



BETTER VENTILATION, BETTER HOMES, BETTER HEALTH

Sustainable, safe and efficient ventilation for a healthier nation



ABOUT BEAMA

BEAMA is the UK's leading trade association representing manufacturers of electrical infrastructure products and systems from transmission through distribution to environmental systems and services in the built environment.

For more information, visit:
www.beama.org.uk

E: info@myhealthmyhome.com

BEAMA Ltd
Rotherwick House
3 Thomas More St
London E1W 1YZ

Chief Executive Officer:
Dr Howard Porter

© Copyright 2021 BEAMA Limited

Registered in England
Reg. No. 84313
Vat Reg No: GB 239 9193 21

BEAMA Ventilation Group

The BEAMA Ventilation Group is made up of the UK's leading ventilation providers, our members are:



www.airflow.com



www.envirovent.com



www.gdhv.com



www.nuaire.co.uk



www.titon.co.uk



www.vectaire.co.uk



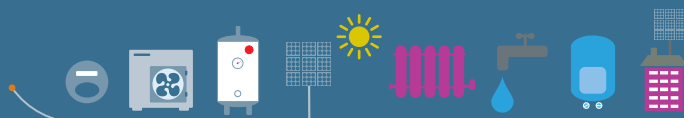
www.vent-axia.com



www.verplas.co.uk

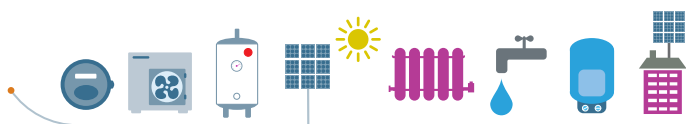


www.zehnder.co.uk



CONTENTS

Executive Summary	4
Foreword on Indoor Air Quality	5
A word from Academia	6
A word from Patients	6
Indoor Air Quality and Health	7
Ventilation and Good Indoor Air Quality	8
The Challenge for Ventilation	9
Policy Solutions	10
My Health My Home	12
Glossary of terms	13
References	13



EXECUTIVE SUMMARY

The proposals in this paper set out what BEAMA believe needs to be done to deliver good indoor air quality in UK homes – helping to deliver better ventilation, better homes and better health.

The COVID-19 pandemic has demonstrated the value of having healthy indoor environments, but also shown their fragility. People are asking the question that if viruses spread much quicker indoors, then what about pollutants and other harmful substances?

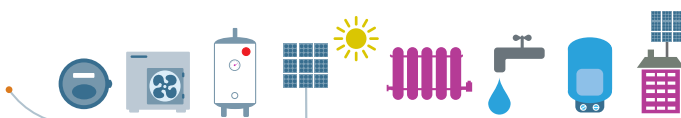
BEAMA has long been advocating that poor indoor air quality, or indoor air pollution, is a growing public health concern. It is responsible for thousands of deaths per year, as well as substantial healthcare and wider economic costs.

As the Government builds towards its Net Zero target, homes are becoming more airtight. With energy efficiency measures, such as insulation, being retrofitted to the existing housing stock and new homes built to ever higher levels of energy efficiency, the need for effective ventilation becomes increasingly important. Numerous studies have shown the critical role that ventilation plays in removing indoor pollutants from the home and stopping these pollutants from accumulating – reducing exposure levels, improving cognitive performance and minimising the health symptoms suffered by occupants.

For the ventilation industry to be able to play its part in delivering good indoor air quality, two big issues must be tackled: energy efficiency and ventilation improvements must be joined up ('Ventilate when you Insulate!') and poor-quality installations of ventilation systems and poor compliance need to be rooted out.

To meet these challenges, BEAMA recommend that the Government

1. Set higher ventilation standards for new build to protect health and wellbeing
2. Ensure energy efficiency retrofits are matched by effective ventilation measures to protect health and wellbeing
3. Drive ventilation compliance standards
4. Treat poor IAQ and ventilation as a public health emergency and, in addition to public education campaigns on the risks and solutions, make sure it is enshrined in all relevant policy areas



FOREWORD

Indoor Air Quality

“Poor indoor air quality, or indoor air pollution, is an issue that has, and is, becoming ever more prominent in all of our lives.

As we begin to emerge from the heights of the COVID-19 pandemic, it felt like an appropriate time to issue an update to our Ventilation White Paper. If coronavirus has revealed one thing about the built environment, it is the importance of effective ventilation for our health and wellbeing. Yet while very positive steps have been made to improve the energy efficiency of our homes, whether they be newly built homes or retrofitted existing homes, the same still cannot be said for improvements in ventilation. Unfortunately, without adopting a ‘Ventilate when you Insulate’ approach, we are at serious risk of creating a major public health burden in the years to come by sealing pollutants and viruses in our homes.

As the industry body representing the UK’s leading ventilation providers, we are determined to do all we can to ensure that the ventilation market works properly and share our decades worth of experience in order to come up with solutions to the problems that face both the industry, and the country at large.

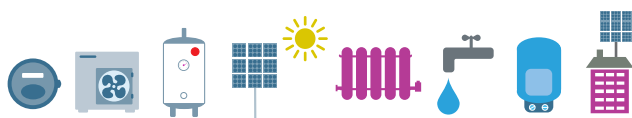
In this paper we set out a new case for delivering better ventilation, for better homes, for better health. We are pleased that the Government’s recently published Heat and Buildings Strategy emphasised the need for our future buildings to be not only low carbon, but healthier as well. This ambition needs to be realised.

We knew that leadership on making ventilation the effective solution for improving indoor air quality needed to come from us as industry, and we embraced that challenge and continue to do so. We now ask the government to join us in this mission by giving us and the wider public the tools and support to make ventilation in UK homes the best it can be, and to ensure that the health and wellbeing of current and future generations is protected.”



A handwritten signature in black ink, appearing to read 'Howard Porter'.

Dr Howard Porter
Chief Executive Officer
BEAMA
November 2021



A word from Academia

“Current legislation in the UK recognises the importance of lethal indoor air pollutants, such as carbon monoxide, and mandates specific actions accordingly. Thermal comfort is also well recognised, which has resulted in concerted action through fuel poverty and domestic energy efficiency initiatives and policies. In comparison, indoor air quality is poorly considered and has not received the same level of attention. As such, indoor air quality actions are significantly lacking.

Given the current focus on energy efficiency policies as part of the Government’s Net Zero strategy, there is a significant need to raise the agenda of indoor air quality to ensure the delivery of homes that protect building occupants and do not create or exacerbate health problems.”

Prof Tim Sharpe

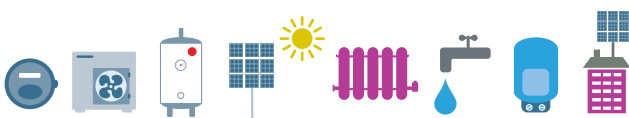
Head of Architecture, University of Strathclyde Chair, Health Effects of Modern Airtight Construction Network

A word from Patients

“Poor ventilation, humidity and inefficient air exchange are major contributors to mould and house dust mites, both of which can have a significant negative impact on the health of adults and children in their own homes. We are seeing an increase in the number of calls to our Helpline from people whose allergic symptoms suggest that these factors are the cause. While energy efficiency remains a priority for the building industry, the issue of indoor air quality and its impact on human health needs to be more widely recognised and addressed.”

Carla Jones

Chief Executive Officer, Allergy UK



INDOOR AIR QUALITY AND HEALTH

Poor indoor air quality (IAQ), or indoor air pollution, is linked to a range of health conditions and is responsible for a significant loss of healthy life years, loss of life and disease burden, and the knock-on costs to the NHS, and the wider economy, are considerable.

UK citizens spend around 90% of their time indoors² and around 16 hours a day³ on average at home. The pandemic saw this rise even further and as home-working becomes increasingly normalised, it is likely that this trend will continue. This means that our potential risk of exposure is many times that of the risk from pollution outdoors, as air quality and virus transmission indoors can be significantly worse than outdoors.⁴

Poor IAQ has been linked to allergy and asthma, lung cancer, chronic obstructive pulmonary disease, cardiovascular disease and more recently even investigated for its links to dementia.⁵ A report into the health effects of indoor air quality on children and young people in 2020 revealed that indoor air pollution caused respiratory problems in children right through from infancy to school age.⁶ Additionally, the National Institute for Health and Care Excellence (NICE) published new 2020 indoor air quality guidelines¹⁸ demonstrating the importance of improved IAQ, recommending the adoption of a whole house approach to heating and ventilation, and balancing indoor air quality with standards for energy use. The pandemic has also revealed the importance of effective ventilation in reducing virus transmission.⁷

In 2015, Hazim B. Awbi, Professor of Building Environmental Science at the University of Reading, predicted that by 2050, without action to tackle indoor air pollution, there could be an 80% rise in those suffering asthma symptoms and total volatile organic compound concentrations could rise to 60% above WHO 24-hour limit levels.⁸

THE HUMAN COST

Poor IAQ is reported to have an annual cost to the UK of over 204,000 healthy life years, with 45% of those lost to cardiovascular diseases, 23% to asthma and allergy, and 15% to lung cancer.⁹

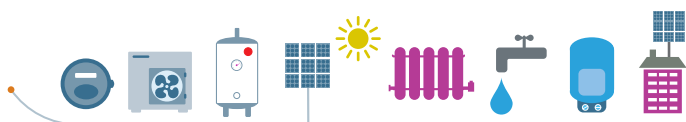
In 2012 The World Health Organisation reported that indoor air pollutants were responsible for around 99,000 European deaths a year.¹⁰ Whilst in 2016, the Royal College of Physicians warned that indoor air pollutants cause, at a minimum, thousands of deaths per year in the UK and are associated with healthcare costs in the order of "tens of millions of pounds".¹¹

Public Opinion¹¹:

74% of the British public are aware that poor indoor air quality could negatively affect their health.

69% of the British public believe indoor air pollution to be as important as outdoor air pollution and

12% say it is more important.



VENTILATION AND GOOD INDOOR AIR QUALITY

The recent drive to increase air tightness and energy efficiency as part of the Government's Net Zero target, largely through insulation measures, has increased the risk of a deterioration in air quality and the build-up of pollutants inside UK homes and buildings. The most cost-effective procedure to rectify these problems is the standardised fitting of an effective and continuous mechanical ventilation system.

In a 2002 BRE study¹² of houses built after 1995, substantial evidence was found to link low ventilation rates with deteriorating indoor air quality, with further deterioration expected for newly built dwellings.

Many studies have shown improvements in indoor air quality and positive human impacts after the installation of effective ventilation systems, including:

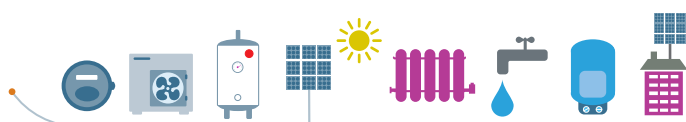
- In 2020, the Royal College of Physicians (RCP) and the Royal College of Paediatrics and Child Health (RCPCH) published a report⁶ on the health effects of indoor air quality on children and young people. It revealed that to combat the respiratory and cognitive problems in children caused by a build up of indoor air pollutants, insulation improvements needed to be matched with adequate ventilation.
- The UK Chief Medical Officer's annual report¹³ 2017 – 'Health Impacts Of All Pollution', references new indoor air ventilation and filtration models, developed by the EU-funded HEALTHVENT, which have shown the potential for significant health risk reduction. Well-maintained ventilation is therefore vital for safeguarding human health by managing and reducing the level of VOCs in the home, minimising cases of lung cancer, asthma, cardiovascular disease and COPD.

- A 2012 Allergy UK study¹⁴ – 'Work Fever' – reports that headaches, lethargy and a dry throat can be caused by poor ventilation and that only 9% of those who experienced breathing difficulties at work, worked in an office that they considered to be well ventilated.
- A 2008 study¹⁵ – 'The effect of domestic mechanical heat recovery ventilation on asthma control of patients allergic to the house dust mite' – shows that visual analogue scores for sneezing, nasal discharge and nasal blockage significantly improved in the group who had the benefit of mechanical ventilation compared to a control group.

Public Opinion¹:

65.2%

of the British public would be willing to pay a small premium for a house that had effective ventilation which maintained good indoor air quality.



THE CHALLENGE FOR VENTILATION

While outdoor air quality has received high levels of publicity and share of voice in recent years, indoor air quality has lagged behind. However, it is beginning to rise up the political and public interest agenda. The National Institute for Health and Care Excellence (NICE) has developed new guidelines on indoor air quality¹⁸ and the Government is developing a report on IAQ via the Air Quality Expert Group (AQEG).

Delivering good indoor air quality in UK homes faces two major challenges. One is that moving towards Net Zero homes requires proper consideration of air quality and the need to 'Ventilate when you Insulate'. The other is that when ventilation work is carried out we need to deliver high quality installations that are fully compliant with regulations so that the effectiveness of the ventilation is ensured.

As successive UK Governments have worked hard to improve energy efficiency in UK homes, it has had the unintended consequence of sealing up homes and trapping in pollutants, as ventilation provision has not been concurrently improved. This has resulted in findings such as those from Exeter University¹⁶ which studied 944 social houses in Cornwall and found a link between the energy efficiency of dwellings (evaluated in terms of the Standard Assessment Procedure – SAP rating) and the prevalence of asthma – each increase in SAP rating was associated with a 2% increased risk of asthma symptoms.

While PAS 2035 was a positive step in tackling the unintended consequences of energy efficiency retrofits by emphasising the need for a full consideration of ventilation in the dwelling at the same time, this approach needs to become accepted practice for all installations.

For the ventilation industry, the quality of installation has become the number one issue. As it stands, competency of installers and compliance with Building Regulations is not regularly enforced, resulting in installations that do not meet the standards expected.

A number of studies have analysed ventilation system installations, including one published in 2016 by the Zero Carbon Hub.¹⁷ The study concludes:

"...The Hub team found things going wrong at multiple stages of the construction process at every site. The cumulative effect of these issues ultimately outweighed any good practice, as the systems we tested showed significant under-performance. At 5 of the 6 sites, fans were operating at only half the required duty or lower, i.e. flow rates were far too low. The end result was that nearly all of the 13 occupants interviewed by the team across the sites had turned off their ventilation systems, finding them too noisy, especially at night. If systems are turned off, they are not doing their job. The air quality in the property will be compromised, with potentially serious consequences for the health of occupants. It is essential that ventilation systems are designed, installed, commissioned and handed over to occupants in accordance with Building Regulations. Our findings show that despite the availability of good practice guidance and training minimum ventilation rates in the units reviewed were not achieved in practice."

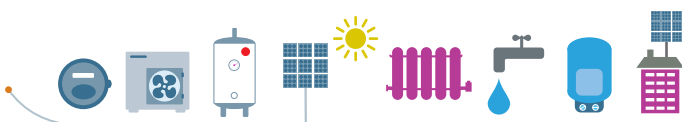
If ventilation is to be an effective intervention, then it must be:

- included at the same time as any energy efficiency improvements
- designed, installed and commissioned to the highest standards

Public Opinion¹:

64.9%

of the British public have experienced the tell-tale signs of poor indoor air quality (such as mould growth and condensation) in their homes.



POLICY SOLUTIONS

BEAMA have recognised that leadership for change must come from industry, but this needs to be supported by a robust regulatory and institutional framework. The Government's commitment made in the Heat and Buildings Strategy to take decisive, 'no-regrets' action now including mitigating the risks of poor air quality must be delivered in practice.

The policy solutions proposed below reflect the expert opinion of those who deliver ventilation to the UK public and are supported by leading academics and key opinion leaders. These recommendations for action are based on years of experience and are designed to help correct some of the key issues facing both the ventilation market and public behaviour and understanding, in relation to controlling viruses like COVID-19 and managing indoor air quality.

STEP 1: Set higher ventilation standards for new builds to protect health and wellbeing

- New build homes should have continuous full supply and extract systems with heat recovery to deliver high standards of indoor air quality (IAQ) and ensure energy efficient operation.
- Mandatory air quality monitoring installations to ensure in-use ventilation performance is measured and occupants are alerted when levels drop below the minimum standard to ensure performance is achieved in practice.
- Consider additional ventilation requirements under Part F of the Building Regulations for the management of airborne virus transmission.

Public Opinion¹:

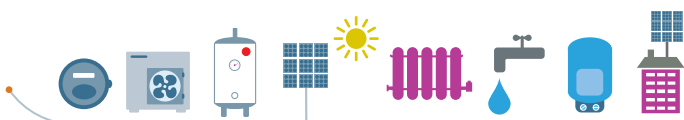
78%

of the British public think that a ventilation system's installation and maintenance should be regulated in the same way that electric and gas installations are.



STEP 2: Ensure energy efficiency retrofits are matched by ventilation measures to protect health and wellbeing

- Enshrine the principle of 'Ventilate when you Insulate' into all retrofit strategies and policies to prevent IAQ deteriorating.
- As part of its goal to raise all homes in England to EPC (Energy Performance Certificate) rating C and its wider Net Zero strategy, the Government should set targets for all existing homes to reach EPC rating C AND have a Part F compliant ventilation system.
- To help consumers understand their ventilation requirements better, an assessment of current levels of ventilation and how this could be improved should be included as part of an EPC package.
- Include specific funding for ventilation within and alongside all financial incentives for energy efficiency. To ensure clarity on the need and inclusion of ventilation measures as part of any funding scheme, 'ventilation' should be explicitly mentioned.
- Compulsory checks and assessments on ventilation provision alongside the installation of energy efficiency measures, as required under the Building Regulations and set out in PAS 2035, needs to be understood and enforced more widely.



STEP 3: Drive ventilation compliance standards

- Provide clarity that systems must be installed and/or commissioned by a registered Competent Person, or signed off by Building Control.
- Fully implement requirements in the new Building Regulations for completed ventilation commissioning sheets to be provided to occupants and included in the standardised compliance sheet under Building Regulations.
- Make ventilation compliance sheets a compulsory requirement of surveys for property sales.
- Implement enforcement mechanisms to ensure compliance with PAS 2035.

STEP 4: Treat poor IAQ and ventilation as a public health emergency and, in addition to public education campaigns on the risks and solutions, make sure it is enshrined in all relevant policy areas, including:

- Net Zero strategy.
- Building Safety Bill.
- Energy Company Obligation.
- COVID-19 Policies/Support Packages.
- Any other policies related to the indoor environment.

Public Opinion¹:

73.4%

of the British public think that poor indoor air quality should become a Government health priority.



MY HEALTH MY HOME

Since 2014, BEAMA has run a public awareness campaign entitled *My Health My Home*.

The campaign aims to raise public, healthcare professional, industry, and political awareness of the potential impacts of poor indoor air quality on human health and the importance of effective ventilation in managing indoor air quality. It also draws attention to the impact that certain behaviours, household products, furnishings and building materials can have in relation to levels of pollution inside homes.

My Health My Home has been widely featured in the media, including the Guardian, the Observer, the Daily Express, the Daily Mail, the Mail on Sunday, the Daily Mirror as well as on This Morning and ITV News.

The campaign has a range of useful publications, including guides, research and interactive tools. These include:

- Ventilation guides for the public and healthcare professionals
- COVID-19 ventilation guidance
- Infographics
- Public information video
- Research
- The Green Homes Compliance Scheme

To find out more about the campaign, visit the *My Health My Home* websites, or follow us on Twitter:

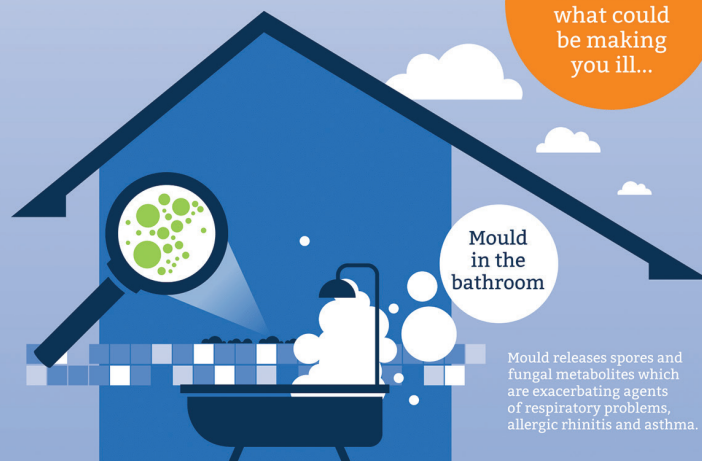
 @MyHealthMyHome

Campaigns site:
www.myhealthmyhome.com

Public information site:
www.indoorairpollution.co.uk

MY HEALTH  MY HOME

Explore the house to discover what could be making you ill...



Volatile organic compounds (VOCs) can irritate the lungs. Acetaldehyde and benzene, two VOCs washing gives off, are carcinogens. Most of the VOCs can't be traced to any particular ingredient in the detergent.

drying washing inside



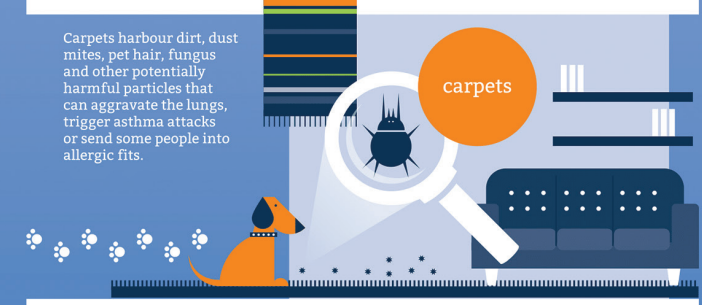
wood burning fireplaces

Particle pollution in smoke can damage lung tissue and lead to serious respiratory problems when breathed in high concentrations.



Carpets harbour dirt, dust mites, pet hair, fungus and other potentially harmful particles that can aggravate the lungs, trigger asthma attacks or send some people into allergic fits.

carpets



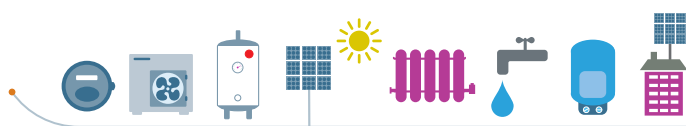
Cooking on a gas hob gives off nitrogen dioxide, acrolein, formaldehyde and carbon monoxide. These have been linked to respiratory symptoms and cancer.

cooking with gas



Paints release volatile organic compounds that may have a range of subtle health effects if breathed in over a long period of time.

paints

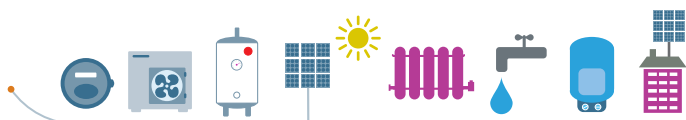


GLOSSARY OF TERMS

BEIS:	Department for Business, Energy and Industrial Strategy
DoH:	Department of Health and Social Care
EEM:	Energy Efficiency Measures
IAQ:	Indoor Air Quality
DLUHC:	Department for Levelling Up, Housing and Communities
MVHR:	Mechanical Ventilation with Heat Recovery
NHS:	National Health Service
TVOCs:	Total Volatile Organic Compounds
VOCs:	Volatile Organic Compounds
WHO:	World Health Organisation

References

1. BEAMA – My Health My Home. (2017). Indoor Air Pollution Survey. Censuswide. The survey was conducted from a representative sample of 1000 UK householders.
2. European Commission, Joint Research Centre – Institute for Health and Consumer Protection. (2003) Report No. 23. Ventilation, Good Indoor Air Quality and Rational Use of Energy.
3. BEAMA – My Health My Home. (2015). Indoor Air Quality Survey. YouGov. The survey was conducted from a representative sample of 2000 UK adults.
4. U.S. Environmental Protection Agency. (1987). The total exposure assessment methodology (TEAM) study: Summary and analysis. EPA/600/6-87/002a. Washington, DC.
5. Yegambaram Manivannan, et al. (2015). Role of Environmental Contaminants in the Etiology of Alzheimer’s Disease: A Review. *Curr Alzheimer Res.* Feb; 12(2): 116–146.
6. Royal College of Physicians and the Royal College of Paediatrics and Child Health. (2020). The inside story: Health effects of indoor air quality on children and young people. Available at: <https://www.rcpch.ac.uk/resources/inside-story-health-effects-indoor-air-quality-children-young-people>. [Accessed 27 September 2021].
7. Scientific Advisory Group for Emergencies (SAGE) – Environmental Modelling Group (EMG). (2020). Role of ventilation in controlling SARS-CoV-2 transmission. Available at: <https://www.gov.uk/government/publications/emg-role-of-ventilation-in-controlling-sars-cov-2-transmission-30-september-2020>. [Accessed 27 September 2021].
8. Awbi, Hazim B. (2015) The Future of Indoor Air Quality in UK Homes and its Impact on Health. BEAMA. Available at: www.myhealthmyhome.com. [Accessed 1 May 2018].
9. National Institute for Health and Welfare. (2013) Efficient reduction of indoor exposures. Health benefits from optimizing ventilation, filtration and indoor source controls.
10. World Health Organisation (WHO). (2014) Burden of disease from household air pollution for 2012.
11. Royal College of Physicians. (2016) Every breath we take: the lifelong impact of air pollution. Report of a working party.
12. Coward et al. (2002). Indoor air quality in homes in England. Volatile Organic Compounds. BRE Report BR 446, CRC Ltd. London
13. UK Chief Medical Officer. (2018) Annual Report of the Chief Medical Officer 2017, ‘Health Impacts of All Pollution – what do we know?’.
14. Allergy UK. (2012) Work Fever: Report by Allergy UK into Allergies in the Workplace.
15. Wright, Gillian R. (2008) The effect of domestic mechanical heat recovery ventilation on asthma control of patients allergic to the house dust mite. Diss. University of Glasgow.
16. Sharpe, et al. (2015). Higher energy efficient homes are associated with increased risk of doctor-diagnosed asthma in a UK subpopulation, *Environment International*, V 75, pp 234-244.
17. Zero Carbon Hub. (2016). Ventilation in New Homes.
18. National Institute for Health and Care Excellence. (2020). Indoor Air Quality at Home. Available at: <https://www.nice.org.uk/guidance/ng149>. [Accessed 27 September 2021].





Follow us on:

 BEAMA Ltd

 @BEAMAUK #NetZerobyDesign

