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Rishi Sunak's rowback on government net zero policy has caused dismay among those Conservatives who have been spearheading Britain's global leadership on decarbonisation for the past decade.

MP Chris Skidmore, arguably the Tories' most high-profile advocate for climate action, called Sunak's climbdown 'incredibly disappointing and a huge strategic mistake'.

The decision to delay the ban on new petrol and diesel cars from 2030 to 2035 was deemed a particularly retrograde step, when so many global carmakers had committed to invest in electric vehicles and battery technology. Ford said moving

the 2030 target would undermine the government's 'ambition, commitment and consistency' – which are key to manufacturing plans. The decision to delay the ban of fossil-fuelled, off-grid boilers from 2025 to 2035 will also be giving the jitters to those firms that are investing millions in transitioning from gas heating to low carbon alternatives.

CIBSE President Adrian Catchpole says watering down policy 'risks seriously undermining confidence from businesses and homeowners that have started on the journey to invest in the skills, supply chains and infrastructure necessary to decarbonise' (see page 7). He also points out that the UK has to act now to keep on the 2050 net zero trajectory – or else it will be impossible to make up lost ground.

The removal of the 2025 deadline for improving the energy efficiency of landlords' properties not only takes us further away from net zero, but also puts more financial pressure on renters. They have been hit particularly hard by inflation and interest rate rises as landlords pass on the extra burden of ownership.

Sunak says he is merely putting the UK on an equal footing with other countries. We've sprinted ahead of other nations in the race to decarbonise, and now Sunak says we need to catch our breath and make sure the cost of decarbonisation doesn't fall on those least able to afford it.

Sunak is using net zero to differentiate the Conservatives from Labour ahead of a general election. His party believes an unexpected Tory by-election win in Uxbridge was because of opposition to the extension of London's ultra-low emission zone. The thinking is that removal of other 'green taxes' will be a vote winner.

It's a gamble that risks unravelling the good work done by those in government who have striven to make the country the global leader in low carbon innovation and technology. Let's hope the UK doesn't become the dozy hare that gives up its lead on net zero to become an also-ran.

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The guidance aimed at helping landlords understand and address the health risks of damp and mould in the home



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Overview of the new Guide M, which aims to ensure a building's performance is optimised while being safely maintained



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What a new standard on thermal insulation materials means for specifying pipes, ductwork, vessels and tanks



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CPD module 223 covers the various elements that determine indoor air quality in a hospital setting

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IN BRIEF

£1bn home-insulation scheme under way

The Great British Insulation Scheme has been launched by the government in an attempt to upgrade the energy efficiency of 300,000 homes.

Most of the assistance under the £1bn scheme, which is an extension of the Energy Companies Obligation, will go to families in lower council tax bands with less energy-efficient homes. Households living in higher council tax-band homes will also be eligible if the property has an Energy Performance Certificate rating of D or lower.

The scheme is designed to deliver single measures, such as loft or cavity-wall insulation, to a larger number of households, rather than deep retrofit fewer homes. People can use an online checker to see if they are eligible.

Energy bill discounts reduce hospital visits

Vulnerable households prescribed energy bill discounts by the NHS in a groundbreaking warm homes project were less likely to visit the hospital or GP subsequently.

Energy Systems Catapult outlined the findings from its Warm Homes Prescription (WHP) trial in a report last month. In total, 823 households, containing people in low-income neighbourhoods who suffer from health conditions made worse by the cold, took part in the project. They were provided with credits on their energy accounts so they could heat their homes to a warm temperature.

Researchers found that the WHPs lessened pressure on NHS services, with fewer hospital and GP appointments booked by those who took part in the trial.

MPs told of soaring excess winter deaths

Excess deaths caused by living in a cold, damp home soared by nearly a half last winter, fuel poverty campaigners have told MPs.

Simon Francis, coordinator of End Fuel Poverty, told the energy security and net zero committee on 6 September that an estimated 4,706 excess deaths in winter 2022/23 were due to living in a cold, damp dwelling in Britain.

This was up from 3,186 in the year before in England, Scotland and Wales.

The government has back-tracked on several climate change policies

Net zero retreat 'risks undermining business and homeowner confidence'

CIBSE calls for stable and consistent government policy on net zero

Around a fifth of households will be exempted from the government's 2035 new gas boiler ban and landlords will no longer be forced to carry out energy efficiency upgrades, Rishi Sunak has announced.

In a speech at 10 Downing Street on 20 September, the Prime Minister unveiled a dramatic and wide-ranging watering down of climate change policies, which he argued currently 'impose unacceptable costs on hard-pressed British families'.

Sunak said the government would take a 'more pragmatic, proportionate, and realistic approach to meeting net zero that eases the burdens on working people'. Announcing that it will give people 'far more time to make the necessary transition to heat pumps', he said many households will be exempt from the 2035 phase-out of new gas boilers. This exemption is expected to cover about a fifth of homes that will face the biggest struggle to make the switch from fossil-fuel boilers, including off-gas-grid homes and those requiring expensive retrofitting or a very large electricity connection to make them suitable for heat pumps.

Sunak also announced that grants under the Boiler Upgrade Scheme, which subsidises installations of heat pumps and other low carbon heating technologies, will be increased by 50%, to £7,500. In addition, he outlined moves to speed up the process for securing grid connections and planning permission.

Tory MP Chris Skidmore, author of the government's net zero review, said the Prime Minister's announcement 'condemns the UK to missing out on what could be the opportunity of the decade to deliver growth, jobs and future prosperity'.

Responding to the announcement, Energy UK's chief executive, Emma Pinchbeck, said: 'As recently as yesterday, ministers were stressing their continuing commitment to [low carbon technologies], so it's alarming for companies considering UK investments in these areas when these same policies are shelved the next day.'

Charlotte Lee, chief executive of the Heat Pump Association, said: 'The government has once again moved the goalposts for heat decarbonisation in the UK, and this risks damaging investor, installer and consumer confidence in this space.'

'We need consistent policy' – CIBSE President Adrian Catchpole

Rishi Sunak's announcement on net zero policy goes against advice from the government's own adviser, the Climate Change Committee. Watering down policy risks seriously undermining confidence from businesses and homeowners, who have started on the journey to invest in skills, supply chains and infrastructure to decarbonise the building stock. As highlighted by Chris Skidmore, the net zero 2050 target is not a lone target: the UK has carbon budgets to meet, and a carbon-reduction trajectory to follow, so we need to act now where we can. As has repeatedly been recommended before, what is needed is a stable and consistent policy framework, alongside government support where required.

Major changes to net zero policy

- Ban on off-grid fossil-fuelled boilers delayed from 2026 to 2035, with only an 80% phase-out target at that date
- Removal of requirement for an EPC C rating for domestic landlords' properties by 2025
- Postponement of 2030 deadline for buying new diesel- and petrol-powered cars and vans to 2035
- Grants for the boiler upgrade scheme increased by 50%, to £7,500

IN BRIEF

Decarbonisation delay would be 'catastrophic economic self-harm'

The author of the recently published government review of its 2050 decarbonisation target has warned that delaying the UK's transition to net zero will result in 'catastrophic economic self-harm'.

Speaking in a House of Commons debate on the government's Energy Bill on 5 September, former energy minister Chris Skidmore said the UK faced the choice of reaping the economic benefits of accelerating progress on meeting net zero, or delaying. He added: 'The rest of the world has woken up to the reality that the energy transition is here to stay.'

Gove faces legal challenge by M&S

Marks & Spencer has launched a legal challenge against the decision by the Secretary of State for Levelling Up, Housing and Communities, Michael Gove, to refuse controversial plans to redevelop its flagship store on London's Oxford Street. The retailer announced on 31 August that it has launched a judicial review of the government's decision not to allow it to demolish the 1929 art deco-style Orchard House, which has become a cause célèbre within the wider debate about whether it is more sustainable to redevelop or retrofit buildings.

Net zero minister hails wind power, but opposes Ulez

Claire Coutinho signals green intent after replacing Grant Shapps

The government's new Secretary of State for Energy Security and Net Zero hailed the 'remarkable success' of the UK's offshore wind power industry in her maiden speech as an MP.

Claire Coutinho was appointed by Prime Minister Rishi Sunak in a reshuffle triggered by

her predecessor, Grant Shapps, moving to fill the role of Secretary of State for Defence, left vacant after Ben Wallace stepped down.

Previously a junior minister at the Department for Education, Coutinho has only been an MP since 2019, and has been in government for less than a year after being appointed parliamentary under-secretary at the Department for Work and Pensions last October, by Sunak's predecessor, Liz Truss.

The East Surrey MP is a member of the Conservative Environment Network and led its campaign to rewild the green belt. In her maiden speech to the Commons, she also described offshore wind as 'one of the most remarkable success stories in the UK today'.

However, Coutinho posted on X, formerly Twitter, that she was 'disappointed' that London's Labour mayor, Sadiq Khan, had won a court battle to expand the ultra-low emissions zone (Ulez) for older, polluting vehicles into the outer part of the capital.



Make Raac schools net zero, say MPs

Schools that are being forced to close because of safety fears over RAAC concrete should be net zero compliant when rebuilt, the chair of parliament's Environmental Audit Committee (EAC) has urged.

The enforced full or partial closures of more than 100 schools, triggered by heightened concerns over the lightweight concrete, present an opportunity for sustainability concerns to be addressed when they are replaced, said Philip Dunne MP. 'The rebuilding programme should incorporate energy efficiency as standard to enable new buildings to be decarbonised. Currently, the education estate emits the largest volume of carbon emissions in the public estate, and there is a key opportunity to make these new, safe buildings net zero compliant to stem damaging emissions.'

On 18 October, the EAC will hold a one-off evidence session with the Department for Education (DfE) on the findings of a recently published National Audit Office report into the DfE's environmental sustainability. The committee would like to hear the views of stakeholders on the report. Submit your comments via its evidence portal at bit.ly/CJRaccEv or email eacom@parliament.uk by 6 October.

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New research suggests heat pumps are suitable in a variety of climates

Heat pumps need no backup in mild countries, says study

New research claims heat pumps provide efficient heating in many cold climates

Heat pumps can be 'successfully installed' in most European countries without requiring back-up heating, according to a new study by a team of academics and researchers, including from the Regulatory Assistance Project thinktank.

A paper in energy research journal *Joule* examined the performance of air source heat pumps (ASHPs) in 'mild' European winters, when minimum temperatures averaged above -10°C.

The study, which used performance data from seven field studies in North America, Asia and Europe, says heat pumps are 'increasingly' used in various climates to provide space and water heating. Measured performance data show that they can provide the 'most efficient' heating in many cold climates. The analysis suggests that heat pumps can be successfully installed in most European countries, which experience milder winters, without concerns over performance or the need for back-up heating capacity.

Above -10°C, heat pumps were able to provide

the required heat at relatively high efficiency, the study says: 'From a heat-provision standpoint, this suggests concerns over the need for back-up heating during mild cold-climate conditions may be unfounded, and the role for hybrid systems may be limited.'

It adds that, during mild cold climate conditions, the coefficient of performance (COP) – the ratio of useful heat outputted by devices to energy consumed – ranges from more than 5 to just less than 2.

Standard ASHPs can maintain average COPs between 2 and 3 in mild cold climates, the study says. In extremely cold climates, where temperatures plunge to as low as -30°C, heat pumps can provide heat at double the efficiency of conventional fossil fuel heaters, it states.

For climates that experience extreme cold temperatures, however, increased heating demand and decreased efficiency of devices mean 'some form of back-up heating may be required', the authors say, adding that there is an 'outstanding question' over the role of hybrid systems in such conditions.

IN BRIEF

Kensa network first to join consumer scheme

Kensa Utilities' Heat the Streets pilot project has become the first to be registered with a new consumer protection scheme for people living on communal and district heat networks. The Heat Trust's scheme, which sets minimum service and protection standards for heat network customers, is designed to lay the foundations for future statutory Ofgem regulation of the sector. The Heat the Streets project uses underground boreholes and pipes to harness stored solar energy from the ground and feed it to a small ground source heat pump in each home.

Jenny Curtis made MD at Vattenfall in UK

The UK arm of Swedish energy giant Vattenfall has announced the appointment of Jenny Curtis as managing director.

Curtis has worked with Vattenfall's heat business in the UK for almost three years. Her last role was interim director for Bristol, where she was leading the team in delivering a low-carbon heat network in the city.

Vattenfall also announced a joint venture with Midlothian Council to build and operate a district heat network for the new town of Shawfair.

The Midlothian Energy Limited JV has been set up to supply low-carbon heat through a network of underground pipes to newly built homes being constructed in the former coal mining area. The heat network's initial phase will supply around 3,000 homes, education facilities and shops.

Bangor designs nuclear fuel cells for Moon base

Bangor University scientists have designed tiny nuclear fuel cells to power mini-reactors that will be required for future Moon bases. The Triso fuel cells can be used in portable, micro nuclear generators, created by Rolls-Royce, which are sufficiently small to be transported to the Moon on a rocket.

Stable nuclear fuel systems are seen as vital for long-range space missions, such as those planned to Mars, because they will not be able to rely on solar power alone.

CMA to publish green heating guidance for manufacturers

The Competition and Markets Authority (CMA) has raised concerns about boiler companies making potentially 'misleading' marketing claims about use of hydrogen in home heating, following a Sky News investigation.

The broadcaster reported that a number of boiler companies have made confusing and potentially misleading marketing statements. Sky cited a claim on manufacturer Worcester Bosch's website, which it said had subsequently been withdrawn, stating that the gas grid is due to switch to '100% hydrogen'. However, the government has yet to make a decision on the proportion of home heating that will be supplied by hydrogen.

Sabrina Basran, director of consumer protection at the CMA, said: 'While we can't comment on individual firms, these claims may be misleading and risk greenwashing consumers into thinking these products are more environmentally friendly than they are. We'll be publishing new guidance to help businesses meet their legal obligations when marketing products in the green heating and insulation sector, as well as considering whether further action, such as enforcement, is necessary.'

IN BRIEF

Heavy rain a factor in construction output fall

Monthly construction output in the UK decreased by 0.5% in July, according to the Office for National Statistics' (ONS's) most recent monthly data, released on 13 September. The data shows a 0.5% drop in volume terms for the month. This follows a 1.6% increase in June.

The decrease in July's output came solely from a 1.3% drop in repairs and maintenance, with new work increasing 0.1% during the month.

The main contributor to the monthly decrease was private housing, including repairs and maintenance, and new-build projects.

The ONS said anecdotal evidence suggests heavy rainfall in July led to delays to planned work, and this was compounded by a continued slowdown in the sector.

It added that construction output was flat in the three months to July, with a 0.3% increase in new work offset by a 0.4% decrease in repairs and maintenance.

Iron mains pipes need replacing ahead of hydrogen blending

Government says hydrogen can embrittle iron pipes and equipment

The phase-out of old iron ring main pipes may need to be accelerated if the go-ahead is given for blending hydrogen into the gas grid by 2025, the government has said.

A new consultation paper, launched by the Department for Energy Security and Net Zero on 16 September, is designed to inform a government decision, by the end of this year, on whether to back 20% of hydrogen by volume into Britain's gas-distribution networks. It states that blending is not a 'substitute for actions' to deliver full decarbonisation of heating, such as accelerating deployment of heat pumps.

In a section on cost implications of blending, the paper flags up that some areas of the gas-distribution network are made up of old iron mains, which can be embrittled by hydrogen.

All iron mains are due to be replaced by 2030. If hydrogen blending is to be rolled out nationally

from 2025, however, 'premature replacement' of iron pipes and equipment may be necessary, 'ahead of the current programme'. This may mean hydrogen being blended only into areas of the gas-distribution network where the pipes and components are not made from old iron. As a result, during early years of blending, it would only act as a flexible offtaker in specific parts of the gas-distribution networks. Another potential cost is updating some legacy gas meters, which may not be sufficiently accurate because of the different volumes of natural and blended gas.

Energy minister Lord Callanan said: 'Blending hydrogen into our gas supply through existing gas infrastructure would open the door to an expansion of its use as a fuel, one that could help us cut emissions and stabilise bills for families and businesses.'

The energy sector, consumer groups and industry have until 27 October to respond to the consultation paper, which is entitled '*Hydrogen blending into GB gas-distribution networks*'.



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Call for protection for heat pump consumers

The government has been urged to close a legal loophole that leaves hundreds of thousands of heat network customers at risk of losing heating and hot water when their building's gas supply is disconnected.

Responding to the government's call for evidence on domestic customers reliant on non-domestic energy contracts, the Heat Trust said these offer far less protection than those for domestic utility customers, which are protected by Ofgem licence conditions.

The consumer body for heat network customers says this lack of protection has led to cases where entire blocks of flats have faced disconnection from their gas supply because of payment issues involving a building management company. The trust is calling for whole residential buildings to be protected from disconnection if an owner or manager fails to pay bills on time.

It is also recommending an ongoing price ceiling for non-domestic supplies serving residential buildings, to give customers equivalent protection to the price cap enjoyed under domestic energy contracts.

In addition, the Heat Trust raised in its response the lack of access communal electricity customers have to the Warm Homes Discount Scheme, which offers top-up payments for certain low-income customers.

Stephen Knight, director of Heat Trust, said: 'While the government is separately looking at regulating the operators of communal and district heating systems, which is great news, customers are also impacted by the lack of regulation of the energy supply to these operators.'

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Entries now open for CIBSE Building Simulation Awards

Nominations are now being taken for the 2023 CIBSE Building Simulation Awards, which are presented by the CIBSE Building Simulation Group and will be showcased at Build2Perform Live on 5 December.

There are two accolades up for grabs: the Building Simulation Award and the Building Simulation Young Modeller Award.

The former focuses on the use of building simulation in projects, and aims to encourage innovation in building simulation techniques. The Young Modeller Award recognises the outstanding contributions of young engineers, apprentices and sustainability consultants working with building performance simulation.

Each entry will be reviewed by a panel of experts, and the finalists will present their projects in front of an audience and judging panel at Build2Perform. The deadline for submissions is 27 October.

To submit your entry for the CIBSE Building Simulation Award, visit bit.ly/CJBSEentry23

To enter for the Young Modeller Award, visit bit.ly/BSYMENTry23

For more information, contact buildingsimulation.competition@cibse.org You can find details about past awards at bit.ly/CJBSEawards

Brian Colin Charlesworth (1948–2023)

On behalf of the Membership & Registration (M&R) Panel, CIBSE would like to recognise and remember Brian Charlesworth, who died last month.

Brian was a generous, amusing, inspiring person to know, and well respected in the industry. He was also a loving family man.

Brian was a CIBSE interviewer from 2003–18 and sat on the M&R Panel for almost 10 years. He was a great mentor and helped many to develop their professional interviewing skills.

After finally retiring completely, he threw himself into beekeeping and ink line drawing, at which he was exceptionally skilled, producing the most wonderful drawings.

When Brian was awarded his CIBSE Silver Medal in 2018, he did not want a formal presentation, so it was presented to him in a local pub. He will be missed greatly and his humour and contribution to CIBSE will be remembered.

CIBSE ANZ boosts ties to construction industry

Region signs agreement with Chartered Institute of Building

CIBSE's Australia and New Zealand (ANZ) Region strengthened its ties with the construction industry by signing a memorandum of understanding with the Chartered Institute of Building (CIOB) in August.

A visit to the region of CIOB chief executive Caroline Gumble was an ideal opportunity to reinforce the institutions' commitment to promoting awareness of

key issues in the built environment locally, advancing knowledge of best practice among members, and working together to do so where possible. The agreement was signed at the CIOB Property Economic Update breakfast in Sydney.

CIBSE ANZ chair Phil Senn feels strongly about taking a collaborative approach to tackle reform and promote competence.

'The building sector requires strong collaboration between design and construction professionals to deliver sustainable, scalable solutions for the built environment,' he said. 'By formalising a partnership between CIOB and CIBSE ANZ, we will improve access to shared knowledge, and work together to solve numerous challenges – the largest of which is how we transition the built environment toward net zero emissions across construction and operation, incorporating circular economy thinking.'

CIBSE ANZ is looking forward to delivering many joint events with the CIOB in the coming months and years.

● For more information on the CIBSE ANZ Region visit: www.cibse.org/get-involved/regions/australia-new-zealand



SLL launches revised LG14 guide for control of electric lighting

Updated publication covers internal and external controls

A new publication offering updates on internal and external electric lighting control has been published by the Society of Light and Lighting (SLL).

The second edition of *LG14: Control of electric lighting*, originally published in 2016, sets out a logical approach for the professional designer to consider the consultation, design, specification, commissioning and handover of a lighting installation incorporating controls.

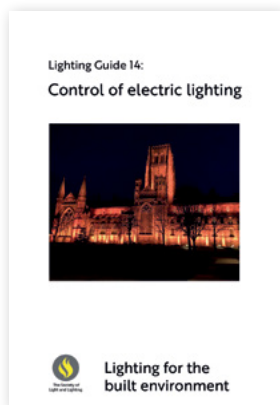
The guide has been updated to inform what is meant by controls for electric light relative to project specification and design in the 21st century. It covers internal and external electric lighting control, but does not cover solar blind and shutter control, or theatre and advertising electric lighting control.

Luminaire technology, energy efficiency legislation and rising energy costs are common drivers for incorporating lighting controls into a project. This means they are increasingly becoming essential, rather than

an optional extra or 'nice to have'.

'Lighting controls are now an integral part of all lighting installations. LG14 guides the designer through the processes required to make informed decisions about how and why to add lighting controls to a lighting design,' said author Sophie Parry, of Trilux, who is Technical & Publications chair for the SLL. Case studies were contributed by the late David Holmes and Simon Robinson, WSP Consulting.

● To access a copy of *LG14: Control of electric lighting*, go to: bit.ly/CEL23CIBSE



Knowledge portal and *CIBSE Journal* voted top membership benefits

Members respond to CIBSE survey which featured EDI for first time

CIBSE Knowledge, professional registration and the *Journal* have been voted the top member benefits in CIBSE's member survey. More than 2,300 people responded to the poll, which is testament to the strong engagement within the Institution's membership.

Every few years, CIBSE carries out a comprehensive survey of its membership. This initiative serves a vital purpose: ensuring that the Institution remains dedicated to delivering relevant services, creating essential products, and championing industry best practices.

The survey gave valuable insight into members' preferences and needs. Among the most noteworthy were the top membership benefits: unlimited downloads of knowledge items from the Knowledge Portal; professional registration; and *CIBSE Journal*, which was rated 'good' or 'excellent' by 80% of respondents.

For the first time, the membership survey included dedicated questions about equity, diversity and inclusion (EDI), reflecting CIBSE's commitment to fostering an inclusive culture. CIBSE firmly believes that inclusivity brings resilience, creativity and innovation, ultimately benefiting the profession and the built environment it serves. The voluntary responses to these questions will be instrumental in shaping our approach to EDI.

One prevalent request from members was for more outreach at events and in schools. This echoes the theme of CIBSE President Adrian Catchpole, who launched the partnership between CIBSE and STEM Learning at his inaugural address in June. This initiative aims to empower our members to become advocates for the profession. CIBSE has developed a suite of presentations that members can use to engage and inspire the next generation of engineers.

Another striking revelation was that 66% of respondents felt there were no visible role models within the industry. This is a challenge that CIBSE takes seriously. It is committed to being vocal and visible in its efforts to improve the performance, safety, health and sustainability of the built environment. CIBSE



Free Guide downloads were voted a top member benefit

wholeheartedly supports and celebrates the talented individuals who make it all possible.

The survey results are being meticulously reviewed and analysed, and will play a pivotal role in shaping the future direction of CIBSE. Member involvement is at the core of its mission, and the team at CIBSE extend their heartfelt thanks to all who took the time to complete the survey.

The CIBSE membership survey is not just a snapshot of its members' thoughts; it is a roadmap for a brighter, more inclusive and innovative future. Together, we will shape the future of our profession and continue to build a stronger, more resilient and vibrant CIBSE community.

The membership in numbers

- 80% of respondents rated the *CIBSE Journal* good or excellent
- 66% of respondents felt there were no visible role models within the industry
- 78% either agree or strongly agree that being a CIBSE member has benefited their career
- 78% agree or strongly agree that CIBSE membership is considered important within the industry
- 83% said CIBSE communicates about the right amount
- 28% placed face-to-face training at the top of their preferences for how they like to conduct their CPD
- 62% said they would describe themselves as being part of CIBSE's community
- 73% of those who attended a CIBSE event or training in the past year rated it as good or excellent

Guidance and FAQs available for concerns over Raac

CIBSE members will be well aware of the concerns about reinforced autoclaved aerated concrete (Raac) that have been reported recently, following the closure of several educational settings.

Building services engineers may be asked about Raac by clients with concerns, and may encounter material that they suspect to be Raac in the course of their work.

The Institution of Structural Engineers has produced a statement and FAQs (bit.ly/CJRaccSt), and issued clear guidance for the assessment of suspected Raac (bit.ly/CJRaccStFG). CIBSE advises anyone who has questions or concerns relating to Raac to seek advice from a structural engineer who has specialist knowledge about the specific characteristics and behaviour of the material.

Collaborative Reporting for Safer Structures UK (CROSS-UK) has set up a theme page with further information. CROSS is a confidential reporting system that allows professionals working in the built environment to report on fire and structural safety issues. These are then published anonymously to share lessons learned, create positive change, and improve safety. Visit: <https://bit.ly/CROSSReport>

Will you be the next SDE Digital Champion?

Entries are now open for the Society of Digital Engineering (SDE) Awards.

The awards celebrate progress and excellence in digital engineering among built environment professionals, recognising those who are contributing to digitalisation, including technicians, engineers and designers. The full list of award categories is:

- Best process and its application
- Best project and collaboration
- Best consultancy
- Best contractor
- Best manufacturer
- Best digital engineer
- Overall winner - Digital Champion 2023

Entries must be in by 27 October, and the winners will be announced during Build2Perform Live, at the ExCeL London on 6 December.

For full details and to enter, visit: bit.ly/SDEGetInvolved

MAINTAINING PERFORMANCE

A substantial update of Guide M with a focus on controls, competence and energy and wellbeing, among many other areas, has taken place. Lead author **Joanna Harris** offers an overview of this key document, which aims to ensure the design community and Facilities

Managers deliver operational building performance

C *IBSE Guide M: Maintenance engineering and management* is considered the 'go to' guide for the facilities management (FM) industry. Everything you need to know about operating buildings services is introduced and explained in this guide, and references to more in-depth resources are also provided.

The guide is based on UK best practice, updated for this third edition by volunteers, who each led on a chapter, or two, where they have knowledge of the subject and industry experience. There was an open call for contributors to volunteer their expertise.

Health, wellbeing and safety

Topical subjects are covered, including wellbeing, which has come into sharp focus since Covid. Lessons learned from the pandemic include the change in how people use buildings, and how management and maintenance that focuses on occupants can help organisations bring staff back into facilities.

Lessons learned from the Grenfell tragedy in the UK – and the resulting change in legislation and how this affects facility operators in terms of fire safety – have been provided, along with an update of all the legislation guidance. The need for the industry to take competence more seriously is another lesson learned from Grenfell, and



the subject is covered in more detail than in the 2014 version. Energy and carbon are subjects that have undergone a lot of change since the previous edition. The content has been updated to cover the need for an energy management policy and capturing and using the energy-use data, and it explains what is required from an energy management system. Advice on low carbon and renewable systems has also been introduced.

Technology and controls

Controls can support the management of facilities more than at any time in the past. Advances in technology have required the subject to be almost completely rewritten in the guide, sharing current best practice from the Building Controls Industry Association. This includes the importance of the description of operation, how systems



TRUST IN YOUR LIFE SAFETY SYSTEMS

SCA - the leading voice of the smoke control industry

The SCA are pioneers in promoting and enhancing the design, manufacture, installation and maintenance of life safety smoke ventilation systems. All SCA members that carry out site installation works are third party accredited, understand the varying smoke control requirements for each and every building and have suitable levels of PI insurance.

Find out more at www.smokecontrol.org.uk





Guide M was last updated in 2014

“The need for the industry to take competence more seriously is another lesson learned from Grenfell, and the subject is covered in more detail than in the 2014 version”

integrate, and a reminder to maintain the basics, but Guide M also offers insight into using controls for maintenance.

There is advice on upgrading control systems, as well as the importance of cybersecurity, commissioning and training.

Contracts and costs

The sections on contracts and costs of operation and maintenance now include guidance on the procurement process. Readers are reminded that awarding contracts based on lowest price alone often does not provide value for money and the guidance is to award based on a combination of price and quality.

Quality submissions should consist of questions designed to test the bidder's understanding of the client's requirements. It is an opportunity for the bidder to set out their approach to service delivery, their understanding of the services needed and of the client organisation, the benefits of

the systems the company will deploy, and to indicate any innovative practices they may wish to introduce during the contract.

Guidance on mobilisation of contracts has been updated to provide a list of items that need to be discussed and agreed, such as: site familiarisation; access procedures/codes; helpdesk processes and contacts; emergency call-out contacts; details of emergency isolation points; and implementation and use of contract technology systems, such as computer-aided FM and computerised maintenance management systems.

Budgetary control, and the cost categories that can enable measurement of financial performance, is presented with maintenance cost consisting of labour, consumables, spares, specialist services, and other asset and equipment costs (such as capital allowances, grants, and so on). The section reminds readers that adjustment factors – such as access arrangements and any hours of working constraints – should be taken into account when calculating maintenance costs. Many criteria need to be included when building up maintenance cost plans and budgets, including an understanding of organisational need and business priorities.

As workplace strategies evolve, it is increasingly important to offer evidence of how costs are generated and used, to demonstrate that effective maintenance cost management can positively impact the workplace user experience.

The guide is still the only source in the industry with a comprehensive list of indicative economic life for engineering assets used in facilities. Life-cycle decision-making for asset renewal involves understanding that asset degradation is a trade-off between capital costs and operating and maintenance costs, while understanding the risks and probability of failure.

The application of asset-specific renewal interventions and threshold triggers for partial repairs (including mid-life overhauls), part or whole replacements during the expected life period, and end-of-life considerations are explained. Reference service life and replacement cycles will need to be adjusted account for a variety of factors. There is an updated explanation of these factors and examples to show how their use.

Economic life expectancy and factors are often used to determine when existing assets or components should be replaced, but this should always include reference to: records of the asset's performance in use; where significant change in the operating and maintenance costs occur; legislation and environmental impacts, where applicable;

and the risks and consequences of failure.

It is often assumed that once an asset reaches the age indicated by the economic life expectancy it should be a candidate for replacement. This is not necessarily the case, however, and may lead to premature – and sometimes inappropriate – interventions.

An updated Excel version of the life tables will be released as the CIBSE Indicative Economic Life Expectancy Tool, available at bit.ly/ToolBox23. It will be aligned with *RICS NRM3 New rules of measurement*, the BESA SFG20 Services and Facilities Group guide to maintenance tasks, and the NBS unified construction classification Uniclass. This ensures the construction and maintenance industry has a shared language to communicate effectively on asset life expectancy and maintenance engineering and management. **CJ**

JO HARRIS is the UK&I hard FM ambassador at Sodexo and lead author of *Guide M: Maintenance engineering and management (2023)*. She was also lead author for the 2014 version.

GUIDE M PARTS

- M1 Guidance for building services designers**
- M2 Strategy and techniques**
- M3 Contracts**
- M4 Energy and carbon**
- M5 Controls**
- M6 Commissioning and testing**
- M7 Handover procedures**
- M8 Documentation**
- M9 Risk assessment and risk management**
- M10 Costs**
- M11 Economic life factors**
- M12 Audits**
- M13 Condition surveys**
- M14 Legislation**
- M15 Wellbeing**
- M16 Training and competency**



Available at www.cibse.org/knowledge-research

After Awaab

The tragic death of Awaab Ishak in 2020, caused by damp and mould in his family’s flat, prompted a national outcry. Government has now issued detailed guidance to help landlords understand and address the health risks of damp and mould in the home. Hywel Davies outlines the guidance and the other actions government is taking to avoid another tragedy

Publication of the coroner’s report into the death of two-year-old Awaab Ishak, and her formal letters to the health and levelling up Secretaries of State, were national news and the subject of this column in December 2022. Both departments have moved swiftly in response.

The Department of Health and Social Care (DHSC) set up a team to develop up-to-date guidance for landlords, working with a multidisciplinary expert group and advice from the Committee on the Medical Effects of Air Pollutants. The resulting guidance was published on 7 September.

The guidance sets out the responsibilities of landlords, in both the social and private sectors, for ensuring that their accommodation is fit to live in and free from serious hazards, including damp and mould. It makes very clear that they must act with urgency to deal with damp and mould in their dwellings, and must protect their tenants’ health.

It includes guidance on the requirements of the Building Regulations that relate to minimising the risk of damp and mould, and that they apply whenever building work is carried out in the dwelling. The coroner in the Awaab Ishak case found that his family’s flat was not compliant with Building Regulations.

The guidance is very clear that tenants should not be blamed for damp and mould in their home, and that



they are absolutely not the result of so-called ‘lifestyle choices’. Washing, showering and doing your laundry are not ‘lifestyle choices’, and any dwelling must be adequately heated and ventilated to prevent them causing damp problems.

Where moisture problems are reported, landlords are required to act quickly to determine the underlying causes, whether they are down to inadequate ventilation or structural faults in the building.

In addition to the new guidance on avoiding damp and mould, the government released further guidance on the Housing Health and Safety Rating System, used to assess the safety of homes and identify and prioritise health and safety risks.

Forthcoming legislation in the Renters (Reform) Bill and the new Social Housing (Regulation) Act 2023, are

“The guidance is very clear that tenants should not be blamed for damp and mould in their home... they are absolutely not the result of ‘lifestyle choices’”

DR HYWEL DAVIES
HonFCIBSE is chief technical officer at CIBSE and a member of the DHSC expert group

Empowering and enabling the public sector to transition to a low carbon future



At Salix we’re passionate about delivering decarbonisation projects across the UK on behalf of the Department for Energy Security and Net Zero, the Department for Education (DfE) and the Scottish and Welsh Governments.

Our schemes include:

- › Public Sector Decarbonisation Scheme
- › Low Carbon Skills Fund
- › Social Housing Decarbonisation Fund
- › Home Upgrade Grant
- › Scotland’s Public Sector Decarbonisation Fund



salixfinance.co.uk



intended to improve housing standards by:

- Creating a statutory duty on social housing providers to appoint a senior health and safety lead; significant statutory duties to monitor compliance with health and safety provisions and raise compliance risks or failings with senior management (see Section 10 of the 2023 Act)
- Introducing new requirements for landlords to address hazards such as damp and mould in social homes
- Empowering the Housing Ombudsman and changing the law to enable social housing residents to complain directly to the ombudsman
- Reviewing the Decent Homes Standard and applying it to private rented homes for the first time
- Introducing new professional standards and requiring senior housing staff to hold, or work towards, recognised housing management qualifications
- Introducing an ombudsman for private tenants.

Landlords and their health and safety leads need to read this guidance and adopt the best practices it sets out. Those who work in social housing or manage private rented homes would be well advised to read section 10 of the Social Housing Act as well.

In addition to protecting tenants' health, it will help to prevent a repeat of the utterly avoidable tragedy that befell Awaab Ishak's family.

MORE INFORMATION

- **The damp and mould guidance can be found at bit.ly/CJdampPriskGov**
- **The Social Housing (Regulation) Act 2023 is available at bit.ly/CJSHAct23**
- **Government has also released a summary of damp and mould returns in the private rented sector, provided by local authorities in England: bit.ly/CJDampPSGov**
- **Further guidance on the Housing Health and Safety Rating System is also available: bit.ly/3CJHHSRS23**

Correction: Is your smoke shaft safe?, *CIBSE Journal*, September 2023

The editing of this article substantially changed the meaning of the one of the paragraphs relating to the use of plasterboard systems for smoke shafts, and distracted from the message that smoke shafts should be proven to be suitable for a SHEV application.

The paragraph should have read: 'Plasterboard systems that have only been tested to BS EN1364-1 are not suitable for constructing smoke shafts used in SHEV systems and neither are systems that are only tested to BS 476 parts 20 and 22 1987. Systems tested to these standards don't have any meaningful leakage test evidence at ambient or at elevated temperature and no evidence of maintenance of opening'. Read the full article at: <https://bit.ly/CJSep2317>

The theory versus the practical

The Building Safety Act has become a reality with its implementation this month.

David Fitzpatrick looks at whether the industry is ready for the challenge

October is a big month for the implementation of the Building Safety Act, and I recently spoke at a conference about the impact it will have on the smoke control side of the industry. I appreciate the act is not just about smoke control; however, I am sure other parts of the industry must have the same challenges.

I could say nothing new, as everything the act talks about should be in place already. Sadly, reality may still have a long way to go in parts of the industry.

First, much education is still required to understand critical elements of the act, such as:

- 1) Who is accountable for a new project, and what are their responsibilities?
- 2) The difference between high-rise and higher-risk buildings.
- 3) Do companies understand the information requirements, not just in design, but also, particularly, in the installation?
- 4) Is each product suitable for the application from a tested requirement, and has it been installed that way?

Talking to some building owners recently, it has been a challenge to register existing buildings because the level of documentation available is just not there.

Away from education, the practical challenge is whether the construction industry can change to move towards a new design and build culture, instead of the build and design one we still have today. Will the market be prepared to do a complete design up front, and who will pay for this? There is a great debate about how this would improve the tendering process and construction programme.

We will also need to move away from changing the design or installation on site because of 'site conditions' and hoping to get the regulator's approval afterwards. I believe those days are going.

The biggest challenge will be the attitude that 'we have always done it that way, so why change', especially when the programme pressure becomes the central focus? Maybe the Building Safety Act can give the industry that push - I hope so.

- **DAVID FITZPATRICK** is director at Sfs business unit, Exyte Hargreaves, and an elected CIBSE Board member



TOP OF THE CLASS

The Undergraduate of the Year award is a new addition to the 2023 CIBSE Young Engineers Awards. Meet the shortlisted contenders, plus those who have made the cut for Graduate of the Year and Apprentice of the Year

The line-up of talented individuals shortlisted for the CIBSE Young Engineers Awards (YEAs) 2023 has been announced.

The Undergraduate category is a new addition to the 2023 awards, and celebrates those on exceptional early career paths. Five students have been shortlisted for their final-year project. Until now, this award has been presented at the President's Dinner.

This year, nine engineers have been selected as finalists for CIBSE ASHRAE Graduate of the Year, and each will have the opportunity to present to a panel of industry judges at the awards ceremony.

In the CIBSE Apprentice of the Year

section, 12 engineers have been shortlisted across two categories: Technician (Level 3-4) and Degree (Level 5-7). Each entrant has submitted a three-minute video that showcases their experiences as an apprentice, and these will be evaluated by the judges.

CIBSE President Adrian Catchpole said: 'These young engineers are at the heart of our industry's ability to meet our commitments to cutting global emissions and retrofitting buildings for net zero. It is their passion and talent that we will be relying on to lead the way to innovation and change.'

The awards ceremony takes place on 12 October, at the Royal College of Physicians in London. To book your free place, visit www.cibse.org/YEA **CJ**

CIBSE Undergraduate of the Year

1 Erin Cullen

Heriot-Watt University

Graduating with a distinction in her Master's in architectural engineering, Erin received the CIBSE Scotland Student Award. She has since focused her research on pathogen transmission within building services. This will be published next year, alongside her work on various Passivhaus projects.

2 Ruairi Devlin

University of Nottingham

Ruairi has recently graduated from the University of Nottingham with a degree in architectural environment engineering and is currently training as a mechanical engineering consultant in Birmingham. He is a huge sports enthusiast and loves to travel.

3 Fraser Nicoll

Glasgow Caledonian University

Fraser is mechanical technician with Perth & Kinross Council, and has achieved a BEng

with first-class honours in building services engineering. He has a passion for problem solving, including energy modelling to provide realistic installation options that support decarbonisation.

4 Roana Pavia

Malta College of Arts, Science and Technology

Graduating with a BSc(honours), Roana worked throughout her studies, earning her wireman licence for single-phase and three-phase systems. She has gained expertise in analysing projects to consider a variety of alternatives for obtaining more sustainable buildings.

5 Lam Tsz Kai

Leeds Beckett University

Tsz Kai is studying for his undergraduate degree in building services engineering. He also serves as a committee member of the Environment and Conservation Fund of Hong Kong SAR and is a Green Building Young Leader at the Hong Kong Green Building Council.





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EMPLOYER OF THE YEAR

The CIBSE Young Engineers Awards finalists are joined by nine companies vying for the title of Employer of the Year. These are firms that have been recognised for leading the way in nurturing and supporting the new industry talent.

They have been shortlisted across three categories – for small (FairHeat, InTandem, Whitecode Consulting), medium (Integrated Environmental Solutions, Introba, PM Group), and large (Aecom, Atkins, Hoare Lea) companies – with an overall champion selected from the winners of each category.

The companies have been selected for their commitment to placing the growth of their employees at the heart of their business.

'To enable them [young engineers] to reach their full potential, we need companies committed to developing their skills. Those on our employer shortlist are doing just that,' said CIBSE President Adrian Catchpole.

CIBSE Graduate of the Year

1 Brianna Barrow

WSP (Houston, Texas) and Texas A&M University

After graduating with a BSc in architectural engineering, Brianna joined WSP as an assistant consultant mechanical engineer. She is eager to bring impactful change to indoor air quality (IAQ) for health and comfort, while preserving the environment.



2 Lawrence Bramall

Scotch Partners and LSBU

Lawrence began work with Scotch Partners as an electrical engineer apprentice. Embarking on a Master's in smart buildings and digital engineering this year, he is looking forward to gaining his charterhip and deepening his knowledge.

3 Phil Holker

Fosters + Partners and University College London (UCL)

After graduating from UCL, Phil joined Foster + Partners, in a team of environmental designers and analysts. His interests lie in energy, sustainability and the use of passive design principles.



4 Francesca James

FairHeat and Cambridge University

After doing a Master's in chemical engineering, Francesca joined FairHeat in 2021 with a keen interest in sustainability, and is excited to be involved in such a dynamic industry. She enjoys being part of a team that aims to deliver innovative solutions.



5 Tom McGovern

Arup and Liverpool John Moores

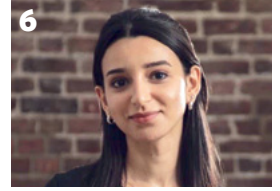
Tom completed his BEng (Hons) in building services engineering in 2023, with the highest grade in his year. Tom is passionate about energy modelling and optimisation, and is currently carrying out research, as well as being a STEM ambassador.



6 Hiba Talmoust

Waterman Group and Queen Mary

Hiba is a net zero and sustainability consultant, while also studying for a Waterman-sponsored PhD at Exeter University, researching AI-based methodology to deliver net zero buildings. In addition, Hiba is the communications officer for YEN London.



7 Lewis Turner

Arup and Leeds Beckett

Lewis works at Arup to deliver sustainable solutions, and is researching infection control in hospitals. He was runner-up for the CIBSE President's prize, and second in the Rehva student competition. He participates in school outreach programmes.



8 Matthew Yates

Atelier Ten and De Montfort University

Matthew joined Atelier Ten after a postgraduate degree in energy and sustainable building design. With the YEN committee, he completed a mentoring programme for university students.



9 Hannah Yorwerth

Aecom and Warwick University

Hannah is a graduate public health engineer at Aecom. She is passionate about increasing the number of women in engineering and creating a sustainable future for the built environment.





CIBSE Apprentice of the Year

» Technician (Level 3-4)

1 Ryan Beary

Trainee design engineer, CPW
After his A levels, Ryan joined the Solihull branch of CPW in September 2022. Currently in his second year of his Level 4 studies at Bradford College, he hopes to continue to degree level. He is passionate about regeneration projects, and wants to bring new life to towns in a sustainable way.

2 Callum Doyle

Building services apprentice, Vertex Services
Currently in his third year, Callum continues to develop his knowledge and expertise, and has played an instrumental role in several large projects, including a significant Cat B fitout. He was nominated as a regional finalist for the Apprentice of the Year, BESA Industry awards 2023, mapping a path towards success.

3 Sidney Hargreaves

Apprentice mechanical engineer, HDR
Sidney is an apprentice mechanical engineer with HDR, working within the development team on various projects. He aims to complete his apprenticeship and go on to become a chartered engineer.

4 Dan Herridge

Building services apprentice, Vertex Services
Dan joined Vertex after achieving his electrical Level 2 diploma. He has gained valuable experience in different specialisms, and in his second year will focus on the heritage sector. He helped with the delivery of a lighting upgrade at 70 Mark Lane, being responsible for identifying, planning and transitioning it from traditional lighting fixtures to energy-efficient LEDs.

5 Sean John

Electrical apprentice, University of Warwick
After his apprenticeship, Sean hopes to run his own electrical company, with the possibility of working overseas. He works hard to be proactive in achieving his goals.

6 Mikey Nagle

Apprentice, BGIS
Mikey joined BGIS at 16 years old, as an apprentice. He has just completed his first year and found the experience very enjoyable. He says he has learned so much from his helpful colleagues, and is looking forward to the next three years of his apprenticeship, with hopes to achieve as much as possible.

Degree (Level 5-7)

7 Finley Bowdidge

Apprentice design engineer, Venables Associates
Finley is a dedicated degree apprentice design engineer at Venables Associates. After completing his A levels in 2021, he was keen to pursue his passion for engineering. With a strong commitment to skill development and a drive to contribute to innovative projects, Finley is carving out a promising future in the field of building services engineering.

8 Mitchell Holland

Technical apprenticeship, Hawden MEP
Mitchell is a junior engineer at Hawden MEP, while also completing his apprenticeship at London South Bank University. He is eager to gain his IEng ACIBSE accreditation upon completion of his apprenticeship. He is interested in electrical bias, and has worked on a variety of projects, from healthcare and

residential to education, which has enabled his skill set to grow.

9 James McLarnon

Mechanical consulting engineer, Stephen Clarke Consulting (SCC)
James is an architectural engineering student at Ulster University, Belfast. He has just finished his year-long placement with Stephen Clarke Consulting, in Holywood, County Down. Now approaching his final year at university, SCC has offered him a part-time job to stay on.

10 Lauren McNaughton

Apprentice building services engineer, Arup
Lauren joined Arup in August 2017, as a building services engineering apprentice. Since then, she has completed a HNC in architectural technology, alongside a BEng (Hons) in building services engineering. Her final university project focused on quantifying the embodied carbon of building services projects through BIM.

11 Owen Sayers

Building services apprentice, AtkinsRéalis
Owen began his Level 3 apprenticeship in 2017, and later enrolled on a design building services apprentice degree at LSBU. He has worked on projects in various sectors, including defence, education and government frameworks, and has developed a good understanding of thermal modelling and building compliance simulations.

12 Jess Sergeant

Degree apprentice, AtkinsRéalis
Jess is currently in her second year of studying at London South Bank University, completing a building services degree. She has enjoyed working with many different teams and has gained a wide variety of experiences.

CIBSE BUILD2PERFORM LIVE COMES BACK BIGGER

Don't miss the biggest engineering services show – CIBSE's Build2Perform Live 2023



KEY THEMES AT CIBSE BUILD2PERFORM LIVE 2023:

- Delivering net zero and adapting to climate change
- Hydrogen, heating, and heat pumps for net zero
- Electrical services for a zero carbon environment
- Adapting digital tools, and smart and secure technologies
- Implementing the building safety reform programme
- Health and wellbeing

What will the Future Homes and Future Buildings Standards mean for designers? What is the Net Zero Carbon Buildings Standard, and how will it be delivered? What do the building safety reforms mean for the industry in practice? These are some of the key questions that will be discussed at CIBSE Build2Perform Live at London ExCel on 5 and 6 December.

The eighth edition of the event promises to deliver a rich experience for industry professionals, speakers, exhibitors, and emerging talent alike. A congregation of innovative minds, CIBSE Build2Perform Live has been recognised for its dedication to innovation, networking and the exchange of ideas.

This year, it will feature a dedicated lighting area, Light2Perform, which will showcase the latest advancements in lighting technology. Some of the many sessions will look at sustainability, new street lighting (TM65), circular economy in lighting (TM66), and protecting the night-time environment.

One of the highlights of the event will undoubtedly be the Society of Digital Engineering Awards, scheduled to take place on 5 December. The awards recognise those working in the built environment who are contributing to the digitalisation of what we do, where we live and how we experience it. Entries close on 27 October.

CIBSE also has a strategic collaboration with the Chartered Association of Building Engineers (CABE), which will curate the Built Environment Live area. See 'Safety routes', *CIBSE Journal*, June 2023 for a discussion on building safety between CABE's Richard Harral and CIBSE's Dr Hywel Davies HonFCIBSE.

In addition, CIBSE is proud to support the Wates Innovation Pavilion: Wates Innovation Zone. This will serve as a hub for

exploring the latest innovations and technologies in the construction industry, further elevating the event's status as a key platform for industry progress.

CIBSE Build2Perform Live 2023 will include more than 100 hours of insightful and thought-provoking content, with a stellar line-up of 150-plus industry experts and speakers. Those confirmed include Kevin Lomas FCIBSE, Susie Diamond, Chris Twinn FCIBSE, Les Copeland FCIBSE, Helen Loomes FSSL, Kristina Allison MSL MCIBSE, Julie Godefroy, Bob Bohannon FSSL and Hywel Davies HonFCIBSE. More than 100 exhibitors will also be showcasing cutting-edge products and services that are shaping the industry's future.

Registration for the event is now open, and anyone interested in building services engineering is encouraged to secure their place. Join CIBSE in shaping the future of the industry, celebrating digital excellence, and exploring innovative solutions that will drive us toward a sustainable, technologically advanced world. **C**

■ For more information and to register, visit the CIBSE Build2Perform Live 2023 website at www.build2perform.co.uk



The architecturally distinct Stephen Taylor Building (left) and Villa Building are set within a large garden in the West Cambridge Conservation Area



GRADUATING WITH HONOURS

Passivhaus accommodation for Cambridge University students at Cranmer Road won a CIBSE Building Performance Award thanks to an elegant, but simple, all-electric services design by **Max Fordham** that delivered high-performing buildings with occupant comfort at its heart



When it was completed in 2020, Cranmer Road was the first major Passivhaus development in Cambridge. The scheme for King's College, in the West

Cambridge Conservation Area, provides 59 new graduate rooms in two architecturally distinct buildings that respond to their urban contexts. The Villa Building and Stephen Taylor Building are, however, located within the same large garden, where three existing student villas are situated.

The college decided to embrace Passivhaus construction after a costing exercise showed that the buildings' low operational energy use would deliver a payback in the region of 25 years, when compared with schemes designed to current good practice and minimum compliance standards.

'The payback, although not short, was enough to be well within the design life of the buildings,' says Gwilym Still, director, Passivhaus leader and partner at Max

Fordham, which was the project's building services engineer, acoustic consultant and Passivhaus designer.

Working with architect Allies and Morrison, Max Fordham set out to develop a scheme that would meet the stringent Passivhaus energy criteria, but that eschewed innovative construction methods and materials in favour of a more conventional palette. The design also accommodates the demands of graduate students, who were consulted throughout development of the brief. 'We set out to build these buildings with standard components as far as possible, but applied in a different way to help with project delivery and demonstrate the scalability of Passivhaus,' Still says.

The three-storey Villa Building occupies a gap between two Arts and Crafts-style villas on Cranmer Road. Its design is characterised by a brick façade topped by a tiled, pitched roof incorporating dormers and gables.

To provide lower-cost rentable accommodation, after consultation with the students, the Villa was conceived as a

PROJECT TEAM

Client: King's College Cambridge
Building services consultant: Max Fordham
Architect: Allies and Morrison
Main contractor: R G Carter
M&E contractor: Munro
Quantity surveyor: Faithful + Gould



19-bedroom house with shared bathrooms, kitchens, and a large kitchen-common room on the ground floor.

The Stephen Taylor Building is located at the rear of the site. Its modernist appearance is in response to this area's more contemporary architecture. Behind its precast concrete and terracotta façade,

The exposed cross-laminated timber design of a kitchen in the Stephen Taylor Building



bookended by grey brickwork stair enclosures, it incorporates 40 en suite study-bedrooms spread over two storeys.

The building also accommodates a large ground-floor common room that serves the entire campus. This building has been designed, structurally and from a building services perspective, to be able to accommodate an additional top floor at some point in the future.

Despite their different architectural treatments, both buildings are supported by a cross-laminated timber structure set on a concrete raft foundation, and both feature cavity wall construction using mineral wool as a partial fill.

Allies and Morrison says this construction method helped achieve a 'remarkably good' airtightness performance: the Villa Building achieved a permeability of $0.17\text{m}^3/\text{m}^2\cdot\text{h}$ (0.16 ACH), while the Stephen Taylor Building achieved $0.31\text{m}^3/\text{m}^2\cdot\text{h}$ (0.19 ACH), both at a pressure differential of 50 pascals.

The building services, too, are similar. Both buildings are all-electric, with space heating

provided by direct electric panel heaters and domestic hot water supplied by point-of-use heaters, to minimise pipework heat losses, along with waste-water heat recovery.

'We opted for an all-electric solution – even though, at the time, it was harder to achieve from a regulatory compliance point of view – because when you looked at the ongoing decarbonisation of the electricity Grid in the context of the design life of the building, the period when gas would be better than electric was vanishingly short,' explains Still.

Both buildings are orientated in the same direction, with their principal elevations facing north-south. Max Fordham did some early-stage modelling of daylight levels and heat gains to establish parameters for the window sizes from which the architect could work. Still says Max Fordham revisited these assumptions as the design progressed to check that these parameters were still applicable.

The scheme was designed before the publication of *CIBSE TMS9 Design methodology for the assessment of overheating risk in homes*. Nevertheless, Max Fordham tested the scheme's comfort performance against current and future weather files using IES dynamic thermal modelling. It also used the Passivhaus Planning Package (PHPP) to prove the scheme's compliance



MONITORING PERFORMANCE

Energy use was reviewed later in the year and the total EUI had risen to 71 kWh-m² per year in response to some of the students overriding radiator controls. The radiators have built-in thermostats that were pre-set at 20°C. These are fitted with a child-proof lock.

As it turned out, these locks were not proof against determined undergraduates, who were reportedly turning the thermostats up to 26°C in some instances. As a consequence, annual energy figures are currently higher than those predicted by PHPP. 'We provided the college with user guides to discourage students from tampering with the radiators,' explains Still. On subsequent projects, Max Fordham has refined this concept by providing local controls that limit temperature setpoint adjustment to a range of plus/minus 2°C.

Monitoring also showed the students were using more domestic hot water (DHW) than the PHPP assumption, which was based on a five-minute shower duration. Clearly, King's College students are cleaner than most and were taking seven- to eight-minute showers. 'We learned that the PHPP assumptions for domestic hot water usage are lower than usage by the UK student population,' laughs Still. 'This has been fed back to the students, and into energy modelling on future projects, where it will influence system choice and energy usage predictions.'

» with Passivhaus comfort criteria.

Both buildings feature continuous mechanical ventilation from packaged mechanical ventilation with heat recovery (MVHR) units incorporating summer bypass. The Villa Building uses a cascade system of air transfer, similar to that in a domestic house: two MVHR units on the top floor supply fresh air to the bedrooms; this spills into the corridors and, from there, to the kitchens, shower rooms and toilets, from where it is extracted.

The Stephen Taylor Building is based on a series of single MVHR units serving



The two buildings provide 59 student rooms

clusters of four en suite bedrooms. In addition, two separate MVHR units serve the two pairs of kitchens. 'The ethos behind the scheme was to keep things as simple as possible from a ventilation point of view, so there is no interlock with the windows – if someone wants to open a window to increase ventilation, they can,' Still explains. 'On both buildings, extract is from the toilets, kitchen and bathrooms – so, if we turned off the vent when someone opened a window, the shower rooms would, for example, start to get humid.'

A single MVHR unit with summer bypass serves the campus common room in the Stephen Taylor Building. Still describes this room as 'a special case' because of its predicted intensive occupancy. Here, the MVHR unit incorporates a mini air source heat pump to automatically heat or cool the ventilation air. 'While you could keep the common room comfortable for most conditions, there were enough hours where it was going to get uncomfortably warm that we put in active cooling,' explains Still. Ventilation rates are increased further in summer, with windows opened by automatic actuators.

The common room also incorporates underfloor electric heating to keep walls clear of panel radiators.

The building's 100-year service life means items such as the MVHR units are designed to be accessible for service and to enable their replacement over the design life of the building. Still says the ductwork is less easy to replace, 'but it is still possible'.

»

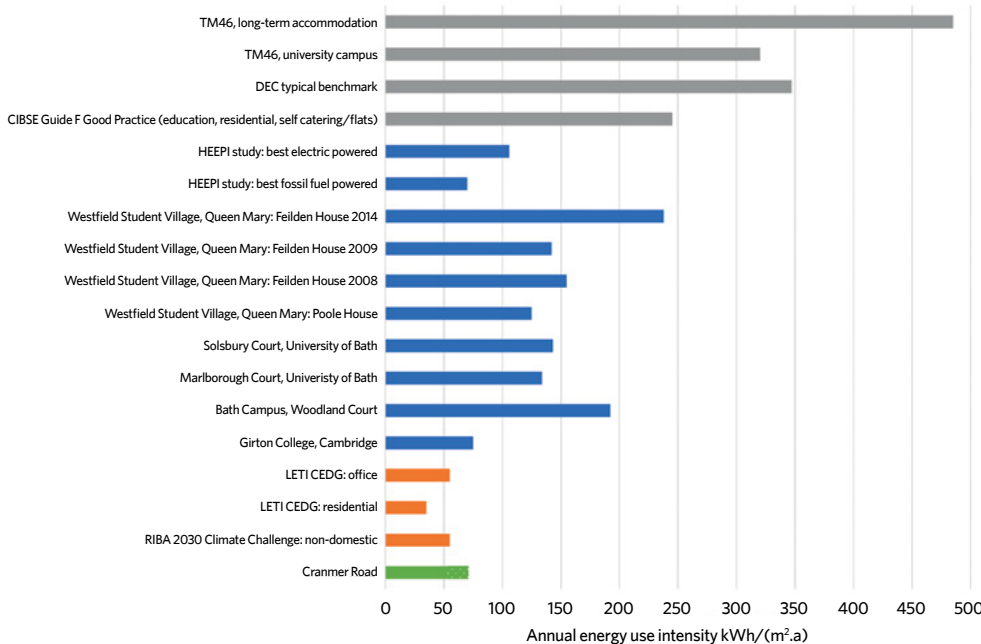


Figure 1: The annual energy use intensity of Cranmer Road compared to benchmarks and other accommodation projects

A view from a kitchen in the Stephen Taylor Building



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The Villa Building's brick façade, topped by a tiled pitched roof

“The design team and contractor remained engaged with the college post-occupancy, to answer queries and help fine-tune systems”

» The scheme was completed in December 2019. On handover, the facilities staff were trained in its operation. In addition, the design team and contractor remained engaged with the college post-occupancy, to answer queries and to help fine-tune systems. Post-occupancy monitoring of energy consumption took place and revealed student behaviour that differed from the design assumptions.

Post-occupancy monitoring of electricity consumption was undertaken from January to April 2020, before occupancy was interrupted by the Covid pandemic. The monitoring showed an expected building energy use intensity (EUI) of 53kWh-m⁻² per year, with a peak heating load below 10W/m².

Post-occupancy feedback was also gathered, informally and through a structured survey using BUS methodology, in April 2021. Overall, the results were extremely positive, with the building scoring highly in areas such as comfort, lighting,

noise, ventilation, effects on health, and appearance. However, the survey did pick up on the initial frustration of some students with the energy efficient lighting controls, which turned off lights earlier than desired in toilet and shower areas. This issue has since been rectified by simply extending the lighting control run-on period.

Max Fordham's well-engineered approach and its response to student issues certainly made an impression on the judges at this year's CIBSE Building Performance Awards, where the scheme won Project of the Year (Non-Domestic). The judges were impressed by the consultant's focus on optimising building energy performance, and they highlighted the use of feedback from the occupant surveys and the scheme's comprehensive approach to commissioning. They also admired how detailed analysis of the impact of a range of future climate scenarios had influenced the design and construction of the two buildings. **CJ**



Stephen Taylor Building link corridor with LED lighting

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ON THE SAME PAGE

The distinctive appearance of the Stirling Prize-winning New Library at Magdalene College was inspired by Cambridge University's historic buildings and Max Fordham's ventilation strategy. **Alex Smith** reports on the melding of form and function in Níall McLaughlin Architects' elegant design



The past 12 months have featured a significant double for Max Fordham. As well as winning the accolade for best non-domestic project at the CIBSE Building Performance Awards, for Cranmer House at Cambridge University, it also played a substantial part in New Library at Magdalene College winning the 2022 RIBA Stirling Prize last October.

Níall McLaughlin Architects' design for the winning library, also at Cambridge University, is strongly defined by Max Fordham's passive-first environmental strategy, which minimised energy loads by including natural

ventilation and generous daylighting. The RIBA judges said there had been 'exceptional engagement with environmental design principles' by the design team.

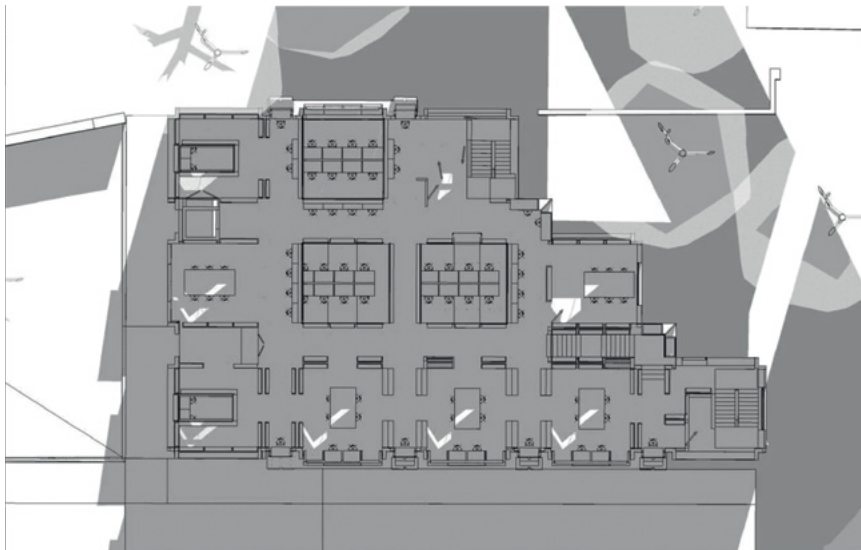
The robustness of the design was tested in the summer of 2022, when a heatwave saw temperatures reach 39.9°C in Cambridge. Despite the large areas of glazing and lack of mechanical cooling, temperatures on the ground floor of the library rose to no more than 26°C, thanks, in part, to the IES dynamic modelling undertaken by Max Fordham.

The three-storey brick and masonry building replaces cramped facilities in the adjacent Grade-I listed Pepys Building. It is sited in a leafy location between the enclosed Master's Garden and the open Fellows' Garden, and fits in with the quadrangles of established courts and buildings.

The new building consists of a library across three floors, and an archive facility and picture gallery on the ground floor. It is naturally ventilated by 11 prominent brick chimneys, which rise above the roofline to exhaust warm air from the library interior. Fresh air is drawn in through arrow-slit ventilation flaps by window seats.

The brick chimneys support the floors and bookstacks, and sit in a grid. Between each set of four chimneys there is a roof lantern comprised of four glazed gables, of which there are 12 sets in total. Load-bearing brick supports cross-laminated timbers (CLTs) that emphasise what the architect calls the

Sunlight modelling in SketchUp ensured students were not subject to direct sunlight at their desks





New Library at Magdalene College won last year's RIBA Stirling Prize

'warp and weft' of the grid design.

Max Fordham's director and partner Ben Sellars says the chimneys chimed with the architect's desire to reflect nearby historic buildings. 'The architect was seeking inspiration from other parts of the college, including Tudor elements. We looked at using the chimneys for stack ventilation and made it work,' he says.

The glazed gables are another prominent feature and these provide generous levels of daylighting. Side windows can be opened manually by students and staff, while rooflights at the top of the chimneys open automatically depending on CO₂ levels in the winter and temperature in the summer.

IES dynamic modelling helped Max Fordham eliminate overheating risks in the design stage, and SketchUp sunlight modelling ensured that students were not affected by glare and direct sunlight from the glazed gables.

Another passively controlled area for which modelling was crucial was the archive, in the centre of the ground floor. To adhere to *BS 4971 Conservation and care of archive library collections*, temperatures have to be between 13°C and 21°C, which they were in last year's heatwave, when temperatures only reached 20.5°C on the hottest day. Thermal mass provides temperature stability in the space – the walls are made from concrete, precast concrete forms the ceiling, and there is a concrete floor covering an earthen base.

To ensure humidity levels were within an acceptable band for the archive, a mechanical ventilation with heat recovery system and dehumidifier was incorporated into the design. 'We did some modelling of that space over the year, which told us the humidity was going to be above acceptable parameters. The small fan and dehumidifier is the nudge the space needs to stop the humidity from going too high,' says Sellars.

As well as the archive room, the ground floor features a permanent gallery space, open to the public, and a reading room. The gallery doubles as an event space, with capacity for around 100 people. A reversible heat pump in an air handling unit provides heating and cooling for the gallery, as well as the archive reading room.

Acoustics were an important element of the design. The architect wanted background noise, not complete silence, and was keen for birdsong from the college garden to be heard from within the library. Placement of the openable vent panels to help shielding from city traffic noise, and the use of acoustic absorption behind slatted timber finishes on the soffit controls excessive external noise ingress. A special flooring design was devised to reduce footfall noise; a raised floor sits, via rubber mounts, on a CLT structural floor, which is exposed below.

In providing new services for the library, the project team was also tasked with



The large reading room lit by roof lanterns

"Load-bearing brick supports CLT timbers that emphasise what the architect calls the 'warp and weft' of the grid design"

overhauling the heating for other buildings. It replaced old gas boilers with new, providing high temperature hot water for existing buildings and low temperature hot water for the library's underfloor heating system.

Sellars says heat pumps were looked at in 2015, during initial designs, but the client decided they would prefer to use gas boilers as it wanted more reassurance of the technology before using it, and because it had gas throughout the rest of its estate. The system was designed to be able to switch easily to electric heat pumps at a later date.

Energy use intensity of the building is 116.4kWh·m⁻² per year (based on gas and electricity bills for 2021) and airtightness is 2.56 m³·h⁻¹·m⁻² @ 50Pa (based on an as-built Building Regulations UK Part L calculation provided by the contractor).

The need for an archive and gallery meant there was limited space for reading rooms on the ground floor. To link these spaces with the upper storeys, the design included triple- and double-height spaces that create a series of interconnected areas lined with bookcases, and galleries. Reading areas range from a large hall with long tables to small rooms on the edge of the building, where people can study alone if they wish.

'As a reader, I'm always interested in how they situate themselves. We tried to create as many different situations as possible where they could read,' says Niall McLaughlin.

This variation extends to the lighting from the rooflights. While baffles allow little direct light to penetrate onto floor or shelf level, there is still a 'lively' play of light on the ceiling and window reveals.

Max Fordham hopes to follow its win by more success at the 2023 Stirling Prize. Impressively, it is the building services engineer for three of the six shortlisted entries: A House for Artists, Central Somers Town, and the Courtauld Institute of Art. [C](#)

■ The shortlist for the 2024 CIBSE Building Performance Awards will be revealed in the December issue of the *Journal*.

PLACEMAKING AND PERFORMANCE

Chobham Manor development is a legacy of the London 2012 Olympics and now its performance is being assessed in a post-occupancy evaluation that's likely to be adopted across the industry. Buro Happold's **Dr Mark Dowson** FCIBSE describes the process and reveals the results



The development was designed with sustainability in mind and all homes were required to achieve Level 4 in the Code for Sustainable Homes, with fabric energy efficiency standards set by LLDC at an early stage to meet Level 5 and 6 requirements

Chobham Manor is an 859-home, £270m residential-led development adjacent to Queen Elizabeth Olympic Park and Lee Valley VeloPark. It was the first of five Olympic neighbourhoods to be completed and forms a key cornerstone of the 2012 Games' legacy.

To understand the scheme's operational performance, landowner London Legacy Development Corporation (LLDC) commissioned an independent post-occupancy evaluation (POE) pilot on the first of four phases of Chobham Manor. Buro Happold was engaged to head the multidisciplinary team for the Phase 1 POE, working with Hawkins\Brown and SOAP Retrofit. Monitoring took place over a 14-month period from October 2020 to November 2021.

Chobham Manor was delivered through a development agreement led by Chobham Manor LLP (CM-LLP), involving Taylor Wimpey, L&Q housing association, and LLDC. The design team comprised five architects and a landscape architect, with PRP as lead masterplan architect.

Design intent

The housing was designed to be child friendly, sustainable and inclusive, with inspiring landscapes and public realm. Central themes were 'designing for families', 'building a community', and 'everyone lives by the green'. During the design stages, the scheme was reviewed against these objectives and wider environmental performance targets. All dwellings were required to achieve ≥ 75 credits (exceeding

Level 4) in the Code for Sustainable Homes, with fabric energy efficiency standards meeting Level 5 and 6 requirements. Airtightness targets were $5 \text{ m}^3 \cdot \text{h}^{-1} \cdot \text{m}^{-2}$ @ 50Pa for houses and $4 \text{ m}^3 \cdot \text{h}^{-1} \cdot \text{m}^{-2}$ @ 50Pa for apartments and maisonettes. The development was required to reduce regulated CO_2 emissions by 40% compared with Part L 2010. Across the four phases, 25 'exemplar homes' targeted zero regulated emissions through on-plot measures only.

All dwellings have smart meters (including water meters) and are connected to the Stratford district energy network, which provides district heating from gas combined heat and power, with a feed of biomass heat.

Post-occupancy evaluation

The Phase 1 POE included a resident survey, focus groups, homes interviews, walkabouts with residents, energy and water monitoring, indoor environmental quality measurements, controls assessments, thermal imaging, an urban greening factor evaluation, and a 'lessons learned' workshop.

Energy use

Anonymised district heating and hot water data for all 259 homes was provided by the energy provider for 26 months from September 2019. For 35 homes that consented to the POE, this data was analysed in more depth at a property level. Monthly electricity readings were provided by residents for 14 months from October 2020, covering 29 households (11% sample).

Site-wide measured space heating was $25 \text{ kWh} \cdot \text{m}^{-2}$ per year, compared with $50 \text{ kWh} \cdot \text{m}^{-2}$ per year for the average new-build home. Domestic hot water and electricity usage was low compared with the new-build average, at $30 \text{ kWh} \cdot \text{m}^{-2}$ per year and $32 \text{ kWh} \cdot \text{m}^{-2}$ per year respectively. For electricity, in 13 properties with half-hourly electricity sensors fitted, peak household demand was 8.1kW (although this home had an electric vehicle). For the remaining properties, peak was 1.7kW to 3.5kW.

On average, properties used 51-64% more energy for heating and hot water per year than SAP predicted. For the 10 properties where living room and main bedroom temperatures were monitored, winter temperatures were



10% higher on average than SAP modelling assumes (19°C). Average airtightness (from as-built Energy Performance Certificates for Phase 1 dwellings) was 4.2m³·h⁻¹·m⁻² @ 50Pa for houses and 3.2m³·h⁻¹·m⁻² @ 50Pa for apartments and maisonettes.

Occupant satisfaction

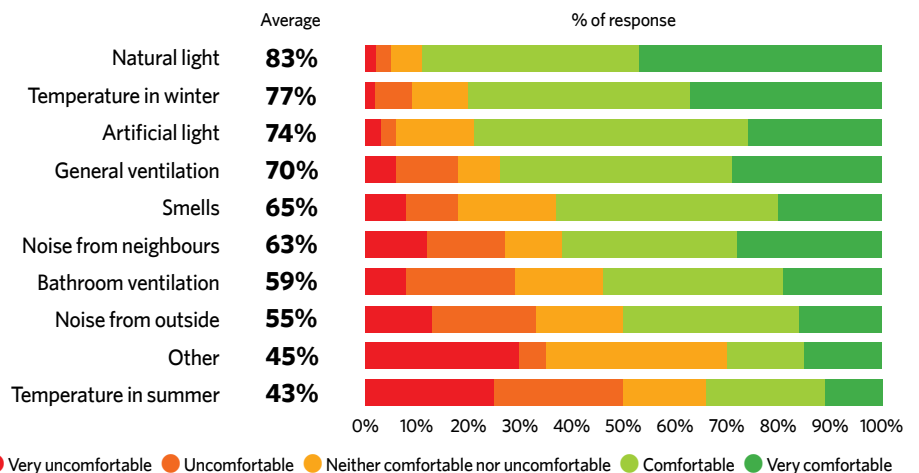
Respondents expressed high overall appreciation of the neighbourhood (87% positive ratings), block/street (82%) and homes (79%), and 64% of the 100 respondents plan to stay for five or more years. In terms of design, respondents were particularly satisfied with daylight (89%) and temperature in winter (80%). Artificial light (79%) and general ventilation (74%) also performed well. Noise from neighbours achieved 62% satisfaction (+12% neutral responses) and noise from outside achieved 50% satisfaction (+16% neutral responses). In summer, overheating was a dominant concern in the quantitative survey results for Phase 1 (only 33% satisfaction). Focus groups revealed concerns over district heat network costs and the quality of landscape maintenance.

Thermal comfort

To investigate the overheating observed in the resident survey, temperature sensors were installed in 11 homes. Across all properties monitored, the average temperature in bedrooms went above 26°C for 2.6% of the year compared with the design target of 1%.

Phase 1 was designed to be compliant with CIBSE Guide A (2006) criteria for overheating assessed under the UKCP09 future weather data, based on a medium-emission scenario, moderate percentile (50%), for a 2030 predicted London climate.

Does your home feel comfortable?



Resident survey responses in relation to user perception of comfort in the home

This design criteria has since been updated with CIBSE TM59 (Phase 3 onwards). A contributing factor to the overheating observed in Phase 1 may be that the thermal comfort strategy included measures reliant on occupant control (use of blackout blinds, operation of windows, and so on), allowing some of the physical design criteria – for example, a g-value of 0.735 was selected for windows compared with solar control glass at 0.37-0.49 – while still achieving compliance. The decision to relax the glazing g-value was also noted as an intervention to support compliance with fabric energy efficiency criteria.

Urban greening factor and water use

The POE included an urban greening factor assessment by The Green Infrastructure Consultancy and Hawkins\Brown. Chobham Manor was designed before the introduction of the Urban Greening Factor (UGF) calculation within the new London Plan. However, the site performs well, with a UGF score of 0.308, calculated as part of the POE (against the new London Plan requirement of 0.4).

The Phase 1 POE showed average normalised water consumption across all units at 126 litres per person per day, compared with the design target of 105. The UK national average is 142 per person per day. Within Phase 1, 10 homes had rainwater harvesting, but were not subject to the POE.

The POE scope also included holding ‘lessons learned’ workshops, with the project delivery team reflecting on what worked well and what could have been improved. Timely resolution of snags, integration of social housing and the resident handover process were noted as areas of critical importance.

Summary

This is one of the first residential POE studies released since the Greater London Authority’s (GLA’s) ‘Be Seen’ London Plan came into force. This policy explains how developers and owners should monitor major developments and report operational energy performance. The scope of the POE also covers studies beyond current policy, particularly in terms of social and functional evaluation.

The POE showed that perceived barriers with data protection can be overcome with a thorough, transparent process. Studies were conducted in line with General Data Protection Regulations, supported by a Data Protection Impact Assessment, privacy notice, consent form, ‘do and don’t’ guides, and a data-sharing agreement.

An ‘issues and mitigations’ table has also been prepared for CM-LLP and LLDC to work through actions identified. Learnings from the POE have been shared by LLDC with residents and industry to inform the development of future POE approaches. LLDC is in the process of rolling out POE across the completed Olympic site.

The pilot POE methodology can be shared with other client bodies. We hope the findings build confidence in the value of POE and accelerate its uptake, as it is a vital mechanism for ensuring neighbourhoods thrive and resident views are heard. [C](#)

MARK DOWSON CEng FCIBSE is an associate director in the Buro Happold sustainability team

References: The Phase 1 POE report is publicly available at bit.ly/CJ23chob

The study will inform the GLA’s approach to POE for future developments, as well as for 5,500+ LLDC homes





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Luxury awaits

Transforming the 1,000-room Old War Office building in London into a luxurious Raffles hotel has been a momentous project for Aecom engineers. **Andy Pearson** discovers that an extensive services refit did not detract from the magnificence of the makeover

From seat of power to one of London's most luxurious destinations, the Old War Office building in Whitehall, London, has undergone a monumental six-year transformation. The Grade II* architectural landmark, the corridors of which were once walked by Winston Churchill, will open its doors to the public this autumn, transformed into a flagship Raffles hotel. Known simply as The OWO, the hotel has 120 rooms and suites (known as keys in the hotel industry) and includes nine restaurants, three bars, and 85 Raffles-branded private residences.

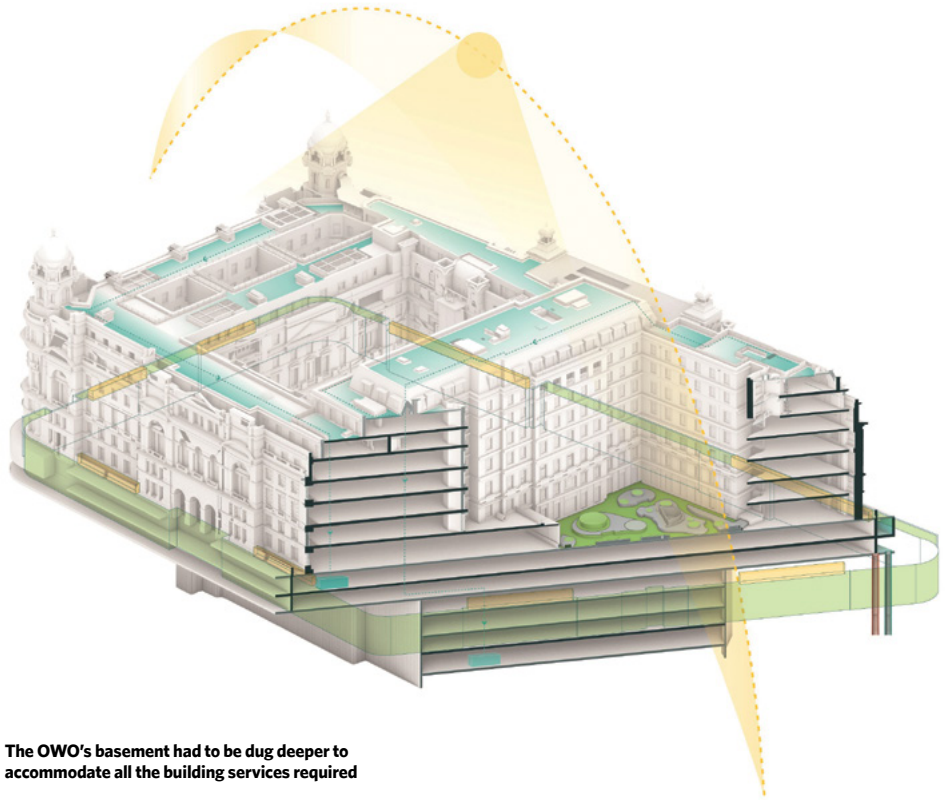
Built in 1906, the listed building's metamorphosis from government office to leisure destination has resulted in the already colossal, 1,000-room structure being extended by 31% with the addition of a three-storey rooftop extension. There are also four additional basement levels carved out below the Baroque-style edifice to house a spa, swimming pool, ballroom and kitchens.

It is the scale of the project, its location within the Whitehall conservation area, and the need to sensitively restore and preserve many of the building's historic interiors that have made servicing the new hotel a herculean task. 'It is all about coordination and trying to get services around the building without disturbing all of its beautiful features,' says Anthony Hume, technical director and The OWO project manager for building services engineer Aecom.

Hume has been involved with the project since 2017, when Aecom was asked to look at the services in the former office building with a view to it being turned into a luxury hotel. 'That was the easy bit; the scale of the project is so big it meant nothing could be reused, so the whole lot needed to be stripped out to enable us to start from scratch while respecting the listing,' he says.

Aecom's approach has been to service the building as a whole, with dedicated systems for each building – the hotel and high-end residences – where possible

The hotel has the larger footprint. Its 120 guest rooms occupy Levels 1 to 6, while amenity spaces, restaurants and bars make up the ground floor, and the subterranean ballroom and its associated kitchen are at Basement Level 2.



The OWO's basement had to be dug deeper to accommodate all the building services required

“The [BIM] model is ‘an absolute monster’, with more than one million elements, 400,000 of which are related to the mechanical and electrical services”

In developing its servicing solution, Aecom was able to use a survey model created from digital scans of the building. The model was supplemented by digital general arrangement (GA) drawings with embedded photographs.

‘The entire building was catalogued in pictures, so you could click on a GA to reveal a photo of a particular element, which was really useful,’ Hume says.

Surprisingly, given the size of the building, finding enough space for all the plant needed to service a luxury hotel was a major challenge. ‘We knew what the hotel operator needed, so we had to work with EPR Architects to make sure there was enough space for us to deliver that,’ explains Hume.

Ultimately, the quest for sufficient space meant the planned new basement extension had to be dug deeper still to accommodate the building services.

‘There are six levels of basement; some were added purely to accommodate plant,’ Hume adds. Even with an enlarged basement, there was limited space for the air handling units (AHUs). ‘We have over 35 air handling units on this job, simply because we did not have the space to



Services had to be installed without disturbing the building's beautiful features, such as this marble staircase

» accommodate fewer, larger units,' he says.

To aid cooperative working and coordination on this complex conversion, the entire project team worked in Autodesk Revit 3D building information modelling (BIM) software. Hume describes the BIM model as 'an absolute monster', with more than one million elements, 400,000 of which are related to the mechanical and electrical services.

'What was fantastic was having this digital design tool combined with a building that already largely existed – so, if we were struggling to route a service digitally, we could get up and walk to the actual space, which was particularly useful when explaining to those new to the project.'

Even with digital scans, the engineer was still presented with some surprises. For example, when part of the ceiling was removed the team exposed a series of beams that had been added in World War II to provide enhanced protection to a particular area. The services had to be routed around the reinforcement.

Perhaps the biggest challenge was in getting the building services from the basement plant spaces to the hotel's upper levels avoiding many of its listed rooms located on the ground floor. 'This floor is full of double-height spaces with minimal ceiling voids and some major structural elements, so we made the decision at the outset to avoid using this space,' says Hume.

Fortunately, Aecom was able to make use of what Hume calls 'the moat' – an existing subterranean corridor located at lower ground level that encircles the entire building, following the line of the façade. 'Using the moat gave us the opportunity to circumvent the entire building to distribute the services,' he explains.

From the plantrooms on basement levels, services rise up to lower ground level, from where they are routed to the moat. From here, the various services follow the building's perimeter until they reach the point on the plan closest to where they are required. From the moat, the services are routed up, through the ground floor, to Level 1, where a deep ceiling void provides the space for them to transfer from the building's perimeter to the foot of a series of internal risers, concealed within the walls, that deliver the services to the upper floors.

For the guest rooms, services from the risers connect to fan coil units (FCUs) to provide heating and cooling. The building's windows are designed to remain



"Aecom used 'the moat' – an existing subterranean corridor at lower ground level that encircles the entire building, following the line of the façade"



Windows in the guest rooms are designed to remain closed, partly because of security reasons



The OWO hotel includes nine restaurants and three bars



The courtyard around which the Raffles-branded apartments are situated

closed. This is partly because of noise, and partly for security reasons in rooms overlooking the royal procession route along Whitehall. Tempered fresh air is supplied to the FCUs from dedicated AHUs located on Level 1. This arrangement was more challenging in the largest guest suites that now occupy the former war rooms, which had listed wood-panelled walls. The panelling had to be carefully removed to enable the services to be installed. FCUs have been hidden behind the panelling, set into recesses carved into the walls. The only clue to their existence are period-style grilles subtly added to the panelling. 'All you can see now is the grille, but the work to install these units was extensive,' says Hume.

The chilled water circuit serving the FCUs circuit is pumped from multiple modules amounting to 3MW of cooling located on Level 6. 'The condensers are the only plant allowed on the roof and they are in a sunken plant area to keep them hidden below parapet level,' Hume explains.

Heating is provided by 4MWs of modular gas-fired boilers located at Basement Level 5. The boilers also supply heat to the hotel's domestic hot water calorifiers, which are located on the same basement level. The boiler flues, however, terminate 11 floors up, when they reach roof level. 'The flues are the only service in the entire building to have a completely straight riser,

DESIGNING FOR ABSENCE

The challenge in servicing the apartments at The OWO is that they needed to be designed for intermittent occupancy, with many residents expected to be absent for large parts of the year. As such, each apartment has a dedicated mechanical ventilation unit with heat recovery to provide it with fresh air.

Even though the units generally draw in air from the apartment courtyard, all the intakes are fitted with a NOx filter to minimise nitrogen dioxide and particulates in the air supply.

As with the hotel guest rooms, heating and cooling to the apartments is via FCUs. However, the apartments have a dedicated heat interface unit to separate them from the landlord's heating and cooling pipework.

This unit's heat exchanger also provides instantaneous hot water to the apartment to avoid the need for water storage. Even so, both hot and cold water systems are connected to what Hume terms a 'hygiene flushing box'. 'This automatically flushes the systems if it detects that they have not been run for a set period, ensuring they are always safe and to prevent stagnation,' he explains.

from top to bottom,' adds Hume.

The residential apartments have a similar servicing strategy to the hotel guest rooms. These are located in a separate wing of the building, surrounding a small courtyard, with a dedicated entrance and basement car parking. Engineers also had to design apartments for intermittent occupancy, as many residents were expected to be absent for large parts of the year. (See panel, 'Designing for absence'.)

The project is finally nearing practical completion. Over its six-year duration, legislation changes and enhancements to the hotel operator's brand standards have necessitated design changes and amendments. For example, Aecom added electric vehicle charging to the residents' parking areas. 'The rapid change in car charging requirements over the course of the project meant we needed to add chargers in midway through,' says Hume.

When The OWO is open to guests and residents later this year, Aecom will still be involved: 'We're doing seasonal commissioning post-handover, so that we can adapt the systems as they are being used,' says Hume. 'We've done the theoretical design, but this allows us to work with the operator to tweak elements to reflect the way that the operator is actually using the building.' Only then will Aecom be able to say the monumental building's transformation is complete. **C**

McDonald's claims its operation at Walt Disney World in Florida is the first net zero energy fast-food restaurant in the world. Cyclone Energy Group's **Benjamin Skelton** explains how innovative ventilation strategies suited to the subtropical climate helped the restaurant achieve actual net positive energy



Greening the golden arches

The original concept for the Walt Disney World campus in Florida included a new community that would serve as a centre for American enterprise and urban living. Walt Disney's death meant the vision of a new city was never realised, but the concept was reprised in the Epcot theme park, which opened in 1982 and showcases modern innovation. It's been wildly popular since it opened and is the fourth most visited theme park in North America.

It is fitting, therefore, that McDonald's designed and built the world's first net zero energy fast-food restaurant on the Walt Disney World campus. The all-electric building has achieved more than 105% net positive energy for 12 consecutive months, thanks to a roof-mounted solar photovoltaic array.

Quick-serve restaurants have very high energy use intensity and, with a 24-hour operation, some creative engineering was required to minimise loads.

Cooking appliances consume 55% of the building's annual energy, while building ventilation is the second-largest load. The majority of ventilation is replacement air for the cooking hood exhaust system, which runs 24 hours per day.

To minimise kitchen exhaust, the kitchen hood exhaust system uses cooking demand-based ventilation controls. These monitor heat, grease and

smoke, and adjust exhaust rates to maintain effective capture and containment.

Quick-serve restaurants have large fluctuations in service and have to provide meals to customers on demand. A typical restaurant will keep their cooking lines hot 24 hours a day, so they can react instantly to an influx of customers. This is not only a major energy consumer, but it also adds significant cooling load and keeps the kitchen hood demand-control system from going to minimum flow.

At the Walt Disney World restaurant, McDonald's deployed a new technology in quick-serve cooking that allows an entire line to go into idle mode and rapidly switch to 'ready' when required. This location handles an extraordinarily large number of customers given its proximity to the theme park and has a very large kitchen to handle the demand. There are three cooking lines and being able to bring them to an idle state during lower demand times significantly reduces ventilation and energy load.

Kitchen pressure is held at a 5% negative to adjoining spaces to keep kitchen odours contained. Having a variable exhaust system means the kitchen make-



Comfort is maintained in the outdoor area 58% of the time annually between 6am and 6pm



The sweeping roof shading the outside eating area is made of custom glass panels with amorphous silicon solar PVs

"A new technology in quick-serve cooking allows an entire line to go idle and rapidly switch to 'ready' when required"

up air unit, and the dedicated outdoor air unit for the adjoining dining room space, must react in sync to maintain a proper pressure balance. Both the make-up air unit and dedicated outdoor air unit have variable speed drives and space-pressure sensors for control. Commissioning this system was complex and required simulation of many scenarios of cooking and occupant loads to tune properly.

The most unique ventilation strategy was the incorporation into the dining room of a natural ventilation system. While this complicates the pressure control of the kitchen, it provides significant energy savings and enhanced occupant comfort.

Orlando is a subtropical climate, classified under the Köppen climatic classification as Cfa. The area has two seasons: hot and rainy, and warm and

dry. May to September is considered the hot and rainy season, with high temperatures typically around 32°C and average lows between 18°C and 23°C, with frequent heavy rain. The warm and dry season spans from October through April, with average high temperatures between 20.5°C and 28.8°C and lows between 8.8°C and 18°C. The warm and dry season experiences about half as much rain as the hot and rainy one.

The operative temperature range for the dining area is between 20°C and 25.5°C. Because the restaurant operates 24 hours per day, natural ventilation is available most often at night, when the seasonal temperature ranges are within the operative temperature range. With the wide operative temperature range, the store has 3,800 hours of natural ventilation per year (43%).

The natural ventilation system was commissioned not only to monitor dry bulb temperature, but also enthalpy, wind speed and precipitation. When the weather conditions are within all ranges, operable glass louvres that line the entire south and west façades of the dining area open, while the variable refrigerant flow system providing space conditioning, and the dedicated outdoor air unit providing ventilation, shut down. Natural ventilation fans draw air through the space and help maintain the pressure balance to the kitchen.

Having the natural ventilation glass louvres at the customer level posed a safety concern that had to be accounted for carefully. Louvres could have an item placed in them, or a customer may put their hands in and get them caught. >>

WHAT IS ZERO ENERGY CERTIFICATION?

The International Living Future Institute (ILFI) Zero Energy Certification is a third-party programme that enables projects to demonstrate zero energy performance.

It certifies, through an audit of performance data, that the building is producing net annual energy demand using energy from the sun, wind or earth.

All of the building's energy needs on a net annual basis must be supplied by onsite renewable energy and no combustion is allowed. Certification is based on actual, not modelled, performance.

ILFI encourages projects to register early in the development process. Those taking part have access to a number of support resources.

Once registered, a project team can submit documents on the ILFI online certification platform. When construction is complete, documentation will be collected for the preliminary audit. After 12 consecutive months of performance data have demonstrated net zero carbon, the ILFI certification staff will review the information before passing it to an independent third-party auditor.

After certification, a case study is published on the project, with the intention of informing and accelerating other zero energy efforts throughout the world.

For more information, visit living-future.org



The Golden Arches form the frame for a green wall

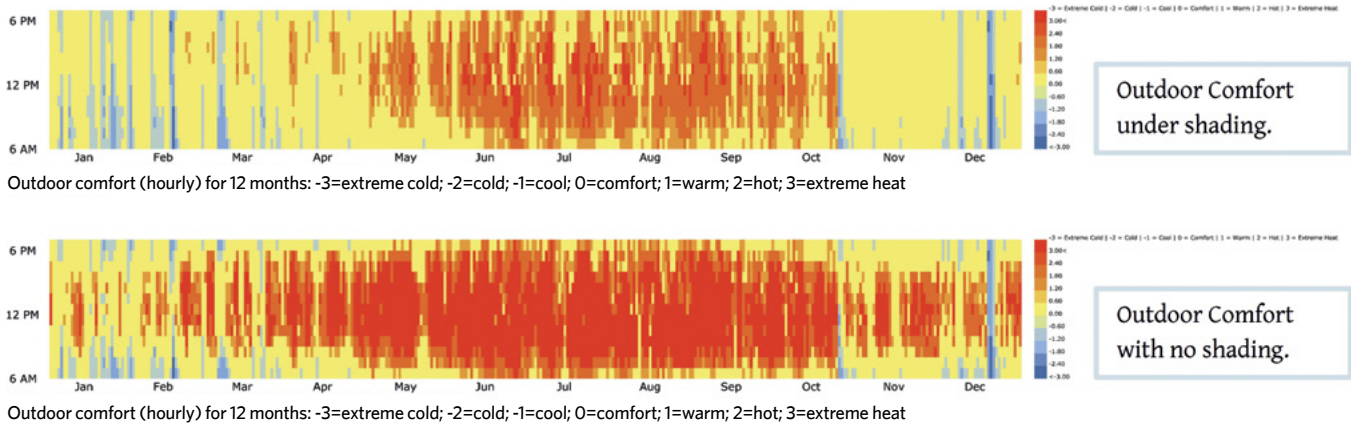


Figure 1: Twelve months of data showing the positive impact on comfort levels in the outdoor area with shading

» To address safety concerns, the inside is screened; this also keeps pests or debris from entering the restaurant. On the exterior, a laser system creates a field covering the entire surface of the louvres, and instantly disables actuation of the system if an object is detected. Actuation starts again when the object is removed. An audible message also alerts customers when the louvres open or close, and an

internal safety mechanism detects added pressure and prevents complete closure. The commissioning authority tested this and still has all his fingers!

Outdoor dining is not typical with quick-serve restaurants, but this location made that experience the centrepiece of the design. Covered by a sweeping roof made of custom glass panels with amorphous silicon solar photovoltaics, the outdoor dining area is shaded and high-volume, low-speed fans modulate to maintain a comfortable environment.

The shaded environment is comfortable and maintains a similar operative temperature range as the indoor environment, even during some of the hotter temperature conditions. A shading study estimates that comfort is maintained 58% of the time between 6am and 6pm annually. The shaded area also helps precondition the natural ventilation air when that system is active.

The flagship McDonald's restaurant was originally scheduled to open in April 2020, but this was delayed because of the onset of the Covid-19 pandemic. In July 2020, the restaurant opened for drive-thru service only. The commissioning team took advantage of this opportunity and evaluated and tuned control strategies for the kitchen ventilation systems.

The dining room opened to service in autumn 2020 and the natural ventilation features performed better than anticipated, as temperature and enthalpy ranges were expanded over design setpoint. (See Figure 1). Energy data is tracked live using a monitoring-based commissioning system and is performing better than design. Issues with inverter failures delayed net zero energy performance in the first year of operation. Currently the restaurant is seeking net zero certification through the International Living Futures Institute (see panel, 'What is zero energy certification?').

BENJAMIN SKELTON is president at Cyclone Energy Group, which was the commissioning authority and energy expert for the McDonald's project



Glass louvres with several safety features provide natural ventilation

The perfect combination..... P-Sensor and the CMR Velogrid



VELOGRID
Velocity Averaging Sensor



P-Sensor

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Under the lights

The new version of *LG4 Sports lighting* is designed to ensure that stadium lighting matches the quality of today's broadcast trends and technology.

Mike Simpson outlines key updates to the guide

LG4 is the long-standing Society of Light and Lighting (SLL) guide to sports lighting, and reflects the current trends in terms of the sports themselves and lighting techniques. Since the last guide was published in 2006, we have seen growth in participation at an amateur level, new sports becoming popular, and greater coverage from broadcasters.

We have also seen a technological revolution in lighting – with the switch to LEDs – and in broadcasting in terms of what is delivered to our screen. In 2018, EN 12193, the European standard for sports lighting, was published, and our task group included authors from that working group. All of these have driven the updates to the latest edition of LG4.

The guide is concerned with the lighting of sports arenas and other playing and recreational spaces. It takes into account a number of factors, including the level of play, which will influence the speed of the action and, therefore, the visual task. Usually, the higher the level of play, the more stringent the lighting requirements. We also have to take into account the different users:

- Players have to be able to see clearly to perform to their optimum level. Small balls moving fast require more light than large balls moving slowly.
- Lighting must enable spectators to see the action, whether up close or far away.
- Television plays an important part in making sport available to the widest possible audience. That audience now demands close-ups showing the strain on the competitors' faces, multiple camera angles, and instant slow-motion replays. Picture quality has gone from HD to 4K and 8K. The lighting must ensure that the highest-quality pictures can be obtained.

The guide covers all aspects of an installation, and there is advice on 51 sports, from archery to wrestling. Greyhound racing has been taken out, although the old guide can always be referred to if necessary, but there are some new sports. In some cases, the governing body may have established the lighting requirements – which should also be considered – but, for many, LG4 will be the primary reference source. In all cases, we have been careful to align with other standards.

Larger indoor and outdoor venues, whether single-use or multi-use, have their own section. For these, the siting of the lighting is critical to achieving the correct performance and minimising glare. This is something that needs to be considered at the earliest possible stage of the design, as lighting positions rely on the physical

structure of the venue. If this is overlooked, it can be impossible to achieve the right lighting result if the mounting positions do not exist.

In particular, broadcasters need to ensure the lighting will deliver good-quality pictures from all camera angles and that the lighting doesn't cause flare in the camera lens. An addendum to the previous edition was issued to take account of updated requirements from broadcasters, in particular the flicker caused by discharge lamps. With the introduction of LED sources, cameras can operate at high shutter speeds for slow motion without any specific measures being taken. Similarly, it has not been necessary to increase levels for 4k and 8K broadcasting. However, uniformity and colour consistency have become more critical.

The new LG4 has been written for the future and the assumption that all new or refurbished projects will be using LEDs. Dimming is possible and there is no longer a time to wait for the lights to come on after a power failure. Practically, the poorest colour rendering is above Ra70, so the minimum recommended colour rendering in the guide has been uplifted to Ra>70 for outdoor applications and >Ra80 for indoor. Players, in particular, will appreciate the better quality of light in future.

One big plus for the LED is that it now outstrips all previous light sources in terms of efficacy, which means less energy use than before. This is just one of the environmental considerations addressed in the guide. The other is the growing demand for the control of stray light from sports installations.

For larger stadiums, THE light tends to be contained within stands, but for community and recreational activities there is little to stop it shining onto adjacent buildings or into the sky – and it is in these situations that lighting is likely to be used daily, into the evening.

Specific criteria to manage this are included and refer to well-established guidelines. Also, light control can be better with LED sources, so we can satisfy environmental concerns at the design stage.

The new LG4 is essential reading for anyone involved in lighting for sport and leisure facilities, and will ensure that lighting is designed to the highest standards. **C**

■ **MIKE SIMPSON**, FSLL, is global applications lead at Signify and a former president of the SLL and CIBSE

■ *SLL Lighting Guide 4 (LG4): Sports lighting* is available at www.cibse.org/knowledge

■ Members of the LG4 task group are: **Mike Simpson** (chair); **Giulio Antonutto**; **Russell Evans**; **Griffiths Evans**; **Richard Morris**; **Dr Alan Smith**; and **Kevin Theobald**

■ This article first appeared in SLL's *Light Lines*



TM66 Assured!

Designed and manufactured in the UK, we take pride in developing and producing lighting solutions that prioritise the Circular Economy. As one of the founding partners of CIBSE and the LIA's TM66 Circular Economy Assurance Scheme, we are at the forefront of pioneering this innovative program.

By actively participating in this scheme, we are committed to advancing the adoption of environmentally friendly practices in the lighting industry and our aim is to assist consultants and specifiers in making informed choices when it comes to selecting sustainable luminaires.



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Building confidence in a luminaire circular economy

This module explores assessing and certifying lighting fixtures for circular economy alignment, and highlights the advantages of assured certification

This CPD article aims to examine the practical assessment and certification of lighting fixtures that focuses on their compatibility with the principles of the circular economy to foster product sustainability, stimulate design improvements and innovation, and establish trust among consumers.

Reportedly, there are around two to four million tonnes of lighting waste generated globally each year. This includes incandescent, fluorescent, and LED lamps, as well as lighting fittings and luminaires. Many of the discarded lighting products ultimately end up in landfill or incinerators, where they can release harmful pollutants into the environment. There are a number of things that can be done to reduce the amount of lighting waste generated, and one key aspect is ensuring that products are holistically as sustainable as practicable. By ensuring that they are compatible with the circular economy, they will preserve value in the form of energy, labour, and materials.¹ And, as reiterated in the recent review paper by Grigoropoulos,² which examines the life-cycle assessment of luminaires, the optimal pathway to enhance sustainability primarily lies in the initial design stage of lighting products. A circular economy, as illustrated in Figure 1, provides an alternative to the traditional linear economy, in which products are made, used, and then discarded. Products, components and materials are kept in circulation for as long as possible, by designing for durability, reuse, remanufacturing, and recycling, thereby reducing waste and pollution.

Specific examples of how the lighting industry can adopt circular principles include the following:

- Evolving products that use less material while delivering life-cycle sustainability
- Designing products that are easy to disassemble and remanufacture
- Selectively employing materials and methods with low embodied carbon
- Prudently recycling materials back in to the manufacturing process

- Offering accessible take-back programs for used lighting products
- Educating consumers about the importance of recycling and reusing lighting products.

As explored more fully in *CIBSE Journal CPD 204*,³ *CIBSE TM65 Embodied carbon in building services: a calculation methodology* provides an introduction to whole life carbon and embodied carbon, and notably also includes a method to assess the

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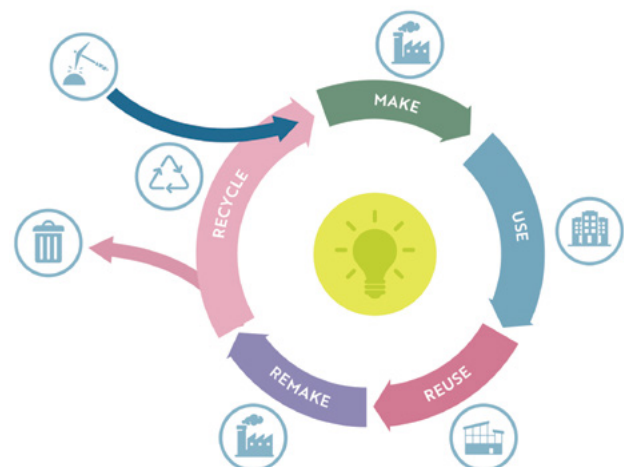


Figure 1: The circular economy model
(Source: CIBSE TM66:2021)

» embodied carbon of MEP products where a manufacturer has not already developed a BS EN 15804:2012+A2:2019⁴-compliant environmental product declaration (EPD) for their product.

The embodied carbon calculations in CIBSE TM66 *Creating a circular economy in the lighting industry* builds on the methodology outlined in CIBSE TM65. It provides a background to circular economy principles, and sets out the drivers and barriers specifically for lighting products. A common benchmarking tool is introduced that aims to overcome the diversity of results from the individual methods that are presented by lighting manufacturers employing their own bespoke techniques, which make it challenging to compare claims of sustainability across the industry. TM66 is designed to balance complexity with effectiveness and usability but is very reliant on the user’s level of knowledge, and their interpretation of the supply and manufacturing supply chains for their product. Case studies are included that demonstrate how some of the principles of a circular economy have been successfully implemented by lighting manufacturers.

The Circular Economy Assessment Method (CEAM) illustrated in TM66 employs accompanying Excel spreadsheet tools to steer manufacturers towards improved product circularity, as well as providing specifiers and clients with an understanding of the questions they need to ask of their suppliers. The tool, CEAM-Make, employs an Excel spreadsheet comprising 66 questions under four tabs – product design; manufacturing; materials; and supporting ecosystem – to assess a luminaire in terms of its circular economy performance. By adding the specific answers to the questions, products are given a rating of zero to four, with the spreadsheet tool allowing iterative inputs to encourage and enable manufacturers to improve the rating. The zero baseline for a product indicates ‘very poor circular economy performance’, with the intent of the tool being to encourage and enable products and support ecosystems that score three or four, indicating ‘excellent circularity’. The CEAM-Make spreadsheet, as shown in the example in Figure 3, provides a final rating – in this illustrated case, highlighting that the manufacturer needs to particularly reconsider some of the materials that are being employed in order to improve the circularity credentials of the product. Accurate completion of CEAM-Make relies on the input of fair and reasonable values backed by hard evidence, with the sheet’s guidance notes warning that there is ‘no

PINNING DOWN LUMINAIRE COMPONENT DATA



The recent case study⁵ by Albu et al explored the life-cycle assessment (LCA) of an example LED suspended luminaire (as shown in Figure 2) designed for use in office, education, residential and retail applications. This comprised an aluminium LED polyurethane powder-coated housing, a driver power supply with electric protection, an LED linear module with electronic control system, a polycarbonate opal diffuser, and various connections and fixings (electrical cables, connection plugs, and screws). For a seemingly simple luminaire there is a reasonably extensive schedule of components, as shown in Table 1, many being sourced at some distance from the final manufacturing location. Albu and his co-authors employed proprietary software that draws on many embodied carbon resources (including the freely downloadable ICE database⁶) to undertake the LCA. Without detailed

knowledge of the manufacturing process of the many specific components, it can be difficult to determine the level of confidence in the provenance and reliability of data for some components. Reasoned, and evidenced, judgments will be required to assess the product data, especially the questions about manufacturing and materials on the CEAM-Make spreadsheet. A significant amount of investigation and evidence-gathering may be necessary to maintain a credible process. However, this can be avoided if the components themselves have an accredited EPD or similar.

Once the initial investigation has been conducted for a product, it is likely that the same data may be repurposed by the manufacturer for other luminaires in the product family.

Raw material	Quantity (kg)	Transport distance (km)
Aluminium extruded profile (body)	1.93	193
Epoxy powder paint	0.04	1,196
Aluminium extruded profile (fixing clips)	0.46	193
Polycarbonate cable connector 2p + n	0.005	542
ABS cable gland	0.005	19
Copper electric cable FY 0.5mm	0.05	11
Copper electric ground wire	0.1	11
Copper electric cable 3x0.5mm	0.01	11
Polycarbonate opal dispenser	0.13	1,881
Steel screws M4	0.01	591
ABS plastic taps	0.08	19
ABS plastic clips	0.08	19
LED module	0.07	1,690
LED driver	0.18	1,690
Driver selector plug	0.001	1,690
Paper adhesive label 50x32mm	0.02	12

Table 1: Schedule of components in an example LED luminaire

wishful thinking or generalised statements allowed – evidence must be specific and supported’ (see the boxout ‘Pinning down luminaire component data’). The end result of the process is a self-certified metric of luminaire circularity.

There is an additional, associated spreadsheet that provides a short-form ‘triage tool’ for a designer, specifier or engineer – CEAM-Specify. The four tabs provided in Make are collapsed into one in Specify, allowing the quick comparison of two or more products.

The CEAM has been created to improve sustainability in the lighting industry and, as such, should be used to assist in the accurate assessment of circular economy performance. It is a rigorous assessment tool that helps manufacturers to identify and improve the environmental impacts of their products. This can give manufacturers greater confidence that their products are truly sustainable and that they are meeting the needs of their customers. The tool is not intended to be used to ‘game’ the process in order to misleadingly inflate the circular economy performance scores.

Circular Economy Assessment Method - Make

(CIBSE TM66 digital tool)



Result			
Category	Points Scored	Maximum possible points	Assessment
Product design	85.0	134.0	2.5
Manufacturing	28.9	46.5	2.5
Materials	4.0	24.0	0.7
Ecosystem	39.0	43.0	3.6
Overall performance	156.9	247.5	2.3

How to analyse the score	
0 to 0.5	Very poor circular economy performance
0.5 to 1.5	Some circular economy functionality
1.5 to 2.5	Definite/substantial progress to circularity
2.5 to 4.0	Excellent circularity

Figure 3: Example of an output of a CEAM-Make assessment for a luminaire - highlighting the need for the manufacturer to focus particularly on alternative materials to improve the overall performance

The Lighting Industry Association (LIA) and CIBSE joined forces to develop the TM66 Assured Product Verification Scheme,⁷ to provide independent verification of lighting manufacturers' circularity claims, as well as to ensure accuracy and maintain credibility. Lighting manufacturers that participate in the TM66 Assured scheme can have their CEAM-Make self-certified assessment independently verified to assure the accuracy, objectivity, and consistency of the luminaire circularity score. The assurance scheme is formally classified as type 1a certification scheme under ISO/IEC 17067 *Conformity assessment - Fundamentals of product certification and guidelines for product certification schemes*.

The TM66 Assured scheme examines each of the 66 questions of CEAM-Make and any accompanying evidence for all four tabs and compares them with CIBSE/LIA's marking criteria. If the average comparative assessment mark across all questions for all four tabs exceeds 70%, the self-assessment will be deemed as passed and be eligible for certification. Where the evidence provided indicates that the self-assessed score is significantly different to CIBSE/LIA's marking criteria on one or more criteria then, providing that the average mark still exceeds 70%, a certificate will be awarded but only at the new CEAM rating, as calculated by CIBSE/LIA. The manufacturer can accept the revised CEAM rating for the product or appeal the decision. If a revised rating is accepted, the manufacturer has three months to show the revised score in all product and marketing literature or on any database or digital tool where the product is included. As part of the assessment process, physical samples of the luminaire may require evaluation and testing to ensure that they are properly represented by the CEAM tool. Where an evaluation is unsuccessful, the manufacturer may be asked to provide additional evidence.

TM66 Assured allows for the assessment of family variants. Family variants are products that are essentially identical with respect to materials used, components, and technology applied, but may have minor differences, such as construction detail, or variation in specific materials. When evaluating family variants, the differences between the products are considered and the product that is considered most representative are selected for assessment.

Certifications are valid for a period of three years and, if requested by the manufacturer, the certificate may be reissued for a further three-year period following a review to determine whether the product still meets the requirements of the scheme. This takes account of updates to the supporting documents (for example, TM66 CEAM) or scheme requirements, as well as whether the product has undergone any changes in design or composition, or if there have been changes to the production location or facilities. If no significant changes are identified, and the product is still in compliance with the requirements of the scheme, then the certificate will be reissued for a further three years. However, if significant changes are identified, then the certificate may be suspended or withdrawn. Minor changes leading to a change in CEAM rating will result in an amended certificate displaying that new rating, which will then be valid for a period of three years. Significant changes will require the assurance process to start afresh.

Before applying any changes to their TM66 Assured products during the certification period, the manufacturer has a duty to inform the assessor of any modifications that may affect certification. The impact of any changes will then be assessed and, where significant changes are identified, the manufacturer will be advised so that they can ensure that the product maintains its circularity credentials through its assured certification.

This formalised assessment can help manufacturers track their progress towards sustainability goals and make informed decisions about how to improve the sustainability of their products and processes. Production costs may even be reduced as a result of consequent improvements in the efficiency of their products and processes. The scheme can be used as a transition tool to help manufacturers plan and report on their transition to a circular economy. Consumers are increasingly demanding sustainable products,⁸ and certification can help manufacturers to differentiate their products from the competition, improve their brand reputation, and potentially attract new customers.

CEAM and similar tools provide an important step towards greater environmental sustainability and transparency in the lighting industry. The increased adoption of circular economy principles and standardised, assured metrics by manufacturers will help lighting designers, building operators, and owners to confidently select luminaires that are more sustainable.

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Further details of the TM66 Assured programme are available at www.thelia.org.uk/page/TM66_Circularity

Turn to page 46 for references



Module 222

October 2023

» 1. **Approximately how many million tonnes of lighting waste is thought to be generated each year?**

- A 1
- B 3
- C 5
- D 7
- E 9

2. **What does the 'E' in CEAM stand for?**

- A Ecological
- B Economy
- C Electrical
- D Endorsed
- E Environmental

3. **How long does the standard TM66 Assured product certificate remain valid?**

- A One year
- B Two years
- C Three years
- D Four years
- E Five years

4. **In the example CEAM-Make output, which of the following is most likely to be considered as the area that exhibits the least characteristic of circularity?**

- A Ecosystem
- B Manufacturing
- C Materials
- D Overall performance
- E Product design

5. **Which of these is most likely true?**

- A Any changes to a certified product will require a full recertification process
- B Circularity will reduce manufacturing costs
- C Each product in a 'family' will need to be individually examined
- D Manufacturer must inform the assessor of any modifications that may affect certification
- E Manufacturer will be required to improve the circularity score when a modification is made

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This month: Pre-insulated pipe standard BS 5422:2023, commissioning valves, pressure independent balancing and control valves

Pre-insulated systems 'do not meet' new standards

TICA calls for closer scrutiny of pre-insulated pipework because of concerns over reaction to fire

The Thermal Insulation Contractors Association (TICA) wants a fresh review of the pre-insulated and duct market following the recent release of BS 5422:2023 and secondary legislation related to the Building Safety Act.

BS 5422:2023 now defines reaction to fire in terms of the Euroclass system, and states a minimum performance of Euroclass C-s3 d2 in dwelling applications and B-s3 d2 in non-dwelling applications. Chris Ridge, technical policy manager at TICA, said: 'Many pre-insulated systems being marketed for use inside of buildings simply do not meet these criteria.'

TICA and BESA first raised their concerns about the suitability of pre-insulated pipework and ductwork product when used inside buildings in July 2022. 'Twelve months after our initial communications, it has become necessary for TICA to raise this issue again,' said Ridge.

TICA also asked questions about the testing regimes used by some manufacturers of pre-insulated pipe and duct systems. 'We are seeing vastly differing reaction-to-fire results for products that appear to be of a similar nature,' said Ridge.

'In some cases, the testing processes adopted by manufacturers appear to have diverged from the agreed testing methods commonly understood for traditional thermal insulation products. Ultimately, manufacturers are marketing a system by combining pipe and duct products with an insulation product - this cannot negate the responsibility of testing the insulation element to the prescribed standards.'

TICA has also highlighted that some pre-insulated products are being marketed for applications where they cannot meet maximum heat-loss requirements prescribed in BS 5422:2023 and Approved Document L Volumes 1 & 2.

BS 5422:2023 applies to thermal insulating materials for pipes, tanks, vessels, ductwork, and equipment operating between -40°C and 700°C (see page 50).

Danfoss extends range of pressure independent valves

Danfoss's range of pressure independent valves for heating and cooling systems now includes AB-QM 4.0 pressure independent balancing and control valves (PICVs). These are designed for use with conventional and digital actuators, such as the Danfoss NovoCon S high-accuracy digital actuator, which can be integrated into a BMS via BACnet or Modbus bus communication.

The valves come in sizes from DN15 to 32, and add new features and improved specifications to the proven capabilities of the well-known AB-QM series.

Danfoss says the resistance of the valve to scaling and clogging has been considerably improved by using innovative PPSU polymer material. They feature a pre-setting scale that remains visible from several directions, even with an actuator mounted on the valve.

The pressure class has been increased from PN16 to PN25 and the adjustable flowrate of the AB-QM 4.0 valves has been increased significantly.

The minimum flow pre-setting has been reduced from 20% to just 10% of the design flow. Alternatively, some of the valves are available as high-flow or low-flow versions. This results in a design flow range of just 20l/h for the DN15 low-flow up to a maximum design flow of 5,000l/h for the valve in the DN32 high-flow version.

All AB-QM 4.0 valves are available with internal or external threads and with test plugs. The DN15 and DN20 can also be provided without test plugs.

Warning against remote heat pump installations

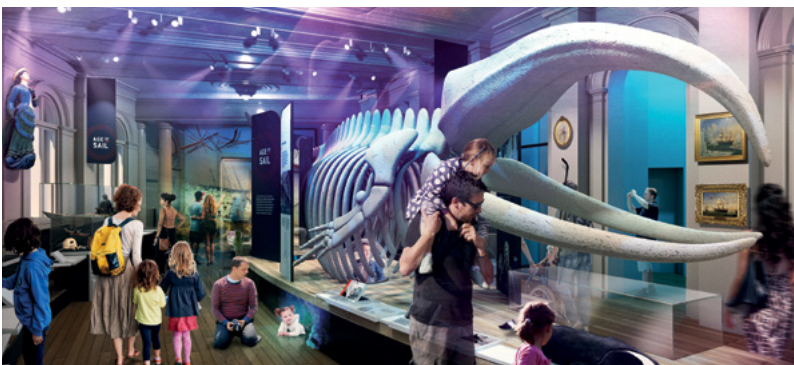
Pipework manufacturer Rehau has warned against the use of 'improvised' pipework installations for remote heat pump systems.

The company said remote installations - where heat pump units are placed a distance from the property they serve - could result in low-quality systems unless underground pre-insulated pipework is used.

Steve Richmond, head of marketing and technical at Rehau, said: 'There may be a temptation to improvise using standard plumbing pipework wrapped in some insulation, and bury it underground, but this will not be a watertight or thermally efficient solution.'

He warned that such an approach would probably lead to inefficient operation of the heat pump, resulting in significantly higher energy bills for homeowners.

REHAU'S FLEXIBLE HEATING FOR MARITIME MUSEUM



Rehau has supplied its Rautitan universal pipework system for drinking water and heating at the Hull Maritime Museum, which is being refurbished.

The retrofit required a new heating system to be connected through the existing solid floor, creating a potentially difficult installation in the narrow concrete channels, said Rehau. Rautitan was able to be bent by hand to fit the channels, and did not require the use of hot works, instead being installed using the Rautool tooling range.

'The strength and flexibility of the product made fitting the pipe lengths into the floor structures much more straightforward than would have been the case with more traditional pipe systems,' said Rehau representative Paul Thompson.

The refurbishment is set to conclude in Q3 2023, with the museum expected to reopen to the public in 2025.

Elevating insulation

The revised insulation standard BS 5422:2023 will minimise heat loss in pipework and contribute to fire safety. Whitecode's Alex Hill summarises the main changes and outlines their regulatory impact

The revised BS 5422:2023 standard is a regulatory milestone, providing methods for specifying thermal insulating materials used in pipes, tanks, vessels, ductwork, and equipment operating within the temperature range of -40°C to $+700^{\circ}\text{C}$. It is essential the industry understands the impact of the updated legislation and what it must do to prepare for the changes.

The full revision reflects the latest advances in thermal insulating materials and aligns with the evolving energy landscape. Its objective is to update insulation types and performance levels to those that currently dominate the market. The revised standard offers improved insulation options, and anticipates a greater future contribution from district heating systems.

It also gives greater clarity on insulation fire performance, marking a departure from the former British fire classification method to bring British standards in line with more robust European ones. The standard gives a more comprehensive assessment of materials' behaviour when exposed to fire, and states a minimum performance of Euroclass C-s3 d2 in dwelling applications and B-s3 d2 in non-dwelling applications.

The legislation offers greater clarity than the previous edition. Tables have been simplified, removing thermal conductivity values for materials that are no longer supplied or rarely used. The revision also introduces the use of 'less than or equal to' values for all pipe sizes, reducing the need for interpolation and increasing overall thermal efficiency.

The updated standards for thermal insulating



materials will have very limited effect on refrigeration and air conditioning applications, but there are major changes where heating is concerned. Perhaps the most significant is the impact of BS 5422:2023 on limiting heat losses and gains. The standard provides a method for compliance in limiting heat losses and gains from building services, and is referenced in Building Regulations Merged Approved Documents, Approved Document L Volume 1 and Volume 2. Consequently, it is likely to become the minimum standard in the future.

The revised standard complements others, such as CIBSE CPI Heat networks: Code of Practice for the UK (2020). For heating, it gives the consultant or specifier an option to have an enhanced insulation standard to substantially limit heat loss. Enhanced insulation thicknesses have been captured from the legacy Energy Technology List/Capital Allowances levels, offering further enhancements and aligning with other emerging pipework insulation standards.

The revision enforces stringent heat loss standards, which will prove beneficial to district heating. As district heating relies on a network of insulated pipes, industry must familiarise itself with BS 5422:2023, as relevant organisations will be impacted by the changes.

Organisations and their clients should consider carrying out a gap analysis to assess if their business meets the requirements of the new standard.

BS 5422:2023, which is available at bit.ly/CJBS5422 is a significant step towards energy efficiency, safety and sustainability within the industry.

ALEX HILL managing director at Whitecode, worked with the BSI on revising BS 5422:2023

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Uponor wins Gold-level EcoVadis rating

Pipework manufacturer Uponor has earned the prestigious Gold rating from EcoVadis. It is now among the top 6% of sustainable companies in the plastic products manufacturing sector.

In 2022, the company launched a new sustainability agenda that set out a framework of ambitious targets.

EcoVadis is a global sustainability rating platform that evaluates companies based on their practices in areas such as the environment, labour and human rights, ethics, and sustainable procurement.

'We continuously develop our ESG [environmental, social and governance] reporting to ensure transparency towards our stakeholders and to make our progress visible. I'm very proud of our team effort across the organisation, which is now reflected in our improved EcoVadis score,' said Thomas Fuhr, chief technology officer at Uponor.

Pump World launches compact booster set

The Smart-box Mini Tank Set has been added to Pump World's range of mains-boosting sets.

The pump incorporates a variable speed booster pump with a 250-litre water-storage tank. Pump World says the Smart-box Mini Tank Set's compact design makes it suitable for boosting low water pressure in small domestic properties.

The pump features dry run and frost protection, wireless connectivity, and an energy-monitoring facility.

The tank comes with float valve, overflow, non-return valve, inspection hatch, and suction and discharge pipes for quick and simple installation.

Paul Marsden appointed chair of SoPHE industry group

Technical manager aims to heighten focus on public health engineering

Baxi's technical specification manager, Paul Marsden, has been appointed as the new chair of the Society of Public Health Engineers' (SoPHE) Industry Working Group (IWG).

This appointment signals a heightened focus on public health engineering within CIBSE and the wider building services sector. Marsden, an expert in hot water systems and renewable/low and zero carbon technologies, has extensive experience in the industry.

'The increasing focus on decarbonisation will not only impact upon how buildings are designed, but also how products are designed and manufactured. This represents challenges and opportunities, and makes

it an exciting time in which to be involved,' Marsden said.

Marsden aims to bolster the importance of public health engineering in the transition to a low/zero carbon future.

David Johnson, business development manager for Pump Technology, has also joined the SoPHE IWG committee.



BSRIA guide still the one to follow for pumping energy efficiency

Engineers are being urged to use the BSRIA Guide *Energy efficient pumping systems* to calculate life-cycle energy for pumps. The guide was published in 2011, but CIBSE technical editor Tim Dwyer says it is still the most authoritative publication on pumping efficiency.

The guide focuses on heating and cooling systems, as these incur the largest loads in building services applications. It states that there is a potential difference of 80% in energy consumption between the worst-designed constant flow systems and the best-designed variable flow systems.

Recommendations in the guide are based on analyses of alternative pipe-sizing methods, pipework layouts, valve selections, pump control options, and system control measures. The guide considers the embodied energy of different pipe materials when making life-cycle energy calculations. It is available for £60 at bit.ly/CJGEEPS11



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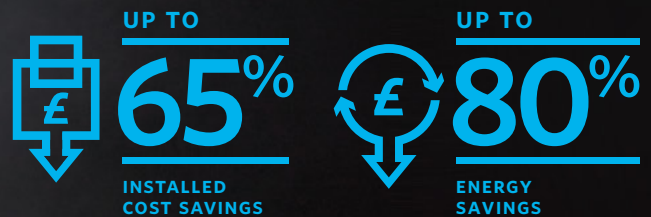
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When valves need a helping hand

Do automatic balancing valves mean less need for commissioning engineers? No, says the CSA's Tony Anderson – more complexity means intervention is necessary to ensure valves perform as intended

Commissioning a system that contains 'automated valves' should be quick and pain-free for the commissioning engineer, according to most of the sales literature. As most commissioning engineers know, however, this is rarely the case.

Over the past 20 years, 'automated valves' have become the frontrunners in the commissioning valve market. CFRs, DPCVs, PICVs and EPICV/EPIVs (see panel for explanation of acronyms) are just a few of the types available, each having their own sophisticated characteristics that can offer huge benefits in hydraulic applications.

When installed, using variable-flow pumps with a suitable system flow strategy, 'automated valves' can maximise flow efficiency, greatly reduce operational costs and offer enormous energy savings to end users compared with a traditional fixed-flow system. This translates into significant benefits over the operational lifespan of the system.

From the off, it's worth noting that the terms 'automated' and 'self-balancing', as used in sales brochures, largely refer to how the valves operate and control water flow after they have been set up and commissioned.

As a specialised component, one of the key challenges with automated valves is getting the system to a commissioned state that allows the valves to perform as per the design intent. Designers should use caution when assigning the pumping strategy around automated valves, to ensure the entire system is maintainable and lends itself to being flushed correctly.

There are numerous examples of when 'temporary' bypass loops had to be installed retrospectively around the automated valve or component, because the energy-efficient design model did not allow for suitable flushing and back-flushing of all system components. This is a lengthy and costly addition to each project. It is no coincidence that, in nearly every one of these examples, the commissioning team was not appointed until the hydraulic installations were at an advanced installation level.



"Small changes, additions or alterations at design stage can make significant operational savings in the long term"

Specialist care is required when performing the pre-commissioning cleaning of systems that contain automated valves. It is possible that each automated valve has a specific flushing mode or dedicated flushing bypass installed; however, this is rarely found to be the case on site.

Constant flow regulators (CFRs) of the removable-cartridge type, for example, will have to have been bypassed or had their cartridges fully removed to achieve flushing velocities. The BSRIA standard flushing velocity or design +10% will not be achievable with the cartridge in place.

Careful handling must be undertaken if removing and storing these cartridges, to ensure they are not damaged and are correctly identified and reinstalled in their original location and orientation. Most types of differential pressure control valves (DPCVs) must also be completely isolated during the initial flushing exercise.

Alterations made to the system for flushing activities need to be recorded, and the system reinstated to 'full flow' condition before commissioning activities commence. Proving the system has been reinstated, and that control valves and flow cartridges are back in their original positions, is a pivotal verification step on

these types of systems.

The importance of pre-commissioning cleaning again highlights the benefits of engaging a specialist commissioning engineer's perspective at the design stage, as they can offer advice on the installation, chemical cleaning, commissioning and maintenance of these valves and the system as a whole. Small changes, additions or alterations at design stage can make significant operational and maintenance savings in the long term.

So, what advantages do 'automated valves' offer to the commissioning of a system? A traditional proportional-balancing exercise on a fixed-flow system over a large circuit could mean revisiting and adjusting individual commissioning valves two or three times. The second and third times are the fine-tuning exercise,

as excess flow from around the circuit can change the flow characteristics within a leg that has already been proportionally balanced. On an 'automated circuit', with automated valves on multiple branches, there is no need for a second or third fine-tuning exercise after a branch has been balanced. On a balanced branch with an automated valve setup, the CFR, for example, would operate by limiting the maximum flow to this branch.

Alternatively, a DPCV would counteract excessive pressure fluctuations by maintaining a constant pressure in the branch, regardless of what happens in the rest of the circuit.

The real benefit to the commissioning of a system with automated valves comes after this initial balance and set-up phase, as such valves can save a great deal of time by eliminating the need for fine-tuning. Conversely, the commissioning engineer has to invest time in setting up the valve in the first instance and then perform a varying-flow proving exercise. This involves being able to demonstrate that, when different parts of the hydraulic circuit have been isolated, design flowrates in other parts of the circuit are maintained. This proves that the variable-flow strategy works across the entire system.

Nowadays, buildings can contain numerous automated valves, or combinations of different types of automated valve, installed in various parts of the same system. The

vital thing for commissioning engineers to understand, therefore, is how these valves are intended to interact and operate as a complete system, not simply how each operates individually. The clearest path to successfully commissioning and maintaining these systems is to make sure that knowledge of how each hydraulic system is intended to be chemically cleaned, operated and maintained is shared between designer, installer, commissioning engineer and future maintenance teams.

With designers striving to produce the most energy-efficient solution to heating and cooling needs, the complexity of variable-flow models is forever increasing. Automated valves form an integral part of how each of these intricate design models operates, so a specialist commissioning engineer should 'automatically' be selected at the earliest opportunity to help transform them into a fully functioning reality on site.

ACRONYMS EXPLAINED

- **CFR:** constant flow regulator
- **DPCV:** differential pressure control valves
- **PICV:** pressure independent control valves
- **ePICV:** electrically operated pressure independent control valve
- **ePIV:** electrically operated pressure independent valve

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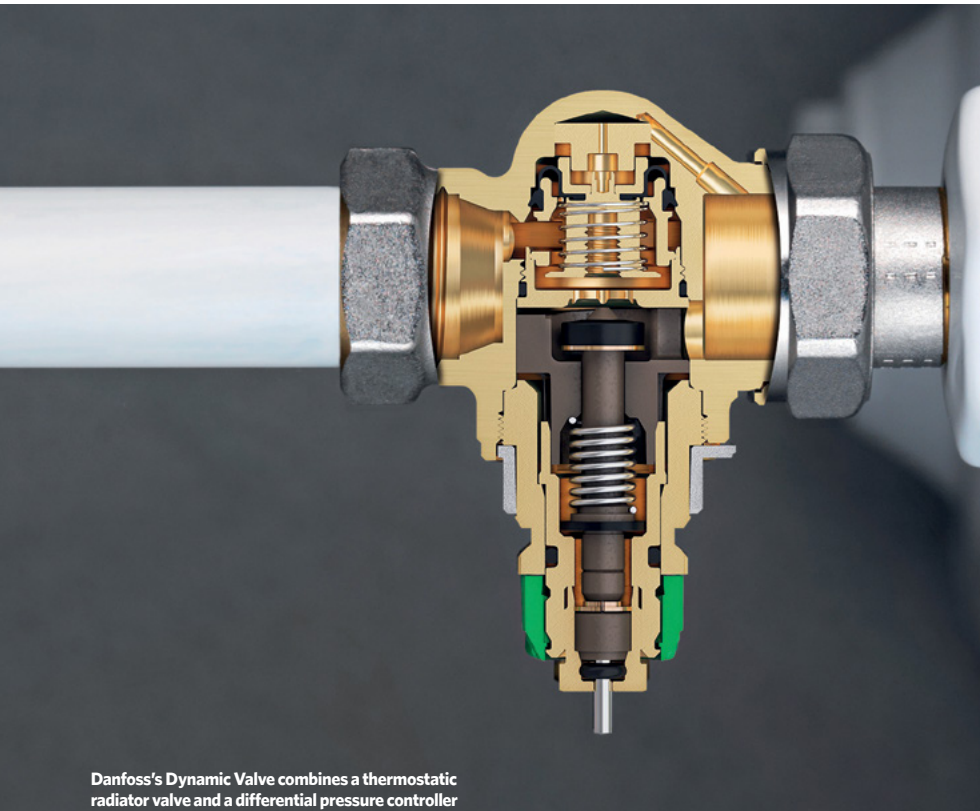
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BALANCING ACT

The growing range of PITRVs promises a simpler, more efficient and quicker way to balance heating systems than regular TRVs – as well as offering potential long-term cost savings. **Phil Lattimore** reports



Danfoss's Dynamic Valve combines a thermostatic radiator valve and a differential pressure controller

Pressure independent thermostatic radiator valves (PITRVs) started to appear on the market about 10 years ago, driven by a desire to hydraulically balance domestic heating systems more effectively and quickly. A growing number of manufacturers and suppliers have introduced PITRVs into the UK, including Drayton's auto-balancing TRVs, Danfoss's dynamic valves, Inatec's PITRVs, and Giacomini's DB-PITRVs. They are available in a range of specifications suitable for different applications of hydronic heating systems and types of radiator set-up.

PITRVs are the evolution of thermostatic radiator valves (TRVs), which were developed more than 80 years ago. As well as offering self-regulating temperature control in a heating system, PITRVs effectively incorporate the differential pressure controller of a pressure independent control valve (PICV) into the body of a TRV package.

In this configuration, PITRVs allow the thermostatic control valve to work more consistently as the conditions vary in the heating system, enabling the system to remain balanced as other valves modulate open and closed, and pressure fluctuates.

'Pressure independent valves for commercial systems have been around for some time, but it has taken a while for the technology to be adapted for TRVs,' explains Merlin Milner, product owner at domestic heating manufacturer and supplier Drayton. 'There is greater focus on boilers achieving the best possible coefficient of performance [CoP] by reducing the return temperature back to

the boiler for efficient flue gas condensing.'

By combining three key functions – flow control, temperature control and differential pressure regulation – PITRVs offer a number of advantages over regular TRVs. They are quicker and easier to set up than a standard TRV during system commissioning. As Milner notes: 'The engineer just needs to know the design heat output of the emitter [radiator or radiant panel] and the target flow temperature. They can then adjust the PITRV to the correct setting, safe in the knowledge that the required flowrate will be achieved, regardless of variations in pressure drop across different parts of the heating circuit.'

'In comparison, the traditional approach of trying to balance a system with a lockshield valve (LSV) is virtually impossible, as many are not designed for this.' Many LSVs have very poor valve authority, so they need to be almost completely closed before they make any significant change in the water flowrate. This makes system balancing particularly challenging as just a single turn on many hand-operated LSV can go from no flow to maximum flow.

Set up correctly, PITRVs can help maintain the design efficiency of the system, reducing energy use significantly compared with more traditional set-ups. They are suitable for a variety of heating applications and can be integrated into new or existing systems.

The need for balance

Typically, a boiler-based heating system will include a number of radiators in different rooms around the property, usually varying in size to accommodate the output requirements of each room, with different lengths of pipework feeding them from the flow and return to the boiler. That means variances

“Set up correctly, PITRVs can reduce energy use significantly compared with more traditional set-ups”

of flow for each radiator within the heating system. Radiators closest to the boiler tend to have less resistance to flow than ones further away, so balancing the system is intended to even this out. Balancing requires some restriction of the flow to the radiators through valves, whether a manual LSV or TRV.

For the heating system to run at optimum efficiency, most boiler manufacturers recommend that the differential temperature – the difference between the flow temperature of the water leaving the boiler and the return temperature of the water coming back – of 20K. Balancing the system aims to ensure that all the radiators on the heating system get sufficient hot water to deliver the required heat output, and that – as the heating water leaves the boiler and approaches any particular radiator, there is no greater or lesser resistance to the flow going through the radiator or carrying on to fulfil the heating requirements of radiators further downstream (or upstream).

In an unbalanced system, insufficient heating water will be delivered to some radiators – particularly those towards the end

of the circuit or on upper floors – so they will not produce the heat required. It is likely to mean the return flow temperature is higher, which can reduce, or even negate condensation in the boiler flue gas, greatly reducing efficiency. PITRVs can be pre-set to maintain a fixed flowrate into each radiator, regardless of changes to the pressure of the system – such as when operating under partial load conditions. Instead of setting a fixed aperture size, as with a LSV, they have an active element inside the differential pressure controller that adjusts automatically to maintain the constant pre-set flowrate. If the radiator output is known, the flowrate can be set by the installer with reference to the manufacturer's guidance. Flowrate settings are typically between 10 and 135 litres per hour, with a variety of maximum differential >>

CALCULATING FLOWRATE

The formula for flowrate is represented by:

The volume flowrate, $L \cdot s^{-1}$, required through a radiator = $\Phi / (c_p \times \Delta\theta)$ (assumes the density of water is $\approx 1000 \text{ kg} \cdot \text{m}^{-3}$) where Φ is the required radiator heat emission (kW), c_p is the specific heat capacity of water ($\text{kJ} \cdot \text{kg}^{-1} \cdot \text{K}^{-1}$), and $\Delta\theta$ (often shown as Δt) is the flow/return temperature difference (K).

c_p for water is approximately $4.2 \text{ kJ} \cdot \text{kg}^{-1} \cdot \text{K}^{-1}$, and the industry standard radiator $\Delta\theta$ is 20K, so this is typically simplified as radiator flow rate ($L \cdot s^{-1}$) = heat output (kW) / 84

The radiator heat output will be influenced by the flow temperature of the heating water entering the radiator, the water flowrate, and the resulting radiator mean water temperature. When the flowrate is set on a PITRV the required flowrate will be dependent on the actual flow temperature of the heating system and potentially not the manufacturer's standard system flow temperature/radiator heat output figures. The radiator manufacturer will be able to provide performance data at different water temperatures and desired room temperatures.

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Alison, Technical Co-ordinator

- » pressure options available to suit a range of system set-ups (from 60kPa up to 150kPa, depending on the manufacturer).

Standard practice

The time-saving benefits and efficacy of PITRVs are boosting demand for the products, says Milner. ‘Specifiers are appreciating shorter system servicing because the automatic balancing negates regular manual balancing,’ he adds.

PITRVs may not be appropriate for some types of heating system; Milner explains that systems with a small flow/return temperature difference – such as heat pump circuit that typically require 5K – are likely to require a valve to be selected with a higher Kv [flow coefficient] – heat pumps require a minimum flow to maintain good performance. However, some PITRVs are available with higher flow rates. (Kv is the flowrate of fluid (m³·h⁻¹) through the valve when the pressure drop across the valve is 1 bar (100kPa) – the strange units being so that it numerically matches the imperial Cv).

Milner notes the importance of correct set-up and maintenance to optimise PITRV-equipped heating systems. Before commissioning, the system should be cleaned and flushed of debris, and treated with corrosion inhibitor to ensure the PH levels are correct and to prevent corrosion. ‘The smaller flow apertures of PITRVs mean system cleanliness is more important,’ he adds. ‘While the valves usually have a commissioning position for filling and draining during set-up, special consideration is required for power flushing. ‘Power flushing must take place with the valves or valve inserts removed, or before fitting them. A special tool is available on some manufacturers’ valves to aid power flushing by temporarily removing the valve insert.’

Milner believes PITRVs will soon become a standard option for domestic



Danfoss Dynamic Valve fitted to a radiator

heating systems ‘when installers begin to understand that the extra cost of the valves is saved many times over by the ease of installation and time saved during commissioning’. Elimination of cold spots around properties and system noise will also reduce the level of call-backs for engineers.

Importantly, stricter rules on energy efficiency are likely to feed back into Building Regulations and encourage more energy efficient valve specification in future. **CU**



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For larger systems, or where the water company has allowed zonal protection to feed several outlets, our BTAB range an ideal choice. From 0.5 - 4 l/s, 1-10 bar single or dual units.

BTAB Fixed Speed: To serve more than one outlet, our BTAB Fixed speed units are capable. They boost the water pressure for elevated areas or where a high flow rate is required. An example of this would be a wash down.

BTAB Variable Speed: Third is a Variable Speed unit. We have a choice of seven with a 2.0 Lt/S output. The higher-flow units are suitable for supplying multiple outlets or applications where a greater flow rate is required. The cistern has a screened overflow and weir, making it suitable for unorthodox applications that require a 'hygienic type AB air gap' - for example, butchery or vegetable preparation.

BTAB Duty Standby/Assist: Duty Standby units have two pumps that alternate daily

to avoid stagnation. One pump runs at one time. Our Duty Assist units allow the second pump to switch on automatically when required, thus doubling the output. Both our Duty Standby and Duty Assist units have variable speed pumps and are set to provide constant pressure.

Hot Water and Fluid Category 5: Hot water becomes a problem for Fluid Category 5, as any stored water will gradually cool in the storage tank and will need to be discharged before any water comes through. There is also a risk with this of promoting bacterial growth.

The solution is to have dedicated water heaters for point-of-use protection or specific products that store hot water in a unique way. The hot-water units we offer are: **The BTHW Ablution unit**, which delivers hot water at the required safe temperature with the highest backflow protection. The primary application is for bidets or ablution hoses adjacent to a WC or bidet. We also have a **Thermostatic shower**, model CSABATLF. This meets BEAB care mark requirements as being safe for use by the elderly, young and sick. The integral backflow protection prevents contamination should the hose become submerged.

All our units are either WRAS or KIWA approved, meaning they meet the requirements of Regulation 4 as stipulated in the Water Supply (Water Fittings) Regulations 1999.

Want to find out more? We cover information about water regulation compliance such as the above at our free Arrow Academy training days. Get in touch today.

■ If you would like to book in for one of our seminars or find out more information, please email marketing@arrowvalves.co.uk or phone our office on 01442 823 123.



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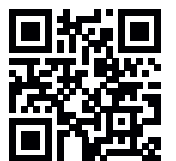
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Hospital indoor air quality

This module explores the various elements that come together to determine overall indoor air quality in healthcare facilities

Indoor air quality (IAQ) in hospitals will significantly impact occupant health and wellbeing. Aside from the more recent impacts of the spread and containment of SARS-CoV-2 in healthcare facilities, there are many other airborne pollutants that, together with the air temperature and humidity, will determine hospital IAQ. This CPD will explore some of the key variables that combine to provide the 'all-inclusive' IAQ.

In England alone, as well as providing a safe environment for the 35 million-plus patient bed-days, hospital air is shared by approximately one million health workers. As indicated in Figure 1 (overleaf), the sources that contribute contaminants to the indoor air are numerous and often interrelated – and these will affect the quality of the environment for patients, staff, and visitors.

In spaces that have at least some ventilation, CO₂ is unlikely to reach levels that cause any health concerns. A CO₂ limit is often set in the design specification as a proxy for the sufficiency of ventilation. However, the recent review² by Fonseca et al notes that it can be challenging to develop ventilation strategies to address the different simultaneously-occurring indoor air pollutants with the formation of secondary pollutants from the reaction between the primary pollutants, as well as with other chemicals or those introduced by ventilation.

In healthcare settings there are many microorganisms – bacteria, viruses, parasites and fungi – that are potentially airborne and can lead to 'nosocomial infections' – otherwise known as healthcare associated (or acquired) infections (HAI). A study by Guest et al,³ based on pre-Covid 2016-17 data, estimated that there were 834,000 cases of HAIs annually in the NHS in England. The proportion of infections that can be directly associated with the IAQ and the airborne load is unknown – and likely impossible to establish. The 2020 review paper⁴ by Hiwar et al notes that IAQ parameters – such as temperature, relative humidity, CO₂ level, particle mass concentration, and particle size – are, in any case, important for the comfort, health and wellbeing of those in hospitals, and will likely impact the 'bioburden' in the environment. This relates to the whole hospital population – Fonseca et al noted² that headaches, fatigue, dryness and irritation of the eyes and skin are common complaints of healthcare professionals, which are often associated with poor IAQ. Air temperature and particularly humidity are linked with the survival of microorganisms, with many bacteria and fungi favouring more humid

conditions and some evidence of virus survival increasing at lower humidities (typically below 40% relative humidity). Low relative humidity, as is typically encountered in heated healthcare premises in winter, also keeps large droplets suspended in air for extended periods of time.⁵ In this context, the term 'aerosol' is widely applied and is variously defined but commonly understood to have a characteristic dimension smaller than 5µm. As explored by Randall et al,⁶ there are various definitions of 'aerosols', with most contemporary sources relating the 5µm threshold to particles that remain suspended in the air for longer periods. However, he explains that this distinction is erroneous, and is actually based on what reaches deepest in the lungs. This has likely confused the understanding of the droplet and aerosol transmission mechanisms as defined by a 5µm threshold.

As well as the much-investigated SARS-CoV-2, there are many other airborne microorganisms that remain viable in the air in an 'aerosol' state.⁷ The stability of viruses in aerosols is affected by relative humidity through several physical mechanisms, but the role of these mechanisms in virus inactivation is not fully understood. Hiwar's review found conflicting results linking IAQ parameters and microorganism prevalence and survival, with any relationship being dependent on the specific microbe.

Typically, the pollutants in the outdoor air that impact occupant wellbeing are the



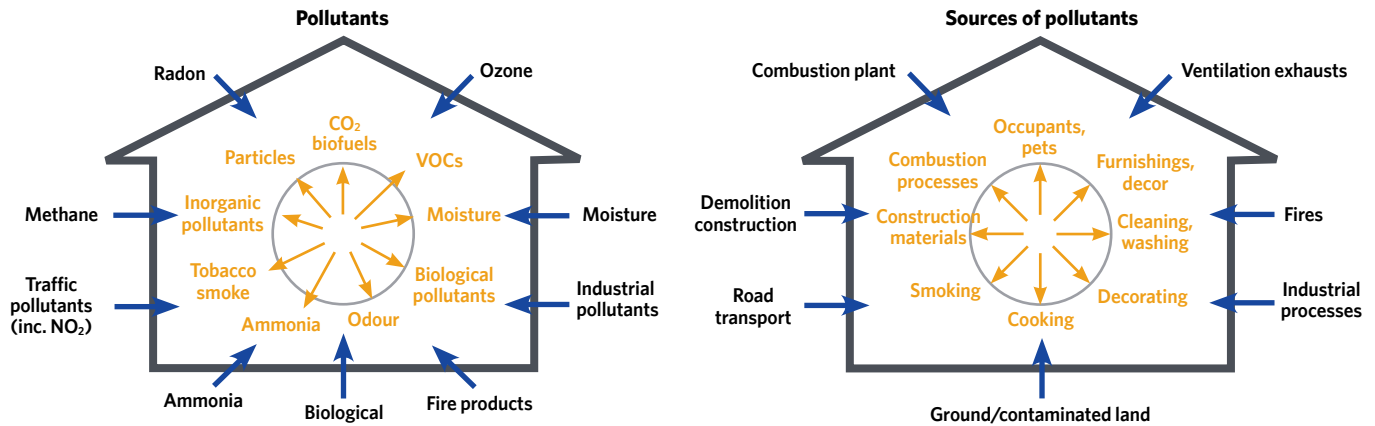


Figure 1: A summary of the external (blue) and internal (orange) pollutants and sources typically encountered in built environments
(Source: UK Chief Medical Officer's Annual Report 2022 – Air pollution¹)

» nitrogen oxides, ozone, sulphur dioxide, and particulates. As noted by the Federation of European Heating, Ventilation and Air Conditioning Associations (REHVA),⁸ particle size distribution may be expressed in different ways, according to their number, surface, and volume. The UK Air Quality Expert Group (AQEG)⁹ indicates that PM₁₀ corresponds to the ‘thoracic convention’ – the size fraction of inhaled particles that penetrate beyond the larynx, while PM_{2.5} corresponds to the ‘high risk respirable convention’ – the size fraction that penetrate to the unciliated airways (essentially to the gas-exchange surfaces) and is of particular concern for high-risk groups (children, the elderly and infirm). Most particles in typical urban air are ultrafine particles (UFP), with at least one dimension smaller than 0.1µm – these are known as PM_{0.1}. However, most of the mass of airborne particulate matter is associated with particles larger than 0.1µm – this consideration is particularly relevant when evaluating the collection efficacy of air-cleaning devices that is typically undertaken by measuring either particle count or particle mass. UFP penetrate deep into the respiratory system, allowing interactions with lung tissue and potentially passing into the blood stream. This, together with the hypothesis that toxicity of particulate matter is governed by the surface area of the particles rather than their mass, has led to suggestions that UFP may be particularly harmful to health.⁹ As noted in the 2020 report¹⁰ by the Royal College of Physicians 2020, ventilation may also lead to the introduction of high ozone (O₃) concentrations. O₃ in the troposphere (ground level) is noted as a toxic air pollutant produced by photochemical reactions from nitrogen oxides and volatile organic compounds (VOCs).¹¹ Ozone is very reactive, and can produce secondary pollutants from chemical reactions, including with d-limonene (used in air fresheners, for example). With enough ventilation, the conditions for chemical reactions are disrupted, and any secondary

pollutants created would be quickly flushed out of the building. However, short term, high levels of O₃ are associated with coughing, asthma attacks, and acute respiratory infections and failure, particularly in those with lung diseases.¹²

As recently noted by the chief medical officer,¹ with the decrease in outdoor air pollution – as observed in some UK environments (as illustrated in Figure 2) – the significant focus should be on employing suitable ventilation strategies to dilute and remove those contaminants that are emitted from within healthcare premises. Occupant activities within hospital settings – such as talking, sneezing, coughing, and movement – contribute to the release of airborne biological contaminants, including particulate matter, chemical pollutants, and bioaerosols. The review¹³ by Ibrahim et al noted that the use of medical equipment, such as nebulisers and disinfection devices, can introduce pollutants into the indoor environment. Likewise, polymer materials, electronic devices, and medical supplies made from specific materials can emit harmful compounds, impacting IAQ. For instance, plastic products may release phthalates, and electronic devices used for administrative purposes may emit VOCs such as benzene, toluene, ethylbenzene, and xylene.

The Covid-19 pandemic demonstrated – and the UKAQEG⁹ confirmed – that ventilation is not just about bringing in fresh air. Inappropriate ventilation can spread airborne infections from one bed to another and from one ward to another.

Therefore, the role of well designed, maintained and operated ventilation is fundamental to reducing unavoidable indoor air pollutants and preventing pathogen transmission, and also minimising the introduction of externally sourced pollutants. It can often be designed to mitigate some of the overheating challenges from climate change, while holistically considering energy consumption and consequent carbon emissions. And while appropriate mechanical ventilation may effectively curb ‘bioaerosol levels’, research¹⁴ reveals that persistent contamination of hospital indoor air by fungi can still cause incidences of nosocomial opportunistic

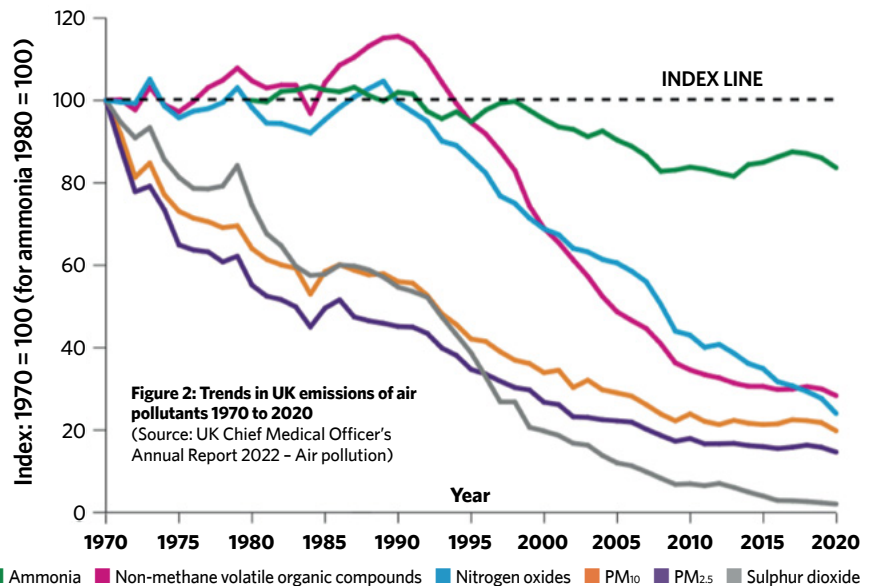


Figure 2: Trends in UK emissions of air pollutants 1970 to 2020
(Source: UK Chief Medical Officer's Annual Report 2022 – Air pollution)

mould infections, which can cause localised infections, fatal diseases, allergic responses, and be life-threatening in immunocompromised patients.

The specific focus on IAQ can quickly change in healthcare premises, as witnessed during the Covid pandemic – which sparked a surge in studies examining the efficacy of air quality control measures. Multiple published works have attempted to categorise methods, systems and practices that are employed to eliminate, or at least control, virus size particles in the occupied spaces. This would typically encompass virus sizes of approximately 0.1µm and a (coughed) respiratory droplet size of 1µm and above. The continued research will undoubtedly inform emerging challenges in air quality control. For example, the impact of ultrafine particles that can penetrate deep into lung passageways and enter the bloodstream – is still being uncovered, but there is already a solid body of evidence¹⁵ that links short periods of exposure to ultrafine particles to significant adverse health effects. Emerging fungal pathogens and infections pose increasing threats to public health, and most at risk are those with a compromised immune system. A recent study¹⁶ notes that the vast majority of the world’s potentially pathogenic fungi do not do well at body temperatures. However, it has found that raised temperatures, as may be experienced with climate change, cause the fungus *Cryptococcus deneoformans* – associated¹⁷ with a quarter of a million cases of meningitis each year – to accelerate in its ability to adapt, and so potentially present an increasing pathogenic challenge for IAQ control. This is undoubtedly only one of many pollutants that will be exacerbated by climate change.

The array of available ventilation systems, as generically illustrated in Figure 3, whether mechanical or natural, play an integral role in maintaining appropriate IAQ. In the review by Ibrahim,¹³ mechanical ventilation emerges as the more potent means of reducing total bioaerosol levels, surpassing the effectiveness of natural ventilation. Also, centralised ventilation systems exhibit enhanced control over chemical and particle contaminants compared with non-centralised counterparts. A key UK reference that guides the ventilation (and IAQ) requirements is the freely downloadable NHS England publication *Health Technical Memorandum 3 – Specialised ventilation for healthcare premises* (HTM03). This two-part extensive and detailed HTM provides guidance in terms of performance specifications and methods to manage and maintain appropriate conditions for the health and welfare of occupants, and for processes such as centralised food preparation facilities. Its core principle is that the default method of ventilation should, as far as possible, be natural ventilation followed by mixed mode (natural with mechanical ventilation), with mechanical ventilation being the last option. It notes that odour control is likely to be the dominant reason for providing ventilation where, in the absence of other guidance, 10L·s⁻¹ per person should be taken as the minimum ventilation requirement. In clinical areas, mechanical ventilation systems would normally provide ‘full fresh air’, and in other areas typically a minimum 20% outdoor air.

HTM03 notes that filtration will be required to remove airborne particulate contamination and, if necessary, odours. In treatment and support areas, the

overriding requirement may be for airborne infection control, hazard containment, the stability of specialist equipment, or relate to a specific department’s function. The standard of filtration will depend on the activities within the occupied spaces and, except for special areas, the filtration is only required to maintain hygienic conditions for the health and welfare of occupants and processes; protect finishes, fabrics and furnishings; and to protect the supply air system. HTM03 concurs that in normal situations viable particles will most likely originate from the occupants of a space and not from the incoming air, so advises a modest filtration requirement for general areas, with more stringent requirements for more critical areas or when outdoor air conditions are particularly polluted. Efficiency or high-efficiency (EPA or HEPA) levels of filtration are only normally required in ultra-clean systems and designated ‘clean rooms’.

Noting that controlling humidity is expensive, the HTM recommends that room air humidity should normally be kept below 70% in order to minimise risks associated with condensation and mould growth. There is no lower limit in typically unoccupied spaces, although some equipment may require closer control.

Although there are basic IAQ requirements that must be met for comfort and health, the demands in healthcare settings can change quickly as a result of unexpected events such as pandemics; changes in transportation, industrial and commercial activities; and the impacts of climate change. It is important for healthcare designers and operators to understand the principles and practices of IAQ control for their specific applications. This will ensure that IAQ systems are properly maintained, and aid in quick and effective developments to meet future challenges.

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■ Turn to page 64 for references.

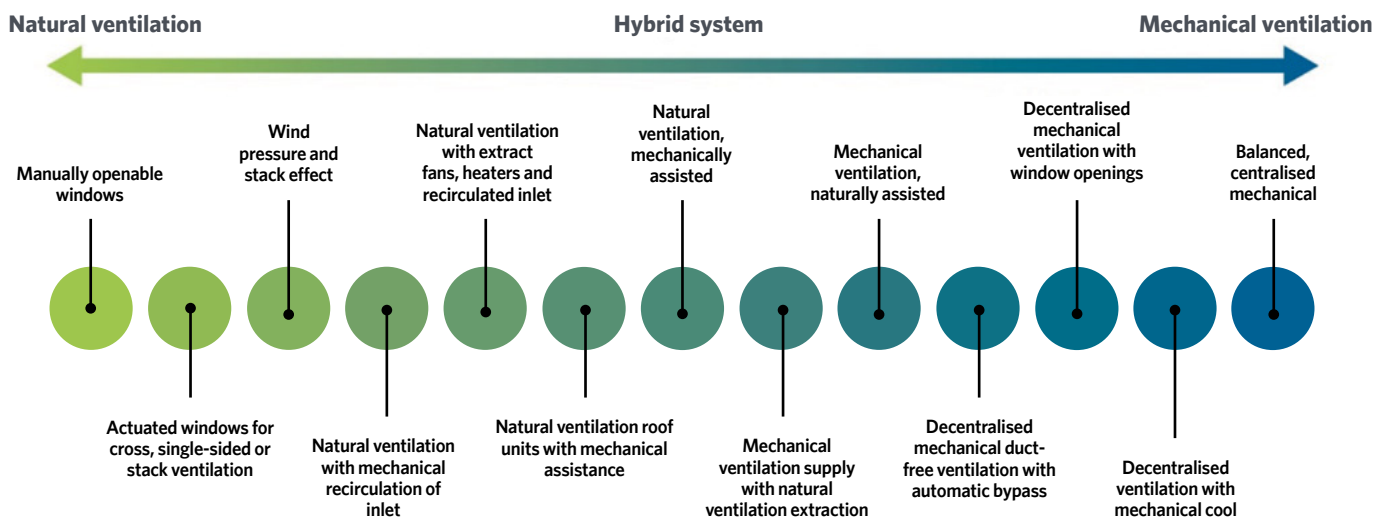


Figure 3: Types of ventilation system (Source: BB101, Building Bulletin 101 Guidelines on ventilation, thermal comfort and indoor air quality in schools Version 1 2018).



Module 223

October 2023

» 1. Which of these was considered an unlikely health hazard in the article?

- A Bacteria
- B CO₂
- C Fungi
- D Parasites
- E Viruses

2. How many HAIs are likely to be due to poor IAQ in UK healthcare premises?

- A One million
- B 20% of total HAIs
- C More than 35 million
- D 834,000
- E Nobody knows

3. What is the most likely actual reason that the maximum characteristic dimension of 5µm is often considered when defining an 'aerosol'?

- A It corresponds to the 'thoracic convention'
- B It is the droplet size that is unaffected longest by high humidity
- C It is the size under which particles stay suspended in the air
- D It reflects the size that reaches deepest in the lungs
- E It represents the typical maximum dimension rejected in a cough

4. In the period 1970-2020, which of these has shown the largest decline in emissions into the outdoor air, according to the UK chief medical officer?

- A Nitrogen oxides
- B Non-methane volatile organic compounds
- C PM10
- D PM2.5
- E Sulphur dioxide

5. What is the minimum outdoor (fresh) air requirement in non-clinical areas as recommended by HTM03?

- A 5%
- B 10%
- C 20%
- D 50%
- E 100% (full 'fresh air')

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Considerations for low flow temperature heating

Last June, changes to England's Building Regulations came into force to help the UK meet its net zero carbon emissions target by 2050.

The regulations now stipulate that new and replacement wet space heating systems in domestic and non-domestic buildings must be designed with a maximum flow temperature requirement of 55°C or lower. When a heat pump is installed, they state a flow temperature of 45°C should be used. This is a step in the right direction, but does not go far enough. Heat pumps are much more efficient at lower flow temperatures. At a flow temperature of 45°C the coefficient of performance (COP) could typically be 3.7; at 35°C, the COP could be as high as 5.0. This 10°C drop in design flow temperature increases heat pump efficiency by a massive 35%.

Choose wisely

Selecting the right emitter that works most effectively at these lower temperatures is crucial. Traditional steel panel radiators have been the go-to emitter for many years. At low flow temperatures however, their surface area needs to be much larger, resulting in overly

large radiators that can be unsightly and take up precious wall and living space.

Underfloor heating can be seen as an option, but its high mass and high water content mean it's slow to react to temperature demand.

The engineer's choice

Jaga's heat pump radiators have been designed specifically for engineers, to help them maximise renewable technology efficiency. They are smaller, lighter, faster and much more energy efficient thanks to their low water content heat exchanger (90% less than steel panel radiators), and unique dynamic boost hybrid (DBH) technology.

DBH technology consists of a set of low noise thermal activators that sit directly on top of the low water content heat exchanger.

There are three speed options, the maximum speed boosting output by up to 300%. The push-button control panel is mounted on the discharge grille and can be configured to suit system design conditions. The default position is temperature control (TPT); alternatives are auto-changeover (ACO) and building management system (BMS).

Jaga's cool touch and LST wall-mounted and freestanding heat pump radiators can all facilitate DBH technology.

Radiators that cool too

As well as powerful heating, Jaga's hybrid radiators can provide light cooling (non-condensing) with any heat pump that can supply cooled water – a completely unique function, designed by Jaga in response to increasing demand for comfort cooling in our warmer summers.

Running with a flow temperature of 16°C means there's no condensate to worry about, and it's much more environmentally friendly than air conditioning.

CPD

Three CIBSE-accredited continuing professional development (CPD) seminars for HVAC professionals are available from Jaga.

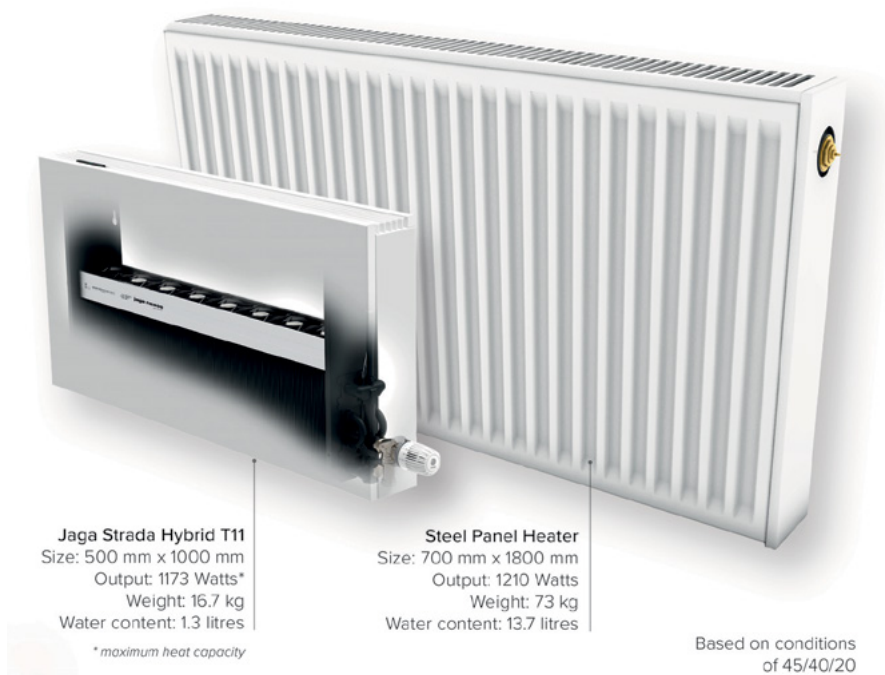
They can be presented to a group in-person, at your premises, or virtually, via Teams. All attendees will receive a certificate of course completion, which counts towards their annual CPD obligations.

- 1 Emitters: considerations for low flow temperature heating
- 2 Design and specification of trench climate convectors
- 3 Ventilation in schools

Design support

Jaga provides full design support for engineers requiring assistance with emitter selection, sizing and control strategy. Our technical engineers are available across the UK to support from the initial design concept through to final commissioning and handover. BIM files are available for nearly all product ranges.

■ Get in touch - to find out more about heat pump radiators, visit jaga.co.uk



Jaga Strada Hybrid T11
Size: 500 mm x 1000 mm
Output: 1173 Watts*
Weight: 16.7 kg
Water content: 1.3 litres

* maximum heat capacity

Steel Panel Heater
Size: 700 mm x 1800 mm
Output: 1210 Watts
Weight: 73 kg
Water content: 13.7 litres

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CLIMATE DESIGNERS

Product of the month

Hospital lowers carbon by switching to Rinnai's H1 solution

Continuous heaters and boilers offer practical, economic decarbonisation through technological innovation

In a significant move towards enhancing sustainability and efficiency, one of the largest hospitals in the North West has transitioned its hot water supply system to highly efficient continuous flow water heaters.

The hospital has adopted 10 Rinnai N Series 1600e units, designed to deliver almost 10,000 litres of temperature-controlled hot water on demand, 24/7. These water heaters, certified for 20% hydrogen blends (I2HY20), offer a reliable and environmentally conscious solution for the hospital's hot water needs.

The decision to switch to hydrogen blend-ready continuous flow water heaters was driven by the hospital's commitment to reduce its carbon footprint and ensure a dependable hot water supply. The Rinnai N Series units, designed to accommodate hydrogen blends and BioLPG, now also come with a 12-year warranty, ensuring long-term reliability.

Rinnai's H1 continuous water heaters and boilers offer practical and economic decarbonisation, delivered through technological innovation in hydrogen and renewable liquid gas-ready technology. The H1 option is centred on hydrogen, as it is anticipated that clean hydrogen fuels will become internationally energy market relevant in the future; Rinnai water heaters are hydrogen 20% blends-ready and include the world's first 100% hydrogen-ready hot water heating technology.

The hospital's new water heating system was designed by Rinnai's in-house Technical Services team in collaboration with leading building services consultants, who emphasised the importance of considering carbon, capital expenditure, and operational expenditure.

When replacing an existing hot water system, it's common to go for a 'like for like' option. However, assessing the site's usage and requirements during a replacement can be an opportune time to reduce carbon emissions, improve efficiency, and future-proof the system for the next decade or more. Pete Seddon, of Rinnai, highlights the advantages of continuous flow solutions in this context. 'Continuous flow, instant delivery of hot water provides constant flows of temperature-specific and controlled end-product, with units that are hydrogen blends and BioLPG ready. They are also just a one-man lift - no need for lifting gear.'



Savings calculated using continuous flow hot water heating

15-20% of the running cost
30% of the upfront cost
15-20% in carbon footprint
60% in space
80% in weight

He explains that if the appliance being replaced is non-condensing and the new appliance is condensing, the flue would require changing, as well as the provision to discharge condensate. Plantrooms are very rarely designed to remove equipment, and this requirement would have a major impact - and it takes so much time. 'The whole system would have to be completely shut down to allow such major works to take place and sites, especially healthcare ones, simply cannot allow this to happen,' Seddon adds.

Moreover, cascading Rinnai appliances allows for dynamic energy regulation to match fluctuating hot water demand, optimising energy usage and creating built-in redundancy. In the event of one unit needing maintenance or repair, the system can continue to provide hot water.

A recent CPD, titled 'Carbon and economic benefits of zero storage in hot water systems', compares the operational, economic, and ecological performance of Rinnai N series

models with traditional storage water systems. The results highlight significant savings in operational costs, fuel consumption, capital costs, and carbon footprint with Rinnai's continuous flow water heaters.

These water heaters are not only efficient, but also space-saving, making them ideal for plantrooms with limited space. The savings are substantial, with reduced running costs, lower upfront expenses, and a smaller carbon footprint, alongside a reduction in the space and weight required.

Rinnai's N Series range of condensing continuous flow water heaters is officially certified for I2HY20 hydrogen blends, positioning them as a future-ready solution. These advancements represent a significant step towards creating more sustainable and efficient hot water systems, aligning with the hospital's commitment to reducing its environmental impact while ensuring a reliable hot water supply.

The adoption of these innovative continuous flow water heaters showcases the hospital's dedication to sustainable practices, setting an example for other healthcare facilities to follow. Solutions such as Rinnai's continuous flow water heaters play a crucial role in achieving energy efficiency and reducing carbon emissions.

■ **For more information**
visit www.rinnai-uk.co.uk

Cats Protection centre in Glasgow receives energy efficient lighting >

Luceco has played a crucial role in enhancing the energy efficiency of the Cats Protection Glasgow Adoption Centre. Since its foundation in 1927, UK charity Cats Protection has helped more than 1.5 million cats find new homes through its extensive network of volunteer-run branches and 34 centres.

In collaboration with principal contractor Scotwood Interiors, Electrical Solutions (Scotland) completed a comprehensive lighting installation at the Glasgow centre. The project included the deployment of Luceco's modular LuxPanels, surface-mounted Sierra bulkheads, linear IP65-rated Climate fittings, and recessed Carbon and Platinum Mini downlighters featuring IP65 diffusers.

The installation incorporated advanced features, such as recessed ceiling day and night PIR motion sensors, presence/absence dimming detection, and DALI PIRs for scene setting, all of which contribute significantly to the building's energy efficiency and occupant comfort.

By integrating these lighting controls, the adoption centre not only achieves considerable energy cost savings, but also takes a significant step in reducing its carbon footprint.

■ Visit www.luceco.com



Nuair expands Xboxer heat recovery range with versatile Xboxer Universal unit

Nuair has expanded its Xboxer heat recovery range with the UNI-X unit, now rebranded as Xboxer Universal. Originally designed for student accommodation, this ventilation solution has found wider applications in schools, hospitals, offices, care homes, and apartments.

The Xboxer Universal retains its high efficiency, low SEPs, and ultra-low noise levels. It comes in three models with adjustable three-speed controls and various spigot options, offering flexibility for different spaces.

Nuair's in-line carbon filters and thermal ducting can enhance the range's performance.

■ Email enquiries@nuair.co.uk or visit www.nuair.co.uk/best-practice/xboxer-family



EnviroVent launches SAP 10-compliant ventilation units for enhanced building efficiency

EnviroVent has introduced two new SAP 10-compliant decentralised mechanical extract ventilation (dMEV) units. The ECO dMEV+ range includes ECO dMEV+ and ECO dMEV+LC, meeting the latest Building Regulations requirements.

These units offer housebuilders and developers constant volume, and continuously running fans with an intermittent control option for the LC version. They feature ultra-quiet operation, low-watt DC motors, and a stylish appearance with interchangeable front-panel trims.

The units are easy to install and maintain, ensuring compliance and energy efficiency.

■ Call 0345 2727 810 or visit www.envirovent.com

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KEY FEATURES

- Valve with failsafe actuator
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Enhanced fire priority demand valve optimises system performance

Aquatech Pressmain has introduced the fire priority demand valve, engineered to close upon sprinkler activation. It isolates the flow of water to the domestic riser, enabling the booster set to pump all the available water to the sprinkler riser, ensuring optimal flow. Equipped with status alerts, alarm messages and an auto-shutdown feature at low tank water levels, the valve boasts a failsafe actuator and pipework water cooling. Connect with the company's area sales managers to explore this advanced solution.

■ Visit aquatechpressmain.co.uk

ELCO heat pump installed at high street bank >

Lloyds Bank employees in Chatham, Kent, now enjoy sustainable heating thanks to the installation of a 48kW Aerotop M heat pump from ELCO Heating Solutions. Replacing old, inefficient gas boilers, this heat pump ensures zero NOx emissions and efficient heating throughout the three-storey office building.

Situated on the building's roof, the heat pump provides space heating to the second and third floors, stairwells and washrooms. As part of Lloyds Banking Group's commitment to carbon neutrality by 2030, this upgrade aligns with the company's efforts to remove inefficient systems from their property portfolio.

Mitie, the M&E consultants for the project, specified the Aerotop heat pump, praising its performance and efficiency. The unit seamlessly integrated with the existing heating system and the building's BMS for centralised control.

ELCO's Aerotop M reversible heat pumps, with outputs ranging from 24kW to 48kW, offer flexible solutions. Multiple units can be managed using a cascade controller, and 'L' models provide outputs from 54kW to 88kW.

■ Visit www.elco.co.uk



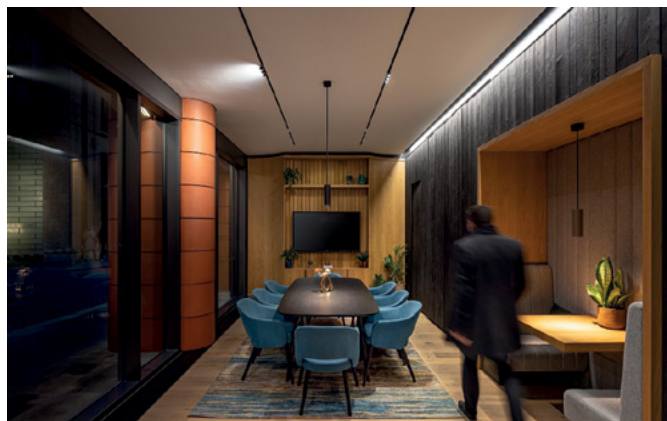
Smart, high-efficiency lighting refurbishment for London office ▼

Outdated fluorescent tubes have been replaced with state-of-the-art LEDs at Fetter Yard, a highly attractive office building in Holborn, London. The installation of Zumtobel's LED solution aims to provide the office with efficient and human-centred lighting.

The building is undergoing a major refurbishment, led by Orms Designers + Architects, with the aim of creating a fresh, contemporary look and update the building infrastructure.

Zumtobel's Slotlight light line and multifunctional Supersystem LED lighting tool now provide aesthetically pleasing lighting and brightness to the rooms, accommodating any future spatial solution and desk arrangement.

■ Visit z.lighting/en/zumtobel/inspirations/fetter-yard



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▶ Jung Pumpen takes pride in setting benchmarks for wastewater solutions

Jung Pumpen has striven to become a benchmark for wastewater and sewage pumping solutions. Years of successful installations mean that public health engineers recognise it as a brand that they can rely on completely.

Selecting the right pumping system is key for every application and the dedicated Jung Pumpen team at Pump Technology Ltd, based in Berkshire, is always on hand to assist customers with advice and detailed specifications.

Pump Technology Ltd is authorised by Jung Pumpen for the specification, supply and support of its products.

■ Visit www.jung-pumps.co.uk

Ideal Heating launches CIBSE-accredited heat networks and HIU CPD ▼

Ideal Heating - Commercial Products has added a new CIBSE-accredited CPD to its offering, focusing on heat networks and heat interface units (HIUs). This beginner-friendly course provides insights into the advantages of heat networks and the critical role HIUs play in ensuring end-user comfort and network efficiency.

It covers HIU basics, operational principles, components, and common functions. Installers can also learn about selecting HIUs for optimal network performance. The CPD can be done online or in-person at Ideal Heating's training centres in Hull and Leeds.

■ Email enquiries@expert-academy.co.uk or visit idealcommercialboilers.com/cpd-courses



Condair launches new commercial dehumidifiers podcast ▼

In collaboration with BusinessNet Explorer, Condair has launched a new podcast on the selection and sizing of commercial dehumidifiers.

Dave Marshall-George, sales director, provides expert guidance on key factors consultants and installers should consider in dehumidifier projects. He highlights the critical role of proper planning in achieving desired humidity levels, temperature control and energy efficiency.

The podcast covers technology selection, sizing, and installation considerations.

It is available on major podcast platforms, including SoundCloud, Spotify and Google Podcasts, under 'Condair'.

■ Visit www.condair.co.uk/podcast





Public health engineers play a vital part in the building design process



Mike Carter

Publicising the best of SoPHE

The Society of Public Health Engineers' new e-newsletter is raising the profile of the industry and giving key insights into an increasingly vital sector

The Society of Public Health Engineers' (SoPHE) e-newsletter is a quarterly publication offering insights into current trends in public health engineering. Following its recent relaunch, Mike Carter FSoPHE FCIBSE, director at Arup, discussed the newsletter's content, contributors and wide-reaching impact, and the pivotal role of public health engineers in addressing climate and water challenges.

When was the e-newsletter relaunched?

On 31 January 2023, and work is under way on the fourth issue, which will be published in winter. Amanda Stanley FCIPHE MSOPHE edits the newsletter, working with the SoPHE steering committee, contributors from the wider membership, and supporting industrial associates.

It is currently circulated to a mailing list of 7,326, including around 800 SoPHE members, as well as being shared on social media and stored on our website, so its circulation reaches further than just the initial email.

Why is it important that the rest of the industry is aware of the role of public health engineering?

With constantly expanding and emerging issues around climate health, the impact on water as a natural resource is becoming ever more critical. Public health engineers play a key role in designing water supply, reuse and disposal systems for the built environment, with the overall aim of reducing water use while also limiting drainage discharge and disposal.

These engineers play a vital part in the building design process, ensuring that the use of water in the building services industry is optimised so that this natural resource is not depleted further.

What have been the biggest talking points so far this year?

There has been plenty of discussion around the SoPHE Technical Conference, which took place in March, focusing on fire systems design. The subject covered legislative guidance and updates on fire-suppression equipment, shedding light on many critical aspects of fire safety.

The summer 2023 issue looked at sustainability, as well as high-rise drainage ventilation design, a current focus of the SoPHE Technical Committee.

What is the purpose of the annual SoPHE Plumbing Competition?

It brings together the emerging talent within the industry, from design and contracting, and ensures that skills-based crafts are not lost. It also serves to make sure our future design engineers understand the complexities of site installation requirements and techniques.

The competition bridges the gap in students' learning from domestic to commercial installations. SoPHE's young engineers will compete with college students in plumbing problem solving, hand skills, and practical fault finding of plumbing installations.

The SoPHE Plumbing Centre of Excellence has gone from strength to strength this year. It has been able to provide a wealth of in-person and virtual CPD sessions, including, for the first time, four simultaneous Plumbing Skills Competition's across different college campuses in London.

What other events can we look forward to in 2023?

Our final event of the year is the SoPHE London Dinner on 3 November. There are plans for a further SoPHE Technical Conference in 2024; probably focused on water supply, disposal systems, and re-use. To finish off a busy year, the SoPHE Young Engineers Network has also arranged for two site visits to the Thames Tideway 'super sewer', and will be welcoming new public health engineering graduates to an event in London.

● To learn more about the SoPHE visit: bit.ly/SoPHE

EVENTS AND TRAINING



NATIONAL EVENTS AND CONFERENCES

CIBSE YEN Careers Fair 12 October, International Students House, London

The Careers Fair brings together students looking for their first opportunity and employers that can nurture their talents. Students, apprentices and graduates will be able to meet with organisations and prospective employers, as well as attend CV workshops and sessions delivered by CIBSE and YEN members. bit.ly/CareersFair23

CIBSE Young Engineers Awards 12 October, Royal College of Physicians, London

The awards recognise the innovative thinking, hard work and skills of apprentices and students who are entering and new to the industry, and showcase those employers who are committed to developing and encouraging young talent. www.cibse.org/yea



Façade 2023 Design and Engineering Awards 8 November, London Hilton, Park Lane

The awards recognise and reward excellence and achievements in façade engineering, raising the profile of, and drawing attention to, the importance of this discipline. bit.ly/FEA23

CIBSE Build2Perform Live 5-6 December, London ExCel

Build2Perform Live is the meeting place for forward-thinking industry professionals, visionary speakers, leading exhibitors, and young talent. It is the must-attend event in the building services sector. www.build2perform.co.uk

CIBSE REGIONS AND GROUP EVENTS

Check the web for information on regions and groups meetings, webinars and podcasts: www.cibse.org/events

SLL and North West: Protecting our dark skies

5 October, Manchester

With presentations from Andrew Bissell, partner, Ridge and Partners, Dan Oakley, director, Darkscape Consulting, and Jack Ellerby, dark skies officer, Cumbria.

SLL: Light Night Leeds 12 October, Leeds

The façade of Leeds Minster is being illuminated by designs created by Leeds primary and high school students, and brought to life by the Society of Light and Lighting (SLL).

SLL: Ready Steady Light 17 October, Sidcup

The annual competition, in partnership with Rose Bruford College, with teams competing to create an exterior light installation with a limited range of kit and in only 180 minutes.

West Midlands: Carbon steel tubes – advanced 24 October, online

With speaker Dr Chris Owen, Tata Steel UK.

SLL:HCNW: Webinar: Diffuse convergence 25 October

With Guinter Parschalk.

ANZ: CIBSE ANZ Young Engineers Awards 26 October, Melbourne

The winners of the ANZ Young Engineers Awards will be announced.

CIBSE Fellows Masterclass 1 November, London

With speaker Jeremy Myerson, professor emeritus at the Royal College of Art, director of the Worktech Academy, and a visiting professorial fellow at Oxford University's Institute of Population Ageing.

West Midlands: Reflection on the regulation – BRAD O 14 November, online

This roundtable discussion brings together experts in the assessment of overheating, plus perspectives from a ventilation/cooling supplier and a lead designer for a property developer. With James Healey, Susie Diamond and Sam Potter.

MEMBERSHIP WEBINARS

CIBSE Membership hosts free two-part webinar series to support members with applications for the Associate and Member grades and registration with the Engineering Council at Incorporated Engineer and Chartered Engineer level. Check the website for dates and to register: bit.ly/CJMar23memweb



TRAINING COURSES

CIBSE runs in-person and live online training. Corporate delivery is also available in-house face to face, or remotely online. See www.cibse.org/training

Mechanical services explained 10-12 October, remote 14-16 November, London

ISO 50001:2018 Energy management system 10-11 October, London 2-3 November, remote

Standby diesel generator 12 October, remote

Earthing and bonding systems 16 October, London

Electrical services explained 17-19 October, remote 7-9 November, London

Mentoring skills workshop 17 October, London 23 November, London

Fire safety building regulations: Part B 19 October, London 22 November, remote

Low carbon consultant building design 24-25 October, London 21-22 November, London

The importance of energy-efficient buildings 27 October, remote

Energy efficiency-related building regulations: Part L 30 October, London 9 November, remote 27 November, London

ISO 50001:2018 Energy management system 2-3 November, remote 7-8 December, remote

Introduction to heat networks and code of practice 6 November, remote

Low carbon consultant building operations 7-8 November, remote 29-30 remote

On demand training

CIBSE has a portfolio of on demand courses that contain interactive online content, with quizzes and additional resources to support your learning. go.cibse.org/training-mycibselearning

Benefits include:

- Online platform accessible on desktop and mobile devices
- Courses and modules available offline when using the app
- Flexibility
- Interactive content
- Corporate training exclusive tools (dashboards, reports)



CIBSE JOURNAL WEBINAR

The latest *CIBSE Journal* webinar, sponsored by Daikin, is now available on demand. This webinar, titled 'Our sustainability journey', explores how the HVAC market needs to adapt to meet the UK's ambitious environmental targets and how Daikin is working to lead the way.

All previous *Journal* webinars are also available on demand: www.cibsejournal.com/webinars





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NEW for 2023

SLL - Light2Perform is a dedicated area within Build2Perform Live, CIBSE's flagship event bringing together our membership and the broader Building Services community for two days of unmissable content, CPD presentations and the latest products and services.

Featuring leading lighting manufacturers, contractors, wholesalers and retailers, SLL - Light2Perform will also have its own content programme running over the two days.

With its own dedicated theatre, all technical content will be organised by leading lighters, Bob Bohannon, Helen Loomes and Sophie Parry.

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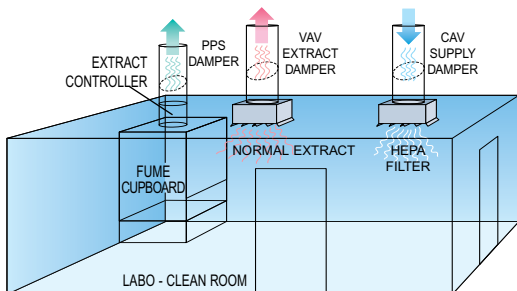


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