# Risk Insight

## Protecting your workforce: Air Pollution

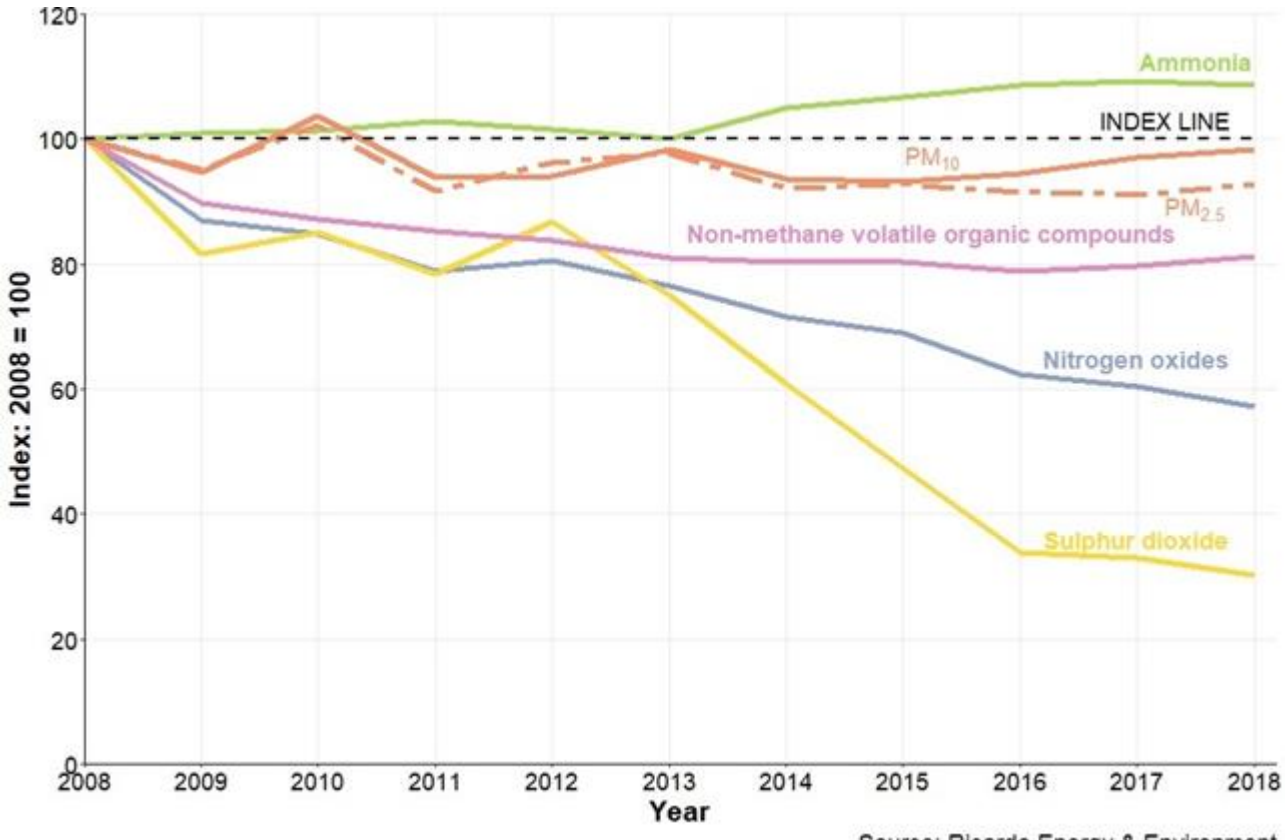
### Introduction

The impact of air pollution on the general population has been very much in the news recently. Each Covid-19 lockdown has seen a reduction in background air pollution although these gains have not always continued once the lockdown is lifted. There is a growing body of scientific research papers linking levels of air pollution to a range of health outcomes. Covid-19 has brought the quality of the air around us to the top of many agendas.

We are describing air pollution as background because it is usually associated with general transport, industrial and domestic emissions released from thousands of premises and vehicles. The main pollutants identified as causing ill-health in people are particulate matter (PM) at PM2.5 and PM10 and gases Nitrogen dioxide (NO2) in particular, but also Ozone (O3), Sulphur dioxide (SO2), Polycyclic aromatic hydrocarbons (PAH) or Carbon monoxide (CO).

There has been a long-term decrease in the emissions air pollutants however in the most recent ten-year period of emissions estimates, there has been mixed progress.

**Trends in annual emissions of particulate matter (PM10 and PM2.5), nitrogen oxides, ammonia, non-methane volatile organic compounds, and sulphur dioxide, 2008-2018**




Source: Ricardo Energy & Environment

This Risk Insight considers the impact of this type of air pollution on workers who may be exposed due to the nature of their jobs, rather than because of where they live.

## The Risks

### Health impact

- Nitrogen Dioxide, Sulphur Dioxide and Ozone gases irritate the airways of the lungs, increasing the symptoms of those suffering from lung diseases
- Fine particles can be carried deep into the lungs where they can cause inflammation and a worsening of heart and lung diseases. These particles can include a wide range of substances including metals.
- Carbon Monoxide prevents the uptake of oxygen by the blood. This can lead to a significant reduction in the supply of oxygen to the heart, particularly in people suffering from heart disease.

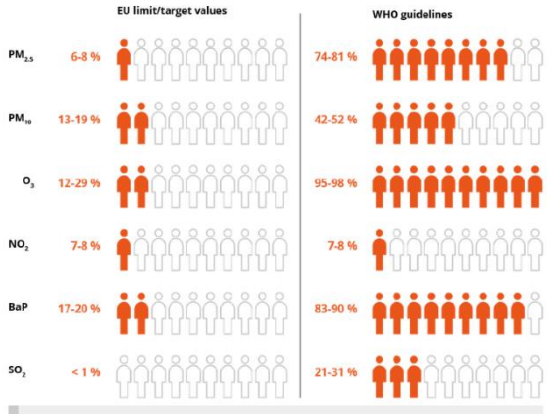
In 2019 The Journal of Alzheimer's Disease Reports published a review of the evidence base with respect to the relationship between air pollution and later cognitive decline and dementia. It found greater exposure to PM2.5, NO2, NOx, and CO were all associated with increased risk of dementia.

As Covid-19 spread around the world, studies such as one published in Nature showed a positive correlation between high concentrations of air pollution particles and more rapid transmission of the disease and more severe illness from catching it.

### Air Quality Standards

There is no globally accepted set of standards for air quality, with some organisation's standards being more stringent than others. The World Health Organisation sets a lower limit than the European Union for most air pollutants. This has the effect of indicating a higher number of people at risk.

Share of the EU urban population exposed to air pollutant concentrations above EU and WHO reference values in 2015 - 2017




### Personal factors

Some people will be more susceptible to the effects of air pollution than others. This is primarily related to medical conditions or disease effecting the heart or lungs, but may also include general health factors such as body mass index, high blood pressure and lifestyle choices such as tobacco use or physical fitness.

The UK Committee on the Medical Effects of Air Pollutants (COMEAP) is carrying out ongoing research including the potential effects of air pollution on people with dementia and on unborn children.

### Occupational Factors

Analysing the impact of this general air pollution exposure on workers is complicated by the presence of other respirable hazards such as inorganic dust (asbestos, cement dust, concrete dust, man-made mineral fibres, or quartz), gases and irritants (organic solvents, epoxy resins, or di-isocyanates), fumes and exhausts (metal fumes, asphalt fumes or diesel exhaust) and wood dust.

These substances are usually directly associated with work activities and employers will have more control over worker's exposure and their protection. The protection of workers from respiratory occupational hazards is a key focus for the HSE in the UK because it causes a significant proportion of occupational ill-health and fatalities. It may be the case that protection from these direct hazards may afford some level of protection from the indirect air pollution hazards also, but this should not be assumed. For example, personal respiratory protective equipment (RPE) provided to a worker to protect them against stone dust during cutting operations may offer little if any protection against hazardous gases from vehicle exhausts.

**Which workers are more at risk?**
Any person who is working outdoors, or in a building with lots of natural ventilation, in an area with higher levels of air pollution could be more at risk. This may include vehicle drivers, road workers, staff at drive-throughs or vehicle garages, police officers, paramedics, crossing patrols, cycle couriers, grounds maintenance workers, telecoms or utility engineers, refuse collectors and construction workers.

## Law and Liability

This Risk Insight deals only with the employer's civil law responsibility to protect the health of workers and their possible liability in the event of a civil claim for compensation. The scenario here is that a worker makes a civil claim for damages resulting from their exposure to indirect background air pollution during the course of their work duties.

For the claimant to prove their claim in common law negligence they must first prove that a duty of care was owed by the defendant, usually their employer. In deciding whether the defendant owes a duty of care the court will consider three points;

1. is there a relationship
2. proximity between the parties?
3. was the injury to the claimant foreseeable?
4. is it fair, just and reasonable to impose a duty?

The first point is usually clear in an employer and worker relationship, although employers should be careful to consider workers who may be considered employees because of the degree of control the employer has over their work. This may include temporary or agency staff, volunteers or embedded maintenance teams potentially.

The second point is much less clear. There is little doubt that air pollution is harmful. However, this is complicated due to the risks outlined above. For example, was the employer aware of any vulnerability the worker may have had to air pollution? To what extent was the claimant exposed to background air pollution at home or through their other activities? Was it the air pollution or another factor such as smoking that caused the harm? Was it indirect air pollution or direct exposure to occupational respiratory hazards that caused the harm? There is also the usual consideration of whether similar exposure had occurred while the claimant was working for other employers.

Similarly, there are factors that complicate point three. Clearly employers have a duty to prevent foreseeable harm to their workers. They are legally expected to do this to the extent that it is reasonably practicable to take action and it is that point that is currently unclear. In this context the employer will not be in control of the source of the pollution emissions, but the level of pollution in an area can be estimated. The section on good practice below indicates some of the measures that a reasonable employer could consider in their risk assessment for worker exposure to indirect air pollution.

It is perhaps indicative of the complexity of this issue that *In January 2019, Andy Slaughter MP, on behalf of the British Safety Council, asked a Parliamentary Question about how the Health and Safety Executive (HSE) regulates the exposure of outdoor workers to ambient air pollution. Sarah Newton MP answered that HSE does not regulate ambient air pollution and has no plans to research its links to workers' health. Again, in May 2019, Paul Farrelly, Labour MP, asked the Secretary of State for Environment, Food and Rural Affairs, whether he plans to ensure that ambient air pollution is treated as an occupational health issue and adopt a workplace exposure limit for diesel engine exhaust emissions. Again, the answers were negative.*[1]

This does not diminish an employer's responsibility for their worker's health.

## Good practice to assess and reduce exposure

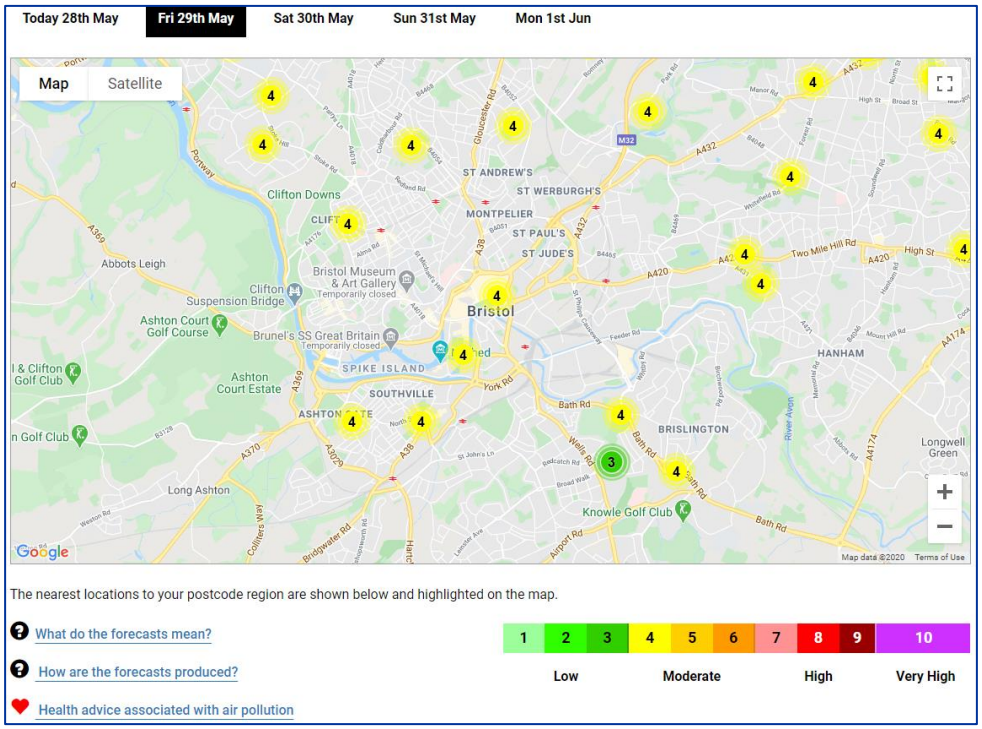
**Assessing exposure**

It is good practice to carry out pre-employment health screening for new workers. There are certain conditions that are known to increase an individual's vulnerability to air pollution. The aim is to identify any proven conditions that the worker has so that the employer can properly protect the individual's health. An employer should also have some means of enabling workers to update this information as their employment continues. This information should be available to managers or supervisors who have control over the individual's work so that reasonable adjustments can be made as necessary.

It is possible to estimate levels of air pollution either through consideration of a set of criteria that will influence exposure. For example;

- Traffic emissions – proximity to roads; traffic volumes and flow; buildings enclosing the work area
- Industrial & other emissions – proximity to urban areas or industrial sites
- Weather – precipitation, wind speed and direction; seasonal variations
- Tasks – duration and frequency of exposure, kneeling or in excavations

In addition, DEFRA produce daily air pollution data and forecasting for the UK (https://uk-air.defra.gov.uk/forecasting/) that can be used to inform risk assessment. Pollution levels are placed into risk bands with corresponding advice for people who are more at risk and for the general population. This is known as the 'Daily Air Quality Index' and an example is shown below with the relevant section of the interpretive table.




## Recommended Actions and Health Advice

| Air Pollution Banding | Value | Accompanying health messages for at-risk individuals* | Accompanying health messages for the general population |
|---|---|---|---|
| Low | 1-3 | **Enjoy** your usual outdoor activities. | **Enjoy** your usual outdoor activities. |
| Moderate | 4-6 | Adults and children with lung problems, and adults with heart problems, **who experience symptoms**, should **consider reducing** strenuous physical activity, particularly outdoors. | **Enjoy** your usual outdoor activities. |

At a personal level, the British Safety Council in collaboration with Kings College London have developed a mobile app called Canairy. The app helps monitor and control outdoor workers' exposure to ambient air pollution in London within the M25.It is based on data produced by the London Air Quality Network (LAQN) (www.londonair.org.uk/LondonAir/Default.aspx) and draws on the LAQN pollution map and the worker's GPS to calculate a user's exposure to pollution on an hourly basis.

By mapping an individual's exposure and linking the values to WHO limits for the major noxious gases (NO2, ozone, PM10 and PM2.5), the app notifies the user if their exposure exceeds WHO limits for these substances.

**Reducing Exposure**
As with any risk assessment process, employers should apply the risk control hierarchy. Eliminating or even changing the nature of the air pollution may prove difficult in the short to medium time, but there are technical, administrative and personal controls that can be considered. Some examples are given below;

Technical controls

- Increasing mechanisation of tasks will reduce how strenuous activities are and so reduce workers' respiration rate
- Improve screening, air filtration and air movement in buildings such as security booths or drive throughs and site welfare facilities
- Placing site accommodation away from roads or upwind of industrial emission points.
- Install temporary or permanent pollution barriers as part of construction projects

Administrative Controls

- Rotation of workers away from higher concentrations of air pollution, particularly those with known vulnerabilities.
- Enable breaks in cleaner air zones
- Turn off engines of plant or vehicles instead of having them idle
- Schedule work around times with lower traffic volumes

Personal Controls

- Provide and fit appropriate personal RPE
- Encourage general good health through wellbeing initiatives
- Worker education programmes about the risks, ill-health symptoms and risk controls for air pollution

## Summary

While there has been good progress in reducing emissions of air pollutants, levels of background air pollution in urban and roadside locations particularly remain at levels that mean that organisations must consider the impacts of this type of air pollution on workers who may be exposed due to the nature of their jobs. Employers need to integrate assessment and mitigation of the risks from air pollution into their protection practices.

## References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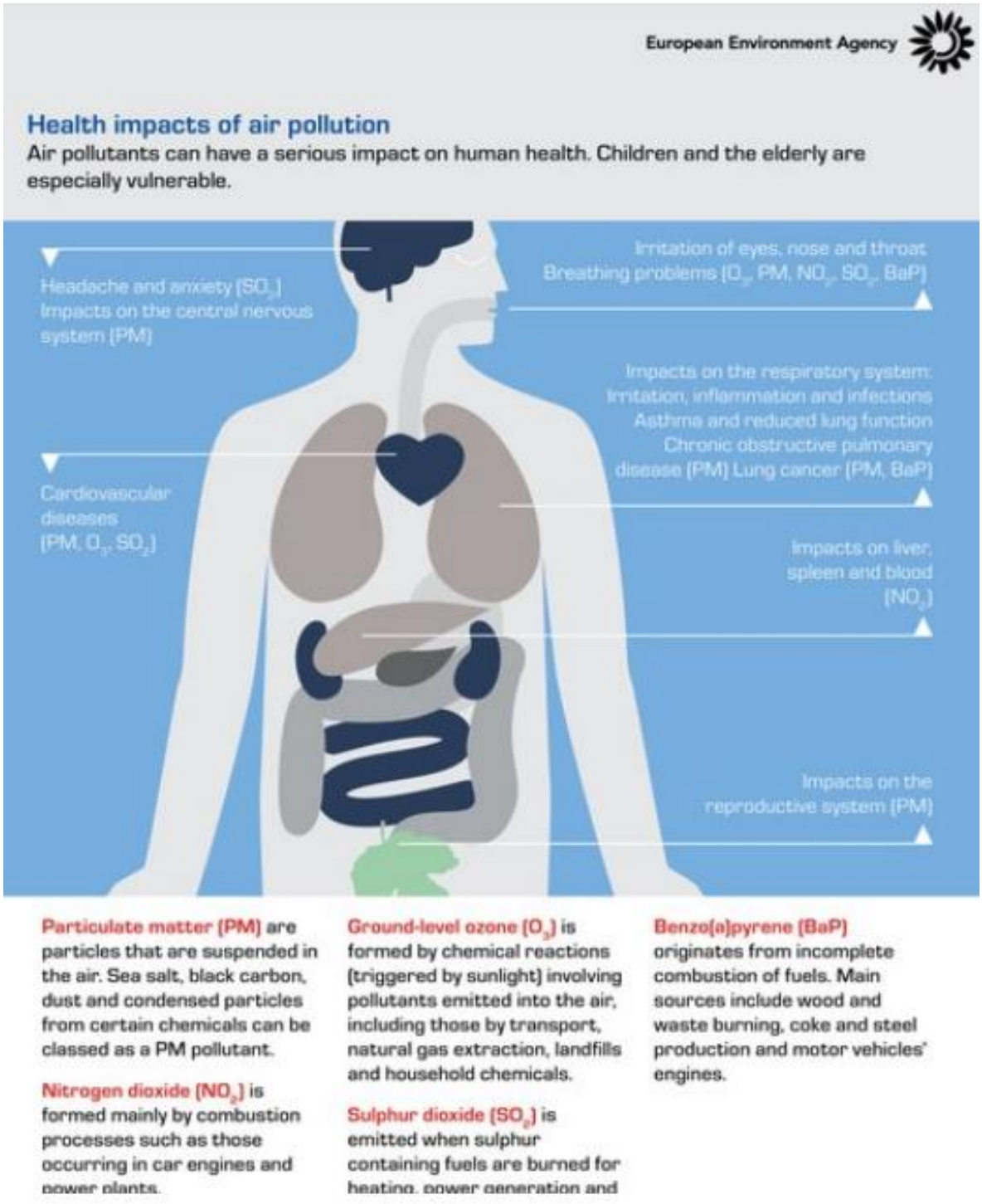

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