

WHAT IS AIR POLLUTION?

Air pollution is the contamination of the air we breathe by harmful gases and particles. Air pollution is a serious threat to our health and it damages the environment. It also causes global warming. The main source of air pollution is combustion of fuels— in vehicle engines, power plants and industry. Wood stoves, trash fires and the use of solvents are also significant sources at our homes. Most air pollution is man-made, but some comes from nature – for example pollen and wind-blown dust.

Air pollution is a complex mix of substances in the air, and some pollutants react with others in the air to form even worse pollutants, like ozone. The most obvious air pollution sources are usually nearby, like traffic and industries, but air pollution can travel long distances and add to the background concentrations in cities. This makes air pollution a regional or international problem.



HOW BIG IS THE AIR POLLUTION PROBLEM?

The World Health Organisation (WHO) reports that 3.7 million premature deaths globally were attributable to outdoor air pollution in 2012. When indoor air pollution exposure is also taken into account, the estimated annual death toll rises to 7 million. Air pollution also increases hospital admissions, medicine use, lost working days and activity restrictions for persons with respiratory or heart problems. Air pollution is now the world's largest single environmental health risk, affecting everyone in developed and developing countries alike. There is also widespread and significant damage to ecosystems, agricultural crops, modern materials, and cultural heritage. The impacts have a huge economic cost. Air pollution has generally decreased in Europe over recent decades, but the health effects of air pollution are a bigger issue today than they were twenty years ago. This is largely due to many years of air quality monitoring combined with sophisticated statistical methods that have made it possible to identify links between exposure to air pollutants and effects on human health at levels previously considered safe.

WHAT ARE THE MAIN AIR POLLUTANTS?

The two most important pollutants from a health perspective are particulate matter and ozone. Other major pollutants are carbon monoxide, nitrogen oxides, sulphur dioxide, volatile organic compounds, and lead.

Particulate matter is a complex mixture of microscopic particles and droplets suspended in the air. The sizes and chemical makeup of this mixture can change over time. PM can also form in the air from reactions between other pollutants. The main source of PM is fuel combustion. In city streets, the cars, trucks and busses are the main PM sources. Diesel engines produce some of the worst PM – ultrafine particles of black carbon (soot) coated with toxic compounds and metals. Combustion PM also comes from power plants and industry smoke stacks, incinerators, home heating and open fires. Aside from combustion, PM also comes from the road, tire and brake particles generated by moving traffic, and dusty construction activities, material handling and industrial processes. In arid regions, strong winds pick up dust from areas of bare dry soil, forming dust clouds with extreme PM levels that can travel great distances.

Ozone at ground level is a strongly irritating and reactive gas formed in the air from other pollutants and sunlight – not to be confused with the protective ozone layer high in the atmosphere.



Ozone forms more easily in hot weather, making the problem worst in the summer. Ozone can form and travel over long distances. The pollutants that lead to ozone formation – known as precursors – include nitrogen oxides (NO_x) from combustion and volatile organic compounds (VOCs) from both fuel combustion and solvent evaporation. Since ozone is not directly emitted, it is more challenging to control.

Carbon monoxide is a poisonous gas formed by incomplete fuel combustion, especially in gasoline car engines or poorly adjusted heaters and boilers.

Nitrogen oxides is a mixture of two combustion gases: Nitrogen dioxide (NO₂) which is a strong irritant, and nitric oxide (NO). NO₂ is a health problem, but both components of NO_x lead to formation of ozone and secondary PM, and acid deposition.

Volatile organic compounds are a broad class of carbon-based chemicals that can evaporate at room temperature. Some VOCs form by incomplete fuel combustion, while others come from evaporation of solvents and fuels. The worst VOCs are highly toxic and carcinogenic, while others are only mildly toxic. Vegetation also emits VOCs. VOCs contribute to secondary PM and ozone formation.

Sulfur dioxide is an irritating gas formed by combustion of fuel containing sulphur, especially coal, oil and diesel fuel. SO₂ contributes to respiratory illness, and aggravates existing heart and lung diseases. SO₂ leads to formation of secondary PM (sulphate particles), and acid deposition.

Carbon dioxide Some additional air pollutants cause significant environmental impacts. Carbon dioxide (CO₂), the main gaseous product of fuel combustion, is the primary cause of global warming. Black carbon in combustion PM and Methane (CH₄) from livestock and natural gas leaks also contribute to global warming.

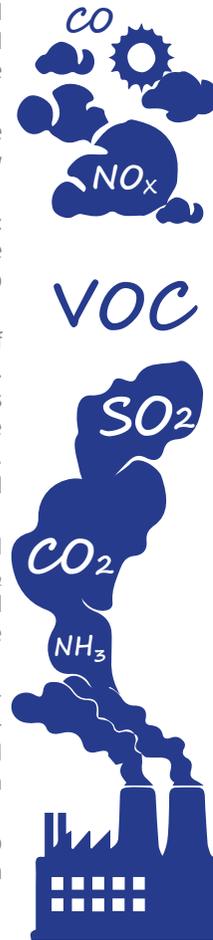
Ammonia from agricultural fertilizers and manure contributes to secondary PM formation in the air, and nitrogen deposition on ecosystems.

WHAT HEALTH PROBLEMS DOES AIR POLLUTION CAUSE?

Air pollutants are often invisible, but they can have serious effects on our health, including the lungs, heart and other organs, and the developing foetus. Breathing polluted air can have immediate effects, like coughing, wheezing, shortness of breath, and irritation of the eyes, nose and throat. High pollution levels can trigger chest pain, lung infections, asthma attacks, strokes and heart attacks. Long-term exposure to air pollution can raise the risk for many serious diseases, including lung cancer, heart disease and asthma. The air pollution exposure of pregnant women may also affect foetal development and the future health of the children.

Air pollution can affect everyone, but some individuals have higher risk:

- People with lung disease, heart disease, diabetes or other serious illnesses,
- Babies, children, and the elderly, and
- People living or working near high levels of air pollution, including roads with heavy traffic, ports and industry.



Here are some tips to help reduce your exposure to air pollution:

- Check air pollution alerts for the day, if available, and avoid strenuous activities when levels are high. In the summer, pollution levels are usually lower in the morning.
- Avoid walking and biking along streets with heavy traffic. Plan your route to follow side streets with less traffic.

HOW DOES AIR POLLUTION AFFECT THE ENVIRONMENT?

In addition to health problems, air pollution can have serious impacts on the environment. SO₂ and NO_x can turn into acids in the air, causing acid deposition that damages soils, forests and lakes.

When nitrogen air pollutants are deposited on the ground and water, they act like fertilizer, causing unnatural growth and disruption of ecosystems. Ozone damages crops and forests. Ozone, acid deposition and PM also damage building materials and cultural objects like statues.



WHAT CAN YOU DO TO REDUCE AIR POLLUTION?

The small things you do every day can help reduce air pollution in your home and community, and help make the air cleaner and healthier for everyone. Here are some tips:

Drive less. Walk, bike or use public transportation when possible. Join a carpool to get to work. When you must drive, combine errands for fewer trips. Keep your car well maintained, and check tire pressure. Turn off the engine while waiting. Make your next car purchase a low-emission, fuel-efficient car.



Conserve energy. Use low-energy light bulbs and appliances. Turn off lights when you leave the room, and turn off "stand by" electronic devices and power supplies completely when not in use. Lower your water heater temperature to 50°C.



Don't burn wood. In many places, wood smoke is one of the largest sources of PM in the winter. If you must use wood, replace your old wood stove with a new approved low-smoke model, and use only clean, well-dried firewood.



Use green products. Buy locally produced goods and eat local foods that are in season. Use solvent-free paints and environmentally friendly cleaning products. Don't smoke. If you do smoke, don't smoke indoors.



Get involved. Write to your politicians about your concerns for air pollution. Tell your neighbours about your own efforts to reduce pollution. Just knowing a neighbour is active about air pollution can motivate a person to take action.



KNOWLEDGE, ATTITUDES AND BEHAVIOR TO ADDRESS ISSUES AND CHALLENGES RELATED TO AIR POLLUTION

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