TONNES OF CO<sub>2</sub>**



**KEY  
TAKEAWAY**

**Governments must act to implement and enforce bans on routine gas flaring to avoid the unnecessary wasting of energy and prevent additional health and environmental harms.**

### 3.6 Sustainable practices in the agriculture sector

Agriculture is another major source of air pollution, though its contributions are under-recognised and its detrimental health effects are underreported [104]. Air pollution from agriculture often comes from the burning of agricultural fields, ammonia emissions from heavy fertilizer use, and from livestock and degradation of manure [46]. Crop burning<sup>14</sup> is often seen as temporary harm due to its seasonality and therefore can sometimes be perceived as more “acceptable” despite its repercussions. But emissions are not just localised and can reach neighbouring and even transboundary areas, particularly pollutants from burning of crop residues [104]. There is also a bidirectional relationship, with agriculture-related air pollution having a negative impact on agriculture itself. Air pollution negatively impacts livestock health and welfare and is associated with reduced crop yields [104].

14 For reference, see [AQMx sectoral guidance](#) on alternatives to crop residue burning.

As of 2020, 58 countries reported incentives to promote sustainable agricultural practices. Among these countries, nearly one quarter reported alternatives to open burning of waste, and one quarter reported closed storage and improved livestock manure management. However, they fail to address ammonia emissions from heavy use of fertilizer, with many governments continuing to provide subsidies for fertilizer [46].

China has removed fertilizer manufacturing subsidies while introducing subsidies and support programmes for farmers for new technologies and training, which led to fertilizer use declining after 2015. These policies are thought to have had a significant impact on the reduction of fertilizer, while the removal of subsidies is estimated to have reduced greenhouse gas emissions by 3.88 million metric tonnes in the country, with a minimal impact on food production [105] [106] [107] [108].

### Less pollution from healthier food systems

The current food system is unsustainable both for public and planetary health. The entire global cycle of the world's food system is estimated to account for 58% of anthropogenic global emissions of PM<sub>2.5</sub>, as well as 72% of ammonia, 13% of nitrogen oxides and 9% of sulphur dioxide.

At the same time, food systems are linked to at least four of the top ten health risks: air pollution, dietary health risks, high body mass index and malnutrition [104]. Transitioning to more sustainable agricultural practices including promoting, adopting and producing healthier food which is aligned with dietary guidelines can reduce these risks while also reducing the environmental impact of the food system. This includes reducing intensive animal farming, as meat and dairy are estimated to account for around 15% of total greenhouse gas emissions [109].

The Planetary Health Diet, as recommended by the EAT-Lancet Commission on healthy, sustainable and just food systems, is largely plant-based, with moderate amounts of animal-sourced foods and limited consumption of added sugar, saturated fats and salts. Shifting to this diet could avert an estimated 15 million deaths worldwide, and a 15% reduction in agricultural emissions [110]. Notably this would require a food systems transformation with significant implications on what, where and how food is produced. For many people, the diet is currently unaffordable and would require some combination of higher incomes, lower prices and nutritional assistance to make it achievable [111].





## Environmental Pollution Programme in Vietnam

During its first phase (2022-2024), the Environmental Pollution Programme in Vietnam (EPP-VN), led by the Global Alliance on Health and Pollution (GAHP), focused on two major challenges: the open burning of agricultural residues and excessive use of pesticides. GAHP and partners trained more than 12,500 farmers across the country, also creating demonstration farms to showcase alternative sustainable practices. In two years, there was an 80% reduction in insecticide use on tea farms and an improvement in yields.

During Phase 2 (2025-2026), the Integrated Pest Management (IPM) model was expanded to reach more than 11,000 tea, coffee and pepper farmers. It included training modules on social inclusion and gender equality to empower women and youth to participate in agricultural decision making. GAHP, in collaboration with the Vietnam Association for Conservation of Nature and Environment, is also supporting the adoption of sustainable alternatives for reducing agricultural open burning, such as microbial decomposition of rice straw and production of bio-pellets [112].



### KEY TAKEAWAY

More sustainable agricultural practices such as the reduced use of excess fertilizer and crop burning, and shifting food systems to align with dietary guidelines, can provide a win-win, reducing emissions while also increasing accessibility and availability of healthy, high-quality foods.

### 3.7 Indoor smoking bans

The tobacco control response can provide important lessons in regulating health-harming products such as fossil fuels. The WHO Framework Convention on Tobacco Control (WHO FCTC) was adopted in 2003 and entered into force in 2005, with 183 Parties to the Convention covering more than 90% of the world's population [113]. Despite progress, tobacco still causes seven million deaths each year, and an estimated 1.6 million occur among non-smokers who are exposed to second-hand smoke. There is no safe level of exposure to second-hand smoke and yet, despite documented evidence of its harms, almost two-thirds of the global population still live in countries which are not protected by comprehensive smoke-free legislation [114].

USEFUL RESOURCE



In line with WHO FCTC Article 8 and its Guidelines for Implementation, smoking bans enforced as 100% smoke-free environments are the only way to protect populations from exposure to second-hand smoke and its health impacts.<sup>15</sup> These bans are also recommended as a measure to act on air pollution as part of [WHO's Compendium of WHO and other UN guidance on health and environment](#).

The health impacts of smoke-free legislation are well-documented. An analysis of transportation and hospitality venues found that overall PM<sub>2.5</sub> levels were 7.5 times higher in countries without comprehensive smoke-free policies, compared to countries enforcing 100% smoke-free environments such as Uruguay, New Zealand and Ireland [115]. England introduced smoke-free legislation in July 2007 banning smoking in almost all enclosed public spaces. There were 1,200 fewer hospital admissions for heart attacks in the first year after the legislation, estimated to have saved the National Health System over US\$11 million (£8.4 million) [116]. Smoking bans also reduce tobacco consumption and smoking prevalence and increase quit attempts and cessation [117]. This can deliver additional co-benefits for tackling NCDs, especially when combined with other tobacco control measures.

Smoke-free legislation should be enacted as part of a comprehensive tobacco control response alongside comprehensive restrictions on advertising, promotion and sponsorship; mandatory health warnings; raising taxes; and mass media campaigns to warn about the health risks of tobacco, in line with the WHO FCTC.



15 Article 8 requires this for indoor workplaces, indoor public places, public transport and "as appropriate" in "other public places", also stating that it should also apply for enclosed workplaces such as motor vehicles that are places of work, such as ambulances or taxis. To drive compliance, governments should also raise public awareness about the risks of second-hand smoke, impose legal responsibilities for compliance on both establishments and individual smokers including penalties in the case of violations and enforcement measures, and develop monitoring and evaluation of measures.



## Uruguay's national smoke-free legislation

Uruguay became the first 100% smoke-free country in the Americas in 2006, after having one of the highest levels of second-hand smoke in the region [118]. In 2004, Uruguay ratified the WHO FCTC and a subsequent presidential decree mandated all health establishments to be 100% smoke-free. In 2005, smoke-free legislation was expanded across public and private workplaces and indoor public places, with penalties for violations, alongside the creation of a tobacco control programme and broader tobacco control measures [118]. Uruguay is now considered to have “best practice in place” by the WHO report on the global tobacco epidemic 2025 [119], with an overall compliance score of 10/10 [120]. Strong leadership and advocacy from civil society was a key contributing factor to Uruguay's comprehensive approach to tackling second-hand smoke in the country [120].

Uruguay's smoke-free legislation resulted in public health gains, with 15% fewer non-hospital emergency visits, a decrease in the need for treatment for bronchospasms [121] and a 22% reduction in hospital admissions for acute myocardial infarction [122].

### KEY TAKEAWAY

Smoke-free bans and wider tobacco control efforts are a key contributor to improving indoor air quality. Moreover, lessons learnt from tobacco control can inform approaches to regulating fossil fuels, including the need for a package of comprehensive measures to optimise impact (e.g., fiscal, marketing and labelling measures as well as awareness campaigns).



## CHAPTER 4

# Promoting cleaner energy solutions



Household energy is a significant contributor to pollution, accounting for approximately half of total black carbon emissions. This is largely from the use of polluting devices and fuels such as charcoal, coal, biomass<sup>16</sup> or kerosene for cooking, heating and lighting. The use of these devices and fuels significantly increases household air pollution [21], while also significantly contributing to ambient air pollution. The use of these fuels is associated with broader risks such as burns from kerosene, while fetching wood increases the risk of being exposed to violence and reduces the time available for education or income-generating activities [123].

Household air pollution also disproportionately impacts women, who spent more time indoors doing cooking and have caregiving responsibilities for children, who are also more physically vulnerable to the impacts of air pollution. The IEA estimates that women and children account for 60% of early deaths from household air pollution [124]. The burden of collecting fuel also disproportionately falls on women and children, taking up to 20 hours a week [125].

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16 Such as wood, charcoal and dung

While there has been substantial progress in reducing the burden of household air pollution, this progress has been uneven. Total deaths from household air pollution fell by 23.8% over the last decade, but this was mainly driven by decreases in South and East Asia and the Pacific, while across sub-Saharan Africa it declined by just 12.6% [46].

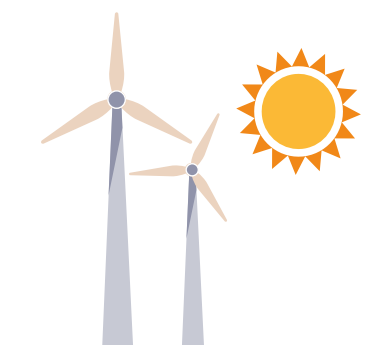
Since 2010, deaths from ambient air pollution from fossil fuels have dropped by 160,000 each year, mainly as a result of coal-phase out (predominantly in high-income countries), showing the public health benefits [126]. Alongside delivering substantial health benefits, incentivising energy efficiency and moving away from fossil fuels helps provide energy security, macroeconomic stability, reduce cost-of-living crises, and increase local and regional employment in energy generation.

## 4.1 Fiscal incentives on renewable energy

Despite the significant health and environmental harms, governments continue to invest more in fossil fuel subsidies than renewable energy. Shifting investment from fossil fuels to provide fiscal incentives for clean energy could help avert the health and economic damages caused by fossil fuels while also helping reach the estimated US\$4 trillion is needed each year until 2030 to reach net-zero by 2050 [127]. While there has been an increase of cleaner energy, more is needed.

Increasing the clean energy contribution to the electricity grid is particularly crucial, as fossil fuels still contribute 60% of electricity generation globally [128]. Fiscal policy incentives such as subsidies for renewable energy can support this, both to encourage investment and increase its use and uptake.

**INCREASING THE CLEAN ENERGY contribution to the electricity grid is particularly crucial, as FOSSIL FUELS STILL CONTRIBUTE 60% OF ELECTRICITY GENERATION GLOBALLY.**



### COUNTRY CASE



#### Uruguay's transition to renewable energy

With more than 90% of its electricity coming from green sources, Uruguay is considered a leader in renewable energy after almost eliminating fossil fuels from its electricity grid [129]. Driven by high-costs and reliability issues, in 2008 Uruguay launched its Energy Policy 2005-2030 which outlined its aims to diversify its energy sources including incorporating renewable energy. As part of the transition, the Government eliminated subsidies for fossil fuels and introduced long-term contracts for renewable projects [130]. The Government also provides a number of fiscal incentives including income tax reductions for renewable energy generation and service producers manufacturing equipment under Decree 354/009, and VAT exemptions for equipment for wind power and solar water heating [131].

The Government engaged early with labour groups from fossil fuel powered energy plants and provided training to workers to develop new skills for the transition, including building and operating for renewables. The transition has seen the creation of an estimated 50,000 jobs [132].

In its Vision 2035, Djibouti has committed to the goal of producing 100% of electricity from renewables by 2035. As well as increasing imports from Ethiopia, one of the biggest producers of renewable energy in the region, Djibouti is expanding its own renewable energy after building its first wind farm in 2023 [133].

### KEY TAKEAWAY

Shifting fiscal incentives from fossil fuels to renewable energy is feasible, helps avert fossil fuel-attributable health and economic damages and promotes fiscal policy coherence. Globally, it would provide the funding needed to reach net-zero by 2050.

## 4.2 Transitioning from coal boilers to cleaner energy sources

Countries are increasingly looking to transition away from residential use of coal and other fossil fuels as part of their net zero plans. According to the IEA, reaching net zero requires the global introduction of bans on fossil fuel boilers from 2025 [127]. This is already underway in some countries. Under EU law, Member States have not been able to subsidise or incentivise fossil fuel boilers and must prepare for a complete phase out by 2040. A number of countries have already announced bans including Austria, France, the Netherlands and Norway [134].

COUNTRY CASE



### Transitioning from coal: subnational examples

#### Krakow, Poland

In 2023, Polish Smog Alert was a finalist in the Earthshot Prize as “one of the world’s most effective clean air campaign groups” for their success in securing legislative change, including Krakow’s ban on the use of wood and coal in household boilers [135]. In 2016, Krakow was the first city in the country to introduce a ban on solid fuel heating in domestic boilers, which came into force in 2019 [136]. To support the transition, authorities established a programme to replace coal boilers with funding support from the LIFE Programme and the National Fund for Environmental Protection. Additional measures were also undertaken as part of the LIFE programme, including awareness-raising campaigns and monitoring air quality in the region [137].

The success of Krakow’s ban on coal household boilers also led to national change, with around 20 cities and towns voting in bans including Warsaw. In 2017-2018 the government introduced emission standards for solid fuel boilers which prevented the sale of the most polluting coal boilers and also introduced quality standards for coal. Anti-smog resolutions have also been passed by 14 out of 16 authorities, covering almost 90% of the country, resulting in around 1.5 million households transitioning from coal heating in recent years. This has resulted in a 20% reduction in premature deaths, saving an estimated 10,000 lives each year from improved air quality [136].

#### Beijing, China

With a plan to reach net zero by 2060, China has begun shifting towards more sustainable energy sources nationally. At the city level, Beijing has substantially reduced its coal use, cutting air pollution and reducing its carbon emissions [138]. The Beijing Clean Air Action Plan 2013-2017 was developed which included implementation of a residential coal ban, alongside other measures to reduce PM<sub>2.5</sub> to protect public health [139]. In 2015, at the national level, the Government also launched a Clean Heating Policy to reduce air pollution from coal stoves and boilers, providing subsidies for clean electric or gas-powered heating [140]. From 2013-2022 in Beijing, all urban areas and more than one million rural households transitioned away from coal to electric or gas for residential heating. The ban on residential coal is associated with cardiovascular health benefits (including 6.6% reduction in acute myocardial infarction) and is estimated to avert around 1,900 premature deaths each year in Beijing alone [140].

More recently, subsidies have sharply been cut, which has led to concerns about affordability particularly among rural residents after rapidly increasing natural gas prices, with many having to either violate the ban and burn firewood or reduce expenses in other essential areas [141]. Ensuring the sustainability of interventions is essential, as well as ensuring vulnerable populations including those living in rural and low-income areas are provided with the necessary support.

KEY  
TAKEAWAY

Transitioning from coal boilers is a crucial part of countries meeting their net zero goals. The health benefits of this transition are well-documented at the country and international level, while the move away from fossil fuels can also bring additional benefits such as providing energy security.

## 4.3 Expanding access to clean cooking

Around one-third of the global population, almost 2.6 billion people, are exposed to pollution from cooking at home with solid fuels. This is a major contributor of household air pollution, which increases the risk of several NCDs including lung cancer, stroke, cardiovascular disease, dementia, lower respiratory infections and cataracts [1]. Globally, there has been substantial progress in increasing access to cleaner, less polluting solutions – with two-thirds of the global population primarily using clean fuels and technologies for cooking in 2021, compared to just half in 2000 [21]. But this progress has been unevenly distributed – 19 of the top 20 countries with the highest exposure to household air pollution are in Africa [1].

Interventions to minimise these burdens vary from improved solid fuel cookstoves to replacing them with clean fuels. While electric stoves are the cleanest option for health, this requires a stable and affordable electricity supply with the supply source needing to also be clean for it to truly benefit both climate and the environment. As such, WHO Guidelines recommend that countries “prioritize increasing access to clean technologies, and promote the highest performing transitional technologies” where cleaner options are not yet accessible [142].

Systematic reviews of improved stove interventions have demonstrated their effectiveness in reducing household air pollution [143]. However, the adoption of clean cook stove interventions remains challenging. Interventions must be tailored to the needs and preferences of households, and highlight the benefits to encourage uptake [143]. Ongoing e-cooking projects in schools in Kenya, Tanzania and Uganda also show the potential of clean cooking interventions to improve air quality in schools (see Chapter 2.2) while also benefiting school budgets due to the high costs of fuel for cooking, with schools in Kenya paying up to US\$20,000 on firewood [144].

Around one-third of the global population, almost

**2.6 BILLION PEOPLE, ARE EXPOSED TO POLLUTION FROM COOKING AT HOME WITH SOLID FUELS.**



### Ecuador's Efficient Cooking Program

Ecuador began transitioning away from solid fuel cooking with nationwide subsidy programmes in the 1970's, resulting in the widespread adoption of LPG as the primary cooking fuel in the country. As of 2025, more than 95% of the country cooked with LPG and approximately 90% of the market cost of LPG cylinder refills was covered by the government. The transition to LPG in Ecuador was associated with significant health benefits – including a reduction in mortality among under-fives from lower respiratory infection.

Ecuador is now focusing on shifting its use of LPG to renewable energy sources, including hydroelectricity to reduce greenhouse gases and reduce its dependency on imported LPG, which costs the government around US\$700 million each year. As part of its Efficient Cooking Program, Ecuador is aiming to replace three million LPG cookstoves with induction cooktops, while investing in changing the national energy matrix and, in the long term, removing the LPG subsidy [1] [145] [146].

COUNTRY CASE



KEY TAKEAWAY

Developing national roadmaps to transition to universal access to clean cooking with a tailored approach and in line with WHO guidelines is essential to ensure a just energy transition in households. [WHO's Technical Brief on household air pollution and related health impacts](#) provides useful recommendations for governments and the research and health communities to tackle the burden of household air pollution. [Further guidance on expanding access to e-cooking is available from AQMx.](#)

## 4.4 Energy efficiency construction requirements

As part of the roadmap to a low-carbon and resilient future, UNEP estimates that the building sector has the potential to reduce emissions by 3.2 GtCO<sub>2</sub>e (billion tonnes of carbon dioxide equivalent), including indirect emissions (from electricity and heat). This requires an integrated approach considering both adaptation and mitigation in the sector. To achieve this, governments are recommended to implement regulations and incentives to encourage the construction of buildings with a zero-carbon footprint that are climate resilient [147].

In 2017, the UN Economic and Social Council Joint Task Force on Energy Efficiency Standards in Buildings developed Framework Guidelines, recognising the role of buildings in improving sustainability. The Guidelines set out principles for strategy, design, construction and management of buildings, with a goal to transform buildings to “align with the highest standards of health, comfort, well-being and sustainability, including improving energy productivity and reducing CO<sub>2</sub> emissions” while reducing building energy requirements to a level that can be largely, or even exclusively, supplied by non-carbon-based energy [148].

Globally, there has been recent progress as countries are increasingly implementing energy efficiency requirements for both new and existing buildings. In 2022, China required all new, expanded and renovated buildings to be designed for energy efficiency, while Japan revised its building regulations to require zero-energy performance for all new buildings by 2030, extending it to existing buildings by 2050 [149]. The UK recently announced that all new homes in England will be required to install solar panels and heat pumps as part of updated planning requirements [150]. Efforts are also underway at the regional level, including the EU’s Energy Performance of Buildings Directive (EPBD) which includes decarbonisation as one of four key pillars, making zero-emission buildings the new standard, and ensuring all new buildings are solar-ready [151]. Despite progress, global energy consumption across the building sector, including fossil fuel use in finished buildings, continues to rise. In order to reach net-zero, energy consumption in buildings would need to drop by around 25% and use of fossil fuels by 40% by 2030 [149].

Fiscal incentives such as grants, tax incentives, or providing access to capital can also encourage improved energy efficiency. For example, the German state bank KfW provides long-term low interest loans and grants to support work improving energy efficiency. This covers both refurbishing existing buildings and encouraging higher efficiency standards than the minimum legal requirement in new buildings. The programme supported around half of new build homes in 2011, and estimates that installations from 2006 to 2012 alone result in savings of 5.7 MtCO<sub>2</sub>e (million tonnes of carbon dioxide equivalent) per annum [152].

Globally, there has been recent progress as **COUNTRIES ARE INCREASINGLY IMPLEMENTING ENERGY EFFICIENCY REQUIREMENTS** for both new and existing buildings.



Net Zero requires a reduction of energy consumption in buildings by 25% and use of fossil fuels by 40% by 2030. Implementing energy efficiency requirements that consider both mitigation and adaption, and providing fiscal incentives to encourage further improved energy efficiency, can support countries in meeting these goals.



## CHAPTER 5

# Promoting active mobility and clean transportation



Around one-fifth of particulate matter emissions come from the transport sector, as well as around 15% of greenhouse gas emissions and 23% of energy-related CO<sub>2</sub> emissions. Promoting cleaner transport methods and more active mobility can reduce these emissions while also delivering co-benefits for health [153].

Urbanisation has led to higher personal vehicle use, contributing to rising emissions and at the same time causing lower physical activity levels. People who drive to work, rather than use public transport or more active forms of travel such as walking or cycling, are less likely to meet recommended activity levels. The increase of traffic has also reduced physical activity among children, who are less likely to play outside. In Germany, 18% of children who live in areas with heavy traffic play outdoors, compared to 79% of children living in streets with traffic calming measures [154]. The use of urban planning can support more active forms of travel and reduce the demand for motorised transport.

USEFUL RESOURCE 

For more information, see [WHO's Land use planning – sectoral solutions for air pollution and health: technical brief](#).

Physical activity is associated with a range of physical and mental health benefits, including contributing to the prevention and management of NCDs. Physical inactivity is associated with between 20-30% higher risk of death compared to those who are sufficiently active. Yet 31% of adults and 80% of adolescents do not meet WHO recommendations for physical activity levels. This is estimated to cost public healthcare systems around US\$300 billion between 2020-2030 if current trends continue [155].

Investing in active mobility can help increase physical activity levels while simultaneously reducing air pollution. Walking and cycling could reduce greenhouse gas emissions from urban transport by an estimated 2-10%, while as little as a brisk 11 minute walk every day is estimated to reduce the risk of early death by 23% [156].

At the same time, improving air quality is essential to ensure that polluted air does not act as a barrier for physical activity, particularly among people who are living with NCDs that may be exacerbated by poor air quality.

## 5.1 Limits on transport emissions

Reducing transport emissions are essential for countries to tackle air pollution, especially in urban areas. 71 countries now have vehicle emission standards in place equivalent to Euro 4/IV<sup>17</sup> or higher, with an additional 29 countries having standards but not yet up to Euro 4/IV, and 80 countries with no standards, leaving significant room for progress [46].

The potential health impacts of reducing transport emissions are well-documented. Japan has been implementing limits on emissions dating back to the 1990's with restrictions on emissions from commercial cargo vehicles and diesel passenger cars through the Nox and PM Law, which was amended in 2001 and 2007 to tighten requirements [157]. The law led to air pollution decreases of 2-2.5x for NO<sub>2</sub> and Suspended Particulate Matter (SPM), resulting in a reduction in asthma prevalence [158]. While in the US, a voluntary retrofit initiative for clean air technology on school buses found it reduced particle concentration by between 10-50%, decreased the prevalence of bronchitis, asthma and pneumonia, and improved absenteeism rates [159].

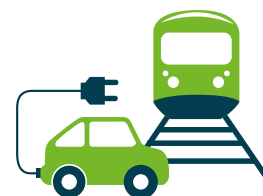
## 5.2 Low-emission zones and limits on old vehicles

Low-emission zones (LEZ) refer to areas with regulations on the most polluting vehicles, typically by restricting the areas which they can enter or charging them a fee to do so as a disincentive. Low-emission zones are widespread, particularly in Europe, with the number of active LEZ reaching 320 in 2022. While low-emission zones share the same aim, measures often differ based on emission limits, vehicle types, exemptions, enforcement and area limits. For instance, emission zones can vary from a 'low-emission zone' which generally restricts vehicles such as diesel cars and vans based on emission standards, to a 'zero-emission zone' where typically only electric vehicles are permitted. While the number of low-emission zones is growing rapidly, an increasing number of cities are also on course to implement zero emission zones, including Brussels, Madrid and Paris [160].

Vulnerable and marginalised groups face a disproportionate impact of air pollution, yet often contribute the least. It's essential therefore that clean air policies such as limits on old vehicles do not inadvertently exacerbate inequalities further and meet the needs of these groups. Clean Cities analysed best practices for ensuring a fair and just transition within urban transport policies and identified the following as particularly effective: scrappage schemes, reduced costs for bicycle purchase, public transport, shared mobility hubs and social leasing of electric vehicles [161].

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**REDUCING TRANSPORT EMISSIONS is essential for countries to tackle air pollution, especially in urban areas.**



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17 Under EURO 4 or EURO IV standards, diesel cars must emit no more than 0.25g/km of NO<sub>x</sub> and 0.025g/km of PM, and petrol cars no more than 0.08g/km of NO<sub>x</sub>. For more information on these standards, please see <https://www.rac.co.uk/drive/advice/emissions/euro-emissions-standards/>.



## London's LEZ to Ultra-Low Emission Zone (ULEZ)

In 2008, London introduced a Low Emission Zone (LEZ) targeting PM<sub>10</sub>, and expanded its scope in 2012. In 2019, it introduced the Ultra-low Emission Zone (ULEZ), targeting NO<sub>2</sub> and PM<sub>2.5</sub>, which was expanded to inner London in 2021 and applied to all of Greater London in 2023 [162]. ULEZ has led to substantial improvements in air quality in London. From 2019 to 2024, it is estimated NOX emissions are 24% lower, PM<sub>2.5</sub> exhaust emissions 29% lower, and CO<sub>2</sub> emissions 2% lower [163]. Among some of the most deprived communities, there has been an estimated 80% reduction in people exposed to air pollution breaching legal limits [163]. ULEZ is largely credited for London meeting the legal limits for NO<sub>2</sub> pollution almost 200 years earlier than what was predicted in 2019 [164]. ULEZ has not negatively impacted footfall or spending on leisure or retail in London, with visitor footfall increasing by 2% in the year following its expansion [164].

The measure has also had additional benefits, increasing active transport particularly for children living further away. A study of the effects of ULEZ found that 42% of children changed to a form of active travel, compared to 20% of those living in Luton, a nearby city outside of the ULEZ [165].

### Lessons learned [162]:

- **Build and maintain a popular mandate:** London Mayor Sadiq Khan was elected in 2016, with a promise to introduce ULEZ. In 2024, Khan was re-elected nine months after the scheme was expanded to include all of greater London, with ULEZ a key battle ground issue for the election.
- **Ensure evidence-based decision-making:** London has monitored and publicly shared air pollution data since 2006, which has helped build the evidence base and enabled the communication of air quality improvements to residents. An early study of policy options, including an impact assessment on individuals and businesses, also helped guide decisions.
- **Use of vehicle scrappage schemes to drive public support while minimising waste:** Scrappage schemes (initially open to small businesses, charities, and people on low-income and disability benefits) were crucial in securing public support.
- **Build a powerful coalition of supporters:** Working with a range of local groups and health professionals to build a strong coalition of advocates has increased the likelihood of people hearing positive messages on ULEZ from trusted sources.
- **Ringfence and invest revenue in improving transport:** Re-investing revenue from the scheme is a legal requirement. This has improved public acceptance and helped fund transport improvements.
- **Ensure sustainable alternatives:** London has had a strong public transport system since its first introduction of the Congestion Charge in 2003. ULEZ is part of a wider transport strategy to promote more sustainable travel in the city, including expansion of safe cycling infrastructure and increasing accessibility of buses.
- **Recognise the importance of communication strategies:** The expansion of ULEZ remained controversial with some community groups. When Birmingham introduced a clean air zone, the council developed a comprehensive public outreach and communication plan to ensure the public understood and accepted the policy [166].



Working with local communities throughout, ensuring sustainable alternative forms of transport, and conducting impact assessments to ensure vulnerable populations aren't disproportionately impacted are key considerations for successful implementation and support of ULEZ.

## 5.3 Investment and expansion of safe cycling infrastructure

Promoting cycling can reduce both air pollution and increase physical activity. In the Netherlands, cycling is associated with increasing life expectancy by six months, preventing 6,400 deaths annually, and saving more than 3% of Dutch GDP in healthcare costs [156]. Infrastructure measures such as road design, connectivity of cycling networks and trip end facilities (e.g. safe parking, changing facilities in workplaces) can significantly encourage cycling uptake [167].

COUNTRY CASE



### Bogotá, Colombia: Leading on sustainable urban mobility

Bogotá has among the highest rates of cycling in the region, with cycling currently accounting for 8% of journeys. This is a result of years of pro-cycling policies, including investing in dedicated cycle lanes, which has resulted in Bogotá having among the most extensive cycle lane networks globally at 593 kilometres. The city also integrated cycling infrastructure with public transport, including secure parking provisions at bus terminals and stations; and enhanced cycling safety including a change to the Colombian traffic code. In 2022, Bogotá also launched the country's first bikeshare system, with 3,300 bicycles across 300 stations. The scheme has a range of bikes including those with child seats and hand bikes, and a discount for low-income riders to expand accessibility and improve cycling conditions for all [168].

The city's "Barrios Vitales" ("Vital Neighborhoods") initiative, piloted in San Felipe, has also proved key in enhancing sustainable travel while simultaneously promoting inclusion and equity. Working in close collaboration with the community to improve the liveability of the city, officials have added new bike lanes, pedestrian zones and green spaces, which has resulted in PM<sub>2.5</sub> decreasing by 13%. The programme is now being expanded, with the aim to reach 33 neighbourhoods by 2035 [169].

Bogotá is also part of the C40 Initiative, which has seen the implementation of additional projects to advance sustainable motility, clean energy and urban planning [170]. Bogotá received the Sustainable Transport Award in both 2005 and 2022, in recognition of its leadership and achievements in urban sustainable mobility.

KEY  
TAKEAWAY

Expanding safe cycling infrastructure is a win-win, reducing transport emissions while also increasing physical activity. Designing schemes in close collaboration with communities and integrating gender and income considerations is key to expanding accessibility and ensuring inclusion.



## 5.4 Nature-based solutions

Integrating nature-based solutions (NbS) into urban planning, alongside encouraging active and public transport, can also advance clean air. Urban greening is one of the most common forms of nature-based solutions employed, with evidence demonstrating its potential to improve air quality, while also having the potential to counter heat stress and improve biodiversity enhancement [171]. Beyond improving air quality, NbS can have additional benefits to health by improving opportunities for physical activity, and improving mental health and wellbeing [172].

In Bangladesh, NbS are a vital tool for climate crisis mitigation and adaptation. A wide range of NbS are being implemented, including the protection, restoration and management of mangroves; agroforestry; urban tree planting and rooftop/vertical greening; and the restoration of wetlands and waterways in cities. These have multiple co-benefits for air quality and health, as urban vegetation helps filter PM<sub>2.5</sub> and reduce heat-related ozone formation, while ecosystem restoration reduces dust and smoke from degraded land. UNDP has supported integrated NbS programming in Bangladesh through their Climate Promise, embedding NbS into national and urban planning with explicit recognition of health co-benefits [173] [174].

At the sub-national level, in Poznan, Poland NbS was integrated into city strategic plans, including the adoption of a “green wedge system”. This included the planting of roadside trees, creating new city parks and adding planters, as well as increasing cycle routes across the city. The changes led to improved air quality as well as increased engagement by residents with the spaces. In Yerevan, Armenia, a green-wall was implemented for a kindergarten impacted by high air pollution as part of a wider 10-year programme of tree-planting across the city. Geochemical studies revealed the benefits of the wall in reducing the children’s risk of exposure to potentially toxic metallic particulates [172].

**Urban greening is one of the most common forms of NATURE-BASED SOLUTIONS employed.**



**KEY TAKEAWAY**

**Nature-based solutions can deliver benefits to air quality while also serving as a vital tool for climate crisis mitigation and adaptation. Integrating NbS can deliver additional co-benefits for health, including encouraging more physical activity and improving mental health and well-being.**



## 5.5 Restrictions on short and domestic flights

While estimates vary, emissions from aviation are associated with between 16,000 and 21,200 premature deaths each year globally from PM<sub>2.5</sub> and ozone [175] [176]. Emerging research is also studying the health impacts of emissions of ultrafine particles (UFPs) from aviation. Short-term exposure of just five hours to UFP near an airport was associated with decreased lung function among healthy people [177]. There is also increasing evidence that prolonged exposure is associated with a negative impact on the respiratory tract, cardiovascular health, and foetal development [178].

Rapid increases in passenger numbers are also outpacing improvements in fuel efficiency, with numbers projected to continue increasing and to double in the next 20 years [179]. Notably, this is driven by a small proportion of the global population. According to estimates, just 3% of global population take regular flights [179]. This is mirrored at the national level; for example, in the UK the top 1% of frequent flyers account for 20% of all flights taken by residents [180].

Domestic and short haul flights attract particular attention due to their comparatively high emissions. Data from the UK shows that domestic flights emit more than twice as much CO<sub>2</sub> per kilometre than a long-haul flights due to the emissions during take-off and landing. The difference compared to more sustainable forms of travel is even starker – with a domestic flight emitting more than six times the emissions of an intercity train and nine times those of a coach [179].

For many countries, achieving their climate goals and commitments will require addressing and reducing emissions from aviation. Countries may consider a range of measures to disincentivise and reduce air travel, particularly domestic short haul flights, where more sustainable alternatives are available, including through fiscal policies (see Chapter 3.2) or implementing bans.

**DOMESTIC AND SHORT HAUL FLIGHTS attract particular attention due to their comparatively HIGH EMISSIONS.**



### France's short haul flight ban

In June 2023, France implemented a ban on short-haul domestic flights where there is a sufficiently frequent high-speed rail alternative taking 2.5 hours or less. The timetable must allow same-day return trips with at least eight hours at the destination. As a result of the exceptions, the ban applies to three routes only between Paris-Orly and Nantes, Bordeaux and Lyon – with account for approximately 2.6% of domestic air travel in the country. The ban was challenged by airlines but approved by the European Commission, which ruled it compliant with EU regulations [181]. While the ban was formally enacted in 2023, some airlines had made this change years earlier. During the COVID-19 pandemic, the French government provided an aid package to Air France that was dependent on the airline removing several domestic routes [182].

COUNTRY CASE



KEY TAKEAWAY

Restrictions on domestic and short haul flights, where adequate more sustainable alternatives exist, remain an underexplored policy option to reduce emissions given their disproportionate emissions compared to public transportation.

## CHAPTER 6

# Improved waste management



The global volume of waste is rapidly growing, largely driven by economic development, consumption-driven economies and growing use of plastic packaging [183]. Each year, more than two billion tonnes of waste are produced across the world, of which 23% is still openly dumped [184]. Among LMICs just 40% of waste is collected, of which 93% is dumped or openly burned [184].

Open waste burning, which can occur at major landfills, small dumpsites or individual household level, releases various air pollutants with health and climate impacts. Open waste burning occurs more frequently in LMICs, rural areas, and informal settlements. This is especially the case for household waste, often driven by insufficient waste collection and management systems, or to generate heat in areas with poor access to clean energy [184].

Open waste burning is a significant source of air pollution – especially in LMICs. In Lagos, Nigeria, it's estimated that more than 50% of pollution emissions come from open burning, including the burning of waste [184]. The number of countries that regulate open waste burning has increased significantly; however, in many countries it is still practiced despite regulations – and 75 countries still lack regulations at all [46]. India has developed Plastic Waste Management Rules that explicitly prohibit the open burning and dumping of plastic waste, complemented by a nationwide ban on single-use plastic items since 2022, seeking to reduce the approximately 9.4 million tonnes of plastic waste that is generated in the country each year [185] [186].

There is also an equity dimension to waste, with the global south bearing a disproportionate burden. The global north produces more plastic waste, with countries such as the US, Denmark and New Zealand generating at least twice as much waste per capita than LMICs [187]. Yet this waste often arrives in other countries, typically LMICs, both as a result of being carried by ocean currents and exporting of waste under the guise of recycling [187]. China banned the importing of waste in 2016, which led to waste being diverted to Southeast Asian countries with fewer regulations. A number of countries implemented similar bans in the following years including Thailand, Indonesia and Viet Nam [183].

COUNTRY CASE



### Ghana: Integration of informal waste collectors into formal waste management

In 2019, Accra, Ghana was a recipient of the C40 Cities Bloomberg Philanthropies Award for its Informal Waste Collection Expansion Project [188]. Recognising the important role that informal waste collectors play in waste management in the city, the Accra Metropolitan Assembly (AMA) engaged in consultative dialogue with representatives to understand their perspectives as well as guide policy development and capacity building. It also facilitated the informal waste sector to form cooperatives, which the city could contract, with the aim of inaugurating 10 cooperatives by 2024 [189]. The city has granted access to official waste sites, access to waste collection equipment and made improvements to working conditions including financial inclusion and health insurance [190]. This is part of wider efforts to improve waste collection and management in the city. Accra has also implemented a source separation programme including the treatment of organic waste to divert it from landfills. The Adepa disposal site, a former open dump, has also been retrofitted to reduce disposal emissions [189].





## Rwanda: Plastic bag ban

In 2008, Rwanda became one of the first countries in the region to ban plastic bags, following an assessment into the country's plastic problem conducted by the Ministry of the Environment. This revealed the various environmental challenges that plastic bags were posing, including air pollution from the burning of waste, as well as soil degradation, clogging of drainage (triggering flooding), and threatening biodiversity. In 2008, parliament passed the Law N57/2008 which prohibited the manufacture, import, use and sale of polyethylene bags. The law was complemented with awareness raising campaigns, including training conducted across sectors, mass media campaigns, and flight announcements before landing in Rwanda. To drive compliance, the government enacted checks at all the country's entry points and regular enforcement inspections. The law also stipulates fines for offenses of up to US\$500 (RWF 500,000) and jail time of up to 12 months. In 2019, the ban was extended to also include single-use plastic items through Law No. 17/2019 [191].

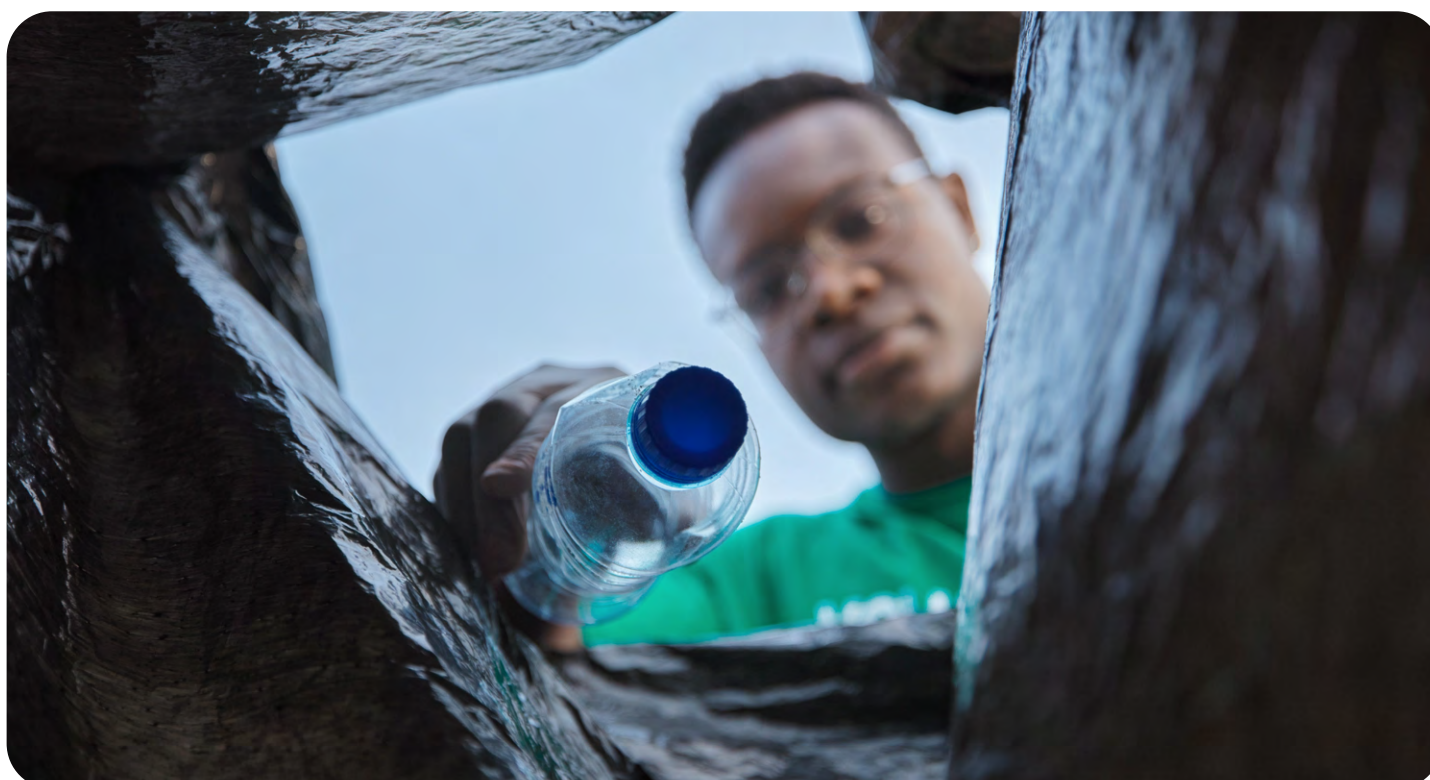
### KEY TAKEAWAY

Waste burning is a major source of air pollution, particularly in LMICs. Governments should take measures to prevent waste burning, including in the short-term: 1) adopting the principles of reduce, reuse, recycle; 2) addressing the role of waste pickers and separators, and 3) adopting effective waste removal and management at authorised landfill sites.

### USEFUL RESOURCE



For long-term priority actions and more information, [see WHO Technical Brief Open waste burning – sectoral solutions for air pollution and health](#), and [AQMX Sectoral Guidance: Eliminating Open Waste Burning](#).



## CHAPTER 7

# Resilient healthcare systems



Air pollution is a leading risk factor driving the NCD burden, and healthcare systems serve a crucial role for the prevention, surveillance and management of NCDs [192]. As the burden of air pollution continues to grow, it's increasingly important that governments take action to strengthen the resilience of healthcare systems to adapt and respond to this burden. While healthcare systems alone cannot fully counteract the long-term health impacts of air pollution, building more resilient healthcare systems can support preventative action and mitigate some of the immediate health effects to reduce related mortality [193].

This must include integrating air pollution considerations into health systems, starting with comprehensive health impact assessments of air pollution<sup>18</sup>, assessing health infrastructure capacity to respond to air pollution cases, and sourcing and fully integrating air pollution data into health systems [193]. The World Bank has produced a set of interventions for countries according to their stage of readiness for action on air pollution across primary and secondary prevention and outlining the role of the health sector [194]. Healthcare systems can also lead by example by reducing emissions within their sector. Globally, healthcare contributes to around 4-5% of greenhouse gas emissions. At COP26, 50 countries committed to developing low-carbon and climate-resilient health systems [195].

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18 WHO has a number of resources available on health impact assessments available [here](#).

## 7.1 Early warning systems

Early warning systems can serve two crucial functions in episodes of high air pollution. They can issue alerts to those more susceptible to the impacts of air pollution (such as those with pre-existing conditions) so they can attempt to limit exposure, and they can help the health system anticipate and prepare for increased demand for its services [196].

**The Belem Health Action Plan**, launched by Brazil at the UNFCCC COP30, provides a framework to promote more resilient health systems, in alignment with the WHO's Global Action Plan on Climate Change and Health. As part of this framework, the action plan promotes early warning systems for health threats, including air pollution, as well as others such as extreme heat, and climate-sensitive pathogens. Information is provided through digital and visual platforms with health specific climate bulletins to communities. More than 50 global philanthropies have committed US\$300 million to support implementation of the plan [197].

**The Early Warnings for All Initiative**, launched in 2022, recognises the importance of early warning systems due to the growing risks of the climate crisis. It recognises the lack of comprehensive multi-hazard early warning systems, with many of the most vulnerable countries, including 57% of small island developing states (SIDS) and 48% of least developed countries, without access [198]. A dialogue hosted by UNEP and SEI called for air pollution to be formally recognised as a climate and disaster risk and integrated into the early warning framework as part of the initiative [199].

In 2024, the first UK's first air pollution alert system was developed in London, which provides alerts to all general practitioners and emergency departments 24 hours before the time when high air pollution episodes are forecasted. The system enables health professionals on the frontline to provide advice to patients on reducing exposure to air pollution while also preparing for higher hospital admissions [200].



Early warning systems can help reduce the health impacts of high pollution episodes, helping individuals avoid exposure where possible and help health systems prepare for increased admissions.

## 7.2 Health literacy: Training healthcare workers on the risks of air pollution and air pollution counselling



WHO has produced resources to improve health literacy on air pollution. Some examples include the [Air pollution and health training toolkit for health workers \(APHT\)](#) and [Communicating on climate change and health: Toolkit for health professionals](#). The Royal College of Paediatrics and Child Health has also produced [a range of useful resources](#) specifically for paediatricians on air pollution and child health. These recognise the crucial role that health professionals can play in strengthening public awareness of air pollution and the climate crisis and their respective health impacts, and provide guidance on how to communicate this information effectively across communities.

Healthcare workers can also play an important role in providing counselling on air pollution. In sub-Saharan Africa, community health workers (CHWs) have played a crucial role in reducing household air pollution. Through the CLEAN-Air (Africa) programme, a comprehensive three-day training module on household air pollution has been integrated into Kenya's national curriculum for CHWs, including specialised advocacy materials to provide health messaging for households. Around 2,500 trainers have been trained across all 47 counties, with the Ministry aiming to expand to all 130,000 CHWs as part of universal health coverage. Early evaluation shows that 50% of women trained have shifted from wood and charcoal to LPG, ethanol, biogas or electricity for cooking [201].

Healthcare workers providing counselling is also crucial for people living with NCDs. Surveys from Asthma+Lung UK revealed two-thirds of people with a lung condition want more guidance from local health services on how to manage the impact of air pollution [202]. This can include advice on how to lower personal exposure, especially on high pollution days. This may include avoiding routes on or near busy roads, keeping windows closed when driving, planning activity including exercise around air quality forecasts and using a N95 mask (which should be discussed with a healthcare professional) [203].

Raising public awareness of the risks of air pollution more broadly is also essential. For example, the majority of adults in the UK did not know or did not believe there was a link between air pollution and diabetes (95%), dementia (83%), stroke (82%), and heart disease (70%), while 33% believed it didn't pose a risk to their health [204].

In Indonesia, the Ministry of Health has integrated air pollution into its national digital app "Satu Sehat", including air pollution data and relevant health recommendations for vulnerable populations and the wider public.

**RAISING PUBLIC AWARENESS of the risks of air pollution more broadly is also essential.**

COUNTRY CASE



### India's integration of air pollution into medical training and Accredited Social Health Activist training

The Ministry of Health of India has conducted capacity building for health professionals on air pollution, as part of wider efforts to implement its Health Adaptation Plan for Diseases Due to Air Pollution (2021). As part of capacity building efforts, the National Center for Disease Control (NCDC) has developed training modules and conducted regular training programmes at district, state and national level to equip healthcare professionals with the knowledge to diagnose, manage and treat air pollution related illness. In collaboration with the National Health Systems Resource Center, it has also integrated air pollution into the training of Accredited Social Health Activists (ASHAs).

The ASHA programme was first launched in 2005 and is now the largest community health worker initiative in the country, with more than 930,000 ASHAs, representing the first link between communities and health systems across India. Air pollution awareness has now been integrated into their routine activities, which include providing education to families on the health effects of air pollution as part of household visits, raising awareness of air pollution at community gatherings and through school programmes, and helping outdoor workers understand air quality levels and the importance of protective measures [193].



**Strengthening health literacy on air pollution (both for health professionals and the public) can help behaviour change to reduce emissions, lower exposure and support people living with NCDs to make informed decisions and manage pre-existing conditions.**

## CHAPTER 8

# Multistakeholder action on air pollution



Tackling air pollution requires a multisectoral and whole-of-government approach, as policy decisions to improve air quality often lie outside of the health sector. It also requires a whole-of-society approach, with diverse actors outside of government. This includes civil society and people with lived experience, which both play a key role, globally and nationally, in raising awareness, holding governments to account, and bringing urgency and expertise to complex issues such as air pollution. Other stakeholders such as academia, foundations and relevant private sector actors should also be involved in addressing air pollution.

## 8.1 Grant making to increase funding for action on clean air

Despite the significant burden caused by air pollution, financing allocated to advancing clean air does not match the scale of the issue. Between 2015-2021, just 2% of international public climate finance and 1% of international development funding went to clean air projects [205]. Clean Air Fund (CAF) is one organisation that provides significant funding through grants, catalysing US\$100 million for more than 230 projects for clean air with NGOs, charities, research organisations and campaigners. [205]

### Partnerships to advance clean air at the city, national and global level

Since 2024, CAF has been partnering with UNDP to address air pollution as a development challenge in LMICs. This collaboration has included 1) the development of air pollution investment cases and multisectoral action plans in Ghana and South Africa; 2) support to around 20 countries in their efforts to integrate air pollution and black carbon into their nationally determined contributions 3.0 (NDCs 3.0); 3) supporting the implementation and financing of air quality and black carbon commitments made in the NDCs 3.0 and in other fora; 4) mapping air quality financing barriers across 15 LMICs.

CAF also supports clean air action at the national level directly; for instance, it has worked with partners in Poland on the adoption of anti-smog measures, low-emission zone regulations and the National Clean Air Programme. At the local level, CAF has supported the introduction of low-emission zones across cities in the UK and has partnered with Bloomberg Philanthropies and C40 Cities on Breathe Cities, a US\$30 million initiative to provide funding, technical support, capacity building and air quality data to tackle air pollution in urban areas.

## 8.2 Denormalising the fossil fuel industry through communication campaigns

Despite the health harms of fossil fuels now being well-documented, the industry continues to be normalised. They leverage marketing and public relations campaigns to promote their products and obscure the harms, using similar strategies to that of the tobacco industry. In response to the role that PR and marketing agencies play in this, the Global Climate and Health Alliance (GCHA) has been leading a communication campaign encouraging the health sector to commit to fossil-free health communications.

### Break the Fossil Influence campaign

GCHA's Break the Fossil Fuel Influence campaign calls on health organisations to lead by example and no longer work with marketing or PR agencies that also work for the fossil fuel industry. In 2024, the health advertising market was valued at US\$42 billion and is estimated to reach US\$62 billion by 2032. This expanded reach for health messaging, combined with health organisations being among the most trusted voices, means the health sector is uniquely positioned to drive critical conversations on climate and health [206]. GCHA has called on health organisations to sign the Fossil Free Health Communications commitment which includes:

- "Expressing a clear intent to avoid future partnerships with agencies that work with fossil fuel companies.
- Committing to ask new vendors about their fossil fuel ties in future procurement and RFP processes.
- Taking a step – however gradual – toward integrity and climate accountability in communications" [207].

## 8.3 Bringing relevant stakeholders and sectors together for action

Civil society coalitions, such as national NCD alliances, play a key role in convening relevant stakeholders and sectors to act on NCD risk factors such as air pollution. Such stakeholders should include youth and people with lived experience, as only their meaningful engagement in policymaking and delivery can ensure that decisions reflect their realities and interventions are responsive to their needs, reaching those most affected. The Healthy India Alliance (India NCD Alliance – HIA) has undertaken such efforts through a national situational analysis and consultation on NCDs and air pollution in India.

COUNTRY CASE



### Situational analysis report on NCDs and air pollution in India

In India alone, over two million deaths were linked to air pollution in 2023. Despite national frameworks like the National Clean Air Programme (NCAP) aiming for a 40% reduction in PM<sub>2.5</sub> and PM<sub>10</sub> by 2026, gaps remain in community risk understanding and the integration of lived experiences into policy. To bridge this, as a part of NCD Alliance's Advocacy Institute NCD Prevention Accelerator Programme with support from the Swedish International Development Cooperation Agency, HIA conducted a national situational analysis synthesising stakeholder dialogues and public opinion data on this issue in 2023. The resulting report reframed air pollution as a complex, cross-cutting NCD risk factor, that is also a climate and broader environmental threat, mapping the co-benefits of action to achieve the SDGs, as well as NCAP and NCD targets. HIA then convened a national civil society consultation, uniting also government bodies (the Secretariat of the National Programme for Climate Change and Human Health, the National Centre for Disease Control and the Central Pollution Control Board), UN agencies, and lived experience champions to incentivise collaboration between sectors and stakeholders for more effective action.

## 8.4 Delivering services to the populations most affected

Civil society organisations can play a crucial role on the ground delivering service to reduce air pollution and protect the most vulnerable populations against its health risks. World Vision Mongolia is one example of a civil society organisations working with communities to expand access to clean energy and safe housing.

COUNTRY CASE



### World Vision Mongolia Innovative Ger project

Many Mongolian families – an estimated 30-40% and up to 90% in rural areas - live in traditional Ger, tents use by nomadic herders, which typically use solid fuels for heating and cooking, resulting in high levels of household air pollution. In 2021, World Vision Mongolia started to test Cooking, Heating and Insulation Products (CHIP) package technology in Ger settings as part of the "Innovative Ger" project [208]. By 2025, World Vision had provided 233 CHIP Ger packages to vulnerable groups to facilitate better access to safer, more comfortable and sustainable housing. The CHIP Ger package includes winter insulation, a ventilation system and an electric heater for the winter season. The essential packages also include traditional five-wall Gers, hot and cold water handwashing basin for household use, and a Ger entryway cabin structure to retain heat in winter which can also be used as a greenhouse in summer for vegetables [209]. In 2024, the project had reached 318 homeless and vulnerable people including children and people with disabilities, supporting healthier living environments and reducing their exposure to air pollution [208]. It is expected to directly benefit 910 individuals by September 2026 [210].

## 8.5 Leveraging the applicability of research

Academia and medical research institutes, such as The George Institute for Global Health, play a key role in collecting the evidence that is needed to make the case for action, inform policymaking locally, and support service delivery. For instance, the NIHR Global Health Research Centre for Non-Communicable Diseases (NCDs) and Environmental Change, hosted by The George Institute, supports work in Indonesia to reduce the NCD burden of plastic burning-related air pollution. The project encompasses co-produced multisectoral interventions with communities, including waste facilities and training community members and environment cadres. These interventions will be piloted and evaluated for effectiveness, aiming to deliver scalable solutions that improve both environmental and health outcomes [211] [212].

Also in Indonesia, The George Institute is running SMARThealth – a project that combines digital decision support, structured risk stratification, and community-based delivery to strengthen resilience against air pollution (*see Box below*). Commissioned by the Union for International Cancer Control (UICC), The George Institute for Global Health has also conducted a global review on air pollution and cancer. The findings show that long-term exposure to polluted air is linked to an 11% higher risk of developing cancer, while sustained exposure to fine particulate matter (PM<sub>2.5</sub>) is associated with a 12% higher risk of dying from cancer, with particularly higher mortality for lung, breast, liver, colorectal, and kidney cancers [13]. A [policy and advocacy guide](#) developed alongside this work calls for integrating clean air strategies into cancer control to address pollution as a critical environmental risk factor.

COUNTRY CASE



### SMARThealth in Indonesia

This project shows how primary healthcare tools can effectively create a decentralised early warning and response mechanism embedded within routine care without requiring entirely new infrastructure, thanks to digital health solutions. At its core, the platform addresses the intersection of clinical vulnerability and environmental susceptibility through three mechanisms:

- Structured digital risk assessments generate a real-time registry of vulnerable individuals at the community level, based on blood pressure, glucose status, age, and behavioural risk factors.
- A clinical decision-support system embeds environmental data inputs, such as district-level air quality indices and seasonal haze alerts, into risk algorithms as dynamic modifiers of cardiovascular and COPD risk. When pollution thresholds are exceeded, the system can automatically trigger tailored clinical prompts, including medication optimisation, exposure reduction advice, mask use, and early follow-up for symptomatic patients, with escalation to primary care assessment for high-risk individuals.
- Community health worker integration enables proactive outreach to high-risk individuals when environmental thresholds are exceeded, linking environmental alerts directly to care delivery.



## 8.6 Building the economic and social case for action

Relevant private sector actors can also play a key role in raising awareness about the burden of air pollution and the impact it has on our economy and population. Haleon, a consumer company solely focused on products that support everyday health, in collaboration with the Economist Impact, has supported the development of a Health Inclusivity Index which demonstrates the economic and social benefits of prioritising health inclusivity.

### The Health Inclusivity Index

The impact of air pollution on people's health is one of the seven common health issues covered by the index, providing estimates of the potential health and economic gains of meeting WHO Air Quality Guidelines in the 40 countries that are analysed in the index, which include some of the most polluted countries in the world. It estimates that, across those 40 countries, reducing air pollution in line with WHO standards could generate economic benefits of US\$100.7 billion and avert 4.5 million deaths each year.

It also demonstrates the economic burden of low health literacy. Average annual spending on prescription and medical visits for people with low health literacy is almost three times higher than those with high health literacy (US\$2,408 vs US\$868). Reducing low health literacy by just 25% is estimated to reduce annual healthcare spending by US\$302.7 billion across the 40 countries in the index [213]. As a follow-up to these findings, a policy brief on health literacy report on health literacy was published highlighting five key priorities to improve health literacy: adopting a whole-of-government and -society approach; integrating health literacy considerations into health and social care systems; creating inclusive information; combating misinformation; and strengthening research and data use [214].



A breathable planet: Best practices for clean air policies to meet NCD targets

## CHAPTER 9

# Conclusion and recommendations



The evidence is clear – clean air policies deliver far-reaching benefits across health, climate, equity and the economy. In addition to their benefits for the environment, they reduce the burden of NCDs, lower healthcare costs, improve economic productivity and generate positive returns on investment. In an era of polycrisis, with progress on the SDGs off-track and national budgets under pressure, interventions that provide multiple, reinforcing gains are not optional but essential. Transitioning to clean energy and transportation, improved urban planning, strengthened health system resilience, and improving fiscal policy coherence will simultaneously improve air quality and contribute to climate action while advancing health, equity and inclusive economic growth.

Advancing clean air will be fundamental for the achievement of universal health coverage. With health systems increasingly under strain and health budgets under pressure, reducing the burden of air pollution and its related health impacts is crucial. Integrating air pollution considerations into health systems will also be essential to achieve this. Air pollution is a risk factor largely beyond individual control and requires decisive government action. Leaders at all levels – city, state, national, regional and global – must take bold and decisive action to protect populations.

## Recommendations

This report provides examples of action from a range of fields, across the commitments of the 2025 Political Declaration on NCDs and mental health. In order to go further, we present recommendations grouped according to those that 1) require immediate action, 2) strengthen the connection between air pollution and climate, 3) seek further alignment, and 4) ensure good governance as an essential enabling condition.

### PILLAR 1

#### Establishing clear priorities for immediate action

Governments must set out clear priorities to address air pollution in a phased approach, focusing on strengthening standards, accelerating investment for enforcement and targeting policies that deliver the highest co-benefits to accelerate progress across climate and health.

#### Implement air quality standards in line with WHO recommendations

As the evidence base demonstrating the harms of air pollution has strengthened, so too has the case for aligning national standards with global health guidance. Governments should adopt and enforce national air quality standards in line with WHO guidelines, supported by robust monitoring systems and mechanisms to drive compliance. WHO's interim targets can serve as crucial mid-term goals to bridge the gap while states move towards more stringent standards over time. This should also include, where necessary, revising laws related to air pollution which are outdated, weak or otherwise insufficient.

#### Increase investment in improving air quality to meet global commitments

Current government and development health spending is not aligned with national disease burdens. Investment in air quality improvement measures remains insufficient, despite the clear health and economic benefits. Governments must rapidly scale up clean air interventions with sustainable financing to meet their obligations, including the commitment to halve air pollution related deaths by 2040 as agreed as part of the WHO roadmap on air pollution. Governments should also increase international development financing for air quality and better integrate air quality interventions within existing international climate and development financing to align with disease burdens and maximise co-benefits (*see Pillar 3 below* for more on further alignment).

#### Prioritise policies with high co-benefits

In a context of stalled progress across the SDGs and constrained resources, identifying policies with the highest co-benefits for each local context can support prioritisation and accelerate action, while delivering greater returns.<sup>19</sup> Policies that deliver reductions in air pollution while also reducing NCD risk, including investing in active and public transport, sustainable urban planning and healthier sustainable food systems, can generate co-benefits for health while also advancing climate objectives.

19 For example, see AIIB Health Strategy: Tomorrow's Infrastructure for Health which includes Pursuing health benefits across infrastructure sectors as one of its strategic priorities. <https://www.aiib.org/en/policies-strategies/operational-policies/health-strategy/index.html>.

## PILLAR 2

### Strengthening connection between air pollution and NCD prevention

Despite air pollution being recognised as a major NCD risk factor since 2018, action on clean air continues to be inadequately integrated within national NCD responses at the rate needed. Governments must seek further alignment, raise awareness about the risks and ensure the healthcare system is able to respond to these.

#### Strengthen integration of air pollution and climate into NCD policy and planning (and health more broadly)

A more inclusive approach, which includes the integration of air pollution action into national NCD strategies and plans and surveillance systems, informed by the recent commitments including the WHO roadmap on air pollution and the 2025 Political Declaration on NCDs and mental health, are essential. WHO can support these efforts by fulfilling its mandate to produce a set of “best buy” interventions for air pollution, as it has done for other NCD risk factors.

#### Strengthen the healthcare system’s ability to respond to air pollution and NCDs

Healthcare systems must be sufficiently equipped to respond to the increasing burden of NCDs due to air pollution, with adequate funding, necessary diagnostics and treatments, and trained healthcare workforce (with air pollution and climate crisis integrated into health curricula). Health impact assessments can support countries in understanding the impacts of air pollution, while early warning systems and improving health literacy can support health services to respond more effectively. Investing in strong data and surveillance of NCDs and their risk factors by health systems is also essential to monitor progress and ensure evidence-based decision making.

#### Strengthen public awareness on air pollution and its health risks

Despite a strong and growing evidence base, air pollution remains under-recognised as a public health issue. Public health campaigns and community-based initiatives can support the public to understand the risks of air pollution and how they can take action to reduce and manage these risks. Strengthening public understanding is also essential to build political support for clean air interventions and encourage behaviour change.



## PILLAR 3

### Seeking further alignment

Alignment beyond the health sector is crucial to act on air pollution. Governments must seek synergies with climate and broader development strategies, pursue fiscal policy coherence and engage in an ambitious and just transition away from fossil fuels.

#### **Integrate air pollution and health considerations into national climate and development strategies**

Opportunities to address the climate crisis and air pollution together can yield significant benefits but require integrated planning. This should include the integration of air pollution into NDCs and supporting the financing and implementation of these activities. Air pollution should also be integrated into NHAPs, LT-LEDS and loss and damage mechanisms. NCDs should also be recognised as a climate-sensitive health risk (*see Chapter 2*). Supporting the development and operationalisation of these mechanisms, while ensuring that air quality and health impacts are recognised, could help address the disproportionate burden faced by vulnerable populations and enhance coherence between climate justice and public health agendas.

#### **Ensure fiscal policy coherence**

Aligning fiscal policy with health and environmental objectives is a public health and economic imperative. Governments continue to subsidise fossil fuels increasing air pollution and NCD risk, while facing strained public finances, growing health system costs, and underinvestment in NCD prevention. Phasing out subsidies on fossil fuels and shifting investment to products and services that advance health and wellbeing is crucial. Coherent fiscal policies can help mobilise domestic resources while ensuring that public spending supports rather than threatens clean air and NCD prevention goals.

#### **Ensure a fair and just transition away from fossil fuels**

Policies should consider and prioritise vulnerable communities which face the highest risks and greater harms, integrating equity into policy design and implementation to ensure that interventions and energy transitions do not impose disproportionate costs on these communities. This can include conducting equity impact assessments of policies, providing income-based subsidies and financial support, and employment support where job losses may occur. The sustainability of solutions should also be considered. At the global level, there is a need for increased investment, as current funding does not match the size of the burden. Air pollution interventions are proven to be equitable and cost-effective, delivering a return-on-investment through improved public health, reduced healthcare costs and higher economic productivity.



A breathable planet: Best practices for clean air policies to meet NCD targets

## PILLAR 4

### Ensuring good governance as an essential enabling condition

Good governance is a core component of effective health policy to advance public health goals, and as such an enabling condition to tackle air pollution and its impacts. Governments must therefore strengthen governance mechanisms through a multisectoral and multistakeholder approach that is free from conflicts of interest.

#### Strengthen governance through a multisectoral approach

Tackling air pollution requires strong cooperation across sectors and a whole-of-government approach. Many of the policies which impact air pollution, including many of those referenced in this report, sit primarily outside of the health sector and are often not identified as a public health issue. This can make integration of a health perspective challenging, and in many countries, health and environment sectors still work in silos. Sensitising sectors outside of health on the burden of air pollution and its intersection with these sectors is essential. To facilitate stronger cooperation and strengthen governance, countries can consider developing and strengthening national multisectoral strategies<sup>20</sup> and national coordinating mechanisms that provide clear roles and responsibilities for ministries and a platform for a coordinated approach, as well as accountability mechanisms.

#### Promote meaningful engagement of people with lived experience and civil society organisations throughout the policymaking process

Communities that are disproportionately affected by air pollution, including people living with NCDs, bear a disproportionate burden yet are often excluded from the decision-making processes that ultimately shape their health outcomes. The Healthy Lungs for Life campaign by the European Lung Foundation (ELF) and European Respiratory Society (ERS) actively support people with lived experience as advocates, including on air pollution, to raise awareness of the importance of lung health. Governments should ensure inclusive participation of people with lived experience and civil society organisations at all stages of policy development, implementation and evaluation. Increased sustained funding is essential for CSOs to contribute effectively through their role. Meaningful engagement can improve accountability and policy design, while ensuring that policies reflect community realities and don't overlook equity impacts.

#### Protect against vested interests

Countries must take action to protect policymaking from vested interests and industry interference. Fossil fuels and other highly polluting industries have a documented history of industry interference and making attempts to delay, derail and weaken policies. Here there is an opportunity to learn from experiences of protecting against industry interference in NCD policymaking. There are lessons to be learned particularly with respect to tobacco, and Article 5.3 of the WHO FCTC. This should include limiting interactions with the fossil fuel industry and ensuring transparency for those that occur, avoiding conflict of interest for government officials, requiring information provided by the industry to be transparent and accurate, and denormalising the industry and regulating activities described as "socially responsible".

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20 UNDP has supported four countries (Ethiopia, Mongolia, India, and Ghana) to develop multisectoral action plans for air pollution and health. These are prioritized and costed plans implemented by government, in coordination with development partners, private sector, and civil society.

# Annex 1

## Relevant tools, guidance and other resources

### Air pollution burden

- Health Effects Institute. [State of Global Air Report 2025](#)
- Union for International Cancer Control. [Clean air in cancer control: An overview of the evidence](#) (2026).

### Air quality guidelines

- World Health Organization. [WHO global air quality guidelines: particulate matter \(PM<sub>2.5</sub> and PM<sub>10</sub>\), ozone, nitrogen dioxide, sulfur dioxide and carbon monoxide](#) (2021).
- World Health Organization. [WHO guidelines for indoor air quality: selected pollutants](#) (2010).
- World Health Organization. [WHO guidelines for indoor air quality: dampness and mould](#) (2009).

### Policy frameworks

- World Health Organization. [Updated road map for an enhanced global response to the adverse health effects of air pollution](#) (2025).
- Global Climate & Health Alliance. [Clean Air NCD Scorecard](#) (2023).
- United for Global Mental Health. [Mental Health in nationally determined contributions: current state and opportunities for integration](#) (2025).
- United for Global Mental Health. [Integrating mental health into climate change adaptation policies](#) (2025).
- United Nations Development Programme. [NDC Insights Series. A decade of the Paris Agreement: A Compendium of NDC Insights](#) (2026).
- United Nations Development Programme. [Legal Environment Assessment for Health and Pollution](#) (2025).
- Office of the United Nations High Commissioner for Human Rights. [Report of the Special Rapporteur on the human right to a clean, healthy and sustainable environment, Astrid Puentes Riaño](#) (2026).
- Heinrich Böll Foundation (Bogotá Office). [Model Policy Framework for the Right to Clean Air, Climate Justice, and Public Health in Latin America](#) (2023).

### Advocacy and policy guidance

- NCD Alliance. [Integrating Action on Air Pollution: An advocacy guide towards the fourth UN High-Level Meeting on NCDs and Mental Health and beyond](#) (2025).
- United Nations Development Programme. [Methodology for Developing Household and Ambient Air Pollution Investment Cases](#) (2025).
- United Nations Development Programme. [Pollution and Health: Guidance Note for Parliamentary Action](#) (2025).
- Union for International Cancer Control. [Clean air and cancer control: An introduction to policy and advocacy](#)

## Guidance on clean air interventions

- Air Quality Management Exchange. [Sectoral Guidance: Expanding Access to E-Cooking](#).
- Air Quality Management Exchange. [Sectoral Guidance: Alternatives to Crop Residue Burning](#).
- Air Quality Management Exchange. [Sectoral Guidance: Improving Fuel Quality](#).
- Air Quality Management Exchange. [Sectoral Guidance: Eliminating Open Waste Burning](#).
- World Health Organization. [Air Quality, Energy, and Health Science Policy Summaries](#) (2025-2026).
- World Health Organization. [Compendium of WHO and other UN guidance on health and environment](#) (2024).
- United Nations Environment Programme. [Actions on Air Quality: A Global Summary of Policies and Programmes to Reduce Air Pollution](#) (2021).
- Climate & Clean Air Coalition. [Integrated Assessment of Air Pollution and Climate Change for Sustainable Development in Africa](#) (2023).
- Climate & Clean Air Coalition. [Clean air and climate solutions for ASEAN](#) (2025).
- World Bank. [A Breath of Change: Solutions for Cleaner Air in the Indo-Gangetic Plains and Himalayan Foothills](#) (2025).
- NCD Alliance. [Burning Problems, Inspiring Solutions. Sharing lessons on action against tobacco and fossil fuels](#) (2019).
- NCD Alliance. [Clean Air Now: Rapid Solutions to the Air Pollution Emergency](#) (2019).

## Tools for health professionals

- Royal College of Paediatrics and Child Health. [Air Pollution Companion](#).
- World Health Organization. [Environmental health training](#).
- World Health Organization. [Air pollution and health, training toolkit for health workers](#).
- World Health Organization. [Communicating on climate change and health: Toolkit for health professionals](#) (2024).

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