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MODERN BUILDING SERVICES

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APRIL 2024

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WELCOME TO THE APRIL ISSUE OF **MODERN BUILDING SERVICES**

So that's a wrap!

This is a wistful yet poignant moment as this is the final issue of Modern Building Services for myself, Sales Manager Vicky Brown, Editor Stephanie Cornwall and Designer Dean Cole at Warners Group Publications.

From next month the new editor of MBS will be **Tracey Rushton-Thorpe**, who can be contacted on **editorial@portico.uk.com** or on 01733 308992.

May will see the 20th anniversary of the first issue of MBS, so we'll be looking back over the last two decades - and forward to the next.

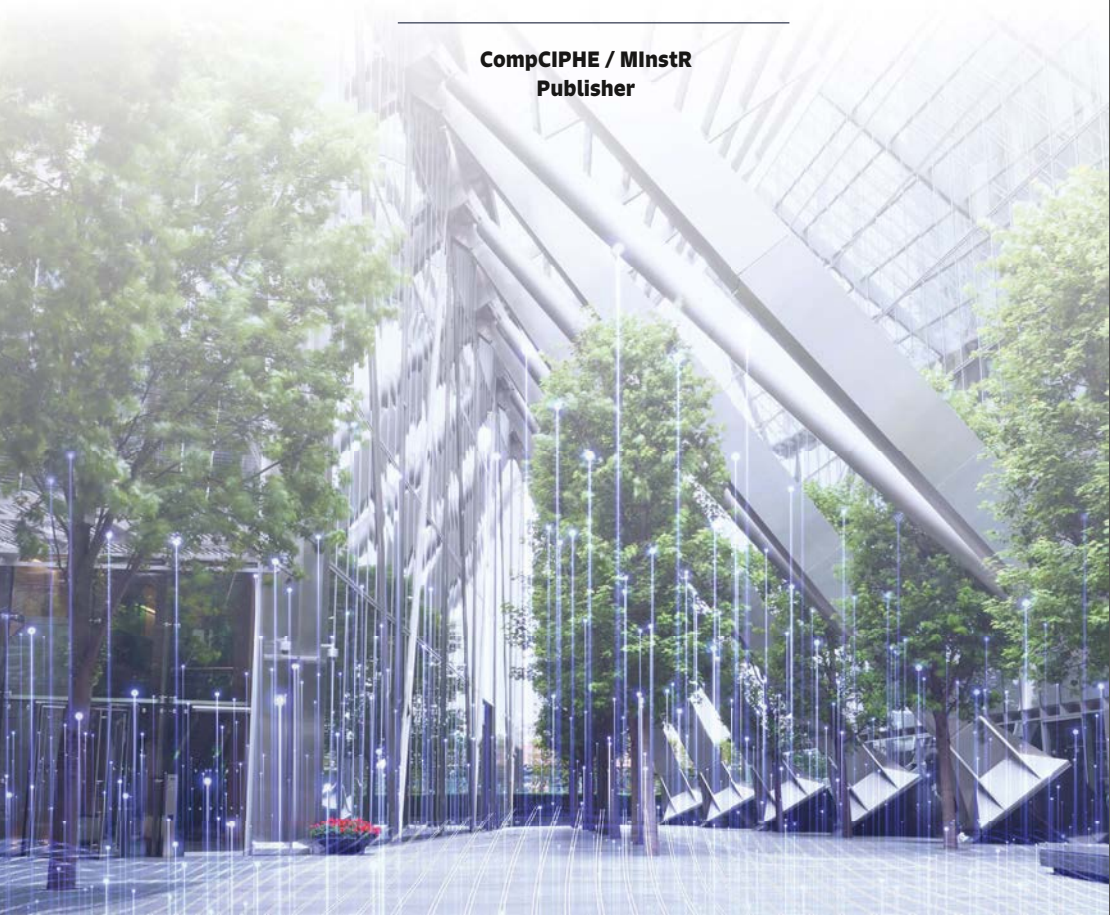
Sales Manager Vicky Brown

We 'll also be covering heating, with the latest developments in technologies, installation techniques and the application of heating methods in a range of different buildings, and Smart Buildings. For that we're covering building performance and management and how new technology, especially the growth of AI, in the sector are making buildings smarter and more responsive to rapidly-changing needs.

MBS is very interested in hearing for you if you've got any news, views or case studies on any of those topics, so get in touch.

Juliet Loiselle

CompCIPHE / MInstR
Publisher



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Inside the **APRIL 2024** issue

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Every building should be treated as high risk, says BESA

Many contractors are still ignoring safety regulations despite repeated warnings that measures introduced by the Building Safety Act are already in place and affect every project, according to the Building Engineering Services Association (BESA).

The association is concerned that firms do not realise the Act has already altered the regulations that apply to all construction work, not just higher risk/high rise residential buildings (HRBs), and therefore face potential prosecution.

While the Act itself is primarily focused on HRBs, it has already changed many elements of the existing fire safety and building regulations, including the supporting approved documents that apply to all projects. It is also introducing secondary legislation that affects all building work.

Chair of BESA's Building Safety Act Advisory Group (BSAAG), Nick Mead, said the industry should be braced for high-profile prosecution under the Act.

"Anyone sitting back and waiting to see what happens is going to be in a lot of trouble," said Nick. "The Regulator is looking for proof that you are complying with regulations now and that the people working on a project were competent to carry out the specific tasks assigned to them."

Nick Mead

Rachel Davidson

He advised treating every building as high risk, adding that many in the industry have become lax in their record keeping, particularly around change management.

"If you cannot provide proof of why a decision was made or that the work was carried out by a competent person, the Regulator will not approve it," he warned.

The advisory group, which was set up to advise BESA members and other specialist contractors about the specific issues relating to the building services sector, warned that MEP firms face particular scrutiny because of the relative complexity of their work and the "eagerness of many specifiers to spread risks around their supply chains".

The group also warned contractors to be ready for a period of uncertainty as Building Control Officers (BCOs) prepare to become a registered profession in April. There are estimated to be more than 4,000 who must become certified as competent to work as building inspectors under the new safety regime and they have until October to complete the required assessments and registration process.

BESA said members were already reporting considerable delays, with an estimated 60% of 'in scope' projects held up at planning Gateway One and just a handful even reaching Gateway Two.

"Many inspectors are taking a no risk approach because of confusion over the new rules – and the least risky approach is not to proceed," said Nick. "The whole thing could get messy if some projects have to be reassessed at a later stage because they were signed off by unregistered BCOs."

BESA's Director of Specialist Knowledge, Rachel Davidson, added that it was hardly surprising there was confusion as the industry tried to adapt to the new regulations.

"We are trying to get away from the previously-accepted approach of 'build and design', rushing into projects then trying to sort out the details later," she said. "We do know what needs to be done but many contractors are sitting back and waiting to see what happens. That is the riskiest approach.

"Companies are only being asked to do what they should already have been doing before the Act, which is comply with existing regulations. So, what are you waiting for?"

www.thebesa.com

New procurement rules for NHS suppliers

New procurement rules mean NHS suppliers will need to demonstrate their green credentials so the NHS can achieve its target of becoming Net Zero for directly-controlled emissions by 2040, with an ambition to reach an 80% reduction in its carbon emissions between 2028 to 2032.

From 2023, suppliers to the NHS with a contract value of more than £5 million per annum have had to have a full Carbon Reduction Plan (CRP). From April 2024, suppliers with contracts between £10,000 and £5 million are required to provide a Net Zero Commitment for their business.

These requirements will be necessary for all new suppliers irrespective of value to bid for NHS contracts and will be considered in addition to the 10% weighting on Net Zero and social value. For organisations bidding for tenders, this will be a pass/fail in the tender process.

Multi-disciplinary energy consultancy, Team Energy, advised that the requirements for the CRP align with those of central government, therefore if organisations have already set out a CRP in line with government guidelines, these will be accepted by the NHS. It has advised those wanting a better understanding of their business GHG emissions and how to set approved targets to guarantee theyare cutting your emissions in line with the NHS Net Zero Roadmap, to get in touch.

www.teamenergy.com

‘Red tape scrapping is welcome – but more policy changes are needed’

The CEO of heat pump manufacturer Aira UK has said the Government’s new proposals to scrap planning red tape for the installation of heat pumps in the UK will be a big breakthrough for the industry and consumers, but more policy changes are needed.

Consumers currently have to wait months to receive planning permission from local councils before they can replace gas burning boilers with new environmentally-friendly heat pumps.

The proposed changes to permitted development rights will, in many cases, enable homeowners to install a heat pump as easily as installing a jacuzzi or new garden shed.

Daniel Särefjord said 95% of the UK’s gas boilers are still being replaced with polluting and highly inefficient systems, despite the availability of more sustainable and cost-effective alternatives such as heat pumps.

“Currently months of planning policy red tape must be overcome before a heat pump installation is permitted. Very few individuals and families can accept to live without heating and hot water for months on end to finally be able to ditch their dirty fossil-fuelled boiler.”

The Government’s recent announcement that it is looking to change the rules on permitted development will play a critical role in encouraging more consumers to install a heat pump in their home, he said.

“By making the switch to a heat pump quicker and simpler, the UK can reduce its total emissions by 16-17%, making it a critical component in taking Europe off gas. It is crucial to recognise the transformative potential of heat pump technology in lowering energy bills and emissions, and we need more policy changes like this without delay to bring us closer to reaching our nation’s legally binding Net Zero targets.”

PEOPLE

Aztec solar appoints operations manager

Aztec Solar Energy Ltd, nationwide engineering-led consultancy and installer of bespoke solar photovoltaic (PV) systems (BESS), has appointed Andy Rowlands in a new role as Operations Manager.

Andy will manage and oversee the implementation to final delivery of projects for Aztec Solar Energy. He will have a team of project managers, logistics and the design team reporting to him.

He brings more than 24 years' experience in the electrical industry, the last three of which have been in the solar PV sector.

Commercial Director Chris Cowling said: "Andy brings a wealth of knowledge and experience with him and is already introducing new processes that will help us evolve our current business and develop into new areas. He is a welcome addition to our expanding team."

www.aztecsolarenergy.co.uk

Lochinvar promotes Liam Elmore to General Manager

Liam Elmore has been appointed as General Manager of the low carbon heating and hot water equipment manufacturer Lochinvar.

He joined the Banbury-based company as UK Sales Manager in 2014 following a two-decade career working with other well-known manufacturers of heating and hot water-related products. He was subsequently promoted to Sales Director in 2018.

Liam was also elected Vice-Chair of the Industrial and Commercial Heating Equipment Association (ICOM) Commercial Heating Group in 2022. He has overseen considerable sales growth during his decade at Lochinvar and has been instrumental in the company's transition towards low carbon technologies.

As part of his new role, he will retain his overall responsibility for sales and customer relationships.

"I am absolutely delighted to have been recognised in this way and to be trusted with the additional responsibility of driving the company forward," he said. "It is an exciting and challenging time for the heating and hot water sector as more renewable and low carbon solutions gain traction and we face ever more stringent legislation.

"We are excited by the opportunities and up for the challenges," he added. "We will have a renewed focus on customers this year with our excellent service team, headed by Will Griffiths, taking centre stage. We have also expanded our product offering."

www.lochinvar.ltd.uk

Sandra takes on role of National Delivery Director

Apprenticeship provider JTL has appointed Sandra Warren-Smith as its new National Delivery Director.

In her new role, Sandra will oversee the management of JTL's regional teams, training centres and apprenticeship programmes.

Sandra has an extensive background of experience and commitment to contributing to the education agenda and creating career opportunities. Prior to joining JTL, she served as the Operations Director for Skills at PeoplePlus UK, where she led the delivery of high-quality skills and employability programmes whilst managing a large, diverse team.

JTL Chief Executive Chris Claydon said: "We are delighted to welcome Sandra to JTL as our new National Delivery Director. Her extensive experience and dedication to quality and innovation in education settings align perfectly with our purpose and vision. Sandra's leadership will undoubtedly drive forward our mission of providing exceptional apprenticeship opportunities to individuals across England and Wales."

Sandra's appointment follows the retirement of Judi Wheeler, who held the same role at JTL for eight years where she managed four regional teams to deliver apprenticeships, professional courses, and assessment services.

Chris Claydon added: "We extend our gratitude to Judi for her dedicated eight years of service and wish her all the best in her future endeavours."

Sandra Warren-Smith said: "I am thrilled to join the team at JTL and look forward to bringing the insight and knowledge that I have gained over my years of experience to my new role."

www.jtltraining.com

Regional Technical Sales Manager appointed

Conex Bänninger, a manufacturer of fittings, valves and accessories, has appointed Mark Oxley as its new Regional Technical Sales Manager for London and the East.

With extensive experience in the plumbing and heating industry, Mark previously worked for tooling manufacturer REMS in sales.

At Conex Bänninger, he will be responsible for maintaining and strengthening the company's relationships with existing customers, as well as driving brand awareness and developing new opportunities.

Business Unit Director Ged Grimes said: "Mark comes with an excellent track record at REMS and will play a critical role in helping us achieve our objectives."

Mark said: "Having developed my plumbing and heating experience with REMS over the last six years, this is a fantastic opportunity for me to expand my knowledge into fittings and valves."

www.conexbanninger.com

Two senior appointments announced at ABM

ABM, an integrated facility and aviation services provider, has appointed a new Managing Director and finance leader.

Campbell Murdoch has joined the business as Managing Director for the Business and Industry division, as part of the senior leadership team. Led by Senior Vice President Richard Sykes, Campbell will work alongside Jim Niblock, Managing Director for Transport and Aviation, and Ian Anderson, Managing Director for All Ireland.

With more than 20 years' experience in senior board positions, Campbell joins ABM from City FM where he held the role of Managing Director. Campbell will play a key part in the expansion of the technical services offering.

ABM has also recently welcomed Liz Freeman to the business as Shared Services Director, Finance, for the UK and Ireland. Liz brings a wealth of sector experience holding senior financial roles over the past 20 years, most recently for OCS.

These appointments follow that of Niall Partridge as Finance Director for UK and Ireland and Simon Barnes as Vice President of Sales in the UK and Ireland at the end of 2023.

Richard Sykes said: "Campbell and Liz are welcome additions to the leadership and we are over the moon to have them on our team."

"Campbell and Liz are welcome additions to the leadership and we are over the moon to have them on our team."

Alongside building the right leadership team, a significant part of ABM's immediate strategy has been to integrate teams under a One ABM approach. Following the move of the London Bridge office into the Transport for London (TfL) North Greenwich offices, the Blackjack Promotions team in Ireland has also moved into the ABM Ireland HQ (formerly Momentum Support). Most recently, ABM announced the relocation of the two West London offices to a new head office at Heathrow.

www.abm.com

New President of the BCIA announced

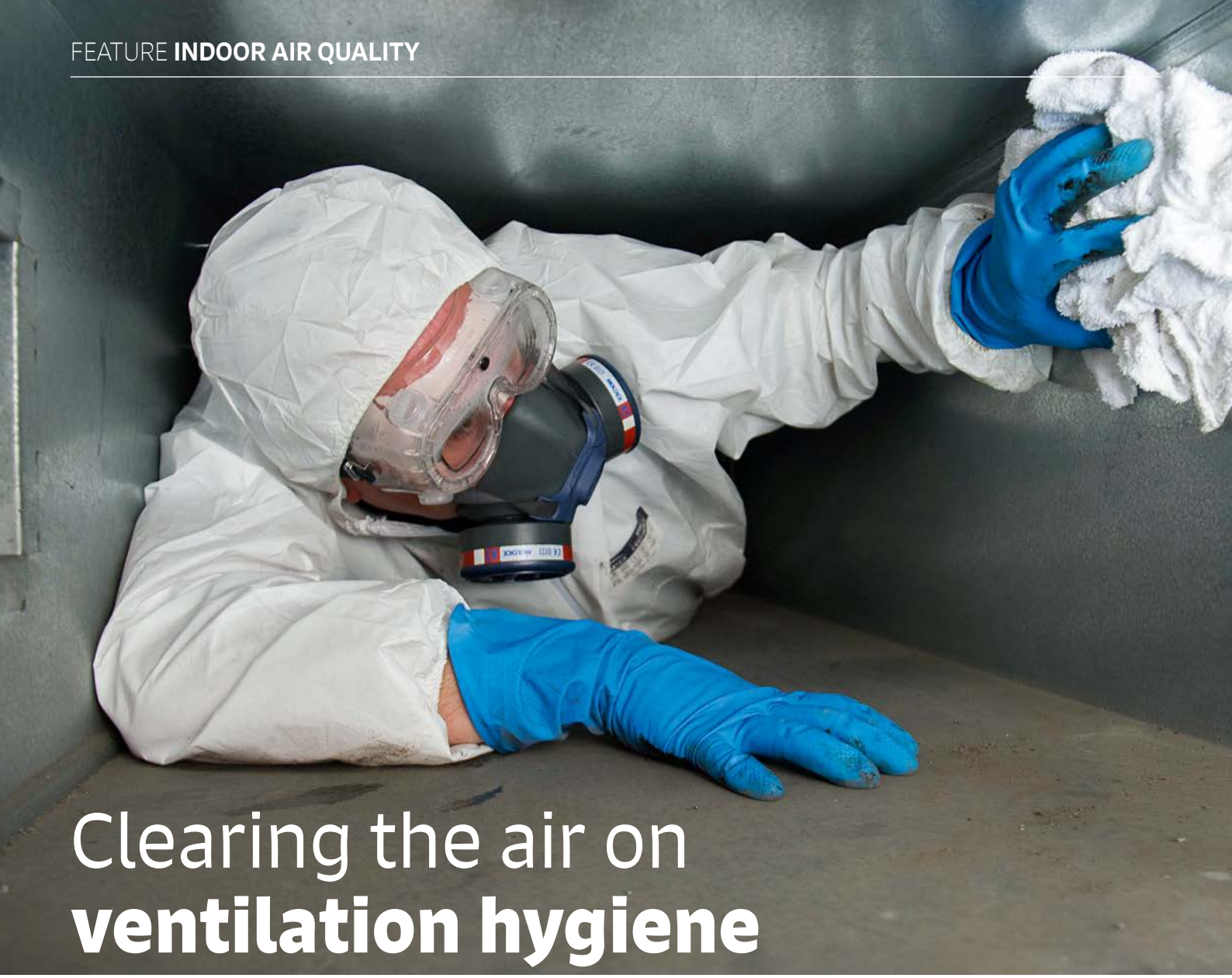
The Building Controls Industry Association (BCIA) has appointed Stacey Lucas, Commercial and Marketing Director at Sontay, as its new President.

Stacey takes over from Graeme Rees who has held the role for the past two years, with Jen Vickers stepping into the role of Vice-President.

Stacey has been working in the building controls and BEMS sector for more than 20 years, starting her career at Sontay in 2001 as a Customer Service Advisor.

Stacey said: "It is a real honour to be taking over the role of BCIA President from Graeme Rees who has done a fantastic job in increasing member engagement and setting us onto a clear path as an organisation carrying recognition, respect and influence in the building controls industry. Over the next two years I aim to continue the good work carried out by my predecessors and I am relishing the opportunity."

Reflecting on his time as President, Graeme Rees said: "These last two years have been extremely rewarding both on a professional and a personal level. I would like to thank everybody who has supported, guided and helped me move the BCIA forward in a number of areas. I have been very proud to serve as President and I am delighted to now hand over to Stacey and wish her the very best of luck in this extremely prestigious role."



Clearing the air on **ventilation hygiene**

Gary Nicholls, Managing Director of duct cleaning expert Swiftclean, and co-author of TR19®, looks at the long-anticipated TR19® Air specification and what this may mean for ventilation hygiene standards.

With awareness surrounding the importance of the impact of indoor air quality on occupants' health and wellbeing increasing, a greater emphasis is also being placed on ventilation system hygiene.

Not only is this sharper focus welcome, but it is set to raise standards in the industry, as TR19® Air will provide a clear specification to guide property and facilities managers towards consistent best practice and compliance.

Thankfully, the days when ventilation systems could be handed over without being cleaned in readiness for use are long gone. The development over the years of first TR17 then TR19, issued by BESA (Building Engineering Services Association), has gone a long way towards ensuring that buildings are served by clean, well-commissioned ventilation systems, which transport air free of contaminants to the property's occupants.

Before the involvement of BESA and the guidance it has issued over the years, we would often find dirt and debris from the installation process present in working ventilation systems.

TR19 (and its predecessor TR17) was drafted as the leading guidance document on ventilation hygiene to tackle the twin challenges of fire safety and indoor air quality. In the case of kitchen extract ductwork, the chief concern is fire safety. Cooking of any genre gives rise to airborne fat, oil and grease (FOG) particles which, together with water vapour and hot air from the kitchen, are carried as an exhaust stream and expelled to the exterior of the property. However, as the hot air travels further from its source, it also cools, depositing FOG particles on the inner surfaces of the ductwork. Gradually, greasy deposits form on the surfaces of the ductwork, and these are a serious potential fire hazard.

In July 2019 a new specification, TR19® Grease, was born out of section 7 of the second edition of TR19. With the status of a specification, rather than a guidance document, TR19® Grease has become the standalone requirement with which commercial kitchens must comply. This represents a large step forward in catering fire safety. It is well recognised that many fires which start in the kitchen are made significantly worse and will spread further through the building if the ductwork is not TR19® Grease compliant.

The remainder of TR19 was then reissued, without section 7, as TR19®; which then entered a period of review which will result in the issuing of the now long-expected TR19® Air.

Ductwork itself must also be free of dust, lint or debris which could provide fuel for a fire; or cause an irritant for those building occupants suffering from asthma or other breathing difficulties.

resistant wall. Fire dampers comprise a set of steel louvres which close automatically in the event of fire to reseal the compartment created by the fire-resistant wall, helping to delay the spread of fire. It is essential, therefore, that we can access fire dampers for annual testing to ensure that they work effectively.

Ductwork itself must also be free of dust, lint or debris which could provide fuel for a fire or cause an irritant for those building occupants suffering from asthma or other breathing difficulties.

What can we expect from TR19® Air? Without doubt, this will place an even greater importance on access. It will also, like its counterpart TR19® Grease, be a specification, rather than guidance. It will, as with the current TR19®, require building managers to classify ventilation systems as high, medium or low according to their use.

Systems servicing laboratories, cleanrooms and operating theatres, for example, will be classified as high, because they demand particularly high air quality and fine HEPA filters. Less frequented areas such as boiler rooms or plant rooms may be classified as low, while most habitable areas will have a medium classification. TR19®Air will continue to contain helpful tables which set out the intervals at which ventilation systems should be cleaned according to their classification, purpose and frequency of use. TR19® Air will become a very clear specification which building and facilities managers can follow to ensure compliance throughout the property.

In order to ensure that the ventilation system is not circulating contaminants, it is vital that we can clean its entire length and that means that we must be able to access every part of it. We therefore expect that TR19® Air will improve accessibility. It is widely expected that there will be an increased requirement for access hatches, especially where there are turns in the ductwork, or access to fire dampers is required.

This could create something of an increased tension between TR19® Air, the soon-to-be specification for ventilation system compliance, and DW/144: Specification for Sheet Metal Ductwork, the specification for the design and construction of metal ductwork. DW/144 does not require the same frequency of access points for the construction of ductwork as TR19® requires for its ongoing compliance. If, as we expect, TR19® Air calls for more access points at shorter intervals, the practical gap between construction standard and compliance specification will widen.

It seems wise, therefore, to call for a revision to be made to DW/144 to fall in line with the requirements of ongoing compliance. In the meantime, with regard to access for future cleaning and compliance, it would seem sensible to design ventilation systems, from an access point of view, to comply with TR19® Air, rather than DW/144. This would avoid the situation in which additional access points need to be installed, at greater cost, in order to facilitate the very first system clean.

The importance of clean ventilation systems has been more widely acknowledged in recent years, as has the importance of using an expert cleaning contractor to provide compliance. BESA recommends appointing a cleaning provider registered with the Vent Hygiene Register (VHR), which is overseen by BESA's certification arm, BESCA. VHR members must provide fully qualified, competent technicians who are fully trained and hold BESA training qualifications in ventilation system hygiene. VHR members will also be able to provide post-clean certification through BESCA, providing the facilities manager with proof of compliance.

By bringing more clarity and emphasis on clean air, TR19® Air is set to ensure that we can all breathe more easily.

More information is available at **www.swiftclean.co.uk**

The wait is over

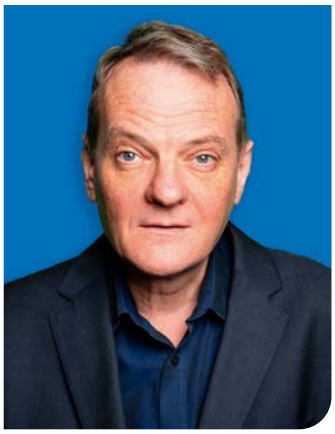
We did originally expect that TR19® Air would follow fairly quickly on the heels of TR19® Grease, but it was delayed. Principally, it has been delayed by a review of the Regulatory Reform (Fire Safety) Order 2005, which was somewhat inevitable following the Grenfell fire disaster and the introduction of the Building Safety Act 2022.

Although we know that in this tragic case, the fire largely travelled up the outside of the building because of the cladding, it was important to discover whether there were any further lessons to be learned from the construction and maintenance of ventilation systems. In this case, ventilation systems were not implicated in the spread of the fire, but a poorly constructed and maintained system could undoubtedly add to the risk of the spread of fire.

Ventilation ductwork must be fitted with a fire damper at the point at which the ductwork creates an opening in the fire-

Before the involvement of BESA and the guidance it has issued over the years, engineers would often find dirt and debris from the installation process present in working ventilation systems.

With monitoring comes **control**



Dan Hopkins, Technical Manager at ebm-papst UK Ltd, discusses how a Building Management System can deliver a healthier outcome for occupants.

It is often quoted that in modern life we spend most of our time indoors, whether this is at home, at work, at leisure or whilst commuting, and this can add up to 90% of our lives spent inside.

At work, whether this is in a commercial, industrial or retail environment, we could be spending most of our time at a designated work station or at several locations around the building. At home, our exponential rise in the use of the internet and sophisticated home entertainment devices, provides much greater choice to be indoors when we are at leisure.

Up until recently, we may not have given a second thought to the effect of these environments on our health, wellbeing, and cognitive ability. Previously, we may have attributed feelings of lethargy, tiredness, sore throats, dry skin, stinging eyes, and other irritating symptoms whilst we have been at work, to a phenomenon that has been referred to as 'Sick Building Syndrome'.

Today we know more about the causes of these ailments, how the indoor environment can affect these symptoms, and the potential for the spread of bacteria and viruses.

As part of the Government commitment that the UK will reach Net Zero carbon emissions by 2050, the building regulations are periodically reviewed to deliver this goal. Approved Document L – Conservation of Fuel and Power (otherwise known as Part L) is a key component of this.

Regular revisions of Part L2 which relates specifically to non-residential properties, have mandated higher efficiency technical building systems. These systems include heating, ventilation, air conditioning, lighting, and domestic hot water systems. In addition to this, Part L2 also requires the building fabric to be constructed to an increased level of air tightness.

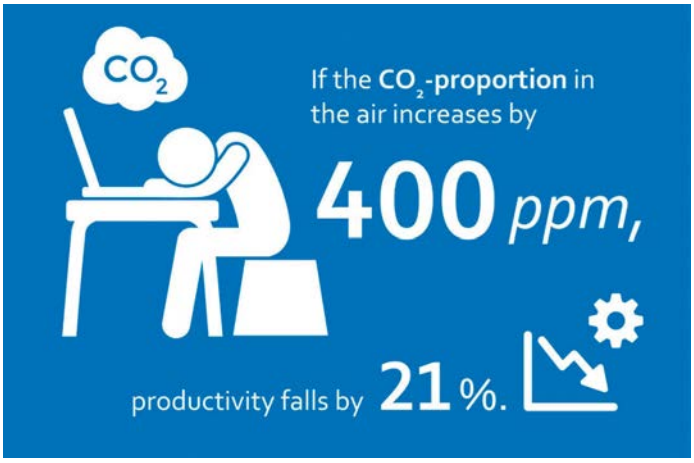
Increased air tightness reduces the infiltration of unconditioned air into the building and the loss of heating and cooling energy from the building to outside.

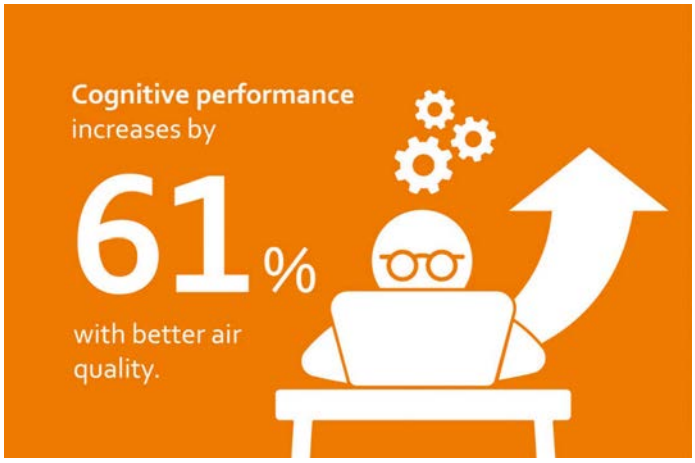
Contaminants build-up

Reducing the amount of air leakage minimises the loss of heating and cooling energy lost through the building fabric. However, this poses a risk of a build-up of contaminants. For this reason, Approved Document F – Ventilation (otherwise known as Part F), specifies a minimum ventilation rate per occupant, guidance on the maximum levels of indoor air pollutants, moisture control requirements and a ventilation rate for each installed printer and photocopier.

There is also guidance to install CO2 monitors, their calibration, installation position and concentration levels to indicate whether the ventilation strategy is effective in the light of Sars-CoV-2 transmission. Whilst the CO2 level provides an indication of the level of occupancy in a room and the potential concentration of bacterial and viral pollutants, it has limitations as an overall indicator of the presence of other potentially harmful contaminants that may be present.

The use of an indoor air quality monitor that can measure the content of the air we breathe can safeguard building occupants against exposure to harmful substances and maximise productivity by creating a better working environment.





Broadly speaking, the factors that affect indoor air quality can be considered in two categories: Cognitive factors, and contaminants that cause illness.

Cognitive factors include attributes such as ambient temperature, relative humidity (%RH), CO2 and volatile organic chemical levels. The effects are usually short term whilst the occupant is exposed to unfavourable conditions, such as an environment that feels stale, stuffy or close. These effects will however be dissipated once the occupant removes themselves into a better environment.

At the extremes of acceptable temperature and humidity levels there are potential biological risks, such as mould growth, that can also affect the health of the occupant. In addition to these factors, strong odours (biological, or culinary in nature), can cause distraction and make the indoor space an unpleasant place to be.

Contaminants can influence the health of the occupant over the longer term and can be particulate, biological, gaseous, or vaporous in nature.

Particulates can come from organic sources (dust, mold spores, pollen, bacteria, wildfires, smoke and viruses) or inorganic sources (exhaust fumes, industrial processes, construction, or other combustion processes). Particulates are generally grouped by their particle size as follows: Coarse - PM10 (Particulate matter of 10µm diameter), Fine (PM1.0 to 2.5µm), and Ultra-fine – PM0.1 (particles of 0.1µm).

Gasses produced as a byproduct of combustion or industrial processes can also contaminate the indoor environment. Some of these contaminants are odour free, including carbon monoxide, nitrous oxide, sulphur dioxide and ozone.

Volatile organic chemicals (VOC's) are vapours that can be produced in industrial plating or coating processes, curing of manufactured materials (furniture, carpets, fixtures, and fittings), finishes such as paint and varnishes, or aspirated in aerosol form such as chemical cleaning agents.

Invisible presence

In addition to temperature and humidity, particulate matter, gases, vapours, and volatile organic chemicals cannot be seen by the naked eye and the occupant will be unaware of their presence and the consequential risk of damage to their health.

For this reason, the use of an indoor air quality monitor that can measure the content of the air we breathe can provide a means to both safeguard building occupants against exposure to harmful substances and enable delivery of an environment to maximise productivity.

IAQ monitors make the invisible visible, and the data that is gathered can be integrated into a wider building management control system to adjust ventilation levels. Monitoring the IAQ over time can also provide facilities management teams insight into whether maintenance (filter change or system cleaning), safety inspections or an investigation into unexpected air quality events are required.

In addition to this, an occupant's experience can be optimised for productivity whilst at work, and better well-being when at leisure.

It is important the IAQ sensor used is of high quality, is calibrated and is capable of checking and adjustment for a drift in accuracy over time. Data should also be able to be gathered over time to allow for analysis of trends, unexpected temporary spikes in contaminants levels and indication that maintenance is required.

This will enable the building management system to determine the order of priority and the level of intervention required to maintain the indoor environment to the required indoor air quality levels. Standards and assessment schemes for IAQ, for example RESET, are already part of building sustainability standards and serve as a benchmark for the attainment of a healthy and productive indoor environment.

Essential role within building operation

Our need to conserve energy to deliver our Net Zero carbon commitment is leading to the requirement for buildings with greater airtightness. Greater air tightness increases the risk of a build-up of odourless contaminants, that cannot be seen, leading to an adverse effect on indoor air quality.

Indoor air quality has a direct effect on our cognitive ability, our productivity and well-being which is why monitoring is an essential part of the building owner and operators' responsibility of a duty of care to their occupants.

With monitoring comes control, with control comes the ability to deliver and maintain a healthy indoor environment.

For these reasons, the competing requirements of approved documents L and F to deliver higher efficiency buildings with adequate indoor air quality, would benefit from the addition of IAQ monitoring and control systems. Indoor air quality sensors can provide the data required to minimise the consumption of energy whilst delivering the required amount of fresh, clean, indoor air to maintain a healthy and productive environment.

More information can be found at **www.ebmpapst.com**

Building owners and managers should prioritise the health and wellbeing of occupants and advocate a holistic approach to IEQ.

A new benchmark to redefine workplace **health and comfort**

Matthew Maleki, CIAT's indoor air quality champion, explores the significance of the new IEQ standard and what it means for business owners and managers.

The dynamics of the workplace are rapidly evolving, especially in the wake of COVID, and the significance of prioritising employee wellbeing has taken centre stage.

In the UK, worklessness through sickness absence and health-related productivity losses costs the economy more than £100bn every year.

The newly-published British Standard for IEQ offers recommendations for measuring, monitoring, and reporting the health and wellbeing performance of indoor spaces and will help businesses who are striving to create environments that foster greater productivity, innovation, and employee satisfaction.

Embracing this standard and making small changes in the way we manage and maintain our indoor environments can make a significant impact on occupant wellbeing and productivity, whilst reducing energy consumption and system running costs. For instance, implementing demand control ventilation (DCV) can typically reduce a building's HVAC running costs by 20-70% depending on the type of application and occupancy.

The new Indoor Environmental Quality (IEQ) standard provides a framework that redefines the benchmarks for a healthy and comfortable workplace as well as signifying a pivotal shift in how business owners and managers should be approaching the wellbeing of their workforce.

Specifically tailored for non-domestic buildings, it offers recommendations for measuring, monitoring, and reporting the health and wellbeing performance of indoor spaces.

What is the new standard?

The British Standards Institute's BS 401023 covers the evaluation of a building's health and wellbeing and indoor environmental quality (IEQ), including a new best practice approach to indoor air quality, thermal comfort, and overheating in buildings.

The standard provides an evaluation and rating system which aims to enhance IEQ to create healthier buildings and boost the wellbeing of building occupants. The IEQ performance score is based on air quality, light quality, thermal comfort and soundscape quality. A building's HVAC system plays a fundamental role in indoor environmental quality and should therefore be focussed upon.

The new exposure limits are based on DEFRA Daily Air Quality Index, WHO Air Quality Guidelines 2021, Approved Document F, BREEAM and WELL Guidelines and British Standard BS EN 16798-1.

Why do we need the new standard?

The effects of poor quality air indoors have long been overshadowed by outdoor pollution, although we spend more than 90% of our time inside and a shocking 3.2 million people die prematurely due to indoor air pollution each year, according to The World Health Organisation (WHO).

Carbon monoxide from cooking and heating, volatile organic compounds (VOCs) from personal care products, particulate matter, tobacco smoke, paint, solvents, mould and bacteria can all affect the quality of air indoors. In fact, more VOCs are emitted from personal care products than from all the petrol and diesel vehicles on the road at any one time.

It's not just cognitive function that is impaired by indoor air pollution, it also has a major effect on our physical health. A shocking number of hospital admissions in the UK could be related back, whether directly or indirectly, to air quality issues.

Respiratory issues, dry skin, headaches, and ear, nose and throat issues are just some of the short-term problems caused by poor indoor air quality. The long-term effects are even more significant.

England's Chief Medical Officer Sir Chris Whitty, who was at the forefront of speaking about the importance of ventilation in combating the spread of COVID-19, is now calling for increased focus on tackling indoor air quality. He said monitoring indoor air quality in public spaces should be standard practice and called for urgent investment to establish records of pollutants that accumulate indoors.

With the drive towards greater energy efficiency, buildings are now being designed to be insulated and as airtight as possible to reduce draughts and avoid heat loss. The result of this is an increase in the retention of moisture in the building with a lack of air circulation and a need to maintain healthy air quality.

The most recent updates to Ventilation: Approved Document F address the need for improving ventilation and offer guidance on the optimum levels of ventilation required to maintain a healthy indoor environment.

What are the benefits of the new standard?

One of the most substantial advantages that BS 40102-1:2023 brings to the table is the potential for cost savings. The local or personalised control and automation of systems not only enhance wellbeing but can also boost energy efficiency, leading to a reduction in operational expenditure.

By adopting the standards outlined in BS 40102-1:2023, building owners can optimise their systems to function more efficiently, ultimately saving on energy costs and contributing to a more sustainable future.

Operational efficiency aside, the standard also addresses the pivotal issue of occupant wellbeing. Improved indoor environmental quality (IEQ) has a direct correlation with increased cognitive function, productivity, and a reduction in fatigue, tiredness, and stress.

The holistic approach advocated by BS 40102-1:2023 ensures that all aspects of IEQ, including air quality, light quality, thermal comfort, and soundscape quality, are evaluated collectively rather than in isolation. This comprehensive evaluation system provides a benchmark IEQ performance score, enabling organisations to identify areas of subpar performance and implement targeted improvements.

For building owners and managers, customer retention and loyalty are crucial metrics. BS 40102-1:2023 acknowledges this by emphasising the creation of an environment where occupants feel comfortable and valued. The positive impact of improved IEQ on customer satisfaction cannot be overstated.

A workspace that prioritises the health and wellbeing of its occupants fosters a sense of loyalty and contentment, ensuring that customers view the building as a location of choice. This not only benefits the building's reputation but also attracts new staff and customers, further solidifying its status in the competitive market.

How should business owners and managers tackle IEQ monitoring?

The process of measuring, monitoring, and reporting IEQ outlined in BS 40102-1:2023 involves a multi-layered evaluation system. To begin with, a scope assessment should be conducted to determine the extent and parameters of the IEQ review. This includes recording company/organisational information, building structure and building services details, maintenance regimes, and potential external pollutant sources.

By understanding the primary function of each space, the typical number of occupants, and the time of day when assessments are conducted, building owners can gain a good overview of their IEQ performance and, using this data, seek solutions to maintain a healthy indoor environment.

The measurement-based assessment involves recording values for various IEQ factors, including air quality (PM, carbon monoxide, ozone, carbon dioxide), and thermal comfort. Thermal comfort, a critical component of IEQ, revolves around air temperature, relative humidity, and, in the case of buildings with fan-powered ventilation or air-conditioning, air velocity.

The inclusion of such parameters ensures a thorough evaluation that goes beyond superficial assessments, providing a nuanced understanding of the indoor environment. Gathering this valuable data will allow the relevant application of ventilation solutions based on the specific needs of the building.

Occupant-based surveys play a pivotal role in ascertaining the IEQ experienced by the users of the building. This user-centric approach acknowledges the subjective nature of wellbeing and ensures that the standards set by BS 40102-1:2023 are not merely theoretical but reflect the real experiences of the building's occupants. This data, combined with the measurement-based assessment, contributes to a more holistic and accurate evaluation of the indoor environment.

Indoor air quality is not always visible. In fact, the visible elements of poor IAQ, like mould or mildew, occur after long-term exposure to IAQ. Measuring IAQ in real-time can make IAQ visible to occupants. It can allow for actions to be taken to improve IAQ before negative effects, including physical symptoms, can occur.

CIAT provides expert solutions to help improve indoor air quality. Many new builds are fitted with smart meters, monitoring the efficiency of mechanical ventilation heat recovery (MVHR) units or air-conditioned spaces where heat pumps utilise fan coil units as the main source of heating and cooling.

IAQ sensors and monitors allow data to be displayed and used for demand controlled ventilation (DCV). When pollutant levels increase, the HVAC system will adjust the air-change rates accordingly, cleaning the space. As levels drop, the HVAC system will readjust to design levels suitable for the rate of occupancy. The result is a clean, energy-efficient space.

The new IEQ standard brings much-needed clarity and direction to the realm of non-domestic building management. Ultimately, a healthy building is an efficient building. By prioritising the health and wellbeing of occupants and advocating for a holistic approach to IEQ, this standard will be an valuable tool for building owners and managers.

More information is available at **www.ciat.com**

The new standard will be an invaluable tool.

The new Indoor Environmental Quality (IEQ) standard provides a framework that redefines the benchmarks for a healthy and comfortable workplace.

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IN THE ABSENCE OF THE COVID-INDUCED PANIC, WHAT IS THE MORE PERMANENT BUSINESS CASE FOR PROVIDING GOOD INDOOR AIR QUALITY?

In 2020-2021 it was hard to turn a corner without bumping into a freshly 'qualified' indoor air quality expert with a magic box supposedly ready to solve all your air quality problems. Customers were willing to listen at the time, even if they didn't quite get their wallet out.

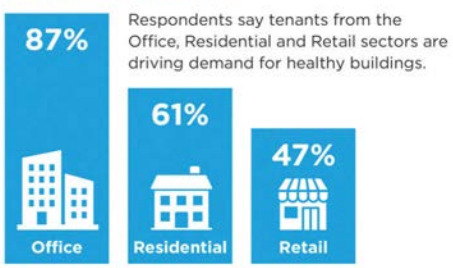
Since 2022, it's been a tough time trying to promote anything that is not focussed on net zero. With the sudden increase in energy costs triggered by the Russian invasion of Ukraine, building operators who were reluctant to address their climate change obligations, suddenly had unsavoury energy bills to highlight inefficient HVAC systems.

Since then, the focus of facility managers and building designers has primarily been on reducing carbon emissions. Because of this focus, there are fewer people willing to listen about solutions for improving indoor air quality. But they should.

There are always multiple stakeholders involved in any purchasing decision, all with different priorities.

Developer: Could I rent out/sell my property for more money if it has good indoor air quality?
An AirRated survey recently found that occupier decision makers would spend on average an 18% premium on commercial space that had a healthy building certification.

Building owner: Will my building remain compliant in future if I deliver today's bare minimum?
Landlords currently rushing to upgrade their buildings to meet EPC B by 2030 is a prime example of this, the same may be the case for air quality in the future.



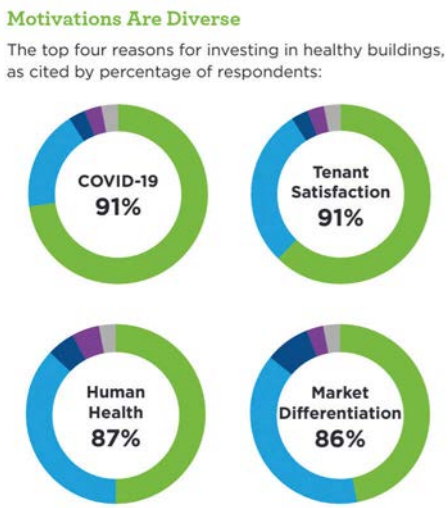
Chief Revenue Officer: Will improving the air quality in my office make my staff more productive?
A 2015 study found that elevated levels of CO2 can cause up to 11% reduction in productivity, 23% impairment in decision making and 299% reduction in information usage.

CEO - Does having a healthy building for my employees demonstrate our commitment to ESG, and does that highlight to our customers that we are a good company to deal with?
The global Real Estate Sustainability Benchmark (GRESB) gives credit for healthy building standards such as AirScore. ESG is an increasingly important consideration for investors.

Human resources: Are we less likely to have staff absences if we have good indoor air quality?
A report from the Confederation of British Industry (CBI) in 2020 found that work absences related to poor air quality cost Britain £600million a year.

Employee: Am I more likely to accept a job in a healthy building?
The latest AirRated survey found that 60% of Americans stated that the health of the building was their most important priority.

Data suggests that there is a clear financial benefit to providing good indoor quality. The demand for healthy buildings pre-dates Covid. Indeed 68.4% of respondents to the AirRated survey saw rising demand before the pandemic. So what is holding back decision makers?



There has been some confusing advice and there is no 'one box fixes all'.

HEPA purifiers were given the backing of the Scientific Advisory Group for Emergencies (SAGE) during the pandemic. Their own subsequent £1.85million trial of portable HEPA purifiers in Bradford schools only cut sick days by 20%. Ahead of those results being made available, the building regulations have been updated to require HEPA filtration to be fitted to recirculating office ventilation systems. This has left consumers confused as to who to listen to.

The commercial office market was where most IAQ custom was seen during the pandemic, with building owners and employers keen to see a return to the office. This sector had historically seen the most demand for healthy buildings pre-Covid. Office occupancy rates are still down at 35%, the current lull in this significant sector is not reflective of the overall IAQ market.

Following an initial, significant decline, the indoor air quality market declines no longer. But we will not see a return to 2021 business levels for some years.

An increasing level of enquiries we see for air quality surveys demonstrate that the heightened awareness of air quality still exists compared to pre-pandemic, but both the assessment and appropriate remediation are likely to be bespoke to the building.

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Alongside energy consumption, AI platforms can track other key metrics such as asset, space, health, and occupant comfort to drive up ESG.

AI takes centre stage

Mark Bouldin, Smart Buildings and Clean Air Expert at Johnson Controls, outlines three steps for integrating AI into facilities management.

Looking back on 2023, one thing is clear: Artificial intelligence (AI) is here to stay.

ChatGPT, a chatbot developed by AI research organisation OpenAI, saw its first anniversary last November and since its inception, it's become increasingly accessible to the public. Integrations into essential programmes we use in everyday life are now commonplace.

So, what happens when we apply this technology to the facilities management space? Unsurprisingly, the opportunities for improvement are boundless.

AI and automation enable businesses to expand their software use as they look to optimise heating, cooling, and power generation in real time. New technologies anticipate projected energy costs ahead of time, enabling a switch from reactive to proactive as AI-powered data analytics reveal the skeleton of a building like never before.

Facilities managers can gain insights into every facet of their infrastructure, from building performance to tenant experience to carbon footprint.

Building managers may still be under the impression that switching to such technologies is too costly and laborious, but the truth is that many quick switches are available, where managers can see the returns on installations instantaneously.

Mapping out areas for improvement

The first step is to identify areas to cut emissions and costs across the built environment, the first step is data gathering and analysis. Facilities managers (FMs) can utilise AI-powered platforms and IoT sensors to gather real-time data on energy consumption.

By harnessing predictive analytics, it's possible for FMs to identify specific areas that produce the most energy waste and emissions. AI platforms make building simulation possible, creating an accessible 'birds-eye' map of the environment as well as test-driving possible future scenarios.

Such a forensic and forward-looking view makes it far easier to make decisions when it comes to sustainability practices, understanding what is feasible for any given building. Alongside energy consumption, AI platforms can track other key metrics such as asset, space, health, and occupant comfort to drive up ESG (Environmental, Social, and Governance) scores.

AI continuously inspects these key metrics, recommending the corrective action to fix any equipment issues or inefficiencies as needed.

The energy question

FMs can also harness AI algorithms and historic patterns to proactively manage energy usage. Real-life use cases reveal the true impact of AI in optimising and reducing power consumption.

For instance, smart filtration and HVAC systems, led by AI, adjust from minute to minute to occupancy patterns. As a result, energy levels and occupant comfort are tailor-made and adjusted accordingly to ongoing changes in the environment.

Some available technologies offer management via a network of cloud-based apps. Through these applications, managers and even tenants can quickly alter water supply as well as make alterations to lighting and HVAC across any part of a building.

The real benefit is accessibility, where changes are made quickly and simply from a smartphone. This makes tracking spending and efficiency far easier, but it also enables managers to update stakeholders on sustainability targets in instantaneous and meaningful ways. Not only are FMs gathering knowledge, they are also able to share it.

Smart management platforms have already been adopted in thousands of buildings all over the world. As businesses look to reduce emissions and increase the accuracy of their ESG reporting in line with ever-evolving government regulations, they can look to all that new technology has to offer. Without AI innovation, leaders may find it difficult to affect programmes for change that are adaptable, future-facing, and affordable.

AI powered data analytics reveal the 'skeleton' of a building like never before.

Refine and finesse

Facilities managers can refine their emissions reduction strategies when they regularly update AI models. Learning from what worked in the past enables FMs to create an approach to building management that is ever evolving.

To make such an approach possible, it's vital that building and company data is interconnected and easily accessible. With data in the cloud, decision-makers can access insights into building operations in one place, analysing it as a complete entity.

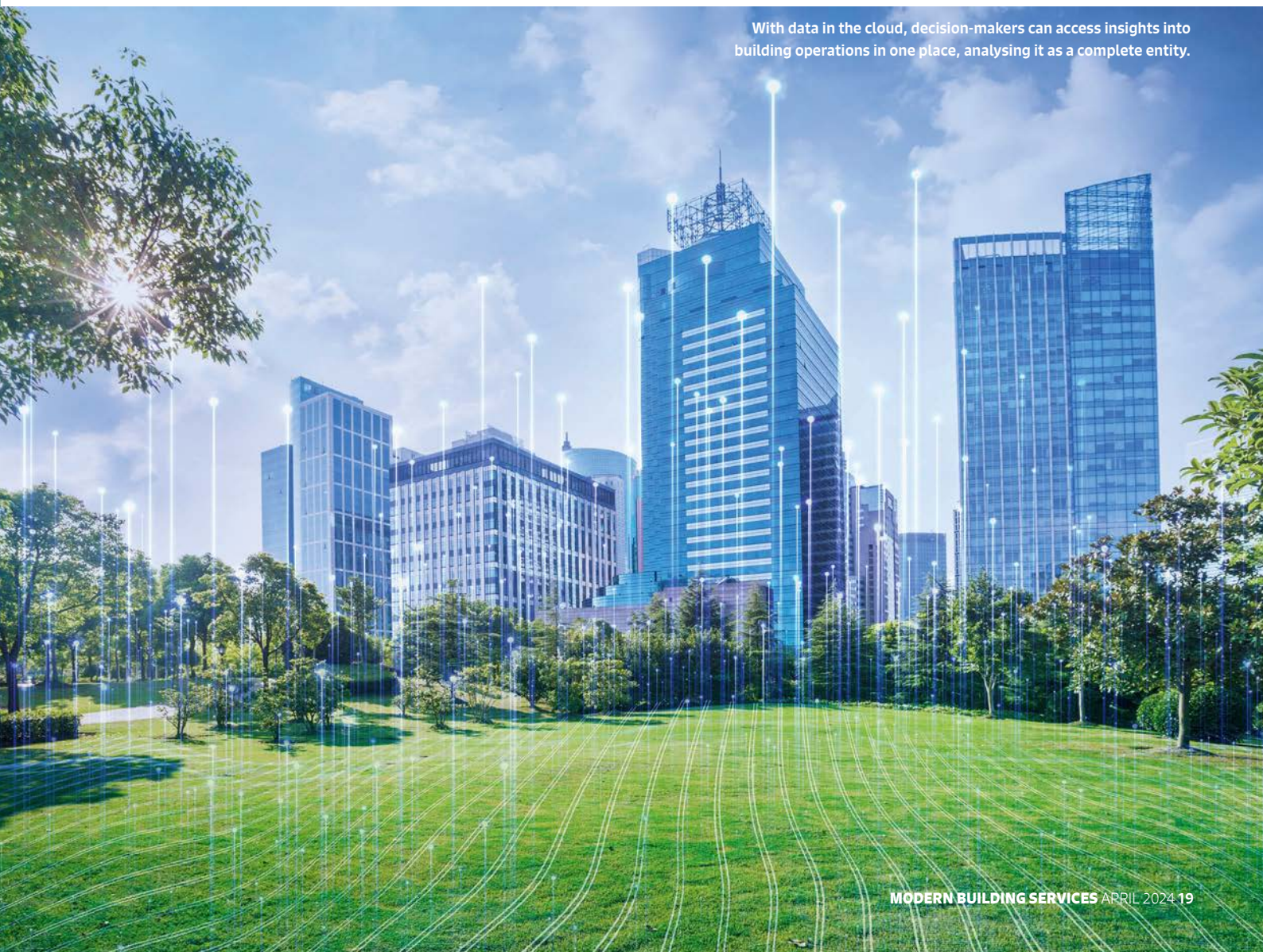
They can then laser-focus this analysis on more specific processes. This could include but is not limited to energy savings, sustainable development, and maintenance.

Once areas for improvement are identified, the appropriate smart technologies and AI integrations can make autonomous adjustments. The result of software that acts independently is happier, healthier building tenants, who experience a building that adjusts intuitively to their needs.

When technologies such as AI and Machine Learning (ML) combine with integrated building data, building and office decision-makers can create something which is genuinely smart and automated. Such technologies will undoubtedly continue to improve occupant comfort and safety in years to come.

In the future, AI will become an increasingly indispensable tool as FMs draw up plans to meet all-important sustainability targets and seek a deeper understanding of emissions across their environments.

More information can be found at **www.johnsoncontrols.com**



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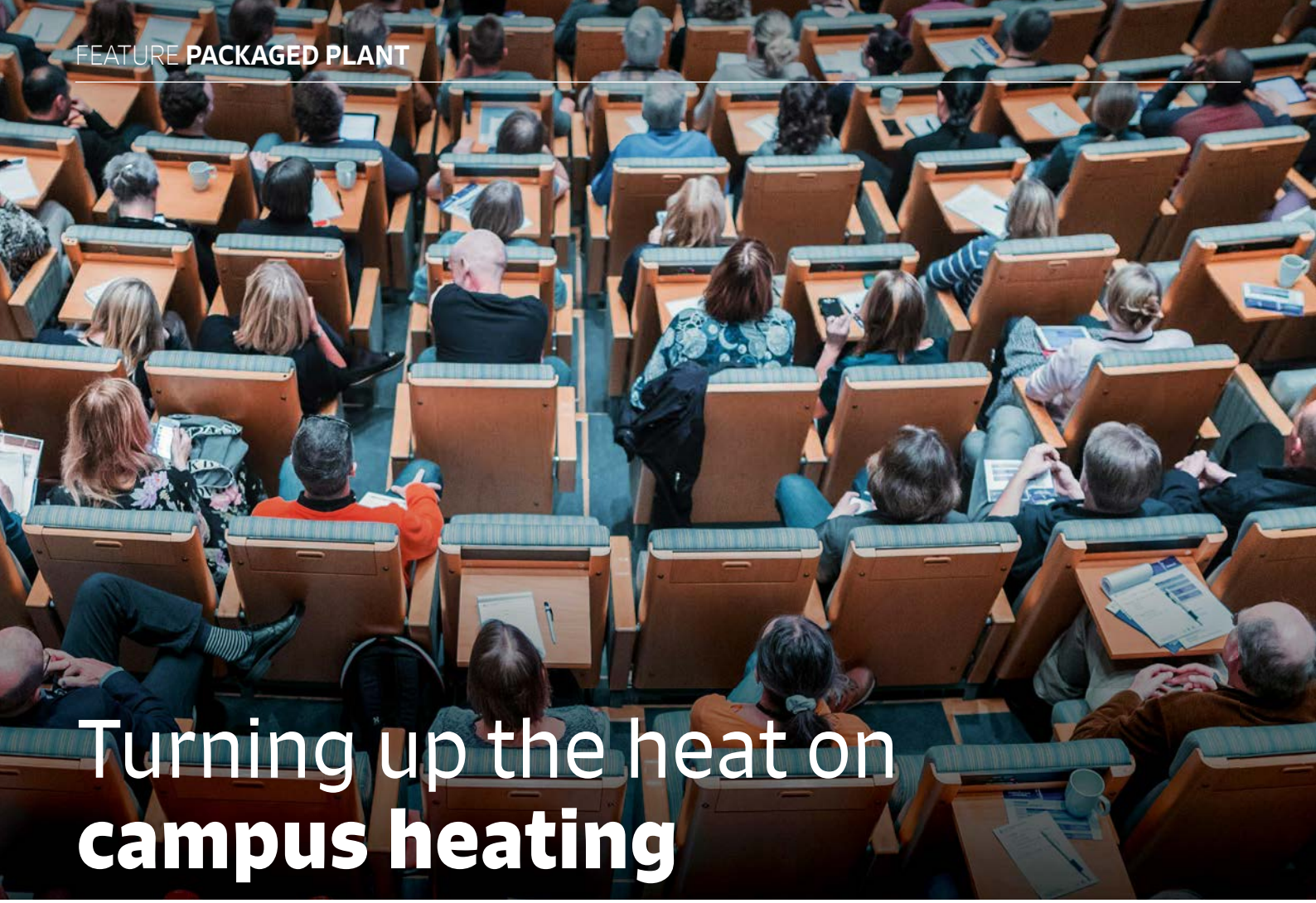

Turning up the heat on **campus heating**

Stephen Hart, Director of Integrated Solutions at Baxi, discusses how campus heating systems can advance the heat decarbonisation drive for universities and hospitals.

While it's well established that changing the way we heat our buildings is an essential step in the UK's journey to Net Zero, healthcare estates and universities are two sectors that have particularly ambitious heat decarbonisation targets in place.

The NHS in England has set targets to reach Net Zero by 2040 for direct emissions and 2045 for the emissions it influences. Meanwhile, universities have a sector-wide target of reducing emissions by 75% by 2035 with many setting Net Zero goals of 2030 or 2040. With a similar high density of buildings and users, and matched by a predictably high heat demand, both are well suited to a campus heating style of heat network.

Heat network is an umbrella term that describes a shared system providing hot water and/or space heating to consumers in multiple buildings (district heating) or consumers in multiple dwellings, often within a high-rise tower block (communal heating).

A heat source (or sources) within a district heating network powers a centralised energy centre which transfers heat to the connected properties through a network of insulated underground pipes. This avoids the need for individual heat sources in individual buildings.

A campus heating system, our focus here, is a subdivision of a district heating system where the heat generator is also the owner of the buildings which are connected by underground pipes to a central energy centre.

Heat networks have a crucial role to play in the UK's transition to Net Zero as they simultaneously facilitate mass decarbonisation while providing greater energy security. The Government's ambition is for 20% of UK heat demand to be supplied from heat networks by 2050, up from an estimated 2-3% today. Government and private sector funding is available to help increase uptake rate.

Challenges and opportunities

Of course, centralised heating systems are not necessarily a new concept for either universities or hospitals. The key problem with university energy systems is the dated and inefficient infrastructure that dates back, in many cases, to the 1980s. For hospitals, the decarbonisation challenge stems from the size, variety and complexity of the buildings and heating systems across the healthcare estate.

Installing a new campus heating or cooling system offers both sectors a real opportunity to ensure a mission-critical solution that will improve both economic and environmental sustainability while delivering greater energy security and resilience.

Further ahead, there is the potential to scale up and become a heat network hub for the local community, unlocking additional future opportunities.

Technology agnostic

When designing a campus heating system, it's important to remember that heat networks are technology agnostic. Many new heat networks are designed to use low-carbon heat sources such as heat pumps or renewable heat such as biomass. They can also use heat recovered from industry or urban infrastructure such as factories or mines and rivers.

Certainly, electric technologies such as heat pumps are the dominant heat source in new heat networks. However, rather than taking an all-electric system, CIBSE Code of Practice CP1 points to the benefits of a hybrid engineered approach to ensure greater reliability and security as demand on the electrical grid intensifies.

While not necessarily achieving full decarbonisation at the outset, a well-designed hybrid system will prioritise heat pump contribution with gas boilers providing the necessary energy resilience. What's more, future-proofed natural gas boilers installed today could run on biofuel tomorrow and potentially green hydrogen in the future, meaning that even the boiler can be decarbonised.

Of the 130 heat network operators surveyed by Government in 2022, 48% said they were likely to switch to a low-carbon heat source at the end of their generation asset lifetime. This supports the view that, rather than focusing on the carbon intensity of the technology at the outset, the priority should be to create the heat network infrastructure and ensure resilience.

In so doing, a campus heating system has the ability to tick all boxes for universities and hospitals alike, reducing the carbon footprint of the estate while improving financial sustainability, security and reliability.

Healthcare estates and universities are two sectors that have particularly ambitious heat decarbonisation targets.

Three steps to campus heating success

1. Carry out feasibility and design studies. Partnering with specialists who can provide expert support on a project-by-project basis will make the process more seamless and straightforward. Look for heat experts who can offer digital tools to provide precontract design advice and engineered solutions based on low carbon technology generators to support funding applications.
2. Think inside the box: Heating solutions providers who can supply in-house offsite manufacturing and engineering capabilities to design and build the energy centre – including packaged plant room options – as well as all the products will help make the switch to an efficient new campus heating system smooth and seamless.
3. Service and maintenance. Applying wireless remote monitoring and control will optimise the performance and drive efficient maintenance. Similarly, predictive maintenance will avoid downtime and disruption, with remote monitoring enabling engineers to identify the root cause and ensure early fix where necessary. The aim should be sustainability at no cost to ongoing system efficiency and reliability.

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A pre-insulated phenolic rectangular HVAC ductwork system.

Limiting embodied carbon

Marc Nickels, Business Development Manager at Kingspan Technical Insulation, discusses the findings of an examination of different HVAC approaches.

Quantifying and limiting embodied carbon is becoming an increasingly important part of building services specifications.

LETI, a voluntary network of more than 1,000 built environment professionals, has estimated that MEP services account for around 15% of embodied carbon during the initial construction of a modern office building. However, across its lifespan, an office building may undergo multiple Cat-A fit-outs, meaning that the overall amount of embodied carbon from these services is much higher.

For specifiers, the challenge is finding solutions and approaches to reducing the embodied carbon from the specified system, whilst also ensuring it performs efficiently and utilises low carbon technologies to minimise operational emissions. This often means taking a step back and carefully considering how the adoption of different heating approaches and technologies may impact on the overall system.

Three scenarios research

Engineering specialist Introba recently carried out modelling based on a typical office development to provide a clearer understanding of how different HVAC approaches can affect overall embodied carbon from MEP systems.

The research considered a five-storey office building with a gross floor area of 10,000 m2. The geometry and layout of the building have been estimated as representative of current UK design standards. The research considered the total embodied carbon from all three MEP areas for both a Shell & Core and Cat-A fit out.

Three different HVAC scenarios were assessed:

- Variable refrigerant flow (VRF)
- Air source heat pump with fan coil units (ASHP with fan coil units)
- Air source heat pump with chilled beams (ASHP with chilled beams)

In each case, the public health and electrical designs were kept constant. The embodied carbon for each scenario under Shell & Core and Cat-A fit-outs was calculated using the methodology in CIBSE TM65 - Embodied Carbon in Building Services: A calculation methodology (2021).

In all scenarios, it was assumed that the refrigerant used in all system options was R32 with a global warming potential of 675 kgCO2e. The leakage rates follow the recommendations in CIBSE TM65 with an annual leakage rate of 2% for the ASHPs and 6% for VRF and end of life rate of 1% for the ASHPs and 3% for VRF.

Combined emissions findings

The results showed that the ASHP with fan coil units scenario had the lowest combined emissions from the Shell & Core and Cat-A approaches and by far the lowest emissions for the CAT-A fit-out.

ASHP with chilled beams had the lowest Shell & Core fit out emissions, however, its CAT-A fit out impact was far higher than for VRF and ASHP with fan coil units. This was mainly down to the high embodied carbon impact of the aluminium chilled beams. This meant that the embodied carbon from the heating/cooling emitters was over four times higher than for the other CAT-A fit-outs.

Overall emissions from the VRF scenario were the highest of the three scenarios. Refrigerant leakage contributed to 32% of the overall embodied carbon emissions from the VRF scenario. In a high refrigerant leak emission scenario, the embodied carbon emissions from the VRF specification could increase further. ➜

Pre-insulated ductwork

In all scenarios, the ventilation systems were found to have a high embodied carbon impact. This is likely because of the significant amount of steel used in ventilation systems as part of the large air handling units and ductwork. As such, any method of reducing the quantity of steel used in ductwork is likely to have a positive effect on the overall embodied carbon of the MEP system.

To investigate this further, a sensitivity analysis was carried out to see if embodied carbon could be reduced by switching from a ductwork specification featuring galvanised steel ductwork lagged with phenolic duct insulation, to a pre-insulated phenolic ductwork system.

The results showed that this could have a particularly notable impact on the embodied carbon emissions from the ventilation system for the ASHP with fan coil units scenario, reducing lifecycle embodied carbon from 100.2 kgCO2/m2 to 88.9 kgCO2/m2. This is a reduction of more than 11%.

Embodied carbon emissions for the ventilation system in the VRF scenario also fell by 4.7 kgCO2/m2 whilst change for Scenario 3 was only 0.3 kgCO2/m2 due to the lower quantity of ductwork for chilled beam systems.

Pre-insulated ductwork also supports potential savings in operational emissions thanks to its highly-insulated and airtight design.

Enhanced pipe insulation specifications

A further finding from the research was that the pipe and duct insulation contributed only a relatively small amount to the overall embodied carbon from the different MEP system scenarios. This was primarily down to the relatively-small mass of insulation when compared to the total mass of the MEP system.

Further modelling was carried out to understand how switching to enhanced pipe insulation specifications may impact overall embodied carbon in the ASHP with fan coil units scenario for a Cat A fitout. Again, three potential scenarios were looked at:

- Option A: BS 5422: 2023 - which bases insulation thickness calculations on the maximum permissible heat loss
- Option B: CIBSE CP1 - which bases calculations on a minimum phenolic foam insulation thickness of 50mm for heat networks
- Option C: Passivhaus - which recommends a pipe insulation thickness of approximately twice the pipe's internal diameter. The maximum insulation thickness in this study have been capped at 100mm

In each case, the analysis compared a foil-faced phenolic pipe insulation product. The embodied carbon of the insulation following the BS5422 methodology was 0.81 kgCO2/m2.

The CP1 methodology results with a more than four times increase at 4.25 kgCO2/m2, and a more than five times increase following the Passivhaus methodology at 5.16 kgCO2/m2.

Despite this, the proportional impact of all three options within the whole MEP system was considered to be minimal.

In practice, upgrading the pipe insulation specification from the base BS 5422 requirements, to the CIBSE CP1 or Passivhaus specification should lead to substantial savings in operational emissions.

To examine this, a modelled comparison was carried out based on indicative pipe sizes of 100 metres of each 20 NB, 25 NB, 32 NB, 40 NB and 50 NB at 55 °C flow in 15 °C ambient with insulation thicknesses to meet the maximum permissible heat losses laid out in BS5422: 2023 Table 15A (Base) and CIBSE CP1 (50 mm thickness on all sizes). This was based upon continuous operation throughout the year.

This showed that by increasing from the base BS5422 specification to the CP1 requirements, annual heat loss and operational carbon associated with the heat loss could be reduced by around 45%.

Revelations on reductions

The research shows that the ASHP with fan coil units scenario had the lowest lifecycle embodied carbon emissions of the three that were examined. The embodied carbon emissions for CAT-A fit out for this scenario were also notably lower than for the other approaches that were examined.

The study also clearly highlights that measures to reduce steel can help to substantially lower embodied carbon. This is demonstrated by the 11% reduction in ventilation system embodied carbon that was achieved for the ASHP with fan coil unit scenario by using pre-insulated phenolic ductwork over a conventional galvanised steel ductwork system lagged with phenolic insulation.

Finally, it highlights the need to consider the embodied carbon impact of different specifications of product within the context of the overall system.

As was shown, enhanced specifications of pipe insulation could raise the overall embodied carbon impact from this solution, but the impact on overall embodied carbon for the MEP system was minimal. As such, this shouldn't be treated as a barrier to adopting enhanced pipe insulation specifications to lower operational emissions.

More information is available at **www.kingspantechnicalinsulation.co.uk**

Research suggests the use of a pre-insulated phenolic ductwork system, such as KoolDuct, over conventional lagged steel ductwork, could allow savings on embodied carbon emissions to be reached.

THE RIGHT TO CLEAN AIR: MOVING THE DIAL ON AIR QUALITY

Air pollution poses severe health risks for residents in areas with poor air quality ratings.

From respiratory issues to life-changing health conditions such as dementia, the need for efforts to purify indoor air is evident. David Millward, Group Product Manager at Elta Group, explores the challenges surrounding the right to clean air and emphasises the need for continuous action.

In recent years, the link between air pollution and various medical conditions, both short-term and long-term, has gained significant attention- and rightly so. This has prompted numerous studies to investigate the connection between indoor air quality and health conditions. Consequently, efforts have been made to reduce the release of dust, carbon monoxide, and nitrogen dioxide into the atmosphere, particularly in city centres and urban areas.

To help mitigate the impact on residents, several cities within the UK have implemented clean air zones where vehicles that exceed standard emissions occur fees for driving through these areas. There has also been updates to Part F of Building Regulations to ensure correct ventilation systems are installed. This is a step in the right direction; however our target is yet to be reached.

Whilst making progress, it is evident that the UK still exceeds the World Health Organisation's annual air quality guideline by 1.8 times. As building service engineers, we play a crucial role in continuing to reduce air pollution.

Addressing both indoor and outdoor air quality requires distinct approaches. While clean air zones help reduce outdoor pollution, indoor air quality relies on factors such as air movement and purification. Ventilation systems play a vital role in introducing circulation, removing particle matter, and eliminating airborne toxins to maintain low indoor pollution levels and prevent hazards like damp and mould growth. However, retrofitting, upgrading, or installing ventilation systems requires skilled professionals familiar with building regulations and the correct assembly and installation of equipment.

It's an ongoing effort to achieve cleaner air, and correctly specified and installed ventilation systems in both new and existing buildings are a huge part. Challenges may arise during the construction or retrofit of inner-city buildings, with issues such as damp and mould damage, missing parts, or incorrect assembly of unassembled ventilation systems delivered to the site.

To address these challenges and in an attempt to gain control over these issues, Elta is able to offer Prefabricated Solutions of their ventilation range, providing customers with over 150,000 options of certified products including fans and ancillaries.

With the company recently undergoing their 50th anniversary rebrand, Elta has committed to helping reshape the world's understanding of Air Quality, with their new slogan being 'Air Movement, Air Quality. Elta aims to create healthier, cleaner, and safer indoor environments by optimising ventilation systems.

For more information about Elta, please visit:
https://eltauk.com/

A converged data network that delivers a wealth of information reliably from the many end devices and systems to the BMS is essential for optimal building performance.

Smart networks underpin smart buildings

Chris Dyke, Sales Director UK & Ireland at Allied Telesis, explains the importance of converged data networks in delivering reliable information from end devices and systems.

The changing office paradigm of working from home, working remotely and hybrid work is redefining building design and management.

Some companies find they don't need the same space, or they need to use their space differently. The office isn't going away, but it is changing, so real estate owners and landlords are having to compete harder than ever for the pool of potential tenants and customers out there.

Smart buildings are crucial to those changes.

Along with changes in how we use real estate, our buildings are being called on to do more for us. Flexibility and comfort for employees, protection of assets, and safety for everyone are at the forefront of new construction, and investing in smart buildings is an attractive option.

The additional benefits include lower ongoing costs to operate, improve tenant satisfaction and employee retention, increased building lifespan, and maximised use and occupancy. Add in the fact that smart buildings are necessary for reducing or eliminating greenhouse emissions, and the case for smart buildings is even more solid.

Convergence and IoT

If information technology (IT) and operational technology (OT) had a child, it would be called IoT. The Internet of Things brings unprecedented abilities to both IT and OT and the line between them is blurring. According to research by Gartner, 75% of OT security solutions will be delivered via multifunction platforms that are interoperable with IT security solutions by 2025.

A smart building typically runs a converged IP network with a centralized Business Management System (BMS) at its core, this allows previously "dumb" devices to report back on their health or status. For example, a failed light panel doesn't need to be reported to facilities. Instead, the lighting system will send a report to the BMS which, dependent on its severity, will be flagged to an operator on a console and remedial action can be taken straight away.

Such reporting can extend right back to a vendor for products under onsite repair/replace warranties. These instant notifications reduce downtime and the financial impact that usually follows.

Running IT and OT over a single IP network drives a convergence of facilities management and property management. Gartner's research also shows that IoT expenditures in smart buildings were $53 Billion in 2020 and are expected to reach $108 Billion by 2030.

It's therefore worth taking a look at the drivers behind the development of smart buildings and recognising that there is a common denominator that underpins them all: Smart buildings need smart networks.

Technology and Integration

Technology advances in the last decade have revolutionized the interface between computers and the outside world. Miniaturization has brought us wayfinding systems, environmental, light, humidity, sound, and hundreds of related devices/sensors.

Most are inexpensive and can be incorporated into any situation. These devices often connect wirelessly to the BMS network, and many can be configured to act as relays for other sensors that would otherwise be out of range of the network.

Flexibility

Rearranging users has always been a major undertaking, but that too is changing. For example, if a user relocates in a smart building, the system can move all of the associated services, such as access to network resources, printing, phone, meeting room, lift and facility access along with that user. All of this allows for a much more dynamic workforce with much less resistance to work where the building suggests.

Flexibility takes on new scales in today's modern buildings. For example, if a tenant decides they need more or less space, or needs to rearrange the physical office layout, walls can be moved, and smart light switches can control specific light fixtures in the newly formed offices. This flexibility allows for corporate growth without sacrificing lighting and energy efficiency to the restrictions posed by a static building layout.

Health, Comfort, and Satisfaction

Along with users' comfort, smart buildings can monitor various health influences. Air quality monitoring can check for mould, pollen, dust, CO2, Carbon Monoxide, Ozone, and noxious chemicals used in cleaning and refrigeration like chlorine and ammonia. Readings from sensors such as these are already being used by some organisations to encourage users back to the office following the pandemic, ensuring that it's the safest possible environment to work.

Refrigerators can be monitored, and settings logged periodically, as many medical lab protocols require. The water feature in the lobby can monitor the water clarity, temperature, pH, nitrites, and ammonia and notify the contractor if something goes out of range.

Instead of traditional fixed maintenance visits, predictive maintenance can be employed allowing optimised models to be utilised which are much better for both the client and any associated maintenance provider. Research has shown that in the US alone, the savings and productivity gains from improved indoor environments are between $25 billion to $150 billion a year.

Providing a flexible and comfortable work environment tailored to its users, accompanied by the security of knowing the environment is being monitored for hazards, increases user satisfaction. In addition, a healthier workspace increases retention and lowers the costs associated with employee turnover.

Security

Placing hundreds (if not thousands) of devices in a smart building increases the attack surface of the network and the building. Hackers are constantly looking for weaknesses in IoT devices to manipulate them into whatever network access they can manage. In addition, devices come with their own software components, which can contain security holes. IT can secure many flaws by ensuring the devices are set up properly on their network, with passwords, encryption and changes locked down.

They can further limit the exposure by micro-segmenting their network to minimise the impact of an attack or allow the isolation of only small sections for maintenance or remediation.

While centralized monitoring and control rely on having all the elements on a common network, that doesn't mean all devices are accessible to each other. Segmenting the network allows IT to group related devices in logical groups. For example, the BMS application can access some groups, and the business applications can access others, but groups cannot directly access members in other groups.

This method allows groups based on physical location, device type, or other criteria dictated by security concerns. Segmentation allows IT to dictate security specifics based on the threats faced by the members of each group. It also means that any bad actor that gains access to a device can only access other group members, greatly limiting their potential impact.

Longevity

Longevity is the measure of tenants staying in a building. Catering to personal preferences, providing unprecedented flexibility for operational changes, protecting individual health, and providing workplace security are all features that keep tenants in a building longer. According to research, renters are willing to pay 20% more on average to live in a smart building and energy efficient buildings sell for 17% more than standard building stock, generate 35% more rental income, and have 18% higher occupancy rates.

Finding Direction

Several certification and scorecard systems have become extremely relevant in recent years, as real estate owners vie to hit ESG targets and demonstrate value to investors and tenants. BREEAM (Building Research Establishment Environmental Assessment Approach) and SmartScore are two such schemes that are used by the industry to demonstrate the compliance and capabilities of a building to a tenant.

These are the norm for a greenfield site but can also be integrated into an existing building via retrofitting, as often the environmental impact of replacing a building can far exceed the benefits in the short to medium term. Retrofitting existing buildings increases return on investment with payback taking less than two years and delivering 25% energy savings annually.

Room for Growth

Lastly, it is vital to remember that every user benefits, and that the owner advantages for a smart building scale up well. Building Management Software can easily become Campus Management or Enterprise Management Software. By incorporating encrypted links or cloud infrastructure, the same management systems can configure and control buildings across the quad, town, or continent. The IT department can deploy the necessary physical equipment at any location for central monitoring. If users move to a new location, their preferred settings and personal information follow them. The benefits multiply with more locations.

Smarter networks underpin smarter buildings

All the intelligent services that enable smart buildings – like layout and user flexibility, access control, heating and lighting, security, and more – need 24/7 connectivity to the BMS to ensure operational efficiency that maximizes building ROI and provides the best possible user experience.

A converged data network that delivers a wealth of information reliably from the many end devices and systems to the BMS is essential for optimal building performance. Look for a network partner experienced in providing secure resilient, always-on networks that underpin smart building operations.

More information is available at **www.alliedtelesis.com**

Keeping things on a level with **rooftop installations**

Raajan Bains, Technical Sales Manager at Walraven, discusses how to overcome challenges in mounting M&E systems on pitched roofs.

Installing M&E systems on flat roofs is challenging enough, but if the roof or surface they are being fixed to has a pitch or slope, it's imperative to ensure that services are installed level so the equipment can function properly and safely.

This presents additional challenges for fixing the M&E services using standard rooftop support feet as the majority are designed to sit on a flat surface. The most common solution offered is that of a rubber wedge to place under the support foot, which is fine if the pitch of the roof slope matches the pitch of the wedge.

Instead of using wedges, fully adjustable rooftop support feet provide a better option as they offer full flexibility in pitch with a simple adjustment mechanism. It ensures that the M&E equipment can be securely mounted and aligned regardless of the rooftop's topography. This adaptability reduces the need for extensive site preparation and allows installations to proceed more smoothly and quickly.

Further considerations

For contractors, the main on-site challenge is sourcing a suitable support foot for mounting M&E services on a sloping surface or roof. Whilst this is a key problem for them to overcome, there are also other factors to consider when installing on a rooftop that affect the appropriate choice of solution.

Other important considerations when selecting support systems for mounting installations on rooftops include structural integrity, surface material, noise/vibration, weather impact, environmental impact, and scalability.

Structural integrity of the roof

Structural integrity must be considered prior to rooftop installation to ensure it is not compromised with the chosen solution. One of the main factors relating to this is ensuring suitable load distribution of the installation.

Every rooftop surface has its own deformation rating, showing how much load can be safely applied to the surface until penetration.

To ensure the longest lifespan of the installation you might want to consider looking for support feet that have a certified UV resistance rating according to the EN standards.

This will determine the number and placement of roof support feet required. Different support feet will deliver different levels of load distribution depending on their design. The manufacturer will be able to help you determine the number of feet required for the optimal solution as this will differ from one product to another.

Surface material

Different roof surfaces will have different coefficients of friction. This means that the resistance to motion between the rubber support feet and the roof surface can differ. Therefore, a suitable solution must be chosen to ensure that the installation is stable and does not move or slide on the surface. The manufacturers can help you to understand if their products will be suitable for the surface material you are installing on.

Vibration and noise resistance

If you're installing HVAC equipment on a rooftop, this can often result in noise and vibration which can pass through the building structure and potentially cause severe problems.

Every rooftop surface has its own deformation rating, showing how much load can be safely applied to the surface until penetration.

In some cases, anti-vibration products such as spring mounts may be required, but the rooftop support feet can also help towards combatting problematic noise and vibration.

As most rooftop feet are made of rubber, they provide some 'natural' level of vibration and noise resistance, but in most cases this cannot be quantified or guaranteed because the product has not been tested and certified for this.

If there is a particular concern regarding noise on your build, you might need to look carefully for a solution with certified noise reduction.

Weather conditions

When installing on an exposed rooftop, it is critical to take into account the effect that different weather conditions will have on the installation. For example, wind and snow loads need to be considered when looking at the overall rooftop load capacity.

UV rays can cause serious degradation to plastic and rubber elements of a rooftop installation, such as the plastic or rubber support feet. This could seriously limit the lifetime of the installation if the feet used do not have any UV resistant properties.

To ensure the longest lifespan of the installation you might want to consider looking for support feet that have a certified UV resistance rating according the EN standards.

Environmental considerations

If environmental considerations are important on your project, you will want to use products that help you deliver more sustainable installations, or meet any requirements specified in the building design documents. Most rooftop support feet are made of rubber or plastic. Manufacturers should be able to tell you if they are made of recycled materials or not, so be aware that not all will be. So if this is an important requirement for your project you should enquire with the manufacturer.

Scalability and future expansion

As building needs evolve and new technologies emerge, the ability to adjust and reconfigure rooftop installations becomes increasingly valuable. Adjustable, long-life feet systems can allow for easy modifications or additions to existing installations without major disruptions or costly retrofits.

Whether accommodating changes in equipment layout, expanding renewable energy capacity, or integrating advanced monitoring systems, choosing quality, long-life, modular rooftop supports can future-proof rooftop installations and support long-term sustainability goals.

Manufacturer help

When it comes to the challenges of installing on pitched roofs, many contractors should seek advice from the manufacturing companies. There are a limited number of solutions on the market to deal with this.

Standard solutions like adding rubber wedges can sometimes solve the problem but it's useful to also consider the broader project requirements to see if a higher spec, all-in-one solution can contribute to other project deliverables such as noise reduction, long lifespan, ease of installation and environmental considerations.

More information is available at **www.walraven.com**

Sunderland Council reduces carbon emissions with new Hamworthy heat pump system

When Sunderland Council needed a heating system that would help to reduce carbon emissions at its offices in Stansfield Business Centre, a new Tyneham heat pump system, set up in a hybrid installation from Hamworthy Heating provided the solution.

As the existing gas boilers at Stansfield Business Centre were operating at elevated temperatures and the heating system was designed to operate with high-grade heat at peak loads, Sunderland Council decided that a hybrid system (with an air source heat pump being the lead source of heating with a gas boiler providing a top up) was required, when its existing system reached end of life.

The new system at consists of a 32kW Tyneham air source monobloc heat pump which is connected to a 500L buffer cylinder. It features a co-efficiency of performance (COP) rating of up to 4.85, to provide efficient, low carbon heating and can be accessed on site or remotely.

www.hamworthy-heating.com

Nuaire releases CPD on High Temperature Axial fans & VSDs

Indoor air quality and ventilation manufacturing specialist Nuaire has announced its latest CPD, which addresses high temperature axial fans and variable speed drives (VSDs).

The CPD has been introduced to explain the standard 'BS EN 12101-3:2002 smoke and heat control systems - Specification for powered smoke and heat exhaust ventilators', and advise on compliance.

It also covers the test conditions that high temperature axial fans and VSDs must undergo, before moving on to best practice in high temperature fan design. The importance of opting for a fan/VSD that has been tested as a package is stressed, along with an explanation of why a VSD Fire Mode (smoke clearance function) is needed.

The high temperature Axial Fans & VSDs CPD can be delivered free of charge. All those attending will gain full CPD credits and certificates.

www.nuaire.co.uk

Rheinriff lighting system marks significant milestone

Lighting providers TRILUX and Oktalit have installed a new lighting system for indoor surfing facility Rheinriff which marks a significant milestone in its history of creating immersive experiences.

Rheinriff has transformed its space into a multifunctional venue where lighting seamlessly adapts to various usage scenarios, thanks to the cutting-edge LiveLink Retail lighting management system.

Situated within the historic industrial hall on Düsseldorf's Areal Böhler, Rheinriff spans around 6,000 square metres, offering an indoor surf hall, event space, and co-working area.

The lighting design integrates the diverse requirements of functional zones, ensuring a cohesive experience from the central "standing wave" to the reception, catering, and work areas.

Wireless connectivity via Bluetooth LE Mesh allows seamless integration of several hundred luminaires into a network divided into function-related groups and zones.

www.trilux.com

New Modular Highline 235 Fan Coil Range Wins at CIBSE Building Performance Awards

The New Modular Highline 235 Fan Coil Range developed by British heating and cooling equipment specialist, Diffusion, won the 'Product or Innovation of the Year – Thermal Comfort' category at the CIBSE Building Performance Awards 2024.

Developed to create the perfect indoor environment in commercial applications, the new Modular Highline 235 fan coil range comprises eight models, including 13 fan combinations. Boasting exceedingly low sound levels, the Highline 235 delivers noise ratings as low as NR25. This ensures its suitability for a wide variety of buildings, particularly residential applications and hotels where quiet operation is critical.

The CIBSE Building Performance Awards (BPAs) 2024 recognises the people, products and projects that demonstrate engineering excellence in the built environment.

www. diffusion-group.com

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