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January/February 2026
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The magazine of the Chartered Institution of Building Services Engineers

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Home truths

The year has started with some important announcements from government on the decarbonisation of heating in Britain's homes. The Warm Homes Plan and the consultation for the Heat Network Technical Assurance Scheme are significant attempts to reduce carbon emissions from domestic heating.

The launch of the UK Net Zero Carbon Buildings Standard (UK NZCBS) is also imminent, and could be a game-changer for building performance as it sets targets for embodied carbon and operational energy use across a range of sectors. We talk to UK NZCBS CEO Katie Clemence-Jackson (on page 22) to hear how feedback from more than 200 pilot projects is influencing the Standard. On page 36, Loreana Padron, of ECD Architects, describes one of the pilot projects – the retrofit of 50 Cambridge City Council houses – and reveals that, while the Standard's carbon and energy limits are achievable, the costs of doing so for social housing are high.

The Warm Homes Plan is a £15bn commitment by the government towards upgrading the energy efficiency of five million homes by 2030. The focus is on new technology, with the availability of £7,500 grants for individual heat pumps through the Boiler Upgrade Scheme being extended by two years, until 2030, and interest-free loans being offered on top for heat pumps, batteries and solar panels.

There is no support for insulation, with the government wary of the mould and condensation damage caused by bodged refurbishments in recent grant programmes, including the Energy Company Obligation (page 6).

Of course, suboptimal performance from heat pump technology is also possible, as is made clear by a recent study (page 39) that analysed operational data from hundreds of heat pumps to pinpoint the causes of poor performance. Happily, the authors identified measures that could yield annual energy bill savings of 26%, such as the optimisation of weather compensation controls.

The 11th edition of the *CIBSE Domestic heating design guide* has been updated to provide guidance on optimising heating systems. It is an essential guide to designing wet heating systems (page 35) and will be joined in the autumn by a companion guide on heat pumps. They will be important in ensuring home occupiers receive optimal heat pump systems and the government maximises use of taxpayers' money.

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Katie Clemence-Jackson
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Charlie Davies
Requirements of the technical standard underpinning upcoming heat network regulations

Tim Dwyer
This month's CPD looks at the challenges of retrofitting and decarbonising the UK's existing building stock

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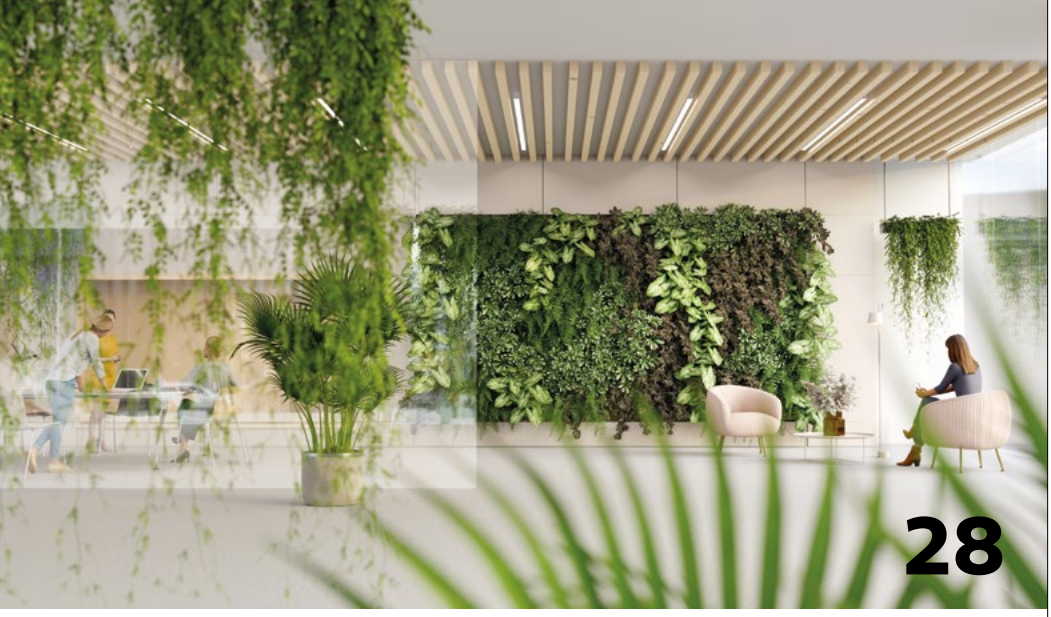

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Government sets key heat network requirements

Existing networks will have to meet a series of 'milestones' in new Heat Network Technical Assurance Scheme

The specifications for the new-look Heat Network Technical Assurance Scheme (HNTAS), have been published by the Department for Energy Security and Net Zero (DESNZ).

For existing heat networks, the technical specifications, published last month, are structured as a series of milestones that they must meet over several years. Milestone 2 sets out minimum performance and reliability thresholds, including metering and monitoring requirements. At the next milestone, 3A, networks must submit performance improvement plans, showing that they have met HNTAS requirements. Achieving HNTAS certification is the final milestone, 4.

New-build networks will require an assessment pass at three key points in their life-cycle: before design begins on a network; prior to starting construction; and ahead of operation. An assessment pass will also be required after two years of operation, to ensure that performance levels continue to meet requirements.

Public consultation on the HNTAS opened alongside the publication of the Warm Homes Plan in January, and will run until mid-April.

Gareth Jones, managing director of FairHeat and lead technical author of HNTAS, said the introduction of mandatory technical standards is a 'game-changer' for the heat network sector.

'Providing clear national standards will be transformational for developers and operators, and their customers connected to heat networks, who will experience better reliability, cleaner air, lower carbon emissions and lower energy bills.'

The draft of the Heat network technical standard (TS1), which states the minimum requirements for the design, installation, and operation of Heat Networks was published in November (see page 18).

FairHeat has been appointed by DESNZ to deliver the interim technical support contract for HNTAS.

Insulation schemes have been 'catastrophic fiasco', say MPs

The number of homes left with defects because of government-backed insulation schemes has been branded a 'clear and catastrophic failure' by the House of Commons Public Accounts Committee (PAC).

A National Audit Office (NAO) investigation, published in October, found that around 98% of the external wall insulation installations fitted under the Energy Company Obligation 4 scheme and the Great British Insulation Scheme had major issues that need fixing.

In a follow-up report, released on 23 January, the PAC estimates that the number of dwellings that require fixing had risen to up to 35,000 homes by mid-January 2025, with an 'unquantified' number since then. Some have defects that pose 'immediate' health and safety risks, such as inadequate ventilation.

Sir Geoffrey Clifton-Brown, chair of the PAC, said: 'A 98% failure rate in a public sector initiative amounts to the most catastrophic fiasco that I have seen on this committee.'

Mehna releases guide for installers of HIUs

The Manufacturers of Equipment for Heat Networks Association (Mehna) has launched a guide for those who have attended heat interface unit (HIU) training courses.

***Heat network installer training – Installation, commissioning and maintenance of heat interface units for the Heat Network Technical Assurance Scheme* should be referenced alongside the TS1 Heat Network Technical Standard and BS8635 – Part 2, a new standard that is expected to be released in October.**

The Mehna guide covers key areas when installing indirect and direct HIUs within 4th-generation heat networks serving domestic and light-commercial premises.

See page 18 for details of the draft TS1.

Funding is aimed at heat pumps, despite scaled-back annual targets

Warm Homes Plan cuts heat pump target by 25%

Focus is on low carbon technologies over insulation

The government's target of 600,000 heat pump installations by 2028 has been watered down, the £15bn Warm Homes Plan (WHP) reveals.

The document, published on 21 January by the Department for Energy Security and Net Zero, says the government's aim is for the heat pump market to expand to more than 450,000 annual installations by 2030.

This is fewer installations over a longer timespan than the previous target of 600,000 heat pumps in UK homes by 2028, which was set out in the Heat and Buildings Strategy, published by Boris Johnson's Conservative government in 2021.

The WHP states that the UK was Europe's 'fastest growing' market for heat pumps in 2024, with installations increasing by just more than 50%, from 55,000 in the previous year to 84,000.

It adds that the market for heat pumps will continue to grow 'strongly' thanks to funding increases in the plan and low carbon heating becoming standard under new building regulations, but the recent rapid increase in deployment rates still leaves the UK well short of 600,000 within the next two years.

The WHP also prioritises low carbon heating technologies over the installation of insulation. It says such measures, particularly solid-wall insulation, have become 'less viable' in recent years following supply chain cost increases. This means alternative technologies – such as rooftop solar and home batteries – are likely to offer 'significantly more cost-effective routes' to reducing energy bills and maintaining thermal comfort.

David Lennan, chairman of the National Warm Homes Council, said Secretary of State for Energy Ed Miliband is making a 'generational policy mistake' by not ensuring that homes are properly insulated. 'It's a fool's errand for the retrofit industry to fit green tech in homes that are not insulated properly,' he said.

Strategy highlights

- **Triple the number of rooftop solar panels on homes by 2030**
- **A new £5bn Warm Homes Fund, an initial £1.7bn of which will be earmarked for new low- and zero-interest loans to consumers, such as mortgage extensions to pay for home upgrades**
- **Merger of the Warm Homes: Social Fund and Warm Homes: Local Grant in 2027/28, to create a single capital scheme to support home upgrades for low-income households, focused on area-based delivery**
- **Establishment of a new Warm Homes Agency (WHA) as a dedicated executive agency to help consumers with home upgrades**
- **Future Homes Standard to be published in the first quarter of this year**

Government doubles heat network target

The Warm Homes Plan (WHP) has set a target to more than double the share of heating demand that should be met via heat networks by 2035.

The document says low carbon heat networks will play a 'significant role, in the right settings' in electrifying the heating of buildings. It adds that the communal heating systems are likely to be the 'best option' in high-density locations such as city centres.

The WHP states that heat networks should meet 7% of heating demand by 2035, 'more than doubling' current levels.

It also announces £1bn of capital support for networks from the Green Heat Network Fund until the end of this decade.

Alongside the WHP, the Department for Energy Security and Net Zero has published its long-awaited next steps on heat network zoning.

Tom Naughton, chief operating officer of specialist heat network engineers FairHeat, said: 'It's great to see the government placing its faith in heat networks and allocating them such a prominent role in the creation and delivery of the Warm Homes Plan.'

Rented homes must have EPC C rating

The government has confirmed that all rented homes will have to be upgraded to meet Energy Performance Certificate Band C by October 2030.

It predicts the measure will lift 'hundreds of thousands out of fuel poverty by 2030'.

A spending cap on improvements to achieve the C rating is set at £10,000, but the government predicts an average cost of around half that.

There will also be a low-value property exemption, which will lower the spending cap where £10,000 would represent 10% or more of a property's value.

Net zero standard recognises NABERS

Rating tool deemed to satisfy NZCBS

The UK Net Zero Carbon Buildings Standard (UK NZCBS) has confirmed that offices achieving a high NABERS UK rating will be 'deemed to satisfy' the Standard's operational energy requirements.

Version 1 of the UK NZCBS is due for publication early this year. It provides targets for existing and new buildings, covering metrics such as embodied carbon and operational energy use.

'Accepting the NABERS UK rating should make life easier, because projects won't need to demonstrate the operational energy evidence twice,' says UK NZCBS CEO Katie Clemence-Jackson. She adds that work is under way to integrate other schemes, such as Passivhaus and Breeam.

Evidence from more than 200 projects showed that the pilot limits for embodied carbon and operational energy were largely achievable, providing strong validation for the framework ahead of Version 1.

See page 22 for more on the UK NZCBS

11&12 Wellington Place in Leeds has a UK NABERS 5* energy rating

Surge in Gateway 2 approvals cuts backlog

The Building Safety Regulator made a record number of Gateway 2 decisions in the last three months of 2025, new statistics show.

According to the figures, published on 22 December, it is likely that more than 700 decisions were made in this period. This marks an increase of more than 250% compared with the first quarter of 2025, when a little more than 200 decisions were made.

Gateway 2 is the planning approvals checkpoint for ensuring all safety-critical elements are fully designed and approved before physical work can begin on higher-risk buildings.

The surge in decisions at this stage has helped to reduce the number of live applications from 1,219 to 1,158 over the last 12 weeks of 2025. This downward trend can also be seen in London, where live cases fell from 791 to 740 over the same period.

New single regulator for construction proposed

Aim is to reduce 'complexity' in built environment regulation

The government says it wants to go further on professional standards than the reforms recommended by the Grenfell Tower Inquiry.

The Ministry of Housing, Communities and Local Government announced in December that it will implement the recommendation for a single construction regulator (SCR), to reduce 'fragmentation and complexity'.

The inquiry also recommended strengthening the regulation and accountability of roles responsible for safety-critical functions, including principal contractors and designers.

However, in a consultation document setting out the prospectus for the SCR, the government says it must go further than the inquiry, and take a 'holistic view of regulation, competence and culture across all those operating in the built environment sector'.

A long-term strategy for the building professions, including wider trades and occupations, will be published, the document says. This will set out a 'clear, unified' plan for regulatory and non-regulatory reform at government, industry and individual level, and will sit alongside parallel reforms to Building Regulations and construction products.

This strategy will 'simplify the current patchwork' of regulation, and establish a central oversight function focusing on a 'clear and coherent set of standards, expectations and outcomes'.

There may be scope for the SCR to go further than the Building Safety Regulator's remit to regulate higher-risk buildings, and raise safety standards of all buildings by 'setting clear behavioural standards and providing uniform foundations for enforcement', the consultation adds.

Read more about the SCR on page 16

Plans for tighter control of fire-engineering function

The title and function of a 'fire engineer' is to be more tightly regulated, the government has said.

One of the recommendations in the Grenfell Tower Inquiry's final report was the establishment of a Fire Engineers Advisory Panel, which, on December 17, set out key principles for regulation and reform of the discipline. These include statutory regulation of the title and function of fire engineer, whose 'central, protected function' should be the preparation of fire-safety strategies.

In its response, the government has promised to introduce legislation, on which a detailed consultation will take place later this year.

The development of a competent fire engineer should be a structured process, combining formally accredited education and supervised professional experience, comparable with other engineering disciplines, the panel's statement said. Fire engineers also require 'deep understanding and knowledge' of core architectural and engineering principles, fire science, human behaviour, and regulations relevant to buildings and fire safety.

The panel has also advised that the scope of buildings and critical infrastructure that require fire-safety strategies should go beyond the existing definition of a higher-risk building.

Fatal infections linked to NHS water system

Issues with the water system of a major hospital probably led to fatal infections of child cancer patients, the NHS trust covering Greater Glasgow and Clyde (NHSGGC) has admitted.

The trust has submitted its closing statement to the Scottish Hospitals Inquiry – which was launched to examine mistakes made in the design and construction of the Queen Elizabeth University Hospital (QEUH) – following concerns about unusual infections and the deaths of four patients.

In its statement, NHSGGC said there was 'causal connection' between an increase in infections at the QEUH and the water system, and that expert evidence shows it is probable that the two are linked.

Hywel Davies made OBE

Hywel Davies, CIBSE's former technical director, has been made an OBE in the King's New Year Honours List. The award was in recognition for his contribution to building safety and standards over the last 40 years.

Davies has been closely involved in the development of the new building safety regime and is a member of the Building Advisory Committee.

Davies is the technical author of the new PAS 2000 Code of practice due to be published by the BSI next month.

Lords calls on construction to raise safety standards

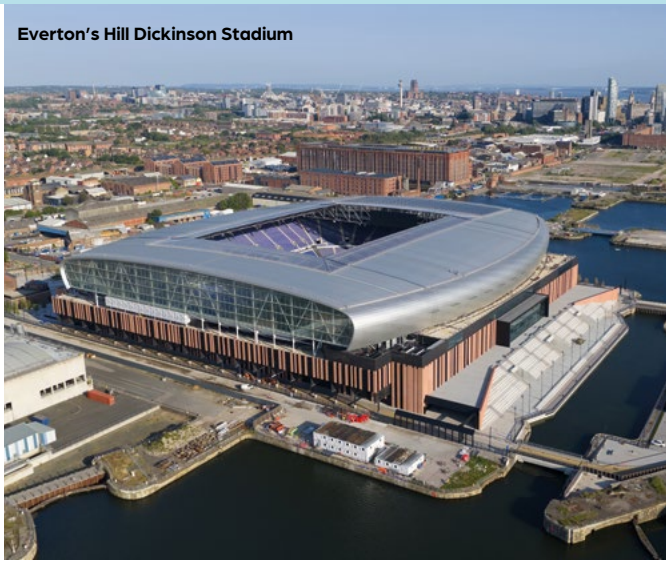
The construction industry's response to new safety requirements for high-rise buildings has been patchy, a House of Lords committee has concluded.

The Industry and Regulators Committee's report on the Building Safety Regulator (BSR) said that while the BSR must be clearer and improve its own processes, the construction industry must also play its part in raising standards.

cibse News

CIBSE region breaks record at new Everton ground

Almost 400 guests attend annual social event at Hill Dickinson Stadium


Everton's Hill Dickinson Stadium

The CIBSE Merseyside & North Wales Region made history on 14 November 2025, when it hosted its annual social event at Everton Football Club's new Hill Dickinson Stadium. It was the first large-scale catered event held at the venue and it broke the attendance record for one of the region's social events.

The event brought together 390 guests from across the industry, for an afternoon of networking, celebration and community spirit, in one of the North West's most talked about new venues.

Regional chair Dan Whitley said the event, which raised £6,000 for Maggie's Cancer Centre, was a proud milestone for the committee and a fitting celebration of the region's growing influence.

It also reflected the region's commitment to supporting emerging talent, with the committee funding a table for full-time students from The City of Liverpool College and Liverpool John Moores University.

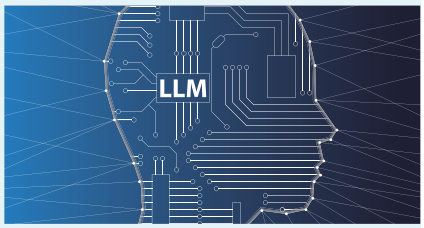
Deputy social secretary Jack Beech, who leads the CIBSE Young Engineers Network locally, highlighted the importance of inclusivity and opportunity.

'Introducing the next generation of engineers to events like this helps them engage with potential employers and see the breadth of opportunities within our industry,' he said.

With more technical and social events planned for the year ahead, CIBSE Merseyside & North Wales continues to strengthen its network and provide a platform for learning, engagement and professional growth across all stages of members' careers.

Entertainment on the day was provided by Alex Crow, and the event was supported by regular contributors MC George Phillips and photographer John Travis.

Training



New course: Introduction to AI for building services engineers

This new course will explore what a large language model (LLM) is, how it works, and how it can be applied within engineering practice. It will cover the capabilities of LLMs and introduce key concepts, such as human-in-the-loop, which ensures that professional expertise remains central to AI-assisted work. Attendees will learn how AI can support drafting and reviewing documents, assist with compliance processes and enhance design workflows.

You will learn how to write effective prompts, refine outputs and use LLMs for code generation, while addressing important considerations around accuracy, data privacy and intellectual property.

The course will also explore the future of AI in building services, focusing on how to integrate it responsibly and effectively into everyday practice.

www.cibse.org/training

For full details and booking:
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Energy strategy reports
11 February

Low and zero carbon energy technologies
12 February

Fire safety in purpose-built blocks of flats
12–13 February

Building services explained
25–27 February

Mechanical services explained
2–4 March

Understanding the law for engineers
11 March

Low carbon consultant building design
16–17 March
9–10 June

Implementing BS 8519:2020 for life safety, firefighting and critical applications
18 March

Advanced simulation modelling for Design for Performance
19–20 March

Introduction to the principal designer and principal contractor roles
23 March
22 May

Overview of IET wiring regulations
23 March

Power system harmonics
26 March

Design of ductwork systems
31 March

Leadership identity and self-awareness
7 April

BS9251 Automatic water-suppression systems overview
14 April

Fire safety management
15 April

Fire safety construction
16 April

Mastering the application of heat pumps
21 April

Design of heating and chilled water pipe systems
28 April

In Feb/March

The importance of controls in building sustainability

12 February, London

A joint event by BCIA Young Engineers Network and CIBSE YEN London.

CIBSE Building Performance Awards (BPAs) 2026

5 March, London

The CIBSE BPAs are the only industry awards that focus on actual, measured performance outcomes. Be there on the night to celebrate.

www.cibse.org/bpa

CIBSE Technical Symposium: Fit for 2050

26-27 March, Loughborough University

The 2026 symposium will explore the future of building services design, with a focus on wellbeing, inclusivity and sustainable performance.

www.cibse.org/technicalsymposium

CIBSE strengthens relationship with Hong Kong and China

CIBSE President Elect Dave Cooper joins CEO Ruth Carter on extensive trip to Hong Kong and China

CIBSE has signed a memorandum of understanding with Macau Institution of Engineers, strengthening collaboration with engineers in China and Hong Kong.

The agreement, which supports the advancement of building services engineers in the region, was signed by CIBSE President Elect David Cooper and CIBSE CEO Ruth Carter during a trip to China and Hong Kong in late 2025.

It marks an important step in fostering shared knowledge, professional development and deeper international engagement.

During the visit, the delegation – together with members of the CIBSE Hong Kong Region committee – participated in a series of meetings and knowledge-sharing activities with government bodies, industry leaders and engineering institutions.

Highlights included a visit to the Zhuhai Gree factory in Guangdong province, where delegates learned about Gree's manufacturing processes and emerging technologies. In Hong Kong, CIBSE hosted a reception at the British Consulate, where discussions highlighted the Institution's global initiatives, building performance, and the role of innovation and sustainability.

The delegation met Chairman Zhou and senior representatives from the Department for Cooperation and Exchange at the Guangdong Provincial Association for Science and Technology, which represents engineers across Guangdong's 70 million residents. The discussions focused on mutual recognition of members and reciprocal agreements to share best practice.

CIBSE visited the Department for Cooperation and Exchange in Guangdong

The skyline of Macau

A meeting with the Architectural Services Department in Hong Kong explored global developments and challenges in building services. The group also met Alan Siu Yu Bun, CEO of the Property Management Services Authority, to discuss the evolving role of property and facilities management in delivering safe, sustainable, high-performing buildings.

At the Hong Kong Institution of Engineers (HKIE), the delegation met Ir Prof Frank Chan Fan, senior vice-president of HKIE. Discussions focused on addressing the skills gap, inspiring young people to pursue engineering careers and exploring the role of AI. A dedicated session with the CIBSE Hong Kong Young Engineers Network looked at career pathways and emerging technologies.

Signing a memorandum of understanding with Macau Institution of Engineers

CIBSE leadership also met the Hong Kong Region Committee to hear updates on local initiatives, membership growth and developments in innovation. The delegation met the Electrical and Mechanical Services Department, where director Raymond Poon and deputy director PC Chan, alongside committee members, presented developments in energy efficiency and green technologies.

CIBSE leaders attended the CIBSE Hong Kong Joint Symposium 2025, which focused on wellbeing and decarbonisation in a smart, resilient and sustainable built environment.

Carter and Cooper visited Chongqing University's Sustainability Department for the Built Environment and met senior faculty, including professors Baizhan Li, Runming Yao, Wei Yu, Yong Ding and Nan Li, and Dr Chenqiu Du and Dr Shiyu Han. It sparked a debate on CIBSE activity in China and supporting engineers locally.

Façade resilience study wins Building Simulation Award

Zahra Jahed Bozorgan, from the University of Bologna, has won the CIBSE Building Simulation Award 2025 for her project 'Assessing thermal resilience of residential façade typologies under climate change using the façade Resilience Index'. Her research offers vital insights into adapting buildings for future climate resilience.

The Young Modeller Award went to Soumya Uttam, from Scotch Partners, for her outstanding contribution as an emerging talent in building simulation.

The CIBSE Building Simulation Awards 2025, organised by the CIBSE Building Simulation Group, celebrate innovation and excellence in sustainable building design. Special thanks to the sponsors – DesignBuilder, EDSL TAS, IES, Monodraught and EDRMedeso.

Advanced Air products verified by embodied carbon scheme

Advanced Air has secured CIBSE Certification Embodied Carbon Verification (ECV) for 49 products across its air handling and ventilation equipment range.

Advanced Air has integrated CIBSE TM65 methodology into its product development strategy, systematically quantifying and reducing embodied carbon across its MEP portfolio. Embodied carbon is now assessed alongside cost and performance during material selection.

The company joins eight manufacturers in the CIBSE ECV Early Adopters programme, establishing independently verified embodied carbon data as the industry benchmark.

Andrew Sargent, Advanced Air's managing director, said: 'By certifying our products through CIBSE Certification's Embodied Carbon Verification Scheme, we build trust with clients while ensuring our sustainability commitments meet the highest industry standards.'

Members value professional development most highly

CIBSE Membership Survey reveals a growing global community calling for more local guidance

Feedback from the CIBSE 2025 Membership Survey has revealed an increasingly global membership that is demanding deeper engagement with the Institution, and more regional guidance and resources.

The survey is a valuable opportunity to reflect on what matters most to the CIBSE community, where the Institution is delivering well, and where it can strengthen support for building services engineers across the globe.

With responses representing an increasingly diverse international membership, the findings validate CIBSE's direction of travel, and highlight clear opportunities to increase engagement and impact.

Strong advocacy and trust

Overall sentiment towards CIBSE remains positive. Its net promoter score has risen to 35 – a level widely recognised as a strong benchmark for professional organisations. This indicates not only satisfaction, but a genuine willingness among members to recommend CIBSE to their peers. It is a powerful measure of trust in the Institution's credibility, influence and relevance within the built environment.

An engaged global community

The survey reinforces the importance of CIBSE's global membership. While the UK continues to represent the largest proportion of respondents, engagement from Hong Kong has increased, reflecting the Institution's strong regional activity and investment. Members outside of the UK expressed a desire for deeper engagement, greater localisation and easier access to regional resources.

This feedback confirms the importance of CIBSE's investment in delivering global guidance, regional e-journals and in-region support across the Middle East and North Africa, Hong Kong, and other international markets.

Member value

Members were clear about the benefit they value most. Professional recognition, particularly chartership and post-nominals, continues to be a key driver of membership.

Access to trusted technical guidance, structured CPD, and opportunities to connect through networks, societies and regional activities also remain central to CIBSE's value proposition.

The future of the profession

Looking ahead to 2030, members identified climate resilience as the most pressing global challenge for the sector, followed by digital integration and the long-term risks posed by skills shortages. These insights closely align with CIBSE's strategic focus on building performance, competence and future-ready engineering.

A shared commitment

The survey results send a clear and positive message: members believe in CIBSE, value its leadership and want to engage more. Their voices will remain central to how CIBSE evolves, ensuring it continues to support, represent and champion building services engineers worldwide.

CIBSE BUILDING PERFORMANCE AWARDS 2026

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Reed, Lloyd
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So, Chun Kit
Tai Po, Hong Kong

Yagoub, Waleed
Dubai, United Arab Emirates

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Amaegbe, Toinpre
Biggleswade, United Kingdom

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Dubai, United Arab Emirates

Campbell, Mary-Frances
Newry, United Kingdom

Chan, Chi Chung
Tsing Yi, China

Chan, Kin Wa
Hong Kong, China

Chen, Jia Xi Kelvin
Hung Hom, Hong Kong

Cheng, Sung Man
Hong Kong, Hong Kong

Cherian, Arun Jacob
Gothenburg, Sweden

Cheung, Tick Wai
Shatin, Hong Kong

Cheung, Tim Kuen
Ma On Shan, Hong Kong

Chui, Chung Ying Janan
Tai Koo, Hong Kong

Chung, Kai Lung
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Fleming, Jack
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Gallimore, Chloe
Manchester, United Kingdom

Harkin, John
Glasgow, United Kingdom

Hiscocks, Daniel
Manchester, United Kingdom

Ho, Ken
London, United Kingdom

Huang, Chin Hung
Ngau Tau Kok, Hong Kong

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Cranbourne North, Australia

Kavanagh, Gavin
Dublin, Ireland

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Tuen Mun, Hong Kong

Lee, Kin Chi
Lai King, Hong Kong

Lee, Tim Tai Terence
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Lee, Tsz Ting
Tseung Kwan , Hong Kong

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McCluskey, Orlagh
Lurgan, United Kingdom

Mohamed Aboobucker, Mohamed Irfan
Dharga Town, Sri Lanka

Mukadam, Sanaul Sultan Husain
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Nguyen, Thomson
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Peck, Alexander
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Bliss, Jamie
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Greenwood, Daniel
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Guest, Abigail
Goole, United Kingdom

Hamilton-Crickmay, Jacob
Leighton Buzzard, United Kingdom

Hilland, Ethan
Plymouth, United Kingdom

Ikong, Preistty Marie
Brentwood, United Kingdom

Kelly, George
Plymouth, United Kingdom

Liedes, Charlotte
Exmouth, United Kingdom

Liu, Yijun
Manchester, United Kingdom

Martin, Joshua
Sittingbourne, United Kingdom

Mead, George
Sheffield, United Kingdom

Murning, Debbie
Dunfermline, United Kingdom

Murshed, Ahmed
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Walton, Evan
Alverthorpe, United Kingdom

Noble, Gabriel
Leatherhead, United Kingdom

Rakhtopol, Nadya
Manchester, United Kingdom

Reid, Ethan
Birmingham, United Kingdom

Ritchie, Madeline Rose
Bidford-on-Avon, United Kingdom

Sevilla Gonzalez, Mercedes
London, United Kingdom

Shephard, Jack
Bridlington, United Kingdom

Smith, Leo
York, United Kingdom

Fit for 2050: CIBSE Technical Symposium

Details of presentations are revealed for the CIBSE Technical Symposium, to be held at Loughborough University on 26–27 March

Papers on heat pump noise, a whole life carbon tool for housing, and post-occupancy evaluation of building envelope systems will be presented at the CIBSE Technical Symposium on 26–27 March.

The theme for the 2026 symposium, which takes place at Loughborough University, is 'Fit for 2050 – Redesigning spaces for wellbeing, inclusivity and sustainable performance'.

Delegates will hear Katie Salter, from the University of Salford, present her case study *Heat pump noise in schools: influence of heat pump placement on noise exposure*. The study examines the acoustic implications of deploying low carbon heating in school environments, demonstrating how the placement of air source heat pumps (ASHPs) can significantly influence noise exposure for pupils and staff.

Bridging the performance gap

Deepak Sadhwani, of Energy Systems Catapult, will present the case study *Bridging the performance gap: A whole life carbon optioneering tool for early stage housing design*. It demonstrates how early design decisions influence long-term carbon, comfort and costs, and includes a proof-of-concept optioneering tool to support net zero housing at the briefing and concept stage.

By testing 1,800 design permutations across construction types, performance standards and future climate scenarios, the work shows how optioneering can help housing providers identify resilient, cost-effective pathways to homes fit for 2050.

Akshit Gupta and co-authors from Eurac Research, ZAG and Focchi will present their research paper *From controlled experiments to real-world insights: A 'test bed building' framework for post-occupancy evaluation of building envelope systems*. The paper introduces a framework that bridges laboratory testing and real-world building performance. Drawing on post-occupancy evaluation, it offers insights to support innovation and the scaling of high-technology, readiness-level solutions, helping to meet nZEB targets while enhancing indoor environmental quality.

Bill McQuade, ASHRAE president, will also present on his theme for the 2025–26 ASHRAE Society Year, 'Healthy buildings: Designing for life'.

For more information and to book your place, visit www.cibse.org/technicalsymposium

Redefining VRF air conditioning systems

Retrofitting air conditioning systems with low-GWP VRF systems has a significant impact on a building's carbon emissions, says Mitsubishi Electric's **Graham Temple**

As we face environmental challenges, retrofitting existing buildings with technologies that deliver the comfort needed while saving energy and supporting a sustainable future is more important than ever. One key technology in this effort are variable refrigerant flow (VRF) air conditioning systems.

These have typically used refrigerants that can have a global warming potential (GWP) thousands of times that of CO_2 and can remain in the atmosphere for hundreds of years. The market is therefore moving to sustainable and lower-GWP refrigerants, which is driving HVAC manufacturers to develop new technologies, ensuring regulatory compliance.

Adopting new refrigerants brings design and safety implications, as many low-GWP refrigerants are flammable or mildly flammable, so extra precautions are needed when designing and installing these systems.

Our new City Multi R32 YXM range builds on the existing VRF system, but takes it to the next level with smarter, more sustainable features. Part of the trusted City Multi VRF range, YXM is suitable for a wide range of applications across new-build and retrofit projects.

R32 is a mildly flammable refrigerant, so the system comes with leak detectors that have a 30-year lifespan, compared with the market average 10 years. That means fewer replacements, lower operational costs and greater peace of mind for clients.

It is available with heat recovery, which allows simultaneous heating and cooling – so, whether it's a retrofit or a new build, the City Multi R32 YXM gives you the tools to deliver reliable performance, lower emissions and greater control without compromise.

These VRF systems are also modular and simple to design, with flexible 2-pipe configurations that require less brazing and make installation simple. They offer high seasonal efficiency and can be installed in various locations, providing great flexibility. Plus, they come with fully integrated control solutions, making it easier to manage and maintain the system, which are key considerations when upgrading legacy infrastructure.

To find out more, visit bit.ly/3LXMdLk

Graham Temple is marketing manager at Mitsubishi Electric

MITSUBISHI ELECTRIC

Safety's critical year

UK government proposals for a single construction regulator raise questions over how professional institutions will need to adapt to a whole-system approach. **Sam Baptist** looks ahead at a key year for building safety

This is shaping up to be a pivotal year for the built environment, with major developments under way across building safety, professional standards and regulatory oversight that will affect England and the rest of the UK.

Just before Christmas, the UK government published its long-awaited *Single Construction Regulator (SCR) Prospectus*. The document sets out proposals to create a new single oversight body and reform the wider regulatory framework covering buildings, construction products and professionals.

This document stems from the first recommendation of the Grenfell Tower independent report, which identified 'systemic fragmentation and cultural weaknesses' in the regulatory system that it says contributed to the tragedy of 14 June 2017.

For CIBSE, the prospectus is an important opportunity to influence the future regulatory environment. It outlines a framework underpinned by four objectives that align closely with CIBSE's role and mission:

- Ensuring buildings are safe, high-performing and sustainable
- Enabling companies and individuals to operate in the interests of users
- Ensuring products are fit for purpose and supported by reliable information
- Rebuilding trust in the system.

System-wide oversight

The prospectus signals that the proposed SCR would have system-wide reach, covering commercial and domestic buildings, new and existing stock, and higher-risk and non-higher-risk buildings. This represents a shift away from a narrowly scoped regulatory approach.

For building services engineers, this matters. A regulator with a whole-system view has the potential to address gaps between design intent, construction quality and performance.

"The government says the current system lacks coherence and clarity"

Competence and coordination

A central theme of the prospectus is the need to address fragmentation. The government says the current system lacks coherence and clarity, leading to inconsistent oversight and accountability. The prospectus proposes a single oversight function for standards and professionals within the SCR. While details are limited, this signals a move towards stronger coordination of professional competence, conduct and standards across disciplines. Comparisons are drawn with sectors such as aviation and healthcare, where central regulation sits alongside clearly defined professional responsibilities.

This raises important questions for professional institutions: how competence frameworks, professional registration and professional development align with future regulatory expectations, and how professional judgement is supported – not undermined – by regulation.

The prospectus also promotes a more digital, data-led regulatory system, with improved information sharing and transparency.

Published on the same day were documents that signal a broader programme of reform and aim to deliver on the recommendations in Dame Judith Hackitt's report. These were:

- An 'authoritative statement' on fire engineers, setting out a vision for a future state of the regulated fire profession
- A review of the definition of higher-risk buildings.
- The third report on the government's progress towards implementing the recommendations from the Grenfell Tower Inquiry report.

What comes next?

Key milestones over the next 18 months include: the SCR consultation deadline in March 2026; a Construction Products Reform White Paper; a government response to the SCR consultation; and a future strategy for built environment professionals, coming in the summer

Alongside safety reforms and scrutiny, performance standards continue to evolve. The forthcoming Future Homes and Buildings Standard, expected to be published soon, following consultation in 2023/24, will shape requirements for energy efficiency, ventilation and low carbon design across new homes and non-domestic buildings, areas where building services engineers play a critical role.

These developments point to sustained regulatory change that will shape professional practice for years.

CIBSE encourages members to engage with the SCR consultation and the wider reform agenda. To support this, we have refreshed our Building Safety Working Group to provide a dedicated forum – so, if you'd like to have your say, get in touch.

Sam Baptist is head of government affairs at CIBSE

Nominations and appointments

Panel puts forward names for Officers and Board and Council Members

New CIBSE Officers, Board Members and Council Members take office each year from the AGM in June. Officers and Board Members serve on the Board, the Institution's governing body, which comprises seven Officers (President, President Elect, three Vice-Presidents, Honorary Treasurer and Immediate Past President) and five Board Members. From the AGM in June 2026, Dave Cooper will step up from President Elect to President, and Vince Arnold will become the Immediate Past President

CIBSE's By-Laws and Regulations require that all candidates for Officer and Board Member vacancies arising at the AGM be considered by the Nominations Panel. Members from all sections of the Institution are invited to put themselves forward for consideration.

The Panel gives careful thought to its recommendations, and seeks to reflect Charity Commission guidance by nominating a range of candidates with the skills and experience required to fulfil the Board's role as the governing body of a significant registered charity. It also seeks to ensure that the Board includes a balance of representation from different industry sectors.

Having considered the advice of the Panel, the Board then nominates candidates for President Elect and Board Member vacancies.

The Board's nominated candidates for vacancies arising at the AGM in June 2026 are: President Elect: Mike Burton CEng FCIBSE; Honorary Treasurer: Les Copeland FCIBSE; Members of the Board: Eimear Moloney CEng FCIBSE, Edith Blennerhassett CEng FCIBSE.

The Board, having considered the Nominations Panel's advice, also appoints three Vice-Presidents to take office at the next AGM. These appointments are normally made from those who serve, or have served, on the Board, and all those listed below are current or past Officers or Board Members. The Board's appointments to take office in these roles from the June 2026 AGM are: Vice-Presidents: David Stevens CEng FCIBSE; Vincent Ma CEng FCIBSE; Peter Anderson CEng FCIBSE.

The Council is a larger consultative body that advises the Board on CIBSE policy. It includes representatives of Regions, Societies, Groups, Networks, Standing Committees, and elected members, who serve a three-year term. The Board operates a similar procedure for election as that applying to Board Members, and two corporate positions and one non-corporate position are available for election each year. The Board, having considered the advice of the Nominations Panel, agreed to nominate the following for vacancies arising at the June 2026 AGM: Members of Council: Brian Goldsmith (Corp); Gita Maruthayanar (Corp); Max McCone (Non-Corp).

Training is essential for a safer future

Professional bodies must collaborate to create holistic training schemes and develop standards in the wake of the Building Safety Act, says BSB Engineering Services' **David Fitzpatrick**

Moving into 2026 is a good opportunity to look back at 2025 and see whether we made progress in respect of fire safety, and whether the Building Safety Act improved the construction industry.

I often hear people say that the act should not have an impact, as all it is doing is reflecting how we should have been working in the past anyway. However, let's be honest, too many hurdles were put in place for this to have happened consistently.

What the act has done has highlighted critical areas that need to be focused on and improved regarding life safety within products, design and installation. We all need to take responsibility for improving building safety and, in our world of fire safety, we must learn from the past and move forward.

The Building Safety Act has created a new culture and way of working, where much more detail is required earlier in the design process. This should improve the onsite construction of projects as long as the design is realised during construction, which has been an issue in the past.

There are many positive parts to the Building Safety Act and they will help drive a better tomorrow. With any new initiative or regulation, however, there are negatives.

From the point of view of product manufacture, there are issues with some of the standards coming out and what is possible from a testing regime and engineering perspective, such as testing a smoke damper in both directions up to 1,000Pa. These need addressing.

The biggest current issue is clarity of requirements in the fire safety standard BS9991, as you can speak to five people and get different answers about what a certain standard means. There needs to be more collaboration in this area between bodies representing manufacturers, designers and installers. There also needs to be more coordination between these organisations to come up with holistic training schemes, such as one on the responsibility of the main contractor and main designer: there is still a lack of understanding in these areas. Training must be the key task for 2026.

David Fitzpatrick is managing director at BSB Engineering Services

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BSB
ENGINEERING A SAFER TOMORROW

Technical transition

The draft Heat Network Technical Standard (TS1) features new technical requirements that will focus on water quality, pressure, resilience, insulation and condition. FairHeat's **Charlie Davies** looks at how the standard will impact heat networks

The Department for Energy Security and Net Zero has released the draft Heat Network Technical Standard (TS1), a landmark development in the transition to a regulated heat network market in Britain.

TS1 will supersede the widely adopted CP1 (2020) Code of Practice, creating a shift from a voluntary code of practice to a formal standard that will underpin the forthcoming Heat Network Technical Assurance Scheme (HNTAS).

TS1 has been developed with the overarching intention of ensuring that heat networks are designed, built and operated to acceptable minimum standards throughout their life-cycle.

There are four key aims of TS1, which are met through achieving a set of objectives at each stage of the standard. The aims are to:

- Meet consumers' heat demands reliably
- Minimise the cost of heat over the lifespan of the heat network
- Ensure sufficient operation and reliability during the design, construction and operation of the heat network
- Reduce carbon emissions associated with the provision of heat.

The technical authors of the document, FairHeat, engaged extensively with industry experts in a 14-member technical standards committee, as well as with four specialist technical sub-working groups, to shape a standard grounded in technical rigour, industry consensus and real-world deliverability.

A number of key changes have taken place from CP1 (2020) to TS1, including: new heat network requirements; the rewriting of minimum requirements; a new structure; and new requirements to address gaps and/or shifts in industry thinking.

"TS1 will supersede the widely adopted CP1 (2020) Code of Practice"

New heat network requirements

Minimum requirements have been introduced in key technical areas, with engagement from specialist technical sub-working groups made up of industry experts in each key technical area.

These new minimum requirements cover the following technical areas: pressure, resilience, water quality, insulation, and condition of pipework and equipment.

Resilience standards aim to minimise interruptions to heat supply, while water-quality standards are now for every stage of the life-cycle.

Minimum requirements for heat networks that have been retained from CP1 have been rewritten to ensure they are suitable for TS1, as a regulatory technical standard. These include:

- Resolving ambiguity to ensure that requirements are suitable for assessment
- Ensuring that language is in line with ISO guidelines
- Aligning terminology with HNTAS
- Splitting requirements where there are different requirements for different elements of a heat network.

Structure

TS1 has been structured across seven stages, which align with the Technical Standards and Assessment Procedures set out in the HNTAS documents, to establish a consistent foundation for the introduction of the regulatory regime for heat networks in Britain.

While TS1 is largely based on CP1 (2020), there are a select number of areas in which there are clear gaps, or shifts in industry thinking. Notable examples include:

- Updates to the calculation methodologies used as part of pipe-sizing assessments, to ensure sufficient performance of heat networks and that consumer needs can be met
- The development of a new key performance indicator for heat losses, as a measure of efficiency of district heat networks.

The draft publication gives the sector early visibility of the regulatory baseline that will underpin heat networks from early 2026 onwards. Once finalised, TS1 will form the backbone of the technical requirements set out under HNTAS, enabling Ofgem-regulated oversight and greater protection for consumers. ●

Read this article online to see the list of TS1 technical requirements.

Access the draft version of TS1 at bit.ly/CJTS1dr

● **Charlie Davies is a consulting engineer at FairHeat**

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CIBSE President Vince Arnold with Katie Clemence-Jackson MCIBSE

Sharper vision

'Inspiring people. Transforming places' is the compelling strapline for CIBSE's new brand identity, launched last month. To mark the refresh, we ask five CIBSE leading lights how they would inspire engineers and transform their environment

The new year has started with a fresh look for CIBSE's famous icon, the 129-year-old hawk. The bird of prey in the logo has been given a makeover that brings it firmly into the 21st century. Its feathers are no longer ruffled, and it now sits alongside a sharper, cleaner CIBSE font that speaks of an institution that is confident, forward-looking and accessible.

The new strapline 'Inspiring people. Transforming places' encapsulates CIBSE's role in developing and supporting people, and in improving the built environment.

CIBSE CEO Ruth Carter says: 'The refreshed visual identity marks an important step in ensuring the brand reflects the modern, forward-thinking institution we are today'.

'The updated logo, visual style and strapline make CIBSE more accessible and relevant, strengthening how we present ourselves to our international communities.'

To mark the rebrand, *CIBSE Journal* has asked five key CIBSE figures (right) how they would inspire the next generation and transform the built environment.

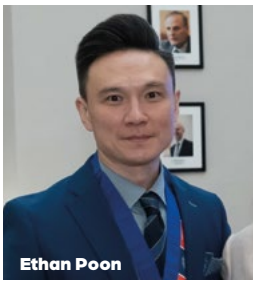
CIBSE
Inspiring people. Transforming places.

"CIBSE's refreshed visual identity marks an important step in ensuring our brand reflects the modern, forward-thinking institution we are today" – Ruth Carter

Inspiring voices

Hannah Gray

Aishwarya Chengappa



Ethan Poon

The panellists are Vince Arnold, CIBSE President; Aishwarya Chengappa, CIBSE YEN Global chair and senior sustainability consultant at Egis; Katie Clemence-Jackson MCIBSE, CEO at UK NZCBS; Hannah Gray, CIBSE ASHRAE Graduate of the Year and mechanical engineer at Foster + Partners; and Ethan Poon MCIBSE, chair of CIBSE Hong Kong region, and chief engineering manager and section head at MTR.

Learn more about the refreshed brand at **bit.ly/CJRebVid**

What one 'bold transformation' would you like to see in building services?

Vince Arnold: I believe we should bring back that feeling of pride in everything we do. Pride in our work and completed projects helps cement the quality and finish for many years to come.

Katie Clemence-Jackson: I'd like to see the UK built environment industry make significant progress towards its decarbonisation goals through uptake of the UK Net Zero Carbon Buildings Standard when it launches early this year.

Hannah Gray: I would like to see engineers shift beyond compliance-driven efficiency towards genuinely regenerative systems that improve environmental and human outcomes over time.

Ethan Poon: I would like to see building services systems and facilities become truly intelligent and responsive, able to sense, learn from and adapt to indoor environmental conditions and the external climate in real time. Systems should optimise performance continuously, to enhance occupant comfort, health and productivity, while being sustainable.

Aishwarya Chengappa: The transformation that I see is the integration of sustainability into the very essence of the design, and the normalising of carbon assessments at the inception stage of a project.

How can CIBSE bridge the gap between local challenges and global standards?

Arnold: The fundamental principles of engineering are, of course, the same the world over. One of the best ways to promote our voice is by continuing to ensure our standards and guidance remain relevant, up to date and transferable.

Chengappa: Key to bridging the gap is CIBSE developing versions of standards for different regions, catering to the different climate conditions and their constraints. In the Middle East and North Africa, using guides that cater for the region's harsh conditions has really been beneficial.

Clemence-Jackson: All people need access to safe, comfortable buildings that meet their needs. CIBSE's guidance allows these buildings to be tailored to their context, and the impact they have on the environment to be understood and managed.

Gray: CIBSE excels at translating global climate ambition into practical, credible guidance that works at project level. It's evidence-based approach to standards and guidance allows engineers to respond to local constraints while remaining aligned with international performance expectations.

Poon: CIBSE's strength lies in its global membership and its ability to translate international best practice into locally relevant solutions. Its extensive body of standards, guidance documents and technical memoranda is widely referenced across the industry.

How do you spark a sense of wonder in the next generation of building services engineers?

Arnold: I chose a career in engineering because it represented a different challenge every day, with wide-reaching scope, and the opportunity to solve problems and make people's lives safer and more comfortable.

Clemence-Jackson: There is a joy in knowing about the hidden world of engineering behind everyday things such as lights or plumbing. I would encourage the next generation of engineers to be curious about the built environment, how it has been shaped by engineers and how they could one day shape it themselves.

Gray: By highlighting the real-world impact engineers can have through good design. Whether it's improving the experience of building occupants or delivering positive outcomes for the surrounding environment, focusing on the purpose behind our calculations helps my generation see building services engineering as a career with clear meaning that is creative and rewarding.

Poon: I want to inspire the next generation by emphasising the meaningful impact our profession can have on people's lives and on the planet. I encourage young engineers to look beyond compliance and calculations, and to see buildings as living systems that support health, comfort and social wellbeing.

Chengappa: In my experience, putting yourself out there brings out the best in yourself – and being part of CIBSE YEN really helped me find a community with which I could resonate.

What's the most transformative, but overlooked, building service?

Arnold: Ventilation is key. We must ensure there is sufficient ventilation in all buildings, including dwellings. It has been shown that poorly ventilated places of work can lead to employee fatigue and has a direct effect on efficiency, productivity and job satisfaction.

Clemence-Jackson: Ventilation – the potential risks of damp and humid buildings are significant and must be mitigated for safe buildings. When done right, a well-ventilated space supports alertness and concentration, keeps things smelling fresh, and lets people be happy and comfortable.

Gray: Ventilation. I may be biased as a mechanical engineer! Its influence on wellbeing, focus and health is significant, but, often, it is reduced to a box-ticking exercise. When designed well, ventilation quietly transforms how people experience a space, making it one of the most powerful systems in any building.

Poon: Lighting plays a critical role in visual comfort, safety, productivity, and even people's natural sleep-wake patterns and overall wellbeing. Many current control strategies remain relatively basic and fail to fully integrate daylight harvesting, adaptive dimming and advanced energy-efficient control methodologies.

Chengappa: Building management systems are often underestimated, especially in older buildings. When combined with smart metering, they give owners, facility managers and occupants a clear picture of how much energy and water are being used on a daily basis. ●

Three projects in the Net Zero Carbon Buildings Standard pilot scheme. From left: 38 Finsbury Square, Theatr Clwyd and First Avenue housing

Ambitious but achievable

In the buildup to the launch of the UK Net Zero Carbon Buildings Standard, **Molly Tooher-Rudd** talks to its CEO, Katie Clemence-Jackson, to see how feedback from pilot projects is influencing the Standard's carbon and energy limits

Feedback from the UK Net Zero Carbon Buildings Standard (UK NZCBS) pilot has provided a huge vote of confidence for the framework, which is set to transform the way buildings in the UK are designed, built and operated.

Evidence from more than 200 projects found that the limits for embodied carbon and operational energy use in the pilot version of the Standard were achievable. 'Generally, there was a positive response – many participants felt the limits were ambitious yet achievable,' NZCBS CEO Katie Clemence-Jackson tells *CIBSE Journal*.

However, as expected with pilot testing, there were also less favourable comments, she adds: 'We're using this to inform a review of our limits, with particular attention paid to those where concerns were raised, to make sure we are striking the right balance.'

Responses from 134 project owners have helped shape the first version of the Standard, which is due to be published in early 2026. The substantial level of feedback is giving the UK NZCBS confidence that appropriate limits have been created, says Clemence-Jackson. 'We were only going to set limits once we had sufficient data to provide us with the right level of assurance.'

The UK NZCBS is a voluntary standard applicable across new-build and existing buildings (whether retrofitted or not). It sets out metrics by which net zero carbon-aligned performance is evaluated, and projects must meet mandatory limits and targets. Among other things, the mandatory criteria cover operational energy use, embodied carbon, onsite renewable electricity, and refrigerants, as well as the need to avoid fossil fuel use on site.

Feedback on limits

The pilot testing programme uncovered broad support for the limits for operational energy use and upfront carbon across all building sectors.

For upfront carbon limits in new works, 76% of respondents thought the limits were at the right level or not ambitious enough. For operational energy limits in new buildings, respondents were more cautious, with 69% saying they were at the right level or not ambitious enough. However, these results were heavily skewed by the science and technology sector, in which 80% said the limits were too ambitious. (See Figure 1.)

For retrofit projects, respondents were also positive, with 85% saying the operational limits for one-go and stepped retrofits were at the right level or not ambitious enough, and 83% saying the same for the embodied carbon limits.

A significant proportion of respondents, however, thought certain targets were too ambitious – 31%, for example, said this about the limit for upfront embodied carbon associated with onsite renewables. Renewable electricity generation targets were also cited as being too ambitious by 56% of respondents.

Clemence-Jackson says the responses make it clear that further clarification is needed, but that many buildings would have met the target with permitted exemptions applied.

Among the clarifications being made to Version 1 in light of the pilot feedback is a detailed explanation of the circumstances in which the renewable generation target can be reduced. These include planning or legal constraints, available space, overshadowed roofs, Grid-connectivity constraints, access, and structural capacity.

Delineation

The pilot revealed the need for clear separation of tenants and landlords' responsibilities, and a delineation working group has developed separate routes to conformity for each in certain sectors. This includes delineation requirements for the office sector, which will be available in Version 1 of the Standard.

A large proportion of respondents

reported difficulty in gathering tenant data – for example, 73% said that, for buildings with multiple tenants, they would not be able to conduct separate embodied carbon assessments for reportable works for each tenant.

'Anyone following this method will still use the Standard's methodology, but there will be certain areas where it's different if your responsibilities are as a landlord or tenant,' explains Clemence-Jackson. The Standard's approach will enable landlords to obtain verification independently of tenants, and vice versa.

There was some concern about the challenges of collecting operational energy data from tenants, particularly in the domestic sector. The NZCBS has responded by stating that, for housing developments, energy data for verification can be provided on a whole-site basis. It is also exploring routes by which landlords and tenants can comply separately in this sector.

Deemed to satisfy

Version 1 will set out how existing schemes can be used towards verification against the Standard. It will contain new annexes to cover where projects that are pursuing other certification schemes can use this as evidence of equivalence – known as 'deeming to satisfy' – for specific mandatory criteria within the UK NZCBS.

For example, Clemence-Jackson confirms that offices with a high NABERS UK rating will be deemed to satisfy the energy use requirements of the Standard. 'It should make life easier, because you won't need to demonstrate the operational energy evidence twice.'

Integration of the Standard with other operational standards, such as Breeam and Passivhaus, is ongoing and will be published when collaboration with these organisations has concluded.

In one pilot project, Glyn-coch Primary School in Wales, the Passivhaus design 'took care of the operational limits', according to Doug Drewniak, principal building performance manager at Willmott Dixon, who added: 'We see Passivhaus as a fantastic way to meet the requirements of the Standard.'

Clemence-Jackson is urging other assessment bodies to come forward: 'We are open to speaking to any other scheme that has relevant metrics deemed to satisfy the Standard. Essentially, we want to reduce the amount of work that people have to do.'

In response to pilot feedback, an interim validation check at practical completion (PC) is being introduced. A working group has developed the technical requirements for this, and full details of the "PC on track" check, and allowable communications around this status, will be provided in Version 1.

Future developments

Data centres have some different evaluation metrics in the Standard. For example, while other buildings must adhere to energy use intensity limits, data centres are assessed using power usage effectiveness, which measures the efficiency of cooling and power infrastructure relative to the IT load. Similar to some other sectors, data centres can apply certain exemptions related to fossil fuels and space heating.

The UK NZCBS has a dedicated data centre sector group, and is planning to talk to members of the CIBSE Data Centres Group to explore future developments for this sector, such as in-use embodied carbon limits and the possible evolution of energy use limits with intensity of use.

New aspects will only be introduced into the Standard if they are supported by evidence, says Clemence-Jackson. Once Version 1 is launched, performance data gathered through the verification process will inform future iterations, she adds: 'We want to work together to gather that additional data and think about what could be introduced in later versions to support data centres on their net zero carbon pathway.'

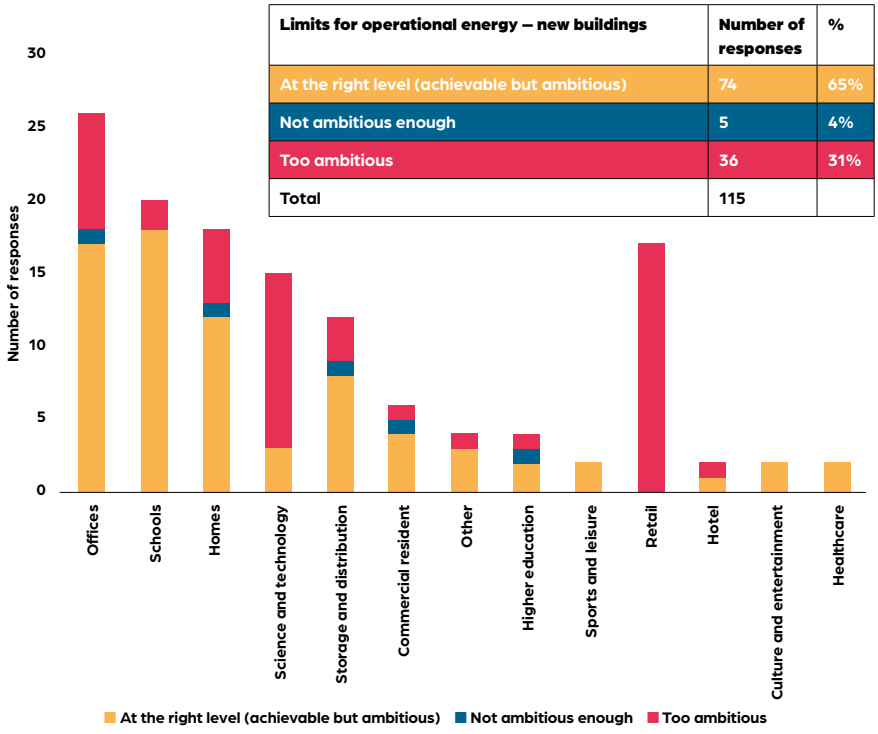
The UK NZCBS is keen to help other countries develop their own versions of the Standard, and has already spoken to the Dutch Green Building Council. 'They told us they were inspired by our Standard. We had a call to talk through technical aspects; they have seen what we're doing and are learning from it,' Clemence-Jackson says.

The Standard's limits are also already starting to influence design approaches in the UK. 'We heard at our conference in November that teams are looking at the refrigeration limits and incorporating them into their future designs – it's really positive to see,' says Clemence-Jackson.

'Constraints set the playing field for creativity. We've set the limits that need to be considered when designing a building. People can be creative in how they meet them.' ●

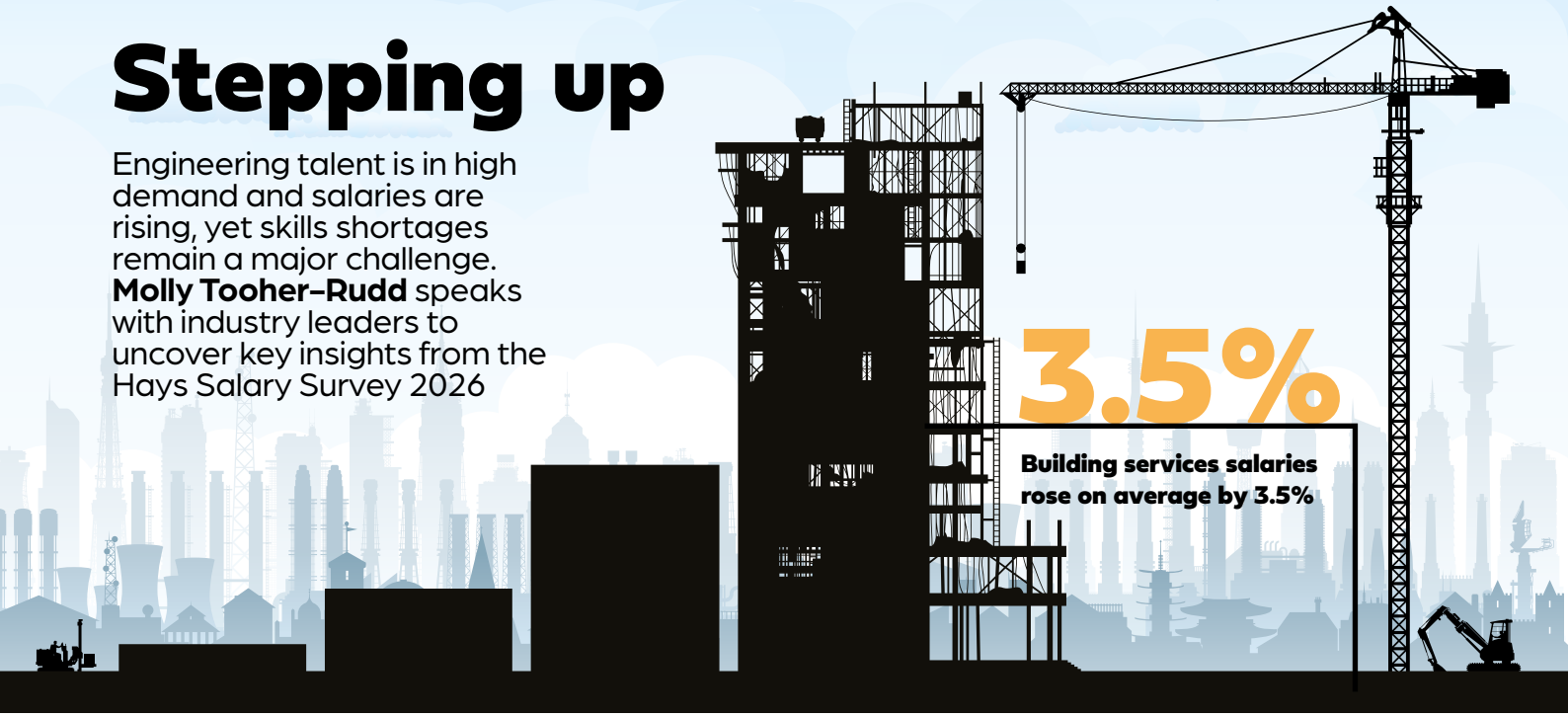
Achievability of limits for operational energy

Limits for operational energy – new buildings	Number of responses	%
At the right level (achievable but ambitious)	74	65%
Not ambitious enough	5	4%
Too ambitious	36	31%
Total	115	



Stepping up

Engineering talent is in high demand and salaries are rising, yet skills shortages remain a major challenge. **Molly Tooher-Rudd** speaks with industry leaders to uncover key insights from the Hays Salary Survey 2026



The push towards net zero buildings is fuelling a surge in demand for building services engineers, driving salary growth that consistently outpaces the broader construction and property sectors.

Building services salaries rose on average by 3.5%, compared with 3% for the industry as a whole, according to the 2026 Hays Salary Survey. This was a substantial increase on last year's pay increase in building services, which was a minimal 1.3%. The overall UK average pay increase across all sectors is 2.2%.

Consultants are leading the charge, with pay increases of 4.9% and 4.5% for associates and directors respectively. M&E quantity surveyors benefited from a 4.9% increase, while senior design engineers enjoyed a 3.9% rise.

Phil Jackson, national director at Hays, observes: 'While we have seen signs of struggle in the overall construction industry, demand for people in building services is probably the strongest it's been.'

For professionals in the sector, this confidence is strengthened by long-term drivers such as retrofit, performance optimisation and net zero delivery, adds Jackson.

However, the same forces sustaining demand are also exposing challenges around acute skills shortages, career progression and retention that the industry must now confront, he says.

Craig Watts, Hays' national building services lead, believes the resilience in the building services discipline lies in its breadth and relevance. 'Building services affects almost every aspect of modern life. It's not as exposed to economic cycles because it's not solely reliant on commercial development,' he says, seeing this as a structural shift rather than a temporary trend.'

Mike Burton FCIBSE, environmental building engineering director at Aecom, echoes this longer-term perspective. 'Change is constant and the market is challenging in places,' he says, 'but we have a shortage of housing, ageing estates and a clear need to decarbonise. Data centres, logistics, defence and aviation are all growing markets, and they need high-calibre engineers to support them. It's a fantastic industry, with a huge positive impact on society.'

'Data centres are a hotspot,' Jackson agrees. 'With MEP services accounting for roughly 60% of data centre construction costs, competition for specialised engineers in this sector is a major driver of the salary increases.'

Consultants: Associate

Region	Typical salary 2026	Minimum salary 2026	Maximum salary 2026
East Midlands	£74,000	£65,000	£84,000
East of England	£70,000	£60,000	£75,000
London	£85,000	£70,000	£85,000
North East England	£65,000	£50,000	£70,000
North West England	£72,000	£65,000	£80,000
Northern Ireland	£70,000	£65,000	£75,000
Scotland	£70,000	£57,000	£80,000
South East England	£75,000	£65,000	£80,000
South West England	£72,000	£68,000	£75,000
Wales	£70,000	£68,000	£73,000
West Midlands	£76,000	£65,000	£84,000
Yorkshire and the Humber	£65,000	£50,000	£70,000
National average	**£72,000**	**£62,333**	**£77,583**
% increase year on year: 4.9%			

Consultants: Director

Region	Typical salary 2026	Minimum salary 2026	Maximum salary 2026
East Midlands	£84,000	£74,000	£92,000
East of England	£85,000	£70,000	£90,000
London	£125,000	£90,000	£150,000
North East England	£80,000	£70,000	£90,000
North West England	£80,000	£75,000	£100,000
Northern Ireland	£85,000	£80,000	£90,000
Scotland	£80,000	£70,000	£90,000
South East England	£90,000	£85,000	£120,000
South West England	£80,000	£70,000	£85,000
Wales	£75,000	£70,000	£85,000
West Midlands	£86,000	£74,000	£92,000
Yorkshire and the Humber	£80,000	£70,000	£90,000
National average	**£85,833**	**£74,833**	**£97,833**
% increase year on year: 4.5%			

Acute skills shortage

This sustained demand continues to collide with a constrained talent pipeline. According to the Hays guide, 92% of organisations experienced skills shortages in the past year, only a marginal improvement on the previous year and still the defining challenge shaping recruitment decisions.

Watts highlights electrical design engineering as an example of an acute pressure point. 'Our demand for electrical design engineers is phenomenal,' says Watts. 'But the gap between supply and demand on the electrical side is more pronounced than in mechanical.'

Watts sees this pressure clearly in day-to-day recruitment activity. 'In the past six months alone we've seen a 50% increase in demand – showing just how strong the market is, and how urgently firms are competing for talent.'

Digital-capability shortages are another factor compounding the issue, with only 27% of employers confident they have the right artificial intelligence (AI) capabilities, while half (50%) report moderate or severe shortages.

Revit has emerged as a clear hiring hotspot, shifting from a desirable skill to an essential one. Watts notes that Revit requirements are now frequent and increasingly senior. 'We're seeing employers move away from junior Revit users towards engineers with a high level of understanding of how these tools integrate with AI-driven generative design and digital twins. AutoCAD alone isn't enough any more. Engineers need to upskill and move with the industry.'

In response, employers are moving toward more holistic hiring. 'We value technical curiosity and adaptability over fixed skillsets, prioritising openness to learn, critical thinking and problem-solving,' says Andy Grint, learning and development coordinator at Hilson Moran. This reflects a wider industry shift where 73% of firms now prioritise attitude over existing skills.

The definition of senior competence is also evolving. While technical capability remains a baseline requirement, soft skills are now a primary differentiator for progression and access to the highest salary bands.

'Commercial awareness has definitely gone up the ranking in terms of

Consultants: Junior design engineer (M&E)

Region	Typical salary 2026	Minimum salary 2026	Maximum salary 2026
East Midlands	£32,000	£28,000	£36,000
East of England	£32,500	£28,000	£35,000
London	£36,000	£28,000	£38,000
North East England	£26,000	£25,000	£36,000
North West England	£30,000	£25,000	£32,000
Northern Ireland	£32,000	£28,000	£33,000
Scotland	£32,000	£27,000	£35,000
South East England	£33,000	£25,000	£35,000
South West England	£35,000	£31,800	£38,000
Wales	£34,000	£31,000	£38,000
West Midlands	£32,000	£28,000	£36,000
Yorkshire and the Humber	£32,000	£28,000	£36,000
National average	**£32,208**	**£27,733**	**£35,667**
% increase year on year: 3.5%			

Consultants: Sustainability consultant

Region	Typical salary 2026	Minimum salary 2026	Maximum salary 2026
East Midlands	£52,000	£45,000	£57,000
East of England	£55,000	£44,000	£60,000
London	£64,000	£45,000	£75,000
North East England	£50,000	£45,000	£57,000
North West England	£55,000	£40,000	£80,000
Northern Ireland	£55,000	£50,000	£65,000
Scotland	£50,000	£38,000	£53,000
South East England	£49,000	£45,000	£55,000
South West England	£51,000	£46,000	£54,000
Wales	£50,000	£46,000	£54,000
West Midlands	£52,000	£45,000	£57,000
Yorkshire and the Humber	£52,000	£45,000	£57,000
National average	**£52,917**	**£44,500**	**£60,333**
% increase year on year: 2.9%			

Consultants: Senior design engineer (M&E)

Region	Typical salary 2026	Minimum salary 2026	Maximum salary 2026
East Midlands	£58,000	£50,000	£65,000
East of England	£58,000	£50,000	£65,000
London	£62,000	£55,000	£65,000
North East England	£55,000	£50,000	£65,000
North West England	£56,000	£45,000	£65,000
Northern Ireland	£58,000	£50,000	£60,000
Scotland	£55,000	£45,000	£60,000
South East England	£60,000	£55,000	£65,000
South West England	£55,000	£51,000	£60,000
Wales	£54,000	£51,000	£60,000
West Midlands	£58,000	£50,000	£65,000
Yorkshire and the Humber	£58,000	£50,000	£65,000
National average	**£57,250**	**£50,167**	**£63,333**
% increase year on year: 3.9%			

Consultants: Intermediate design engineer

Region	Typical salary 2026	Minimum salary 2026	Maximum salary 2026
East Midlands	£42,000	£36,000	£48,000
East of England	£48,000	£40,000	£55,000
London	£45,000	£45,000	£50,000
North East England	£42,000	£36,000	£48,000
North West England	£39,000	£33,000	£45,000
Northern Ireland	£40,000	£35,000	£45,000
Scotland	£45,000	£35,000	£50,000
South East England	£42,000	£35,000	£45,000
South West England	£50,000	£47,000	£55,000
Wales	£48,000	£47,000	£55,000
West Midlands	£42,000	£36,000	£48,000
Yorkshire and the Humber	£42,000	£36,000	£48,000
National average	**£43,750**	**£38,417**	**£49,333**
% increase year on year: 2.9%			

Consultants: Revit/BIM technician

Region	Typical salary 2026	Minimum salary 2026	Maximum salary 2026
East Midlands	£46,000	£37,000	£50,000
East of England	£43,000	£32,000	£49,000
London	£57,000	£45,000	£65,000
North East England	£40,000	£37,000	£50,000
North West England	£44,000	£35,000	£45,000
Northern Ireland	£45,000	£38,000	£48,000
Scotland	£37,000	£26,000	£42,000
South East England	£52,000	£40,000	£55,000
South West England	£45,000	£41,000	£50,000
Wales	£42,000	£41,000	£49,000
West Midlands	£45,000	£37,000	£50,000
Yorkshire and the Humber	£46,000	£37,000	£50,000
National average	**£45,167**	**£37,167**	**£50,250**
% increase year on year: 2.4%			

Contractors: M&E quantity surveyor

Region	Typical salary 2026	Minimum salary 2026	Maximum salary 2026
East Midlands	£65,000	£55,000	£70,000
East of England	£66,000	£55,000	£72,000
London	£72,000	£65,000	£90,000
North East England	£60,000	£55,000	£70,000
North West England	£60,000	£55,000	£70,000
Northern Ireland	£65,000	£60,000	£70,000
Scotland	£52,000	£50,000	£55,000
South East England	£70,000	£55,000	£72,000
South West England	£60,000	£55,000	£65,000
Wales	£55,000	£50,000	£63,000
West Midlands	£65,000	£55,000	£70,000
Yorkshire and the Humber	£60,000	£55,000	£70,000
National average	**£62,500**	**£55,417**	**£69,750**
% increase year on year: 4.9%			

what clients are asking for,' says Watts. Communication, client engagement and leadership are increasingly critical, particularly as firms manage complex change around technology, flexible working and workload pressures.

Pay has responded to these pressures, though increases remain measured. Over the past 12 months, 85% of employers increased salaries, most commonly by 2.5–5%.

Looking ahead, 84% of employers expect to raise salaries again. Jackson notes that building services is experiencing some of the strongest upward pressure. 'Electrical skills shortages, retrofit, net zero and cost-of-living considerations are all converging. Many employers are actively reviewing pay structures to retain existing staff.'

Salary alone is no longer sufficient to retain experienced engineers. At Hilson Moran, 'wellbeing and social value are core to how we operate – from flexible working to open conversations around mental health,' says Grint. 'Creating an environment where people feel supported, heard and able to grow is fundamental.' Successful employers are increasingly making these principles a core business objective.

Employers should also be wary of the 64% of professionals who intend to look for a new role within the next 12 months. Watts says a lack of flexibility and opportunity in a role can be a major cause of dissatisfaction. 'It is vital that employers clearly articulate and signpost opportunities for progression, or they risk losing talent simply because the route forward wasn't communicated strongly enough,' adds Watts.

At Aecom, graduates and apprentices rotate across disciplines, and receive structured training in technical and soft skills. 'Career planning, variety and learning are key to retaining talent,' Burton says.'

For Burton, long-term resilience depends on broadening awareness and investing in people. 'We need to raise awareness of the industry and its specialisms,' he says. 'Areas such as building physics, CFD, fire and façade engineering are difficult to recruit for, simply because people don't know these career paths exist.'

Contractors: Revit/BIM technician

Region	Typical salary 2026	Minimum salary 2026	Maximum salary 2026
East Midlands	£47,000	£40,000	£55,000
East of England	£32,000	£30,000	£40,000
London	£50,000	£42,000	£60,000
North East England	£39,000	£33,000	£55,000
North West England	£35,000	£33,000	£55,000
Northern Ireland	£48,000	£45,000	£55,000
Scotland	£30,000	£25,000	£30,000
South East England	£43,000	£37,000	£45,000
South West England	£35,000	£33,000	£38,000
Wales	£33,000	£30,000	£36,000
West Midlands	£45,000	£40,000	£55,000
Yorkshire and the Humber	£40,000	£40,000	£55,000
National average	**£39,750**	**£35,667**	**£48,250**
% increase year on year: 2.6%			

Contractors: Directors

Region	Typical salary 2026	Minimum salary 2026	Maximum salary 2026
East Midlands	£80,000	£70,000	£95,000
East of England	£87,500	£75,000	£95,000
London	£110,000	£90,000	£130,000
North East England	£80,000	£70,000	£85,000
North West England	£80,000	£70,000	£95,000
Northern Ireland	£95,000	£85,000	£100,000
Scotland	£83,000	£80,000	£90,000
South East England	£90,000	£75,000	£95,000
South West England	£80,000	£75,000	£85,000
Wales	£75,000	£68,000	£80,000
West Midlands	£80,000	£70,000	£95,000
Yorkshire and the Humber	£80,000	£70,000	£85,000
National average	**£85,042**	**£74,833**	**£94,167**
% increase year on year: 2.2%			

Contractors: Estimator

Region	Typical salary 2026	Minimum salary 2026	Maximum salary 2026
East Midlands	£55,000	£45,000	£70,000
East of England	£58,000	£50,000	£65,000
London	£65,000	£55,000	£70,000
North East England	£55,000	£45,000	£70,000
North West England	£50,000	£45,000	£70,000
Northern Ireland	£55,000	£50,000	£60,000
Scotland	£45,000	£40,000	£50,000
South East England	£72,000	£60,000	£80,000
South West England	£55,000	£50,000	£60,000
Wales	£50,000	£45,000	£60,000
West Midlands	£55,000	£45,000	£70,000
Yorkshire and the Humber	£55,000	£45,000	£70,000
National average	**£55,833**	**£47,917**	**£66,250**
% increase year on year: 2.90%			

Contractors: Project manager

Region	Typical salary 2026	Minimum salary 2026	Maximum salary 2026
East Midlands	£65,000	£50,000	£70,000
East of England	£65,000	£55,000	£75,000
London	£80,000	£70,000	£90,000
North East England	£60,000	£50,000	£70,000
North West England	£60,000	£50,000	£70,000
Northern Ireland	£55,000	£50,000	£60,000
Scotland	£50,000	£45,000	£55,000
South East England	£70,000	£55,000	£75,000
South West England	£55,000	£52,000	£58,000
Wales	£45,000	£40,000	£55,000
West Midlands	£65,000	£50,000	£70,000
Yorkshire and the Humber	£60,000	£50,000	£70,000
National average	**£60,833**	**£51,417**	**£68,167**
% increase year on year: 3.7%			

Contractors: Project engineer

Region	Typical salary 2026	Minimum salary 2026	Maximum salary 2026
East Midlands	£50,000	£40,000	£52,000
East of England	£55,000	£45,000	£65,000
London	£65,000	£60,000	£75,000
North East England	£50,000	£40,000	£52,000
North West England	£45,000	£40,000	£52,000
Northern Ireland	£45,000	£45,000	£55,000
Scotland	£48,000	£40,000	£50,000
South East England	£55,000	£45,000	£65,000
South West England	£48,000	£43,000	£50,000
Wales	£43,000	£40,000	£44,000
West Midlands	£50,000	£40,000	£52,000
Yorkshire and the Humber	£50,000	£40,000	£52,000
National average	**£50,333**	**£43,167**	**£55,333**
% increase year on year: 4%			

Contractors: Senior contracts manager

Region	Typical salary 2026	Minimum salary 2026	Maximum salary 2026
East Midlands	£70,000	£60,000	£80,000
East of England	£71,000	£60,000	£75,000
London	£82,000	£70,000	£95,000
North East England	£70,000	£60,000	£80,000
North West England	£65,000	£60,000	£80,000
Northern Ireland	£65,000	£60,000	£70,000
Scotland	£75,000	£60,000	£80,000
South East England	£75,000	£60,000	£78,000
South West England	£65,000	£58,000	£70,000
Wales	£62,000	£56,000	£65,000
West Midlands	£70,000	£60,000	£80,000
Yorkshire and the Humber	£70,000	£60,000	£80,000
National average	**£70,000**	**£60,333**	**£77,750**
% increase year on year: 2.9%			

Inspired by nature

A paper measuring the psychological impacts of biophilic design says that nature has the potential to inspire creativity and motivation in building environments. **Tim Dwyer** looks at the evidence from Nottingham Trent University research

Biophilic design, the practice of embedding nature and natural references within the built environment, has long been associated with improved wellbeing. Research suggests contact with nature reduces stress, restores mental focus, and provides a sense of refuge and safety.

A recent paper[1] by Dr Yangang Xing FCIBSE and colleagues at Nottingham Trent University extends this evidence base with an empirical study that examines the three established biophilic theories, and introduces a fourth – that biophilic environments may also stimulate inspiration. The findings offer quantitative insight into how varying degrees of biophilic quality influence psychological states.

The concept of biophilia, meaning 'love of life', was first articulated by Erich Fromm in the 1960s and developed by Edward O Wilson in the 1980s, with further theoretical grounding provided by Wilson and Stephen Kellert in the early 1990s.

In modern urban societies that keep people indoors for most of the day, connection with nature is increasingly fragile. Surveys regularly reveal dissatisfaction with workplaces lacking greenery, daylight, colour or art, features linked to positive affect and productivity. Such environments may erode wellbeing and contribute to complaints, collectively known as 'sick-building syndrome'.

Three psychological theories are commonly referenced. Stress–recovery theory suggests that exposure to nature lowers arousal; attention–restoration theory proposes that natural settings replenish directed attention; and refuge and prospect theory holds that environments offering protection and outward views satisfy deep-rooted preferences for safety. Xing and his colleagues tested all three and added the biophilic-inspiration hypothesis, proposing that natural surroundings may evoke motivational and creative states.

The researchers recruited 255 participants, aged 18 to 77. Each completed online trials combining a stress-induction exercise with exposure to virtual interior environments representing classrooms, corridors and stairwells. The stress task required rapid arithmetic under noisy, socially pressurised conditions. Participants then viewed digital images of interiors rendered at four levels of biophilic design: Level 0 with no natural elements; level 1 introducing natural light, depth and prospect; level 2 adding natural analogues – such as organic colours, textures and materials; and level 3 incorporating plants, daylight and natural materials.

Psychological responses were measured using the positive and negative affect schedule (Panas). Pairs of adjectives were mapped to the four theoretical constructs: relaxed/irritable

(recovery); attentive/fatigued (attention); self-assured/frightened (refuge); and inspired/downhearted (inspiration). Comparing post-stress and post-exposure ratings allowed the authors to calculate the degree of emotional recovery attributable to each biophilic level.

Across all constructs there were statistically significant improvements as biophilic richness increased ($p < 0.001$). At level 0, sterile interiors produced negative scores, indicating a further deterioration in mood. In contrast, levels 1–3 generated progressively larger positive effects, reaching mean improvements of +1.74 for recovery and +1.19 for inspiration at level 3. Most increments between levels were significant, showing a dose–response relationship between biophilic intensity and psychological benefit. Simple 'liking' ratings aligned with the Panas outcomes: only the most biophilic environments were viewed favourably. (See Figure 1.)

No significant correlations were found with demographic variables such as age, gender, ethnicity, or whether participants lived in urban or natural settings. The responses appeared broadly universal, supporting the proposition that biophilic tendencies may be widely shared.

The inclusion of 'inspiration' as a measurable construct marks a conceptual development. Whereas earlier theories focus on restoring depleted states such as stress or fatigue, the inspiration hypothesis aligns with positive psychology, which emphasises human flourishing.

Feeling inspired represents a proactive emotional condition that can underpin creativity and engagement, extending the rationale for biophilic design into educational and innovation-focused settings.

The authors also suggest that the absence of biophilic features may contribute to sick-building syndrome (SBS). While SBS is often linked to air quality or comfort parameters, sensory monotony, lack of natural cues and visual sterility may also act as psychological stressors. Conversely, introducing layered natural elements, including spatial variation, organic materials and greenery, produced measurable emotional gains.

Like all laboratory-based work, the study has limitations. Digital imagery captures only the visual dimension and not the full sensory spectrum of real environments. Future research, the authors note, should incorporate additional sensory cues and objective physiological measures, and be validated in live building contexts. They also highlight the need to explore individual differences, such as personality traits and neurodiversity. Nevertheless, the controlled approach suggests an association between environmental design variables and affective outcomes, although further validation is required.

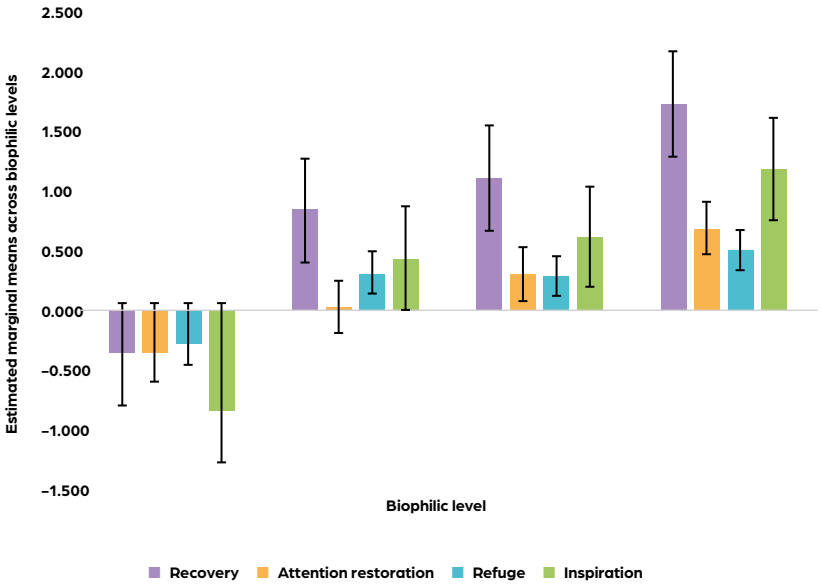
Contributors sought

A biophilic design guide is being developed, with a workshop in early 2026.
To contribute, email Dr Yangang Xing FCIBSE at yangang.xing@ntu.ac.uk

Viewed through the lens of building services and architectural engineering, the implications are noteworthy. Design decisions influencing light, air, materials and spatial form have psychological as well as physical effects. Incorporating biophilic principles within schools, offices and healthcare facilities has the potential to support reduced stress, improved concentration and greater creative engagement. At a broader scale, enriching urban buildings with natural qualities may help mitigate some of the psychological pressures associated with city living.

The research team proposes that biophilic design may represent more than an aesthetic strategy, noting potential public health implications. Their findings suggest its effects could extend beyond comfort and energy performance into emotional and cognitive domains. In showing that inspiration may be influenced by environmental design, the study highlights an area warranting further investigation. In short, the paper suggests that buildings that strengthen our connection with natural elements may help us feel more alive. ●

Figure 1: Changes in reported mood across biophilic design levels
Source: bit.ly/45bw0J2



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Hard truths behind the energy transition

Building services engineers are eager to decarbonise, but need upskilling if they are to move from fossil fuels to clean energy, according to a new survey by *CIBSE Journal* and Eaton. **Andy Pearson** reports on the findings

Decarbonising the built environment is no longer a theoretical challenge. For most building services engineers, it is now a defining feature of everyday practice. According to a new survey, sustainability is important in the current projects of 91% of respondents. While policy ambition and client ambition are accelerating, however, delivery on the ground remains constrained by a combination of technical, commercial and organisational barriers.

The survey, with more than 250 responses – brought to you by *CIBSE Journal* and intelligent power management company Eaton – offers a revealing snapshot of how the industry is grappling with the challenges of delivering net zero carbon buildings.

An experienced profession under pressure

The survey respondents are predominantly senior, experienced practitioners. More than half have worked in building design or consultancy for 20 years-plus, and a further 22% for 11–20 years.

Most respondents work across M&E disciplines, with HVAC, power and lighting systems most frequently specified. This cross-disciplinary exposure is important, because decarbonisation increasingly cuts across professional boundaries. Decisions about heating systems, electrical infrastructure, controls and resilience are now tightly interlinked. This depth of experience lends weight to the findings: nearly half are long-standing practitioners reflecting on a system that is changing fast.

When asked to rank the biggest challenges they face in building design projects today, pressure to reduce project timelines and costs emerged as the most significant issue overall.

Budget constraints and changing client expectations followed closely behind, with poor stakeholder communication ranking highly. Staff shortages, while often cited in industry forums, ranked lower than might be expected.

Electrification is widely recognised as central to decarbonising buildings, particularly through the replacement of fossil fuel heating with heat pumps and the expansion of electric vehicle (EV) infrastructure. However, the survey highlights just how challenging this transition is in practice.

Survey details

***CIBSE Journal* received 250 online responses between December 2025 and January 2026**

When asked about the single biggest challenge in designing for electrification (see graph below), capital cost and economic viability topped the list, cited by more than 40% of respondents. Grid capacity and supply constraints followed, while integration with existing building fabric and space limitations also featured strongly. Responses included: 'Lack of carbon literacy and skills shortage on every level'; and 'Unsuitable codes and standards'.

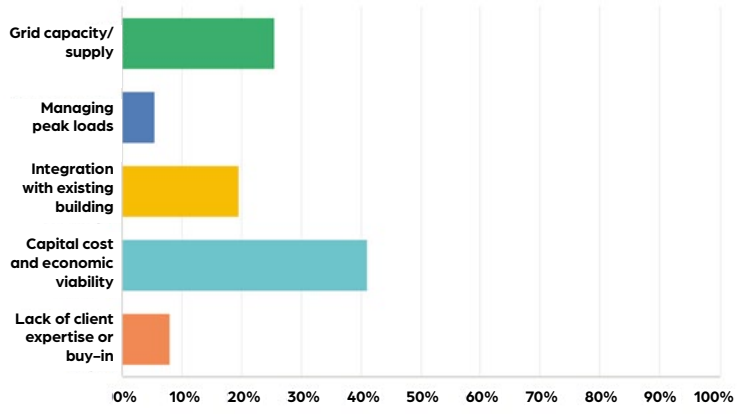
These findings point to a disconnect between policy ambition and physical reality. While electrification is often presented as a straightforward substitution, practitioners are grappling with buildings and networks that were never designed for today's electrical loads.

Retrofitting heat pumps into constrained plantrooms, accommodating new risers or substations, and negotiating with network operators over connection capacity are now routine challenges.

Given that Grid capacity was identified as a major challenge, it is surprising that only a small minority of respondents are actively integrating distributed energy resources (DERs) – such as battery storage, solar PV and EV charging – into their designs today, with most reporting relatively low levels of adoption.

Marc Gaunt, sales director, commercial buildings, UK & Ireland, at Eaton, points to a

What is the single biggest challenge you face when designing for the electrification of building systems?



recent retail project as an illustration of what is possible. The 2,320m^2 store faced a fixed 250kVA Grid supply limit that could not meet its operational needs, even after significant efficiency improvements.

Using Eaton's Building as a Grid Simulator, the team modelled real-world energy flows and identified a battery-based approach to bridge the gap. A 200kW/750kWh containerised xStorage system was installed externally, and integrated with the site's switchboard and distribution infrastructure to provide peak shaving and maximise the store's consumption of energy generated by large onsite solar panels.

Respondents expect digital technologies to have a significant impact on their work over the next two years. Energy consumption forecasting, artificial intelligence, smart sensors and battery energy-storage systems all featured prominently. Building performance simulation tools also ranked highly, reflecting the growing need to model buildings dynamically.

Sustainability now mainstream

Green building practices are now firmly embedded in mainstream design. Yet the survey suggests this does not automatically translate into clarity. When asked how the push for net zero carbon buildings has most significantly impacted electrical infrastructure design, respondents pointed to a wide range of factors: embodied carbon in materials, system sizing for higher peak loads, integration of renewables and storage, operational performance, and product longevity (see graph below).

This breadth of impact reflects the complexity of net zero itself. Engineers are no longer optimising for a single parameter, such as capital cost or energy efficiency, but balancing multiple, sometimes competing, objectives across the building life-cycle. Without clearer guidance and consistent metrics, this complexity risks slowing progress, rather than accelerating it.

Alongside decarbonisation, power resilience remains a major concern. More than 80% of respondents rated resilience as very or moderately important when specifying systems for clients. This highlights an emerging tension within building services design. As buildings electrify and rely more heavily on digital systems, their vulnerability to power disruptions increases. Engineers are therefore being asked to square a difficult circle: deliver low carbon buildings that are also robust in the face of Grid instability, extreme weather and changing patterns of use.

At the same time, traditional resilience solutions – such as diesel generators – sit uneasily with decarbonisation goals, although solutions such as battery storage and smart load management can help keep buildings and systems operational.

Knowledge gaps and the skills challenge

Despite the experience of the respondent group, significant knowledge gaps remain. Smart grid integration, demand-side and microgrids were all identified as technologies that represent the most significant current knowledge gap in design teams. DC distribution and battery energy storage also featured highly.

This is not a criticism of practitioners, but an indication of how fast the landscape is shifting. Many of these technologies are still evolving, with limited guidance, few exemplars and inconsistent client demand. Without structured knowledge sharing and professional development, there is a risk that innovation will outpace competence.

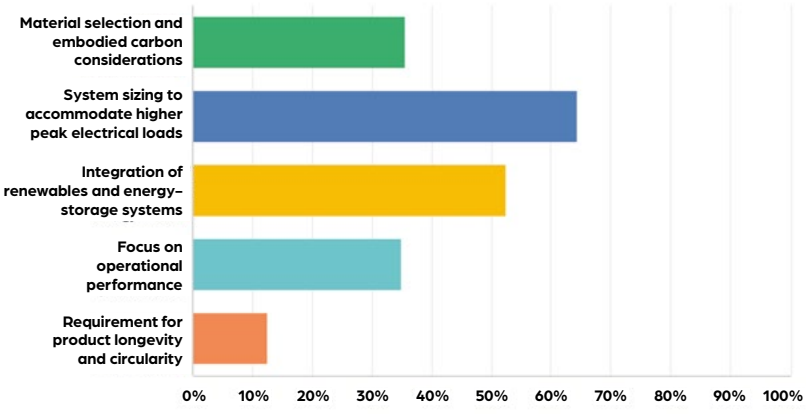
The findings point to a profession broadly aligned on the need for change, but stretched by competing pressures: electrification, Grid constraints, skills shortages, cost volatility, and the pace of regulatory and technological change.

Perhaps the most striking finding is not any single challenge, but the cumulative effect of many placing unprecedented demands on building services engineers.

Yet the survey also suggests a profession that is embracing these challenges. The message is clear: decarbonisation is not being resisted on technical grounds, but constrained by systemic issues that require coordinated action. Policy, regulation, education, client leadership and infrastructure investment need to move in step.

The findings reinforce the importance of professional guidance, knowledge sharing and advocacy. Engineers are ready to deliver low carbon buildings, but they cannot do it alone. The next decarbonisation phase will be defined by how effectively the industry tackles the practical realities revealed by this survey. ●

How has the push for net zero carbon buildings most significantly impacted the specification and design of electrical infrastructure (for example, switchgear, distribution, backup power) on your projects?



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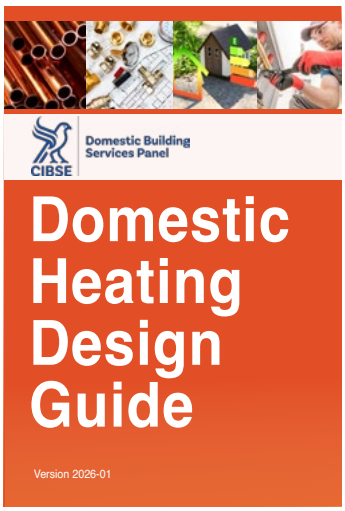
The essential guide for domestic heating design

The new edition of the *Domestic heating design guide* is critical for designers of heating and hot-water systems in owner-occupied homes, says **Andy Mathews**



The guide is available at bit.ly/CJKnPo

The new edition of the *Domestic heating design guide* has responded to a rapidly evolving heating landscape by improving technical accuracy, accountability and system performance, while aligning with current regulatory expectations, including the Building Safety Act. The 11th edition of the guide, developed by the CIBSE Domestic Building Services Panel, is intended to support designers and installers of space heating and domestic hot-water (DHW) systems in new and existing owner-occupied homes.

Reflecting current best practice, the guide retains its user-friendly structure while improving overall usability.

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Key updates

The guide introduces the system criteria document, which, in line with the Building Safety Act, provides a clear, auditable record of design decisions, system intent and professional responsibility.

Heat-loss calculations, using the latest CIBSE weather data, have been updated and options around design outdoor temperatures have been expanded – guidance is now included for not just the coldest day of the year, but also the 99.6th to 95th percentile coldest day, allowing designers to make informed design decisions and reduce the risk of oversizing.

The heat-loss assessment method has been updated as per BS EN 12831-1:2017, the standard for calculating design heat load. Safety margins that designers were previously encouraged to add throughout the design process have largely been removed. A 'safety' margin can be added back in at the end of the design process if needed, but by doing so at this stage, the designer is much more cognisant of the scale of the margin that is added.

There is dedicated guidance on control strategies and DHW design now aligns with BS EN 12831-3:2017. Coverage of modern hydraulic and system configurations has also been expanded.

The new edition also incorporates updated U-value tables, to include up-to-date construction standards.

There is a system design section, with improved coverage of fundamental fluid dynamics principles, heat emitters other than steel panel radiators, advanced system layouts (such as 4-pipe heat generators and manifold distribution), circulator control options, and low loss headers

The guidance around assessment of air permeability has changed. Where possible, the primary recommendation is to undertake an air permeability test. As a fallback, the guide now uses the SAP 10 air permeability assessment methodology for retrofit installations.

There is expanded guidance on making sure water treatments are recorded, compatible with each other and the system, and are regularly tested using approved methods. The updated document provides guidance on sizing a system to store water at a temperature less than 60°C (no less than 50°C), when this might be appropriate, and the mitigations (including thermal disinfection procedures) that should be taken if this is followed. The guide does not offer guidance on selecting a specific model of heat generator and manufacturers' advice should be sought on this. It does provide guidance on outputs that the heat generator should meet, on which selection can be based.

For heat generator sizing, the guide's default position is that the heat generator should be designed for hot-water priority operation (either DHW reheat or space heating), and the cylinder reheat should be driven by the space-heating demand. Guidance for other ways of sizing is also included.

The guide does not focus specifically on heat pumps – it is heat generator neutral – but it was written with heat pumps in mind. It signposts readers to the upcoming *CIBSE Domestic heat pump design and installation guide* (DHPDIG), expected in Q3 2026.

Next steps

As well as the DHPDIG, the panel plans to focus on updating its *Underfloor heating design and installation guide*. The *Rainwater harvesting guide* and *Solar thermal heating design guide* will be reviewed and updated when appropriate. ●

What the guide covers

- **Low-pressure and low-temperature domestic space heating and hot-water systems in the UK and Northern Ireland**
- **Open-vented and unvented/sealed/pressurised systems**
- **Systems connected to an automatically controlled heat source**
- **Systems in privately owned residential dwellings**

● **Andy Mathews is chair of the Domestic Building Services Panel. See the video interview on the web version of this story**

Setting the standard for social housing

Social housing retrofits can meet the upcoming UK Net Zero Carbon Buildings Standard, but the costs are high, says ECD Architects' **Loreana Padron**, based on a 48-homes Cambridge City Council pilot delivered by the practice

A retrofit project in Cambridge has demonstrated that social housing can meet the sustainability targets of the UK Net Zero Carbon Buildings Standard (UK NZCBS), but the team behind the scheme also make clear that funding remains a critical barrier.

The sustainable overhaul of 48 homes in Ross Street and Coldham's Grove, for Cambridge City Council, was submitted as a pilot project for the UK NZCBS, an emerging framework that includes performance-based targets covering operational energy and embodied carbon. The retrofit strategy included extensive fabric upgrades, low-temperature air source heat pumps (ASHPs), mechanical ventilation with heat recovery and onsite solar generation.

Although the design phase began before the Standard pilot was published, the process gave a clear understanding of where design decisions aligned well with the UK NZCBS, where they exceeded it, and where unavoidable constraints in existing housing made compliance more challenging.

Project team

Architect: ECD Architects
(Project architect: Marion Gray)
Mechanical, electrical and plumbing engineering: Greengauge
Retrofit coordinators and assessors: Keegans
Quantity surveyors: Focus
CDM principal designer: Currie & Brown
Monitoring and evaluation: SOAP Retrofit
Contractor: Axis Europe

External insulation was installed on the semi-detached Cambridge City Council homes

A technical overview

Combined with low carbon heating and onsite renewables, a fabric-first approach was fundamental to the success of the project. Reducing space-heating demand is the most reliable way to improve comfort, reduce energy bills and enable low carbon technologies to operate effectively.

Fabric improvement measures included external wall insulation, rafter-level roof insulation, suspended floor insulation to the front of homes, perimeter underground insulation, triple glazing, and airtightness measures. By significantly improving the building fabric, systems such as mechanical ventilation with heat recovery (MVHR) and heat pumps were able to run efficiently and predictably. Without this level of insulation, there was a risk of creating homes that were expensive to heat, potentially leading to affordability issues, resident dissatisfaction and unintended consequences, such as condensation and mould.

Heating and hot water were provided by ASHPs designed to operate at a maximum flow temperature of 45°C with a delta T of 5K. Radiators were assessed and around 50% replaced to ensure adequate output at low temperatures.

To maintain air quality, MVHR was installed throughout, supplying fresh air to habitable rooms and extracting from kitchens and bathrooms. Additionally, gas cookers were replaced with electric alternatives, and low-flow taps and showers were added where required.

Each home was fitted with between 2.4kWp and 4.0kWp of PV capacity. No batteries were installed; instead, any residual electricity generated and not used by the ASHP is transferred to phase change material-based thermal stores or hot-water cylinders. There was no need for local grid upgrades,

thanks to early engagement with the Distribution Network Operator, which confirmed this.

While fabric improvements made these technologies viable, the original renewable generation targets in the UK NZCBS remained challenging on constrained, existing roofs. Compliance was ultimately achieved through the Standard's allowance for exemptions in existing buildings. Heat pumps play a role in achieving operational carbon reductions. Combined with fabric upgrades, onsite renewables and, where possible, battery storage, they offer a scalable and future-proof solution.

Routing pipework and MVHR ductwork was the greatest challenge, often requiring visually intrusive ceiling-level boxing and prolonged disruption for residents. Space and integration were also significant constraints. Finding suitable locations for external heat pumps and hot-water storage is often challenging in existing homes.

Delivering a deep retrofit with residents in situ was complex. Plumbing modifications associated with external wall insulation and the installation of MVHR ductwork required access to multiple rooms. Coordinating these works while residents remained in their homes required detailed planning, flexibility and ongoing engagement.

The experience reinforced that deep retrofit in occupied homes is possible, but it requires realistic programming, significant flexibility, and a strong, trust-based relationship between the contractor, client team and residents.

It is still early days, but, overall, residents have responded positively. There has been an initial learning curve, particularly around heating controls and ventilation systems, so providing ongoing support, clear guidance and reassurance has been essential. Residents received handover booklets, with links to videos, supported by in-person demonstrations from the MEP installer team. An Energy Action Day, including manufacturer demonstrations, took place near the end of the contract.

Uptake of social housing retrofit to the UK NZCBS requirements is likely to be limited in the short to medium term because of cost and disruption. While the Cambridge project demonstrates that the Standard is achievable, funding for Social Housing Decarbonisation Fund measures falls short of the deep retrofit expenditure required per home.

Embodied carbon also remains challenging. Although bio-based materials could reduce impacts, risk aversion in the post-Grenfell regulatory environment often limits their use. Solar generation is particularly difficult in retrofit, making the Standard's renewable exemptions for existing buildings necessary and pragmatic.

Overall, the project shows that deep retrofit aligned with the UK NZCBS is achievable, but only where funding, client ambition, delivery models and the right team are fully aligned. ●

Meeting the Standard

The Cambridge project performed exceptionally well, successfully meeting nearly all the mandatory limits required for alignment with the UK NZCBS.

The project achieved a 'Yes' for being fossil fuel-free and comfortably stayed within carbon limits, with embodied carbon at 141.9kg $CO_2e \cdot m^{-2}$ GIA (well below the 270 limit) and refrigerant GWP at a negligible 3kg $CO_2e \cdot m^{-2}$ GIA against a limit of 677.

The embodied carbon of the MEP systems was calculated using OneClick LCA. The scheme was able to meet the embodied carbon metric with MEP equipment included (excluding PVs), with MEP accounting for approximately 14% of total embodied carbon for stages A1–A5.

Additionally, its operational energy of 40.53kWh·m^{-2} GIA per year was significantly better than the 75kWh·m^{-2} GIA per year limit, although these figures currently rely on modelled data rather than in-use metered data.

While the project technically failed the target for onsite renewable electricity generation, producing only 34kWh·m^{-2} building footprint/year against a target of 75kWh·m^{-2} building footprint/year, the assessment notes that the limit was effectively met through exemptions because of site-specific constraints.

● **Loreana Padron is head of sustainability and associate director at ECD Architects**

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Bridging the heat pump efficiency divide

Real-world analysis of domestic heat pump installations has identified underlying reasons for system underperformance. **Alex Smith** looks at the study paper's recommendations, which the authors say could reduce household's annual energy costs by 26%

As the United Kingdom accelerates its transition towards net zero heating, heat pumps have emerged as the primary technology for decarbonising space and water heating. With more than 200 million units already installed globally, the efficiency of these systems is critical; higher performance reduces energy system costs, lowers carbon emissions and alleviates peak strain on the electricity Grid.

However, real-world data reveals a significant 'performance gap' between different installations, a challenge that must be addressed to ensure the economic viability of the transition.

A recent study provides a compelling analysis of this divide, drawing on data from the open-source HeatPumpMonitor.org platform and the UK's Electrification of Heat (EoH) trial. Its findings offer a technical roadmap for designers and installers to narrow the efficiency gap through better design, commissioning and control strategies.

The performance gap in numbers

The core of the study lies in the stark contrast between two datasets. Systems monitored on HeatPumpMonitor.org reported a high average seasonal performance factor (SPF) of 3.86 at the H4 boundary (this metric accounts for the efficiency of the entire heating system). See panel, 'Benchmarking success'.

In contrast, the EoH trial recorded a significantly lower average SPF of 2.81. Earlier trials, such as the Renewable Heat Premium Payment (RHPP) scheme, showed even lower efficiencies, averaging 2.36.

An SPF of 2.8 results in running costs roughly equivalent to a gas boiler. Achieving an SPF of 3.86, however, yields annual cost savings of approximately 26% – around £224 for an average household – demonstrating that technical best practice has tangible economic benefits.

The paper highlights several key factors that contribute to this discrepancy, including suboptimal weather-compensation settings driving high flow temperatures, frequent cycling on room temperature, and extended operation at less efficient compressor modulation levels. Based on these insights, the study presents technical and policy recommendations for improving heat-pump performance.

The thermodynamic driver: flow temperatures

The study identifies that the strongest correlation with high performance (R^2 0.55) is the heat output-weighted average difference between flow temperature and outside air temperature. This aligns with Carnot thermodynamic principles: the smaller the temperature lift the higher the efficiency.

Analysis of the high-performing systems on HeatPumpMonitor.org offers specific benchmarks for design:

- **For SPF ≥ 4.0:** Systems require an average flow temperature on the coldest day of 36.6°C ± 5.5°C.
- **For SPF ~ 3.5:** Systems require an average flow temperature on the coldest day of 39.5°C ± 5.5°C.

These figures stand in contrast to traditional 'rule of thumb' design flow temperatures of 45°C or 50°C.

Optimising weather compensation

Detailed interrogation of the EoH trial data revealed that suboptimal weather compensation is a primary cause of inefficiency.

A visual inspection of 165 Vaillant AroTherm systems in the trial showed that 55% were operating with weather-compensation settings that were too high, causing them to cycle frequently on room thermostats rather than maintain steady-state operation.

In one representative case study (EOH2578), a system frequently

Benchmarking success

HeatPumpMonitor.org is a community-led, open-source initiative, established by the OpenEnergyMonitor community to facilitate the transparent sharing and comparative analysis of real-world heat pump performance.

As of November 2025, the platform had tracked data from 594 systems, with 413 of these using MID-certified meters to provide standardised and trustworthy evidence of efficiency. This study only used ASHPs that met the standard SPF H4 monitoring boundary and were not used for summer cooling (169 in total).

The organisation's primary objective is to define the "state of the art" in system performance, proving that high efficiency is achievable through rigorous system design, installation and commissioning.

Beyond serving as a data repository, it functions as an educational resource, offering granular insights into how specific heat pump models modulate, cycle and perform under defrost conditions or extreme cold. This empirical evidence allows building services professionals to move beyond theoretical models and optimise real-world calibrations to lower consumer costs and reduce Grid strain.

ramped up to flow temperatures far higher than necessary, followed by 1.5-hour 'off' periods. This 'stop-start' cycling at full capacity is significantly less efficient than modulating the compressor to match actual demand.

Dynamic simulations suggest that optimising the weather-compensation curve and allowing the system to modulate could increase the coefficient of performance (COP) from 2.86 to 4.61, if the schedule time was moved from 5am to 1.45am to meet the same 19.6°C room temperature between 6.45am and 8.45pm. The changes reduced energy electricity consumption by a third and peak electricity demand was reduced at 6am from 5.1kW to 1.2kW.

Technical recommendations

The sources provide several clear technical levers to improve real-world outcomes:

1. **Target lower design temperatures**: Engineers should aim for design flow temperatures of no more than 40°C, and ideally closer to 37°C, to achieve high-end performance.
2. **Refine heat-loss calculations**: Traditional calculations often overestimate actual heat loss. The sources recommend using more precise methods, such as air-permeability testing and the EN 12831-1:2017 calculation method.
3. **Prioritise emitter size over capacity reductions**: When accurate calculations reveal lower heat losses, designers should lower the design flow temperature rather than reduce the size of the radiators. This allows the existing or planned emitters to provide sufficient heat at a higher efficiency.
4. **Optimise controls**: Careful adjustment of weather compensation is critical. Even in 'low-disruption' retrofits, where emitters are not upgraded, optimising these settings can significantly boost performance.
5. **Minimise setbacks**: Large temperature setbacks in heating schedules necessitate higher flow temperatures to recover the heat, which can degrade SPF. Maintaining room temperatures within a narrow range (for example, 18-20°C) is preferable.

Policy and industry standards

The study concludes that current UK policy – which often provides incentives per unit installed rather than being based on performance – does little to encourage high-efficiency outcomes. To bridge the divide, several policy shifts are proposed:

- **Standardising onboard monitoring:** Integrated monitoring in many heat pumps is currently unreliable for comparison. A common accuracy standard for onboard monitoring would provide a low-cost alternative to third-party metering and facilitate performance guarantees.
- **Promote performance guarantees:** Policies should consider rewarding above-average real-world performance.
- **Enhanced training:** Installer accreditation should be updated continuously in light of field-trial evidence, to ensure they are equipped to design for low-temperature operation.

The divide between the 3.86 SPF achievable in well-optimised systems and the 2.81 SPF seen in wider trials represents a missed opportunity for energy saving and Grid stability.

By focusing on low flow temperatures, accurate heat-loss assumptions and rigorous commissioning of weather compensation, installers can ensure that heat pumps deliver on their promise of low carbon, cost-effective heating.

As the study suggests, the performance gap is not an inherent flaw of the technology, but a reflection of how it is currently designed and operated. ●

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[1] Rosenow, J., Lea, T. and Boni, G. (2026) 'Bridging the efficiency divide: open-source insights into UK heat pump performance gap', *Energy and Buildings*, 352, 116785.

Heat pump performance under different trials and projects in the UK

Trial/project name	Number of systems	Mean ASHP SPF H4
HeatPumpMonitor.org	169	3.86
Electrification of Heat	428	2.81
RHPP	297	2.36
Energy Saving Trust (EST)	15	2.45

Awaab's Law guide aims to support social housing providers

Nuaire has launched *A guide to Awaab's Law and the future of safe housing standards* to help social housing organisations comply with the legislation, which came into force on 27 October 2025.

The law was introduced following the death of two-year-old Awaab Ishak in 2020, which was linked to prolonged exposure to mould in his family's rented home.

The guide sets out the legal requirements for investigating and addressing damp and mould, including the enforceable timescales now in place. It is available to download from Nuaire's website.

Daikin expands commercial AHU range

Daikin Applied UK has expanded its compact air handling unit (AHU) portfolio with the Compact R, a new rotary heat recovery AHU designed for space-constrained UK commercial buildings.

Part of the Compact series, it delivers improved energy efficiency within a compact footprint. Available in seven sizes, it offers flexible configuration, Eurovent-certified performance and high indoor air quality.

Compact R supports integrated Daikin systems, fast installation and low maintenance, helping designers meet efficiency, comfort and compliance requirements.

Ventilation features at the 2026 Technical Symposium

The event is at Loughborough University on 26–27 March

A compelling line-up of papers at the CIBSE Technical Symposium 2026 will showcase new research and real-world case studies. Here's a preview of some of the featured contributions:

Transforming 1920s–1940s housing to minimise energy use and optimise comfort
Dilek Arslan, Emmanouil Perisoglou, Jo Patterson (Cardiff University) and Andrew Shea (University of Bath)
This explores how Britain's ageing social housing stock can be decarbonised without compromising comfort. It applies advanced dynamic simulation and optimisation to test deep retrofit strategies on a Swansea council house.

Residential indoor air quality impacts of building fabric upgrades and heating and cooking electrification
By Professor Rajat Gupta and Dr Sahar Zahiri, Oxford Institute for Sustainable Development
As homes move to low carbon heating and cooking, this study monitors three Oxford homes retrofitted with heat pumps and electric cooking. While electrification reduced combustion pollutants, occupant behaviour remained critical to IAQ outcomes.

'We have to freeze or be deafened': A survey on the effectiveness of CO_2 alarms in university spaces
Aanchal Vishal Bhagwat and Carolanne Vouriot, University of Sheffield
CO_2 sensors are increasingly used to prompt ventilation. Based on a survey of 100 university occupants, this paper examines how people interpret and respond to CO_2 alarms, finding that uncertainty and comfort concerns often limit action, despite high IAQ awareness.

Leveraging high-granularity operational data to inform building control strategies, indoor air quality and performance-gap considerations
Laurence Peinturier (Atamate) and Kat Kelly (University of Oxford)
The performance gap between predicted and actual building operation remains a major challenge. Using non-domestic case studies, this paper compares real operational data with regulatory assumptions, showing how occupancy-responsive controls can improve energy efficiency, comfort and IAQ.

Sustainable workplace: Enhancing health and wellbeing through circular design
Lucia Savastano and Alejandro Mar Morales, Cundall
Cundall's new Edinburgh office demonstrates a combustion-free, all-electric workplace shaped by staff engagement, circular design and continuous IAQ monitoring, delivering one of the firm's lowest-carbon CAT B fit-outs.

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Retrofit or restore: a strategic approach for existing building services

This module explores the challenges of retrofitting the UK's existing building stock and the key role it plays in helping to achieve climate change targets

With around 80% of the UK's 2050 building stock already in place,[1] representing the oldest in Europe, existing buildings play a crucial and unavoidable role in achieving national and international climate targets. These structures are likely to contribute up to 25% of the UK's greenhouse gas emissions, making significant sustainability-driven energy performance improvements essential for reaching net zero goals. Upgrading heating, ventilation and air conditioning (HVAC) and other mechanical, electrical, and plumbing (MEP) systems can reduce operational carbon significantly, while preserving the embodied carbon inherent in the existing fabric. Sustainability underpins the retrofit-versus-restore debate, requiring approaches that minimise environmental impact, both operationally and in terms of embodied carbon. This process is complex, requiring engineers to weigh the efficiency and decarbonisation benefits of retrofitting modern systems against the practical and financial advantages of restoring existing ones, especially in heritage settings.

To upgrade systems effectively to meet high performance standards, a strategic and holistic approach is essential, as piecemeal interventions can result in negligible energy savings and may even lead to fabric damage or abortive work. Industry guidance typically emphasises a whole-building, fabric-first approach. This perspective views the building as an interconnected system of materials, functions, users and services, helping to identify measures that are suitable, proportionate and sustainable. Sustainability, in this context, must encompass not only carbon reduction, but also long-term resilience, material resourcefulness and occupant wellbeing. A truly sustainable retrofit integrates technical, economic and environmental criteria into the decision-making framework. The recent renaming of the CIBSE Heritage and Retrofit Group (previously simply 'Heritage') highlights the zeitgeist to balance conservation principles with retrofit imperatives, stressing that interventions must deliver verifiable carbon savings while maintaining occupant health and comfort, and avoiding maladaptation. LETI's *Climate Emergency Retrofit Guide*[2] further reinforces this, targeting 60–80% energy reductions in homes through deep, whole-house retrofits, with the core message being to improve the building fabric sufficiently to enable a switch to low carbon heating – such as heat pumps – thereby avoiding the lock-in of fossil fuel systems. The energy efficiency hierarchy (as described by Historic England[4]) provides a high-level, structured methodology for this process, beginning with understanding the building's context and eliminating waste, then moving to improving the efficiency of the fabric and services, and, finally, generating energy from low carbon and renewable sources (see boxout, 'Integrating renewables'). By reducing the building's intrinsic energy demand first, the task of decarbonising the remaining load with onsite technologies becomes far more manageable and cost-effective.

This entire decision-making framework becomes more complex when dealing with historic and traditional buildings. For structures built before around 1919, which use different methods and materials than more recent buildings, a different approach is required. Retrofitting historic buildings requires a delicate balancing act between the need for energy efficiency and the imperative of preserving their heritage value and character. The principle of minimal intervention is key – wherever possible, existing elements should be upgraded or reused rather than removed, and new installations must be reversible and unobtrusive. Measures appropriate for modern buildings can cause irreversible harm to historic fabric or conceal significant details. Any new equipment should be installed to minimise visual and fabric impact, perhaps by routing new services via existing voids or choosing compact systems that fit within existing plantrooms. Understanding the building's significance through a heritage impact assessment (HIA) is essential when proposing changes. A HIA is used to understand what makes a building historically significant and how proposed retrofits would impact that character (see *Heritage Impact Assessment in Wales*[4] for further information on HIA). Compliance with Building Regulations, and local planning or listed-building consent is mandatory. Energy performance assessments, such as EPCs, may offer only a partial picture for these buildings, and can suggest measures that are inappropriate[5] for their construction or context.

The challenge is further compounded by future climate projections, which consistently indicate shifts in energy demand towards increased cooling loads. This is exacerbated by the urban heat island effect, and necessitates that HVAC systems are sized and configured for future conditions, not just current ones. Increased insulation, if not balanced with effective

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ventilation and solar control, can worsen the risk of overheating, which is anticipated to rise significantly. Mitigation strategies – including effective shading, maintaining thermal inertia where possible, and purge night ventilation – become crucial. The performance of renewable energy systems is also affected by temperature changes, and the integration of energy storage and load-shifting becomes increasingly important to manage the variability in generation and the fluctuating higher cooling-demand profiles.

While replacing old boilers with modern, high-efficiency condensing models offers an incremental improvement, a true shift towards decarbonisation involves adopting low carbon technologies. Heat pumps – whether air-, ground- or water-source – are a primary option. Historically, their lower flow temperatures necessitated emitter upgrades, but the increasing availability of higher-temperature heat pumps simplifies integration with existing radiator systems. For a transitional approach – particularly in heritage contexts, where fabric upgrades are constrained – hybrid systems that pair a smaller heat pump with an existing boiler can provide a balance between upfront cost and carbon reduction, with the boiler retained for peak loads only. Beyond individual building applications, heat pump technology enables the development of district and community heat networks. These can draw upon novel sources of ambient heat, including urban water bodies such as canals, or the significant waste heat from infrastructure, such as underground train systems, data centres, and other local buildings.

As buildings become more airtight through deliberate fabric improvements or incidental sealing of passive air paths, effective mechanical and passive ventilation strategies are essential to maintain indoor air quality and prevent moisture accumulation. Mechanical ventilation with heat recovery (MVHR) systems facilitate air exchange while reclaiming sensible and latent heat from the exhaust stream, preserving internal conditions with minimal energy penalty. On the cooling side, significant energy and maintenance savings can be realised by replacing legacy chiller plant with high-efficiency options, such as oil-free, magnetic-bearing chillers, or integrating thermal storage to support peak shaving and load shifting. Zonal comfort issues caused by poor air distribution or variable internal loads can be resolved through the deployment of decentralised fan-assisted terminals. One of the most straightforward and effective upgrades across air and hydronic systems is the retrofit of variable-speed drives (VSDs) to fans and pumps, enabling part-load modulation. Governed by the non-linear affinity laws, even modest reductions in speed can produce disproportionately large reductions in power consumption – often exceeding 50%. However, across all environmental systems, the single most impactful opportunity for immediate energy savings can lay in the implementation of modern control strategies. Many legacy systems operate continuously or without coordination, resulting in avoidable energy use. Retrofitting a modern building management system (BMS) can provide dynamic scheduling and demand-led operation, unlocking substantial efficiencies. Techniques such as demand-controlled ventilation – where airflow is modulated in response to occupancy or real-time CO_2 levels – can reduce fan energy and associated heating and cooling loads dramatically. The strategic deployment of smart sensors, wireless nodes and adaptive algorithms, including heritage-sensitive settings, offers potential operational savings and can generate the data required for continuous commissioning and fault detection. Lighting retrofits – including LED upgrades, occupancy sensing, daylight dimming and time scheduling – can cut lighting energy consumption by 50–80%, while simultaneously reducing internal heat gains. Similarly, domestic hot water (DHW) systems can be improved by insulating distribution pipework, decentralising services or transitioning to heat pump water heaters with improved seasonal performance factors. Careful consideration and implementation of metering and sub-metering will enable continuous optimisation and verification of energy savings.

An ultimate test of the 'restore vs retrofit' dilemma, the ongoing work at the Houses of Parliament is tackling decades of decay by replacing services within one of the world's most complex heritage sites

System-level improvements are most effective when combined with upgrades to the building envelope. Measures such as insulating walls, roofs and floors can reduce heating and cooling loads significantly, but must be carefully designed to prevent thermal bridging and moisture issues – especially in heritage buildings. Any amendments to the existing structure, whether involving insulation or not, require appropriate hygrothermal modelling and effective vapour control to manage condensation risks and protect the building fabric.

Further gains in thermal performance and airtightness can be achieved through window upgrades, such as secondary glazing or high-performance alternatives.

Integrating renewables

The integration of renewables is an important strategy for decarbonising building stock. Building integrated renewables (BIR) – such as solar photovoltaics (PV) and solar thermal collectors – support the move to electrified heating and reduce reliance on Grid energy.

For modern commercial buildings, retrofitting focuses on achieving substantial energy and carbon reductions. Here, BIR solutions such as rooftop solar arrays, exterior wall-integrated photovoltaics and window-integrated photovoltaics can be considered to use building surfaces for energy generation. The decision is primarily driven by technical feasibility, the potential for significant energy savings and contribution to net zero targets. For historic buildings, decisions are governed by conservation principles. Changes must typically be reversible, use sympathetic materials, and minimise impact on historic fabric and character, often requiring statutory consent. The challenge is to integrate modern systems sympathetically. This may involve selecting less visually intrusive options such as roof-integrated PV or solar slates, or positioning panels on less prominent roof pitches. Here, performance benefits must be balanced with the primary goal of preserving heritage value.

Retrofits must consider future climate projections. As weather patterns shift, heating and cooling demands will change, affecting the performance and optimal sizing of BIR systems.

When implemented as part of an integrated strategy, these measures reduce operational carbon, enhance comfort and help extend the life of existing building services. Poorly designed retrofits, however, can introduce problems such as overheating, damp and mould. Understanding the hygrothermal behaviour of building materials is essential for mitigating these risks.

The initial investment for comprehensive retrofits can be high, and while they can offer long-term savings on energy bills, the payback period for certain measures can be lengthy. Government incentive schemes intended to bridge this financial gap have often been criticised for being complicated and short-term, as well as failing to reach all who could benefit.

To ensure quality and provide a structured approach to managing risk, the industry is developing robust standards, such as the BSI Retrofit Standards Framework,[6] which already includes PAS 2035 for domestic projects and PAS 2038 for non-domestic applications. These standards, which are more fully described in the boxout 'The PAS Retrofit Standards Framework', mandate a rigorous end-to-end process of assessment, design, installation and evaluation, overseen by qualified professionals.

However, even with robust standards, a project's success ultimately depends on the people involved. A significant barrier to scaling up retrofit is the shortage of skilled technicians and engineers with the specific knowledge of building physics and new technologies that this work requires. Simultaneously, many building owners and occupants lack awareness of the benefits of retrofit or where to access impartial advice, making trust and clear communication essential. Studies suggest that community-based approaches can be more effective than relying solely on financial incentives for fostering consumer confidence.

Guiding project decisions relies on a robust analytical workflow. Modelling tools such as dynamic thermal simulation, which are increasingly enhanced through artificial intelligence (AI), provide the predictive baseline for retrofit strategies. This baseline must then be validated by post-retrofit performance monitoring to quantify real-world savings and to close the well-documented performance gap. This empirical data informs life-cycle cost analysis and multi-objective optimisation, allowing for the identification of cost-optimal solutions that balance competing project objectives such as capital cost, operational efficiency and occupant comfort. In practice, the choice is rarely between a full restoration or a complete replacement, as hybrid approaches are often most effective.

This strategy involves retaining serviceable infrastructure, such as ductwork and piping, while upgrading key components such as fans, controls and heat emitters. An existing ventilation system, for instance, could potentially be brought to near-modern standards by replacing its fans and adding a heat-recovery section within the original casings. Such a pragmatic approach aims to deliver a technically and financially viable solution that achieves significant energy savings without compromising the building's functional or heritage requirements. Increasingly, a holistic assessment, completed by applying methodologies such as CIBSE TM65[7] to evaluate the embodied carbon of specified systems and materials, ensures the building's whole life environmental performance is properly accounted for.

Upgrading the building services within the existing building stock is a key undertaking for reducing energy consumption and achieving net zero emissions. This requires a departure from traditional, measures-based approaches towards a comprehensive whole-building perspective. While the potential benefits are substantial, significant challenges must be addressed. These include managing technical risks, navigating the complexities of historic buildings, overcoming high initial costs, addressing the critical skills gap, and ensuring that effective policy frameworks and quality standards are applied consistently. Future efforts must focus on simplifying access to advice, strengthening the workforce through training and accreditation, and evolving standards and policies continuously to facilitate safe, effective and climate-resilient retrofits at the scale required. ●

The PAS Retrofit Standards Framework

PAS 2035:2023 for domestic buildings and PAS 2038:2021 for non-domestic buildings provide a structured approach to managing risks and ensuring high-quality energy efficiency retrofits. These standards establish a detailed, end-to-end process encompassing assessment, design, installation and evaluation, helping to professionalise retrofit. Retrofit coordinators oversee domestic projects, while retrofit lead professionals manage non-domestic ones, ensuring compliance and mitigating risks.

The standards include the explicit requirement to assess the heritage significance of older and traditional buildings, ensuring that energy efficiency improvements align with conservation principles and do not compromise architectural integrity. The whole-building approach advocated by PAS 2035 and PAS 2038 acknowledges the complex interplay between retrofit measures, aiming to prevent common failures such as moisture damage and indoor air quality issues.

These standards were developed in response to widespread concerns over poor-quality retrofit work, including issues such as mould growth, inadequate ventilation and suboptimal thermal performance. Given the inherent risks of retrofit projects, PAS 2035 and PAS 2038 emphasise the necessity of trained professionals with expertise in building physics and risk management. By introducing comprehensive assessments, structured design processes, robust installation protocols and post-completion evaluation, they address previous shortcomings associated with fragmented, measures-based approaches that often led to substandard results.

While PAS 2035 is not legally mandated, compliance is required for government-funded schemes such as the Energy Company Obligation[8] and the Warm Homes: Social Housing Fund Wave 3.[9] Adoption is also encouraged for privately financed retrofits. The standards serve as part of a broader sustainability framework that supports the UK's net zero carbon ambitions and ensures that environmental, social and economic considerations are fully embedded into the retrofit process.

Retrofitting is key

This article marks over a quarter century of *CIBSE Journal* CPD contributions, and choice of topic is deliberate. Retrofitting our existing building stock is an urgent global challenge, explored here through a UK lens.

Researching each of my 250-plus articles has been a valuable education, and my hope is that readers are inspired not only to deepen their understanding, but also to share that knowledge. Mentoring and supporting others – especially those entering the building services profession – is essential if we are to grow a technically capable, thoughtful and forward-looking engineering community. The CPD series will continue, but additional authors will bring fresh perspectives to the challenges ahead.

Tim Dwyer (tim@timdwyer.com)

Module 260

January/February 2026

1. **When adopting a whole-building approach, what is likely to be the most effective initial step in a major building services retrofit?**

☐ A Implementing a modern building management system (BMS)
☐ B Installing a large-scale solar PV array to offset existing consumption
☐ C Reducing the building's intrinsic energy demand through fabric improvements
☐ D Replacing the primary heating plant with a high-efficiency model
☐ E Upgrading all lighting systems to sensor-controlled LEDs

2. **When proposing retrofit interventions in a designated heritage building, what is the primary guiding principle?**

☐ A Achieving the highest possible EPC rating
☐ B Ensuring all new systems are reversible and cause minimal harm to the historic fabric
☐ C Prioritising the decarbonisation of the heating system above all other considerations
☐ D Replacing all original single-glazed windows with high-performance triple-glazing
☐ E Selecting the lowest-cost compliant solutions available

3. **Why does retrofitting variable-speed drives (VSDs) to fan and pump motors often yield disproportionately large energy savings?**

☐ A The capital cost of VSDs is significantly lower than new motors
☐ B The non-linear relationship between motor speed and energy consumption
☐ C They are the only solution compatible with older distribution pipework and ducting
☐ D They improve the power factor of the electrical system
☐ E They reduce maintenance requirements for the associated pumps and fans

4. **What significant risk must be carefully managed when adding insulation to a building?**

☐ A A decrease in acoustic performance
☐ B A significant increase in air leakage
☐ C An increase in winter heating demand
☐ D An increased risk of summertime overheating
☐ E Damage to the building's primary structure

5. **Within a modern analytical workflow for retrofit, what is the main purpose of post-retrofit performance monitoring?**

☐ A To generate accurate energy bills for tenants
☐ B To provide data for marketing the building's green credentials
☐ C To replace the need for initial dynamic thermal simulation
☐ D To satisfy the requirements for listed building consent
☐ E To validate the predictive energy models and quantify the performance issues

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[8] Energy Company Obligation – **bit.ly/CJSep25CPD8** – accessed 1 June 2025.
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Further reading:

- *Course Handbook: Level 3 award in energy efficiency measures for older and traditional buildings,* Historic England, 2024.
- *Nearly-zero energy buildings – retrofitting to meet the standard,* CIBSE Research Insight 3, 2020 .
- *Refurbishment for improved energy efficiency: an overview,* CIBSE KS12:2008.
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- *Retrofitting homes for net zero,* UK Parliament Energy Security and Net Zero Committee 2025.
- Fylan, F and Glew, D, Barriers to domestic retrofit quality: Are failures in retrofit standards a failure of retrofit standards?, *Indoor and Built Environment* 2022, Vol. 31(3) DOI: 10.1177/ 1420326X211027197.

Products of the month

Ideal Heating launches new Imax Xtra 2 cascade

Ideal Commercial Heating has released a new installation video showcasing just how quickly a high-performance cascade system can be assembled using its Imax Xtra 2 commercial boilers.

Aimed at contractors and commercial heating engineers, the video shows that delivering high outputs does not have to come at the expense of lengthy onsite build times.

The video follows the real-time installation of a three-boiler cascade using 80kW Imax Xtra 2 floor-standing condensing boilers. Every stage of the build – from the first component being unpacked to final connection – is captured and time-stamped.

The result is a cascade capable of delivering up to 840kW of heat, fully assembled in less than 90 minutes. Viewers can see how the wheeled boilers are positioned and aligned, how the prefabricated header kits simplify pipework, and how hydraulic

separation is integrated efficiently on site.

Key to this speed is the Imax Xtra 2's installer-friendly design. Its compact footprint allows the boilers to fit easily through standard doorways, while wheels make manoeuvring within plantrooms straightforward. Installation is further streamlined by fully recyclable packaging that enables fast unpacking, and by the fact that no specialist tools are required.

The Imax Xtra 2 range covers outputs from 80kW to 280kW, all achieving Class 6 NOx performance. Up to four boilers can be cascaded, for a total output of 1,120kW, offering flexibility for a wide range of commercial applications.

Multiple hydraulic separation options are available, including plate heat exchangers, low loss headers and magnetic low loss headers, while a full-colour touchscreen simplifies setup, commissioning and servicing.

To support specification, Ideal Commercial Heating offers an online Imax Xtra 2 Cascade Configurator. The tool enables contractors to design the optimal cascade in minutes and generate a complete component list, helping to ensure everything is ordered correctly first time. Free commissioning by Ideal Commercial Heating engineers is available on Imax Xtra 2 boilers, with an additional five-year warranty when commissioning is completed within three months of installation.

● **To watch the video, visit: bit.ly/49y86dq**

Inclusive paging system enhances campus fire safety

The University of Southampton has strengthened fire safety and accessibility across its multi-campus estate with the installation of a targeted paging alert system for deaf and hard-of-hearing users.

The solution combines Advanced's MxPro 5 fire panels with its ESPA-compliant pager interface, integrated with Scope Communications' paging technology and delivered by Premier Fire Security.

With more than 200 fire panels installed across the university, the system provides precise, location-specific alerts without relying on audible alarms. Each building or group of buildings is assigned a unique pager address, ensuring that users only receive relevant fire alerts, reducing confusion and improving response times. Pagers can be programmed for different locations and include accessories such as pillow pads for night-time alerts.

The installation includes a dedicated paging group that supports engineers, security teams and fire marshals, delivering diagnostic and fault messages to improve coordination.

The system is designed to be scalable, with plans to extend coverage across student accommodation, creating a flexible, cost-effective and inclusive fire-safety solution.

● **Visit: www.advancedco.com**

Breathing Buildings appoints new operations director

Breathing Buildings has announced the return of Huw Poppy as operations director. He originally joined the business in 2011 and previously served as sales director.

Poppy is also secretary of the CIBSE Natural Ventilation Group, giving him insight into current best practice and the future of ventilation design.

In his new role, he will strengthen operational performance across product development, technical design and servicing, while supporting consultants and contractors from early design through to commissioning.

● **Visit: www.breathingbuildings.com**

High-output heat pump added to Hamworthy range

Hamworthy Heating has expanded its Tyneham 290HT commercial heat pump range to include a new 65kW model. This increases the number of outputs in the range to six, from 15kW to 65kW, meeting growing demand for higher-capacity, low carbon heating.

Using a natural refrigerant with a global warming potential of just 3, the range delivers high efficiency – with coefficients of performance of up to 4.94 – quiet operation, and flexible cascade or hybrid system options.

With noise levels as low as 64db(A), the Tyneham 290 range is well suited to commercial buildings where noise control is a consideration.

● **Visit: www.hamworthy-heating.com**

Primary school upgrade delivers efficient heating

Whiston Willis Primary Academy in Merseyside has completed a future-ready heating and hot-water upgrade with support from ACV UK.

Working with CHL Mechanical Services, the project installed Evo S condensing boilers and WaterMaster Evo water heaters across the infant and junior schools. Housed in a refurbished external plantroom, the solution was completed in just four weeks, with no disruption to the schools' daily operations.

The upgrade delivers reliable, energy-efficient performance for pupils and staff, backed by comprehensive aftercare support.

● **Visit: www.acv.com/gb**

Twin-flue technology showcased at ElementalLONDON

Keston marked a successful appearance at ElementalLONDON 2025, held at Excel London in November. The event provided an opportunity for the firm to showcase its UK-manufactured, twin-flue boiler range to installers and specifiers.

Highlights included the Heat 2 twin-flue boilers, plus the Combi 2 and System 2 ranges, demonstrating flexible siting options and solutions for complex installations. With outputs from 45kW to 55kW, and up to 18 metres of twin-flue capability, Heat 2 boilers offer a highly adaptable solution for a variety of projects.

● **Visit: www.keston.co.uk**

Hamworthy sets up new commercial service team

Hamworthy Heating has launched a new Commercial Service Division, bringing its expertise in commercial heating and hot water into one specialist team.

The division provides nationwide commissioning, warranty, servicing and breakdown support, delivered by highly skilled engineers.

Customers benefit from next-day recovery response under warranty, a 90% first-time fix rate on condensing boilers and water heaters, and clear service reports issued within three working days, helping to minimise downtime and maintain system performance.

● **Visit: www.hamworthy-heating.com**

New CPD supports Part O compliance

Vent-Axia has launched a new CIBSE-approved CPD titled 'Overheating in residential properties: Part O – how ventilation can be part of the solution'. It will help housebuilders and specifiers understand the causes of overheating in new homes, the requirements of Approved Document O, and how ventilation can be used to remove excess heat. It also offers guidance on ventilation strategies to protect occupant health and wellbeing.

● **Visit: www.vent-axia.com**

Award win highlights MVHR for net zero homes

Vent-Axia's Lo-Carbon Sentinel Econiq MVHR range has been named 'Domestic Ventilation Product of the Year' at the H&V News Awards. The judges praised the solution's versatility, efficiency and ease of integration. The range delivers high indoor air quality, quiet operation and up to 93% heat recovery, while helping housebuilders address overheating.

● **Visit: www.vent-axia.com**

Panasonic heat pump transforms home retrofit

A four-bedroom home in Cumbernauld, Scotland, has been upgraded with a Panasonic Aquarea 9kW M Series T-Cap heat pump.

The retrofit replaced an unreliable combi boiler and outdated microbore pipework, and was installed alongside a 200-litre Panasonic DHW tank and Aquarea Smart Controls. The system maintains stable temperatures even in extreme cold, reduces reliance on the property's log burner, and lowers its carbon footprint. The transition was supported by a grant from Home Energy Scotland.

● **Visit: www.aircon.panasonic.eu**

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The FGG Flowgrid has been designed to measure air volume in ventilation ducts. The Flowgrid consists of a standard duct section with a length of 200 and 300 mm and is available with a 20-30 or 40mm duct connection flange to suit standard duct work

The CMR sensing probes are fitted across the internal duct frame area in predefined spacing. Each probe has a number of pressure inlet points to measure the impact and static pressure at the same time and provide an average velocity measurement.

The result is a velocity pressure which ultimately provides a total air volume measurement. Both static and impact pressure have an independent pressure averaging tank which provides a smooth pressure signal of the whole measured area.

Another great advantage of the FGG Flowgrid is, that it can measure bi-directional as it is manufactured equally on both sides. This means, the air flow is measured in one direction and should there be a reverse flow, this can be detected and measured when using the CMR P-SENSOR.

The Flowgrids are manufactured in standard height increments of 100mm going up to a maximum height of 1200mm. Custom sizes can be made 3000 x 3000mm

The Flowgrids are installed in many projects such as

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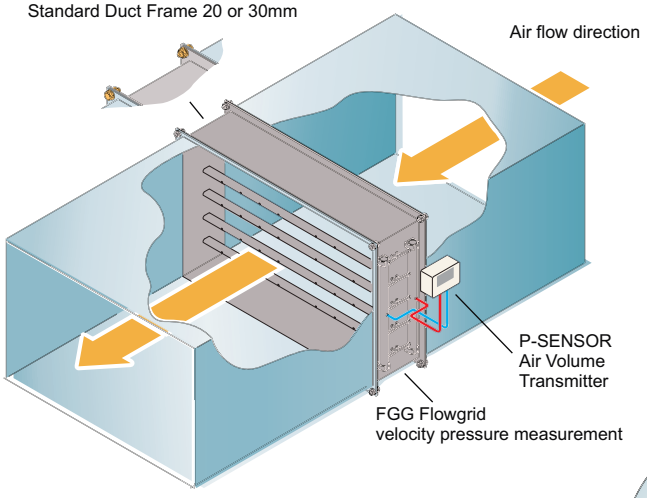
FGG FLOWGRID and P-SENSOR providing accurate average air volume measurement in ducts.



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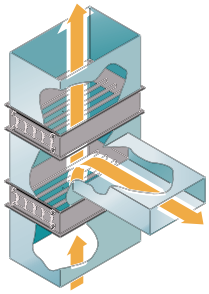
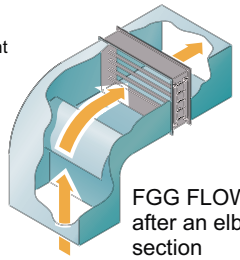
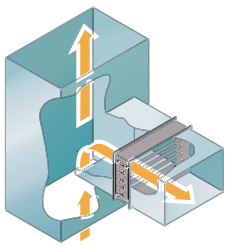
With LCD display
and keyboard



FGG FLOWGRID
before and after a
T- duct section



FGG FLOWGRID
after an elbow duct
section



FGG FLOWGRID
in a T- duct section

CMR is ISO 9001 and UKAS accredited

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