How indoor air quality can contribute to a happy, healthy and more productive workforce

“We shape our buildings; thereafter they shape us.”

Winston Churchill

2019
Think back to the 1990s and early 2000s. This was the beginning of the revolution in green buildings. Today, there’s a new revolution afoot. Wellness in buildings is the new green.

The Green Revolution was all about optimising the performance of the building and making it as energy-efficient as possible. ‘Building wellness’ takes into account the human aspect. It aims to create a positive place to live and work. One that makes people happier, healthier and more productive.

The quality of air that we breathe is vital for our health, productivity and wellbeing. **90%** of our time is spent indoors and we each consume, on average, 10,800 litres of air each day. The importance of good Indoor Air Quality (IAQ) is clear.

According to one international report, 800,000 people die worldwide every year due to poor IAQ in their workplace. In the UK, air pollution brings forward some **36,000 deaths** over the same period. And Sick Building Syndrome – which can result in headaches and loss of productivity - even has its own page on the NHS website.

A survey commissioned by the Building Engineering Services Association (BESA) reports that almost **70%** of office workers believe poor air quality in their place of work is having a negative effect on their day-to-day productivity and well-being.

**90%**

of our time is spent indoors. So the quality of our buildings has a real impact on our health.
800,000 people die every year globally due to poor IAQ in their workplace
Amongst the most common causes of poor IAQ are ventilation systems issues, high CO2 levels, inadequate temperature control, humidity, infection and odour, poor air circulation and insufficient fresh air intake.

As the dangers of air pollution gain greater exposure our focus on it grows. Air pollution is a top environmental risk to human health in the UK. It is the fourth greatest threat to public health after cancer, heart disease and obesity. One report cites that air pollution causes a cost of £2.7billion to the UK economy -through its impact on productivity. IAQ is clearly an area that requires careful consideration.

Fortunately, it is becoming a key factor when both assessing a building’s wellness and driving employee health initiatives in workplaces internationally – by companies of all sizes, not just the high-end tech giants and corporates.

It’s a development we’re seeing at Plasma Clean. Building wellness and IAQ is being increasingly embedded into corporate wellbeing strategies to deliver a healthier and happier work environment. This results in significant returns on investment for companies, including fewer absences, higher employee retention rates and more engaged and productive workers.
Every business has a responsibility to itself and employees to look after its most expensive asset by making the work environment as healthy and nurturing as possible.
The effect of IAQ on workplace health, happiness and performance

For most employers, a healthy and happy workforce is a vital component of a productive, successful company.

A study in Environmental Health Perspectives in 2016 directly quantified the impact of indoor environmental quality on cognitive function. By changing levels of ventilation, carbon dioxide and volatile organic compounds, the study measured how the indoor environment in which we work and live affects our health and productivity. On average, cognitive scores were 61% higher in the Green building and 101% higher in the Wellness building than in the conventional building.

Staff costs - including salaries and benefits - account for up to 90% of a business’ overheads. So, their productivity - or anything that impacts their ability to be productive - should be a major concern. Even a 1% increase in staff productivity - or a 1% decrease in staff turnover - can have a noticeable effect on a company’s bottom line.

As the benefits and importance of building wellness increase - driven by the likes of the Government’s Clean Air Strategy 2019 and the arrival in the UK of international standards such as WELL and Fitwel - the incorporation of wellness into our buildings is no longer just a “nice-to-have”.

Staff costs account for up to 90% of a business’ overheads
Illness costs UK businesses £77 billion each year in lost productivity.

It’s not only a social responsibility, it’s an economic one too. Illness costs UK businesses £77 billion each year in lost productivity. This equates to, on average, each employee losing 30.4 days - or six working weeks - of productive time annually. This is due to both absenteeism and more predominantly, ‘presenteeism’ where employees attend work whilst ill. The costs of which are likely to significantly outweigh the cost of implementing a well building programme and investing in IAQ.
In fact, for every dollar spent on wellness programmes in the US, medical costs decrease by $3.27 and costs of absenteeism fall by $2.73.

In response to these startling statistics, more companies than ever are taking steps to ensure that the physical environment in which their employees work is much healthier.

It’s particularly important for those businesses operating in urban areas, where there’s evidence that employees working near high-traffic-density roads are exposed to high levels of vehicle pollutants. Despite these emissions being generated outside, they find their way into buildings through the ‘so-called’ fresh air supply.

High levels of NOx (oxides of nitrogen generated by vehicles and gas boilers) can contribute to asthma, respiratory tract infections and long-term conditions, lung cancer and chronic obstructive pulmonary disease. In some cases, levels of NOx indoors are similar to those on the street. Such health risks are driving the demand for solutions that can remove harmful pollutants from the air.

By providing better IAQ – businesses can differentiate themselves from the competition. They become employers of choice as well as standing themselves in good stead to protect against future employee litigation over the health effects of poor IAQ.
Human resources and facilities managers are the custodians of two of the most important drivers of business performance - people and places. For an organisation to operate most effectively, it’s important that both functions work in partnership.
Human resources and facilities managers are the custodians of two of the most important drivers of business performance - people and places. For an organisation to operate most effectively, it’s important that both functions work in partnership. By committing to building wellness, HR professionals are empowered to play a greater role in the physical workspace design and operations, to have more influence on culture and change management decisions and to align the brand with the employee experience. By providing a Well building – within which good IAQ is essential – employers can improve the way staff behave within it. Whilst providing them with health benefits that come with an enhanced physical environment.
Meeting employee expectations

Corporate wellbeing strategies that deliver a healthier and happier workplace environment are becoming increasingly viewed as an integral part of the value proposition to employees.

Along with workplace pensions, holiday allowance, childcare vouchers and flexible working, they’re fast becoming an expectation rather than a perk. Good IAQ is essential for a building to be ‘well.’

The millennial generation is taking this one step further and actively choosing a better quality of life at work – career opportunity, paid time off, forward-thinking culture - over a higher salary.

The demand for well buildings is on the increase. A recent Europe-wide study found that 72% of employees either already had or wanted to have a building that promoted wellness.

There is a growing understanding that the environment in which you work has a significant role to play in our overall wellbeing. IAQ is at the heart of it.
Building wellness is to the current era what green buildings were in the early 1990s. With the introduction of international accreditation standards and the UK Governments’ Clean Air Strategy 2019, addressing building wellness is no longer an optional extra.

The responsibility of providing a healthy workplace must become a shared vision between a wider organisational stakeholder group. This typically includes building and facilities managers, finance and HR functions.

Efforts have been significantly increased in terms of building wellness design - including certifications and standards that promote better IAQ - that aim to make buildings support and promote health and the wellbeing of its occupants.

**WELL** aims to measure, certify, and monitor the features of a building that are likely to impact the health and overall wellbeing of building occupants. The 2018 version has 11 categories of wellness called Concepts and indoor air quality is the first.

Focussing more on sustainability, building materials, energy efficiency and the environment, the LEED green building certification complements WELL, which assesses human sustainability.

**Fitwel** also helps employers to evaluate all elements of building design to create a healthy workplace. Some of its strategies will limit harmful airborne pollutants, reduce workers’ exposure to them and also ensure their quick elimination to improve IAQ.

The introduction of The British Council for Offices’ (BCO) study in 2018 - "Wellness Matters: Health and Wellbeing in offices and what to do about it" – is driving improvements in IAQ and states the business case for investment in it.

**BREEAM** - the world’s leading sustainability assessment method for master planning buildings - has also introduced an Indoor Air Quality plan to enhance the wellbeing of the people who live and work in them.
Facilities managers are perhaps most affected as the demand for well buildings grows. Whilst previously responsible for delivering building services, facilities managers are increasingly involved in providing environments that demonstrably enhance the working lives of their occupants. Improving IAQ is a key priority.

Similarly, developers and architects must now focus on the effect their buildings will have on the people who work in them. Since the 90s and the Green Building concept, they have worked to ensure their buildings were kind to the planet. Now they must be kind to their inhabitants too. Wellness in buildings is the new green.
building with good IAQ in mind

By delivering healthy building design, there’s increasing evidence of the benefits for developers – with 73% of early adopters of WELL-certified buildings experiencing faster leasing rates and an increase of 62% in building values.

This proves that well buildings and good IAQ really do provide a strong competitive advantage.

Implementing a well building requires collaboration from the outset between architects and building services engineers. Risk assessments of potential outdoor and indoor sources of air pollution at design stage can inform the environmental strategy of a building. This leads to implementation of appropriate mitigation measures.

Undertaking a worker wellbeing survey post-occupancy is another effective evaluation tool. It measures the benefits of improved IAQ. This often includes feeling more awake during the afternoon and reduced headaches.

73% of early adopters of WELL-certified buildings saw faster leasing rates

62% of early adopters of WELL-certified buildings saw increases in building values
“I’ve always been interested in creating cleaner, safer environments.

“My original academic research focussed on how micro-organisms break down pollution in the environment, which led to me completing a doctorate in environmental microbiology.

“In the early days, I worked closely with university scientists and engineers to help exploit their academic scientific research. As a result, Plasma Clean was born.

I now lead all Plasma Clean Research & Development activity, successfully developing plasma and UV-C technologies to control odour and infection in the built environment.

“There is now more focus than ever on IAQ in the workplace - on both the benefits of it being good and the dangers when it’s poor.

“Poor air quality is the largest environmental risk to public health. Toxic air is now the biggest environmental risk of early death, responsible for one in nine of all fatalities. It kills 7 million people a year around the world, far more than HIV, tuberculosis and malaria combined.

A Study from the University Medical Center of the Johannes Gutenberg University in Mainz, Germany concluded that the number of people dying as a result of air pollution may exceed the number killed by smoking.

These deaths are linked to incoming air pollutants such as NOx and diesel particulates, as well as Volatile Organic Compounds (VOCs), which leach from furniture and fittings. This often leads to indoor air pollution reaching levels of between two and five times greater than outdoors.

“Encouragingly, more people and organisations are taking action and investing in total air quality solutions. We’re working with an increasing number of developers, facilities and building managers and building services engineers to supply, install and service plasma and UV-C technologies filtration solutions that eliminate harmful pollutants.

“We are also seeing an increased use of air quality monitors that continuously – and visibly - check pollutant levels.

“I firmly believe that every business has a responsibility to itself and its most expensive asset – its employees – to make the working environment as healthy and nurturing as possible.”

Expert view - Dr David Glover, Co-Founder and Managing Director of Plasma Clean
The health and productivity benefits of good IAQ - primarily indicated by low concentrations of CO₂ and pollutants - are well established.

Considered as the ‘lungs of the building’, the role of Air Handling Units which are part of the HVAC (heating, ventilation, and air conditioning) system is to filter and distribute fresh clean air around the building.

Worryingly, however, HVAC systems are the number one cause of microbial contaminants and bad IAQ according to one leading study. To achieve good levels of IAQ, HVAC systems must have the correct filtration equipment installed and be regularly maintained.

With an extensive and growing portfolio of solutions, Plasma Clean provides air filtration systems and services to meet the requirements of every building, employee and organisation. All solutions and products are suitable for new builds or can be retro-fitted into existing HVAC systems. They include:

- Low-pressure drop air filters to remove harmful contaminants such as NOx from incoming air.
- Standalone odour control units for washroom and waste room smells.
- Kitchen ventilation grease, smoke and odour control.
- Air quality sensors to continually monitor and feedback into the Building Management System (BMS).
- TR1g duct cleaning and leakage testing to ensure that buildings operate as efficiently as they did on handover.

Applications are as diverse as removing NOx from buildings located near busy roads, to taking away odours from sewage treatment plants. The company is also seeing increased use of UV-C treatments in HVAC systems to treat heat exchange coils and to disinfect recirculated air.

By exposing the heat exchange coils to constant UV-C light, for example, biofilm growth is prevented. This keeps the coil clean, helping to maintain optimum heat transfer across the coil surface to maximize energy efficiency. This also prevents the transmission of airborne contaminants and odours throughout the building and reduces staff sickness and absenteeism.
Plasma Clean has commissioned a study with the University of Leeds to determine the performance of UV-C for disinfection purposes. Results showed that UV-C disinfection was capable of significant reductions in the concentration of *Geobacillus stearothermophilus* – a test organism routinely used in pharmaceutical sterility testing - achieving a 99.9% kill rate after exposure to UV-C.

It’s recommended that Plasma Clean air filtration solutions are installed with IAQ sensors to monitor air quality by continuously checking pollutant levels. The likes of CO₂, NOₓ, gas pollutants, particulates in the air, humidity and outdoor pollution are all monitored through these devices, which raise a warning if unacceptable levels are reached.

To continue to reap the benefits, it is important to maintain the system to avoid dust and microbe build-up and ensure optimal energy efficiency. Careful selection of components and a planned service regime are key. The mentality of ‘fit and forget’ is not an option.

Plasma Clean is a manufacturer of a range of solutions designed to enhance air quality.
About Plasma Clean

**Plasma Clean** is a manufacturer of a range of solutions designed to enhance air quality. We were founded by University of Manchester scientists **Dr David Glover** and **Professor Christopher Whitehead**.

We are an innovative, research-led UK technology company specialising in solutions that help provide a cleaner and safer environment in which to live and work.

We use cutting edge plasma and UV-C technologies to control odour and infection in buildings providing trusted total air quality solutions to some of the world’s leading brands, including: Hilton, Marriott, Premier Inn, Burger King, McDonalds, Tesco and TGI Fridays.

Today, Plasma Clean is an established and trusted pioneer of indoor air quality solutions for all commercial sectors, bringing a unique mix of experience and academic rigour to problem solving and providing expertise to designers, building services engineers, facilities managers, HR and CEOs across the UK and beyond.

Underpinning all we do is a passionate belief in Building Wellness and the role of indoor air quality for a happy, healthy, more productive workforce.

For further information visit [www.plasma-clean.com](http://www.plasma-clean.com) call 0161 870 2325 or email [ask@plasma-clean.com](mailto:ask@plasma-clean.com)

Plasma Clean Limited.
Broadstone Mill
Broadstone Road
Stockport, Cheshire
SK5 7DL
UNITED KINGDOM