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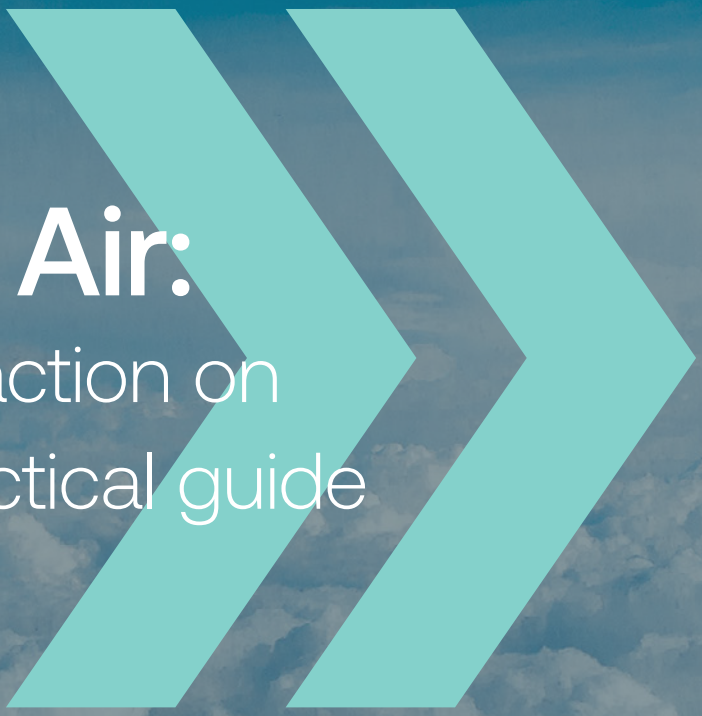
Clearing the Air:

A case for investor action on air quality and a practical guide for getting started



ShareAction»

About and acknowledgements

Through our flagship programme, Long-Term Investors In People's Health (LIPH), ShareAction is engaging investors and companies on commercially relevant public-health issues. Our goals are to help investors improve public-health outcomes in a way that enhances long-term value for themselves and the companies in which they invest.

We have already achieved tangible progress through our Healthy Markets Initiative (now part of LIPH) driving major food-producers and retailers to prioritise aspects of consumer health. This success was only possible through close collaboration with the investment community. Given the scale of the air-pollution crisis, we seek similar collaboration for air quality.

This briefing summarises the latest research on the close links between air quality and our health – we are what we breathe. It also explores the commercial risks that poor air quality poses to investors and companies.

Our thinking has been particularly influenced by the work of Ricardo Energy, Stockholm Environment Institute (SEI) and the World Economic Forum (WEF), supported by the Clean Air Fund. We've also taken inspiration from the Environmental Research Group at Imperial College London. These entities have all undertaken ground-breaking work on the various ways in which companies can measure and reduce their air-pollution footprint.

Feedback on this briefing is welcome at health@shareaction.org.

Contents

Executive summary

Executive summary

While clean air is recognised as a basic human right by the UN General Assembly[1], **air pollution is the leading environmental cause of death[i], killing approximately 7 million people annually**[2]. Each air pollution-linked death is said to be associated with an average loss of 19 years of life[3]. It ranks as the second leading global contributor to disease after high blood pressure[4]. It also has subtle impacts on mental processes that affect performance and decision-making [5].

The health effects of air pollution cost the global economy at least US$8.1 trillion per year, or 6.1 percent of global GDP[6]. The costs of air pollution are numerous, and create a range of risks for investors, at both a systemic and enterprise level.

Systemic air pollution risks (those that affect a wider system) include health effects that cause workforce absences and reduce worker productivity. They also include negative effects on consumer spending through various impacts on behaviours. Furthermore, deaths and diseases, either directly or indirectly linked to air pollution, create significant societal costs that decrease the returns of large and diversified investors. These costs create a loss of at least US $6.9 trillion, or 5.2% of global GDP[6].

At the enterprise, or individual company, level, regulation is a critical risk for polluting companies. While long-standing industrial-emissions standards in many countries do not have robust designs or suffer from lack of enforcement, there is a global trend toward the revision, and stricter enforcement, of standards; this is the result of many countries making stronger pollution-reduction commitments in the recent past. Impending corporate-disclosure frameworks must also be considered, including the European Corporate Sustainability Reporting Directive (CSRD) and the International Sustainability Standards Board (ISSB)[7, 8].

A wide variety of commercial activities cause air pollution. Burning fossil fuels and biomass for energy is the largest primary contributor, but industrial processes and agriculture also contribute significantly[2]. A 2008 report by the United Nations Environment Programme (UNEP) and the United Nations Principles for Responsible Investment (UNPRI) estimated that 54 percent of outdoor air pollution was caused by the world's 3,000 largest companies[9].

It is certainly possible for companies to tackle their air-pollution footprint, and evidence of positive corporate action is growing. We encourage companies to recognise, assess and mitigate their emissions throughout their operations and value chain.

Investors, both asset managers and asset owners, can play a key role in tackling

i Other environmental causes of death include water pollution, lack of sanitation and toxic chemical exposure.

the air-pollution crisis, not only in allocating capital to champion good practice, but also by stewarding companies towards reducing air pollution and driving corporate transparency.

This briefing sets out a series of practical actions that investors and companies can take to start tackling the air-pollution crisis and protect themselves from its various risks. The list of actions, while not exhaustive, provides a clear overview of key considerations required to address material air-pollution issues, manage them effectively, report on progress and, ideally, support and drive industry-wide innovation to improve air quality.

Working together, we can use our collective influence to promote clean air for all, help create long-term value for companies and investors, and build a stronger and more resilient global economy. This briefing provides recommendations for ways to maximise this influence.

The air-pollution crisis

The air-pollution crisis

What is air pollution?

Air pollution is contamination of the indoor or outdoor environment by any chemical, physical or biological agent that modifies the natural composition of the atmosphere. As this briefing looks at the impact of commercial activity on air pollution, it will focus on outdoor environments.

Air pollution can travel across national borders[10]. For instance, pollution originating in China can reach the United States (US), and a significant proportion of air pollution in the UK doesn't originate from within the country[11,12].

A number of pollutants threaten human health

Some air pollutants are released directly while others are known as secondary pollutants, formed by a reaction between different particles. The result is a complex array of particles and gases that can impact human health. A selected list of prevalent particles is shown in Table 1.

The World Health Organization has set air-quality guidelines for six critical pollutants, which act as public-health references for national and sub-national air-quality institutions to follow. For example, the WHO recommends that the annual average concentration of fine particulate matter (PM2.5) should not exceed 5 micrograms per cubic metre ($\mu g/m^3$)[10]. However, 99 percent of the global population breathes air that is above this limit[2].

Table 1: Most harmful air pollutants affecting human health

Air-pollutant type	What is it?	Health risks	WHO restricted?
PM2.5 (fine particles less than 2.5 micrometres in diameter)	Tiny particles of smoke, soot and dust in the air	Enters lungs and bloodstream to embed into organs. Causes various health issues, including cancer, stroke and heart disease	Yes
PM10 (coarse particles less than 10 micrometres in diameter)	Larger particles of smoke, soot and dust in the air	Causes breathing problems, especially for sufferers of lung conditions	Yes
O_3 (ground-level ozone)	Compounds created through reactions of other pollutants	Causes inflammation of the respiratory tract	Yes
SOx (sulphur oxides)	Chemicals released when burning fossil fuels	Constricts the respiratory airways	Yes
NOx (nitrogen oxides)	Compounds released when things burn	Exacerbates symptoms of those already suffering from lung or heart conditions	Yes
VOCs (volatile organic compounds)	Chemicals that easily evaporate into the air	Inflames the respiratory tract, eyes, nose and throat	No (forms O_3 and PM2.5)
CO (Carbon Monoxide)	Chemicals released when burning fossil fuels	Causes serious illness/death	Yes

Source: 13

PM2.5 leads to the most air pollution-linked deaths[6]: a 2018 report focusing on fossil fuels claims that it was responsible for approximately 67 percent of air pollution-linked deaths, compared to 22 percent for O_3 and 11 percent for NO2. For this reason, PM2.5 is referred to as a key indicator of air pollution throughout this briefing.

Commercial activities are a significant source of air pollution

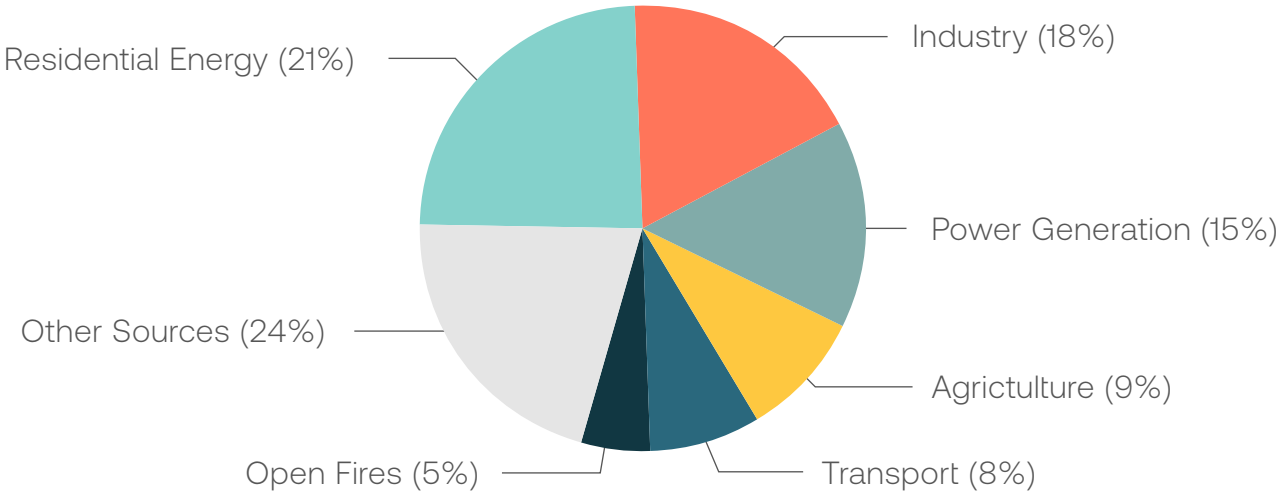
There are many commercial activities that contribute to air pollution. The primary source is the burning of fossil fuels, but other activities play a role, as highlighted in Table 2.

Table 2: Selected list of commercial sectors that contribute to air pollution

Sector	Possible polluting activities
Steel production[14]	• Emissions during iron-ore processing, heating and cooling • Combustion processes in furnaces and coke ovens • Emissions released during metal-treatment
Oil and gas[15]	• Oil and Gas extraction and processing • Truck-freight movement • Drilling and refining
Energy[16]	• Emissions from power plants and industrial facilities • Fossil-fuel combustion
Mineral-mining[17]	• Emissions during excavation and transportation • Material extraction and processing
Agriculture/food[18]	• Livestock waste and fertiliser application • Livestock digestion and manure decomposition
Chemicals[19]	• Chemical-production processes
Cement[20]	• Grinding, heating and clinker-production
Transport and logistics[21]	• Vehicle engines and exhaust • Fuel combustion in vehicles, shipping and planes • Emissions from tire wear
Construction[22]	• Emissions during excavation and construction • Construction materials and equipment • Emissions from machinery and vehicles
Glass-manufacturing[23]	• Emissions during glass-production processes • Emissions from machinery and equipment
Retail[24]	• Emissions from transportation • Energy consumption • Emissions across value chain
Paper mills[25]	• Emissions from paper-production processes

A 2018 research by over 40 scientists found that approximately 18 percent of global PM2.5 pollution comes directly from industry and 15 percent from power-generating entities (Figure 1). Agriculture and transport, which contribute 17 percent collectively, are also closely linked to commercial activities. Overall, commercial activities can be linked to at least 40–50 percent of global PM2.5 emissions.

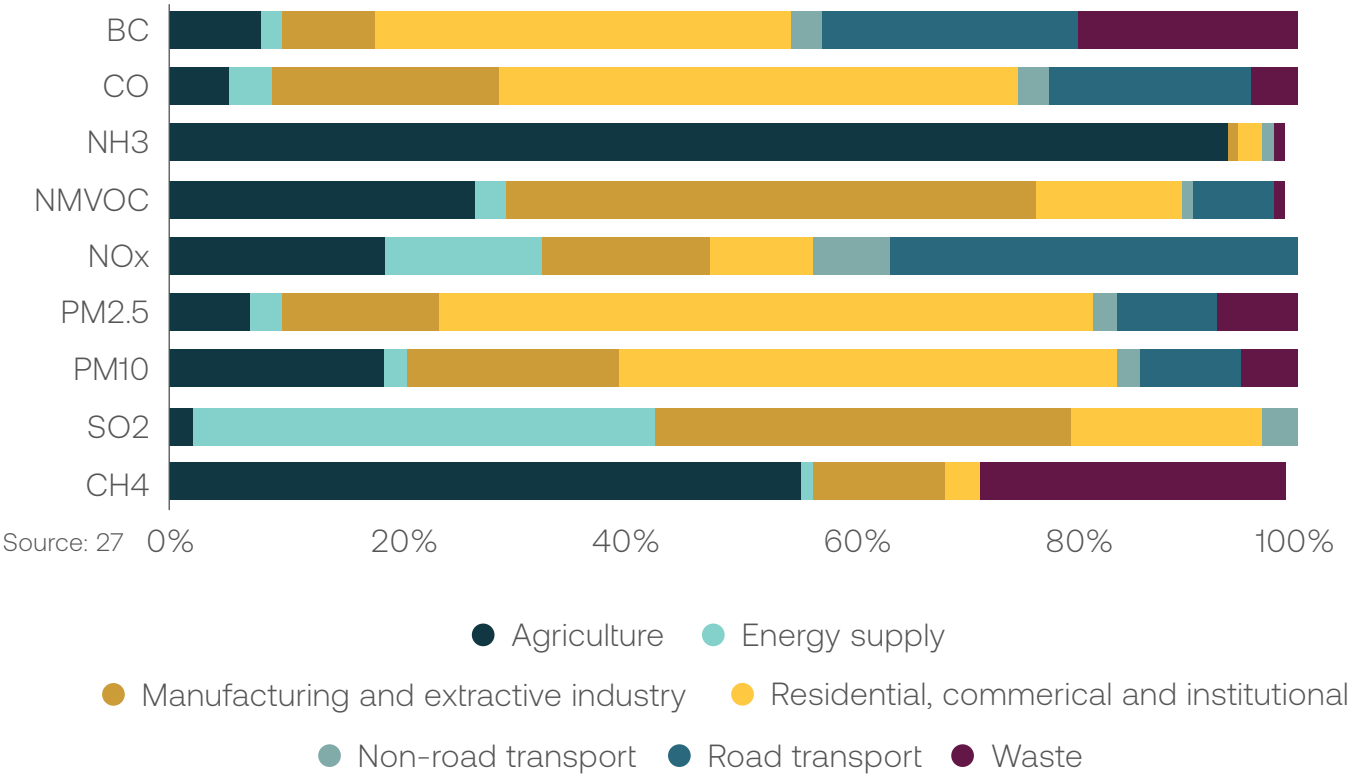
Figure 1: Sources of PM2.5 globally, 2018



Source: 26

The European Environment Agency releases annual data on various pollutant sources in Europe, as seen in Figure 2. Commercial activities contribute to emissions categorised under agriculture, energy supply, transport, waste and industrial activity. For example, approximately 30 percent of PM2.5, 50 percent of PM10, 80 percent of SO2 (SOx) and 90 percent of NO_2 (NOx) in Europe results from commercial activities.

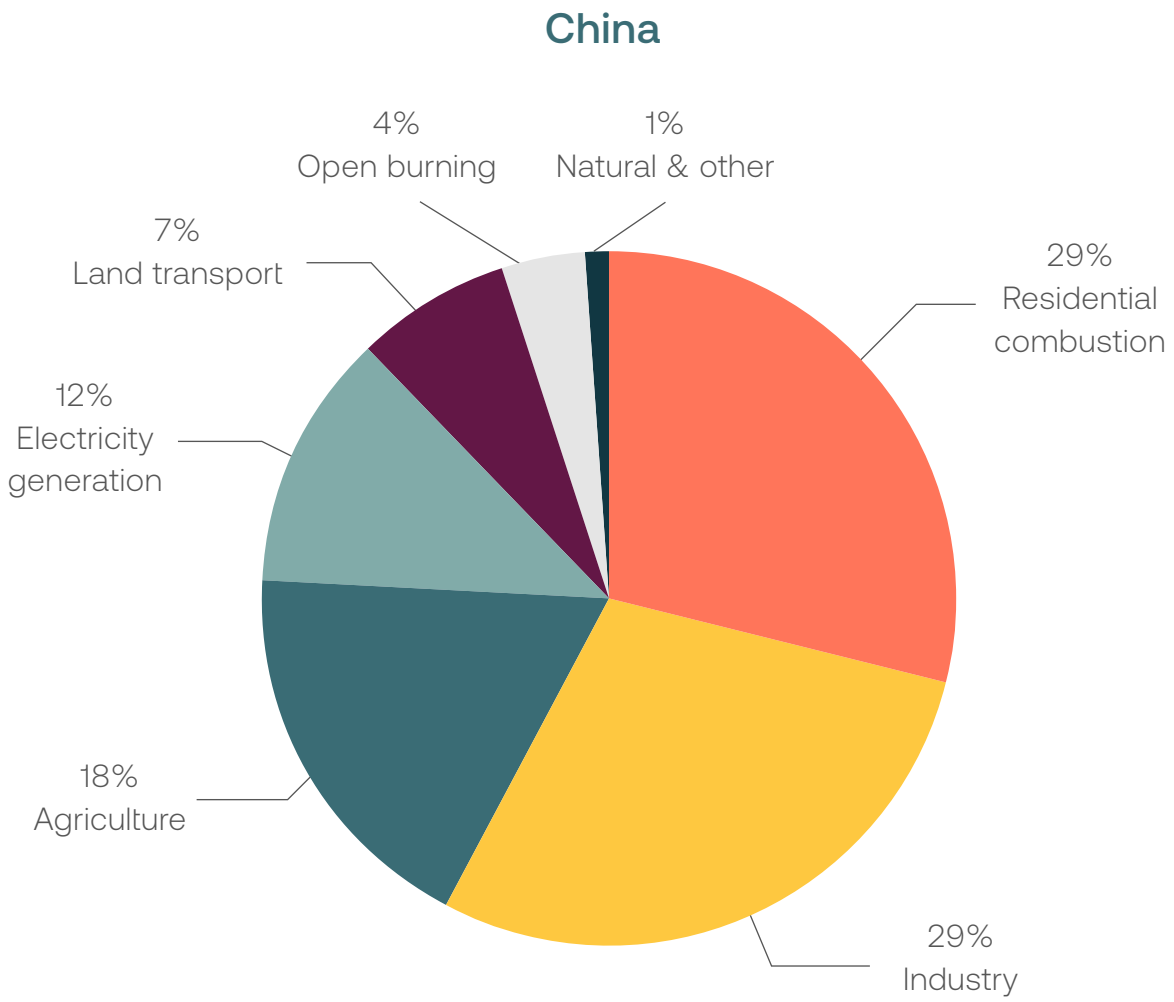
Figure 2: Sources of various air pollutants in the EU, 2020



Source: 27

A significant proportion of PM2.5 emissions in China, the world's largest manufacturer of goods, can be attributed to commercial activities. As seen in Figure 3, industry, electricity-generation and agriculture contribute to almost 60 percent of overall emissions.

Figure 3: Sources of PM2.5 in China, 2019



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In summary, commercial activities worldwide are major contributors to air pollution. In 2008, UNEP and UNPRI estimated that 54 percent of outdoor air pollution was caused by the world's top 3,000 companies by market capitalisation [9].

Reducing air pollution to benefit climate change and human health

Air pollution and climate change share some common sources, as shown in Table 3. Some actions to reduce air pollution can therefore have dual benefits, reducing the burden of disease and deaths attributable to air pollution as well as mitigating climate change.

Table 3: Co-benefits of tackling air pollution and climate change

Activity	Explanation	Dual mitigation
Fossil-fuel combustion	• Burning fossil fuels and biomass is a primary source of both air-polluting substances and greenhouse gases.	• Cleaner energy sources and improved energy efficiency can reduce emissions of both air pollutants and greenhouse gases.
Industrial processes	• Industrial activities release various pollutants into the atmosphere, contributing to air pollution. • Many industries are also energy-intensive and emit greenhouse gases.	• Adopting sustainable technologies and increasing energy efficiency can curtail both types of emissions.
Agriculture	• Agricultural practices release air pollutants, as well as potent greenhouse gases.	• Sustainable-farming methods and improved livestock-management can benefit both air quality and climate.

Source: 29

Mitigating both air pollution and climate change can lead to benefits such as improved public health, enhanced energy efficiency, cleaner and more vibrant cities, economic growth and resilience, and extreme weather events.

Air pollution and human health

Air pollution and human health

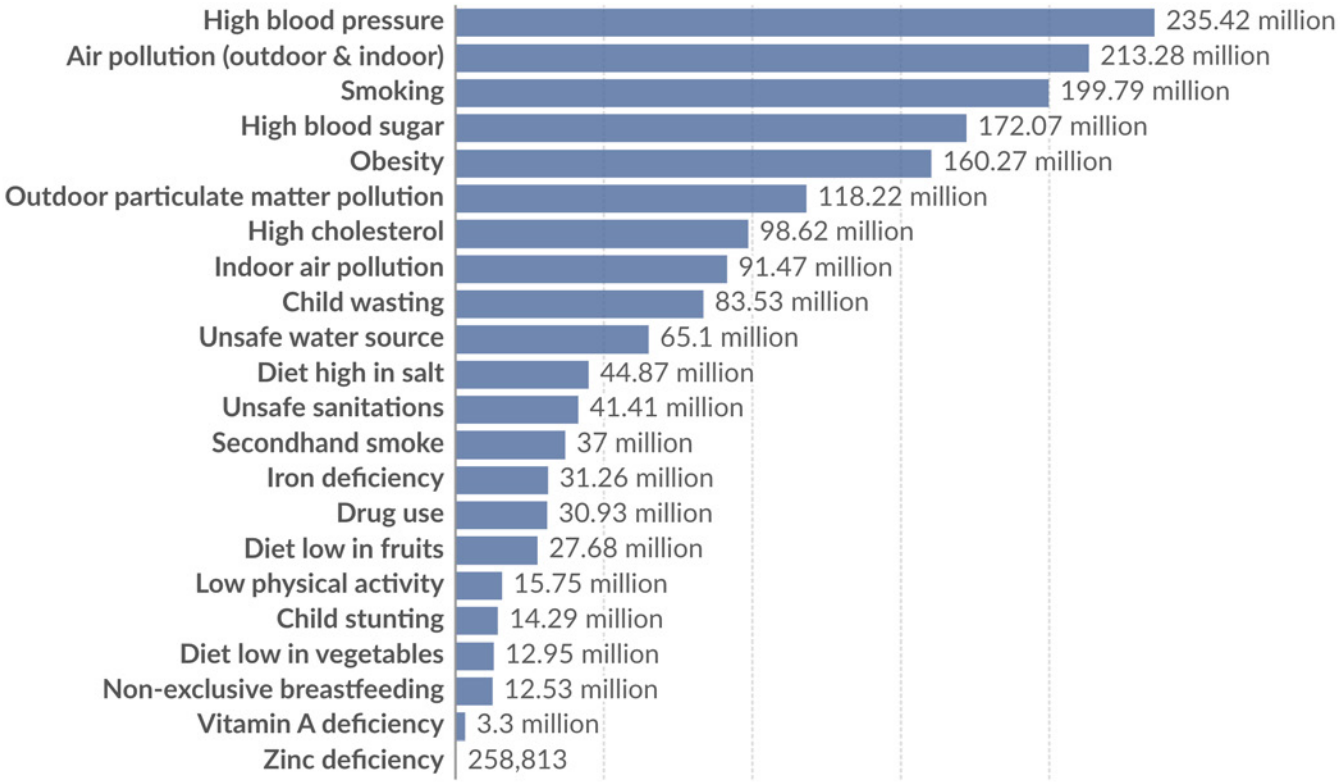
Air pollution is the second-largest contributor to the global disease burden

Air pollution quietly infiltrates human bodies as we breathe, affecting organs and tissues[12]. Both short- and long-term exposure to air pollution is linked to numerous serious conditions and diseases[30], including heart disease, stroke, diabetes, lung disease, cancer, acute respiratory infection and pre-term birth (leading to low-birth weight)[30, 31].

Figure 4 shows the various factors that cause global diseases. In 2019 alone, air pollution resulted in a loss of 213 million years in "disability-adjusted life years" (DALYs), second only to high blood pressure[32]. One DALY represents the total number of years lost due to ill health[32].

Children and adolescents are most vulnerable to air pollution because their bodies are still developing. Prenatal exposure can also affect neurodevelopment and future cognitive function. Low birthweight – which can be caused by air pollution – is intrinsically linked with generational decreases of human potential and capability[30, 33].

Figure 4: Global disease burden by risk factor, 2019



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Air pollution also affects cognitive function

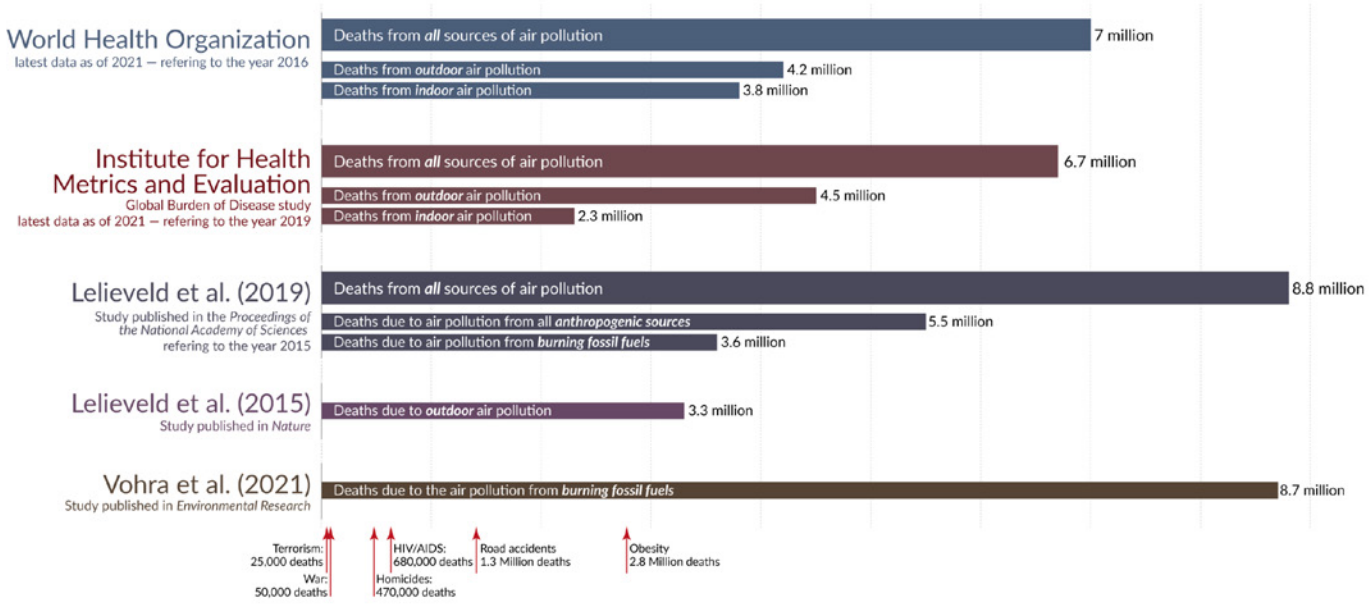
Air pollution reduces the oxygen-carrying capacity of red blood cells, which can affect the healthy functioning of the brain[34]. This can lead to reduced concentration and confusion, affecting clarity of thought[35]. A review of nearly 70 studies, which examined possible links between air pollution, mental ability and dementia concluded that air pollution likely contributes to mental decline and dementia[5].

Air pollution is a significant cause of death

Studies consistently identify air pollution among the top three global causes of mortality. The World Health Organization reported that 7 million lives were lost due to air pollution in 2019[36]. This means that around one in eight deaths globally are caused by air pollution[4]. A more recent study, published in the journal Environmental Research, gives an even larger figure – it states that 8.7 million deaths can be attributed to outdoor pollution from burning fossil fuels alone (Figure 5)[37]. An earlier study found that, on average, each death caused by air pollution from fossil fuels is associated with a loss of 19 years of life[3].

The medical journal The Lancet reports that air pollution contributes to three times more deaths annually than AIDS, tuberculosis and malaria combined, and 15 times more deaths than all wars and violent incidents combined[38].

Figure 5: Selected list of studies estimating deaths from air pollution, 2021



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Impact on low- and middle-income countries

Air pollution is a global problem but it's devastating impact on human health is not evenly distributed[40, 41]. Low- and middle-income countries bear a disproportionate burden of the impacts[42], as can be seen in Figure 6. China and India together accounted for 58 percent of global air pollution-related deaths in 2019[41].

Figure 6: Share of deaths attributed to outdoor air pollution by country, 2019

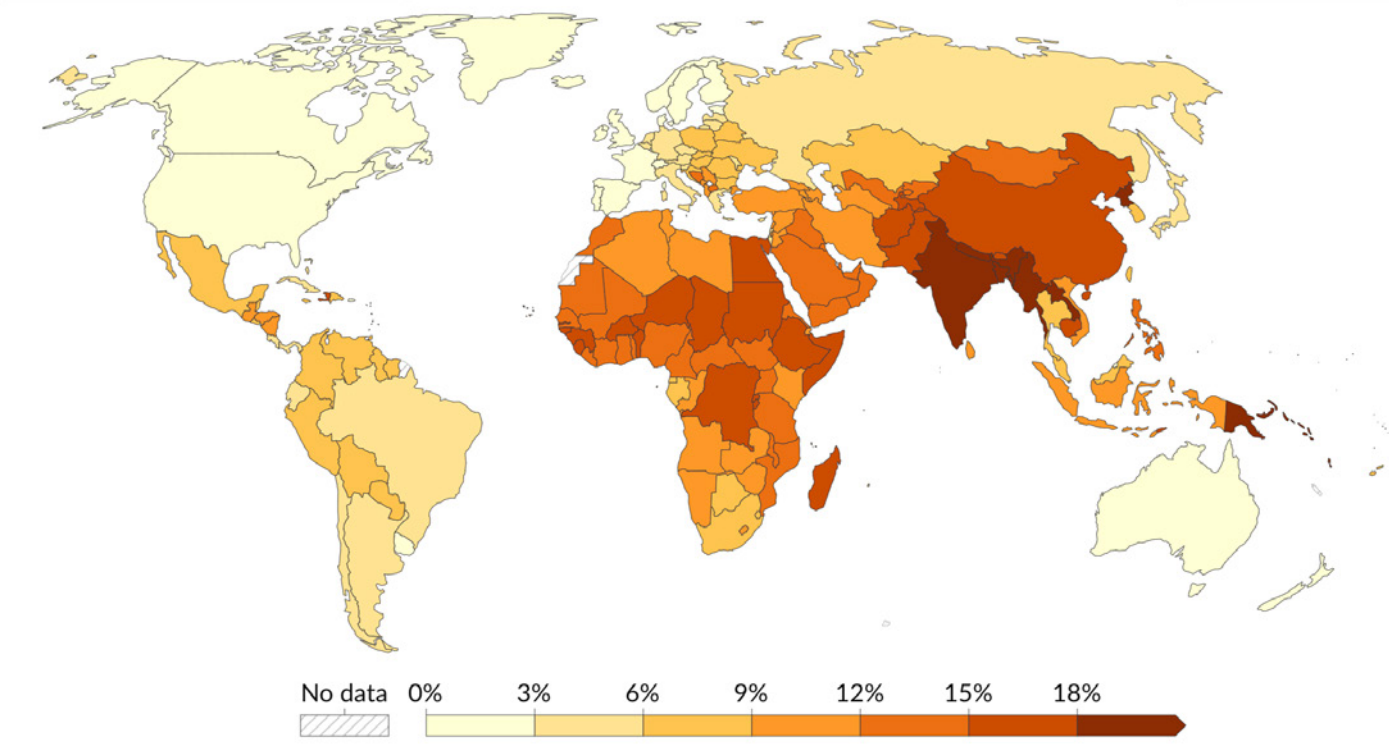

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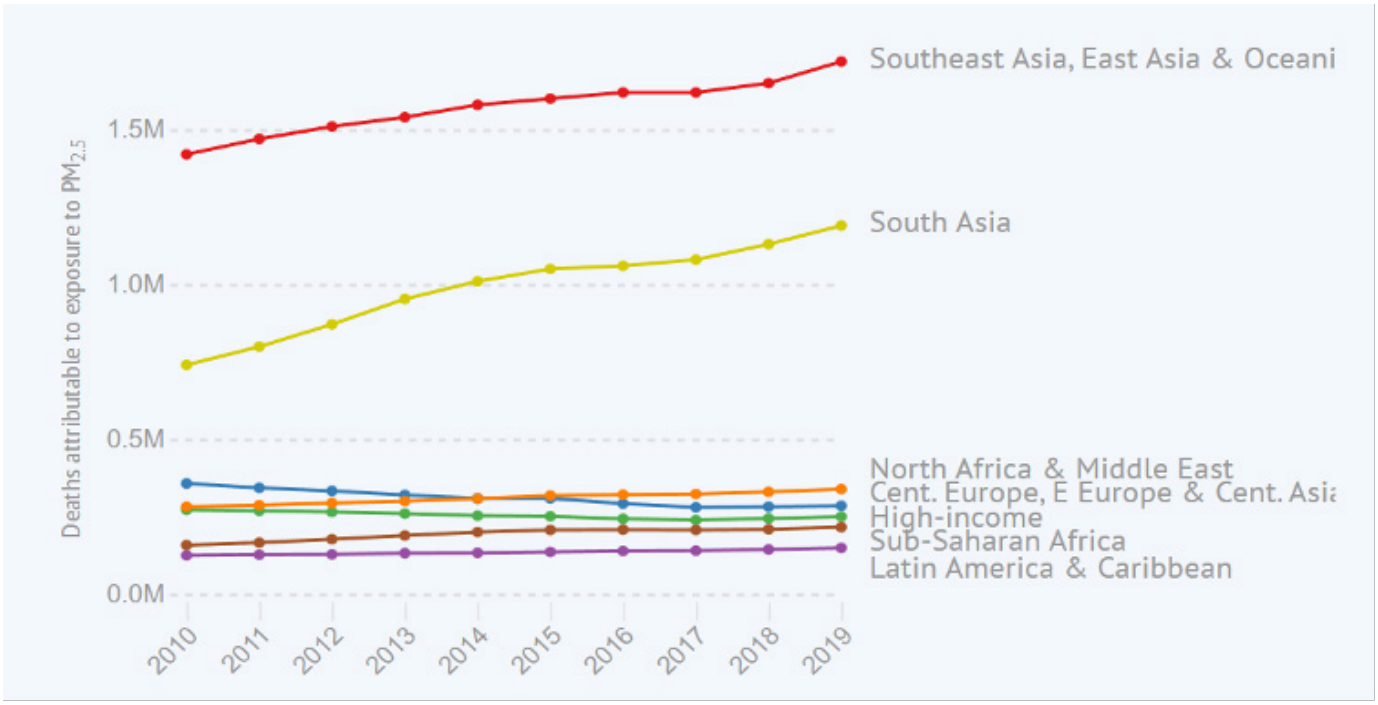
Figure 7 shows that countries in Asia experience the highest proportion of global deaths attributable to PM2.5. Over the past decade, South Asia, Southeast Asia, East Asia and Oceania have seen a sharp increase in deaths associated with PM2.5[41]. The collective rise in mortality in these regions far outweighs the minor reductions seen in high-income regions and parts of Europe[41].

Figure 7: Number of deaths due to PM2.5 per region, 2010-2019



Source: 41. Reproduced with permission from the Health Effects Institute

Economic growth has helped to lift millions of people out of poverty, but associated commercial activities have substantially reduced air quality due to an increase in fossil-fuel combustion to meet increased energy demands. Furthermore, urbanisation over the years has meant that increasing numbers of people live in densely packed cities, where air quality is generally poorer[43].

Impact on higher-income countries

In higher-income countries and regions, such as Europe and the US, harmful air-pollution levels have been significantly reduced, leading to a reduction in associated health conditions and deaths. For example, many European countries have shifted from coal-fired power plants to cleaner energy sources and introduced catalytic converters to make vehicle-exhaust gases less polluting[27, 44, 45].

Despite these achievements, air pollution remains the leading environmental cause of death in developed economies due to factors such as traffic congestion, industrial emissions and emissions from agricultural areas[41, 12, 46, 47]. Exposure to air pollution caused approximately over 500,000 deaths in Europe in 2021[48]. The estimate for the US is between 100,000 to 200,000 deaths[45]. Across most European countries and the US, PM2.5 levels are still at least twice as high as WHO guidelines[27, 49].

Within developed economies, ethnic minority and poorer communities are most affected by air pollution

Across developed economies, there are income and ethnic disparities in the human-health impacts of air population. While all regions in the EU have experienced air-quality improvements from 2007 to 2020, a substantial gap in health outcomes from air pollution persists, with the least-affluent regions consistently reporting PM2.5 levels around one-third higher than the wealthiest areas[50, 51].

In the US, for example, people of colour suffer disproportionately from exposure to pollution compared with white Americans[52]. There are similarities in London, where non-white communities experienced 16–27 percent higher NO2 levels than white communities in 2019[53]. A study conducted by the think-tank Global Black Maternal Health states that due to increased levels of air pollution in certain London communities, a black British baby and an Asian British baby are 80 and 60 percent more likely to die, respectively, than a white baby[54].

The explanations for these inequalities are complex. However, one significant factor is likely to be the presence of lower-income and ethnic-minority neighbourhoods in more polluted areas[52]. A UK study reinforces this view, stating that “people of colour are more likely to live in the 10 percent most overall deprived neighbourhoods in England. These are the very neighbourhoods that tend to be impacted by air pollution and lack of access to green spaces, and that have higher concentrations of waste facilities[55].”

Financial risks posed by air pollution

Financial risks posed by air pollution

Systemic risks

Air pollution creates systemic risks that affect all companies and investors. The World Bank estimates that the global healthcare cost of PM2.5 pollution alone was US$8.1 trillion in 2019 – equivalent to 6.1 percent of the world's GDP. This has increased from a previous estimate of US$5.7 trillion in 2016 (5.8 percent of global GDP)[6]. The systemic risks of air pollution create costs for companies and investors in different ways.

Illness of workers and their dependents can lead to work absences and lost productivity

Air pollution makes people sick and takes them out of work. It also increases the illness rate of dependents, such as children and the elderly, and workers may have to take time off to act as carers[12].

Worker-absence and subsequent losses in productivity represent a direct financial risk to companies and investors. According to the Organization for Economic Cooperation and Development (OECD), approximately 1.24 billion working days were lost to air pollution-related illnesses in 2015; the estimate in a 2018 report by the CREA was 1.8 billion[3]. Projections for 2060 indicate a significant increase, with lost working days estimated to reach around 3.75 billion globally[40].

In economic terms, these costs accounted for 0.3 percent of global GDP, equivalent to US$225 billion, in 2015[40]. Projections indicate a substantial increase, with costs set to reach 1 percent of global GDP by 2060[40].

Taking action against air pollution can protect investors and companies from the growing financial costs associated with sickness absence. Research by the UK National Health Service (NHS) concludes that improving workforce health by reducing air pollution leads to greater productivity and subsequent economic gains[56].

Illness can affect productivity even when employees are at work

Workers may still go to work while suffering from illnesses caused by air pollution reducing their productivity[12]. Furthermore, even when not ill, poor air quality can also affect their cognitive ability and impair decision-making[5].

According to the OECD, the number of "restricted activity days" (days when workers were unable to perform normal levels of work) due to air pollution was 4.93 billion in 2010 and is projected to surge to 14.9 billion by 2060[40]. Research has shown that air pollution reduces

productivity of people in diverse settings; from a farm in California, to a garment factory in India and call centres in China[34, 57].

Consultancy firm Dalberg has estimated that, in 2019, employee productivity in India decreased by 8–10 percent on high-pollution days, resulting in significant financial losses estimated at US$24 billion[58]. This loss is equivalent to the entire pharmaceutical industry's annual production in India.

Air pollution reduces consumer spending

Air pollution has also been shown to influence consumer behaviour. Lower air quality has a marked effect on consumers' willingness to venture outside their homes, reducing footfall for businesses[58, 34].

Furthermore, air quality influences consumers' decision-making and consumption patterns[34]. An analysis of credit-card transaction data in Spain revealed that for every 10 percent increase in PM2.5, consumers spent between €20 and €30 million less per day[59]. In India in 2019, air pollution caused a 1.3 percent reduction in consumer spending, equivalent to a loss of US$22 billion[58].

Air pollution may impact investor behaviour and stock-market returns

Evidence highlights a potential link between air pollution and stock-market returns. One possible explanation is the subtle cognitive effects of air pollution, which may encourage investors to take fewer risks. In a study conducted in New York, short-term variations in PM2.5 levels were found to correlate with movements in the S&P 500 index. The effects were substantial, with a one standard deviation increase in PM2.5 leading to an 11.9 percent reduction in same-day returns[60]. Studies have demonstrated a negative correlation between air pollution and stock returns in the US, China, Canada, the Netherlands, Australia and Italy[61, 34].

The externalities of air pollution represent a cost to diversified investors

Externalities of air pollution refer to the total costs to society that are not directly borne by the polluting entity. The World Bank states that mortality from PM2.5 alone results in externalities equivalent to US$6.9 trillion, or 5.1 percent of global GDP[6]. The costs would be significantly higher if other pollutants were taken into account. The OECD states that externalities tied to premature deaths from outdoor air pollution are projected to cost US$18–25 trillion by 2060, approximately 9–12 percent of estimated global GDP at the time[40].

Some companies will profit from environmental pollution, but investors with large and diversified portfolios will ultimately bear these costs. A study by The Shareholder Commons suggests that the most important factor in determining the long-term value of diversified portfolios is the intrinsic value of the economy, rather than the financial performance of individual portfolio companies. Accordingly, the behaviour of an individual company that harms the economy threatens diversified investors, even when that conduct might serve the company, at least in the short term[9, 62].

Externalities to society create costs for companies that arise in different ways. Rising awareness could also result in significant reputational losses through altered consumer behaviour. Most investors are tied to diversified holdings. UNEP and UNPRI estimate that if externalities decrease GDP (e.g. by 11–18%), they will similarly affect an institutional investor's future cash flows, leading to reduced investments, lower dividends and ecreased asset value[9].

Enterprise risks

Enterprise risks in this briefing refer to the possible costs incurred by investors as a result of companies infringing air-pollution regulations. When it comes to air pollution, there are two general categories of enterprise risks for investors: country-level industrial-emission standards and corporate-sustainability disclosures. This section describes these enterprise risks, starting with a brief overview of industrial-emissions standards.

Industrial-emissions regulations haven't required robust corporate air-pollution disclosure

In total, 125 countries have legislation that sets air-quality standards, and 41 percent of these have some form of industrial-emissions standards on factories or processing units. Companies adhering to these regulations can gain industrial licences, without which they cannot operate factories. Levels of enforcement, however, vary significantly[63].

In the EU, industrial-emissions standards are relatively well enforced. The Industrial Emissions Directive (IED) and Best Available Techniques (BAT) are the EU's primary tools for industrial-emissions control. Initiated in their current form in 2010, they target selected polluting industries across more than 50,000 production units. Industries must use the techniques listed in the IED to mitigate emissions to gain official permits for operating – these efforts have played a part in decreasing pollution levels in Europe[64].

The UK also continues to adopt the IED post-Brexit. However, these regulations have gaps and limitations in terms of reaching the desired level of pollutant disclosure[65]. Since current corporate disclosure on air pollution revolves around these regulations, further action on the regulations needs to be taken.

Gaps and limitations in these regulations include[65]:

1 **Specific focus:** regulations target production units and not a company's entire operations or value chain;

2 **Limited sectors:** certain industrial sectors – such as energy, oil and gas, and mining – are included while other known air-polluting sectors – such as construction – are exempt;

3 **Data accessibility:** data collected by regulators may not be easily accessible or transparent, in contrast to corporate greenhouse-gas reporting;

4 **Scattered implementation:** member states implement rules in an inconsistent manner;

5 **Limited pollutants:** most factories report on limited pollutants such as NOx, SOx and PM10, but not on PM2.5;

6 **Missing data:** industrial units are only required to report emissions if they exceed a minimum limit, creating data gaps; and

7 **Lack of assurance:** current data isn't third-party validated, relying solely on self-reporting by organisations.

There is a global trend towards strengthening and enforcing industrial-emissions standards

We have observed a global trend of revisions to national air-quality policies and regulations, with commitments to decrease air pollution, which can be explained by several factors.

Firstly, in 2021, the WHO launched new air-pollution guidelines, which recommended air-quality levels that were more stringent than the previous 2005 recommendations[10]. Secondly, more countries have established national climate-change plans – such as National Determined Contributions, as a result of The Paris Agreement in 2015 – and since sources of greenhouse gases and air pollution overlap, a number of countries have integrated goals to tackle both issues[66]. Thirdly, there is rising awareness around the significant impacts of air pollution due to improved scientific evidence[67].

In 2020, the EU launched the European Green Deal, which sets out the goal of a climate-neutral Europe by 2050. A key part of the deal is the action plan "Towards Zero Pollution for Air, Water and Soil", which recognises gaps in current EU legislation and includes a 2030 target to reduce air pollution-related deaths by 55 percent. Evaluations were undertaken for the IED, and in 2022 the European Commission officially started the process for revising regulations[68, 69].

Countries and regions where industrial-emissions standards are being revised are shown below in Table 4. The revisions are being undertaken across continents, reinforcing a heightened global awareness of industrial contributions to air pollution. Polluting entities may be liable to more significant penalties where standards already existed, and new

penalties may be imposed in countries where they previously didn't. This reflects an upcoming enterprise risk due to rising global accountability. Investors and companies should be prepared for this in order to ensure operational continuity and protect their returns.

Table 4: Selected list of countries/regions with revised industrial emissions standards since 2017

Country/ Region	Regulation	Status	Possible Outcome
EU[69, 68]	Revision of IED/BAT – 2022	Under deliberation	• More sectors affected • Stricter emissions limits • Penalties/fines for infringements • Incentivised investment in cleaner technologies • Increased pollutants reported
UK[70, 71]	Revision of IED/BAT – 2022	Under deliberation	• Stricter emissions limits • Incentivised investment in cleaner technologies • More sectors affected • Increased pollutants reported
	New law on environmental/ pollution offences – 2023	Legislated and implementation now underway	• Upper limit of fines scrapped • Proportionate penalties • Penalty process more efficient
China[72]	Revised industrial and environmental standards – 2015	Legislated and implementation now underway	• Increased monitoring – 186,000 penalties in 2018 as compared to 83,000 in 2014 • Increased financial penalties for polluters – 382% increase from 2014 to US$2.15 billion in 2018
India[73]	Revised industrial and environmental standards – 2022	Legislated and implementation now underway	• Standards for 63 industries revised • Legal obligation for industries to report their emissions to a central repository; as of 2022, 80% of sanctioned units had complied, with strict penalties for non-compliers

Country/ Region	Regulation	Status	Possible Outcome
Thailand[74]	Revised industrial and environmental standards – 2021	Legislated and implementation now underway	• Stricter emissions limits • Increased monitoring • Increased fines and penalties
Nigeria[75]	Revised environmental and air-pollution strategy – 2021		
Bangladesh[76]	Revised industrial and environmental standards – 2022		
Indonesia[77]	Revised industrial & environmental standards – 2021		
Brazil[78]	Revised environmental air-pollution strategy – 2018		
Colombia[79]	Revised environmental and air-pollution strategy – 2017		
Mali[80]	Revised environmental and air-pollution strategy – 2016		

New EU sustainability framework will require companies to provide unprecedented disclosure on air pollution

The EU's Corporate Sustainability Reporting Directive (CSRD) will formulate the corporate-disclosure arm of the EU Green Deal[7]. The CSRD mandates companies operating in the EU to include comprehensive disclosure on environmental and social matters as part of their management reports. The CSRD will apply to over 49,000 companies, representing 75 percent of EU business revenue[81].

The CSRD also applies to EU subsidiaries of non-EU firms with revenues of over €150 million, or those listed on any European security exchange[82]. The CSRD requires companies to report on global footprints rather than just European. Application of the new rules will be initiated in

the 2024 financial year, for reports published in 2025, and full implementation is expected to be completed by 2027[81].

With regards to air pollution, companies will be obligated to make the following disclosures in their management reports[83]:

- description of process to identify business risks;
- policies to address the problem;
- governance structure to resolve the problem
- complete disclosure of company's operational emissions (in contrast to just production/ processing units as in IED) and clear targets for reduction;
- actions and resources allocated to objectives;
- third-party valuation of reports;
- assessment of financial risks, impacts and opportunities.

The sanctions for non-compliance have not been defined yet and will be the mandate of member countries. The EU has, however, stated that sanctions must be "effective, proportionate and dissuasive"; they are likely to come in the form of fines and litigatory threats for companies[84]. Ultimately, such issues could negatively affect investor returns, representing a major enterprise-level risk.

Countries around the world are likely to adopt international standards

The International Sustainability Standards Board (ISSB), under the International Financial Reporting Standards (IFRS) Foundation, is developing global sustainability-disclosure standards, with a focus on investor and financial-market needs [8]. These standards are based on those outlined by the Sustainability Accounting Standards Board (SASB).

The UK government plans to endorse and adopt the ISSB standard, potentially creating UK Sustainability Disclosure Standards by July 2024[85]. The Chinese Government has been significantly involved in the development of the ISSB frameworks, and there is an expectation that the framework will formulate the basis of the country's disclosure frameworks[86]. Governments of other countries are also in talks with the ISSB to adopt and implement the framework, including Brazil, Nigeria, South Korea, Egypt, Canada, Singapore, Australia, Japan and Brazil[87].

The ISSB standards cover 77 industries and require air-pollution reporting across all operations for a significant proportion of them. These include oil and gas, energy, mining and logistics/

freight. Upon adoption of these standards, non-compliance may be sanctioned according to legislative tools across different countries.

India is developing its own reporting standard (Business Responsibility and Sustainability Reporting (BRSR) requirements), which are expected to come into force at the end of the fiscal year in 2023[50]. BRSR will mandate the top 1,000 listed companies by market capitalisation to follow a comprehensive framework, which includes reporting on emissions of specific air pollutants[88].

Recommendations to reduce air-pollution risks

Recommendations to reduce air-pollution risks

There are several asks that investors can make of companies to address air pollution – actions that can enhance a company's long-term value by lowering regulatory, financial and reputational risks, and differentiating them from competitors. The first part of this section addresses the inadequacy of the current corporate-disclosure structure around air pollution, providing a series of recommended steps for companies to take. The second part highlights the ways in which investors can protect themselves from financial and regulatory risks.

Recommended steps for companies

1 Recognise and assess risks related to air pollution

Companies often overlook air pollution as a risk, and recognising this is the first step to addressing the problem. Companies should conduct a risk assessment to understand:

- how their activities impact air pollution;
- the business risks they face as a result of their emissions;
- and the opportunities available to reduce air pollution.

2 Create governance structure for air pollution

Assigning governance structures with managerial responsibilities for corporate air pollution is crucial at both strategic and operational levels. This ensures that air-pollution management receives strategic direction and is effectively executed. Companies can merge the governance structure for air pollution with that for climate change.

At a strategic level, it's important to have a high-ranking executive, such as a Chief Sustainability Officer or Environmental Director, overseeing air-pollution management, ensuring the issue receives the necessary attention and resources.

3 Establish clear policies

Companies should:

- develop a clear air-quality policy, with an overview of where the company currently stands and set goals for the future;
- ensure that the policy contains detail on the identification, assessment, management and remediation of air pollution;

- and give air pollution the prominence it requires by including dedicated sections in company reports and other relevant materials.

By recognising the gravity of the issue, companies can take a crucial step towards meaningful action to mitigate air pollution's impact on both their operations and the world.

4 Initiate measurement and disclosure

Companies are encouraged to initiate comprehensive air-pollution measurement and disclosure on two levels:

1. The air pollutants from a company's operations
2. The air pollutants from its value chain

The focus on the value chain acknowledges that a company's air-pollution footprint can sit across the supply chain, beyond its primary operations. For example, a significant proportion of a company's air-pollution emissions can be attributed to raw-material extraction, supplier manufacturing and logistics. These are often located in low- and middle-income countries, which are disproportionately affected by air pollution [89]. For sectors such as retail or services, supply-chain emissions may constitute the largest proportion of the overall air-pollution footprint.

Methodologies to measure air-pollution emissions in value chains are similar to how greenhouse gases are calculated, and these measurement processes can be merged by companies[31, 9]. To initiate measurement and disclosure effectively, companies should implement robust monitoring systems, adopt standardised measurement methodologies and establish clear reporting protocols. This allows companies to develop a clear baseline from which to measure progress, highlight priority areas and build transparency around, and awareness of, efforts to improve air quality.

5 Set clear targets and metrics for air pollution

After measuring and disclosing emissions across a company's operations and value chain, emission-reduction targets can be set, along with metrics to allow a company to demonstrate how and where progress is being made. This will enhance transparency and demonstrate that a company is taking its air-quality responsibilities seriously.

6 Allocate resources to actions that achieve air-pollution and climate-change benefits

Having assessed operational and value-chain emissions, built internal support, and set clear reduction targets and measurement metrics, companies can take action to mitigate air pollution. Different actions will be required for decreasing operational and value-chain emissions. The former is concerned with internal technological changes, whereas the latter

includes engaging stakeholders across supply chains. As stated before, sources of air pollution can significantly overlap with those of climate change; by taking actions for air pollution, companies can also mitigate their carbon footprint. Actions companies can take include:

- moving towards cleaner energy sources, such as solar power and hydrogen;
- transitioning to electric vehicles;
- applying the latest technology for air-filtration and -dispersion at production/processing units;
- engaging supply-chain stakeholders to strengthen pollution-mitigation actions;
- and conducting supplier sustainability assessments.

7 Validation of policies, actions and reports

Third-party verification and audit processes are important tools to maintain credible reporting, which builds and maintains the trust of stakeholders, including investors.

Knowing that data will be subject to external review encourages organisations to invest in accurate reporting processes. This accountability extends to addressing any identified issues or areas for improvement. In some jurisdictions, such as in the EU with the CSRD, third-party validation will be a regulatory requirement. By taking the appropriate steps, companies can stay ahead of regulatory changes.

8 Corporate lobbying for improved regulations

Companies play a crucial role in lobbying national and international policy spaces. Collective lobbying by companies for stronger air-pollution regulation on the corporate sector will be a crucial step in protecting them from the systemic risks of air pollution. Companies should use their influence with policy-makers to propel regulations that mandate obligatory corporate value-chain disclosure, alongside comprehensive strategies and actions to reduce their footprint. The aim should be to replicate greenhouse-gas corporate-disclosure regulations.

9 Participate in learning and innovation

Companies can involve themselves in industry-wide initiatives to reduce air pollution, sharing best-practice ideas, activities and technologies and, ultimately, accelerating efforts to reduce air pollution.

The Alliance for Clean Air is showing that change is possible

The Alliance for Clean Air, launched by the World Economic Forum in partnership with the Clean Air Fund, is showcasing that comprehensive corporate action on air pollution is not just

a possibility, but a reality. The alliance includes 16 multinational companies – including Ikea, Mahindra, Maersk, Google, Wipro and Siemens – that are taking pioneering steps towards measuring and reducing their air pollution. Transparency is a key driver, with several members working on setting reduction targets after publishing their air-pollutant emissions inventories. These efforts are contributing to the normalisation of data collection and reporting on air pollution, fostering momentum across the private sector[90].

Ikea stands out, within The Alliance for Clean Air and across the world, as a leader in improving air pollution. The company's 2022 climate report includes a multi-year inventory of its air-pollution footprint across the value chain. This includes raw-material extraction, supplier production, distribution and logistics, internal production, all offices and stores, worker travel and even customer travel [91].

The company has made a breakthrough in developing a scientifically robust mechanism for measuring its complete air-pollution footprint across the value chain, working with the Stockholm Environmental Institute (SEI) and the Climate and Clean Air Coalition (CCAC).

Ikea says it will further analyse its footprint and define targets that cut both greenhouse-gas and air pollution emissions.

Investors are encouraged to engage businesses towards accessing this methodology, which is available online, and follow in Ikea's footsteps to take concrete company actions towards air pollution[91].

Recommended steps for investors

Investors hold significant influence, not just through their capital allocation but also through their ability to steward the direction and priorities of the companies in which they invest. Both asset managers and asset owners play a key role in shaping the governance and decision-making strategies, as well as fiduciary duties, of companies.

Broadly speaking, asset owners and managers are well suited to do the following:

Action	Who for	Detail
Recognise air pollution as a material environmental, social and governance (ESG) issue in investment policy	Asset owners and managers	The investment policies of asset owners and asset managers have significantly evolved to integrate ESG considerations in the corporate sector. This has been crucial to driving progress on a wide range of sustainability challenges. By incorporating air pollution into investment policies, asset managers and owners can help to bring necessary attention to the issue.

Action	Who for	Detail
Engage with companies to integrate air pollution into policy	Asset managers	Asset managers can advocate for inclusion of, or a stronger stance on, air pollution in company sustainability agendas and policies, for example: • integrating air quality-focused discussions into formal engagement with companies; • directly or collaboratively engaging with companies on their sustainability agendas; • challenging companies to develop stronger goals; • and developing clear escalation procedures to push companies to address air pollution (e.g. tools such as private and public letters, resolution filing and directorate voting).
Push for comprehensive air-quality management processes and data validation	Asset managers	Asset managers can advocate for companies to adopt the measurement steps set out in the "Recommended steps for companies" section of this briefing.
Incorporate business risks of air pollution into investment strategy	Asset owners and asset managers	Integration of the regulatory, financial and reputational risks from air pollution into long-term portfolios and risk-assessment strategies can help to safeguard investments, protect brands and contribute to a healthier, more sustainable future for all. This could be done by: • developing a policy on how air-pollution risks influence capital allocation; • developing a framework of air-quality metrics to continuously assess company performance; • and revisiting investments in companies that cause air pollution. Asset owners can ensure through engagement that asset managers are following these actions.

Action	Who for	Detail
Invest in innovative technologies	Asset owners and asset managers	Long-term returns can be significantly advanced by investing in innovation. As air-pollution awareness grows and regulations are tightened, technologies that contribute to tackling air pollution will be in high demand. Identifying and investing in innovators now could reap future financial rewards[92].
Collaborate for systems stewardship	Asset owners and asset managers	Systems stewardship refers to the collective actions of multiple stakeholders to achieve progress that wouldn't be possible in isolation. As many of the costs of air pollution are borne at a systemic level, asset owners and asset managers can effectively engage companies collectively to tackle air pollution. This can include engagement with wider industry groups, such as industry associations, to drive progress.
Influence and lobby for stronger corporate air-pollution regulation	Asset owners and asset managers	While the CSRD and the ISSB represent significant steps forward, they may not encompass all the elements needed for comprehensive air-pollution reporting. In contrast to CSRD, the ISSB does not include details such as company policies or actions towards air pollution. Both also lack mandatory value-chain reporting. Both asset managers and asset owners can play a positive role in shaping regulation, by applying their collective influence in policy arenas to lobby for stronger air-pollution reporting on businesses. Additionally, they can support the work of environmental and health organisations in calling for action on regulatory gaps.

Examples of investor progress on air pollution

Some investors have already started to address the air-pollution crisis. For example:

- Columbia Threadneedle Investments (CTI) recognises the public-health risks associated with air pollution. This can be seen on its website, where it acknowledges the significant deaths, diseases and economic damage caused by air pollution. It also recognises a way forward through investment opportunities related to the problem, which can benefit CTI, its clients and the global economy.
- .

- Allianz Global Investors (AGI) acknowledges air pollution as an “invisible killer”, with significant effects on global health and economic outcomes. Furthermore, AGI also recognises the minimal public and private financing to tackle air pollution across the world. It is taking steps to highlight and fund innovators developing technologies for clean-energy and emission-control technologies in power generation. AGI is also investing in entities that develop solutions to industrial and dust emissions, such as filters and fume collectors[94].

Call to action

Call to action

From public-health and workforce wellbeing to corporate regulation and reputation, air pollution has significant and wide-ranging effects on people and the economy. These effects are unequally shared, with those living in lower-income countries and communities facing a disproportionate portion of the burden.

This challenge presents serious risks for companies and their investors, both at an enterprise and systemic level. However, it also presents a significant opportunity to enhance long-term value by addressing these risks and gaining competitive advantage.

We believe that investors and companies have a key role to play in tackling air pollution, and have the tools available to do this. As sources of greenhouse-gas emissions and air pollution overlap significantly, investors and companies can take advantage of the opportunity to address these two issues at once.

ShareAction welcomes the opportunity to discuss any of the issues raised in this briefing. Working together, we can use our collective influence to promote clean air for all, help create long-term value for companies and investors, and build a stronger and more resilient global economy.

Appendix

Appendix

Pollutant	Description	Sources	Health risks posed
Particulate matter	Particulate matter (PM) refers to inhalable particles, composed of sulphate, nitrates, ammonia, sodium chloride, black carbon, mineral dust or water. PM can vary in size but is generally defined by its aerodynamic diameter, with PM2.5 and PM10 the most common in the regulatory framework and relevant for health.	Sources of the largest particles, called coarse particles (with a diameter between 2.5 and 10 micrometres), will mainly consist of pollen, sea spray and wind-blown dust from erosion, agricultural spaces, roadways and mining operations. The finer particles (PM2.5) can be derived from primary sources (such as combustion of fuels in power-generation facilities, industries or vehicles) and secondary sources (such as chemical reactions between gases). In outdoor environments, the main sources are location-specific and can have different origins, but they typically include traffic and transportation, industrial activities, power plants, construction sites, waste burning and agriculture.	The health risks associated with particulate matter of between 10 and 2.5 micrometres in diameter (PM10 and PM2.5) are especially well documented. PM is capable of penetrating deep into the lungs and can enter the bloodstream, causing cardiovascular (ischaemic heart disease), cerebrovascular (stroke) and respiratory impacts. Both long-term and short-term exposure to particulate matter is associated with morbidity and mortality from cardiovascular and respiratory diseases. Long-term exposure has been further linked to adverse perinatal outcomes and lung cancer. In 2013, it was classified as a cause of lung cancer by WHO's International Agency for Research on Cancer (IARC). It is also the most widely used indicator for assessing the health effects of exposure to air pollution.
Ozone	Ground-level ozone (O_3) is a major component of smog.	It is formed from photochemical reactions with pollutants such as volatile organic compounds, carbon monoxide and nitrogen oxides (NOx), emitted from vehicles and industry. Due to the photochemical nature, the highest levels of ozone are seen during periods of sunny weather.	Exposure to excessive ozone can cause problems breathing, trigger asthma, reduce lung function and l ead to lung disease.
Sulfur Dioxide	Sulfur dioxide (SO_2) is a colourless gas that is readily soluble in water.	It is predominantly derived from the combustion of fossil fuels for domestic heating, industries and power generation.	Exposure to SO2 is associated with asthma hospital admissions and emergency room visits.
Nitrogen Dioxide	Nitrogen dioxide (NO_2) is a reddish-brown gas that is soluble in water, and a strong oxidant.	Ambient sources of NO2 results from high temperature combustion of fuels in processes such as those used for heating, transportation, industry and power generation.	Exposure to nitrogen dioxide can irritate airways and aggravate respiratory diseases. NO_2 is an important ozone precursor, a pollutant closely linked to asthma and other respiratory conditions.
Carbon monoxide	Carbon monoxide (CO) is a colourless, odourless gas produced by the incomplete combustion of carbonaceous fuels, such as wood, petrol, coal and natural gas.	The predominant source of carbon monoxide (CO) in ambient air is from motor vehicles.	Carbon monoxide diffuses across the lung tissues and into the bloodstream, making it difficult for the body's cells to bind to oxygen. This lack of oxygen damages tissues and cells. Exposure to carbon monoxide can cause difficulties breathing, exhaustion, dizziness, and other flu-like symptoms. Exposure to high levels of carbon monoxide can be deadly.

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About ShareAction

ShareAction is a NGO working globally to define the highest standards for responsible investment and drive change until these standards are adopted worldwide. We mobilise investors to take action to improve labour standards, tackle climate change and address pressing global health issues. Over 15 years, ShareAction has used its powerful toolkit of research, corporate campaigns, policy advocacy and public mobilisation to drive responsibility into the heart of mainstream investment. Our vision is a world where the financial system serves our planet and its people.

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Authors

This briefing was prepared by Ammar Khan in the ShareAction Health Team, with contributions from Thomas Abrams and Jonty Whittleton.

ShareAction»

shareaction.org
info@shareaction.org
+44 (0)20 7403 7800

Runway East,
2 Whitechapel Road,
London, E1 1EW, UK

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