

Federal Ministry for the Environment, Nature Conservation and Nuclear Safety



## Air Quality Management as a cross-sectional topic of relevance for the achievement of the SDGs

In recent years, **air quality** and its management has increasingly attracted the public's interest, in the industrialised world, emerging economies and developing nations alike. The effects of poor air quality on human health, the climate and the environment have been proven by numerous scientific studies and are now – often only in basic terms though - known to large sections of the society. More and more citizens now comprehend clean air as a basic human right and demand it from policymakers. There is also a growing recognition that air pollution negatively affects the achievement of the UN's **Sustainable Development Goals (SDGs)**, which requires swift action by policymakers, polluting sectors and the individual. These effects are of socio-economic and/or ecological nature and are complexly interwoven. Only integrated, multidisciplinary approaches for the reduction of emissions of air pollutants, which are often also greenhouse gases, can therefore do justice to the problem.

The Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), a German service provider in the field of international cooperation, contributes through its projects and expertise in over 100 countries worldwide to sustainable development for a future worth living. The SDGs therefore provide an important framework for GIZ's work. In the following, we would like to show how closely the topic of air pollution control is linked to achieving the SDGs. This document is a contribution to the first "International Day of Clean Air for blue skies".





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Measures for air quality improvement positively impact public health, with benefits for citizens and national economies alike due to a healthier, more productive workforce and less health costs. Socially disadvantaged people in particular suffer from the effects of poor indoor and outdoor air quality as they often live in narrow, less green neighbourhoods and use cheaper, more polluting (often solid) fuels for cooking and heating. Hence, most citizens will benefit most if approaches to air pollution control focus on the home environment (e.g. electrification of cookstoves etc.) and on the outdoor environment of their city/living environment (e.g. improvement of sustainable, low-emission public transport, closure of residential areas for motorised through traffic, etc.).

In addition, air pollution control benefits agricultural harvests (e.g. by reducing precursor emissions – primarily nitrogen oxides from fossil fuel combustion – of ozone, the main pollutant limiting the growth and yields of plants), leading to more affordable and less volatile food prices, which in turn promotes food security and livelihoods of consumers and producers.



Ground-level ozone can lead to crop losses and a decrease in nutritional quality, depending on the ozone concentration, the prevailing microclimate and crop species and cultivar. Wheat and beans (incl. soybean) are known to be especially ozone-sensitive, but the productivity of rice and maize can also be affected. Plants that are already weakened by ozone are also often more susceptible to other harmful environmental hazards such as fungi and pest attacks. These effects together might lead to increased usage of fertilisers, pesticides and fungicides, with negative impacts on the environment and economy.

The reduction of ozone precursor emissions, e.g. nitrogen oxides emitted during the combustion of fossil fuels, can benefit agricultural production, with positive economic knockon effects for both private households and food supplying humanitarian aid organisations.



According to the WHO, 7 million people worldwide die prematurely every year from polluted air. Acute and (more prevalent) chronic diseases that are caused or promoted by air pollution include for instance respiratory (including asthma, lung cancer) and cardiovascular illnesses (e.g. heart attacks and strokes). Birth defects, miscarriages and premature births are also linked to poor air quality, as well as many neurological disorders (e.g. migraine, dementia, Parkinson's) and mental illnesses (e.g. depression). Recent studies also show that the susceptibility of humans to contract viral diseases (e.g. coronavirus) can be related to their exposure to polluted air. The welfare costs and losses caused by these diseases are vast.



In Least Developed Countries (LDCs), polluting solid fuels (e.g. charcoal, wood, coal) are widely used for cooking and heating, often in poorly ventilated interior spaces. This leads to increased pollution of indoor air by particulate and gaseous pollutants. Since female members of the family are traditionally more responsible for domestic activities in these countries, there are often significantly higher cases of illness caused by air pollution in women than in men. Children and the elderly, who often stay indoors, are also affected by emissions in these environments.

Clean fuels, electrification of cooking and heating and good indoor ventilation can contribute to significantly improved, healthier working conditions at home.



Methane is a major contributor to climate change and an important precursor of tropospheric ozone. Untreated wastewater is a significant source of methane emissions. Upgraded wastewater facilities enable the capturing of methane emissions and their use as natural gas, thereby also contributing to the affordable energy goal (SDG 7) and significantly reducing its negative impact on air quality.



In many industrialised, emerging and developing nations, fossil fuels are still used to generate energy. This type of energy generation is not only increasingly expensive, it is also harmful to the climate and pollutes the air. Many air pollutants that are emitted when fossil fuels are burned are also greenhouse gases (so-called "short-lived climate pollutants"), e.g. Methane, soot or ground-level ozone, and therefore impair the desired Sustainable Development Goals in a variety of ways.

The application and further expansion of renewable energy sources (sunlight, hydropower, wind power, biomass) create positive incentives for human health, the environment and the climate. Due to the cheaper production and the cheaper operation of the corresponding technologies, regenerative energy generation is becoming cheaper and increasingly affordable for households with lower incomes.

A particular problem is the pollution of the indoor air, which can be attributed to the use of polluting energy sources for cooking and heating. Fuel such as wood or charcoal cause high levels of particulate matter. If such fuels are used indoors without adequate ventilation, the negative health effects due to the high concentration of pollutants are serious. Clean fuels, electrification of cooking and heating and good indoor ventilation can all contribute to significantly improved working conditions in the home.



Due to the current COVID-19 pandemic and the subsequent economic recession, there are wide-ranging national and international goals and incentives to restart the economy in a sustainable, "green" manner (e.g. "The Green Deal" of the European Union). Sustainable economics and growth usually have positive effects on air quality, i.e. renewable energy generation, environmentally friendly transportation (including walking and cycling), climate-friendly industrial production, organic agriculture, etc. all directly or indirectly support clean air. A resilient labour market and economic development can ultimately only be accomplished when natural resources, the environment and human health are protected.



Sustainable, modern infrastructure planning and environmentally and climate-friendly production are emitting less air pollutants and greenhouse gases. Particularly in emerging and developing countries, where a primary focus lies on the expansion and renewal of industry and infrastructure, there are vast saving potentials for solid and gaseous air pollutants by retrofitting industrial plants and the construction of new, modern plants.



Urbanisation is increasing globally, particularly in emerging and developing nations. The consequential increase of transportation, construction and consumption and the associated use of natural resources pose a serious challenge for a healthy urban environment. Only integrated, socially acceptable concepts that aim for affordable protection of air quality, climate and the environment for every citizen and thus lead to an increase in the quality of life can contribute to the sustainable development of cities.

A reduction of air pollutants can be accomplished by investing in cleaner and more efficient public and private transportation. The setup of high-quality public transportation systems and the creation of low emission zones increase the quality of air and life alike.

By the way, the construction sector itself is suffering from air pollution (for example, acid rain affects buildings) and can actively contribute to better air quality (for example through the use of green, emission-filtering facades).



Many industrial and agricultural production processes emit air pollutants and greenhouse gases. Modern, highly efficient industrial facilities can reduce these emissions, as well as organic agriculture that does not rely on chemical fertilisers, chemical-synthetic pesticides, overproduction, intensive mass animal farming, etc. Additionally, a careful and conscious consumption, which minimises food waste, is another important indirect step towards air quality and climate protection.



Air pollution and climate change are strongly interconnected. Many air pollutants and greenhouse gases have the same sources and many air pollutants are also greenhouse gases themselves. They are called short-lived climate pollutants (SLCPs). This also means that many measures for the improvement of air quality also benefit climate action (and *vice versa*).

Many of the SLCPs, e.g. methane, are short-lived compared to carbon dioxide (CO<sub>2</sub>), but they often have a higher global warming potential than CO<sub>2</sub> and hence cause more climate damage within the same timeframe. Scientists agree that the 1,5°C temperature rise goal can only be accomplished by simultaneously reducing SLCPs <u>AND</u> CO<sub>2</sub>. Most nations are currently in the process of revising their Nationally Determined Contributions (NDCs) to the Paris Climate Agreement by making them more ambitious. This process offers the excellent opportunity to firmly anchor the reduction of SLCP emissions in the NDCs and offers the simultaneous achievement of many goals in a cost-effective manner: climate protection, increased air quality, improvement of agricultural yields and the protection of the biosphere.

Secondary effects of air pollution also contribute to climate change. Some plants are especially sensitive to tropospheric ozone, which limits the growth and distribution of plants. Since forests and grasslands are important natural carbon sinks at a global scale (by absorbing  $CO_2$  needed for photosynthesis), the reduced plant growth due to ozone exposure leads to a decreased  $CO_2$  capturing potential of the vegetation. The non-absorbed  $CO_2$  heats up the Earth's atmosphere further. The threat of tropospheric ozone to biodiversity has also been proven. Plant species or cultivars that are particularly sensitive to ozone – these are often endangered

plants with a limited distribution - lose their competitive strength in ecosystems due to their exposure to ozone, which can lead to their displacement and eventually extinction, thereby limiting biodiversity.

Many measures against climate change also lead to an improvement of air quality, for example the switch to sustainable transportation, ecological agriculture, energy production from renewable energy sources, etc. The co-benefits (climate change mitigation + air quality improvement + human health + higher agricultural production) of these measures are a strategic and financial incentive for policymakers.



Is has been proven that the secondary air pollutant tropospheric ozone poses a threat to biodiversity. Plant species or cultivars that are particularly sensitive to ozone – these are often endangered plants with a limited distribution - lose their competitive strength in ecosystems due to their exposure to ozone, which can lead to their displacement and eventually extinction, thereby limiting biodiversity.



Air pollution is a borderless, global issue. Some air pollutants travel for long distances, leading to pollution effects far away from the emission source, often passing national borders and creating tensions between nations. As such, effective policies of air pollution abatement will have to be of regional, continental or even hemispherical focus, to address the international nature of the problem. This requires strong, trusting partnerships between countries and organisations to share resources and knowledge on air pollution sources, effects and abatement strategies.

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## **Overview of SDGs with relevance for Air Quality Management (AQM)**

