



INDOOR AIR QUALITY

A FU⁺UREPLUS GUIDE



+ WHAT IS INDOOR AIR QUALITY?

Indoor air quality is the quality of air inside a built space. It can be affected by a range of factors, including ventilation, building layout, location and functionality.

Small amounts of air pollutants are emitted from natural sources, such as wildfires, pollens or sea spray, but most air pollution occurs through human activities such as burning fossil fuels, use of cleaning products, tobacco smoke, dust, asbestos, moulds etc.

+ HOW IS INDOOR AIR QUALITY DISTINCT FROM OUTDOOR?

When we think of air pollution, car exhausts or factory fumes may come to mind. Outdoor air pollution is one of [the world's largest health and environmental problems](#), but also disproportionately affects certain [demographic groups](#) over others. Concentrations of outdoor pollutants, however, vary greatly depending on changes in the weather, climate or human behaviour, and tend to be dispersed by the natural effects of wind and heat.

Indoor pollutants on the other hand can become trapped inside buildings, especially where there is poor ventilation, and are not dispersed as quickly as they are outdoors. It is therefore vital that businesses consider both the impacts of their operations on outdoor air quality, as well as how they are ensuring that indoor air quality is monitored and improved.

+ WHY IS INDOOR AIR QUALITY IMPORTANT?

The full effects of exposure to poor indoor air quality is still being researched, but it is well documented that air pollution in general is having a devastating effect on public health.

Prolonged exposure to poor indoor air quality can have various negative effects, from headaches, dizziness and lack of concentration, to respiratory illnesses, high blood pressure, depression, irritation of the eyes and skin, asthma, and longer-term effects such as strokes, cardiovascular disease, lung cancer and reduced life expectancy. Emerging evidence also suggests that air pollution may have links to [cognitive function](#), causing premature decline, dementia, and mental health issues in children.



+ HOW IS INDOOR AIR QUALITY MONITORED?

Measurement of indoor air quality can be carried out fairly easily via portable or fixed-location air quality sensors, of which many options are available on the market. There are also companies that specialise in installing and monitoring indoor air quality. Please ask if you would like further information - info@future-plus.co.uk

The key indicators that can be monitored when assessing air quality are as follows:

- **Fine particulate matter** (such as dust, mould, smoke, pollen, ash etc.)
- **Carbon dioxide**
- **Volatile organic compounds** (such as formaldehyde)
- **Temperature**
- **Humidity**
- **Carbon monoxide**
- **Nitrogen Dioxide**
- **Radon**

In recent years, there has been increasing pressure on landlords to secure green building certificates using accreditations such as LEED and WELL, which focus on the efficiency and sustainability of buildings, as well as an emphasis on human health and wellbeing.

+ WHAT ARE 'SAFE' LEVELS OF POLLUTANTS?

Fine particulate matter - The guideline set by the World Health Organisation (WHO) is 10ug/m³. For every 10ug/m³ increase in levels of PM_{2.5} (fine particulate matter with a diameter less than 2.5 µm) above this guideline, life expectancy is seen to be lowered by one year.

Carbon Dioxide - Is a naturally occurring gas that makes up 0.04% (400ppm) of air, but is harmful to human health at levels >4.0% of air composition (40,000ppm) and should be well below this.

Volatile Organic Compounds (VOCs) - Recommendations from the World Health Organisation state that 0-400ppb is acceptable indoors. Exposure to VOC levels of around 400-2,200ppb can result in headaches, dizziness and irritation, while 2,300-30,000ppb is considered an unhealthy level of pollutants. Long-term exposure at these levels can lead to liver and kidney damage, respiratory and cardiovascular diseases and cancer.



Temperature - Between 21°C and 22°C is thought to be optimum.

Humidity - Both high and low humidity can impact health and comfort, and can also exacerbate the presence of biological pollutants such as mould spores. Recommended humidity levels are not lower than 30% and not higher than 60%.

You can find more detailed information on safe indoor air quality levels via the World Health Organisation's [Guidelines of Indoor Air Quality](#).

+ WHAT CAN WE DO TO IMPROVE INDOOR AIR QUALITY?

Ventilation - opening windows and internal doors to create a flow of air is the first step to improving air quality, although if your building is near a busy road, avoid opening windows during rush hour. Check you are using any extracts or trickle vents available too.

Air Filtration - an air purifier can be an effective way to remove pollutants, and plenty of indoor plants can also help.

Removing chemicals and pollutants - cleaning chemicals, printers and photocopiers, air fresheners, even furniture and carpets release VOCs. Choose eco-friendly cleaning products; keep printers and photocopiers away from desk areas in well-ventilated spaces, and make sure that office spaces are kept clean and carpets and rugs hoovered regularly.

Occupancy and capacity monitoring - avoid overcrowding (two many desks in one area for example) and monitor working patterns across the building or office space. Make sure that meeting rooms are not overheated and are well ventilated.

Training and education - once you have reliable air quality data, make sure employees are made aware that indoor air quality is an important issue and understand how small changes, such as keeping doors and windows open, can improve air quality, benefiting everyone.

Manufacturing - Indoor air quality in the manufacturing industry can throw up significant challenges in terms of employee safety and occupational health. Poor air quality can also lead to production issues, lower product quality, and lower profit margins. If you would like more information on indoor air quality in the manufacturing industry, please get in touch: info@future-plus.co.uk or you can find further resources regarding action for clean air [here](#).