



RISE

Retrofit information,
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Indoor Air Quality: Getting ventilation right

Supply chain advice pack

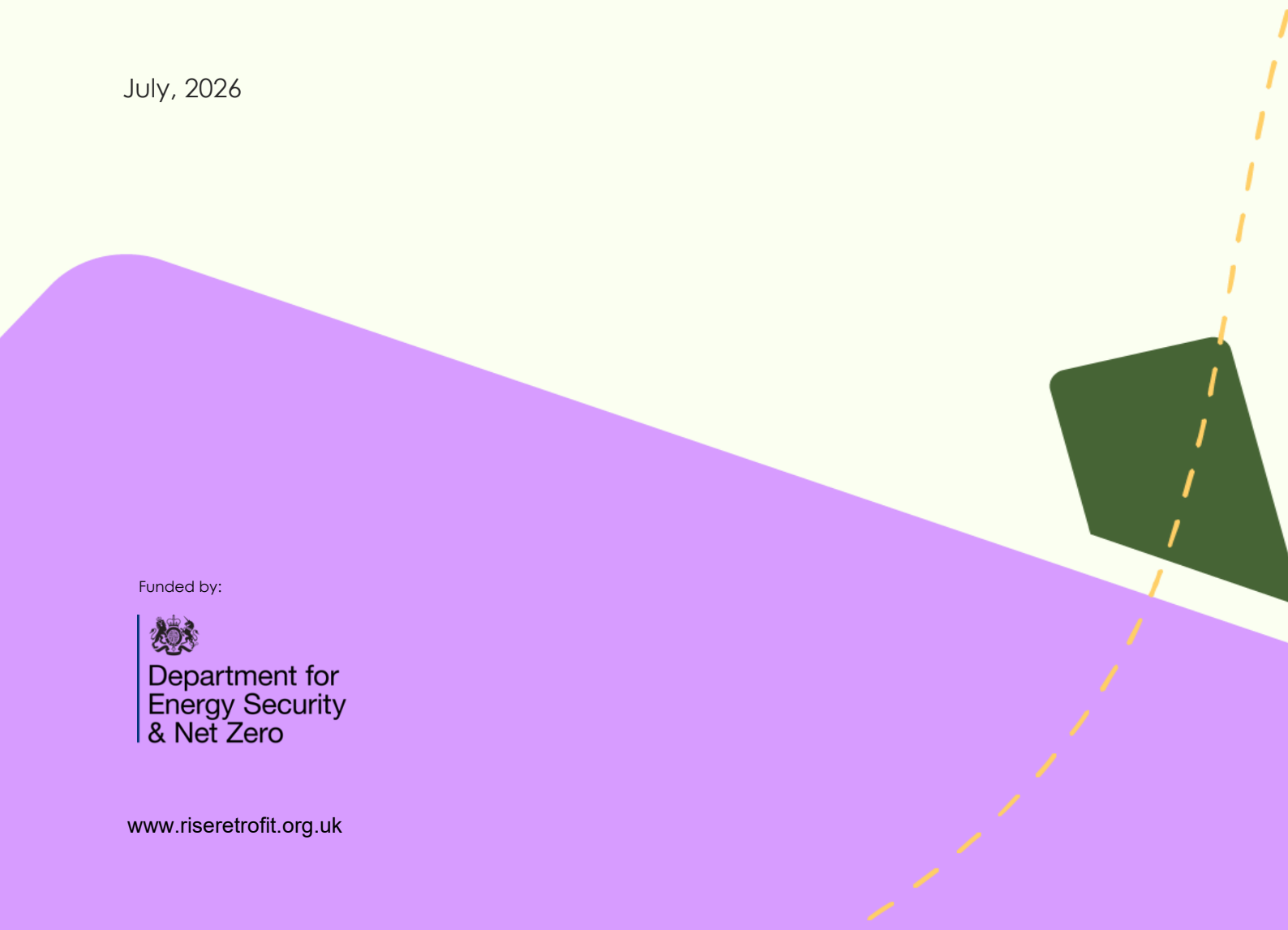
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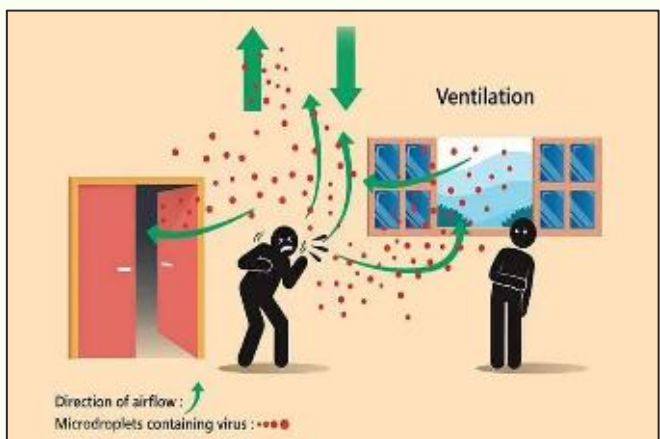


Introduction

Indoor air quality (IAQ) describes the atmospheric conditions inside a building that can impact occupants' health, comfort and performance. IAQ is critical consideration in domestic retrofit energy efficiency measures often increase airtightness within a building, altering the airflow patterns. This can increase the risk of poor ventilation within a building. The characteristics of IAQ include air temperature, relative humidity (RH), carbon dioxide levels, volatile organic compounds (VOCs), odours etc. Ventilation rate is considered an important factor as it directly determines how effectively indoor pollutants are diluted and cleared.



Source: Construction update



Source: Howlett

Understanding Indoor Air Quality

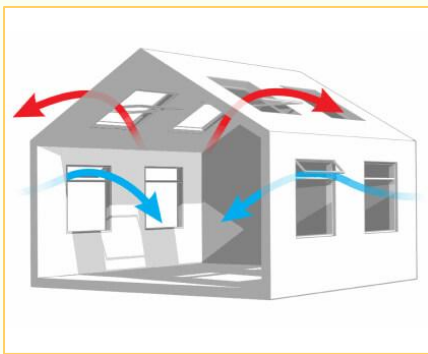
Ventilation is the main mechanism that controls IAQ.

When ventilation is poorly designed, installed, or maintained, pollutants accumulate, even in well-designed buildings.

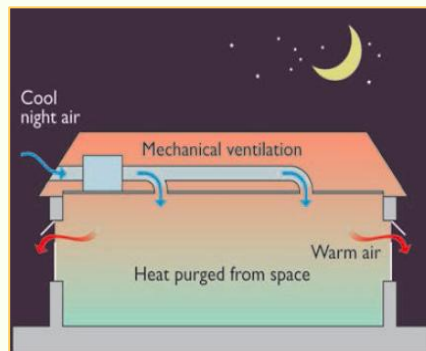
- Modern airtight buildings trap pollutants, making controlled ventilation essential rather than optional.
- The ventilation rate directly determines how quickly pollutants are diluted and removed.
- Good IAQ depends on correct system selection, proper installation, accurate commissioning, and ongoing maintenance.

Types of ventilation

- Natural ventilation in a building uses passive forces such as air pressure difference across the building, to push fresh air through one side and draw stale air out from the other, known as 'cross ventilation'.
 - There is also the 'stack effect' when air moves in and out of a building driven by thermal buoyancy.
 - This supplies fresh air and will help to cool building interiors, reducing the need for extract fans, helping to reduce carbon emissions and operational costs.
- Mechanical ventilation uses ductwork and fans to extract stale air and draw in fresh air, regardless of the weather conditions.
- Hybrid ventilation combines both natural and mechanical systems, using wind and the stack effect when weather conditions are beneficial. and helping to maximise efficiency whilst keep buildings comfortable and properly ventilated.



Source: Vesco



Source: The Green Age



Source: Passivent

What are volatile organic compounds

Volatile organic compounds (VOC's) are carbon based chemicals that evaporate into the air at room temperature. VOC's are ever present within our everyday lives, in homes, offices and buildings. Types of VOC's include:

- Formaldehyde
- Benzene
- Toluene
- Acetone
- Ethanol

Common sources

- Household products: paints, varnishes, glues
- Building materials: carpets, woods, adhesives
- Everyday goods: cleaning sprays, cosmetics, washing powders
- Fuel and solvents: petrol, degreasers, paint thinners



Source: air-Q

Health effects

There are various health risks with VOC's however this does depend on the specific chemicals and the length of exposure.

1. Short term exposure: eye, nose, throat irritation, headaches dizziness and nausea.
2. Long term exposure: can lead to chronic respiratory issues, possible liver and kidney damage.

How to reduce VOC exposure

Ventilation and source control need to be prioritised when looking to reduce or eliminate VOC exposure. Keep rooms well-ventilated by opening windows, especially when re-decorating or cleaning. Choose low VOC paints, fragrance free cleaning products. Store chemicals outside of living areas where possible. An activated carbon air purifier can also help remove harmful gases and improve IAQ.

Getting ventilation right

Getting ventilation right means ensuring systems deliver the airflow needed to protect occupant health. This requires attention at every stage - design, procurement, installation, commissioning, and maintenance.

Design and Specification

Ventilation systems must be sized and specified correctly for the building's use, occupancy, and layout.

Key considerations:

- Required airflow rates
- Occupancy patterns and peak loads
- Pollutant sources
- Energy efficiency and heat recovery
- Filtration requirements

Commissioning, Operation and Maintenance

Effective commissioning and regular maintenance are essential to ensure ventilation systems perform as intended.

Key requirements:

- Measure and balance airflow
- Verify controls, sensors and pressure regimes
- Replace filters and clean components
- Inspect fans, motors and ductwork
- Calibrate CO₂ , RH and temperature sensors

Monitoring, Verification and Responsibilities

Ongoing monitoring and clear coordination are essential to ensure ventilation systems continue to perform as intended and maintain good indoor air quality.

Key requirements:

- Use appropriate monitoring tools (CO₂ sensors, IAQ monitors, BMS, remote systems)

- Avoid common installation and maintenance pitfalls
- Follow clear checklists at each stage
- Monitoring helps identify issues early, supports evidence-based maintenance, and ensures systems continue to deliver the airflow and filtration needed for healthy indoor environments.

Common Pitfalls to Avoid

- Systems installed without proper commissioning
- Duct leakage reducing delivered airflow
- Poor coordination between installers and commissioning teams
- Value engineering that removes essential components
- Avoiding these issues requires clear responsibilities, communication, and adherence to agreed standards across the supply chain.

Practical Checklists for the Supply Chain

The table below summarises the essential checks at each stage of the project lifecycle.

Stage	Key Checks
Design	Airflow rates calculated; pollutant sources identified; filtration appropriate for outdoor air; maintenance access included
Installation	Ducts correctly sized and sealed; fans and terminals installed as specified; access for filter changes; controls and sensors positioned correctly
Commissioning	Airflow measured and recorded; systems balanced; controls tested; documentation completed
Maintenance	Filters replaced on schedule; sensors calibrated; ducts and grilles clean; fans and motors operating efficiently

Summary

Indoor air quality is essential for health, comfort, and productivity. Ventilation is the primary mechanism for controlling IAQ, but only when systems are correctly designed, installed, commissioned, and maintained. For the supply chain, getting ventilation right means taking responsibility at every stage to ensure systems deliver the airflow needed to protect occupants and maintain building performance.

Good IAQ is not a one-off achievement it requires continuous attention, monitoring, and collaboration across the supply chain.

Resources

	Podcast: All RISE podcasts are available here .	Podcast: "Indoor air quality and retrofit with the University of York" available here .	
	Masterclass: All RISE masterclasses are available here .	Masterclass "Ventilation in practice with Aereco" available here .	
	Advice pack: All RISE advice packs available here .	Advice pack: "Different approaches to ventilation, and minimising conflict" available here .	

This pack aims to share insights, good practices, and lessons learned from the sector. It is intended for informational purposes only and does not constitute as recommendations or endorsements of specific suppliers, products, or services or as legal advice. Please always check the latest regulations.



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