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Factsheet: Air quality

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Introduction and definition

There are many different definitions of air quality, all of which primarily concern the measures to which air can be assessed as clean or polluted. Broadening the definition can also capture the extent to which that air is suitable and/or clean enough for the eco-systems affected by it to remain healthy and the longer-term possible effects that air could have on the wider environment.

The presence or amount of substances in the atmosphere/localised air that can cause damage to the climate and the environment or be harmful to the health of people and/or other living organism, is termed 'air pollution'. These pollutants can include:

- particulates and dusts - both organic and inorganic and at a range of sizes that may allow them to be inhaled and respired (for example, PM10 and PM 2.5)
- spores, bacteria, viruses and other biological material
- gases (for example, carbon monoxide, oxides of nitrogen and sulphur, chlorofluorocarbons, and methane).

Air quality and air pollution are factors in internal environments, such as houses, workplaces and schools (indoor air quality or IAQ) as well as outside (ambient air quality).

How does it affect our profession?

FM is responsible for sourcing, managing and delivering many of the services in our workplaces which have a direct effect on ambient as well as indoor air quality.

From vehicle emissions, boilers or other plant and equipment (refrigeration, fire and evaporative cooling) and the power we use (the impact of generation), to internal ventilation, chemicals for cleaning and other processes; all can have an effect on air quality, both positively and negatively.

By understanding these impacts and sourcing, specifying, operating and managing our buildings more effectively we can help optimise both the direct and indirect effects of air pollution and the risks associated with it.

Background and context

Historically, action around, for example, the smogs of the 1950s in the UK saw the introduction of the Clean Air Act in 1956. Due to concerns over the depletion of the Earth's ozone layer in the 1980s, a worldwide environmental treaty - the Montreal Protocol – was introduced, bringing in a

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phased ban on the production and use of ozone-depleting substances. However, these are only part of the story.

Because we, for the most part, cannot see air or the contaminants within it, its quality can be invisible to us. This air pollution, however, is a significant health concern, with the World Health Organisation (WHO) reporting that:

- an estimated 4.2 million premature deaths globally are linked to ambient air pollution
- worldwide ambient air pollution accounts for:
  - 29% of all deaths and disease from lung cancer
  - 17% of all deaths and disease from acute lower respiratory infection
  - 24% of all deaths from stroke
  - 25% of all deaths and disease from ischaemic heart disease
  - 43% of all deaths and disease from chronic obstructive pulmonary disease
- pollutants with the strongest evidence for public health concern, include particulate matter (PM), ozone (O_3), nitrogen dioxide (NO_2) and sulphur dioxide (SO_2).

More recently, concerns over asthma associated with ambient air pollution in the local environment have also come to the fore and added further focus on the need for greater control/management.

All these factors, coupled with greater public health awareness and understanding, are and will continue to see increased scrutiny of air quality/pollution as an issue and one that need to be addressed.

Legislation, policy and standards

Worldwide, many countries have already introduced initiatives, agreements and processes to help manage, mitigate and reduce the effects of air pollution. These range from broad controls to targeted interventions against specific compounds and chemicals (that is, SO_2, oxides of nitrogen and PM).

Globally, as previously highlighted, controls of carbon, greenhouse gas (GHG) emissions and ozone-depleting substances have been long established. On a national and local level, strategies around clean air, for example the US Clean Air Act, the National Clean Air Agreement in Australia and the UK Clean Air Strategy 2019, set aims and targets for improving air quality and tackling air pollution.

Other initiatives, both long established and developing, include:

- the United Nations Economic Commission for Europe (UNECE) Convention on Long-range Transboundary Air Pollution (1979)
- the WHO Global Platform on Air Quality and Health: a collaboration of nearly 50 international/regional agencies and research institutions, 'to strengthen capacity for air quality monitoring worldwide and assessment and reporting of related health impacts in a transparent and harmonized way'
- Clean Air Asia and Clean Air Africa: international NGOs with a 'global mission for better air quality and healthier, more liveable cities'.

As well as ambient air pollution, indoor air quality has also been a focus, with the EU-derived Workplace Health Safety and Welfare Regulations (1992), Regulation 6 Ventilation, the Control of Substances Hazardous to Health (COSHH) (2002) (and EH/40 - Workplace Exposure Limits) and the Building Regulations 2013 (as amended), Part F Ventilation, in the UK, covering aspects of

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ventilation and air quality. Equally, through the COVID-19 pandemic air quality and ventilation have been major themes and it is unlikely that these will go away any time soon.

Best practice, insight, guidance and resources

It would be impossible to list all the information available and keep this factsheet brief, so understanding your national, local and organisational requirements must be the best first step in assessing your air quality/managing air pollution.

Most Governments, NGOs and other bodies publish (mainly) freely available information, insights, guidance and best practice. This information covers GHG emissions and ambient air quality as well as applicable standards for IAQ. Air quality index information, published daily, is now also readily available for many cities and other locations around the world.

Setting your own policies, objectives and targets provides further commitment to and measurable targets against which you can monitor your progress and success.

UN Sustainable Development Goals

Although it doesn't feature as a standalone topic, air quality is intrinsic to a number of the 169 targets described in the United Nations Sustainable Development Goals (UN SDGs), including:

- Goal 3, Good Health and Well-Being: target 3.9 is 'By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and **air**, water and soil **pollution** and contamination'
- Goal 11 Sustainable Cities and Communities: target 11.6 is 'By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to **air quality** and municipal and other waste management'
- Goal 12: Responsible Consumption and Production: target 12.4 is 'By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their lifecycle, in accordance with agreed international frameworks, and significantly reduce their *release to air*, water and soil in order to minimize their adverse impacts on human health and the environment'.

Air quality also impacts on a number of other UN SDGs, both directly and indirectly: the encouragement for research, implementing strategies and the greater adoption of clean and environmentally sound technologies and industrial processes will see benefits environmentally socially and individually.

Governance, metrics and KPIs

There is a myriad of metrics, KPIs, legislation and governance in place for air quality/pollutants, depending on your location and type of industry.

Carbon emissions have been very highly covered for a long time, although the mechanisms for driving change and reduction are varied; with carbon footprint management and cap and trade schemes just two examples.

Equally, fluorinated greenhouse gases (F gases) (i.e. hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF6)), also have legislation in place covering their production, usage and disposal. As a consequence, procedures for recording their volumes and usage are relatively well developed.

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Other pollutants that have an environmental as well as a public health concern include particulate matter (PM), ozone (O_3), nitrogen dioxide (NO_2) and sulphur dioxide (SO_2) has seen specific targeting of them with thresholds set for both ambient and indoor air quality. However, these can and do vary between jurisdictions. Some of this targeting has had a profound effect, such as the 97% reduction in sulphur dioxide emissions (from 1970 levels) in the UK (Defra).

Setting your own applicable targets for air quality based on verifiable and accurate baselines (and your legal requirements, of course) is a good means of demonstrating your commitment not just to the environment, but to also your local community and staff.

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