cibse Journal

October 2026
www.cibsejournal.com

The magazine of the
Chartered Institution of
Building Services Engineers

Engine for innovation

Accelerating aero and power development at the new Whittle Laboratory



Why height matters in drainage design

Responsive circulation in bathing pools

Tigris K5/M5

Blowing the whistle on unpressed fittings



The world's first fitting with acoustic leak alert!

Acoustic Leak Alert

Detect non-pressed fittings by a whistle

In4Sure 360°

View to check pipe insertion

Multi Jaw

Fits multiple pressing jaw profiles:
U, Up, TH, B, H

Opti Flow

increased inner bore for optimised flow

SCAN HERE for more information

www.wavin.co.uk

wavin
An Orbia business.



42

Contents

News
6 News
10 CIBSE news

Events & Training
10 Looking ahead

Voices
14 Draft London Plan
More could be done around retrofit and heat networks to decarbonise, says **Julie Godefroy**

16 Open to attack
Peter Schwartz details the real risk of cyberattacks when connecting old building systems to modern IP networks

54 Q&A: Mind the gap
CIBSE Global YEN 30 Under 30 Award winner **Muhammad Izzul Hakimi bin Roslan** on closing the design performance gap

Features
18 Renewing and respecting
CIBSE Engineer of the Year **Miriam Ozanne** reflects on her purpose-driven career

21 Beyond compliance
Dame Judith Hackitt and other experts at a recent CIBSE conference explore the operational reality of delivering whole life building safety

24 Whittle Laboratory
Max Fordham faced challenges when it came to supplying enough power and cooling for wind turbine testing while also protecting researchers

30 Smart moves
Amendment 4 of the Wiring Regulations updates the UK's electrical standard. **Leon Markwell** MCIBSE reports

32 Rethinking resilience
The industry must prioritise thermal resilience for better protection against extreme climate events

34 Museum retrofits
Tim Dwyer looks at what varying retrofit priorities at the V&A Museum mean for building services engineers

Technical
Pipework, pumps and valves

37 Foiling the great escape
Uninsulated pipework in the plantroom is contributing to needless energy waste, **Alex Smith** explains

40 The height of efficiency
Reuben Colver-Thompson says considering the hydraulic and airflow characteristics of high-rise developments is key

42 Being responsive
A shift to responsive circulation could deliver massive energy and cost savings in swimming pools. **Tim Dwyer** reports

CPD
47 Rethinking hot-water storage: balancing energy, carbon and water hygiene

Classified
52 Products

CIBSE
Inspiring people. Transforming places.

www.cibsejournal.com

CIBSE Journal is the official magazine of the Chartered Institution of Building Services Engineers

DIGITAL CHANNELS

CIBSE LinkedIn

***CIBSE Journal* newsletter**

www.cibse.org

For cibse
Journal production manager: Nicola Hurley
Tel: +44 (0)208 772 3697,
nhurley@cibse.org

CIBSE, 91–94 Saffron Hill,
London, EC1N 8QP
Tel: +44 (0)208 675 5211

©CIBSE Services Ltd. ISSN 1759–846X

Subscription enquiries
If you are not a CIBSE member but would like to receive *CIBSE Journal*, subscribe now! Costs are £80 (UK) and £100 (international). For subscription enquiries, and any change of address information, please contact Nicola Hurley at **nhurley@cibse.org** or telephone **+44 (0)208 772 3697**. Individual copies are also available at a cost of £7 per copy, plus postage.

CIBSE Journal, ISSN 1759–846X (USPS 4070) is published by CPL One, 1 Cambridge Technopark, Newmarket Road, Cambridge CB5 8PB, UK.

Subscription records are maintained at CIBSE, 91–94 Saffron Hill, London, EC1N 8QP, UK.

ISSN 1759–846X (print)
ISSN 2756–1895 (online)

ABC audited circulation: 20,023 January to December 2025
Printed by: Warners Midlands PLC

CIBSE BUILDING PERFORMANCE AWARDS 2027

TABLE BOOKINGS ARE NOW OPEN

Make sure you secure your table to celebrate and reward excellence in building performance on **4 March 2027** at the Park Plaza Westminster Bridge.

View all BPA categories

@CIBSEAwards
#BPA2027

Sponsors

ABB AIRFLOW CMR CRANE FLUID SYSTEMS ideal HEATING COMMERCIAL MITSUBISHI ELECTRIC

cibse.org/BPA



Safety limits

Last month's CIBSE Building Safety Conference featured some of the key figures driving safety improvements in UK buildings (page 21). The keynote speech by Dame Judith Hackitt and the discussions during the four panel sessions showed positive progress on establishing a robust building safety regime for new homes, but also many areas of weakness, particularly around occupied buildings and the lax approach to safety by some in the supply chain.

Former interim chief construction adviser Thouria Istephan, who called on individuals and organisations to take more accountability for building safety, painted a sobering account of professionals she had seen continuing to work for clients even when asked to do something immoral or illegal.

She reminded the audience that professional people had a code of ethics that makes them accountable. She said she knew of clients that still weren't carrying out competence checks and not taking an interest in safety.

A number of speakers identified an issue with buildings in occupation, including Jon Vanstone, chair of the Industry Competence Committee. He said that while there had been a focus on the construction of safer buildings, there was an 'immaturity in the management of occupied buildings'.

In her speech, Dame Judith said there was sometimes a 'woeful lack of knowledge and competence' in handling refurbishments, and that industry needed to up its game and spend more time listening and caring for residents.

She and others noted that there had been much better collaboration between industry and the Building Safety Regulator (BSR), and that this had helped to 'find workable, pragmatic solutions' to the challenges of the Building Safety Act and the design of higher-risk buildings (HRBs).

Charlie Pugsley, acting chief executive at the BSR, noted that approval rates for HRBs had doubled in the past year and time taken for approval had nearly halved – but he echoed other speakers in expressing concerns about how newly applied competencies and behaviours could be embedded throughout the whole life of a building.

Alex Smith, editor asmith@cibsejournal.com

Editorial

Editor: Alex Smith
Tel: +44 (0)1223 378034
Email: asmith@cibsejournal.com
Technical editor: Tim Dwyer
Reporter: Ian Farrell
Editorial assistant: Cathy King
Designer: Kevin Reed
Chief sub-editor: Jo Halpin

CIBSE Journal is written and produced by CPL One
Tel: +44 (0)1223 378000
www.cplone.co.uk
1 Cambridge Technopark, Newmarket Road, Cambridge CB5 8PB.

Editorial copy deadline: First day of the month preceding publication

Advertisement sales

Display and sponsorship Jon Morton
jon.morton@redactive.co.uk
Tel: +44 (0) 20 7324 2786
Products & services Daniel Goodwin
daniel.goodwin@redactive.co.uk
Tel: +44 (0) 20 7880 6217
Recruitment advertising
cibsejournaljobs@redactive.co.uk
Tel: +44 (0) 20 7880 6215
Advertising production Jane Easterman
jane.easterman@redactive.co.uk
Tel: +44 (0) 20 7880 6248

Credits

P21 iStock.com / CHUNYIP WONG
P31 iStock.com / WUT789
P34–35 ©Victoria and Albert Museum
P40 iStock.com / Paul Gorvett
P42–43 iStock.com / Fly View Productions

The opinions expressed in editorial material do not necessarily represent the views of the Chartered Institution of Building Services Engineers (CIBSE). Unless specifically stated, goods or services mentioned in editorial or advertisements are not formally endorsed by CIBSE, which does not guarantee or endorse or accept any liability for any goods and/or services featured in this publication.
We remind all readers that it is their responsibility to verify advertisers' products claims.

Contributors



Julie Godefroy
The GLA's draft London Plan and its focus on in-use performance and post-occupancy reporting



Peter Schwartz
Why old building systems are at risk from cyberattack when connected to modern IP networks



Miriam Ozanne
CIBSE's Engineer of the Year on her passion for heritage projects and starting up her own consultancy



Tim Dwyer
CPD on new approaches to reducing energy consumption in domestic hot-water applications

At least 1,100 NHS ops cancelled in heatwaves

Emergency surgeries among procedures postponed

NHS hospitals cancelled more than 1,000 operations, including at least 10 emergency procedures, because of high temperatures during May and June, new figures show.

The website Carbon Brief obtained the figures after submitting freedom of information requests to 140 NHS trusts across England and Wales, asking for details of surgeries cancelled during 17 days in May and June when 'amber' and 'red' heat warnings were in place.

Fewer than half of the NHS trusts contacted replied, but those that did reported 1,110 operations had been cancelled because of record-breaking temperatures on their wards.

Nearly all the postponed surgeries were 'elective', meaning they were scheduled in advance and not immediately life-saving.

However, the list also detailed 10 emergency surgeries for life-threatening conditions, and at least eight heart operations and seven skin-cancer removals.

According to Carbon Brief, the areas forced to cancel the most operations included Surrey and Sussex, south Essex and parts of London, which were among the regions to experience the highest temperatures during the UK's record May and June heatwaves.

The highest number of cancellations was reported by the Surrey and Sussex Healthcare NHS Trust, with 140 at Crawley Hospital, near to where a record temperature of 35.7°C was briefly set in June.

Publication of the Carbon Brief figures follows a call, in August, by the Royal College of Nursing for an urgent programme to heat-proof facilities across health and care services.

Alliance out to highlight vital need for air con inspections

Awareness of TM44 remains 'worryingly low' in the leisure and retail sectors, according to a new alliance that is seeking to raise the profile of the mandatory energy efficiency assessment for air conditioning systems.

Consultancies Greengage Solutions and Mission Net Zero, and leisure industry ESG platform Sustainable Hotel Buyer, have joined forces to launch the TM44 Alliance.

It has been set up in response to concerns that awareness among businesses of their TM44 obligations remains low across the hospitality sector, leaving many at risk of unknowingly falling out of compliance.

Under TM44, air conditioning systems with an effective rated output of more than 12kW must be inspected at least every five years. Businesses that do not have a valid inspection may be exposed to enforcement action by Trading Standards, as well as financial penalties.

Organisations can check if their properties have a valid TM44 inspection by visiting the Alliance's website at **www.tm44.org**

Passive cooling can target heat in Bangladeshi factories

Stifling temperatures in Bangladesh's garment factories can be reduced with affordable passive measures, according to new research.

The report, *Six seasons, four summers*, highlights severe heat stress in the factories, with indoor temperatures exceeding outdoor levels by up to 2°C.

Improved ventilation, insulation, zone partitioning and other energy efficiency improvements can pay for themselves within four years, according to the research jointly carried out by Cornell University's Global Labor Institute and YGEN Engineering.

The research says lower working temperatures will boost productivity in the factories, helping to pay for the improvements.

Man dies in blaze at 22-storey London tower

Fire-safety work application approved the day before

The London Fire Brigade (LFB) is investigating a fatal blaze in a high-rise block of flats for which the Building Safety Regulator (BSR) had approved an application for fire-safety remediation work just the day before.

Ten engines were called to Neutron Tower, a 22-storey residential building in the East End neighbourhood of Poplar, in the early hours of 12 September. A two-bedroom flat and balcony on the 17th floor were damaged by the blaze.

Firefighters wearing breathing apparatus rescued two adults and a child, but a man was declared dead at the scene. The LFB is examining a range of factors regarding the cause of the fire.

Construction News reported that the BSR approved an application for fire-safety remediation work to the tower one day before the fatal blaze.

The regulator confirmed that the building control application was received in February 2026 and approved on 11 September. This is beyond the eight-week statutory timeframe for deciding remediation applications unless an extension is agreed. The case was 'complex', requiring 'multiple' requests for information and 'ongoing engagement' with the applicant to ensure that compliance with Building Regulations was fully demonstrated, the BSR said.

'There is currently no evidence to suggest that either the building's cladding, or the time taken over the Gateway 2 application, caused or contributed to the fire,' it added.

Istephan calls for vigilance on risks

Too many are living in unsafe buildings, the government's interim chief construction adviser has said before leaving the role last month.

In her final report, Thouria Istephan said progress has been made on construction standards since the Grenfell Tower disaster, but there is further work to do.

'We must remain vigilant. We must continue to monitor risks, as well as push for buildings to be made safe,' she says in the report. 'I encourage anyone who sees safety risks to raise them and to take action.'

We must ensure regulations 'appropriately respond' to emerging safety risks, she added.

Read about the CIBSE Building Safety conference, at which Istephan spoke, on page 21

COMPLETE

ENERGY EFFICIENT SOLUTIONS FOR ANY VALVE REQUIREMENT

For more than a century we have designed market leading solutions. Our variable flow valves, with outstanding hysteresis performance, can help reduce energy consumption by up to 27% based on a 10% improvement in the controlled flow rate. So, why not take comfort in our efficiencies.

Find out more at Cranefs.com/solutions



CRANE FLUID SYSTEMS

Aquatics centre lighting more efficient

Manufacturer Signify has carried out an upgrade of the London Aquatics Centre's lighting, which will deliver energy savings of up to 60% when the Olympic venue is being used at full capacity. The company, which manufactures Philips lighting products, has replaced the centre's legacy HID lighting with more energy-efficient LED technology, as part of a wider upgrade of the Zaha Hadid-designed aquatics venue for the 2012 Games. The new lighting is 60% more energy efficient while providing sufficient illumination to comply with World Aquatics' broadcast standards.

Norman Foster backs mini-reactors for towns

Architect Norman Foster has backed the rollout of micro-modular nuclear reactors. Addressing the World Nuclear Symposium in London last month, he said container-sized micro-modular reactors could provide electricity independent from the Grid and linked directly to the sources of power demand. Each of these mini-reactors could supply sufficient zero carbon power for a small town, he added. 'Nuclear would enable us to achieve a better balance between powering our society and protecting nature's ecosystems,' Foster said.

Hilson Moran becomes Tyréns Hilson Moran

Hilson Moran has been renamed Tyréns Hilson Moran to reflect its ownership by the Swedish built environment consultancy. Tyréns Group, a £250m-plus business, was founded in 1942, and Hilson Moran has been part of it since 2017. The new identity, which took effect from the beginning of September, provides a clearer connection to the wider group, which has 3,000 employees across Canada, eastern Europe and Scandinavia. Tyréns Hilson Moran says clients will continue to work with the same teams.

Scotland hits pause on hyperscale data centres

Moratorium on applications in place until planning guidance takes environmental impacts into account

Consents for hyperscale data centres in Scotland have been paused until the Holyrood government draws up planning guidance for the sector.

The vote by the devolved Scottish Parliament came after it had debated a motion by the Scottish Greens to introduce a moratorium on applications until there is a strategy and updated planning guidance in place that takes account of data centres' 'cumulative impacts on energy demand and the environment'.

Around two dozen planning applications for hyperscale data centres have been submitted in Scotland as developers seek to take advantage of the country's abundant renewable energy resources.

MSPs backed an amended motion, drawn up the Labour Party, which calls on the Scottish government to report back to parliament on the development of national planning guidance for hyperscale data centres by the end of the current calendar year, and publish it in full within 12 months.

The motion adds that no decisions on applications for such centres should be made until this guidance has been completed.

Hannah Mary Goodlad, Scottish Minister for Public Finance, told the parliament that it is 'highly unlikely' that the go ahead would be given for proposed data centres within the next three months.

Ahead of the debate, the Scottish government's chief planner, Dr Fiona Simpson, announced that applications for all proposed data centres over 50MW will be subject to Environmental Impact Assessments.

Dr Kat Jones, director of Action to Protect Rural Scotland, called on the Scottish government to 'urgently' call in hyperscale data centre applications, that are approaching a decision date.

ASHRAE President to judge at Young Engineer Awards

New ASHRAE President Sarah Maston will join the judging panel for the CIBSE ASHRAE Graduate of the Year final, to be held in London on 8 October.



Maston's theme for her 2026-27 presidency is 'Changing the game: retrofitting for resilience'.

At her inaugural address, she reminded the audience that around 80% of the buildings that will exist in 2050 are already standing, and that improving the resilience, efficiency and health of existing buildings is every bit as important as delivering new net zero developments.

Maston argued that the profession must respond not only to the need to reduce carbon emissions, but also to a future in which extreme weather events will increasingly test the resilience of buildings and communities.

Her programme is built around three priorities: greater awareness, adoption and enforcement of modern building energy codes; the promotion of existing building commissioning and multidisciplinary collaboration as the foundation of successful retrofit strategies; and the development of the workforce, including an interactive educational video game.

See page 12 for the Young Engineers Awards shortlist

Domestic heat pump retrofits drop by 22%

Heat Pump Association blames fall in funding

The number of retrofit heat pump installations in the first half of this year was more than a fifth lower than during the equivalent period in 2025, new government statistics show.

According to the Department for Energy Security and Net Zero's latest heat pump deployment figures, there were 20,895 installations during the first two quarters of the year – a 22% fall compared with the same period in 2025, when 26,768 retrofit installations were recorded.

This marks a break from the general upward trend in the number of heat pumps installed in existing properties over recent years.

Only two regions recorded growth in retrofit installations in the first two quarters of this year – London and Northern Ireland.

A Heat Pump Association UK spokesperson said the government figures highlight the challenges facing the retrofit heat pump market, with government-funded installations falling compared with in the first half of last year.

'This reflects the impact of the Energy Company Obligation ending and slower deployment through the Warm Homes: Social Housing Fund and Warm Homes: Local Grant, as well as a three-month hiatus being caused in the able-to-pay, off-the-gas-grid market because of an uplift to the Boiler Upgrade Scheme being announced in April but not being introduced until July.'

Call for energy levies to be moved from bills

Ex-Chancellor Rachel Reeves' move to strip most energy levies from bills 'did not go far enough' and all should be shifted onto government spending, her successor, John Healey, has been told.

A letter to the Chancellor, signed by 120 businesses, trade groups and charities, says last year's Budget package, shifting three-quarters of these levies from household bills to the Exchequer, was a 'very welcome start, but did not go far enough'.

It says that moving electricity levies from business and household bills would immediately make energy costs 'more affordable and competitive, providing a boost for manufacturing industries and tackling cost of living challenges'.

It would also address 'distortions' that undermine investment in electrification.

This valve comes with full technical support. Just like all our others.

Our technical team is here to support you every step of the way, offering responsive, collaborative guidance on everything from valve sizing to full technical submittals. When needed, we can provide on-site support before, during, and after installation. And to help your teams grow, we offer CIBSE-approved CPD modules and engaging hands-on live-rig training.

Find out more at Hattersley.com

Hattersley®



Neil, Technical Director

cibse news

TM39 certification scheme launched to recognise competence in metering and monitoring



TM39 Metering Specialist meets demand for qualified professionals

A new professional certification scheme to address the challenges of developing a metering strategy has been developed by CIBSE Certification.

TM39 Metering Specialist has been developed in alignment with the updated *TM39: Building metering and monitoring* guidance.

As the built environment races to meet net zero targets and the focus shifts to embodied carbon, the importance of operational energy remains, along with our dependence on accurate metering and monitoring of energy usage.

The updated CIBSE TM39 lays out a framework for developing a successful metering strategy. It includes key sections on validation, communications and cybersecurity, and helps organisations install and use meters to understand, manage and optimise their energy use with clarity and confidence. It is relevant to clients, managing agents, building services professionals, energy managers, facilities managers and anyone else involved in metering.

'Reliable assessment of building performance depends on the accurate measurement of energy and water use,' said Ellen Salazar, CIBSE's head of building services engineering.

'While robust metering and monitoring systems provide the foundation, the reliability of the resulting data ultimately depends on the competence of the professionals who specify, install, commission and maintain them.'

The new scheme meets growing demand for formally recognised competence in metering and monitoring of operational energy in buildings. As reporting requirements continue to evolve, the need for qualified specialists in this field has never been greater.

For more information about the scheme, visit: bit.ly/CJT39MS

Training

Whole Life Carbon Assessment (WLCA) training

As Whole Life Carbon Assessment (WLCA) reporting shifts from best practice to a regulatory baseline, the demand for rigorous, standardised assessment has become more urgent.

Delivered entirely online, CIBSE Training's WLCA suite provides the essential pathway from foundational awareness to advanced, project-ready execution. Our courses equip practitioners with the methodologies needed to calculate, analyse and mitigate carbon emissions.

The curriculum is split into two distinct, on-demand modules tailored to experience levels:

WLCA foundation training

For full details and booking: www.cibse.org/training

This module covers the building blocks of carbon reporting, including embodied carbon, life-cycle assessment fundamentals, environmental product declarations, material sourcing and international standards.

WLCA practitioner training

This advanced module equips building professionals with the practical methodologies, software applications and standards – including the RICS 2nd Edition (2023) standard – needed to deliver life-cycle assessments on live projects. The course covers international policy, LCA inputs, calculation software and results reporting, and culminates in a two-part examination.

Training spotlight

Upcoming courses in October 2026

CIBSE Training is running a series of remote courses in October, including:

- **8 October**: Air conditioning inspection for buildings
- **12–13 October**: Low carbon consultant building operations
- **15 October**: Amendment 4 of IET Wiring Regulations
- **15 October**: High-voltage (11kV) distribution and protection
- **22 October**: Emergency lighting to comply with fire-safety requirements

Visit www.cibse.org/training for full course outlines, to check availability and to secure your place.

CIBSE MENA Awards celebrate outstanding talent and projects

Two new categories for vertical transportation will feature at awards in Dubai

More than 80 individuals have been recognised for their talent and leadership in the shortlist for the CIBSE MENA Awards.

The accolades recognise excellence in building services engineering, highlighting projects and professionals who are setting new standards in sustainability, safety and performance.

Every stage of a career – from graduate to executive – as well as specialisms such as plumbing, electrical, mechanical and sustainability engineer, are covered in the 11 'People' categories.

Meanwhile, two new categories for vertical transportation (VT) have been added to the 'Company' awards: VT of the Year – Consultancy; and VT of the Year – Manufacturer and Supplier. This recognises the importance of this area of engineering in the region and aligns with CIBSE President Dave Cooper's specialism.

The shortlist for the 11 'Project' categories includes a diverse range of unique and technically advanced schemes, showcasing exceptional sustainability credentials. There are also five innovations and products awards.



Winners from last year's awards

The CIBSE MENA Awards, in collaboration with CIBSE MENA Region, take place at the W Hotel on Dubai's Palm Jumeirah, on 29 October. They are supported by FJ Group, Polypipe, CVS, Victaulic, BK Gulf, Fujseng, GF, Hira Industries, Mechartés, Meinhardt, Seed Engineering, Viega, Watertec and Zumtobel. For the full awards shortlist, visit: **www.cibse.org/mena**

Other upcoming events in the region:

- **CIBSE MENA Decarbonisation Conference, 27 October, Dubai**
- **CIBSE MENA Retrofit Conference, 25 November, Dubai**

In October

Ready Steady Light

15 October, Sidcup

The annual Society of Light and Lighting (SLL) competition, in association with Rose Bruford College and the International Association of Lighting Designers, invites professionals to compete in a back-to-basics celebration of the art and science of light. Each team will be challenged to create an exterior light installation with a limited range of kit and in only 180 minutes. Teams must be led by one member of the SLL.

Celebrating black excellence in the built environment

15 October, London

Join CIBSE Home Counties South West, the TfL RACE Colleague Network Group, BPIC Network and Rider Levett Bucknall for a panel discussion celebrating the achievements, leadership and influence of black professionals across the built environment.

Climate adaptation and resilience conference

21 October, London

This conference brings together industry leaders, policy-makers and practitioners to explore practical, evidence-based approaches to managing overheating, flooding, moisture and water resilience, drawing on CIBSE TM59, TM61–64 and the CIBSE Climate Action Plan.

CIBSE MENA Decarbonisation Conference

27 October, Dubai

Taking place during CIBSE MENA Week, the conference will bring together speakers, including Viktor Osokin, CEO of Tevmo, to share expertise in the area of decarbonisation. Topics covered will include cooling in a hotter Middle East, whole life carbon, AI and digital twins, and data centres, supported by Tevmo.

CIBSE welcomes IChemE to HQ

The Institution of Chemical Engineers (IChemE) is to relocate its London base to CIBSE's headquarters in Saffron Hill, as a result of an exciting new collaboration between the professional engineering bodies.

While CIBSE and IChemE represent distinct disciplines, having two leading institutions under one roof will create valuable opportunities to strengthen collaboration, share knowledge and foster innovation across the wider profession.

Working alongside each other, CIBSE and IChemE will be able to expand opportunities for members, partners and those not yet engaged with professional engineering institutions.

AI and sustainability to the fore as young engineers vie for 2026 awards

Employers also in the spotlight as annual celebration of upcoming talent draws near

Shortlists have been revealed for the 2026 CIBSE Young Engineers Awards (see below).

Thirty young engineers are in the running for awards that recognise the most talented graduates, undergraduates and apprentices.

Shortlisted graduates will present on the topic 'How should building services engineers evolve to actively shape AI's impact on ensuring a truly sustainable future?', while undergraduates will be judged on a 450-word abstract and three-minute video of their final-year project.

For Apprentice of the Year Level 3-4, the finalists have submitted a three-minute video on the topic: 'How do you think digital tools and automation, including AI, could support building services engineers in delivering more energy efficient and sustainable buildings in the future?'

Shortlisted Level 5-7 apprentices, submitted videos on the topic 'What responsibilities do engineers have when adopting AI and digital tools to support sustainable design?'



2025 Graduate of the Year Hannah Gray is an awards judge this year

CIBSE ASHRAE Graduate of the Year
- Aretha Ahunanya, UCL and Savills
- Athiya Junaid, Heriot-Watt University and WSP
- Kawtar Houbad, Imperial College London and MTVH
- Khaled Alqaisi, Mutah University, Jordan
- Khanyiso Mtwana, Heriot-Watt University and FairHeat
- Laura Stephens, Loughborough University
- Sasha Green, UCL and FairHeat
- Sebastian Taylor Aguilar, LSBU and MCA Consulting Engineers
- Serra Ardor, UCL and HTA Design
- Yuill Petrie, Heriot-Watt University and Cundall

Undergraduate of the Year
- Charlotte Davis, University of Sheffield
- George Stephens-Clark, University of Portsmouth
- Jamison Boll, University of the West of England
- Ka Po Cheung, Leeds Beckett University
- Maya Issa, University of Nottingham
- Millie Mann, University of Nottingham
- Precious Fabamifobee, University of Nottingham
- Tilly Turnbull, University of Nottingham
- Yingxi Chen, University of Nottingham

Apprentice of the Year: Level 3-4
- Austin Riches, DPL Group
- Bekim Fejzullai, Cundall
- Nadia Husen, Hawden MEP
- Varanika Jeyapahan, Scotch Partners

Apprentice of the Year: Level 5-7
- Alicia Neal-Usche, Skelly & Couch
- Asa Hynes, Stantec
- Harvey Dean, Arup
- Ieuan Newton, Stantec
- Katie Stubbenhagen, Scotch Partners
- Melissa Riggs, Troup Bywaters + Anders
- Morganne Jacobs, Stantec

The Young Engineers Awards are supported by Swegon, Georg Fischer, and Troup Bywaters + Anders. They will take place on Thursday 8 October in London at 30 Euston Square, London.

For further details and to book, visit: www.cibse.org/yea

Employer of the Year finalists

Ten companies are in the final of the 2026 Employer of the Year awards. The overall winner will be announced at the Young Engineer Awards on 8 October after the handing out of awards for the small, medium and large employer of the year.

The shortlisted employers champion young people in the building services sector through commitment to them in the workplace or by supporting them through education.

The Employer of the Year awards are sponsored by the CIBSE Patrons.

Small company (<50 employees):
- Cooper Homewood
- In Tandem
- S I Sealy

Medium company (51-300 employees)
- Atelier Ten
- PM Group
- Troup Bywaters + Anders
- Whitecode Consulting

Large company (>301 employees)
- Arup
- Crown House Technologies
- Hoare Lea

New Licentiates

LICENTIATE

Abraham, Sham
Manchester, United Kingdom

Abul Basar, Mohamed Arfin
Dubai, United Arab Emirates

Albrow, Elliott
Leeds, United Kingdom

Anderson, Grace
Popham, United Kingdom

Asare, Eliakim
Orpington, United Kingdom

Badat, Aamir
London, United Kingdom

Bali, Kirti
London, United Kingdom

Beer, Nicholas
London, United Kingdom

Blyth, Jenson
Hull, United Kingdom

Chruscinski, Adam
Maidstone, United Kingdom

Crawford, Clinton Lester
Newham, United Kingdom

Dann, Cain
Loughton, United Kingdom

De Brito, Paul
Bradford, United Kingdom

Elsey, Oliver
Barnoldswick, United Kingdom

Fejzullai, Bekim
Birmingham, United Kingdom

Garrity, Patrick
Welling, United Kingdom

Gibbs, Keaton
Birmingham, United Kingdom

Green, Antony
Greystones, Ireland

Hayles, Martin
Wokingham, United Kingdom

Holroyd, Thomas
Barnt Green, United Kingdom

Jaffer, Aafreen
South Croydon, United Kingdom

Jajoria, Kapil
Ingatestone, United Kingdom

Khan, Muhammad Afzal
Doha, Qatar

Kerr, Robbie
Celbridge, Ireland

Lavery, Connor
Malvern, United Kingdom

Leaver, James
Poole, United Kingdom

Lyczba, Dan
London, United Kingdom

Marks, Alan
Rugby, United Kingdom

Mason, Aaron
Heysham, United Kingdom

Mathewson, Anthony
Telford, United Kingdom

Morley, Matthew
Rawtenstall, United Kingdom

Mustafa, Leart
London, United Kingdom

Navarro, Frans
Charlbury, United Kingdom

Ncube, Ntandoyenkosi
Manchester, United Kingdom

Neil, Christopher
Glasgow, United Kingdom

Norris, Rory
London, United Kingdom

Novella, Dominique Frederik Johannes
Randalstown, United Kingdom

Omar, Salwa
Barking, United Kingdom

Park, Jenson
Exeter, United Kingdom

Paul, Subrata
Kilkenny, Ireland

Peterson, Craig
Berkshire, United Kingdom

Powell, Owen
Cheadle Hulme, United Kingdom

Pricop, Silvia
Waltham Abbey, United Kingdom

Robinson, Adam
Letchworth, United Kingdom

Russell, Alexander
East Midlands, United Kingdom

Sharples, Ryan
Manchester, United Kingdom

Shahid, Wahaab
Dukinfield, United Kingdom

Smith, Louie
Plymouth, United Kingdom

Syed, Mohammed Yousuff
Dubai, United Arab Emirates

Thompson, Oliver
Ripley, United Kingdom

Vagg, Ben
Lewisham, United Kingdom

Vivian, Miles
Bristol, United Kingdom

Walton, Alfie
Chesterfield, United Kingdom

Young, Bobby
Poole, United Kingdom

Call for nominations to Board and Council

Each year at the AGM in June, new Officers, Board members and Council members of CIBSE take office.

The Board is the Institution's governing body. It comprises seven Officers – President, President Elect, three Vice Presidents, Honorary Treasurer and immediate Past President – along with five elected Board members. All positions are subject to eligibility requirements set out in the bylaws and regulations.

Candidates are considered by the CIBSE Nominations Panel, which reviews eligibility and suitability before advising the Board on appropriate candidates.

- The **President Elect** must be a Fellow of the Institution and must have served as either a Vice President or the honorary treasurer.
- The **Vice Presidents** and **honorary treasurer** are appointed by the Board, based on recommendations from the Nominations Panel.
- **Board members** are elected from eligible Corporate Members who have been considered by the Nominations Panel.

The CIBSE Council is a consultative body that advises the Board on Institution policy. It includes several elected members, alongside representatives from all CIBSE Groups, Regions, Societies and Standing Committees.

We are now inviting CIBSE Members to nominate themselves for positions that become vacant in 2027. More information – including available roles, role descriptions, eligibility criteria and the nominations forms – can be found at: **bit.ly/CJNOM17**

The Board will determine which candidates to nominate for appointment or election.

Candidates who are not recommended by the Nominations Panel or the Board, but who meet the eligibility criteria, may still stand for election by securing the support of 10 Corporate Members, in which case a ballot will be held.



British Safety Council honours Dave Cooper

CIBSE President Dave Cooper MBE FCIBSE FSoVT has been presented with a Lifetime Achievement Award by the British Safety Council.

The accolade recognises Cooper's outstanding and long-standing contribution to improving safety across the lift and escalator industry.

Throughout his career, Cooper has been at the forefront of raising standards, sharing expertise and championing safer practices across the vertical transportation sector.

Is London measuring up?

The outcome-based approach in the draft London Plan is to be welcomed, but more could be done around retrofit and heat networks to decarbonise, says **Julie Godefroy**

The draft London Plan is open for consultation until 15 October. Some of its proposals for sustainability policies (GHR1 to GHR11) are based on measurable outcomes, which is a very welcome shift and one for which CIBSE has long argued.

The approach to energy and operational carbon changes from a relative reduction beyond Building Regulations to absolute energy use intensity (EUI) and space-heating demand targets, complemented by onsite renewables and a minimum five years of post-occupancy reporting.

This is really positive: targets expressed as improvement on Building Regulations make it difficult to compare performance with targets and to track progress over time; an absolute metric (for example, $kWh{\cdot}m^{-2}$ per year) gives a stable and comparable benchmark.

The proposals include 'baseline' and 'aspirational' limits. The latter are aligned with the UK Net Zero Carbon Buildings Standard (NZCBS) limits for 2040 onwards, except for offices – where the London Plan is more ambitious – and industrial buildings. Here, the NZCBS differentiates between logistics and distribution sectors, and data centres.

However, the wording on refurbishments is ambiguous, seemingly without EUI limits. This must be addressed, as long argued by CIBSE, particularly now that the NZCBS offers an approach and possible EUI limits.

It is proposed to drop carbon offsetting, which has been used unevenly. The GLA *Carbon Offset Funds monitoring report* shows that around half of the £170m collected since 2016 has been spent, with some boroughs spending more than 80% of their funds and others less than 15%.

The largest category of funded projects is, however, a genuine positive – energy efficiency projects in council estates, schools and social housing, as well as projects such as heat networks



"An absolute metric gives a stable and comparable benchmark"

decarbonisation. If offsetting goes, other funding streams will be needed.

GHR2 requires a low carbon heat appraisal on all major schemes, with heat-source selection based on upfront and whole life costs and carbon. This is a positive response to CIBSE's repeated concern that heat networks are too often encouraged for their potential to deliver carbon savings, without actual delivery. However, the draft policy relies heavily on the national heat network zoning regime, under which connection can become mandatory in designated zones, with concerns about carbon content of heat limits and how they will be calculated (potentially continuing to favour gas-fed CHP). This is a real limitation to delivering low carbon heat, and ambition could be raised in the Plan.

GHR3 introduces upfront embodied carbon targets for new build. This is very welcome, building on how much industry has moved on in recent years, with whole life carbon assessments in the current London Plan, more widespread skills and data, and the NZCBS.

The limits for residential schemes below 11m and for Class E buildings are broadly aligned with the NZCBS. An important distinction is residential schemes above 11m, for which limits are much higher than in the NZCBS.

The policy also requires a pre-redevelopment audit, assessing retention before demolition. This is a step forward, but it only asks for assessing and reporting, not meeting a fixed test. A more robust approach could be taken – for example, following Westminster's Retrofit First policy – and retrofit projects could be subject to limits; for example, following the NZCBS.

Other policies, and what's missing

GHR4 strengthens the overheating mitigation hierarchy and expects shading on windows receiving direct sunlight. However, it sits oddly alongside a reduced 2.4m floor-to-ceiling standard and softened encouragement for dual-aspect dwellings (HN8).

Finally, for a number of years CIBSE has argued for more consistent and extensive monitoring of outcomes, both at scheme level and in aggregate, to track progress and inform future policy.

The GLA's energy monitoring reports have improved significantly from past headline averages: recent ones publish EUI and space-heating demand by typology (though often based on Part L rather than performance assessments), and whole life carbon against benchmark by module.

What remains missing is the 'be seen' in-use layer: the most recent report shows only a handful of as-built submissions and in-use reporting yet to follow. This is largely to be expected, as a development approved now will not generate its first in-use data for some time. Looking forward to what the data will reveal when it does get published! ●

● **Julie Godefroy is CIBSE head of net zero**

Shaping the future of our profession

CIBSE responds to government's built environment professions strategy

The UK government has set out its ambition for a long-term strategy covering competence, behaviours and accountability of professionals working across the built environment – and it has direct consequences for CIBSE and its members.

The Ministry of Housing, Communities and Local Government (MHCLG) recently published a call for evidence on a strategy for the built environment professions, trades and occupations.

It asks how government, regulators, employers and professional bodies can work together to ensure those who design, build and operate buildings are skilled, behave professionally and are appropriately held to account – ultimately delivering safer, high-performing, sustainable buildings.

CIBSE has submitted a response, drawing on evidence from across our membership. Our central argument is that the UK has strong professional infrastructure – registration, CPD, certification, technical standards – and the focus should be on strengthening what already exists.

Handover risk

Our evidence suggests that the greatest professional risks sit not within any single discipline, but at the handover points between them, where information, accountability and continuity can be lost.

We argue that professional registration and robust competency standards remain the foundation of a trusted profession, and their value should be evidenced continually, rather than asserted at a single point in time.

This, in our view, should be measured alongside how buildings actually perform in practice through verified, in-use performance metrics, ensuring that competence translates into real-world results for buildings and occupants.

What could this mean for CIBSE members? Expect: closer scrutiny of how competence is demonstrated throughout a career; mandatory, rather than voluntary, schemes for safety-critical roles; and a sharper focus on measured, in-use performance as a mark of professional success.

This is only the start. CIBSE is working closely with the MHCLG as the strategy develops and, in October, we will co-host a strategy workshop with the department at CIBSE HQ – a direct chance for members to feed back to the policy-makers shaping this work.

In the meantime, we'd welcome your views. This strategy will shape our profession for years to come and we want your evidence behind it.

Contact technical@cibse.org

Collaboration drives uni decarbonisation



Collaborative engineering and integrated design helped deliver a large-scale decarbonisation project for Birmingham City University, says Mitsubishi Electric's **Rachel Lekman**

When Birmingham City University (BCU) secured Salix funding to remove gas from its School of Life and Health Sciences building, financial restrictions on the project called for an innovative solution. This is where collaboration and partnership was able to deliver the ideal response.

Working together, SHEco Renewable Systems and Kooltech, the UK's leading distributor of Mitsubishi Electric HVAC systems, delivered a value-engineered solution that reduced project costs by £2m from the original tender without compromising technical quality or performance.

Working with specialist product support from Mitsubishi Electric, flow temperatures and cooling and heating loads for the building were calculated. Equipment was then chosen that aligned with Public Sector Decarbonisation Scheme objectives and the constraints of the building's infrastructure.

The solution uses two Climaveneta 4-pipe simultaneous heating and cooling air source heat pumps. These heat water up to 45°C to serve a bank of 'first stage' thermal stores, as well as delivering cooling at 13°C and 6°C.

The thermal stores then pre-heat four EW-HT water source heat pumps, which boost the temperature to 70°C to go onto the existing secondary system. This avoids having to change any of the secondary-side emitters, helping deliver the project within budget.

This project stands as a strong example of how collaborative engineering and integrated design can help the higher education sector transition towards low carbon operation and long-term energy efficiency.

Through innovative in-house design and value engineering, SHEco and its partners were able to help BCU progress its net zero ambitions with a future-focused, highly efficient system that delivers lasting environmental and commercial benefits.

The scheme is one of the university's first large-scale, heat pump-led decarbonisation projects and sets a clear benchmark for sustainable building transformation in the higher education sector.

Watch a video of the project here: bit.ly/CJUoBDC

● **Rachel Lekman is consultant channel manager at Mitsubishi Electric**

MITSUBISHI ELECTRIC

Open to attack

With retrofits routinely connecting decades-old building systems to modern IP networks, there is a real risk of exposure to cyberattack unless digital security is included in the project scope from the outset, says OryxAlign's **Peter Schwartz**

Most building automation still runs on protocols drawn up decades ago, long before network security was considered. Standards such as BACnet and Modbus were built for reliable communication inside a closed environment, and they carry little authentication or encryption of their own.

A retrofit changes that environment completely. The moment these systems join a modern IP network, the operational technology that runs the building meets the information technology that runs the business, and devices that were only ever meant to communicate with one another become reachable from beyond the plantroom.

Smarter buildings now reach further still, with heating and power increasingly linked to the Grid and demand balanced in step with real-time energy signals.

Retrofit is where this happens most, because the work joins equipment of different ages to shared infrastructure. Building automation security reviews[1] trace the problem to the technology itself, finding that many of these weaknesses 'stem from the design of the underlying BAS protocol'.

Where the weak points sit

The exposure tends to concentrate at a few predictable places. Older controllers often run firmware that can no longer be patched, sometimes because the manufacturer withdrew support years ago. Networks assembled piecemeal over a long period tend to be flat, with no real separation between the building services and the corporate systems. A single compromised controller on a network of that kind can disrupt heating or access for an entire floor, and can give an intruder a foothold from which to reach into business systems.

Responsibility adds a further complication. The building services team frequently specifies and commissions connected equipment without any formal handover to an IT or security function, which leaves the connected estate with no clear owner.



"A compromised controller on a network... can give an intruder a foothold"

Cybersecurity usually enters the conversation once the equipment has been chosen – sometimes once it has already been installed. Procurement treats it as an IT concern sitting outside the building services package. Design budgets seldom account for it at concept stage. No standard obligation exists to write it into a services brief.

The question of who secures the connected estate then goes unasked until an incident forces an answer, by which point the cost and disruption of putting it right have climbed well beyond what early planning would have needed.

CIBSE has recognised the problem. Its DE6.1 guidance *Cyber security in building services design*[2] points to the need for 'dedicated security experts to review and feed into each design', and it treats connected buildings as a growing part of national infrastructure.

The national security picture reinforces that position. The National Cyber Security Centre sets out principles for connecting operational technology safely[3] that place hardening the network boundary and limiting its exposure at the centre of the work, and it frames secure connectivity as something to design in from the start.

That principle translates into a few practical moves on a live retrofit. An accurate inventory of what is being connected comes first, as nothing can be protected while it remains invisible to the people responsible for the network. Segmenting that network so the building services sit apart from corporate traffic then limits how far an intruder can move.

Hardening newly connected devices and maintaining them through regular updates helps close obvious openings. Equipment selection also matters and specifying products that support secure configuration spares a project the harder task of defending hardware that was never built to be defended.

Conversations need to begin at the brief and specification stage, with building services and IT working from a single plan agreed at the outset.

The expertise to lead this already sits with building services engineers, who decide what gets connected and how it runs. Treating the network and its security as core building infrastructure gives a retrofit the resilience to match its new capabilities. That work belongs in the brief, at the point where the design is still taking shape and the cost of getting it right is at its lowest. ●

● **Peter Schwartz is a senior technology consultant at OryxAlign**

For more, visit bit.ly/CJOACPT

References:

[1] CIBSE DE6.1: *Cyber security in building services design* (2019) **bit.ly/4yolyJc**
[2] Morales-Gonzalez, C et al (2024) 'On building automation system security', *High-Confidence Computing*, 4(3), p.100236 **bit.ly/CJBASS24**
[3] National Cyber Security Centre (2026) Secure connectivity. Available at: **bit.ly/CJNCSCOT** (accessed: 11 September 2026)

Why we must ask 'who owns the performance gap'?

New free-to-attend series explores gap between design intent and operational reality, explains **Jennifer Cox**

The gap between predicted and actual building performance remains one of the built environment's most persistent and costly challenges. Despite increasingly sophisticated modelling tools, design standards and building technologies, many projects fail to deliver the levels of energy efficiency, comfort and operational performance anticipated during design.

To explore why this continues and how the industry can respond, a new four-part event series, 'Who owns the performance gap between design intent and operational reality?', has been launched.

It will examine how decisions made throughout the project life-cycle influence building performance after occupation. Each event focuses on a different aspect of the performance gap, bringing together designers, engineers, contractors, operators, policy-makers and researchers to share evidence, lessons learned and practical solutions.

The series begins by investigating the consequences of over- and undersizing building services, while the second session considers heat network design, and the third focuses on modelling and simulation tools. The last event in the series looks at post-occupancy evaluation, measurement and verification.

Rather than searching for a single owner of the performance gap, the series recognises that responsibility is shared. By bringing together stakeholders from a building's life-cycle, the programme aims to encourage greater collaboration, accountability and learning. Ultimately, the goal is to identify practical actions that will help narrow the gap.

Event diary: who owns the performance gap?

- **5 November**: How the performance gap is affected by oversizing/undersizing equipment, and how controls and metering can improve it
- **12 November**: The relationship between energy performance and heat network design
- **18 November**: How the performance gap is affected by modelling and software at design stage, followed by the Building Simulation Awards
- **1 December**: Who owns the performance gap? A post-occupancy evaluation and vision for the future.

All events run from 13.00–17.00 at CIBSE HQ, followed by networking in the new Members Area. Sign up for the events at **bit.ly/CJPGev26**

● **Jennifer Cox is a senior electrical engineer at Cundall**

Rethinking damper specifications



Higher product classification does not always mean a smoke and fire damper will be the appropriate specification, says **David Fitzpatrick**

There is an understandable tendency within fire safety to assume that more performance must mean operating at the highest level of product classification. Increasingly, however, I am seeing designers being pushed towards products and classifications that may go beyond what the application requires.

That raises an important question: are we always specifying for the building or are we sometimes specifying for a particular company's performance?

This is not an argument for reducing standards; it is the opposite. Good engineering should mean understanding precisely what performance is required, why it is required, and whether there is appropriate evidence to support the proposed solution.

A higher classification does not automatically make a product more appropriate for every application. Specification should begin with the fire strategy and the role the product is expected to perform within it. From there, designers can consider the required classification, supporting construction, tested installation method, available evidence and practical coordination with other building services.

In simple terms: *fire strategy + application + classification + evidence + installation + coordination*. All six matter.

Overspecification can introduce unnecessary cost and complexity, but my greater concern is that it risks shifting attention away from the fundamentals. A product with an enhanced classification still needs to be suitable for the specific wall, floor, duct arrangement and installation condition for which it is being used or installed.

For experienced consultants, much of this will already be embedded within established specification processes. But as our industry rightly places greater emphasis on competence and evidence-based decision-making, we should also be confident enough to ask why a particular level of performance is being requested.

The principle I come back to is a simple one: *Don't start with the product. Start with what the building needs the product to do*. That is the foundation of good specification.

● **David Fitzpatrick is managing director at BSB Engineering Services**

david.fitzpatrick@bsb-dampers.co.uk | www.bsb-dampers.co.uk

BSB
ENGINEERING A SAFER TOMORROW



Miriam Ozanne started her own consultancy the same month she won CIBSE Engineer of the Year

Career CV

Work history

Director at Ozanne Consulting: Mar 2026 – present
Regional director: building performance, Aecom: Apr 2022 – Mar 2026
Regional senior MEP manager, WeWork: Jun 2019 – Apr 2022
Associate director and principal engineer, Aecom: Sep 2017 – Jun 2019
Senior mechanical engineer, Arup: Aug 2009 – Dec 2016

Voluntary work

Engineering volunteer/researcher in Palestine

Education

MEng Mechanical engineering, Imperial College London

Renewing and respecting

CIBSE Engineer of the Year Miriam Ozanne MCIBSE speaks to **Ian Farrell** about her purpose-driven career, bridging technical design with operational reality

Miriam Ozanne's recognition as CIBSE's Engineer of the Year highlights how versatile, dynamic and influential the modern-day building services engineer has become.

Since entering the industry in 2009, Ozanne has advised high-profile public bodies and blue-chip corporate clients, applied her technical expertise to sustainable projects in Palestine, and worked on the 'greatest show on Earth' at the London 2012 Olympics.

In March 2026, the same month she was named CIBSE Engineer of the Year, Ozanne took the decision to establish her own design consultancy, specialising in bridging the gap between design and operational reality. It marks the start of an ambitious new chapter in an already rich and varied career.

Like many engineers before her, Ozanne was not immediately aware of the attractions of a career in building services. After turning her back on the idea of becoming a Formula 1 race engineer – too much travel – she decided to look at well-known engineering consultants close to Imperial College London, where she was studying for her degree in mechanical engineering.



While admitting to being 'a bit of a geek' who loves the technical side of the job, Ozanne says she is also a people person. Her work with Arup on a variety of projects – including a bank HQ in Mexico and the British Museum – allowed both sides of her skill set to thrive. 'The opportunity to work with so many different people, coming from so many different angles, was great. I really enjoyed that,' she remembers.

As her skills as a building services engineer developed, Ozanne soon realised she could put them to good use volunteering with various NGOs and organisations in Palestine.

'When I started out in my career, there was this feeling that I could have a positive impact,' she says. 'I did a lot of volunteer work on renewable energy, recycled water and schools projects. It was a huge motivator for me. I'm very purpose-driven. I care about what I'm doing.'

Her passion for volunteering saw Ozanne leave Arup and work full time in the Middle East, supported by research funding. Afterwards, she returned to the UK to work as an associate director and principal engineer at Aecom.

For three years from 2019, Ozanne worked at flexible workplace provider WeWork, where she experienced the reality of operating buildings.

'My time at WeWork was important because, up until then, I had designed buildings without necessarily understanding how they were going to be operated. We have this divide between the people who design and people who operate, and that doesn't help with energy efficiency,' she says.

In 2022 Ozanne returned to Aecom and formed a building performance team focused on optimising buildings in operation, an area she was passionate about. Her aim was to break down traditional industry barriers between those who design and those who operate buildings.

Since March this year, however, she has been her own boss, having set up her consultancy. 'I have a young family and it feels like the right time for an adventure like this,' she says. 'While at times it feels slightly terrifying, the freedom and flexibility of greater choice was a strong motivator to take this step.'

Much of her work is with organisations that have made bold decarbonisation commitments and now face the practical challenge of delivering them cost-effectively.

'There was a time when everyone was just running headlong for decarbonisation, but that has changed – it can't be at any cost. A lot of my work now is listening to organisations that are saying "we've made this commitment; how are we going to meet it?".'

Fortunately, Ozanne says there are a lot of ways to save energy in a building before looking at expensive retrofit options.

Taking a holistic view was important when she was working on a net zero strategy for 20 Fenchurch Street. Ozanne and her team combined their design knowledge with strong collaboration with the building management team. Based on extensive data analysis, they identified and implemented a range of changes to operational controls, at no cost, that resulted in significant energy savings.

"If you can't bring a historic building into the modern world, you're essentially leaving it to ruin"

Ozanne notes the wider benefits of prioritising building performance, such as extending plant life. 'If plant is run efficiently, the expected life can go beyond their lease, saving money and carbon'.

She talks passionately about embodied carbon, and says huge strides forward with Environmental Product Declarations and TM65 are allowing for better calculations. Building operators are increasingly understanding the bigger picture of whole life carbon, she adds.

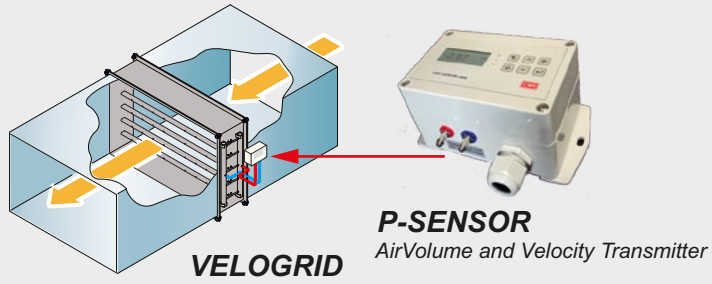
While Ozanne has spent many years working on new 'steel and glass' buildings, her heart is in the heritage sector. 'I am passionate about decarbonising heritage buildings. If you can't bring a historic building into the modern world so it's suitable for use and resilient to climate change, then you're essentially leaving it to ruin.

'My approach is shaped by my time in Palestine, where the history of buildings and people's connection to the land are so important.'

Ozanne's consultancy is already collaborating with others to deliver decarbonisation solutions for heritage projects such as Leeds Castle, in Kent, with Zero Emission Buildings. 'With older buildings, it's not just about decarbonising from an environmental perspective; it's about future viability. If we can cut operating costs, that is positive for these venues.

'I'd love to be known as the "heritage decarb lady", honouring the past by allowing it to evolve and develop. That really excites me.' ●

The perfect combination - CMR Flowgrid and Sensor all in one



P-SENSOR
AirVolume and Velocity Transmitter

VELOGRID
Velocity / Air Volume Averaging Flowgrid

CMR are the manufacturers of both the P-Sensor and the Velogrid. The Velogrids are made of galvanised or stainless steel and also PPs.It fits duct sizes up to 3m x 3m. The P-Sensor can be mounted on the Grid. The P-Sensor is digital and has a keyboard to enter duct height - width - density - and the scaling can be adjusted to m/s - m3/s - m3/h - l/s.It can even work out the Air Change rate. It has a very accurate PID control and can be connected to any BMS or PLC System. It provides a linear volume signal output delivering 0..10V 4..20mA and an addressable Modbus rtu bus.

CMR CONTROLS Ltd

22 Repton Court Repton Close
Basildon Essex Ss13 1LN GB
Website : https://www.cmr.uk

T+44 (0) 1268 287222

e-mail: sales@cmr.uk

MITSUBISHI ELECTRIC

CONSULTANT FOCUS

on the new City Multi R32 VRF YXM range



Market-leading efficiency that cuts running costs and operational carbon.

Mitsubishi Electric's City Multi R32 VRF range is evolving and is now available in system capacities from 12 to 112kW, with both Heat Pump and Heat Recovery options. We've re-engineered our popular plug and play VRF system with a new ultra-compact modular YXM chassis design, flexible piping configurations, market-leading low noise levels and BS EN 378 part 3 compliant safety measures. Incorporating a unique patented Vertical Flat Tube (VFT) heat exchanger, the new **City Multi R32 VRF YXM** range delivers high seasonal efficiencies, low operational costs and a significant reduction in whole life carbon.

Available to install now, if you are a Consultant and have a specification project suitable for our new **City Multi R32 VRF YXM** range and would like to speak to a Mitsubishi Electric Account Manager, or simply to register for future updates, please visit:



CityMultiYXM.com

CITY MULTI YXM

R32

NEW YXM RANGE



Beyond compliance

Dame Judith Hackitt and other expert speakers explored the operational reality of delivering whole life building safety at a recent CIBSE conference. **Alex Smith** reports

CIBSE's conference on building safety last month moved beyond legislative theory to consider the operational reality of designing and delivering safer buildings.

The keynote speech at CIBSE Building Safety 2026: Delivering safer buildings in practice was given by Dame Judith Hackitt, author of the landmark *Building a Safer Future* report, published in 2018 following the Grenfell Tower tragedy.

Dame Judith, who currently chairs the Industry Safety Steering Group, described the progress being made under the new building safety regime and highlighted areas of concern. These include severe skills gaps in the retrofit sector, an overreliance on building control and a lack of consideration by the supply chain for construction product safety.

Dame Judith told delegates that the construction industry had to take a more proactive approach to building safety, adding: 'It's time to shift the debate from a focus on regulatory compliance to talking about creating and delivering safety, quality and a built environment in which we can all take pride.'



Dame Judith Hackitt

She noted that there had been much better collaboration between industry and the Building Safety Regulator over the past year, and that this had helped to 'find workable, pragmatic solutions' to the challenges of the Building Safety Act regime.

These included regular meetings between the BSR and industry representatives to resolve practical bottlenecks in the gateway system for higher-risk buildings(HRBs).

While there had been improvements in the building safety regime for new HRBs, Dame Judith said challenges existed around the safety of buildings already in occupation. There was sometimes a 'woeful lack of knowledge and competence' in handling refurbishments, she added, and a need for industry to 'up its game' in listening and caring for residents.

Key players such as managing agents and tenant management organisations were 'very poorly equipped to deal with their new responsibilities', she said.

As the chair of the panel that, in May, published a review of building control, Dame Judith believes the role is undervalued, not well understood and over-relied upon by industry.

'Their sheer volume of work is exacerbated by others who are not yet raising their game in terms of what they present to building control for approval and, in the case of high-rise buildings, to the BSR,' she said.

There was a role for building control to offer guidance to duty holders, she added, but there was a line that must not be crossed: 'There is a balance to be struck between offering helpful advice and stepping into the space of being the designer by proxy.

'That is why raising everyone's competence is so critical to easing the squeeze on building control.'

Proposals in the Construction Products Reform White Paper around product regulation are also a key part of a 'complex picture', Dame Judith told the conference, adding that shortcomings in the heat-soaked thermally toughened glass sector, identified by the Office for Product Safety and Standards (OPSS), proved product safety was an issue.

Failure to supply the technical documentation required to verify products meet safety standards was not only the fault of manufacturers, she said, but also the supply chain for not asking for information, and 'not seeming to care' until the regulator took action. The General Safety Requirement in the white paper expands legal responsibility across the entire life-cycle and places a duty on everyone to be confident they are using the right materials.

In a morning session on competence, accountability and assurance, former interim chief construction adviser Thouria Istephan said accountability must operate at both individual and organisational levels, and she added that governance needed to be examined and internal challenge functions established in organisations.

Accountability applies to every professional, Istephan said, and they must have the courage to speak up and act, even when systems make it difficult. 'As professional people, you have a code of ethics that says you are accountable.'

"The role of building control is undervalued, not well understood and over-relied upon by industry"

Istephan highlighted the failure of client organisations to take responsibility for competence checks since Grenfell and told the conference she was aware of clients who had done nothing in response to the inquiry. 'Some real root-cause issues are related to clients, and them not taking an interest,' she said.

In the same session, Jon Vanstone, chair of the Industry Competence Committee (ICC), identified the boundaries and handover points between different disciplines as a persistent source of problems. While individual teams completed specific tasks, system-wide integration was not always achieved, he said. He also criticised the current state of competence evidence, noting the difficulty in distinguishing between self-certified positions and rigorous third-party-assessed qualifications.

The ICC had identified two top systemic risks. The first is immaturity in the management of occupied buildings. 'We focus so much on construction, we don't think about how we're managing, repairing and retrofitting buildings,' Vanstone said.

The second is the introduction of regulation in areas where competence does not yet exist to deliver against it.

Dame Judith said there is an urgent need for all sectors to develop a skilled workforce that adapts to continuous change and reform. 'Industry can no longer do the same things in the way it has always done,' she said. ●

Visit www.cibsejournal.com for more from the conference

Building safety reform: what the next phase means in practice

In the session following Dame Judith's keynote, Charlie Pugsley, acting chief executive at the BSR, noted that approval times for Gateway 2 HRB applications had nearly halved, and approval rates doubled, in the past year. He said the focus now needed to shift to ensuring competencies and behaviours were embedded throughout the construction phase.

'We need to make sure that those competencies and behaviours play out so a good design actually leads to a safe building for its whole life,' he said.

Pugsley raised concerns about proportionality in delivering building assessment certificates for buildings in occupation, warning that residents risk being priced out of their homes if access to competent professionals remained limited. He also flagged



overheating as a potential future crisis, given evidence of heat-related deaths over the summer.

Jack Pringle, chair of the RIBA board, highlighted fragmentation in procurement and a race to the bottom on price as factors that contributed to Grenfell. He welcomed the principal designer role in the Building Safety Act as a means to restore architects' oversight of the broader design team.

He also argued for reserved functions – specific, critical tasks or duties that only qualified, regulated and competent professionals are legally allowed to perform – particularly for buildings above a certain size. 'There is little point in having regulated professions and proved-competent professionals, if anyone can make a Building Regulations application,' he said.

Amanda Long, CEO at Code for Construction Information, said the OPSS, which is the enforcement authority for construction product safety, was doing a good job of engaging the building industry and increasing its capacity to work with manufacturers. The OPSS will be absorbed into the SCR, and Long said uncertainty about the new body was contributing to a 'wait and see attitude' across industry, which was slowing the pace of change.



The leading trade body for electrotechnical contractors

STRENGTHEN YOUR BUSINESS

THROUGH ECA MEMBERSHIP

- Recognised professional credibility across public and private sector clients
- Technical and business-critical expertise to support compliance, reduce risk and protect margins
- Tailored savings and services that deliver measurable value
- Access to a powerful peer network, shaping industry standards and policy

For electrotechnical contractors committed to excellence, resilience, and growth, ECA membership is essential.

Discover more at eca.co.uk/unlock

ECA

Jet-propelled design



The extreme heat, noise and vibration generated by turbine testing at the new Whittle Laboratory in Cambridge presented Max Fordham with a formidable challenge: supplying enough power and cooling for a wind tunnel and test rigs while protecting researchers in adjacent workshops and offices. **Andy Pearson** reports

The new Whittle Laboratory at the University of Cambridge is designed to accelerate the development of the technologies that could help aviation achieve a zero carbon future.

Home to the National Centre for Propulsion and Power (NCPP), the £58m facility takes its name from Sir Frank Whittle, who developed the first jet engine at Cambridge. The laboratory is an expansion of the 1970s laboratory building, which it adjoins, on the university's West Cambridge campus.

Conceived along similar lines to facilities for Formula 1 car development, the 4,000m^2 building is designed to bring together researchers, industry and technology in an environment geared towards shortening the journey from concept to implementation for fans, compressors and turbines.

Here, researchers can develop a concept, fabricate a prototype in the building's rapid-manufacturing facilities, test it in conditions designed to simulate real-world aviation or power conditions, and then feed the test data back into the next iteration. The intention is to compress development cycles from years to weeks.

The new Whittle Laboratory is home to the National Centre for Propulsion and Power

Designed by Grimshaw Architects, working with building services engineers Max Fordham, the laboratory features a triple-height space that houses a unique, £14m cylindrical, variable-pressure, -temperature and -density wind tunnel, which has a rotating rig for testing components under simulated operating conditions.

'The wind tunnel is the focus of the building,' says Andrew Johnson, partner at Max Fordham.

Providing the infrastructure to support this facility was one of the defining challenges for the building services engineers. The wind tunnel requires a substantial electrical supply

for its 4MVA drive system, while simultaneously rejecting up to 4MW of heat generated by the process plant.

Powering up the test hall

The task was made all the more challenging by the considerable noise and vibration generated by a rig, designed to test components for high-speed turbines, within a building intended to encourage openness, interaction and the chance encounters between researchers from which new ideas can emerge.

The test rig runs intermittently. To ensure sufficient power is available, the high-voltage supply to the West Cambridge campus had to be upgraded and a new substation installed.

'We had to negotiate with UKPN [UK Power Networks] to get the site's high-voltage ring upgraded from 8MVA to 10.3MVA, to accommodate this big increase in the electrical load,' explains Johnson.

The unit's high-powered 4MVA drive system is contained within the NCPP Test Hall. To enable 4MW of heat to be removed from it, Max Fordham had to supply cooling water to the tunnel's 200mm flanged connection at flow/return temperatures of 36°C/55°C.

'Providing cooling for the unit was challenging, because it's a really, really peaky instantaneous high load,' says Johnson.

Max Fordham looked at various cooling options before settling on a bank of four roof-top adiabatic coolers dedicated to the process load. 'Based on the cooling load, the site's acoustic constraints and the Energy Cost Matrix [see panel], adiabatic cooling was clearly the best way to go,' adds Johnson.

The rig will not be able to achieve maximum cooling on days when the ambient dry bulb air temperature is above 30°C.

'If the air temperature is above 30°C outside, the adiabatics wouldn't allow you to deliver 4MW of cooling while meeting the site acoustic constraints demanded by the planning requirements for the West Cambridge Masterplan, (46 dB $L_{Aeq,1hr}$ at the site boundary)" explains Johnson, who adds that the researchers understood the rationale for the limitation and were confident they could work with this constraint.

Cooling for the future

Five 1,340kW adiabatic coolers have been installed. One unit provides space cooling for the wind-tunnel laboratory, with the remaining four units dedicated to keeping the process equipment cool. Space has also been provided on the roof for an additional adiabatic cooler, to future-proof the installation should the testing regime evolve to require more cooling in future.

The wind tunnel is operated remotely and is incredibly noisy. When it runs at full speed, noise levels in the laboratory can exceed 100dB – sufficiently high to require stringent hearing protection and restrict occupancy. Vibration is mitigated by the mass of the laboratory's 1,700mm-thick concrete foundation supporting the compressor and motor. To minimise airborne noise, the laboratory is separated from

Project team

Client: University of Cambridge's Estates Division and Department of Engineering
Architects: Grimshaw (design), RHP (delivery)
Engineering consultants: Max Fordham (MEP, Breeam and acoustics)
Smith and Wallwork Engineers (civil and structural)
Roger Parker Associates (MEP delivery)
Sweco (civil and structural delivery)
Contractor: SDC
Project management: Aecom
Cost management: CB3
Landscape design: Turkington Martin and Liz Lake Associates
Clerk of works: Hickton Quality Control
Commissioning compliance manager: Banyards



The 4MW wind tunnel is the focus of the building

Energy Cost Matrix

The Energy Cost Matrix (ECM) relates the total life-cycle energy required to construct, operate, maintain and take down the building to the construction costs.

It was developed by the late Sir David MacKay, former chief scientific adviser to the Department of Energy and Climate Change, to prioritise whole life energy minimisation, operational efficiency and long-term adaptability.

The matrix was applied to both the building services and the architecture. Johnson says it had 'a big impact on the design of the building envelope'. When applied to the building services, he adds, you have to factor in the capital cost of the plant and the embodied carbon of all the different installations, plus the ongoing energy cost of the different options.

For domestic hot water (DHW), the ECM steered the team towards point-of-use DHW heaters. 'We looked at the two options: having a standard calorifier with hot-water circulation; and electric point-of-use units,' Johnson says. 'The Energy Cost Matrix proved it was better to have local point-of-use heating, because there's no circulation pipework or heat losses.'

the office spaces to the south by workshop spaces, which house the facility's rapid-manufacturing tools used to fabricate the components that will be tested.

As part of the acoustic design, the ceiling and walls of the laboratory incorporate large areas of acoustic absorption. Max Fordham undertook extensive acoustic modelling of the whole building to ensure resultant noise levels and reverberation times were within prescribed limits.

The building's central atrium also has acoustic panelling on the walls and an acoustically treated soffit. After passing through the three-storey building's colonnaded entrance, visitors arrive in the central atrium. 'It's a really collaborative open-plan space, so reverberation control was key,' says Johnson.

Professor Robert Miller, chair in aerothermal technology and director of the Whittle Laboratory, describes the building itself as 'part of the machine designed so ideas move from thinking to fabrication to testing'.

The atrium is the heart of this machine, and a key component of its philosophy of collaboration and idea sharing. It is designed to support informal presentations and the exchange of ideas through gatherings of researchers and students. Researchers' offices are clustered around the atrium, on the first and second floors, with many featuring windows opening directly out onto the space.

On the first floor, opening to the atrium, is a space to house The Whittle 'Tea Table' – a giant table, salvaged from the original building, with enough spaces for a large number of the building's occupants to sit around and chat.

The atrium is also a key element in the building's ventilation strategy. In addition to flooding the space with daylight, its five saw-tooth rooflights incorporate louvres. These enable stack ventilation, with warmed stale air exiting through the louvres while pulling outside air in through a combination of manually openable windows and automatically controlled louvres across the office floors. This gives researchers the option of natural ventilation when conditions allow.



The central atrium is acoustically separated from the workshops and test areas

'We were heavily involved in the façade design with Grimshaw, to minimise solar loads and maximise daylighting to offices and the atrium, and to use natural ventilation wherever we could,' says Johnson.

Natural ventilation

Extensive thermal modelling showed that natural ventilation would keep most spaces comfortable for a large part of the year. 'The idea is that the office windows open to the atrium and the office doors remain open; everything is designed to work with that scenario,' explains Johnson.

At times when office windows are closed, ceiling-mounted fan coil units (FCUs) provide heating and cooling to the majority of offices. A few spaces are heated using low temperature hot water (LTHW) radiators, while the central atrium and building's library are kept comfortable using underfloor heating. 'It's a mix and match approach to heating, depending on how the spaces are used,' says Johnson.

He adds that comfort modelling was undertaken for 2050 and 2080 future climate scenarios. 'The modelling showed that the building would remain comfortable in 2050, but would overheat in 2080 without additional external shading or a decrease in the G-value of the glazing, or both.'

Not all offices are open to the atrium: on the upper floors, there are cellular rooms for those who need a space for uninterrupted thinking, writing and research. Other rooms house the



Exposed services will simplify future adaptation



AVAILABLE TO ORDER NOW

STAINLESS STEEL CONDENSING

EQMAX

COMMERCIAL WATER HEATER

YOUR NEW **IDEAL** WATER HEATER IS NOW IN STOCK

10 MODELS

OUTPUTS: 20kW to 120kW

STORAGE: 210 to 538 litres

Hot Water from the UK's commercial heating market-leaders.

Designed for replacement & refurbishment projects.

5 YEAR WARRANTY* | DHW | A ErP

*Terms & conditions apply

SCAN ME

To view our full range of products visit:

idealcommercialheating.com/hot-water

ideal HEATING COMMERCIAL

CIBSE

Turn your experience into Chartered Status

Built your career through practical experience rather than a traditional degree? The CIBSE Experience Route could help you progress towards Professional Registration.

Why choose the Experience Route?

- Professional recognition
- Experience-led assesment
- Cost-effective
- Career advancement

Learn more and apply





Left: A wall-mounted jet engine feature. Right: A Rolls-Royce Trent XWB engine

graphics processing units-based computational tools running AI to analyse data harvested from the test rigs, to further compress development timelines. These spaces are fully air conditioned.

Max Fordham's brief was for a fully electric building, so two 100kW roof-mounted reversible air source heat pumps provide heating and cooling. In addition, a 125kW chiller on the roof has been installed to provide top-up cooling for peak summer loads.

Three roof-mounted air handling units, incorporating heat recovery, LTHW coils and chilled water coils, provide tempered fresh air to the rooms.

There is also provision for future connection to the heating and cooling mains of Cambridge West District Energy Network. The university asked the team to look into using the 4MW of heat recovered from the wind-tunnel drive motors elsewhere on the campus, via the district heat network. 'The practicalities of storing 4MW of intermittently generated heat just wasn't feasible,' Johnson says.

In a facility designed to encourage rapid innovation, the building services have to be able to respond. As a result, they have been designed to be easily adapted and upgradable to support developments and innovations over the coming decades. 'A lot of the services are exposed, or accessible through the raised access floor – so if the NCPP wants to reconfigure the spaces in future, it's all fairly easy.'

Mechanical plant occupies most of the roof space, with the exception of two areas. There are blast panels in the roof above the wind-tunnel hall, which are designed to blow out in the event of a catastrophic failure of a test. There is also a large area of photovoltaic panels, which generate 34.6kWp.

To ensure the carbon impact of a building designed to support research into net zero aviation was minimised, the design team used the Energy Cost Matrix to make carbon-efficient selection of plant and materials. Embodied carbon was further reduced by reusing the raised floor tiles reclaimed from the laboratory that previously occupied the site. 'The design team monitored the embodied carbon up to construction commencement,' says Johnson.

However, the embodied carbon figure for the building is hugely skewed by the large amounts of concrete used for the structural foundations of the NCPP process plant, so does not provide a meaningful comparison against LETI targets.

Preparing for take-off

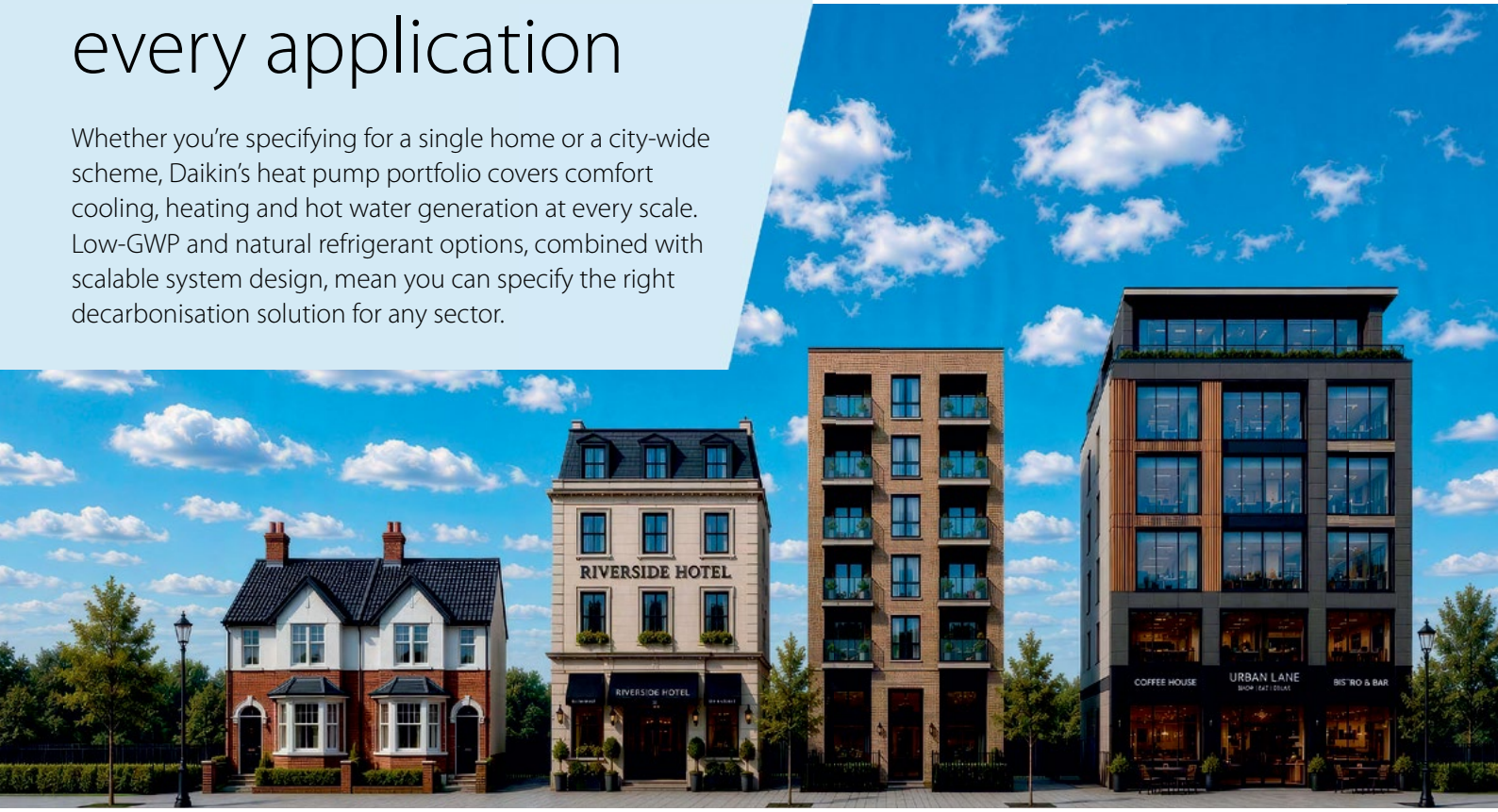
The laboratory opened on 20 July 2026, and Max Fordham is currently undertaking a post-occupancy evaluation of the building services. It has picked up on a few niggles, such as the controls on some FCUs being set incorrectly.

The study has also highlighted that a few of the areas are not being used as originally envisioned. 'We're working with the university to sort out a few minor tweaks,' says Johnson.

It is expected to take up to two years before the wind-tunnel is fully operational so that research at the NCPP can really take-off. ●

Specify the right **heat pump** for every application

Whether you're specifying for a single home or a city-wide scheme, Daikin's heat pump portfolio covers comfort cooling, heating and hot water generation at every scale. Low-GWP and natural refrigerant options, combined with scalable system design, mean you can specify the right decarbonisation solution for any sector.



One portfolio. Every scale

	Daikin Multi+	Daikin Altherma 4	Daikin Altherma WS	Daikin CZ series	Daikin QZ series
					
Performance	Heating, cooling and domestic hot water	Reliable year-round heating, cooling & domestic hot water	Heating, cooling and domestic hot water	Commercial heating, cooling and hot water up to 75°C	Commercial heating, cooling and hot water up to 75°C
Installation	All-in-one system with up to four indoor units and DHW tank	Wall-mounted or floor-standing indoor unit options	Connection to 5th generation ambient loop	Compact footprint with integrated hydraulic option	Modularity for phased replacement of traditional plant
Operation	App control and PV optimisation	Quiet operation and high seasonal efficiency	High performance with heat recovery from ambient loop	Intelligent defrost management across multiple units	Flexible sequenced modular plant solution
Scale	Smaller and light-commercial applications	Residential and light-commercial projects	From apartments to city-wide district heating schemes	Scalable up to 500kW heating	Scalable up to 1.6MW heating

Comfort heating/cooling and hot water solutions from a single unit to large capacity 1.6MW systems.

Some creative elements in this advertisement were generated using AI.

Discover Daikin solutions for your next project

daikin.co.uk/commercial

Smart moves

From medical locations to Power over Ethernet, Amendment 4 of the Wiring Regulations brings targeted updates to the UK's core electrical standard. **Leon Markwell MCIBSE** breaks down the key changes you need to know

Changes in the 18th edition of the IET Wiring Regulations primarily affect electrical designers and installers, but there are changes that are directly relevant to multidisciplinary building services projects, particularly where battery storage, smart building infrastructure, healthcare or energy management systems are involved.

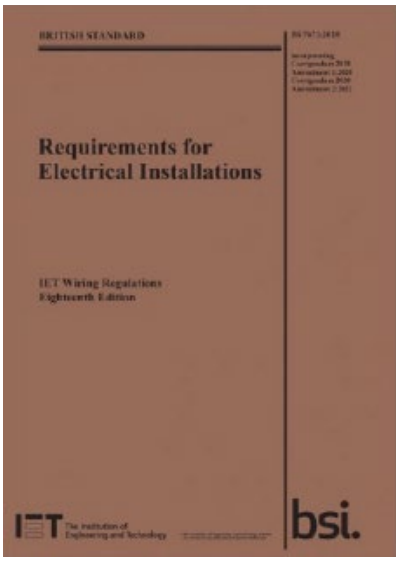
For professionals, the key updates in BS 7671:2018+A4:2026 (**bit.ly/4xMRPuv**) include a new chapter dedicated to stationary secondary batteries to support safe energy storage integration, alongside a new section addressing functional earthing and equipotential bonding for ICT systems.

Furthermore, the amendment introduces specific requirements for Power over Ethernet (PoE), to reflect its growing role in smart building infrastructure, and mandates a major revision to Section 710 concerning medical locations.

The IET Wiring Regulations BS 7671 have been used for the safe design and installation of low-voltage electrical installations in the UK since the 1880s. Since becoming a British Standard, they have been formally titled 'Requirements for electrical installations', as 'regulations' are now generally statutory and BS 7671, in itself, is not statutory. Because of the history of the document, however, the text will always be known as 'the regs'.

As requirements, they are guidance, and there may be other ways of installing electrical services – but electrical installations that conform with the current BS 7671 are likely to achieve conformity with the relevant parts of the statutory Electricity at Work Regulations 1989, insofar as they apply, and there is a HSE note in BS 7671 to clarify this.*

BS 7671 is produced and revised by the IET and the BSI. Committees and sub-committees have representatives from most of the industry bodies, and CIBSE is represented by members of



the CIBSE Electrical Services Group.

Some of the more relevant technical updates in Amendment 4 are below.

Fire safety

Chapter 42: Protection against thermal effects

Regulation 422.2 (Protected escape routes) has been modified slightly. Cables that meet the requirements of Regulation 422.2.1 can be installed in a protected corridor. In addition, cables installed in a fire-resisting enclosure are now deemed to be outside the protected escape route. Regulation 422.2.1 now lists the cables permitted for installation in protected escape routes.

Section 521: Types of wiring system

A note has been added clarifying the intent of Regulation 521.10.202. Wiring systems are to be supported such that they will not be liable to premature collapse during fire and trap people.

Section 537: Isolation and switching

Regulation 537.4.2 has been redrafted and firefighters' switches are now required in locations specified by the fire engineer to support the building's overall fire strategy.

Chapter 56: Safety services

Chapter 56 has been updated and aligned with other current BSs.

Appendix 13: (Informative) Escape routes and fire protection

The guidance in the first part of Appendix 13 (Cables in protected escape routes) has been redrafted to take account of BS 9991 and BS 9999, and a fire safety strategy is to be prepared by the fire engineer based on appropriate guidance.

Energy transition (battery storage and bidirectional power)

Section 551: Low-voltage generating sets

Regulation 551.7.1 has been redrafted. An indent (c) has been added, which requires a suitable protective device where energy flow is bidirectional. An indent (d) has also been added, which prohibits the connection of a source to the load side of an RCD under certain conditions.

Regulation 551.7.2 has been redrafted to form two regulations. Regulation 551.7.2.1 requires the generating set to be installed on the supply side of all protective devices and that stationary batteries (Chapter 57) be considered a generating set, not a load. Regulation 551.7.2.2 sets out the requirements for the low-voltage switchgear and controlgear assembly when a generating set is used as an additional source of supply, in parallel with another source, and is connected via LV switchgear.

Chapter 57: Stationary secondary batteries

A new chapter, this deals with requirements for stationary secondary battery installations where the designed purpose is for storage and supply to electrical installations.

Digital buildings (Power over Ethernet)

Section 716: Power over Ethernet

This new section deals with requirements for the distribution of ELV DC power using balanced, information technology cables and accessories primarily designed for data transmission, as specified in BS EN 50173-1, using power feeding sourcing equipment in accordance with BS EN IEC 62368-3.

Critical environments (medical locations)

Section 710: Medical locations

There is a major revision of the section, with requirements for independent supplies in medical locations of group 2 and the inclusion of a schedule of test results for recording the resistance of supplementary protective equipotential bonding conductors.

Energy efficiency

Chapter 81: Low-voltage electrical installations Part 8-1: Functional aspects – energy efficiency

A new Chapter 81 concerning energy efficiency has been introduced. This refers the reader to the Building Regulations for England and Wales, Scotland, and Northern Ireland for guidance on the requirements. The chapter also refers the reader to BS HD 60364-8-1:2019, Low-voltage electrical installations Part 8-1: Functional aspects – Energy efficiency. The guidance previously given in Appendix 17 has been deleted.

Appendix 17 (Informative) Energy efficiency

This appendix has been deleted and a new Chapter 81, concerning energy efficiency, has been introduced instead.

Cable installation and sizing

Section 536: Coordination of electrical equipment for protection, isolation, switching and control

Regulation 536.4.202 has been redrafted and now covers the coordination between low-voltage switchgear and controlgear assembly and the overload protective device. The regulation now contains load curtailment as one of the conditions to be satisfied.



Appendix 4: Cable ratings

The reference methods for buried cables have been updated. Distinct methods and corresponding current-carrying capacities now apply based on whether the cable is installed in direct contact with soil or enclosed within a conduit or duct. Tables 4A2, 4D4A, 4E4A, 4H4A and 4J4A have been revised to reflect these changes.

Compliance, CPD and reporting

Chapter 65: Periodic inspection and testing

Regulation 653.1 now requires the notes for the person producing the report (provided in Appendix 6) to be taken into account on the Condition Report. Regulation 653.2 now requires the report to include guidance for the recipient(s) based on the model in Appendix 6. A note has also been added pointing out that photographic and/or thermographic images can be appended to the report.

Appendix 6: (Informative) Model forms for certification and reporting

The notes for the person producing the condition report have been redrafted. Items have been rearranged for clarity.

Training and experience

As this Amendment 4 does not have significant new requirements, it has generally been considered that electrical operatives carrying out installation works do not require a specific new qualification. But they must be aware of the requirements in the new Amendment relevant to their work, especially if they are a qualified supervisor or duty holder, or supervising operatives or helping to train apprentices.

General CPD or regular toolbox talks should be encouraged to inform operatives of the amendments and assess their understanding. As required in the Electricity at Work Regulations 1989, people carrying out work must be competent or properly supervised.

Engineers or designers may require formal training and qualifications, depending on their work, and, again, must be competent or properly supervised. CPD, by itself, may not be adequate.

Although Amendment 4 introduces relatively few fundamental design changes, it reflects the continuing evolution of electrical installations as buildings become increasingly electrified, digitalised and integrated with renewable energy systems.

Please contact BSI if you identify an inaccuracy, ambiguity, gap or technical inconsistency in any standard. ●

● Leon Markwell MCIBSE is senior engineer at IET and chair of the CIBSE Electrical Services group

NOTES

*This HSE note infers that where a design may fall outside the remit of BS 7671, requires Building Regulations special requirements, has specific external influences beyond those referenced in BS 7671, or requires a higher degree of design requirements, as evidenced by a robust and suitable risk assessment, because of the respective installations' usage or design, the designer and installation duty holder must account for this (the duty holder carries the legal, statutory responsibility for health and safety under UK law, under the Electricity at Work Regulations 1989).

Rethinking resilience

Meeting current building standards won't guarantee protection against extreme climate events. To safeguard occupants during heatwaves and power outages, industry must prioritise thermal resilience, says a critical review. **Yingyue Li** reports

Designing a building that complies with today's UK Building Regulations is no guarantee that it will be fit to withstand future climate extremes.

In the UK, new buildings are designed to comply with energy efficiency standards and overheating requirements. However, compliance checks evaluate a building against normal summer conditions, not climate extremes, so meeting the requirements of Building Regulations doesn't necessarily mean buildings are future-proofed against a changing climate.

Regulations also assume that building systems run continuously, without interruption. They do not account for Grid failures or power outages during severe heatwaves.

Increasingly extreme weather, ageing Grid infrastructure and more frequent peak-demand spikes are putting unprecedented pressure on distribution networks.

The instability of the Grid means air conditioning (AC) cannot be regarded as a silver bullet; widespread AC use risks overloading electricity networks during extreme heat.

A recently published critical review[1] on thermal resilience says services should be stress-tested against worst-case scenarios – such as a heatwave occurring at the same time as a power outage – to ensure occupants remain safe when mechanical cooling fails.

Assessing thermal resilience requires looking at how indoor environments respond when a disruptive event is combined with a power outage. By adapting the CIBSE TM52 framework (Figure 1), an internal temperature profile can be mapped against the duration of overheating (hours of exceedance), severity (daily weighted exceedance) and upper temperature limits.

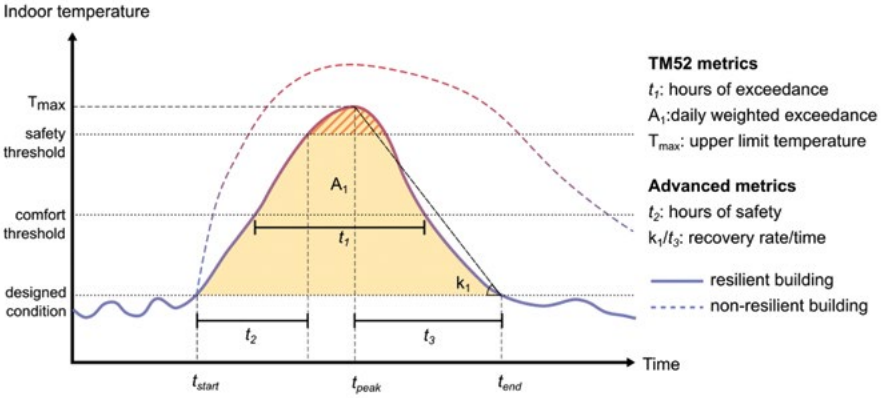


Figure 1: Conceptual resilience curve of indoor temperature during heatwave and/or power outage

When facing a compound scenario – heatwave and outage – safety-based thresholds may be more appropriate than comfort-based ones. The concept can be applied in summer and winter under disruptive events: in summer, it indicates how long safe indoor conditions can be maintained without active cooling, while, in winter, it reflects how long a building can remain habitable when heating is unavailable.

This challenges the simplistic design approach of relying solely on active systems and additional cooling capacity to address overheating. Instead, it reinforces a passive-first strategy, such as better-performing building fabric, including improved insulation to reduce heat loss in winter and greater thermal mass to buffer indoor temperature fluctuations during extreme conditions.

This metric could also serve as a proxy energy flexibility indicator that reflects a building's passive capacity to reduce energy demand when the Grid is under stress or when tariffs are high.

The recovery time or recovery rate can provide another perspective on a building's ability to respond to extreme events, by indicating how quickly conditions can return to a safe or acceptable range.

Figure 1 also shows that resilient and non-resilient buildings perform differently during disruptive events: a resilient building has a greater capacity to absorb shocks, recovers more quickly and has a shorter window of danger.

This distinction can be further illustrated through modelling results for a typical dwelling, with three different envelope types, under extreme summer and winter conditions during a 24-hour power outage (Table 2).

The 'good' case represents a well-insulated dwelling designed in line with the LETI net zero recommendations and incorporating high thermal mass; the

	Good	Typical	Poor
Wall U-value, ($W \cdot m^{-2} \cdot K^{-1}$)	0.13	0.70	2.50
Ground floor U-value, ($W \cdot m^{-2} \cdot K^{-1}$)	0.13	0.30	1.50
Roof U-value, ($W \cdot m^{-2} \cdot K^{-1}$)	0.10	0.70	2.30
Window U-value, ($W \cdot m^{-2} \cdot K^{-1}$)	0.80	2.80	4.80
Window G-value	0.5	0.7	0.8
Air permeability, $m^3 \cdot h^{-1} \cdot m^{-2}$ @50Pa	1	8	15
Thermal mass type	Heavyweight	Medium weight	Lightweight

Table 1: Fabric properties of the three building cases (dwelling)

'typical' case reflects the predominant characteristics of English housing stock; and the 'poor' case represents a lightweight, uninsulated envelope. The fabric property inputs are shown in Table 1, with a maximum ventilation rate of 5 ACH applied to all cases.

Under future extreme summer conditions, free-running dwellings will be at risk of severe overheating, and active cooling measures may need to be considered. When a power outage occurs, however, substantial differences emerge between the three design cases: the poor-performing dwelling quickly enters unsafe conditions, while the good-performing dwelling is able to buffer indoor temperature rise and avoid unsafe conditions.

A similar pattern is observed during a winter cold snap with power outage, when the good-performing dwelling is able to maintain comfortable conditions for a much longer period (Table 2).

Extreme weather is part of a broader, unpredictable trend that requires a robust risk assessment framework. Current weather datasets are often too conservative – recent weather has already hit levels predicted for 2050. With the release of new CIBSE weather files, designers can test building performance under future conditions.

Resilience assessment can move beyond a simple pass/fail indicator of overheating towards an approach that translates complex risk scenarios into a clearer indication of how buildings perform in extreme conditions. Such an approach could show whether a building is able to remain safe and functional in 2080, or withstand heatwaves and power outages of varying severity.

	Good	Typical	Poor
Time to uncomfortable (summer)	2h 30min	1h 10min	40min
Time to unsafe (summer)	Not reached	4h 20min	2h 30min
Time to uncomfortable (winter)	8h 10min	3h	2h 10min
Time to unsafe (winter)	Not reached	Not reached	8h 50min

Table 2: Performance of typical dwelling under extreme conditions with 24-hour power outage

Resilience can be communicated through comparable evidence, helping to reduce uncertainty around climate risk and, potentially, informing insurance, financing and investment decisions. There is potential for a rating framework, which could indicate the level of building resilience in an accessible way. ●

Yingyue Li is a paper co-author and PhD student in energy resilience and the built environment at UCL

References:

[1] Li Y, Tsouknida E, Collins T, Bateson A, Tang R, Burman E. (2026) Thermal resilience in the built environment: A critical review. *Sustainable Cities and Society*. bit.ly/CJthre26

Hamworthy

MODUMAX mk4

Introducing the new improved modular boiler from Hamworthy

Combine our **Modumax mk4** condensing boilers with our **Tyneham** commercial air source heat pumps for a hybrid set up.

> Reduce **capital costs**
> Reduce **carbon emissions**
> Available in outputs up to **762kW**

SCAN HERE

Modules stacked up to 3 high
15 combinations delivering up to 762kW
Small footprint – less than 1m²



7" Touchscreen HMI
Reduced flue height
Pipe kits with matched pumps
Compact modules easy to fit in tight spaces

There's a Hamworthy for that.

For more information please visit:
hamworthy-heating.com

ASK
advice. specification. knowledge.

Museum retrofits: don't get stuck in the past



The retrofit priorities at the V&A Museum in London vary widely among different stakeholders, according to research by UCL's India Golding. **Tim Dwyer** looks at what this means for building services engineers

When building services engineers talk about retrofit, the focus is typically on improving performance – upgrading the fabric, plant, lighting and controls to reduce carbon emissions. But what if they are not the principal measures by which people who use and operate a building judge whether a retrofit has been successful?

Research by UCL's India Golding, with the V&A Museum in South Kensington, London, aimed to establish what retrofit success means for a museum. She interviewed more than 30 stakeholders – working in estates, projects, conservation, curatorial teams, design, security, visitor experience and senior management – to understand what they expect a retrofit to deliver.

While energy and carbon were important, they sat alongside other factors, such as protecting the museum's collections and historic fabric, the visitor experience, and accessibility. Engineers cannot, therefore, assume the main objective is to minimise energy use. The first question may instead be: what conditions does this museum actually need to provide and for whom – or what? This is particularly important when existing building services plant reaches the end of its life.

The V&A Cafe, the world's oldest museum restaurant

One participant described the replacement of chillers serving existing galleries. New equipment was selected to satisfy the existing cooling demand. Essentially, the old machine was replaced by a newer machine capable of providing the same service. This is understandable, because museums cannot allow environmental conditions protecting valuable collections to deteriorate while engineers experiment with alternative strategies.

However, should replacement plant automatically reproduce the conditions and loads inherited from existing installations, or is it an opportunity to reconsider what is required?

Conventional building services measures – such as energy efficiency, carbon reduction and regulatory compliance – were most frequently raised by those responsible for measuring and reporting them. Other stakeholders judged projects differently. A curator may be concerned with presentation and access to a collection; a conservator may focus on environmental stability; and estates teams must keep ageing, often complex buildings operating reliably.

None of these objectives is wrong; the challenge is reconciling them. Changes to humidity or temperature limits to save energy must not be at the expense of acceptable environments for collections and occupants. Early engagement with those responsible for these should be part of the design process.

Should we replace the plant at all?

Whole life carbon was not explicitly raised by those interviewed, but tended to emerge indirectly through discussion of the consequences of installing new equipment. As one participant put it: 'It's quite interesting that we think about installing new plant to save energy. There's something counterintuitive about the fact that we are manufacturing a new thing to save on energy.' This is an important observation.

For fossil-fuel retrofits, operational carbon savings can rapidly outweigh the embodied impact of new plant – but that balance becomes less clear as buildings and systems decarbonise. As operational carbon falls, embodied carbon associated with manufacturing, transporting and installing new plant becomes proportionately more significant, so replacing a heat pump with a slightly more efficient one is problematic

Increasingly, the decision may become not simply 'what is the most efficient replacement?', but 'does this equipment need replacing yet?' Extending plant life, modifying controls or reconsidering environmental requirements might sometimes prove a better whole life intervention.

Museum plant is expected to last for many years, while operating conditions change over time. That means considering future climate conditions, changing energy supplies and potentially changing patterns of museum use. Simply replacing existing equipment according to historically measured demand risks locking today's assumptions into another generation of building services. Conversely, designing for every conceivable future extreme risks oversized plant and unnecessary embodied impact.

A broader measure of retrofit

Golding intends to develop criteria for evaluating museum retrofit that capture environmental, economic, social and cultural value. Judging by her research, successful retrofit may be less about making a building conform to a predetermined definition of low-energy performance and more about understanding which services need to be provided – and finding the lowest-impact way of providing them. ●



The V&A Museum in South Kensington

Do museums need fixed environmental conditions?

There is an interesting parallel between Golding's research and changing thinking on thermal comfort and collection care.

***CIBSE TM52 The limits of thermal comfort: avoiding overheating* established an adaptive approach to assessing overheating, moving from reliance on a single, fixed temperature. This approach, reflected in CIBSE Guide A, recognises that temperatures people find uncomfortable change with outdoor conditions.**

Conservation thinking has become less prescriptive. BS EN 16893:2018 provides the standard for buildings and rooms used for heritage collections, while the joint Declaration on Environmental Guidelines from the International Institute for Conservation of Historic and Artistic Works and International Council of Museums – Committee for Conservation supports a more flexible and sustainable approach to environmental control.

It recognises that specifications should take account of needs of collections, the building and the local climate, and that collection care should not automatically assume air conditioning. Passive and lower-energy approaches should also be considered.

This direction has been reinforced by the Bizot Green Protocol, formally adopted by the Bizot Group at Museum COP in 2023. For many classes of hygroscopic objects, the evolved guidelines indicate temperatures of 16–25°C and 40–60% relative humidity, while recognising that more sensitive objects may require tighter control.

Neither people nor artefacts necessarily require a single, tightly controlled environmental condition. Establishing the conditions needed, and where, before determining the systems required to maintain them could provide significant opportunities when retrofitting museums.

MECFLOW PRESS

TOUGHEN UP!



Water supply projects can throw up tough challenges, but now MecFlow Press from Polypipe Building Services provides solutions to the widest range of branch applications.

Specifically engineered for potable, hot & cold plumbing and heating installations, the system is based on a multi-layer composite pipe material comprised of inner and outer layers of polyethylene with a flexible core of but-welded aluminium.

MecFlow Press is 100% oxygen-tight and uses innovative, flow-optimised fittings - with inspection windows for positive pipe insertion and a leak-before-press test function for ultra-secure joints.

Meeting tough standards doesn't need to be a tough decision - choose MecFlow Press from Polypipe Building Services.

www.polypipebuildingservices.com/mecflow/

Part of the GENUIT GROUP

Polypipe Building Services



Commercial heat pump installations with fully specified thermal insulation systems

Foiling the great escape

Uninsulated pipework contribute to needless energy waste. **Alex Smith** reports on proposals for new standards and more inspection

Pipework

Valves

Pumps

Assuming 1 million active commercial air conditioning systems in the UK, refurbishment of refrigeration pipe insulation could result in an energy saving equivalent to that generated by a medium-sized power station.

This is according to the Thermal Insulation Contractors Association (TICA), which in April published a white paper calling on government to incentivise the adoption of thermal insulation of pipework[1].

In 'Proof is on the roof', *CIBSE Journal* Heating Supplement May 2025, TICA technical director, Chris Ridge, and Kaizen Energy Consultancy's managing director, Lawrence Leask, explained how good specification and installation practices could reduce this profligate waste of energy.

In the white paper, TICA describes thermal insulation as a 'low-hanging fruit for industrial and commercial decarbonisation', but says it is an afterthought at each of the design, installation and ongoing inspection/maintenance stages.

On page 38, Leask describes one example of poor insulation in three calorifier inspection hatches, which he calculates are costing the building owners £2,061 a year in energy losses.

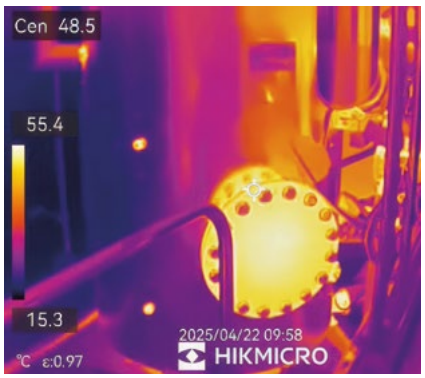
The paper suggests the government adopts a standard based on BS EN 17956:2024, which provides A to F energy-efficiency classes for technical insulation systems. Introduced in 2024, the scheme has, according to the white paper, led to European nations – including Germany and the Netherlands – drawing up mandatory performance requirements to incentivise thermal insulation surveys and improvements.

In the Netherlands, businesses subject to the energy-saving investigation obligation must conduct an insulation scan every four years or provide a technical insulation performance check (Tipcheck) not older than two years, and commit to implementing measures with a simple payback period of five years or less.

A Tipcheck is a standardised energy audit designed to evaluate and optimise the thermal performance of industrial and large-scale commercial insulation systems. Developed by the European Industrial Insulation Foundation (EiiF). Tipcheck follows the principles of recognised energy-audit standards EN 16247 and ISO 50002, and assesses insulation performance using the A to F energy-efficiency classes defined in EN 17956.

The white paper also describes how, in Germany, the DIN 4140 insulation installation standard advocates for achieving at least EN 17956 Energy Efficiency Class C. A subsidy programme for small and medium-sized enterprises is offered by the German government to support insulation improvements, covering up to 25% of costs.

EiiF recommends a minimum energy classification for industrial applications and suggests an Insulation Energy Efficiency Class C to EN 17956 for new installations in planning and design stage. For existing systems, it says that Class C be mandatory if the payback period for the insulation improvement is less than five years.



The camera reveals no insulation on the hatch

In commercial buildings, the white paper says there are many examples of non-UV elastomeric foam insulants being installed on externally located variable refrigerant flow pipelines, and that degradation of this insulation is adding to operational costs.

Thermal insulation integrity is not fully assessed during statutory TM44 air-conditioning inspections, adds TICA, and it suggests that the government introduce a minimum thermal energy rating similar to the energy rating required for the building.

It is also calling for the adoption of 'enhanced insulation thicknesses' in Approved Document L, to encourage additional carbon reduction.

As well as rating schemes, TICA wants government to provide support for training energy managers and FMs on thermal insulation awareness. It is also asking for funding to understand the impact of poor insulation on energy costs and overheating. ●

To access and support the white paper, visit bit.ly/CJTicaWP

Identifying the heat-loss culprits

Lawrence Leask, managing director at Kaizen Energy Consultancy, found clear evidence of uninsulated pipework systems when he carried out a TM44 air conditioning inspection (ACI) for a large modern office block.

A TM44 ACI is legally required for any system or group of units that provide heating and cooling with a total cooling output exceeding 12kW (see page 6).

It does not capture heating systems, but Leask says he feels morally bound to report if he discovers something significant or easy to fix.

In this case, he used an infrared camera to identify three 500-litre calorifier inspection hatches (manways) and associated pipework that were poorly insulated (see image, left). 'If you investigate the calorifier, the temperature of the fluid inside is 60°C, the inspection hatches have a diameter of 400mm and the heat loss will be constant,' he says.

Assuming the temperature of the fluid inside is 60°C and the heat losses constant, Leask calculated that the energy losses from the three hatches would be 4,122kWh, at an annual cost of £2,061.

He also estimated that the necessary thermal insulation jackets would cost £585 and save 3,821kWh in annual energy losses. This equates to a yearly saving of £1,910 and a 708kg reduction in CO_2 emissions. Leask says the savings meant the payback on investment was only four months.

If these thermal insulation jackets had been installed in 2017, when the need was first identified, the savings over eight years would have amounted to 32,976kWh, representing a cost reduction of £16,488 and a decrease of 5,664kg in CO_2 emissions, adds Leask, who notes there was a Display Energy Certificate (DEC) for the building. This included an operational rating and a range of recommendations for improving energy performance.

The building had a DEC operational rating of F for CO_2 emissions (where A is the best and G the worst). The DEC assessor had recommended insulating the calorifier access cover plate and heating and pump bodies, but recorded the potential impact on carbon emissions as low, which surprised Leask.

In contrast, the building's Energy Performance Certificate (EPC), which rates the building's calculated energy performance rather than its actual operation, was A. Its recommendations for improving energy efficiency made no mention of thermal insulation.

For Leask, this highlights how relatively simple insulation improvements can be overlooked in energy assessments. 'The opportunity to implement a non-invasive measure with a four-month payback period was effectively missed,' he says.

Swegon

Higher Performance. Lower Energy Use.

Our new GOLD includes the innovation OptiFlow, which delivers reduced pressure loss, lower noise levels, and optimised airflow.

Scan our QR code to learn more.





We're stronger together

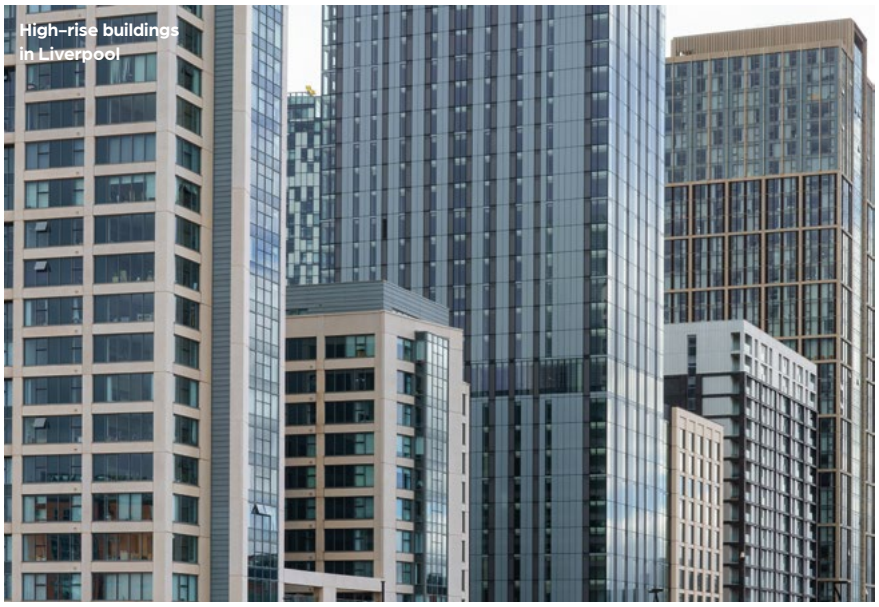
The commercial heating and hot water brands you trust are coming together under one name: Baxi.

Bringing Andrews Water Heaters, Potterton Commercial and Remeha into the Baxi brand gives you full access to complete commercial solutions and support from one trusted partner. And while our brands are evolving, what matters most stays exactly the same: the same products you trust, the same support you rely on, and the same people and expertise behind them.



We cover all angles

Scan to discover more


High-rise buildings in Liverpool

Reaching new heights

CIBSE's TM70 gives designers the framework and tools to deliver appropriate design solutions for drainage in tall buildings. Geberit's **Reuben Colver-Thompson** explains why considering the complex hydraulic and airflow characteristics of high-rise developments is key

The publication of CIBSE's *TM70: Tall building drainage design*, in December 2025, marked one of the most significant developments in building drainage design for decades. For the first time, designers had access to a comprehensive, evidence-based framework that addresses the unique hydraulic and airflow behaviours found in tall buildings.

TM70 moves away from purely hydraulic calculations and towards pressure-based system performance, formally integrating key considerations such as effective building height, offset penalties, pressure-fluctuation modelling and advanced ventilation strategies.

In doing so, it helps engineers make informed decisions. As buildings continue to rise in height and complexity, TM70 provides the drainage industry with design guidance based on measured performance rather than convention.

With any new technical guidance, however, comes the risk of misinterpretation. One of the key messages emerging from recent discussions around TM70 is that engineers must understand why certain solutions are required, not simply assume that, because a technology exists, it should become the default specification on every project.

Designing for the building

Pressure transients have always been a consideration in drainage design. As wastewater travels down a stack, it entrains air, generating positive and negative pressure fluctuations that, if uncontrolled, can compromise trap seals and system performance.

In genuinely tall buildings, these transient pressures become increasingly significant. Greater stack heights, larger connected loads and more complex offsets create conditions that simply do not exist in conventional residential or commercial developments.

This is precisely why TM70 places such emphasis on understanding the relationship between building height, airflow, pressure equalisation and ventilation strategy.

It does not, however, suggest every building should now incorporate every available pressure-management technology. Instead, TM70 promotes a risk-based, performance-led approach in which the drainage solution reflects the actual demands placed upon the system.

For buildings of relatively modest height – five or six storeys – the hydraulic conditions are fundamentally different from those experienced in true high-rise developments.

Flow velocities are lower. Pressure fluctuations are reduced significantly. Conventional single-stack systems, when correctly designed and installed in accordance with recognised standards, have delivered reliable performance for many years.

Changing physics

As building height increases, however, the physics changes – so design interventions should increase in proportion to system risk.

In tall buildings, longer discharge paths generate higher airflow velocities and larger pressure transients. Stack offsets become more influential, simultaneous discharge events become more severe and maintaining trap seal integrity becomes increasingly challenging. These are the conditions that TM70 seeks to address through improved design methodology, rather than prescriptive product selection.

One of the most refreshing aspects of TM70 is that it shifts the conversation away from product-led design towards measurable system performance.

For too long, drainage has often relied on historic rules of thumb or assumptions. TM70 instead asks engineers to consider airflow, pressure equalisation, commissioning and validation as part of an integrated drainage strategy. That creates opportunities for innovation, but also

responsibility. Manufacturers will naturally seek to demonstrate where their technologies add value, but the challenge for specifiers is ensuring that solutions are selected because they solve an identified engineering problem, rather than simply because they are available.

Additional components increase capital expenditure, introduce further maintenance considerations and add system complexity. It's important to establish the methodology and determine whether those components are required to achieve compliant, resilient performance.

TM70 also reinforces something many drainage specialists have advocated for years: drainage systems cannot be viewed as isolated products. Stack geometry, offsets, ventilation arrangements, pipework configuration, discharge loading and commissioning all contribute to influencing performance. When these principles are considered from the outset of



design, engineers can often achieve simpler, more efficient installations without unnecessary complexity.

Industry next steps

Perhaps TM70's greatest achievement is not that it introduces new guidance, but that it encourages better engineering conversations, focusing on what the building needs rather than which system to specify.

As the industry becomes more familiar with TM70, confidence will grow. Engineers will become better equipped to distinguish between buildings that genuinely require enhanced pressure-management measures and those for which established drainage principles remain entirely appropriate.

This is not about making every drainage system more complicated. It is about making every drainage system fit for purpose. ●

***TM70 Tall building drainage design (2025)* is available from the CIBSE Knowledge Portal at cibse.org/knowledge**

● **Reuben Colver-Thompson is product manager – drainage at Geberit www.geberit.co.uk**

EasyFlow Pro

Installs should feel this Easy



Everything you need, brought together for an easier finish.

The EasyFlow Pro (ART 710) simplifies potable water installs with one compact, WRAS approved assembly, supplied with an insulation jacket as standard, designed to save space, reduce the number of potential leak paths, and deliver a neater installation on site.



WRAS APPROVED PRODUCT

Valves made Easy.
Visit albionvalvesuk.com



Being responsive: rethinking swimming pool circulation

Emerging research challenges the long-held practice of fixed turnover periods in swimming pools, suggesting a shift to responsive circulation could deliver massive energy and cost savings without compromising water quality. By **Tim Dwyer**

Swimming pools are among the most energy-intensive buildings in the leisure sector, with an indoor-pool leisure centre potentially using around seven times as much energy per square metre as an average commercial office[1].

Heating the pool and maintaining warm, humid conditions are obvious contributors, but a substantial energy load is less visible – continuously circulating water through filtration and treatment systems.

A developing body of UK research suggests there may be significant scope to reduce that energy demand without compromising water quality or bather safety. The research also questions whether circulation should continue to be determined primarily by fixed turnover periods, rather than responding to bathing load and actual treatment performance.

Assessing circulation energy

The research has developed over several years. In 2019, Martin Wood and Lester Simmonds, of Pool Sentry*, working with researchers from Cranfield University and Public Health Wales, reviewed[2] the role of filtration in managing cryptosporidium risk in commercial pools.

This was followed in 2021 by work[3] involving Wood, Simmonds and Loughborough University's Timothy Marjoribanks that revisited the long-established Gage-Bidwell Law of Dilution (see panel, below) and considered how effectively filtration removes contaminants from a well-mixed pool. That work helped provide a scientific basis for relating circulation requirements to the number of bathers – effectively the pollution load – rather than relying solely on the time taken to circulate a volume equivalent to the entire contents of the pool.

The potential energy consequences of this approach were explored[4] much more extensively by Marjoribanks, Simmonds and Wood in a 2025 paper in CIBSE's *Building Services Engineering Research & Technology* (*BSER&T*). Using Sport England data for 6,433 non-domestic

The Gage-Bidwell law and filter efficiency

The 1926 Gage-Bidwell Law of Dilution states that, in a perfectly mixed pool, a single volumetric turnover (T_w) recirculates only 63.2% of the water, leaving 36.8% untouched. Consequently, it takes six volumetric turnovers to recirculate 99.7% of the pool's water volume.

However, a critical design pitfall is confusing water recirculation with actual particle removal. The classic dilution equation, $C/C_0 = e^{-T}$, implicitly assumes 100% filter efficiency (E = 1.0), meaning every contaminant particle passing through the filter media is trapped on the first pass.

In practice, commercial sand filters often operate at much lower efficiencies, sometimes between 20% (E = 0.2) and 50% (E = 0.5) because of high filtration velocities, lack of proper coagulation or inadequate backwashing.

When filter efficiency is compromised, the actual rate of contaminant decay is significantly slower, governed by the modified decay model: $C/C_0 = e^{-ET}$. To reconcile this, the particle-turnover time ($T_p = T_w / E$) provides the actual time required to remove 63.2% of physical particles (such as cryptosporidium).

If *E* falls below 50% because of poor coagulation, six turnovers are mathematically insufficient to safeguard pool users, proving that filtration performance is as critical as pumping rates.

Source: Simmonds et al, 2021 and Marjoribanks et al, 2025



pools, the researchers estimated that circulating pool water in accordance with current UK guidance consumes around 369GWh of electricity annually, costing approximately £100m. Filter backwashing, including replacement water and its reheating, adds another £22m. The resulting carbon footprint of circulation, water and associated heating was estimated at 98,400tCO_2e per year.

The study then considered what happens if circulation becomes more responsive to actual requirements. Reducing pump speed while pools were closed was estimated to cut circulation energy by 36%. Reducing flow to 80% of design flow during periods of relatively low bathing load could save another 19%.

The researchers calculated that applying both measures could reduce circulation energy by around 55%. Combining these operational changes with improvements in pumping efficiency towards Passive House Institute guidance[5] (specific energy-efficiency target of 25–40W per $m^3 \cdot h^{-1}$ of circulating water) increased the potential saving to as much as 70%.

While achieving this standard is highly desirable, the authors of the paper note that it can be a slow, expensive process to implement. In many existing legacy pools, fundamental design defects in the pipework and system hydraulics mean that achieving Passive House targets is not always practically or economically viable.

These are modelling results, and the authors acknowledge considerable uncertainty in pool geometry, bathing loads, plant performance and operating practices. Importantly, however, the paper also presents measured results from two contrasting pools where pump-speed setback had been implemented.

Bathing loads

Open-period circulation energy fell by 31% and 39%, while closed-period consumption fell by 29% in both cases, without deterioration in the reported turbidity or free-chlorine indicators.

The researchers also compared the UK's Pool Water Treatment Advisory Group (PWTAG[6]) guidance with the German DIN 19643[7] standard. For more than 40% of the pools analysed, the difference exceeded 20% – potentially corresponding to a much greater difference in pumping energy. Both approaches are intended to provide safe, attractive pool water.

The argument has since moved beyond simply identifying potential energy savings. In 2026, Wood, Simmonds and Marjoribanks joined researchers and public health specialists from several European countries to examine[8] how commercial pool circulation requirements are determined across Europe.

Their paper identified two broad approaches: traditional turnover periods based largely on pool type, and circulation determined by bathing or pollution load. The second approach reflects the principle that bathers are a principal source of contamination, so treatment requirements should have some relationship to the number of people actually using the pool.

This does not mean simply turning down the pumps when the pool looks quiet. Adequate disinfectant concentration must be maintained throughout the pool, filtration must remain effective, surface extraction and chemical dosing must continue to operate correctly, and the pool hydraulics must avoid poorly treated areas. Any reduction therefore needs to be supported by monitoring and an understanding of the performance of the particular pool.

Nor is this thinking entirely absent from current UK guidance. The PWTAG already recognises circulation related to bathing load, including the treatment of 1.7m^3 of water per bather, and its guidance allows variable-speed drives to reduce circulation during periods of low use, subject to appropriate safeguards.

The 2025 research, therefore, did not trigger a sudden change in PWTAG requirements. The accumulating research points towards a potentially more significant evolution – from circulation primarily prescribed by fixed turnover periods towards an evidence-based approach that responds to bathing load and demonstrated treatment performance.

For building services engineers, the broader question is a familiar one. Much building services plant is sized for peak conditions that occur relatively infrequently, yet can subsequently be operated as though that peak demand were permanent.

Variable-speed control

Swimming pool circulation provides another example of where better sensing, variable-speed control and a clearer understanding of actual load may allow plant to respond to demand, rather than operating continually for peak conditions.

The potential energy savings are substantial, but the developing

"More responsive operation could deliver substantial energy savings without compromising water quality"

research is equally clear that they must be demonstrated alongside effective filtration, disinfection and pool hydraulics.

The objective is not simply to circulate less water, but to determine how much treatment is actually required to maintain safe water for swimmers. ●

**Wood and Simmonds are employed by Pool Sentry, which provides pool monitoring, control and energy optimisation services, an interest declared in the 2025 paper. The authors reported no external funding for the research.*



A technician fixing a swimming pool water pump

References:
[1] Duverge, Jean Jonathan and Priyadarsini Rajagopalan. 'Assessment of factors influencing the energy and water performance of aquatic centres', *Building Simulation* (2020) 13: 771–86.
[2] Wood M, Simmonds L, MacAdam J, Hassard F, Jarvis P, Chalmers R M. 'Role of filtration in managing the risk from cryptosporidium in commercial swimming pools – a review', *Journal of Water and Health* (2019) 17(3): 357–70 **bit.ly/CJSPfilt**
[3] Simmonds L P, Simmonds G E, Wood M, Marjoribanks T I, Amburgey J E. 'Revisiting the Gage–Bidwell Law of Dilution in relation to the effectiveness of swimming pool filtration and the risk to swimming pool users from cryptosporidium', *Water* (2021) 13(17): 2350. **bit.ly/CJGBDil**
[4] Marjoribanks T I, Simmonds L P, Wood M. 'Balancing environmental, economic and public health: The cost of swimming pool water circulation', *Building Services Engineering Research & Technology* (2025) 46(4): 529–44. **bit.ly/CJSPWC25**
[5] Gollwitzer, E, Grove-Smith, J, Peper, S, Schulz, T, Ahrens, O and Kaluza J. (2021). Passive House concept for indoor swimming pools: guidelines. Darmstadt, Germany: Passive House Institute.
[6] PWTAG Technical Note 49 – Swimming pool circulation pumps and variable speed drives, **bit.ly/CJSPCPVSD** accessed 28 Aug 2026
[7] DIN 19643-1:2023-06. Treatment of water of swimming pools and baths – Part 1: General requirements. Berlin: Beuth Verlag.
[8] Wood M, Simmonds L P, Chalmers R M, et al. 'Managing bathing loads and circulation rates in commercial swimming pools: Rationale and perspective from UK and Europe', *Water* (2026) 18(6): 713. **bit.ly/3SKGAUs**







New low emission strut channel coming soon!

Building a more sustainable future together

As an M&E and HVAC fixing specialist, we're committed to helping the building services industry reduce environmental impact through transparent product data, responsible business practices and continuous product innovation. If sustainability is a priority on your project, see how we can help:

- We offer EPD's (Environmental Product Declarations) on products including pipe clamps and channel
- We are an Ecovadis Silver Medal holder putting us in the top 15% of those assessed for sustainability
- We actively work to optimise our supply chain & processes to reduce our emissions year on year
- We continually review our products to optimise material usage and deliver smart solutions that are durable, recyclable, reusable, utilise recycled materials, save time and deliver installation efficiencies

NEW – Walraven RapidStrut® LE

Find out more via the QR code!

We're excited to launch **Walraven RapidStrut® LE**, made using recycled steel and fossil-free energy to reduce CO^2 emissions up to 59%



The value of smart

walraven

Design hot water around actual building demand.

Heat what's needed
Reduce wasted energy by heating only the hot water that's needed, when it's needed.

Precision level sensing
A full-length sensor shows the volume and temperature of the hot water throughout the cylinder.

Auto-cleansing built in
Automated pasteurisation cycles, with real-time data to verify performance.

Future ready
Compatible with all major building energy sources.

Rapid recovery
Usable hot water within 30 minutes from cold.



Talk to us about your next commercial hot water project

SMART COMMERCIAL
HOT WATER 120-2,000L

mixergy®

SPONSOR
mixergy

Rethinking hot-water storage: balancing energy, carbon and water hygiene

This module explores new approaches to reducing energy consumption in domestic hot-water applications

As buildings become more energy efficient and heat pumps increasingly replace higher-temperature heat sources, domestic hot water (DHW) presents designers with a particular challenge. This CPD considers how stratification, improved sensing and smarter control of hot-water storage may help reduce energy use and carbon emissions while maintaining appropriate water hygiene.

The changing challenge of hot water

Traditionally, providing DHW has been relatively straightforward. Fossil-fuel boilers could readily generate water at 60°C or above, while the energy associated with hot-water production and storage was often relatively modest compared with the energy required for space heating. That balance is changing.

Improved building fabric, lower air permeability and more efficient heating systems are progressively reducing space-heating demand. DHW demand does not necessarily fall at the same rate, as people still shower, wash and use hot water. Consequently, DHW can represent an increasingly significant proportion of the energy consumed in a low-energy building. At the same time, electrification of heat is increasing the application of heat pumps. These are generally most efficient when producing lower-temperature water, so requiring one to raise the temperature of stored DHW can reduce its coefficient of performance (COP).

A 2023 Government Office for Science expert roundtable[1] on heat pump technology noted that, whereas the higher temperatures available from gas boilers suit both space heating and hot-water production, lower-temperature heat pumps are less naturally suited to DHW production. This means that the lower temperatures that can improve heat pump efficiency and reduce storage and distribution losses must be reconciled with the temperatures required to maintain appropriate water hygiene. Effective DHW design therefore needs to provide the required quantity of hot water when it is needed, while minimising unnecessary energy consumption and maintaining an appropriate and demonstrable regime for controlling microbiological risk.

The energy cost of storing hot water

A conventional hot-water cylinder is, fundamentally, a thermal store. Energy is put into the water before it is required and retained until there is a demand. The greater the volume heated, and the higher its temperature above the surrounding environment, the greater the quantity of stored energy.

However, storage inevitably results in heat loss through the cylinder insulation and from associated pipework. Increasing the temperature difference between the stored water and its surroundings increases this heat transfer. Consequently, maintaining an entire cylinder at a high temperature when only a small proportion of its contents will shortly be required can result in unnecessary energy use.

This is not a new problem. Research[2] undertaken for the former Department of Energy and Climate Change into hot-water cylinders and heat pumps found that storage losses could significantly affect overall DHW efficiency, and concluded that lower heat pump flow and storage temperatures, combined with periodic sterilisation, offered the best system efficiencies in the systems examined.

Modern energy modelling is becoming more sophisticated in its treatment of these effects. The Home Energy Model[3] separately considers hot-water demand, storage-tank losses and pipework losses, including the influence of pipe dimensions, insulation and the temperature difference between the water and its surroundings. In commercial buildings, distribution can be particularly important. Long pipe runs and secondary circulation systems may maintain substantial quantities of water at elevated temperature continuously. Improving the efficiency of the heat generator or cylinder while ignoring distribution losses risks optimising only one part of the system.

Do we need to heat the whole cylinder?

A nominal 300-litre cylinder does not mean that 300 litres of hot water must always be available. The useful capacity depends on the temperature and stratification of the water in the cylinder, the incoming cold-water temperature, the required delivery temperature and the pattern of demand.

As hot water is less dense than cold water, appropriately designed storage vessels can develop thermal stratification, with hotter water towards the top and cooler water below. As hot water is normally drawn from the top of the store, a useful quantity can potentially be available without the entire contents



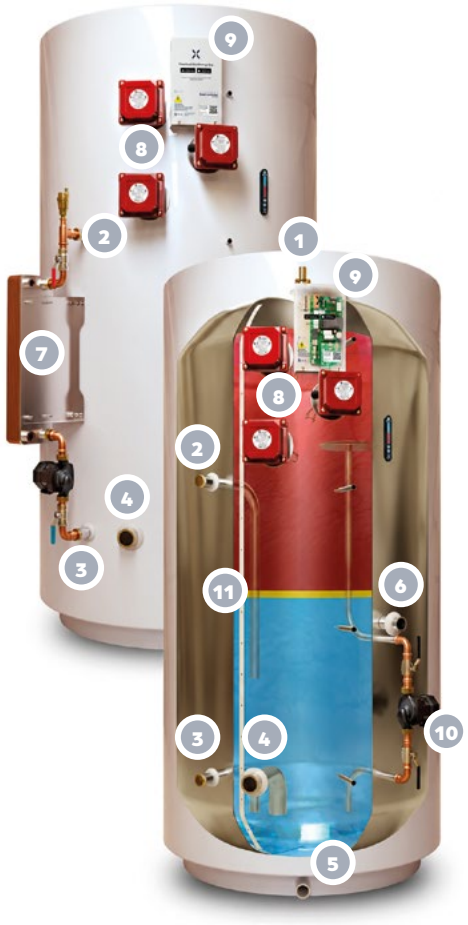
Continuing professional development (CPD) is the regular maintenance, improvement and broadening of your knowledge and skills to maintain professional competence. It is a requirement of CIBSE and other professional bodies. This *Journal* CPD programme can be used to meet your CPD requirements. Study the module and answer the questions on the final page. Each successfully completed module is equivalent to 1.5 hours of CPD. Modules are also available at cibsejournal.com/cpd

being at the same temperature. The principle is recognised explicitly in the developing Home Energy Model methodology,[4] which models a hot-water store as layers, with draw-off occurring initially from the upper layer, with incoming cold water entering the lowest layer.

Maintaining stratification can allow a store to be considered in terms of usable hot-water volume rather than simply nominal cylinder capacity. In some actively controlled hot-water cylinders, controlled circulation can be used to manage the heated volume from the top down, allowing the proportion of the store that is heated to reflect anticipated demand.

This is not necessarily the optimum strategy with every heat source. Where an external heat pump supplies an indirect cylinder through a plate heat exchanger, charging the complete store may provide more favourable heat pump operation. By allowing much of the stored hot water to be used before reheating, the subsequent charging cycle starts with cooler water and provides a longer heat-pump run, reducing cycling and allowing more of the charging period to take place at lower water temperatures and potentially higher COP. A suitably designed external plate heat exchanger can also provide effective heat transfer between the heat pump circuit and stored water, helping to minimise the temperature difference required between them and, hence, the heat pump flow temperature.

The appropriate charging strategy therefore depends not only on the quantity of hot water required, but also on the characteristics of the heat source and its connection to the store. Where partial-volume heating is employed, potential benefits include reduced standing losses and shorter recovery to a useful quantity of hot water. Both partial- and whole-volume charging strategies can provide greater flexibility over when energy is put into the store.



1: Domestic hot-water outlet
2: From plate heat exchanger
3: To plate heat exchanger
4: Cold-water inlet
5: Drain point
6: Return from DHW circuit
7: Plate heat exchanger and pump module
8: Direct electric heating elements
9: Smart controller
10: Stratification control pump
11: Strip of temperature sensors

Figure 1: Example of a commercial hot-water cylinder using an external plate heat exchanger for indirect heating. When connected to an external heat pump, the complete store is heated during each charging cycle and the controls can delay charging until much of the available hot water has been consumed. The cylinder controls can also respond to PV generation and time-of-use tariffs, and use learned demand patterns to optimise the timing of water heating (Source: Mixergy)

Water hygiene sets a boundary

Maintaining regions of a cylinder at lower temperatures introduces another important consideration – water hygiene. Legionella bacteria occur naturally in water and can multiply under favourable conditions. The Health and Safety Executive (HSE)[5] identifies water temperatures between 20°C and 45°C as suitable for legionella growth, particularly where other favourable conditions, such as stagnation and available nutrients, are present. Temperature control remains the traditional strategy for reducing risk in hot- and cold-water systems.

For conventional temperature-controlled hot-water systems, HSE guidance is clear that hot water should be stored at 60°C or above and distributed so that it reaches 50°C within one minute at outlets, or 55°C in healthcare premises.[6]

HSE guidance also emphasises that legionella control is not solely a matter of cylinder temperature. System design and operation should avoid stagnation and unnecessarily long pipe runs, remove dead legs and blind ends where possible, flush infrequently used outlets, and manage scale, sludge and contamination. This is particularly significant when considering lower-temperature storage. It is important not to confuse the 50°C distribution criterion with an acceptance that stored water may simply be maintained at 50°C. There is, however, an underlying time-temperature relationship in the thermal inactivation of legionella – the rate of die-off increases substantially as temperature increases. This provides the basis for considering control regimes in which normal operation takes place at lower temperatures, combined with periodic thermal disinfection.

CIBSE's 2026 *Domestic heating design guide*[7] now includes consideration of DHW storage below 60°C together with thermal-disinfection procedures (see section 4.5.1.1 of the guide).

A CIBSE Domestic Building Services Panel factsheet[8] similarly notes that daily-use DHW temperatures may typically be between 50°C and 60°C, but recommends a controlled weekly thermal-disinfection cycle that is likely to heat all stored water to at least 60°C for at least one hour.

Lower-temperature operation cannot simply be justified on the basis that it saves energy. The complete hygiene-control strategy needs to be considered and, where an alternative to established guidance is proposed, its effectiveness needs to be appropriately demonstrated.

Temperature, measurement and water hygiene

Improved temperature sensing provides an opportunity to monitor and control the thermal condition of the store more precisely. A conventional cylinder may

provide relatively limited information about its internal condition. A thermostat at a single location can indicate whether a particular temperature has been reached there, but does not necessarily reveal the temperature profile throughout the store.

Actively stratified hot-water cylinders can use controlled circulation and temperature sensing to manage the thermal boundary between heated and cooler water, allowing only the volume required to meet anticipated demand to be heated. Multiple temperature measurements through the height of a stratified store can also provide an indication of its state of charge, rather than simply whether a thermostat is calling for heat. From the temperature profile, the available quantity of hot water or stored energy can be estimated, providing additional information for monitoring and predictive control. In an actively controlled hot-water cylinder, a periodic cleansing cycle can extend the heated volume through the complete cylinder, including its lower and normally coolest region. Temperature sensing at or near the bottom of the cylinder can be used to confirm that the selected cleansing temperature has reached the lowest part of the store.

Continuously logged temperatures at several heights can also provide a record of conditions within the store, including confirmation that the lowest monitored region has reached the specified cleansing temperature. Such records may support monitoring and the site-specific risk assessment, but do not in themselves demonstrate control of legionella risk throughout the complete DHW system.

The cylinder cleansing cycle does not, however, constitute thermal disinfection of the complete DHW system. HSG274 describes thermal disinfection as a specific whole-system procedure involving appropriate temperatures and duration, circulation through the system, sequential operation of outlets and temperature verification. Cylinder temperature control therefore remains only one component of the overall legionella-control strategy. Any alternative operating strategy needs to be considered as part of the system-specific risk assessment and appropriately demonstrated.

A controllable thermal store

Once the temperature distribution within a cylinder can be measured and controlled, the store potentially becomes a more active component of the energy system. Instead of the simple instruction to maintain a complete cylinder between two thermostat limits, charging can potentially respond to anticipated demand. If a building normally requires a known quantity of hot water at a particular time, sufficient water can be heated in advance rather than maintaining maximum storage continuously. In some systems, machine-learning algorithms can use historical demand data to anticipate hot-water requirements and adjust the volume and timing of charging accordingly.

Charging may also be coordinated with external signals, including available PV generation and time-of-use electricity tariffs. Where surplus PV electricity would otherwise be exported, for example, it can instead be used to charge the hot-water store, allowing the cylinder to act as a relatively inexpensive thermal battery.

For example, at CIBSE's London headquarters, an actively controlled hot-water cylinder has recently been integrated with the variable refrigerant flow (VRF) system serving the newly constructed Manly Trust Skills Centre, enabling recovered heat to be used for DHW production.

Smart control also creates opportunities to shift electricity demand in response to time-of-use tariffs or electricity-system conditions. Control can therefore extend beyond determining when the cylinder calls for heat to consider how much heat should be stored, at what temperature, from which source and at what time.

From energy efficiency to whole life carbon

Reducing delivered energy is important, but it should not be the only measure used to assess an improved DHW system.

Operating a heat pump at lower temperatures can improve efficiency and reduce operational electricity consumption. Reducing average cylinder temperature and the volume maintained hot can reduce standing losses. Better control of charging may allow greater use of locally generated renewable electricity and lower-cost or potentially lower-carbon Grid electricity.

The improved knowledge of the state of the store can also inform plant sizing. Where the state of charge and recovery performance can be determined, storage volume and heat-generator capacity can be assessed against the expected demand profile. In some applications, this may allow reduced storage volume or heat-generator capacity, and potentially reduce peak electrical demand, although this will depend on the particular load profile and required recovery time. If that results in smaller heat-generation equipment, there may also be benefits in capital cost and embodied carbon.

However, whole life assessment should also recognise what is added. Pumps, sensors, electronic controls and communications equipment contain materials and embodied carbon, and may have shorter service lives than the vessel itself. Maintainability, replaceability and eventual disposal, therefore, form part of the assessment. Claims for whole life carbon reduction should consequently be supported by appropriate evidence, rather than inferred automatically from operational energy savings.

The commercial opportunities and challenges

These considerations become particularly interesting as smarter storage moves from homes into commercial buildings. Commercial DHW demand is extremely diverse. Hotels, sports facilities, offices, educational buildings and other applications have very different demand profiles. Some have predictable peaks and others have prolonged periods of little demand followed by intensive use. This makes storage potentially valuable, but it also means that sizing and control based simply on nominal cylinder capacity may miss opportunities for optimisation. Heat source, storage, distribution, controls, usage and water hygiene together determine overall performance.

Smarter storage

Decarbonising DHW does not mean pursuing the lowest possible storage temperature. The aim is to minimise unnecessary energy use while meeting hot-water demand and maintaining appropriate water hygiene. That means questioning how much water genuinely needs to be hot, when it needs to be heated, how heat can be generated most efficiently, and how its hygienic condition can be demonstrated.

There is no single optimum charging strategy. Whether it is better to maintain stratification and heat only part of the store, or to charge the complete volume, will depend on the demand, heat source and wider energy system. Improved sensing and control provide greater scope to manage these interactions, allowing the hot-water cylinder to become an active part of the building energy system rather than simply a passive store. This has the potential to reduce energy costs and operational carbon while providing greater flexibility. These benefits, however, should not come at the expense of water hygiene or simply shift energy and carbon impacts elsewhere in the system. ●

© Tim Dwyer, 2026.

SPONSOR
mixergy

Module 269

October 2026

1. Why can domestic hot water (DHW) represent an increasing proportion of energy use in a low-energy building?

- ☐ A Heat pumps always use more energy for DHW than fossil-fuel boilers
- ☐ B Hot-water demand necessarily increases as insulation levels improve
- ☐ C Hot-water distribution losses increase as building fabric improves
- ☐ D Modern buildings require DHW to be stored above 70°C
- ☐ E Space-heating demand can fall substantially while hot-water demand does not necessarily fall at the same rate

2. What is a potential benefit of maintaining thermal stratification in a hot-water store?

- ☐ A A useful quantity of hot water can be available without heating the complete contents to the same temperature
- ☐ B Legionella control is achieved without thermal disinfection
- ☐ C Standing heat losses are eliminated
- ☐ D The incoming cold-water temperature is increased
- ☐ E The whole cylinder can be maintained at the same temperature

3. Why might whole-volume charging be advantageous when an external heat pump supplies a cylinder through a plate heat exchanger?

- ☐ A Delaying charging until much of the hot water has been used can provide a longer heat pump run with reduced cycling
- ☐ B It allows the cylinder to operate without thermal stratification
- ☐ C It ensures that the heat pump has a COP greater than 3
- ☐ D It ensures the heat pump always operates at its maximum flow temperature
- ☐ E It removes the need for temperature sensing

4. What additional information can multiple temperature measurements through the height of a stratified hot-water store provide?

- ☐ A An indication of the store's state of charge and available hot water or stored energy
- ☐ B Confirmation of legionella control throughout the complete DHW system
- ☐ C The flowrate at every DHW outlet
- ☐ D The heat pump's seasonal coefficient of performance
- ☐ E The refrigerant charge of the heat pump

5. Which statement best reflects the article's conclusion about hot-water cylinder charging strategies?

- ☐ A Partial-volume charging should always be used with heat pumps
- ☐ B The appropriate strategy depends on factors including demand, heat source and the wider energy system
- ☐ C The lowest possible storage temperature will normally minimise whole life carbon
- ☐ D The optimum strategy depends principally on the nominal capacity of the cylinder
- ☐ E Whole-volume charging is always more energy efficient than maintaining stratification

Name (please print) .....

Job title .....

Organisation .....

Address .....

.....

.....

Postcode .....

Email .....

Are you a member of CIBSE? If so, please state your membership number: .....

The *CIBSE Journal* CPD Programme

By participating in this CPD module, you consent to sharing your details with Mixergy. Mixergy may contact you via email and/or telephone with further information and technical insight on its services. You have the right to opt out from such communications at any time.

I understand that I will receive marketing communications from Mixergy after completing this module (please tick here). ☐

Go to www.cibsejournal.com/cpd to complete the module online. You will receive notification by email of successful completion, which can be used to validate your CPD records. Alternatively, complete this page and post it to: N Hurley, CIBSE, 91–94 Saffron Hill, London EC1N 8QP

References:

[1] Government Office for Science. *What impact can heat pumps have in domestic heating today, and how might that change over time as technology improves?* London: Government Office for Science; 2023. **bit.ly/CJOct26CPD1**

[2] Kiwa Gastec at CRE. *Investigation of the interaction between hot water cylinders, buffer tanks and heat pumps*. London: Department of Energy and Climate Change; 2013. **bit.ly/CJOct26CPD2**

[3] Department for Energy Security and Net Zero. *Home Energy Model: technical documentation*. London: DESNZ; 2026. **bit.ly/CJOct26CPD3**

[4] Department for Energy Security and Net Zero. *HEM-TP-11: Hot water storage tanks*. London: DESNZ; 2026

[5] Health and Safety Executive. *Legionnaires' disease: Technical guidance. Part 2: The control of legionella bacteria in hot and cold water systems (HSG274 Part 2)*. HSE; 2024.

[6] Health and Safety Executive. *Hot and cold water systems – Legionnaires' disease*. HSE. **bit.ly/CJOct26CPD4**

[7] CIBSE. *Domestic Heating Design Guide*. 11th ed. London: Chartered Institution of Building Services Engineers; 2026. ISBN 9781918034196. **bit.ly/CJOct26CPD5**

[8] CIBSE Domestic Building Services Panel. *Heating and Heat Pump Factsheet*. CIBSE. **bit.ly/CJOct26CPD6**

CIBSE MIDDLE EAST & NORTH AFRICA AWARDS 2026

In collaboration with CIBSE UAE Region

Be part of the region's leading celebration of building performance

29 October 2026 | W Hotel, Dubai, UAE

The CIBSE MENA Awards showcase the people and projects delivering a sustainable future across the built environment. Spaces are limited – **secure your seat now**

cibse.org/MENA

CIBSE MENA
#MENA2026

Headline sponsor

FJ Group

Deluxe Sponsor

Polypipe Middle East

Gold Sponsors

BK Gulf LLC
Mechartés
MEINHARDT
TRILUX
viega
HIRA INDUSTRIES
HIRA walraven
MAICO Gulf

Ideal Commercial unveils EQMAX range

Ideal Commercial Heating has launched the EQMAX range of gas-fired condensing water heaters, marking the company's first move into commercial domestic hot-water products.

The EQMAX water heater range comprises 10 models offering outputs from 20kW to 120kW, and storage capacities of 210, 356 and 538 litres. The goal of this selection is to allow the output and stored-water volume to be closely matched to the requirements of each application.

Ideal says that EQMAX is suitable for planned refurbishment projects and replacement installations, where restoring the hot-water supply quickly is a priority. It is designed using hydraulic connection sizes and controls that aim to make installation straightforward.

Each EQMAX direct-fired water heater incorporates a stainless-steel storage tank, heat exchanger and coil, designed to result in a lightweight product that contractors can then transport easily through buildings into plantrooms. Models with 210- and 356-litre storage capacities have a diameter of less than 800mm, enabling them to pass through a standard-width doorway. The 538-litre model will fit through standard doorways without the removable zip-fastened insulation jacket.

The stainless-steel construction is combined with electrical anode protection, intended to further enhance product durability across areas with different water compositions.

Ideal Commercial says EQMAX has been tested for operation in hard-water conditions of up to 350mg/l of calcium carbonate, which aims to give contractors confidence when selecting equipment for regions where water hardness or softness can contribute to premature corrosion.

A key objective of the product is to offer high flowrate performance and fast heat-up times for demanding applications such as hotels, schools, hospitals, leisure facilities, sports clubs and other commercial or public buildings with substantial hot-water consumption.



Across the range, continuous flowrates at a 50°C temperature rise extend from 360 litres per hour to 2,190 litres per hour.

A range of hydraulic and flue accessories will be available alongside the EQMA range.

Amy Sedgwick, product manager at Groupe Atlantic UK & ROI, said: 'With the addition of the EQMAX range, customers now have access to both commercial heating and hot water through Ideal and merchant partners.'

● **Visit: idealcommercialboilers.com/hot-water**

Passivent's bus station ventilation is just the ticket

Passivent has supported the redevelopment of Bishop Auckland's bus station with a natural ventilation package designed to help deliver a comfortable concourse environment for passengers using the town's new transport hub.



Delivered by Esh Construction for Durham County Council, the scheme aims to replace the station buildings with a modern, fully accessible concourse featuring indoor seating, improved, live passenger information, public toilets, parent and child facilities, and a retail kiosk. Designed by Jacobs, the project forms part of a wider regeneration programme supported by the government's Future High Streets Fund.

Passivent supplied 63 window Aircool ventilators and a three-zone iC8000 controller to support the building's natural ventilation strategy. The Aircool units have been positioned on both sides of the concourse to enable secure, controllable cross-flow ventilation and maintain thermal comfort within the busy bus station environment. The ventilation strategy is managed by Passivent's iC8000 multizone intelligent controller.

● **Visit: www.passivent.com**

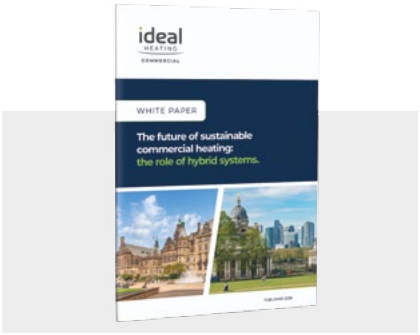


AVC UK releases WaterMaster Evo 2 and HeatMaster Evo 2

AVC UK has introduced the WaterMaster Evo 2, a gas-fired condensing water heater, and the HeatMaster Evo 2, a commercial combi boiler. Both feature an integrated time clock so that hot water can be scheduled around building occupancy, making them an efficient solution for commercial buildings, says AVC.

The WaterMaster and HeatMaster Evo 2 have been designed to deliver fast heat-up times and continuous flowrates of 473-1,754L/h at 60°C.

● **Visit: www.acv.com/gb**



White paper on the future of sustainable commercial heating

Hybrid heating systems and how they can support the decarbonisation of commercial buildings is the theme of a new white paper from manufacturer Ideal Commercial.

The future of sustainable commercial heating: the role of hybrid systems examines the decision-making process behind commercial heating decarbonisation projects, and is designed to highlight why hybrid systems are increasingly being adopted as part of a realistic and effective transition to lower carbon heating.

● **Visit: idealcommercialboilers.com/net-zero**

Modelling gives community centre the optimum Passivent ventilation strategy



Passivent has supplied its Airscoop roof ventilation terminals and Hybrid Aircool wall ventilators for a new two-storey community centre in Somerset.

The installation uses IES Virtual Environment modelling to deliver the most efficient ventilation strategy.

Passivent says the original plans were for four roof terminals, but the IES modelling demonstrated that using just three of its Airscoop roof terminals would provide the required ventilation.

The three terminals aim to provide natural 'displacement' ventilation for the large events space on the first floor and are backed up by Passivent's 15-year no-leak guarantee.

Each terminal's base unit extends into the building to house the insulated internal damper. The objective is to make installation more straightforward and allow the roof to be made watertight with flashings before the terminal lid is fitted.

The whole system is controlled by Passivent's iC8000 controller, operating on a four-zone system.

● **Visit: www.passivent.com**

Hamworthy Heating launches new Modumax boilers

Hamworthy Heating's new Modumax mk4 floor-standing boiler features a modern, intuitive design with flexible connections and pipework kits.

This makes it an efficient and flexible solution for a wide range of commercial buildings, says the manufacturer.

The boiler's new asymmetrical configuration and digital touchscreen enables simple operation, as the improved access to key components speeds up servicing and onsite installation, adds Hamworthy.

A Modbus communications module is also included in the model range, to aid integration with building management systems, with a VFC remote-signal kit supplied as standard to support setup.

Modumax mk4 boilers fit through standard doorways and can be disassembled for transport into basement or rooftop plantrooms with limited space or access.

The units feature a low flue height for locations with vertical clearance restrictions. Modules can be stacked two or three high in up to 15 configurations, providing up to 762kW in less than one metre square of floor space.

The range is available with six pipework kits, including pumps, and can be paired with a selection of Hamworthy Heating low loss headers to help simplify primary circuit design. Boilers are also dual approved for use with both natural gas and liquefied petroleum gas.

Featuring stainless-steel heat exchangers, Modumax mk4 floor-standing boilers come in five models with outputs ranging from 97kW to 254kW at 50/30°C.

Designed to deliver a 5:1 turndown ratio, low Class 6 NOx emissions across all models and up to 95% gross seasonal efficiency, the range's objective is to combine durability and efficiency.



Darren Townend, product manager at Hamworthy, says: 'Modumax mk4 boilers include all the features our customers know and trust, but are now even easier to install, commission and service.'

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

Q&A

Muhammad Izzul Hakimi bin Roslan was one of five engineers celebrated as digital and automation innovators in this year's CIBSE Global YEN 30 Under 30 Awards

As a CAMS Assethub inspection officer, Muhammad Izzul Hakimi bin Roslan focuses on digital asset management and data-driven infrastructure decisions to shift operations from reactive to proactive. Alongside auditing large-scale building conditions for life-cycle planning, he is pursuing a PhD on integrating inspection data into digital twins for predictive maintenance.

Here, Roslan explains that closing the design performance gap requires data discipline as much as algorithms.

Q How can enhanced asset data and digital twins address the building performance gap?

A The performance gap stems mainly from outdated condition data causing building performance to drift from design targets. A digital twin can bridge that gap if it is in sync with the real building continuously and applied across the whole portfolio.

Q How do you ensure the data captured translates into a usable digital model?

A We have to be disciplined. Every asset is recorded against a fixed classification and rating scale via our proprietary CAMS mobile app. The data then follows a structured pipeline: export, initial QA, format conversion, secondary QA, and final delivery. This yields detailed defect descriptions that feed into clients' work-order systems to support their planning and renewals.

Q How can building owners begin to trust predictive data?

A Building owners distrust predictive data because algorithms lack transparency. A paper presented at the Conference on Railway Excellence, which I attended via an Emerging Rail Professional Scholarship, showed AI accuracy rose from 84–90% to 98–100% with a semantic context layer. Combining traceable reasoning with context ensures trust and accuracy.



Q What change to handover data delivery would most benefit asset managers?

A Using structured, machine-readable asset records with day-one condition baselines enables seamless integration into asset management systems. Handover baselines fix flaws at the source by replacing default assumptions of deterioration models.

Q What is the most common roadblock you encounter when trying to capture clean, structured data from older building systems?

A Older legacy systems were not designed for clean data export because of uncalibrated sensors, non-standard registers and a lack of digital baselines, making asset data difficult to map. I have done floorplan capture using an iPad-based scanning app because older council buildings often lack updated digital floorplans, relying instead on hand-drawn sketches or scanning apps.

"Unverified registers drift significantly, often missing unlogged modifications or replaced assets"

Q Which tools have made your life easier on site?

A Mobile inspection apps with instant sync, as they eliminate site-to-system data lag. CAMS Assethub provides the CAMS app to deliver this. It builds an online database from field data for deterioration modelling and financial planning. iPad room-scanning apps for floorplans look good, but require post-processing cleanup.

Q Where is the biggest disconnect between the physical assets and digital models?

A Asset registers reflect initial installation rather than current conditions. During building audits, I achieved a 1.05% spatial variance (the physical to drawn area gap) and a 20% area increase over planned scopes. Unverified registers drift significantly, often missing unlogged modifications, replaced assets or unrecorded systems.

Q How has your experience identifying failing plant shaped your view of new system design?

A That systems must be designed for maintainers, not just handover. This requires day-one baselines, calibrated and documented sensors, and early, consistent classification. Component dependencies must be explicitly visible.

Q What are we designing today that is going to be a nightmare to audit or maintain in 15 years?

A Overly complex, proprietary building systems lacking calibration plans and no structured way of keeping their data current. A sensor quietly drifting out of calibration, or a digital twin built once for handover day but never updated, look fine until someone actually relies on them. ●

elemental LONDON

25-26 November 2026
Excel London

CO-LOCATED WITH LONDON BUILD 2026 EXPO

THE UK'S LEADING & LARGEST SHOW FOR

CONSTRUCTION • DESIGN

HVACR • BUILDING EFFICIENCY

25,000+ ATTENDEES

900+ TOP-LEVEL SPEAKERS

17 CPD STAGES

CPD SESSIONS

450+ EXHIBITORS

NETWORKING PARTIES

LIVE MUSIC & ENTERTAINMENT

---

17 CPD CONFERENCE STAGES

Climate SOLUTIONS

CIBSE

SUSTAINABILITY ARENA

UK HOUSING STAGE

CIBSE BUILD2PERFORM THEATRE: UNMISSABLE SESSIONS

OVERHEATING: ADDRESSING THE NEED FOR COOLER BUILDINGS

Exploring retrofit, passive and mechanical cooling, and how we can design buildings for a warmer climate.

BUILDING SAFETY ACT: WHAT BUILDING OWNERS & SUPPLY CHAINS NEED TO KNOW

Looking at how the Building Safety Act is changing the responsibilities of building owners, contractors and consultants.



DELIVERING HEALTHIER BUILDINGS: FROM IAQ TO NOISE

Exploring indoor air quality, damp and mould, noise, and how design and technology can support healthier buildings.

Programme details are subject to change. Explore the latest & full programme online:
www.elementallondon.show/2026-event-timetable/



LEADING HVAC BRANDS AT ELEMENTALLONDON

Meet leading industry brands including *Baxi, Danfoss, Daikin, Clivet, Mitsubishi Electric, Beijer Ref, Mitsubishi Heavy Industries* and *Excool Special Products*, showcasing the latest in heat pumps, cooling and HVAC technology.

25,000+ built environment professionals. Two co-located shows. One ticket.

REGISTER FREE TICKETS

ELEMENTALLONDON.SHOW

FLOWGRID AIR VOLUME SENSOR

- Accurate average air volume measurement
- Multiple differential pressure sensing points
- Averaging velocity pressure tank
- Suitable for bi-directional volume measurement
- Low velocity detection from 0.5 m/s
- Frame made in galvanised metal or stainless
- Standard mounting flanges 20-30-40 mm
- Height manufactured in 100mm increments
- Width manufactured in 50mm increments
- Length 300 mm to fit the CMR Dampers
- Sizes 3000 x 3000mm have been manufactured
- Custom made sizes can be manufactured
- 35 Years field application experience



CMR FLOWGRID

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.

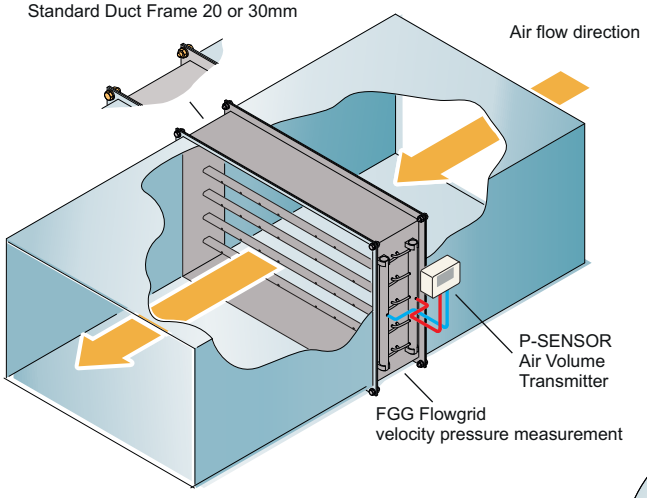
Another great advantage of the FGG Flowgrid is, that it can measure bi-directional as it is manufactured equally on both sides. This means, the air flow is measured in one direction and should there be a reverse flow, this can be detected and measured when using the CMR P-SENSOR.

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

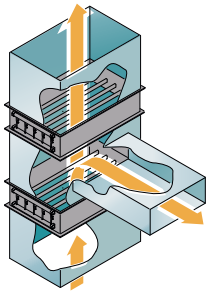
Commercial Buildings - Industrial Production Plants - Pharmaceutical Production - Validated Monitoring Systems Hospital Isolation Rooms - Operating Theatres - Data Centres

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

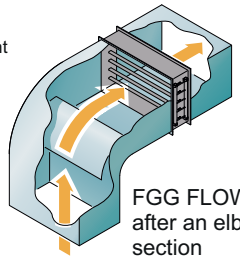




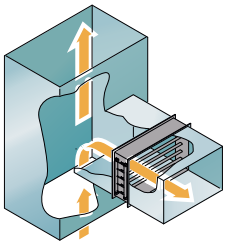
P-SENSOR
With LCD display
and keyboard



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

CMR CONTROLS Ltd
Precision Air Pressure and Volume Sensors

22 Repton Court Repton Close
Basildon Essex SS13 1LN GB
web www.cmr.uk

Phone +44 (0) 1268 287222
Direct +44 (0) 1268 242542
mail sales@cmr.uk