

Ventilation Factsheet

What is ventilation?

Ventilating and cleaning the air in buildings is a crucial part of enabling health and wellbeing of people. But it is so often ignored or poorly understood – and we usually only notice when there is a problem.

Good ventilation can reduce exposure to air pollutants and infectious diseases, help us to perform better and be more productive, enable us to sleep better, and reduce mould and damp in buildings.

Good ventilation is part of creating a sustainable and low carbon environment, by using technology well to balance air quality, energy use and comfort.

How do you ventilate a building?

Buildings can be ventilated in a multitude of different ways depending on the age, design, location and purpose of the building. Natural ventilation uses windows, doors and other openings to allow airflow through a building that is driven by the weather – the wind or by temperature differences. Mechanical ventilation uses technology to enable airflows and ranges from a simple extract fan such as in a bathroom, through to complex ducted systems that provide air to a whole building. Alongside ventilation, there are a range of technologies to heat, cool or clean the air that can also be used to provide good indoor environments.

Sounds complex? Sometimes it can be, but there are many ‘free’ resources out there to help aimed at professionals and the public. For example: -

Ventilation in the workplace – HSE summary of how to manage ventilation in workplaces including a simple video and information on how to assess ventilation. **Link:** <https://www.hse.gov.uk/ventilation/overview.htm>

Breathe Freely – BOHS simple tool to help evaluate ventilation. This was designed for the pandemic but is very helpful for general assessment of ventilation too. **Link:** <https://breathefreely.org.uk/ventilation-tool/>

BESA guides to indoor air quality – links to several reports including a beginners guide to indoor air quality and more detailed guidance and assessment approaches. **Link:** <https://www.thebesa.com/iaq?hsLang=en>

CIBSE Top Tips on Ventilation – summary of information on ventilation including how buildings are ventilated and some considerations for design and operation. **Link:** <https://www.cibse.org/knowledge-research/knowledge-portal/ventilation-in-buildings-top-tips>

Reducing health harms associated with air pollution (UK Health Security Agency) **Link:** <https://www.gov.uk/government/publications/chemical-hazards-and-poisons-report-issue-28>

Infection Resilient Environments: Buildings that keep us healthy and safe (RAEng NCEP) **Link:** <https://raeng.org.uk/media/i4eekztq/infection-resilient-environments-initial-report.pdf>

Infection resilient environments: Time for a major upgrade (RAEng NCEP) **Link:** <https://raeng.org.uk/media/dmkplp10/infection-resilient-environments-time-for-a-major-upgrade.pdf>

Engineering a reduction in air pollution (RAEng) **Link:** <https://raeng.org.uk/media/h0hpcdan/nepc-air-pollution-report.pdf>

UK Gov. SAGE paper – Role of Ventilation in Controlling SARS-CoV-2 Transmission 2020 **Link:** https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/928720/S0789_EMG_Role_of_Ventilation_in_Controlling_SARS-CoV-2_Transmission.pdf

Managing complex trade-offs

Ventilation is just one element in enabling a building to perform well. Ventilation needs to be considered alongside energy consumption, climate change, urban pollution, noise, comfort and safety and security in buildings. In designing buildings for the future and upgrading existing buildings to be sustainable, healthy and safe, there are complex trade-offs to consider.

With the current focus on energy costs, it is tempting to reduce ventilation rates as a way of saving money. But this brings potential significant health consequences in the long term. It is critical that the importance of good indoor air quality is at the heart of decisions about design and operation of buildings.

Even simple actions can help enable better ventilation and heating without increasing energy costs:

Ventilation TIPS:

Make sure your systems work

It sounds simple but ensuring filters are regularly changed, that systems are set up properly and that fans are running can make a big difference.

Use windows well

If you are relying on windows, open high level windows during cold weather to reduce drafts and/or open windows intermittently rather than all the time.

Optimise the heat

The more effectively you use your heating system the easier it is to ventilate too. Bleed radiators, make sure that radiators are not blocked by furniture or covers and move seating away from cold windows.

Use the weather

On sunny days in autumn and winter, allow the solar heat to come into your building and open windows more on the sunny side.

Target your ventilation to activities

Use extract fans for short periods when cooking or after showering. This removes pollutants and moisture at source and prevents problems later.

Consider using air cleaners

When it is difficult to ventilate, HEPA filter air cleaners can be an effective and low energy way of reducing exposure to indoor pollutants, particularly for people who are vulnerable to the impacts of air pollution or disease.

Did you know?

Ventilation helps you sleep

A **study from Denmark** showed that participants who had better ventilation in their bedroom had a better measured sleep quality and were able to concentrate better the next day. Link: <https://onlinelibrary.wiley.com/doi/10.1111/ina.12254>

Ventilation can reduce respiratory infection

Studies in **army barracks** and a **nursing home** have both shown lower respiratory illness prevalence in buildings with higher ventilation rates. Link: <https://jamanetwork.com/journals/jama/article-abstract/371466>
<https://agsjournals.onlinelibrary.wiley.com/doi/10.1111/j.1532-5415.1996.tb01859.x>

Ventilation is good for your building

Buildings with better ventilation have less issues with damp and mould, which improves human health and reduces damage to building materials.

Ventilation reduces sickness absence

A **study from California** showed a significant association between higher ventilation rates and lower sickness absence in schools. So, improve your ventilation and increase attendance. **Link:** <https://onlinelibrary.wiley.com/doi/full/10.1111/ina.12042>

Ventilation helps you perform better

Ever get that sleepy feeling in a meeting, office or classroom where you just can't concentrate? It's quite likely that it is the build-up of carbon dioxide and pollutants due to poor ventilation. Many studies show that better ventilation can help concentration, productivity and performance.

Ventilation reduces exposure to pollutants

Indoor pollutants are caused everyday by cooking, cleaning, building materials and furnishing. Ventilation lessens exposure to these particles and Volatile Organic Compounds (VOC).

Ventilation improves sick building syndrome

A **study from the USA** which put UV lamps in the ventilation system in an office build to control biological pollutants and showed a reduction in symptoms in the office occupants. **Link:** [https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(03\)14897-0/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(03)14897-0/fulltext)

o o o o o O o o o o o

CWU Health, Safety and Environment Department (Nov 2022)

(Acknowledgement: Our thanks to the Building Engineering Services Association (BESA))