

A circular badge with a yellow-to-black gradient. The text "Lighting Special" is written in white, with "Lighting" on the top line and "Special" on the bottom line.

Lighting  
Special

Highlights from CIBSE  
Build2Perform Live

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Installing PVs on  
King's College Chapel

---

# A brutal brief

How Atelier Ten worked within the tight constraints  
of a Brutalist icon to electrify its building services

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# Thinking aloud

**T**he sense of excitement at CIBSE Build2Perform Live was more tangible than ever this year. Hundreds of visitors pored over the latest renewable technology on exhibition stands, and packed-out theatres heard expert panels discuss the huge challenges facing industry on its path to net zero.

There was standing room only at the session on the Net Zero Carbon Buildings Standard (NZCBS), where CIBSE's Julie Godefroy and LETI's Clara Bagenal George MCIBSE explained how the standard would verify building performance. Key to the standard are limits around operational and embodied carbon, and onsite renewables and refrigerants, which will become tougher as supply chains become adept at building and maintaining low carbon buildings (page 23).

Until recently, embodied carbon was almost impossible to measure in MEP plant, but with buildings becoming more energy efficient, it now makes up a significant proportion of a building's whole life carbon. Clients understand this, and are driving demand for more data that will enable them to compare products.

It was encouraging to see CIBSE Members from Amazon and Tesco discuss a collaboration on a new TM65 edition for grocery stores. Amazon has already partnered with CIBSE to produce TM65.3, the methodology for logistics centres, and it understands the benefit of working collaboratively. As Amazon sustainability engineer Andrew Rhodes told the audience: 'We can't do this on our own.'

This month's case study is the stunning refurbishment of Space House, a 1960s Brutalist icon in London, designed by architect Richard Seifert (page 46). MEP engineer Atelier Ten had to be at its creative best to design the services within the confines of the Grade II-listed exposed structure. The energy use intensity is 78.2kWh·m<sup>-2</sup> per year NIA, which comfortably meets the NZCBS limit for office buildings, which is 125kWh·m<sup>-2</sup> per year NIA (for offices starting on site in 2025). It's encouraging to see that our sector already has the skills and technology to meet the challenge of NZCBS.

Some of you may be watching carols from King's College Chapel, Cambridge, in a few week's time. For the college, it will be a green Christmas, as the chapel roof now has a large array of PV panels, which generate 123,000kWh per year (page 26).

● Alex Smith, editor [asmith@cibsejournal.com](mailto:asmith@cibsejournal.com)

## Editorial

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**Anastasia Mylona**  
 CIBSE's technical director reflects on COP29, where passive cooling was high on the agenda



**Tim Dwyer**  
 Charting growth of the TM65 methodology, which measures embodied carbon in building services



**Sally Godber**  
 The Passivhaus Trust has published a guide highlighting key considerations in heat pump design and specification



**Colin Ashford**  
 CIBSE Gold Medal recipient on his distinguished career in engineering and what he tells the next generation



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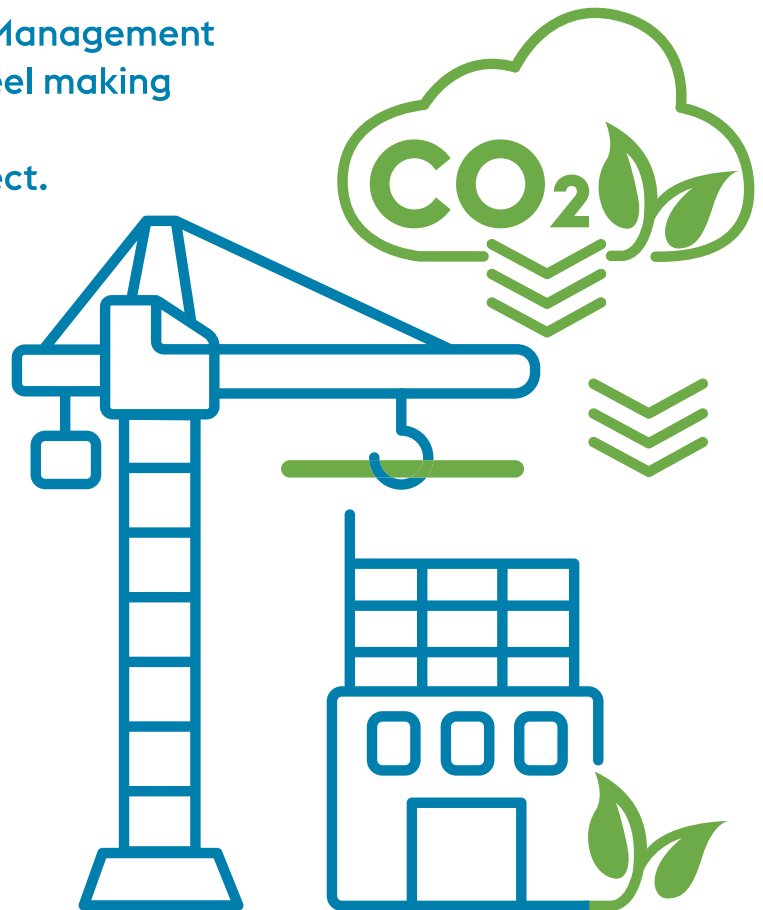
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Read our  
Lighting special  
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and online at  
[cibsejournal.com](http://cibsejournal.com)

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# UK sets new emissions target at COP29

Aim is to reduce carbon emissions to 81% of 1990 levels by 2035

**S**ir Keir Starmer has announced that the UK is planning to accelerate the pace of its emissions reductions over the next decade.

In his keynote address at the COP29 climate change summit in Azerbaijan's capital Baku, the Prime Minister said the government has accepted advice, issued last month by the Climate Change Committee, that the UK should aim to reduce emissions to 81% of 1990 levels by 2035.

The new target, part of the UK's Nationally Determined Contribution submission at the summit, increases the pace of the country's emission reductions. The previous target, set out in 2020's Sixth Carbon Budget, was 78% of 1990 emissions levels.

Commenting on the latest emissions-reduction target, Sam Richards, CEO of pro-growth campaign group Britain Remade, urged the government to urgently publish its

Planning and Infrastructure Bill, which was promised in the King's Speech earlier this year. He said: 'The only way we are going to meet this new target is by slashing the time it takes to build new sources of clean energy.'

Representing CIBSE at COP29, technical director Anastasia Mylona highlighted the urgent challenges facing the building industry in its race to achieve net zero and decarbonisation targets.

She said the building industry had to adapt to the climate impacts that are already occurring and those anticipated in the future.

To meet the growing demand for cooling, Mylona added that passive measures should be a priority in building design, construction and operation. She also stressed the importance of assessing the climate risks and vulnerabilities of buildings and their occupants. (See page 17).

## Two-fifths of heat pump installer trainees not practising

Sufficient installers are being trained to meet anticipated levels of heat pump demand, but many are not becoming installers, according to a report by the Heat Pump Association (HPA).

It states that 7,856 individuals were trained to become installers in 2023 – a 133% increase on 2022. In the first nine months of 2024, more than 7,000 individuals have already completed heat pump installation training. This should mean the industry is 'on track' to meet the

previous government's target of rolling out 600,000 heat pumps per year by 2028.

However, the HPA report says that around 39% of those who have received this training are not going on to work in the market.

HPA chief executive Charlotte Lee said: 'Provision of courses is not the limiting factor in this instance; rather, there is a lack of confidence in the market and uncertainty about the heat pump deployment pipeline.'

### GSHPA investigates fatal borehole explosion

The Ground Source Heat Pump Association (GSHPA) has said it is 'deeply saddened' by the 'tragic loss' of two Bedfordshire pensioners following a gas explosion in October. The BBC reported that Paul Swales

(85) and Julia Harris (84) died in an explosion at the same point where an underground gas leak occurred in July following the drilling of a borehole to install a ground source heat pump.

The GSHPA said it will work

with relevant parties to examine how the explosion occurred and learn from the tragedy: 'We have received questions about the presence of gas in boreholes. To the best of our knowledge, this is an extremely rare occurrence.'

# Salford keen to demolish Stirling Prize winner

Centenary Building no longer meets modern standards, says University of Salford

The first winner of the RIBA Stirling Prize – the University of Salford's Centenary Building – is set to be demolished.

Designed by Hodder Associates, the building won the inaugural prize in 1996, but has been vacant for eight years.

Boasting then-groundbreaking natural ventilation and underfloor heating, the Stirling judges praised the decision not to use air conditioning. However, occupants of the building complained that it was too cold in the winter and too hot in the summer.

A post-occupancy survey of staff working in the building, carried out by Manchester University in 1998 and seen by *CIBSE Journal*, showed that it received a 'very poor' score of -19%. This is at the bottom of the range for most

buildings, and key factors in this score were temperature, and control of heating and ventilation.

'While the Centenary Building has been part of the university estate for decades, its infrastructure no longer meets modern standards and requirements. It has now been vacant for a third of its built life,' said a university spokesperson.

The building is proposed for demolition as part of Salford City Council's masterplan to redevelop the area. But its architect, Stephen Hodder, has called for it to be adapted rather than demolished. The Twentieth Century Society has also submitted an application for the building to be listed, in a bid to stop it being demolished.

## BSR warns building inspectors over competency claims

The Building Safety Regulator (BSR) has warned registered building inspectors (RBIs) about the risks of registering for work categories for which they lack certificates of competence. In its latest monthly bulletin, the BSR says that doing so may constitute professional misconduct, resulting in 'serious consequences' for inspectors and their employers.

It adds that any RBIs registered for categories beyond their assessed competency should submit a Change of Circumstances form to avoid potential penalties.

## Include air quality in EPCs says Beama

The government is being urged to broaden the remit of the Energy Performance Certificate (EPC), to recognise and assess indoor air quality.

A Beama position paper, published on World Ventil8 Day last month, says the evolution of the EPC has focused on energy efficiency, but there is a 'clear disconnect' with the need to ensure buildings and their occupants are healthy.

Lee Nurse, chair of Beama's ventilation group, said: 'With so much focus on retrofitting homes to improve their energy efficiency, we should not be ignoring the ongoing health of occupants.'

## White paper proposes healthy retrofits

A new white paper sets out how home retrofit initiatives can be aligned with local public health and climate-resilience goals. 'Retrofit for health and climate resilience service delivery model' has been published by Connected Places Catapult.

Based on research carried out by a partnership that also includes Oldham Council and the Carbon Co-op, the paper explores the feasibility of rolling out a services-based approach to tackling these issues across the UK's regions.

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## Beama and HPA launch control guide for heat pumps

Beama and the Heat Pump Association (HPA) have developed a heating control guide for air-to-water heat pump systems.

The guide aims to clarify Approved Document Part L with regards to specifying single-zone or multi-zone systems.

Available digitally from both organisations' websites, the new guide is the first of several collaborations between the trade associations ([bit.ly/CJHPHC24](https://bit.ly/CJHPHC24)).

It will include additional annexes covering underfloor heating controls, with the next expected early next year.

Craig Dolan, chair of the HPA, said: 'The guidance offers valuable example schematics and highlights key considerations to enhance compliance.'

# Government increases backing for heat pumps

## Budget for Boiler Upgrade Scheme increases to £295m

The government has nearly doubled the budget for the Boiler Upgrade Scheme (BUS) and extended fast-track planning rules for heat pumps.

In the next steps on its Warm Homes Plan, the Department for Energy Security and Net Zero (DESNZ) said the budget for the BUS will grow to £295m in the next financial year. A further £30m has been allocated for this year's scheme.

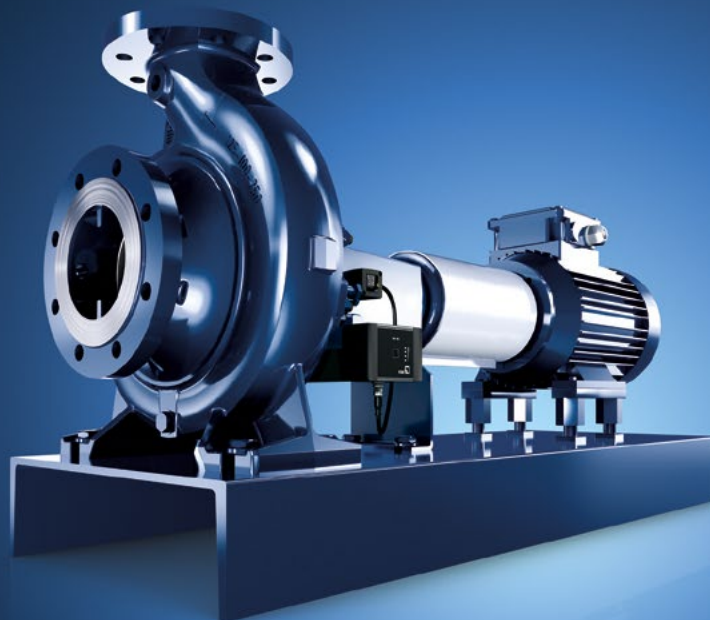
The additional BUS cash has been allocated from the £3.4bn committed in October's Budget for the Warm Homes Plan over the next three years.

The government announced. £374m for the Warm Homes: Social Housing Fund and £88m for the Warm Homes: Local Grant scheme.

It has also announced that it is pressing ahead with proposals to ease planning rules on heat pump installations. The requirement that heat pumps must be installed at least one metre from a property's boundary in order to benefit from permitted development rights – which cut out the need to submit a full planning application – has been removed. This restriction will still be in place for listed buildings.

Other announcements include plans to increase energy efficiency standards for boilers and heat pumps, and investing £5.2m in Groupe Atlantic, in the first award from the Heat Pump Investment Accelerator competition.

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# Plans for £1bn heat network in central London

South Westminster Area Network will use heat from the Underground, the Thames and sewer systems

Plans have been unveiled for one of the UK's biggest heat networks, covering a swathe of central London.

The South Westminster Area Network (Swan) is designed to serve a sizeable area of the capital's city centre, running along the River Thames from Victoria railway station to Temple Underground Station near the Strand, bounded by St James's Park.

It could serve landmark buildings such as the Houses of Parliament and the National Gallery, as well as buildings owned by Westminster City Council and the government.

The heat network would supply low carbon heating using innovative sources such as piping warmth from the London Underground, the Thames and the sewer network.

Heat would be distributed across the network via underground, insulated pipes filled with hot water. The network zone is one of a number being established across England that have been targeted for accelerated investment into heat network infrastructure.

The network is expected to save 75,000 tonnes of CO<sub>2</sub> every year, create 500 jobs, improve local air quality by reducing nitrogen oxides emissions by 99%, and create 100 opportunities for UK businesses.

Swan was the idea of the Department for Energy Security and Net Zero and Westminster City Council. The Swan Partnership, a joint venture between heat network developers Hemiko and Vital, will fund, build and operate the heat network.

The partnership is being supported by the London Heritage Quarter and Aecom. It plans to invest £100m within three years – rising to £500m within a decade and £1bn by 2050 – into what will become one of the UK's biggest heat networks.

However, the network plans have sparked controversy with some residents who bought ex-Westminster Council flats. They claim they could have to pay up to £66,000 as part of work that will replace their ageing district heating system.

## Safeguards proposed for heat network customers

Customers of heat networks should be given added safeguards against forced entry to recoup debts, the government and Ofgem have proposed.

In a joint consultation paper issued last month, the regulator and the Department for Energy Security and Net Zero outlined a new consumer protection regime for the hitherto unregulated heat network sector.

On debt management, the paper says provision of powers of entry, such as those possessed by electricity and gas retailers, are 'necessary' to enable heat network operators to manage debts. However, it warns that there is a 'greater' risk that these powers would be 'misused' than in gas and electricity retail, because there is a larger number of heat network suppliers.

The consultation says that heat network customers are more likely to be vulnerable than their counterparts across the market, because this form of heating is more common in social housing.

As well as following Ofgem's general approach that use of powers of entry should be the 'absolute last resort', the paper proposes other safeguards that could cut the risk of imposing on consumers' privacy and dignity.

## More sign up to Heat Trust's consumer protection scheme

Ten more heat networks have registered with the Heat Trust's consumer protection scheme, bringing the number of consumers it covers to more than 85,000.

The new networks include the first by Vattenfall to be registered with the scheme – Brent Cross Town, in north London, and Midlothian Energy, in Scotland.

Stephen Knight, managing director of Heat Trust, said: 'Registering 10 more heat networks to our scheme in the past 10 weeks is a welcome step towards setting an industry standard while working towards decarbonisation of heating in the UK.'

'Heat networks are going to be increasingly central to how we heat our homes, and it is vital that consumers have confidence that they can expect a good experience.'

The previous, Conservative government legislated for Ofgem to regulate heat networks, but it has not been confirmed when this will take effect.

## Engineers are the second most-trusted profession

Nine in ten people in the UK trust engineers to tell them the truth, according to the Veracity Index from Ipsos.

Engineers were the second most-trusted profession, just behind nurses (94%), but ahead of doctors (88%).

Trust in engineers is almost equal across genders, with only a 4% difference between men and women.

At the bottom of the trust league are politicians generally (11%), government ministers (15%), advertising executives (16%) and journalists (27%).

The Institution of Engineering and Technology, which worked on Index, said that engineers had recorded similar levels of trust in previous years.

# Emerging engineering talent celebrated in ANZ awards

Five triumph, as keynote asks if AI will be next engineer of the year

The brightest young engineering talent was celebrated recently at the CIBSE Australia and New Zealand (ANZ) 2024 Young Engineers Awards.

The Awards, which took place at L'Aqua, overlooking Sydney's Darling Harbour, in October, recognise the outstanding achievements and contributions of young engineering professionals, students, graduates and mentors, and the businesses that champion them. Five awards were presented on the night. The winners were:

- Mario Wellalage, mechanical engineering undergraduate at RMIT University; the Mark Griffin Student of the Year
- Kimberly Lowe, graduate mechanical engineer at Aecom; the Haris Moraitis Graduate of the Year

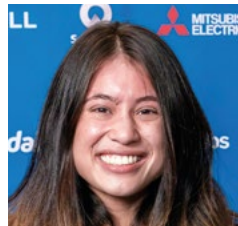
- Jerry Zhang, mechanical engineer at Beca; the Jack Pirie Young Engineer of the Year
- Tom Wise, director at WSce; the Jeff Robinson Champion of the Year
- Northrop Consulting Engineers; Graduate Development Programme of the Year.

This year's awards were focused on how the emerging technology of artificial intelligence (AI) enhances our capabilities as building services engineers. Guest speaker Mike Dowling, director of technology at Operational Intelligence, delivered a keynote address titled 'Is AI the next young engineer of the year?'

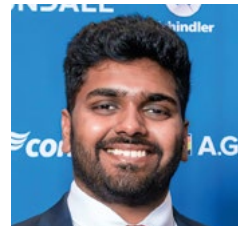
CIBSE would like to thank everyone who entered these awards, the judges, and all the sponsors.



Jerry Zhang



Kimberly Lowe



Mario Wellalage



Tom Wise

## Training



**2025 CIBSE Training Brochure now available with details of all courses.**

While CIBSE settles into its new home, courses will continue to be offered remotely. Face-to-face corporate training is also available, bringing expert trainers to your workplace. CIBSE members receive 20% off all CIBSE Training standard rates.

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### Presentation

**North East: Building Safety Act Presentation**

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### Events

**East Midlands: Water safety: chain of infection – a reservoir of organisms**

10 December, online

Register at [bit.ly/CJWS2024](http://bit.ly/CJWS2024)

### CPD

**East Midlands: Protected escape routes**

21 January, Loughborough

Register at [bit.ly/CJPER2024](http://bit.ly/CJPER2024)

# CIBSE UAE showcases outstanding achievements

Egis is standout winner, capturing seven of the 23 awards on offer

Outstanding projects, consultancies, manufacturers and individuals were celebrated at the CIBSE UAE Region Annual Awards, which took place at Habtoor Palace on 30 October.

The evening brought together 350 industry leaders and innovators – as well as CIBSE’s President, Fiona Cousins, and CEO, Ruth Carter – to acknowledge excellence in building services and highlight projects that are setting new standards in sustainability, safety and performance.

The 23 awards presented on the night allowed for a vast array of industry talent to be recognised.

Standout winner was Egis, with an impressive seven awards, including five project categories for the Natural History Museum in Abu Dhabi. Egis also took Best Digital Innovation, for



its Transforming Egis Embracing Digital Innovation project, and Retrofit Project of the Year for Yas Waterworld, in Abu Dhabi.

Rising talent to watch includes Ayah Rahmoun, from Arup, who won MEP Graduate of the Year, and Takwa Dawdi, from Red Engineering, who was named MEP Young Engineer of the Year.

More established engineers were also celebrated. Nigel Thomas, AESG – Sustainability Engineer of the Year; Anzala Asher, Rheem Manufacturing Middle East – Engineer of the Year (Manufacturer and Supplier); Mercy Joe, WSP – Electrical Engineer of the Year; Ajith Kumar, Egis – Plumbing Engineer of the Year; and Ahmed Farag, WSP – Mechanical Engineer of the Year.

For a full list of winners, visit:

[www.cibse.org/uae](http://www.cibse.org/uae)

The Awards took place as part of CIBSE UAE Week 2024, which ran from 28–31 October and focused on climate resilience and sustainability in the region. Cousins, Carter and CIBSE President Elect Vince Arnold attended events throughout the week.

Highlights included a presentation at the MENA Climate Proof Forum, which detailed how innovative design strategies can transform building resilience in the Gulf, plus a visit to the Rochester Institute of Technology, Dubai, and its sustainability and energy centre. There was also a tour of Masdar City’s transformative net zero and climate-resilient practices, a visit to Heriot-Watt University, Dubai, and a tour of Misk Art Institute.

## Building Simulation Award winners announced

The 2024 Building Simulation Award has been won by Xiaoxiong Xie, a lecturer in building engineering at the University of Plymouth.

The winning entry, which was recognised at CIBSE Build2Perform Live last month, is on ‘Multi-scale modelling of air source heat pump impacts on outdoor microclimates in 2050s UK scenarios’.

The Young Modeller Award was won by Gaurav Kataria, senior building performance and sustainability engineer at Harley Haddow. The award is based on the overall work of young modellers.

Judges said: ‘Gaurav has

achieved a lot already in his career and is effectively using modelling as a tool to contribute positively to the entire design process from the very early stages, and to facilitate communication with other specialties.

‘He has used his initiative to create his own methodologies and tools in order to use detailed HVAC modelling in decision-making.’

The annual awards are organised by the CIBSE Building Simulation Group.

Also at Build2Perform, PhD student Kate Turley was named the 2024 SLL Young Lighter at the Light2Perform stage (see page 40).

## Danes join CIBSE UAE for retrofit event

CIBSE UAE Region and the Danish Missions in the UAE hosted a Dual Retrofit roundtable in October, to explore retrofitting urban environments for sustainability and resilience.

His Excellency Joakim Larsen, Consul General, and Ruth Carter, CIBSE CEO, opened the event, and emphasised the importance of retrofitting as a sustainable alternative to demolition.

The commitment from the UAE and Denmark to enhance urban sustainability was clear, setting the stage for impactful collaboration.

● This event was held as part of CIBSE UAE Week 2024. For information from the region visit [www.cibse.org/uae](http://www.cibse.org/uae)

# CIBSE appeals for more contributions to industry Benevolent Fund

After a drop in donations to its Benevolent Fund, CIBSE is asking members to consider making a voluntary £10 contribution by ticking the Benevolent Fund box when they renew their memberships.

There has been a drop in contributions in recent years, with fewer than 25% of CIBSE members contributing in 2024 – the lowest figure ever, which could impact the vital safety net the fund is able to offer.

The Fund, which celebrated its 90th anniversary last year, was set up to help members and former members, and their dependants, in need. It provides financial and other assistance to those whose circumstances have changed, wherever they are in the world. This could be as a result of serious illness, death, or financial hardship. Since its inception, the fund has helped hundreds of individuals, their dependants, and families.

There are three main sources of income for the fund: donations from members at subscription renewal time; dividends on investments; and one-off donations from members, regions and CIBSE events.

Around 5% of members have their membership subscriptions paid for by their employer, and these do not include the fund donation.



For those paying by direct debit (DD), donations to the Fund are taken unless you have opted out. CIBSE will advise you if you are opted out when it sends your DD notification. If you wish to contribute, please reply to this notification and let us know.

If you are not currently making a contribution to the fund through your membership subscription, but wish to, you can make a donation at [bit.ly/CJBen24](https://bit.ly/CJBen24)

Donations are essential for the fund to carry on its important function and to continue being able to support those requiring help.

Kevin Kelly, chair of the CIBSE Benevolent Fund, said: 'The Fund was set up by you, for you. It is, quite simply, at the heart of what the CIBSE community does so well – supporting each other – and we need to ensure that it continues to be able to offer that support for the benefit of our whole CIBSE family.'

Each CIBSE Region has one

Benevolent Fund almoner, who acts as the contact for any members in their region looking for assistance or advice. The almoners are integral to the functioning of the fund and the support it offers members in their local region, helping with access to services, arranging financial help, and more.

Alan McWilliam, almoner for the East Midlands Region, said he has been able to offer CIBSE members and their dependants regular financial assistance or one-off payments to help with unforeseen expenses, such as a contribution to household repairs.

Volunteering 'gives me such a feeling of belonging to the CIBSE community and a sense of satisfaction, knowing that I am helping someone make ends meet', he added.

Of contributing to the Benevolent Fund, McWilliam said: 'If you donate, you will do so knowing that you will be helping someone in our building services community.'

If you know someone who could benefit from the help the fund can offer, or simply a chat to find out what is available, please put them in touch with their local almoner.

Details of all the almoners can be found at: [bit.ly/BenAlm](https://bit.ly/BenAlm)

**For more details and to contact your local almoner or make a donation, visit [www.cibse.org/benfund](https://www.cibse.org/benfund)**

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



**VELOGRID**  
Velocity Averaging Sensor



**P-Sensor**

CMR are the inventors and manufacturers of both the P-Sensor and the Velogrid. The Velogrids are made to measure to fit any ductsize up to 3m x 3m and the P-Sensor has a keyboard to easily enter : duct height - width - density - magnification factor and the scaling in m/s - m<sup>3</sup>/s - m<sup>3</sup>/h - l/s. It can even work out the Air Change rate. And the BMS gets three linear volume signal outputs of 0..10V 4..20mA and an addressable Modbus rtu bus.

**CMR CONTROLS Ltd**

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Fax +44 (0) 1268 287099  
[sales@cmr-controls.com](mailto:sales@cmr-controls.com)





Arup won New Build Project of the Year – UK, for the Grand Courtyard and Pavilion at The Old War Office hotel in London

## Winning façade projects push boundaries

Arup claims three Project of the Year wins at SFE Façade 2024 Design and Engineering Awards

Exemplary projects that push the boundaries of technologies and set new benchmarks for what's achievable in façade engineering were recognised at the SFE Façade 2024 Design and Engineering Awards.

The awards, which took place in London on 6 November, are run by the Society of Façade Engineering (SFE) and CIBSE, and celebrate excellence and achievements in façade engineering from around the world.

Arup was the outstanding winner on the night, taking home three trophies in the Project of the Year categories. It took the Special Structures International Award for Airshade, the world's first air-powered shading device, developed by Arup in Masdar City, UAE. The judges said the device had potential to benefit projects across all economic regions to improve comfort and operational energy.

Arup also won New Build Project of the Year – UK, for the Grand Courtyard and Pavilion at The Old War Office. The project added a contemporary dining space, which revitalised a historic space while respecting the Grade II-listed surroundings and setting benchmarks for future projects. The Special Structures UK award also went to Arup for the Barn Elms Ecological Kiosk.

Octatube's refurbishment of the Grade II-listed cable-net façade of Channel 4's headquarters was another

standout project, claiming two awards for Refurbishment of the Year UK and Innovation of the Year UK. Judges said it was a true refurbishment that improved safety while sensitively protecting the original design.

International projects from Europe, Beijing, Singapore and Pakistan also took home prizes. Notably, the Beijing City Library and Eckersley O'Callaghan won New Build of the Year – International. The project, designed to celebrate reading, features a 16m-tall frameless, folded plate-glass wall, which is believed to be the tallest façade of its type ever completed.

Roberta Giacalone, from Wintech, was named Young Façade Engineer of the Year, with her dedication to technical excellence and ongoing professional growth setting a strong example for the future of façade engineering. John Downes was presented with the Lifetime Achievement Award for his impactful career advancing industry standards in health, safety and sustainability, and Dr Hywel Davies was recognised with an Honorary Fellowship of the SFE for his outstanding commitment to the society and the industry.

With special thanks to headline sponsor Reynaers Aluminium.

**For the full list of winners visit: [bit.ly/SFAAward24](https://bit.ly/SFAAward24)**

## Embodied carbon certification for Mitsubishi products

Mitsubishi Electric has been awarded Embodied Carbon Verification (ECV; TM65) for four of its product families, including City Multi VRF units and Lossnay commercial ventilation.

Having been involved in the initial pilot, Mitsubishi Electric is an early adopter of CIBSE's ECV scheme, and plans to expand the verification across its portfolio, including Hybrid VRF and CAHV commercial heat pumps.

CIBSE Certification, a wholly owned CIBSE subsidiary and Nabers UK scheme administrator, uses profits generated from its operations to expand its services and fund CIBSE.

● Find out more about the ECV scheme at: [bit.ly/CJEmbVer](https://bit.ly/CJEmbVer)



## CIBSE moves to London address

CIBSE is looking forward to settling into its new headquarters in Farringdon, London, after moving in during December.

The Institution's new address is: CIBSE, 91–94 Saffron Hill, London, EC1N 8QP. It hopes to be able to welcome members and visitors from autumn 2025.

At 17,000ft<sup>2</sup>, the building is 70% larger than CIBSE's old Balham office, and will have a range of flexible spaces, including an area for an auditorium and a mezzanine on the top floor.

The move comes two years after CEO Ruth Carter announced that CIBSE would be leaving its Balham home after 44 years.

# New fellows, members and associates

## FELLOW

**Amies, Alexander Henry**  
London, United Kingdom

**Badiei, Ali**  
Uxbridge, United Kingdom

**Bateman, Paul Andrew**  
Sunderland, United Kingdom

**Branson, Warren**  
Burton-on-Trent, United Kingdom

**Burgess, John**  
Cork, Ireland

**Davis, Richard**  
Worthing, United Kingdom

**Edwards, Peter**  
Chatham, United Kingdom

**Enstone, Michael Richard**  
St Albans, United Kingdom

**Graham-Law, Eleanor**  
Roade, United Kingdom

**Hansen, Richard**  
London, United Kingdom

**Morgan, Richard**  
Bicester, United Kingdom

**O'Loughlin, Philip**  
LLandymog, United Kingdom

**Redfern, Robert**  
Leighton Buzzard, United Kingdom

**Rimmer, Michael**  
Winsford, United Kingdom

**Taukkoor, Giovanni Singh**  
Sharjah, United Arab Emirates

## MEMBER

**Abdou, Abdelrahman**  
Dubai, United Arab Emirates

**Barden, Jason**  
Milton, Australia

**Burgess, Thomas**  
Vancouver, Canada

**Challamarad, Chijyoti**  
Dubai, United Arab Emirates

**Cheng, Angus**  
Kowloon, Hong Kong

**Chilton, David**  
Manchester, United Kingdom

**Chung, Alvin Pui Kwan**  
New Territories, Hong Kong

**Chung, Tsz Hei**  
Southern District, Hong Kong

**Curpen, Vythilingum**  
Toronto, Canada

**David, Zsolt Krisztian**  
Singapore, Republic of Singapore

**Ellis, Blake**  
Overland Park, United States

**Ewen, Mark**  
Leeds, United Kingdom

**Farkhondeh, Hodeis**  
London, United Kingdom

**Farschimonfared, Mehrrad**  
Mount Colah, Australia

**Fung, Kam Ming Kalms**  
Hong Kong, Hong Kong

**Goff, Samantha**  
Cromer, Australia

**Hines, Mark**  
Willenhall, United Kingdom

**Ho, Wai Chi**  
Tai Po, Hong Kong

**Ip, Chi Ming**  
Kwai Chung, Hong Kong

**Jan, Kaleem Ullah**  
Dartford, United Kingdom

**Jayantha, Heyare Hewage Yohan**  
Nugegoda, Sri Lanka

**Kelly, Paul**  
San Francisco, United States

**Lam, Weng Fai**  
Tai Kok Tsui, Hong Kong

**Lam, Ming Kei**  
New Territories, Hong Kong

**Lau, Chun Kit**  
Kwun Tong, Hong Kong

**Lee, Chi Wing**  
New Territories, Hong Kong

**Leung, Chi Yip**  
Tuen Mun, Hong Kong

**Li, Chong Wing**  
Kowloon, Hong Kong

**Ling, Kwan Fai**  
Kowloon, Hong Kong

**Luk, Ching Kit**  
Ap Li Chau, Hong Kong

**Luk, Yee Bun**  
Kwun Tong, Hong Kong

**Man, Siu Pan Stephen**  
Sai Ying Pun, Hong Kong

**McDaid, Harry**  
Birmingham, United Kingdom

**McLaughlin, Sarah**  
Pagewood, Australia

**Munawar, Tariq**  
Al Nahda-2, United Arab Emirates

**Najibnia, Ali**  
Reading, United Kingdom

**Naylor, George Thomas**  
Barnsley, United Kingdom

**Ng, Wa Hei**  
To Kwa Wan, Hong Kong

**Nutkins, James**  
Flackwell Heath, United Kingdom

**Olej, Rebecca**  
Dubai, United Arab Emirates

**Parker, Christopher James**  
Hipperholme, United Kingdom

**Rajendran, Ramesh**  
Hawalli, Kuwait

**Ralph, Nick**  
Dudley, United Kingdom

**Reid, Carl**  
Aldershot, United Kingdom

**Roddy, Mark**  
Altrincham, United Kingdom

**Sarieddine, Rabih**  
Dubai, United Arab Emirates

**Shaikh, Mohammad Altamash**  
Riyadh, Saudi Arabia

**Shek, Wai Ching**  
Ngau Tau Kok, Hong Kong

**Shen, Hanyang**  
Wanchai, Hong Kong

**Stensberg, Lydia**  
Central, Hong Kong

**Suresh, Sanjay**  
Bengaluru, India

**Syed, Jareer**  
Riyadh, Saudi Arabia

**Sze Ming, Wong**  
Yuen Long, Hong Kong

**Tang, Po Yi**  
Kowloon, Hong Kong

**Tsoi, Yan Lam**  
Shatin, Hong Kong

**Ur Rehman, Asad**  
Macclesfield, United Kingdom

**Varsani, Jaymin**  
Harrow, United Kingdom

**Wing Kit, Ng**  
Yuen Long, Hong Kong

**Wong, Che Sing**  
Sai Ying Pun, Hong Kong

**Wong, Kwan Ting**  
Kowloon, Hong Kong

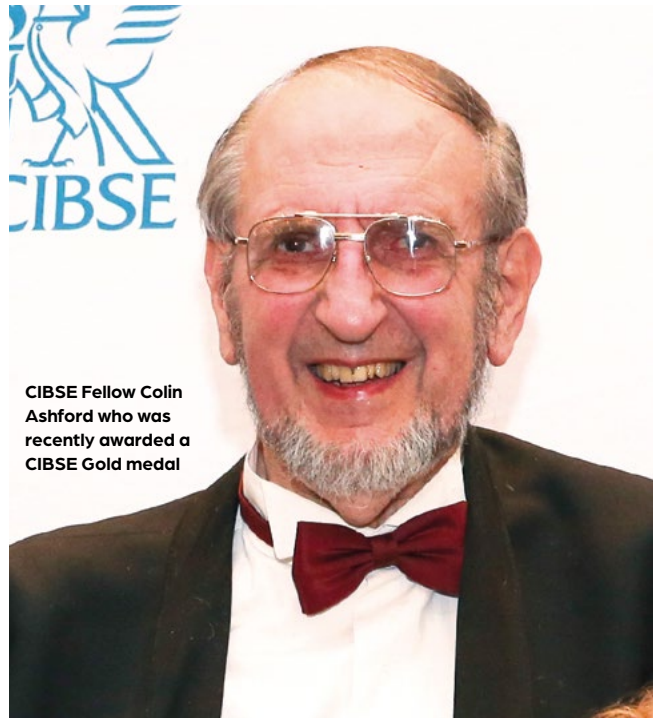
**Wright, Christopher**  
Banbury, United Kingdom

**Yiu, Tin Lun**  
Kwun Tong, Hong Kong

**Yu, Chi Pan**  
Hong Kong, Hong Kong



**CIBSE Fellow Colin Ashford who was recently awarded a CIBSE Gold medal**



## ASSOCIATE

**Agyekum, Joel**  
London, United Kingdom

**Bedi, Arjan**  
London, United Kingdom

**Boone, Samuel David**  
Colchester, United Kingdom

**Chalk, Thomas**  
Harpenden, United Kingdom

**Hadaway, Phillip**  
Southend-On-Sea, United Kingdom

**Hatfull, Joseph**  
Maidstone, United Kingdom

**Jahn Kassim, Puteri Shireen**  
Kuala Lumpur, Malaysia

**Kelly, Nicholas Daniel**  
Bicester, United Kingdom

**Medley, Lois**  
Dartford, United Kingdom

**Mone, Vincenzo**  
Melbourn, United Kingdom

**Osborne, James**  
Ware, United Kingdom

**Parr, Thomas**  
Milton Keynes, United Kingdom

**Ferry, Dale**  
Sunniside, United Kingdom

**Petken, Teddy Mark**  
Dartford, United Kingdom

**Sayers, Owen**  
Steyning, United Kingdom

**Servante, Danny Aaron Luke**  
Sevenoaks, United Kingdom

**Smith, Harrison Andrew**  
Bristol, United Kingdom

**Smith, Jessica**  
Soliuhull, United Kingdom

**Sutcliffe, William**  
Peterborough, United Kingdom

## LICENTIATE

**Akehurst, Toby Charles**  
Lane Lewes, United Kingdom

**Ali, Syed Moazzam**  
Hyderabad, India

**Allister, Jacob**  
Ilkley, United Kingdom

**Apsley, Ryan**  
Chesterfield, United Kingdom

**Atherton, James**  
Warrington, United Kingdom

**Brammer, Paul**  
Manchester, United Kingdom

**Davies, Max**  
Bristol, United Kingdom

**Dickinson, Ben**  
Manchester, United Kingdom

**Downes, Jonathan**  
Kippax, United Kingdom

**Gujar, Gaurav**  
Andheri, India

**Guttridge, Beau**  
London, United Kingdom

**Marsden, Ollie**  
London, United Kingdom

**Moore, Richard See**  
Buxton, United Kingdom

**Mtawali, Takondwa**  
Sevenoaks, United Kingdom

**Murray, Ryan**  
Rochdale, United Kingdom

**Peffer, Charlie**  
Chiddingfold, United Kingdom

**Penman, Innes**  
Glasgow, United Kingdom

**Preece, Ben**  
Rotherham, United Kingdom

**Ryder-Jones, Cameron**  
Tewkesbury, United Kingdom

**Shelley, Alexander**  
Leeds, United Kingdom

**Simpson, Daniel**  
Hull, United Kingdom

**Smallshaw, Jack**  
Manchester, United Kingdom

**Smith, Blair**  
Glasgow, United Kingdom

**Vento-Ramsden, Finlay**  
Bradford, United Kingdom

**Woodhouse, Corey**  
Ilkley, United Kingdom

**Zahid, Mohammed Subhan**  
Leeds, United Kingdom



## Freedom of London for Arnold

CIBSE President Elect Vince Arnold CEng, FCIBSE was awarded the Freedom of the City of London, in recognition of his dedication to building services engineering and the wider industry.

'I'm deeply honoured,' said Arnold. 'I believe this personal recognition also reflects the collective efforts of the entire CIBSE community in driving progress and innovation within building services engineering.'

'I am excited to continue working alongside such dedicated professionals as we shape a more sustainable future for our industry.'

## Retrofit Revisit wins award

CIBSE's groundbreaking research Retrofit Revisit: 10 Case Studies has been recognised at the Building Innovation Awards 2024, winning the Best Retrofit Innovation or Project award.

The research, co-authored by Julie Godefroy, CIBSE's head of net zero policy, and Marion Baeli, principal – sustainability transformation at 10 Design, was recognised for its innovative approach to building performance evaluation.

Supported by Innovate UK, Historic England and Studio PDP, the research investigates the long-term performance of 10 housing projects, each of which underwent deep retrofit measures more than a decade ago.

The collaboration involved a dedicated team of evaluators and a supportive steering committee.

Read about the Retrofit Revisit research at 'A model retrofit', *CIBSE Journal*, March 2024 [bit.ly/CJRetro10](https://bit.ly/CJRetro10)

## A new standard for net zero



Industry now has an opportunity to road test the pilot version of the Net Zero Carbon Buildings Standard. Mitsubishi Electric's **Graham Temple** says it will have a significant impact on building design

**T**he UK Net Zero Carbon Buildings Standard (UK NZCBS) is likely to have significant impacts on the UK built environment, driving a transition towards more sustainable and low carbon buildings.

The primary objective of the new standard is to provide a unified definition of 'net zero carbon aligned buildings' and encourage their development, by providing pathways for existing buildings to achieve net zero carbon, either through a 'one-go retrofit' or a phased 'stepped retrofit' approach.

Without a clear definition, it is difficult to design and construct a net zero building, which is why construction organisations have come together to develop an approach that will allow the industry to design, deliver and operate net zero buildings – and, more importantly, develop a robust means of verifying these buildings as net zero carbon. These industry bodies include, among others, the Carbon Trust, CIBSE, RICS, LETI, RIBA, UK GBC, and BRE.

At a recent launch event, Julie Godefroy, CIBSE's head of net zero policy, said the standard has been released in a pilot version for two main reasons: First, for feedback from the industry on the technical requirements and the evidence needed to achieve performance outcomes; and second, because work is under way to put in place the verification body and bodies, and the verification processes behind the standard.

The standard is likely to see a surge in the construction of new buildings designed and built to meet its requirements. The applicability to retrofit and refurbishment projects will also encourage the improvement of existing buildings to align with net zero carbon principles.

'We are really keen for industry to start using it,' added Godefroy, 'It will only be as good as you all make it, so please adopt it, test it, and let us know what you think.'

Find out more and join the pilot here:  
[www.nzcbldings.co.uk/pilotversion](https://www.nzcbldings.co.uk/pilotversion)

● **Graham Temple is marketing manager at Mitsubishi Electric**



# CONSULTANT FOCUS

## ON LOW-CARBON HVAC SOLUTIONS FOR PUBLIC BUILDINGS

At Mitsubishi Electric, we understand the challenges consultants face when specifying and installing low-carbon HVAC solutions in public buildings. Whether it's in the health, leisure, or education sectors, our mission is to make this process as seamless and efficient as possible.

### Expertise You Can Trust

With years of industry-leading experience, Mitsubishi Electric is your trusted partner in delivering sustainable solutions. Our dedicated team of experts is always on hand to provide tailored guidance and support, ensuring that every project meets the highest standards of efficiency and compliance.



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Please visit: [les.mitsubishielectric.co.uk](https://les.mitsubishielectric.co.uk)  
to learn more about how we can help you.



# Driving change

COP29 offered the opportunity for CIBSE to advance net zero and climate-resilient practices. **Anastasia Mylona** shares her experience in Baku, Azerbaijan, where she spoke about the importance of passive cooling in a warming world

## It was a great privilege to represent

CIBSE at COP29 this year, and to be given the opportunity to contribute to global conversations on climate change and sustainability.

I was invited to speak at the 'Sustainable cooling in a warming world' event, hosted by the UK government's Department for Energy Security and Net Zero in the Blue Zone UK Pavilion. The event was opened by Kerry McCarthy MP, parliamentary under-secretary of state (minister for climate), who took part in the discussion on advancing climate action and sustainable practices across sectors.

During my address, I highlighted that, while we continue on the trajectory to achieve our net zero and decarbonisation targets, we also need to adapt to the climate impacts we are seeing right now, and those we anticipate in the future. Even if we achieved net zero tomorrow, the climate will continue to change until at least the middle of the century, with increases in temperatures and extreme weather events.

One of the challenges for the building industry is how to meet demand for cooling in the years to come. Reducing demand by implementing passive measures needs to be a priority in building design, construction and operation.

In the UK, regulatory requirements such as Part O of the Building Regulations have already introduced the need to assess overheating in new homes. This involves applying passive solutions, such as improved natural ventilation and shading, to mitigate the risk of overheating.

New homes are assessed for current and future climates, using a methodology developed by CIBSE (TM59), based on the UK Climate Projections. This increases the resilience of homes to current conditions and the anticipated impacts of climate change.



**“Reducing demand by implementing passive measures needs to be a priority”**

When passive measures may no longer suffice to keep buildings cool, we will need to consider sustainable cooling strategies powered by green energy. Technologies and strategies that we implement now (eg, heat pumps) should be able to evolve with the changing dynamic between heating and cooling demand. Sustainable cooling strategies are essential in avoiding further increases in carbon emissions and ensuring the resilience of buildings in a warming world.

In Baku, I urged engineers, the building industry and policy-makers to align their decarbonisation efforts. I also stressed the importance of assessing the climate risks and vulnerabilities of buildings and their occupants, and how addressing these risks is critical to adapting to the unavoidable changes in the climate.

Manuel Pulgar-Vidal, global leader of climate and energy at WWF, and

Emma Pinchbeck, CEO of the Climate Change Committee, joined minister McCarthy in delivering their closing remarks. They praised the UK's leadership in tackling climate change, underlined by the government's recent commitment to cut emissions by 81%, compared with 1990 levels, by 2035.

I was also invited at COP29 to attend the Ministerial Roundtable on delivering the Global Cooling Pledge. This was launched at COP28, with more than 70 signatories committed to reducing cooling-related emissions by 68% by 2050, enhancing energy efficiency by 50% by 2030, and expanding access to sustainable cooling technologies. The roundtable addressed critical progress, gaps and next steps, including integrating cooling into Nationally Determined Contributions, improving monitoring systems, and capacity building.

Despite the cynicism and negative publicity that COP29 has received in the media, it does provide a unique opportunity for international networking and collaboration that would not be possible otherwise. Representatives from all over the world, researchers, organisations, and charities are innovating, collaborating and implementing life-changing initiatives.

My experience at COP29 highlighted CIBSE's powerful global voice in shaping the future of sustainable building practices. As a leading advocate for climate resilience and decarbonisation in the built environment, the Institution is playing a pivotal role in driving the global conversation on climate action.

Through its influence and thought leadership, CIBSE is ensuring that the voices of engineers, designers and policy-makers are heard on the world stage, empowering the built environment to adapt to the changing climate and accelerate the transition to a net zero future. ●

# SAV CPD Seminars and Service Engineer Training



SAV invites you to book a  
**CIBSE accredited CPD seminar or  
service engineer training session.**

This is a great opportunity to learn something new, refresh existing knowledge, improve skills, or simply keep up-to-date with the latest developments within our industry.



**FIND OUT MORE**

## **CIBSE Accredited CPD Seminars**

- An Introduction to 4G Heat Networks
- Designing with Large Delta T Heat Pumps
- Lean System Design (LSD) for Schools and Commercial Buildings
- Achieving Passivhaus & BB101 Standards for School Ventilation
- Meeting BB101 (2018) with Smart Mechanical Ventilation
- Getting Regulation Ready – Heat Network Metering Strategy

## **Training Sessions**

- SAV Advanced Service Engineer Training

# Embodying best practice

The quality of submissions for the 2025 CIBSE Building Performance Awards is higher than ever. **Alex Smith** looks at the entries – including for the new Leadership and Client of the Year categories – and picks out this year's trends

**T**he shortlists for the CIBSE Building Performance Awards have been revealed, and Savills is leading the way with eight nominations. As well as making the cut in the Engineer of the Year and Leadership categories, it picked up nominations for facilities management, learning and development, air quality product or innovation, portfolio workplace and best digital innovation in both organisational strategy and project delivery. Other multiple nominees hoping to win big at the ceremony on 27 February, at the Park Plaza Westminster Bridge, include Max Fordham, British Land, Hoare Lea, Aecom and AtkinsRéalis.

There are two new categories for the 2025 awards – Client of the Year and Leadership – and three categories for workplaces: new build, portfolio and retrofit.

Client of the Year recognises those who have demonstrated leadership in driving whole life building performance, and acknowledges those who have prioritised energy efficiency, user satisfaction, carbon reduction, and value across projects.

The judges were impressed by the shortlisted organisations' level of commitment to reducing carbon emissions and remarked on the diverse range of finalists, ranging from local authorities to developers.



The Leadership Award celebrates individuals, organisations or initiatives that have shown exceptional leadership on climate action. Good leadership among the nominees tended to focus on influencing and leading the wider sector, rather than internal teams, said the judges.

The quality of entries for the Embodied Carbon Award – Products and Systems: for Manufacturers and Suppliers also impressed the judges, who said it showed manufacturers are taking embodied carbon seriously and investing resources in assessing and reducing it. Consultants were also commended in the Embodied Carbon Award for services and projects. The judges said consultancies are 'doing a

lot of great work to improve their understanding of the processes required to assess and reduce embodied energy in their projects'.

In the Project of the Year workplace categories, the judges were impressed by the quality of entries and the high number of retrofit submissions. They were encouraged to see upfront carbon being considered more seriously in the Residential Project of the Year, and said submissions were pushing boundaries.

In the Product or Innovation thermal comfort category, there was a better spread this year of quality entries and new technologies demonstrating innovation. Adaptation to climate change was a common theme, and the judges also observed a move away from refrigerant-based cooling to more natural means of temperature control.

The Wellbeing category judges were pleased to see solutions primarily targeting retrofits, while, in the facilities management category, there was a consistently good selection of entries, which made the scoring close. ●

See page 20 for the shortlists. To book a table at the awards, visit [www.cibse.org/bpa](http://www.cibse.org/bpa)

## Consultancy of the Year shortlists

**The three Consultancy of the Year categories are always fiercely contested, and this year is no exception. Judges said the quality of entries in the less than 50 employees section indicated how competitive the market was, with companies showing strong client relationships.**

**In the 50–300 employee category, they noted that the best-scoring section among entries was on staff development and diversity, inclusion and equality, reflecting positively on the sector's progress on retention and training, and on recruiting engineers from diverse backgrounds.**

**In the more than 300 employees category, judges said the excellent innovations and approaches deserved a wide audience.**

# CIBSE BUILDING PERFORMANCE AWARDS 2025

Join us for the Awards Celebration on **Thursday 27 February 2025**  
at **Park Plaza Westminster Bridge, London**

## **BEST DIGITAL INNOVATION - ORGANISATIONAL STRATEGY**

- Building Performance Dashboard - Buro Happold
- Cyclops - Foster + Partners
- Digital Daisy Chain - AtkinsRéalis
- Origin - Hoare Lea
- Paper to Digital Data - Central London Operations & UK Engineering

## **BEST DIGITAL INNOVATION - PROJECT DELIVERY**

- Biome - Hoare Lea
- Collaboration: The Key to Unlocking the Value of Digitisation - AstraZeneca
- IES Live - IES
- Paper Trails to Digital Triumphs - Savills
- PHabric - QODA Consulting
- SimQIT - Simulation Quality and Insights Tracker - Atelier Ten
- Sydney Airport International Terminal T1 Chilled Water Plant Optimisation - A.G. Coombs Group, Exergenics

## **BUILDING PERFORMANCE CONSULTANCY (UP TO 50 EMPLOYEES)**

*Sponsor: Mitsubishi Electric*

- Cyclone Energy Group
- grfn
- Horizon M&E Services Design
- Q Sustain
- RCDC
- S I Sealy & Associates
- SRE
- Sustainable Construction Services

## **BUILDING PERFORMANCE CONSULTANCY (51 - 300 EMPLOYEES)**

*Sponsor: Airflow*

- Harley Haddow
- L&P Group
- Max Fordham
- Whitecode Consultancy
- XCO2

## **BUILDING PERFORMANCE CONSULTANCY (OVER 300 EMPLOYEES)**

*Sponsor: ABB*

- AtkinsRéalis
- Buro Happold
- Hoare Lea

## **CIBSE EMBODIED CARBON AWARD - PRODUCTS AND SYSTEMS: FOR MANUFACTURERS AND SUPPLIERS**

- Apollo Fire Detectors
- Artus Air
- Mitsubishi Electric

## **CIBSE EMBODIED CARBON AWARD - SERVICES AND PROJECTS: FOR CONSULTANTS**

*Sponsor: CMR*

- AECOM
- Amazon
- Buro Happold
- Q Sustain

## **CLIENT OF THE YEAR**

- Co-operative Group
- Derwent London
- Legal and General Investment Management
- London Borough of Islington

## **COLLABORATION**

- 20 Fenchurch St Building Performance Optimisation - AECOM
- LGIM's Symphony Model - Legal & General Investment Management
- Tower 42 - L&P Group
- Unifying Innovation: Cutting Office Energy Use Through Collaboration - Weil, Gotshal & Manges, London

## **ENGINEER OF THE YEAR**

*Sponsor: Ideal Heating Commercial*

- Harry Sharples, Principal Building Performance Engineer - AECOM
- Nabil Cook, Technical Director - OMEGA Solutions
- Netza Jack, Head of Building Performance & Environment - Man Group
- Steve Hilton, Regional Engineering Manager - Savills
- Volkan Doda, Head of Design Technologies - Atelier Ten

#BPA2025  
#BPAShortlist  
#CIBSEShortlist

Sponsors



Congratulations to our

# SHORTLIST

## FACILITIES MANAGEMENT

*Sponsor: Gratte Brothers Group*

- 20 Fenchurch Street - Savills
- Department for Work and Pensions - Mitie
- MoD, Permanent Joint Operations Base, Infrastructure Support Provider, Ascension Island - Mitie Defence International
- Portfolio managed by Helix, a Hines Company - Demand Logic
- Savills Portfolio - Smart Managed Solutions
- Workspace Group Portfolio - Workspace Group

## LEADERSHIP

- Andy Jackson, Head of Central London Operations & UK Engineering - Savills
- AtkinsRéalis
- Energy Systems Catapult
- Kuram Gwakyaa, Head of Sustainability - Mitie
- re:sustain
- Skidmore, Owings & Merrill
- Swire Properties

## LEARNING AND DEVELOPMENT

- Building a Sustainable Future: Leadership Training for Environmental Excellence - Webuild SpA
- Building Safety Act - Training and Assessment - Hoare Lea
- From Prison to Property - Savills
- The ZERO Internship Programme - University of Oxford

## PRODUCT OR INNOVATION OF THE YEAR - AIR QUALITY

- Acuity Central Connectivity System - Monodraught
- Data Led Air Handling Control - Savills
- Sensedge Mini Indoor Air Quality Monitor - Kaiterra
- The Pluvo Column - Pluvo
- Vent-Axia Lo-Carbon Sentinel Econiq - Vent-Axia

## PRODUCT OR INNOVATION OF THE YEAR - THERMAL COMFORT

- AR75 - Artus Air
- Heat3D - Rapid in-situ measurement of U-values - Build Test Solutions
- In Ground retrofit under floorheating - JK floorheating
- Mixergy iHP X integrated heat pump cylinder - Mixergy
- NIBE S735 Exhaust Air Heat Pump - NIBE
- Optimum Air Conditioning System - EcoTechX
- Passive Cooling Double-skin Roof - Universidad de Sevilla
- Zehnder ComfoAir Q600 with ComfoClime - Zehnder Group UK

## PRODUCT OR INNOVATION OF THE YEAR - WELLBEING

- Nature Connect - Signify
- Zehnder ComfoAir Q with ComfoClime - Zehnder Group UK

## PROJECT OF THE YEAR - RESIDENTIAL

*Sponsor: Crane Fluid Systems*

- Agar Grove 1b - Max Fordham
- Brambles - Bere Architects
- Lucy Cavendish College: Student Accommodation - Max Fordham

## PROJECT OF THE YEAR - RETROFIT WORKPLACES

*Sponsor: Crane Fluid Systems*

- Reading International Business Park - Twin & Earth
- The Burrell Collection - Atelier Ten
- The Entopia Building - Max Fordham, Architype & BDP
- Tower 42 - L&P Group
- Tower Hamlets Town Hall - Atelier Ten

## PROJECT OF THE YEAR - NEW BUILD WORKPLACES

*Sponsor: Crane Fluid Systems*

- 150 Holborn - Introba
- Globe Point, Temple - Hoare Lea
- n2 - AECOM
- Woodcote Grove Redevelopment - AtkinsRéalis

## PROJECT OF THE YEAR - PORTFOLIO WORKPLACE

*Sponsor: Crane Fluid Systems*

- Aldar Energy Retrofit Project - grfn
- Cathedral Hill Industrial Estate, 13 units - SRE
- Savills & SentinlI Decarbonisation Project - Savills

# Microbubbles, dirt and magnetite

## Protecting your HVAC system from hidden contaminants

**H**VAC system performance is often compromised by invisible contaminants such as dirt and air, which can reduce efficiency, raise maintenance costs, and damage critical components. Addressing these issues is essential for HVAC designers and engineers focused on optimising system reliability. While traditional solutions, such as strainers and filters, are available, they often have limitations. Here's how the advanced Zeparo Cyclone Max offers a more effective alternative.

### Common solutions and their pitfalls

**1. Strainers** - Though effective at capturing dirt particles, strainers clog over time, raising differential pressure and pumping costs. Regular maintenance can alleviate this, but not prevent it entirely, creating financial and operational burdens.

**2. Bypass filters and sedimentation separators** - These systems treat only a portion of the system's flow, leaving other parts vulnerable to particle buildup. Sedimentation can damage essential components and necessitate costly, time-consuming repairs.

### Consequences of contamination

These limitations lead to increased maintenance, downtime, and potentially expensive component

replacements. Dirt accumulation and clogging contribute to generator fouling, higher pump head requirements, and blockages in heat exchangers and pumps. Additionally, trapped air in water lowers heat transfer and accelerates corrosion, further impairing efficiency.

### A solution built on cyclonic technology

The Zeparo Cyclone Max is engineered specifically to tackle these challenges. Its cyclonic working principle achieves up to 95% dirt separation in a single cycle, regardless of water flow speed. Most HVAC systems run below 50% capacity for about 80% of the year, making Zeparo's high-efficiency separation particularly beneficial. This feature can result in energy savings of 3-7% by the third year after installation.

While gravitational separators are effective at low speeds, they lose efficiency as system speed rises. The Zeparo Cyclone Max, equipped with a powerful magnet for small, lightweight magnetite particles, maintains effective dirt separation across all speeds, distinguishing it from other solutions.

### Comprehensive air removal with Zeparo Aero

The Zeparo Aero complements the Cyclone Max by removing micro and macro air bubbles, reducing corrosion and limiting particle release. Together,

they provide comprehensive system protection, safeguarding essential HVAC components.

### How cyclonic technology works

Cyclonic technology uses centrifugal and gravitational forces to create a vortex that drives particles outward for capture. A strong magnet attracts even tiny particles, holding them in a separator chamber, where they are contained by a separation plate. This process achieves efficient dirt removal and ensures system reliability with minimal maintenance.

### Easy installation and broad compatibility

The Zeparo Cyclone Max's compact 1:1 width makes retrofitting straightforward, with horizontal and vertical installation options. Its lightweight metal body, designed to withstand temperatures up to 110°C, makes it versatile enough to protect various HVAC components in settings such as data centres and district heating systems.

### Reliable and proven performance

The Zeparo Cyclone Max and Zeparo Aero are rigorously tested solutions with proven reliability across global applications. With advanced air and dirt separation, significant energy savings, and compatibility across HVAC systems, Zeparo sets a new standard in reliability and efficiency.



● Explore the *Air & Dirt Handbook*, a comprehensive resource offering deep insights into pressurisation and water quality



# Alive to opportunities

The two days of CIBSE Build2Perform Live showed that designing and maintaining sustainable buildings not only benefits the environment, but also has a significant positive impact on people's lives, reports **Alex Smith**

**T**he CIBSE Build2Perform Live conference and exhibition brought together engineers, academics and policy-makers to discuss the big issues affecting building services performance. Over two days at ExCeL London, more than 1,700 delegates heard from 125 speakers on topics such as the Building Safety Act, embodied carbon, and decarbonisation of heat.

Dedicated theatres for lighting and facilities management (FM) reflected their importance in improving building performance, and there was a wide range of live CPD sessions.

CIBSE President Elect Vince Arnold opened the event by telling engineers they had a 'unique opportunity to shape not only buildings, but also the communities and urban environments in which they exist'. He drew attention to CIBSE's contribution to the UK Net Zero Carbon Buildings Standard (UK NZCBS), and its responses to the challenges around competency posed by the Building Safety Act.

'As we navigate the complexities of this new regulatory landscape, it is essential that we commit ourselves to upholding the highest safety standards in our work,' said Arnold, who described how CIBSE's new Building Services Fire Safety Working Group would 'shape internal resources and be an invaluable point of contact for inquiries and concerns'.

The session on the UK NZCBS was standing room only. Delegates heard about the pilot, which will road test the standard on real buildings. UK NZCBS outlines performance and energy and carbon limits to reduce operational and embodied carbon to align with the UK's climate goals. CIBSE's head of net zero policy, Julie Godefroy, said: 'We don't just sit and wait. The energy limits facilitate decarbonisation of the Grid by 2035, if not earlier.'

The speakers emphasised the importance of getting more projects into the pilot testing scheme. 'The more data we have, the more reliable we can be in terms of how we set a trajectory to reach our target,' said Julia Skeete, senior associate principal at SOM.

In a session on embodied carbon and TM65, Amazon sustainability engineer Andrew Rhodes MCIBSE said embodied carbon was a key focus for the online services giant, as it represents a



**Claire Brierley speaks about minimising embodied carbon in refrigerants**

large proportion of its carbon footprint. Amazon was heavily involved in CIBSE TM65.3 guidance for logistics centres, as well as the North American version, TM65NA. Rhodes said it is now working with supermarkets and CIBSE on a new version of TM65 for grocery stores, telling the audience, 'we can't do this by ourselves'.

Yara Machnouk MCIBSE, associate at Introba Consulting, said mechanical, electrical and plumbing (MEP) represented 40% of carbon over the lifetime of a building, in part because of the high replacement rate of MEP equipment.

## **Embodied carbon and cooling**

Claire Brierley, sustainability consultant at Hoare Lea, spoke about refrigerants and their three big influencing factors on embodied carbon: refrigerant type, leakage rate, and volume of charge. She said lower global warming potential (GWP) refrigerant systems, such as R32 and R513a, were performing better than high-GWP refrigerants, but ultra-low alternatives were 'struggling a bit on efficiency'. However, as the Grid decarbonised, the refrigerants' whole life impacts would be lower, added Brierley, because operational efficiencies would have less impact.

David Stevens FCIBSE, director of estates, facilities and capital development, at East London NHS Foundation Trust, and CIBSE vice-president, kicked off day two at Maintain2Perform, with a focus on promoting operational aspects of the built environment.

'Compliance alone won't ensure safety or performance,' he said. 'We need to shift our mindset to truly future-proof our buildings.' He highlighted the rapid pace of change driven by climate imperatives and emerging technologies, particularly AI.

A panel discussion with the CIBSE FM Group brought together James Campbell, partner at Troup Bywaters + Anders, Bernard Crouch, director at AcumenFM, and Natalie Atherton MCIBSE, asset life-cycle manager at AstraZeneca. Atherton emphasised the importance of forward-thinking leadership: 'We must use data to anticipate future needs.' Crouch agreed, citing recent environmental challenges. 'The floods in Spain showed us what happens when we don't consider future scenarios,' he said.

Campbell spoke on flexibility. 'By 2050, 80% of buildings will already exist. We must adapt spaces for new uses, focusing on systems-level performance,' he said, adding that the role of nature should be considered in buildings.

In a debate on the role of engineers in a tech-driven world, Mike Darby, co-founder and CEO at Demand Logic, said technology was removing mundane tasks and allowing engineers to focus on problem-solving – but they still need a deep understanding of systems. 'A BMS can't operate optimally if it's signed off incorrectly or misinformed,' Darby added.

Lewis Locke, head of AndOr Systems, also believes AI offers opportunities. 'With IoT [internet of things] and analytics, engineers can achieve what was impossible manually. Tech enhances efficiency – it doesn't replace us,' he said.

Twenty One Engineering MD Phil Draper FCIBSE raised concerns about inadequate training, saying 'many on site lack the necessary skills to maintain complex systems effectively'.

A seminar on engineering education, chaired by CIBSE Journal technical editor Tim Dwyer FCIBSE, was organised by members of the newly

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## Compliance alone won't ensure safety or performance. We need to... truly future-proof our buildings

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established CIBSE Education Guild. Dejan Mumovic FCIBSE, chair of the guild and director of the UCL Institute for Environmental Design and Engineering, emphasised the influence of engineers across a building's life-cycle, and underscored the critical role of undergraduate education in equipping future professionals with the skills needed for this.

Dr Yangang Xing, from Nottingham Trent University, discussed his experience with a Royal Academy of Engineering-funded project focused on mapping energy for urban zero carbon transitions. His hands-on approach to urban sustainability not only helps students gain practical skills with digital tools, but also builds their confidence with complex scientific concepts.

The final presentation was by Philip Griffiths, chair in building physics, and PhD researcher Moses Itanola, from Ulster University, on the environmental impacts of energy use, resource demand, and waste in the building sector.

Several speakers reminded delegates of the human cost of poor buildings. Kate de Selincourt, Passivhaus Trust health and wellbeing associate, said a substantial proportion of homes do not have adequate heating because people can't afford to turn it on. Passivhaus design provides much better insulation and airtightness, De Selincourt added, reducing heating costs dramatically and offering greater resilience against cold temperatures. She shared a study that compared the temperature decay in January between a Passivhaus and standard home. After five days, the Passivhaus home was 16°C, while the standard home was 8°C (with a 4°C average outdoor temperature).

In a retrofit session, ECD Architects' head of sustainability and associate director, Loreana Padron, shared details of a retrofit project for Cambridge City Council, involving 46 1930s semi-detached and terraced houses, and a block of flats. The fabric-first project follows EnerPHit principles, and homes will have external wall insulation, triple-glazed windows and improved airtightness. Heat pumps will replace gas boilers, and PVs and MVHR are being installed.

As people had cheaper bills, they were more likely to turn on their heating and live in warm, healthy homes, Padron said: 'We aim to take a lot of people out of fuel poverty,' she added. ●

A 'silent seminar' at one of the vision theatres





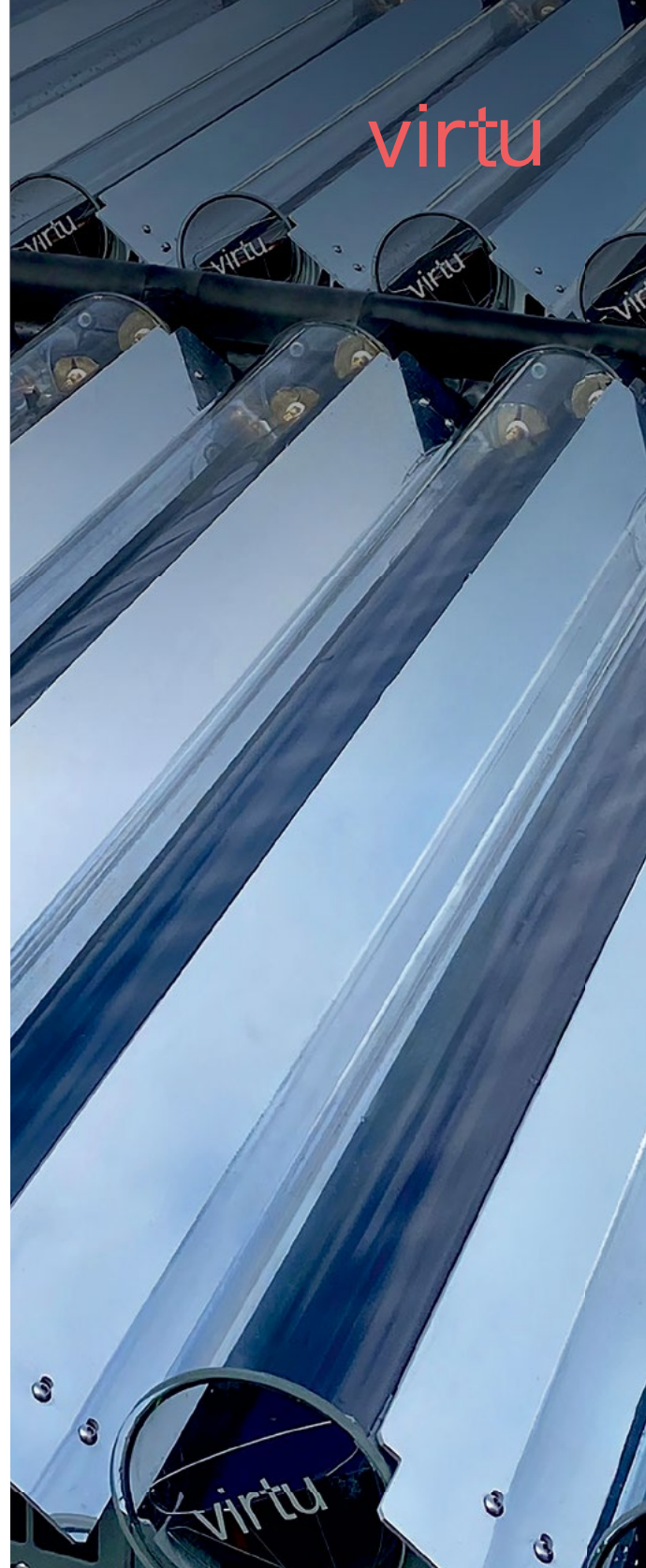
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# Renewing tradition

Grade I-listed King's College Chapel, in Cambridge, is one of the UK's most revered buildings, so a new photovoltaic array on the roof had to be designed with utmost sensitivity. **Alex Smith** finds out how Max Fordham's design satisfied the planners

**E**very Christmas Eve, millions of people switch on their televisions to watch the traditional carol service from King's College Chapel, Cambridge, one of the UK's most revered buildings. Completed in 1515, the Grade I-listed chapel is a prime example of late Perpendicular Gothic architecture and is the University of Cambridge's most iconic landmark.

Eyebrows were raised, therefore, when the College proposed installing photovoltaic (PV) panels on the 509-year old chapel roof, as part of its plan to decarbonise operations by 2038. The proposal met with protests from conservation groups; Historic England stated that the panels would 'damage the architectural character and interest' of the building<sup>1</sup>, and it was concerned that the reflective quality of the panels would be different in appearance from the existing lead.

Despite such objections, King's College was keen to press ahead: the 1950s lead roof needed replacing and the chapel offered large potential for renewable energy. Max Fordham and Caroe Architects were given the responsibility for devising a solution that would not harm the significance of the chapel.

## Project team

**Client:**  
King's College, Cambridge  
**Architect:**  
Caroe Architects  
**MEP consultant:**  
Max Fordham  
**Structural engineer:**  
JM Structural Consultants  
**Main contractor:**  
Barnes Construction  
**Mechanical contractor:**  
Munro Building Services  
**PV specialist contractor:**  
Photon Energy

There were four aesthetic challenges: hiding the panels from prominent viewpoints; minimising reflections from the sun; overcoming undulations on the roof; and accounting for the impact of thermal expansion. In addition, the system had to be fully demountable.

Through a combination of engineering ingenuity and detailed modelling, Max Fordham came up with a solution that satisfied the planners and allayed conservationists' concerns. In total, 483 REC Alpha 420 Pure-R panels were installed, producing about 123,000kWh per year that is fed into an onsite electricity supply.

To assess the visibility of the PVs from the ground, Max Fordham's MEP engineer director, Phil Armitage, walked around Cambridge to ascertain from where the roof could be seen. 'The pitch of the roof is quite shallow and, from ground level, you hardly ever see the ridge above the beautifully detailed stone parapet. The chapel design emphasises this parapet, not the boring, ordinary lead roof behind it,' he says.

While largely hidden from the ground, there were sight lines from prominent locations, particularly from King's Parade, near the Corpus

Clock, and the college quadrangle. This meant Max Fordham was limited in how far the PVs could extend up the slope of the roof.

This limitation threatened to reduce the number of panels by a third, because it meant only two rows of panels could be installed on each slope – the third row would have been visible above the ridge from the ground. The answer, says Armitage, was to lower the profile of the PVs so they could be positioned higher up the roof slope, enabling three rows to be installed. A top-hat section, bolted to the supporting rail, enabled the PVs to be lowered by 100mm – the rail supporting the PV is positioned on the L of the top hat (see Figure 1). The lower profile meant the top edge of the array could be 670mm further up the slope, allowing a third row of PVs to be installed, which could not be seen from the Corpus Clock.

Each 1118 x 1730mm panel is clamped to an independent aluminium frame system supported on metal posts that sit on baseplates anchored to timber boards. Lead upstands and caps waterproof the posts. The fixings are designed to ensure the PVs can withstand wind uplift, which is caused by winds flowing across the exposed upper surface faster than across the lower surface, creating a pressure differential and resulting in lift.

To assess the risk of the sun reflecting off panels, a study based on a sun-path diagram looked at where and when the reflection would be visible. The conclusion was that there are only a few times in the year when you would see reflections from Trinity Street and Garret Hostel Lane Bridge, which planners deemed acceptable.

Thermal expansion also had to be accounted for. If the rails supporting the PVs ran the length of the roof without interruption, there would have to be 200mm spacings at 15m intervals between the panels to allow expansion; being visible from the ground, this would not have been acceptable. The solution was to divide the rails into 15m bays, which reduced thermal expansion and meant the gap between bays was only 50mm. 'It sounds like a tiny detail, but it's a significant part of the design development,' says Armitage.



The shallow 25° angle of the roof pitch meant that the north and south slopes were suitable for PVs

The design also had to take into account the undulations in the roof. Photon Energy, the specialist contractor, adjusted the height of the fixings by changing the depth of the packing between the posts and the top-hat section. This ensured a smooth, even surface across the length of the installation. The posts are designed to be removable, leaving no trace but for a lead square welded in to cover the gap. 'This is about a moment in time in a building that has a very long life', says Armitage. 'The appropriateness and relevance of PV will change, so you have to think about what happens if they need to be removed.'

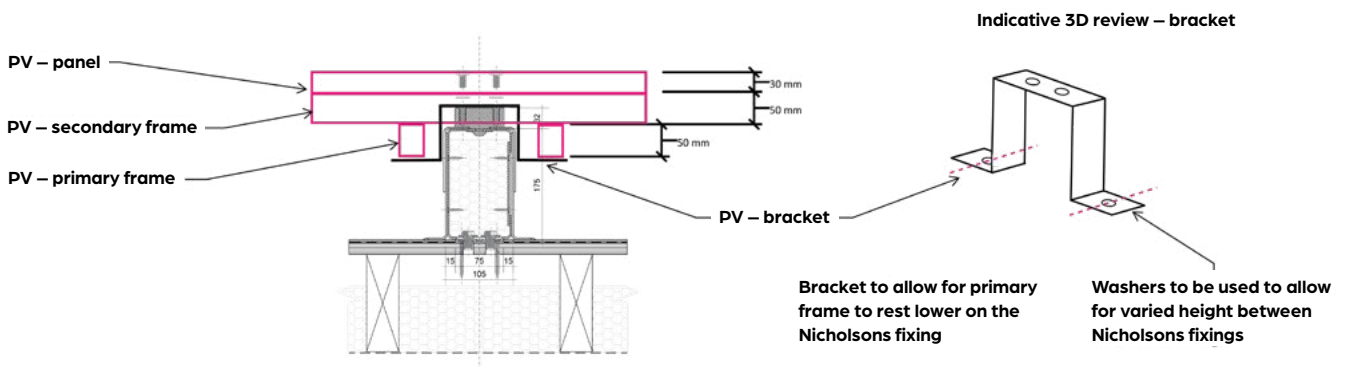
The PVs are supplying electricity to the College site after a new connection was made to the main college's electricity supply, via an adjacent building, earlier this year. Armitage believes the project's success shows the potential for solar panels on other historic sites, including York Minster, where PVs are now being installed.

'Where PVs can be installed in a sensitive way that does not alter the enjoyment of a building, they are an entirely appropriate response to the climate issues faced by society,' he says. ●

**References:**

<sup>1</sup>Letter to the Diocese of Ely from Historic England, October 2022. [bit.ly/CJHEKCC](https://bit.ly/CJHEKCC)

Figure 1: The top-hat bracket positioned over the rail lowered the profile of the PV system by 100mm





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Lighting

## Light and dark

A return to pre-LED design principles is creating more sensitive lighting installations





## Silver Jubilee Bridge, Runcorn

Arup won a Platinum Build Back Better award for its illumination of the Silver Jubilee Bridge, which crosses the River Mersey between Runcorn and Widnes.

The lighting design aimed to reflect the bridge's history, structural form and details, honour its builders, reduce

obtrusive light, and emphasise the structure against the modern Mersey Gateway Bridge upstream.

While the old design flooded the bridge with cold white light, Arup's illumination minimises obtrusive light and its negative impact on biodiversity

and the nocturnal environment. The design illuminates the lower and upper chords of the arch with a concealed projector.

Low-powered luminaires within the structure reveal the fine detail of the 61-year-old bridge.

# Hello darkness, my old friend

How three award winners used discreet lighting to highlight heritage structures

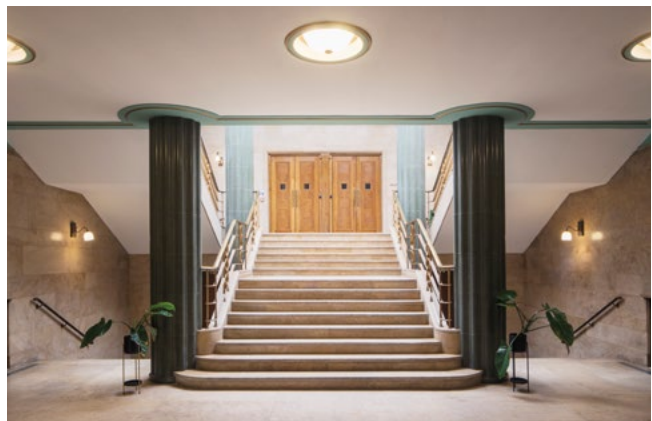


## Saint Patrick's Church, County Mayo, Ireland

The illumination of Saint Patrick's Church by Dark Source won a Build Back Better Platinum and Green award.

The church had been fully illuminated, but a dark-sky approach resulted in lighting being used sparingly to draw attention to the church's architectural features: The vertical nature of the front façade windows and stained glasswork is emphasised by backlighting, which contrasts with horizontal illuminations elsewhere. The judicious use of LED lighting has resulted in a 40% reduction in light pollution.

The grounds have also been illuminated, making the church a welcoming destination at night.



## Bromley Town Hall, London

An artificial skylight linked to daylight sensors is the central feature of the refurbishment of Bromley Town Hall, which won a Build Back Better Gold award.

Working with architect Cartwright Pickard and Fusion Interiors Group, lighting designer Nulty drew attention to original details of the 1907 building, and luminaires were either refurbished or faithfully reproduced. The skylight was installed in a 1930s extension, where none of the original fittings had survived.

Emergency lighting was hidden among original features and the basement has wall-mounted linear lighting that brings warmth to its raw brick and concrete aesthetic.



# Lightening impacts

**T**he lighting industry is undergoing a transformative shift towards circularity, sustainability and repair, signalling its commitment to reducing environmental impact. This change focuses on holistic design approaches that prioritise the needs of people and spaces, as well as the environment.

This was a key focus of November's Light2Perform event at CIBSE Build2Perform, where industry leaders gathered to discuss the future of lighting. Central to the discussion was TM66, a tool that is driving sustainable practices by addressing embodied carbon and supporting circular economy principles (page 40).

SLL president Dan Lister joined a panel of experts at Light2Perform for a debate on rethinking sustainability (page 34). He championed a 'less is more' approach, advocating for careful design that aligns lighting with the needs of specific spaces and users. As Lister explained in an interview with the *CIBSE Journal*, his presidency has prioritised reducing embodied carbon while promoting a broader view of sustainability to include facilities management teams and support services (page 32).

The importance of integrating these principles was demonstrated by Whitecroft Lighting, which won the CIBSE Embodied Carbon Award earlier this year. By adopting lean manufacturing and design, Whitecroft has successfully reduced the life-cycle carbon of its products by up to 46% (page 38).

Meanwhile, the Build Back Better Awards showcased inspiring projects that are pushing the boundaries of what thoughtful lighting can achieve. These projects (page 30) prove that innovation and environmental responsibility go hand in hand. ●

● **Molly Tooher-Rudd, reporter**

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SLL president **Dan Lister** on how lighting designers should aim to create people-orientated spaces while minimising embodied and operational carbon

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CIBSE Embodied Carbon Award winner Whitecroft cut life-cycle carbon from its products by 46%. The firm's **Tim Bowes** tells **Molly Tooher-Rudd** how they did it

### 40 Treading a circular path

An expert panel at Light2Perform discussed opportunities and challenges of circularity and repair

# Sustainable CPDs

Tamlite Lighting is committed to equipping professionals with the knowledge to achieve sustainable and compliant lighting practices through its CIBSE-accredited CPD courses. Tailored to architects, engineers and lighting consultants, these address the latest standards, trends and regulations, helping participants to make informed decisions that drive positive change. Our most popular CPDs include:

**Regaining dark skies:** This explores the principles of Dark Sky compliance for responsible outdoor lighting design, to minimise light pollution. Learn how to reduce unnecessary upward light spill, helping to preserve natural nightscapes while balancing functional lighting needs.

**Towards a circular economy for luminaires:** Focusing on the circular economy's impact on lighting, this CPD highlights sustainable practices, such as remanufacturing and recycling. Attendees gain insights into extending product life, reducing waste, and enhancing sustainability in lighting design.

**Common pitfalls with emergency lighting compliance:** Designed to address the latest safety standards, this CPD covers best practices for emergency lighting, focused on compliance, safe evacuation and reliable design. Professionals gain the foundational knowledge needed to meet safety regulations and protect building occupants effectively. ●



**Debbie-Sue Farrell, head of wellbeing and marketing manager at Tamlite Lighting**

# Doing more with less

Lighting design should prioritise people-orientated lighting solutions while reducing embodied and operational carbon, according to SLL president **Dan Lister**, who tells **Molly Tooher-Rudd** that lighters should learn lessons from the past, when high costs meant luminaires were used sparingly

**L**ighting professionals must go beyond the bare minimum to deliver sustainable outcomes for end users, says Dan Lister, president of the Society of Light and Lighting (SLL), as well as Arup director and UK lighting practice leader.

During his presidential address in May, Lister told the audience that the industry 'had a moral responsibility to provide the best possible solutions within given constraints.'

He said lighting engineers had to do more with less, and reducing carbon in lighting was at the forefront of the decarbonisation challenge for buildings.

Other critical issues facing the industry, he added, are emerging technology, changing regulations, and the role of artificial intelligence.

In his address, Lister issued a call to action for colleagues and SSL members to consider not just the calculable aspects of light – such as energy, embodied carbon, light spill



and cost – but also the less tangible aspects, such as quality, perception, experience, visual comfort, and occupant comfort. He also told members to think about the needs of different parts of society.

Lister has seen the lighting industry evolve rapidly over the years, particularly with the advent of LED technology. 'LEDs became prominent

in the mid-2000s and quickly transformed the field,' he explains.

Reflecting on this transition, he points out that lighting was used sparingly, historically, 'because it was expensive to run and difficult to maintain'. With LEDs, however, designers gained the freedom to incorporate more light sources without the prohibitive costs.

This newfound flexibility presents fresh challenges, such as overlighting and greater risk of introducing glare, says Lister, and industry is now having to look more closely at the balance between energy use and comfort.

He emphasises the importance of understanding these shifts. 'We have early careers and young designers who have never known anything else but LEDs, and it can be hard to appreciate the challenges and limitations of older lighting methods.'

Understanding the evolution of lighting technology can lead to a more mindful approach to design, Lister adds, bringing the focus back to the occupiers of the space. He believes today's lighting choices should be informed by past lessons learned.

'One of the things we're looking to do early next year is provide something to help early-career professionals understand older technology – to identify the pros and cons of what came before,' he says.

## New guide on creative lighting

'I think we are missing the human aspect (beyond inclusive design) – If we are not lighting for the needs of people, why are we lighting it at all?' Lister says. Part of this is understanding how good design can become great design, being far more than just functional – but creating atmosphere and supporting the experience of the individual.

This is where the upcoming creative lighting guide will be invaluable. It delves into the essential role of light in architecture; considering how light, both natural and artificial, transcends its functional purpose, becoming a crucial element in design.

This guide addresses the architectural lighting design process,

## Seeing the light: Lister's career path

**Dan Lister's journey into the lighting industry was not something he anticipated, but rather something he 'kind of fell into'.**

**With a background in electronic engineering, his initial exposure to lighting came during a placement with Arup in his second year of university, when he was introduced to the world of building services.**

**This experience gave him a new perspective on lighting and showed him it could transform spaces and people's experiences of them. He was particularly drawn to how lighting design blends science and art.**

**'I was fascinated by the way that**

**engineering intersects with people – the artistry combined with numbers contribute to how you experience a space,' says Lister.**

**This introduction to the field sparked a lifelong passion, leading to him pursuing a Master's degree in light and lighting at University College London, a programme he describes as the foundation of his career.**

**Since then, Lister has worked on a vast array of projects, ranging from public infrastructure and environmental conservation to international museums and residential spaces.**



offering creative and practical guidance suitable for any project. It aims to complement existing standards bodies such as the SLL and the BSI, focusing on our role as designers to, where appropriate, challenge these standards to support innovative design.

The guide seeks to enhance the quality of lighting design across the built environment. It acknowledges the significant changes in the lighting industry, such as the advent of LEDs and the push for sustainable, inclusive, and health-conscious designs.

The guide is not a one-size-fits-all solution, but offers detailed considerations for various project stages, helping designers navigate the complexities of the modern and evolving landscape of lighting design.

### **Inclusive design**

Lister also spoke during his presidential address about the need for inclusivity in lighting design, particularly for visually impaired and neurodiverse individuals.

'We need to create better user experiences,' he asserts. 'If we aren't lighting for people, then we're missing the mark.'

By considering the needs of diverse populations, Lister believes lighting designers can create spaces that are not only visually appealing, but also accessible and comfortable for everyone.

'Lighting has a role in adding social value,' Lister says. 'The more we can do to draw interest and bring value to society, the better.'



**Integrated daylight: 'Driven Voids' at the Reid Building at the Glasgow School of Art**

### **Naturally lit**

On the environmental front, Lister is increasingly aware of how lighting affects biodiversity and natural habitats. In an ideal world, he believes lighters should aim for zero environmental impact and avoid lighting entirely.

Safety and practicality require a balanced approach, he says, where light levels and spectral properties are carefully managed to minimise ecological disturbance.

'Technology has shown us different ways to achieve this balance, from dynamic controls that dim or turn off lighting at night to colour temperatures that minimise impacts on plants and nocturnal animals. It's all about context,' he explains, stressing

that a 'race to zero' should always be tempered by practical considerations.

Looking to the future, Lister is focused on how the industry can continue to evolve sustainably while also maintaining high design standards. He is involved in the development of industry standards, including TM65.2 and TM66, which provide frameworks for measuring and reducing embodied carbon.

Lister is encouraged by the alignment of manufacturers, designers, and standards bodies in pushing for sustainability: 'The market will drive itself once everyone is aligned.'

For young engineers entering the field, Lister's advice is to stay curious and open-minded. 'Embrace everything,' he says. 'Don't approach it purely as an engineer.'

At Arup, he works with a diverse team, half of whom don't have engineering degrees. He believes this variety of backgrounds strengthens the field, blending science and art in unique ways.

Lister encourages newcomers to understand the basics and fundamentals of lighting, but to also think independently and creatively.

'To be truly great, you need to adopt the guidance but think for yourself,' he advises. For him, lighting design is about more than just numbers; it's about connecting with people and creating meaningful experiences. ●



**Forgotten space: Lighting used to rejuvenate a sense of place at the University of Sheffield Concourse**

# Treading a circular path

As the lighting industry increasingly focuses on circularity and repair, an expert panel at Light2Perform discussed opportunities and challenges

**T**he lighting industry is driving conversations around sustainability, circularity and repair, with growing recognition that real progress requires a cultural shift.

The topic was the subject of a panel session at last month's Light2Perform event, at Build2Perform Live, chaired by Matt Waring, editor at [d]arc media.

Opening the discussion, Dan Lister, Society of Light and Lighting (SLL) president and Arup associate director, highlighted how clients are keen to retrofit their lighting with 'large-scale LED upgrades' – but the challenge is not just about deploying LEDs, but also about reducing their environmental impact, he said.

A key milestone has been the development of BS 8887, which focuses on remanufacturing, added Lister, who called it 'a game changer' for its ability to offer more consistent metrics for sustainability.

Simon Fisher, founder and director of F Mark, said he has seen a growing appetite for change over the past 10 years, but costs remain a barrier for many clients. He added that sustainability is becoming a more valid metric with the emergence of TM65.2 and TM66, which focus on embodied carbon calculations and circular economy principles respectively.

The conversation shifted to the practical application of circularity, particularly the reuse and refurbishment of lighting products. Lister shared Arup's experience of refurbishing light fittings in its own offices, achieving an embodied carbon reduction of more than 80%. 'It's not as hard as everyone thinks it is,' he said, adding that case studies are critical for building confidence among clients.

'We're conditioned to think that new



From left: Matt Waring, Simon Fisher, Kristina Allison and Dan Lister

is best,' Fisher said. 'We need to demonstrate through case studies that remanufactured products can deliver the same or better results.' This cultural shift, he argued, is essential for scaling up reuse and repair.

Kristina Allison, associate at WSP, said circularity must be embedded into the design process: 'It shouldn't even be a question. It's our responsibility as designers to make sustainability a core part of our work.'

The concept of lighting as a service emerged as a key topic. Fisher acknowledged its potential to monitor and report environmental benefits, but admitted: 'It's a nightmare to implement.' He cited the complexity of ownership models, and the disconnect between specifiers, manufacturers and end users, as significant barriers.

Lister pointed out that design plays a vital role in sustainability, regardless of the delivery model. 'The biggest impact on embodied and operational carbon is the design,' he said. 'It's about finding the right solution for the space and avoiding over-provisioning.' He explained that effective lighting solutions require a conscious approach to fitting design, placement, and embodied carbon savings, which are sometimes overlooked in favour of contractual and operational simplicity.

Allison agreed, emphasising the importance of focusing on people. 'If the lighting isn't for the people using the

space, we don't need it,' she said, echoing the sentiment that sustainability must go hand in hand with human-centred design.

## Education and legislation

Allison stressed the need for education, within the industry and among the public. 'It's about changing society's attitudes,' she said, citing night-light festivals and school engagement programmes as examples of how the industry can inspire the next generation.

Fisher shared his work on Scotland's upcoming Circular Economy Bill. 'On our first call with the Scottish government, the goal was clear: they never want to buy a new light fitting again,' he said. While this might not be practical, Fisher emphasised the importance of considering reuse and remanufacture in all procurement decisions.

The panel concluded by discussing the role of organisations such as the SLL in driving forward sustainability. Again, Lister highlighted the importance of technical standards. 'The rest of the world is looking at us,' he said. 'The way to make real change is to get these standards out there and make them more powerful.'

'Let's not just drive for low carbon and low energy use and sacrifice the human aspect. More is less; put less light in. We need to make sure we are lighting in the right place at the right time.' ●

# The ultimate emergency lighting design guide and Wellington College's emergency evacuation system

## Learn the six steps to an effective emergency lighting design

Eaton's *Fundamentals of emergency lighting* guide is a must-read for engineers, architects, and facility managers dedicated to building safety. This comprehensive resource delves into the critical aspects of emergency lighting systems, offering detailed insights into design principles, regulatory requirements, and maintenance strategies.

The guide covers essential topics such as the types of emergency lighting, the importance of proper installation, and the latest industry standards. It also provides practical advice on conducting risk assessments and ensuring compliance with safety regulations. By exploring these areas, professionals can enhance their understanding and implementation of effective emergency lighting solutions.

This guide is particularly useful for those involved in the planning, design and maintenance of building safety systems, helping them to ensure that their projects meet the highest standards of safety and reliability. Download your copy to stay informed and prepared.

● For more information:  
[b.link/Emerg\\_light\\_fund](https://b.link/Emerg_light_fund)

## Wellington College's safe evacuation

Wellington College, in Crowthorne, Berkshire, is an English boarding school, which means pupils, and some staff, live and sleep at the school. The college was already pleased with Eaton's emergency lighting range, having used Eaton technology for more than six years, but its current system was in need of an upgrade. The school has more than 1,200 pupils and more than 600 staff, as well as visitors, so proper preparation for safe evacuation is vital. As a site with all year-round activity, Eaton's CGLine+ was a great solution because of its easy installation and online monitoring features, generating no disruption.

CG Line+ is a controlling and monitoring system designed for large-scale operations, with the ability to monitor up to 480 luminaries. Its web-based visualisation displays all of the different lighting zones in the college, allowing the Wellington staff to immediately identify any issues, as well as conduct control and test functions. Installation is ongoing, but each new area of lighting is uploaded upon completion, which results in a seamless transition across the campus. Eaton will continue to provide service support



for the system, as well as consultancy advice.

Paul Fox, senior electrician at Wellington College, said: 'We are working towards 100% of our emergency lighting being Eaton products; they are the best in class, being robust, efficient and easy to maintain.'

● For more information: [b.link/Wellington\\_College\\_upgrade](https://b.link/Wellington_College_upgrade)

## Emergency lighting solutions

Eaton's emergency lighting solutions stand out for their reliability, innovation, and compliance with safety standards. The company's extensive product range is designed to meet diverse architectural needs, ensuring seamless integration into any building design. Eaton remains focused on developing solutions for safe evacuation. Its adaptive signage allows the building owner to direct people out of the building as and when the nature of the threat changes. Did you know that only 38% of people see conventional exit signs during an evacuation? Eaton's new increased affordance technology enables exit signs to flash or pulse during an emergency evacuation, making them much more visible to occupants. When it comes to safe evacuation, leave it with Eaton.


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An exploded view of the Cascade Flex luminaire



# Cutting carbon, not corners

Whitecroft Lighting won a CIBSE Embodied Carbon Award by adopting lean manufacturing and design to cut life-cycle carbon from its products by up to 46%. **Molly Tooher-Rudd** speaks to the firm's Tim Bowes about its circular approach

**T**he industry-wide focus on cutting embodied carbon in lighting makes Whitecroft's win in the CIBSE Building Performance Awards category particularly impressive. Judges praised the manufacturer's cradle-to-cradle (C2C) approach to lighting design and its commitment to reducing embodied carbon in its products

The accolade acknowledges Whitecroft's exceptional efforts to address embodied carbon alongside the operational carbon savings associated with LED lighting.

Five years ago, the company embarked on a transformative journey to rethink the design, manufacture and life-cycle of its lighting products. While LED technology brought significant energy savings during operation, Whitecroft recognised the need to

address the carbon impact of its products across their entire life-cycle.

'We realised that the impact goes beyond the operation of our products; it extends into the design and manufacture, and who we are as a business,' says Tim Bowes MSL, head of academy at Whitecroft and closely associated with its sustainability strategy.

The shift led the firm to embrace circularity as a core design philosophy and it has spent the past five years finding ways to reduce the materials used in its products and replacing glues and adhesives.

'We questioned the amount of material we used, how much we needed, and where it came from,' says Bowes. 'Our designs now minimise screws and eliminate adhesives, making them easier to maintain, repair and recycle.'

Whitecroft's Cascade Flex Family (CFF) luminaire is designed with replaceable components and drastically reduced plastic content, and has cut embodied carbon by 46% over a 40-year lifespan compared with standard flat-panel luminaires.

'Standard industry flat-panel luminaires contain significant amounts of plastic and are often replaced during a building's life-cycle, increasing embodied carbon,' says Bowes.

'The CFF, however, uses 67% less plastic – equivalent to 68 plastic bottles – and has a replaceable central cartridge that can be refurbished and reused multiple times.'

Whitecroft also prioritises local sourcing, with components such as the CFF's pods tooled in Oldham, just five miles from its factory. This reduces transportation emissions and supports

the local economy, aligning with the company's circular economy principles.

Whitecroft is the only UK lighting manufacturer to have achieved C2C accreditation, a globally recognised standard for sustainable product design. This certification rigorously evaluates materials for toxicity, environmental impact and social fairness, while ensuring products can be recycled or repurposed at the end of their life-cycle.

'C2C certification gave us the framework to verify that what we were doing was good,' says Bowes. 'It provided the granular product data we needed to develop Environmental Product Declarations [EPDs], which are vital for industry transparency.'

Based on a life-cycle assessment, EPDs provide verified information on the environmental impact of a product. Whitecroft has achieved EPDs for all of and will be provided for all NPD products going forward. By using tools such as One Click LCA software, the firm is paving the way for more efficient, cost-effective EPD creation.

EPDs also give clients critical data on embodied and operational carbon, enabling more informed decision-making. 'Our EPDs help customers map out whole life carbon impacts, ensuring savings are achieved,' says Bowes.

Whitecroft continues to enhance operational carbon efficiency through smart lighting controls, such as its Organic Response system, which dynamically adjusts lighting based on



natural daylight. Pre-set dimming modes further optimise energy use when the building is not being used fully.

With the decarbonisation of the UK's energy mix, embodied carbon will account for an increasingly significant proportion of whole life carbon. 'We need to continually innovate to reduce impacts, operationally and in terms of materials,' says Bowes.

In addition to product innovation, Whitecroft educates the industry on embodied carbon and circular design principles. With CIBSE accredited environmental CPD sessions, it shares insights into low carbon lighting design, the circular economy, smart buildings, and on repurposing existing spaces with its Relight programme.

Relight extends the lifespan of lighting systems by refurbishing and

redistributing components, reducing waste and emissions. 'This approach is fundamental to achieving net zero' says Bowes. 'We've invested heavily in this journey because we believe it's the right thing to do – for our business, our customers, and the wider industry.'

'Embodied carbon is harder to calculate for complex products such as lighting, but it's essential. Our mission is to lead from the front and demonstrate what's possible.'

A new initiative from Whitecroft is the Bright Futures Academy, aimed at addressing the skills gap in the industry while fostering internal and external development (see panel, 'Bright future'). Internally, the company emphasises a robust training culture to develop its workforce. By focusing on training, development plans and opportunities for growth, the company aims to instil its core values – committed together, curious creators, and aiming higher.

The academy also works to unify training across departments, ensuring all employees understand how their roles align with customer needs. 'By understanding better how our customers work, we can deliver the right solutions,' Bowes says.

Broader industry challenges, such as rapid technological shifts and sustainability demands are also tackled by the academy.

'The industry is trying to catch up with rapid changes, from sustainability and net zero goals to smart buildings and data analytics,' says Bowes, 'but with the right education and innovation, we can meet these challenges.' ●

## Bright future

**Whitecroft Lighting's Bright Futures Programme, launched initially in partnership with construction and facilities management company BAM, aims to enhance understanding of product selection and sustainability.**

**'We worked very closely with BAM and several of its partners, bringing in 18 to 20 graduate – and apprentice-level individuals,' explains Bowes.**

**The programme included a two-day event at Whitecroft, featuring team-building activities, an introduction to Whitecroft operations, and insight sessions on topics such as**

**lighting design, sustainability, and product development. The interactive structure of the programme allowed participants to take on roles within project chains, enhancing their understanding of product selection and decision-making. A follow-up took place in the autumn, and the initiative is designed as a 12-month programme, offering access to Whitecroft's learning management system for ongoing training.**

**Sustainability is a core theme, with monthly courses and multiple touchpoints throughout the year.**

# Circularity in focus with TM66

At Light2Perform, industry leaders debated TM66 and its transformative impact on sustainable lighting, as well as its influence on greener practices in the lighting sector

**C**reating a circular economy in the lighting industry was a key theme at Light2Perform, held at London ExCeL last month.

During a session on rethinking sustainability in lighting, panel members discussed the CIBSE guide *TM66 Creating a circular economy in the lighting industry*, and highlighted the emergence of the new functional unit value as a key metric for comparing lighting products' embodied carbon.

Kristina Allison, associate at WSP and co-author of TM66 (and *TM65.2 Embodied carbon in building services: lighting*) highlighted the increasing adoption of TM66.

'It's already being used across all product ranges from a manufacturer's point of view,' she explained, adding that consultants are integrating it into specifications and asking manufacturers for specific metrics.

Simon Fisher, founder and director of F Mark, elaborated on TM66's practical application, and focused on the emergence of the functional unit value as a game-changing metric.

The metric measures lighting products' embodied carbon per thousand lumens of output at 35,000 hours of life. With these parameters, he said 'you can fairly evaluate which product is better.'

Fisher emphasised how the metric helps stakeholders make informed decisions about sustainability.

'The beauty of embodied carbon calculators is that it's pure metrics,' he said.

Chair Matt Waring, editor at [d]arc media, underlined the importance of standardised comparisons, noting that: 'It's harder to manipulate figures to make yourself look better when there's a fixed point.'

Fisher agreed, explaining that 'every material has a known coefficient for embodied carbon. When applied fairly, it's an excellent method for comparing

embodied carbon across products.'

Daniel Lister, Society of Light and Lighting (SLL) President, noted TM66's growing traction in Europe and beyond. 'European manufacturers are seeing it as a game-changer. It allows that apples-to-apples comparison, which wasn't possible with previous metrics,' he said. However, he acknowledged challenges in creating universal standards. 'It's idealistic to think we could have a global standard. Getting industries to agree on a unified metric is a massive step forward.'

Lister noted, adding that, while regional variations may persist, TM66 represents a crucial move towards harmonising sustainability practices.

Lister emphasised the growing importance of reuse and circularity, particularly in higher education, where institutions manage vast portfolios of

lighting units. 'In our offices at Arup, we have seen embodied carbon savings of more than 80% simply by refurbishing light fittings. It's not as hard as people think.'

Allison agreed, but noted disparities in client awareness. 'Not all clients know they need this yet. We're still trying to influence specifications and push the conversation forward,' she admitted. Nonetheless, she is optimistic, calling it 'a high priority' for her firm and emphasising the need for persistence.

The discussion concluded with a consensus that TM66, though not perfect, is a significant step towards better sustainability metrics. As Lister stated: 'It may not be the end goal, but it's an amazing step on the journey. Anything that helps the industry focus on embodied carbon and circularity is a benefit.' ●

## Turley wins SLL Young Lighter award

**Kate Turley, of Chroma Lighting, was named the 2024 SLL Young Lighter at Light2Perform. Her award-winning presentation, 'A tailored dynamic lighting and sensing paradigm to support wellbeing for people living with dementia', highlights her research on the intersecting fields of lighting, technology and health.**

**Turley, a PhD researcher collaborating with industrial and academic partners, was lauded for her innovative work. Her journey into lighting began during her BSc in geophysics, when she gained an interest in programming, computing and the Internet of Things (IoT).**

**Her two-year Knowledge Transfer Partnership with Chroma Lighting and Ulster University resulted in the creation of an integrated lighting and sensing device designed to enhance the wellbeing of dementia patients. This IoT framework opens up new possibilities for understanding how light impacts dementia care, which Turley continues to explore in her PhD, supported by an Industrial Fellowship from the Royal Commission for the Exhibition of 1851.**

**Her contributions have garnered global recognition, with publications presented at IEEE and INSTICC conferences, and accolades such as Best PhD Project, Best Interdisciplinary Research, and the Emerging Scholar Award between 2021 and 2024.**



Kristina Allison (right) and Young Lighter Kate Turley



# FUTURE Designs, the leading UK lighting manufacturer, remains as ambitious as ever as it announces plan for continued success of the business

**D**avid Clements (left) will take on the role of chairman, moving away from the day-to-day running of the business to focus on strategic growth in key global markets across Europe and the Middle East, while pushing forward with the expansion of the carbon careful initiative. Oliver Clements will become managing director, with responsibility for the overall business operations.

Succession planning for FUTURE Designs began five years ago, with the creation of the Employee Ownership

Trust. This was initiated for the long-term benefit of all employees and the continued legacy of the organisation. Since then, there has been a focused strategy to develop and strengthen the senior management team, alongside significant investment to increase the expertise and skill sets in the business.

After nine years in Farringdon, the business has relocated its design and technology centre to Soho. This major investment increases its presence and visibility, creating an industry hub for networking and knowledge sharing.

## David Clements chairman of FUTURE Designs, comments:

'FUTURE Designs was created in 1991 and has organically grown to become one of the top-five privately owned lighting manufacturers in the UK. It is a business built on our enduring ability to meet the exacting needs of our clients.

'I am excited for the management team, led by Oliver, to create their own path for future success, building on the strong foundations of FUTURE Designs.

'We have remained at the forefront of innovation in this sector and there is much to be excited about as we strive to always deliver the best product and outcomes for our valued customers.'

## Oliver Clements, managing director of FUTURE Designs, says:

'The foundations for business growth have been set for many years. My role is to maintain our strong legacy and ensure even greater success for the future. Continuity of business is paramount and I look forward to increasing and developing FUTURE Designs with my co-directors – Leon Ellis, technical director, and Paul Noad, operations director – alongside our senior management team.

'The wider marketplace is continually evolving and I remain as dedicated to our customers as ever, ensuring that the latest innovations and technologies are integrated into manufacturing processes and product development.

'The rigorous attention to detail to guarantee quality at every level, with an exemplary service in delivery and after-care, will always be a hallmark of the business.' ●



The carbon careful initiative has been developed by FUTURE Designs, a pioneer in the refurbishment and upgrading of existing luminaires and carcasses. The initiative is designed to refurbish redundant luminaires with the latest LED technology, transforming them into highly efficient and carbon-saving solutions.

FUTURE Designs is always at the forefront of any technological breakthrough, and is renowned for its expertise in this area of lighting science. It has proven to be the expert in adapting old fluorescent lighting to state-of-the-art lighting, ensuring that the benefits from reduced impact on the environment are fully realised.

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# Trustworthy heat pump design

A new Passivhaus Trust guide to air-to-water heat pumps aims to highlight some of the complex aspects of design that are sometimes missed by experienced engineers, says Warm's **Sally Godber**

**W**e regularly review services designs and have been surprised to see many air-to-water heat pump systems designed without consideration of basic energy efficiency.

The Passivhaus Trust has published a guide to help designers understand the impact of their designs on energy performance. *Air-to-water heat pumps: The basics of energy efficiency* ([bit.ly/CJPasHP24](https://bit.ly/CJPasHP24)) offers a detailed overview of the decisions that have to be made to successfully design air-to-water pump systems.

Despite its title, it includes some complex aspects of design that are often missed by experienced services engineers. Most can be applied to any project irrespective of building energy standards. Topics include flow temperatures, overall system design, distribution losses, heat pump and emitter sizing, system controls, and input into the Passive House Planning Package (PHPP). The paper has been reviewed and endorsed by CIBSE.

The paper only covers design choices that have a big impact on energy performance. While it is published by the Passivhaus Trust, nearly all aspects of the advice can be applied to any project, irrespective of building energy standards.

There are various aspects of systems and heat pumps that influence good performance, but the most critical is flow temperature. The lower the flow temperature, the better the performance. For heating systems, flow temperature should be <40°C and preferably <30°C. (See panel, 'How to get flow temperatures low: the basics'.) These are some other basic considerations when designing a heat pump:

- For non-domestic systems, avoid coupling together systems that run at different time schedules, because this can result in heat pumps and additional components being kept online unnecessarily.
- For heating, review performance during low and typical, as well as peak, conditions; select your heat pump to run at peak efficiency at typical conditions and consider how well it modulates. Domestic heat pumps are generally good at modulating down to lower capacity, but for larger (>30kW) systems it is unusual,



and results in poor performance if not managed carefully.

- Reduce distribution losses and improve maintenance for external pipework by keeping external lengths to a minimum and installing all possible valves and components internally.
- PHPP calculates the whole-system performance (as recommended in AM17) and is quick and helpful. Aim for a seasonal performance factor (SPF, or H-1 in PHPP) of >4, with an SPF of 3 as the minimum.

● **Sally Godber is an energy consultant at Warm. She co-authored the guide alongside energy consultant Alan Clarke and Gwilym Still, Passivhaus director at Max Fordham**

**Heat pumps**

## How to get flow temperatures low: the basics

**For space heating, emitters must be sized to deliver the peak heating demand at a reduced temperature. Services engineers need to be aware of this at an early stage to ensure they are large enough.**

**The flow temperature can be reduced further outside of peak-load conditions, as the required output will be less.**

**Avoid coupling systems of varying temperatures if this results in the whole system running at the higher temperature. This is usually the case for non-domestic buildings, where systems serve heating and hot water. This is described as 'bracketing' and the importance of it is referenced in CPD Module 242: 'Foundations for transitioning from boilers to air source heat pumps', CIBSE Journal, November 2024.**

**For existing buildings, specific constraints need to be considered, which are outlined in the Passivhaus Trust's guidance 'The right time for heat pumps in retrofit', [bit.ly/CJPasRet24](https://bit.ly/CJPasRet24)**

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## News Heat pumps

# Baxi backs hybrid HPs

### Making hybrid heat pumps eligible for BUS could slash emissions, says research paper

Making hybrid heat pumps an eligible technology in the Boiler Upgrade Scheme (BUS) would result in a 26% decrease in emissions, according to research by Gemserv, commissioned by Baxi.

The paper, 'Unlocking the power of heat pumps with hybrid installations', was published last month and includes analysis of the role hybrid systems could play in heat decarbonisation.

According to this analysis, a hybrid installed in an average mid-terraced house can secure approximately 52% lower carbon emissions than a standalone gas boiler, and 72% when compared with oil boilers.

The report says hybrid systems should also be included in the Home Energy Model, which will replace the current Standard Assessment Procedure methodology, and in the Product Characteristics database and the Reduced Data Home Energy Model.

The paper contains four definitions of hybrid heat pumps: an air source heat pump (ASHP) added to an existing gas boiler; an ASHP and new boiler; a new ASHP replacing a boiler; and existing heat generators replaced by one unit containing a condensing combination boiler and small heat pump.

It says a hybrid system could enable consumers to switch to heat pumps without having to make initial upgrades to radiators and fabric, though these would be beneficial over time and save consumers money.

The study estimates a standalone heat pump would cost £9,257, compared with £8,250 for a hybrid system. However, upgrades to radiators and fabric for the heat pump-only solution would add £7,246 to the upfront cost.

# Guide promotes heritage retrofits

Retrofitting historic buildings while preserving their heritage features is 'entirely possible', according to a new guide for residents. It says the 'majority' of retrofit measures, such as heat pumps, can be implemented 'as long as they are carried out sensitively', and there are often opportunities to go further than initially envisaged.

Retrofit guides for three housing archetypes and a strategic summary document are available from the ESSA Conservation Area association website. Consultants Prewett Bizley, Levitt Bernstein and Etude were appointed by ESSA, with support from Kensington and Chelsea Council, to carry out research and draw up the retrofit guide.



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# Making space

Constrained by the rigid concrete frame of the Grade II-listed Space House, Atelier Ten had to work creatively to accommodate low carbon MEP systems in the iconic office's recent refurbishment. **Andy Pearson** looks at the solutions

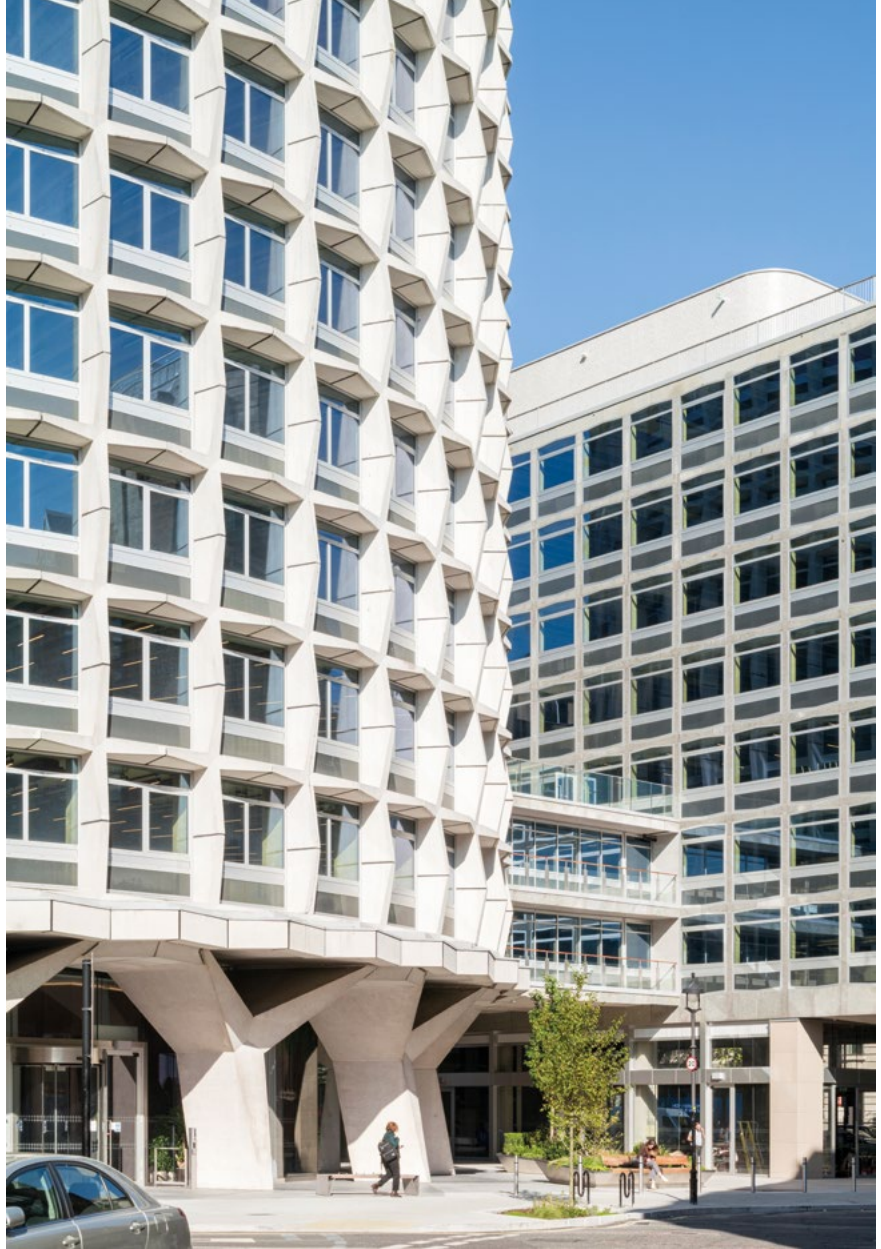
**T**he regeneration of Space House – a 1960s, Grade II-listed, Brutalist architectural icon in London's Covent Garden – as an office for the 21st century has pushed the boundaries of what is possible in an energy-efficient refurbishment of a historic building.

Completed in 1968, Space House was designed by architect Richard Seifert & Partners for developer Harry Hyams, the same team responsible for the 34-storey Centre Point tower, a few streets further west. The buildings' shared heritage is evident in the geometric grid of their precast concrete structural façades.

While Centre Point has since been transformed into a residential block, Space House has been completely updated to turn it into a high-spec, energy-efficient, contemporary workspace, one of the first Breeam Outstanding listed buildings in the UK.

Its refurbishment has been quite a challenge, says Younha Rhee, technical director at building services engineers Atelier Ten. 'The buildings' listed façades meant we had to work within the existing envelope, which created spatial constraints in almost every area: the floor-to-ceiling heights on the office floors; the basement; the roof; and even the risers,' she explains.

Atelier Ten's involvement with the scheme started in 2019, when the project was at RIBA Stage 3 and architect Squire & Partners was already on board. Space House is actually



## Project team

Developer: **Seaforth Land**

Investor: **QuadReal**

Main contractor: **Bam Construction**

Architect and principal designer:

**Squire & Partners**

Breeam, sustainability, MEP: **Atelier Ten**

Structural engineer: **Pell Frischmann**

Project manager and cost consultant:

**Gardiner & Theobald**

two buildings: a distinctive, 17-storey round Tower and an adjacent, more conventional-looking, eight-storey rectangular Block. The two offices are linked by a common basement and by a two-level, enclosed walkway on levels 1 and 2. At the time the engineer was appointed, developer Seaforth Land had set a target of Breeam Excellent for its refurbishment.

Rhee says Atelier Ten was 'confident' it could push the mechanical, electrical

and plumbing (MEP) design to achieve Breeam Outstanding within the confines of the buildings' listed envelopes by exploiting the inherent qualities of the original design. 'We developed our design to use what was already there, and to minimise any interventions, so as to retain the original architect's intention in terms of how the building operates,' she explains.

Both offices had a good base on which Atelier Ten could build: they had narrow floor plates, openable windows, and good levels of daylight. Their innovative hybrid structure of precast and in-situ concrete meant they also had high levels of thermal mass to help minimise peak cooling loads. This was exposed by removing the suspended ceilings installed by a previous tenant to reveal the concrete soffits on the office floors.

Removal of the suspended ceiling also helped the design team overcome the office's very low floor-to-ceiling



Bespoke trapezoidal-shaped chilled beams have been fitted within the recess formed by the structural beams

heights, which Rhee says was one of the most challenging aspects of the legacy scheme. Even with the soffits exposed, the floors' lack of height precluded the use of fan coil units (FCUs) because there was insufficient depth beneath the structural beams to accommodate these. Undaunted, Atelier Ten developed a servicing solution that employed active chilled beams to provide heating, cooling and ventilation to the office floors, using 'as fitted' drawings retrieved from the archives.

The benefits of using chilled beams, says Rhee, are that they are more energy efficient than FCUs, 'because the beams have a radiant component', they provide better thermal comfort, and they are quieter. In addition, because they have fewer moving parts than an FCU they have a longer lifespan, which means they have 'lower whole life embodied carbon', adds Rhee.

Despite the two buildings' different forms and heights, Atelier

Ten has applied the same servicing strategy to both. This includes the ability to subdivide each office floor plate to enable two tenants to be accommodated per floor.

For the Block, which faces predominantly east-west, Atelier Ten was able to insert conventional rectangular chilled beams between its orthogonal structural grid to maintain floor-to-ceiling heights on the 960m<sup>2</sup> floor plates.

For the circular Tower, however, bespoke trapezoidal-shaped chilled beams had to be manufactured. This was to ensure they would fit within the tapering recess formed by the structural beams that radiate – like spokes on a bicycle wheel – from the building's concrete core to the cruciform precast concrete façade elements on each of the 960m<sup>2</sup> circular floor plates.

The spokes help order the exposed building services on the column-free floor plates, with the chilled beams

alternating every third recess with the track-mounted lighting and sprinklers, and containment.

The offices were originally heated by oil-fired boilers located in the basement plantroom. Under this all-electric scheme, the fossil-fuel boiler has gone, and in its place are four roof-mounted air source heat pumps (ASHPs) that provide heating and cooling to the chilled beams via pipework routed through the central core of the tower. 'Removal of fossil fuels from site to make this an all-electric scheme was key to making our design sustainable,' says Rhee.

The four ASHPs provide a total of 1,640kW of heating and 2,040kW of cooling. The chilled water is supplied at a temperature of 14°C flow, 17°C return, and heating is supplied at a temperature of 45°C flow, 38°C return. 'Because it is a concrete building and we could not introduce additional insulation to the listed façades, the heating demand is

## Case study Space House

higher than it would be in a new building,' explains Rhee.

Air handling units (AHUs) on the roof and in the basement supply fresh air to the chilled beams. The offices are designed for a relatively dense occupancy of one person per 8m<sup>2</sup>, which, Rhee says, was based on the British Council for Offices guide that was current at the time. She adds that, because this is a speculative office – and the tenants' requirements were unknown – there is 'some flexibility in the design in case we need to accommodate a trading floor'.

Extraction is from grilles in the building's core. The supply air is dehumidified at the AHUs to prevent

condensation on the chilled beams in the summer. There is also a dew-point sensor on the floor plate, which will close off the valves if condensation is detected.

The original intention was to control the volume of fresh air to the chilled beams to each floor zone using a variable air volume (VAV) box, to help minimise energy usage. However, there was insufficient space to install VAV boxes because of the limited floor-to-ceiling height, so fresh air is supplied to the chilled beams at a constant volume.

'We can regulate the volume of air to each floor based on CO<sub>2</sub>, but there is no zonal control – so, unfortunately, the fresh air supply is at a constant air

volume,' Rhee explains. However, the impact of this decision is mitigated to a certain extent because the services to the chilled beams are intended to be turned off for around 30% of the year, to enable the floor plates to be naturally ventilated as part of a mixed-mode approach.

The engineers were fortunate that the two blocks were originally designed to be naturally ventilated. The 39.5m-diameter Tower was built with opening windows on the perimeter of the floor plates. It also has a small lightwell in the central core, which acted as a chimney, drawing air from the perimeter and discharging it at roof level. Under the refurbishment,

## Obsolete space put to new use

At the base of the Tower, outmoded basement space has been put to new uses. Designed in an era when the car reigned supreme, the scheme originally incorporated two levels of car parking – and even its own mini petrol station.

All of this has now gone, with the original 200-space basement car park transformed into a versatile, double-height, 1,500m<sup>2</sup> event space, shared by the two buildings.

The subterranean transformation includes the addition of 600 cycle spaces (accessed by one of the original car park ramps) and 62 showers.

Domestic hot water for the showers and toilets is provided by two water source heat pumps to step up the temperature of the heating hot water from 45°C to 60°C. The heated water is stored in calorifiers in the basement.

A similar transformation has taken place on the Tower's ground floor, where a new public restaurant has been created above the spot in the basement where the petrol station was located. Appropriately called The Filling Station, it is connected to the main plant through heat interface units and cooling interface units for heating and cooling, and

capped boosted cold water service and drainage.

The existing UPKN 33kVA sub-station was retained in its current position, but the vertical ventilation to the roof was removed. Atelier Ten added a new ventilation system, which now discharges at ground level.

The listed buildings have also been extended upwards, with two storeys added to the Tower and one to the Block. These are set back from the building's listed façade; they were allowed by the planners ostensibly to conceal the rooftop plant while, at the same time, helping to maintain the building's intended silhouette.

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the lightwell has been infilled to accommodate additional toilets. Nevertheless, Rhee says the Tower's circular shape will facilitate natural ventilation because 'it doesn't matter from which direction the wind is blowing'.

Natural ventilation of the rectangular Block was facilitated by its narrow, 16m-wide floor plates, which ensure adequate cross-ventilation.

Both buildings' Grade II-listed status restricted fabric energy efficiency improvements to the replacement of the single-glazed, floor-to-ceiling windows with double-glazed units.

'We wanted to improve the fabric performance as much as we could, but because of the listed nature of the building, and the risk of interstitial condensation, we could not add any insulation to the solid walls,' explains Rhee, who adds that – as the glazing is approximately 80% of the wall area – replacing the single-glazed windows with energy efficient double-glazed units has made 'a big improvement'.

The listed façades also prohibited the addition of external solar shading, although Rhee says the precast concrete façades provide 'some shading'. Installation of internal blinds is at each tenant's discretion, which means the glazing is designed to control both solar gains and heat losses. Atelier Ten provided the architect with the required g-value and u-values for the glazing specification.

To ensure the upgraded window units were a perfect fit, every opening was 3D-scanned to determine its dimensions. Every third window is fitted



More than 90% of the existing structure of Space House was retained

with an actuator, which will open and close the window under the control of the building management system (BMS), to optimise the buildings' performance and use of natural ventilation.

The mixed-mode ventilation will run predominantly in spring and autumn. 'There is a very sophisticated control strategy to optimise the building performance and thermal comfort criteria,' explains Rhee, who says there was some concern about controlling the levels of humidity in the offices to prevent condensation on the chilled beams – 'which is one of the reasons we had to automate the opening of the windows'.

The windows will also open automatically at night, under the control of the BMS, to enable night purge of the structure's thermal mass to remove heat accumulated during the day, recharging it ready for the following day.

The basement of the Tower has been repurposed, as has the ground floor, which now features a restaurant. Two additional floors have been added

to the Tower and one to the Block to create more space (see panel, 'Obsolete space put to new uses').

Atelier Ten's initial proposals included photovoltaic (PV) arrays on the roofs of both buildings. As the design evolved, however, space for the array disappeared, much to the annoyance of the planners. 'The air source heat pumps occupy most of the available roof area on the Tower, which prevented us from introducing PVs,' explains Rhee. 'We had to demonstrate to the planners why PVs could not be accommodated.'

On the lower-height Block, it was not space, but adjacent buildings that prevented the use of PVs, because 'the roof was too heavily overshadowed to deliver the output that would make the installation economical', says Rhee.

In operation, the building will be powered by 100% renewable energy from the Grid.

The building services design means operational carbon will be reduced by 46% in the new extensions, says Rhee, and by 70% across the existing elements of the scheme, compared with a notional Building Regulation-compliant building. It is an impressive achievement that shows it is possible to breathe new life into a 60-year-old Grade II-listed building.

Equally impressive is that remodelling the Brutalist icon has retained more than 90% of the existing structure, which has saved 10,700 tonnes of CO<sub>2</sub> as embodied carbon – which, as Rhee points out is 'comfortably below the LETI and RIBA 2030 targets'. ●

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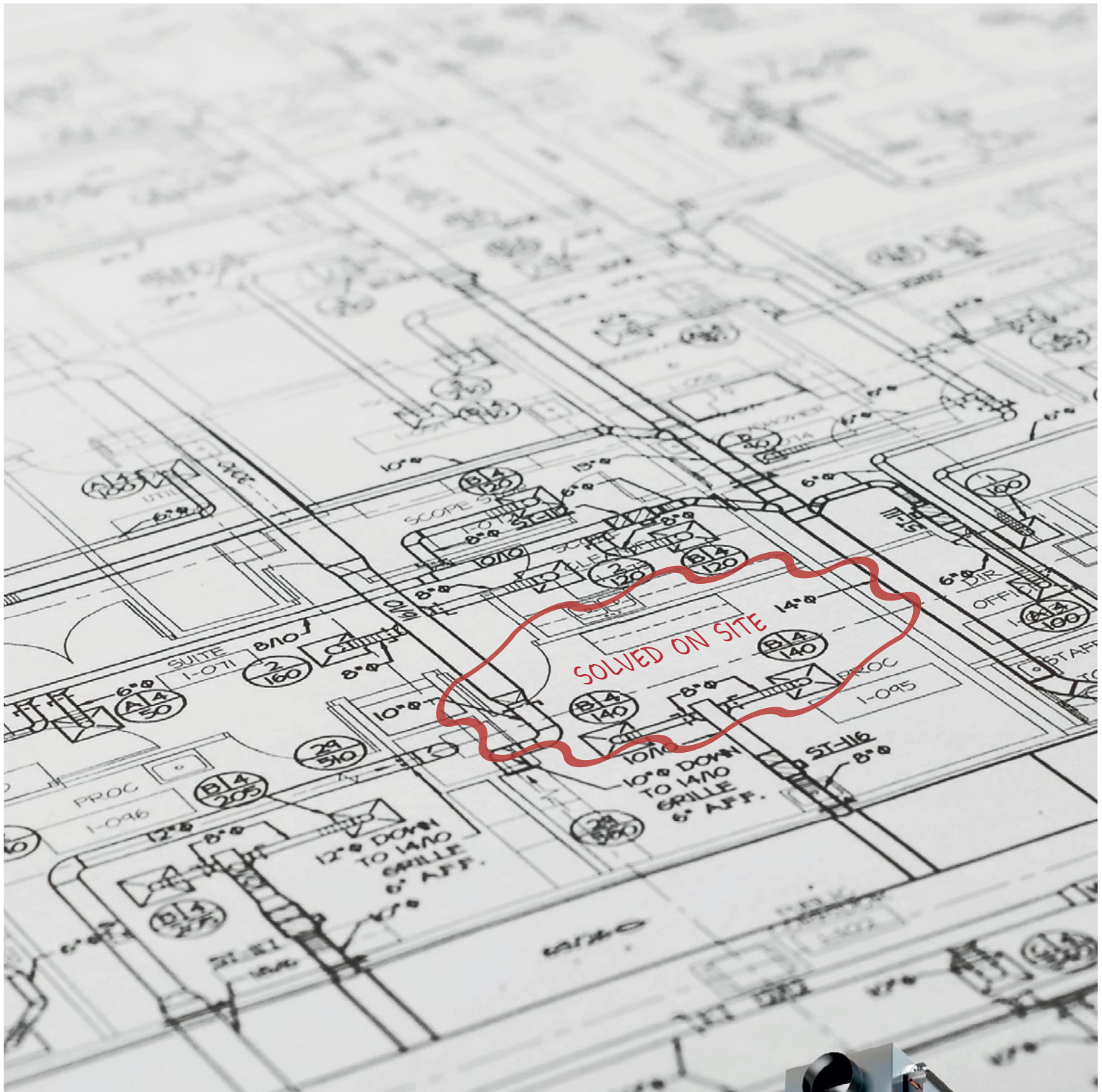


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# A global methodology for estimating embodied carbon in building services

This module explores the scope of TM65, and the regional and sector-specific addenda published to support its global adoption

**C**IBSE TM65, *Embodied carbon in building services: A calculation methodology*, provides guidance on calculating the embodied carbon emissions of mechanical, electrical and plumbing engineering products used in buildings. Since its 2021 inception, the Technical Memorandum has spawned several significant addenda. This CPD will provide a reminder of the scope of TM65, and explore the regional- and sector-specific addenda that have been published to support and encourage the adoption and application of TM65 as a route to predicting the life-cycle global warming impact of a product.

TM65 and Environmental Product Declarations (EPDs) are standardised ways to assess and report embodied carbon. They each play a distinct role in fostering transparency and driving the reduction of embodied carbon in the building services industry.

EPDs are independently verified and registered documents that communicate transparent information about the life-cycle environmental impact of a product. They are considered the most reliable source of information about the environmental impacts of a product and are a standardised way of declaring carbon emissions associated with a product throughout its life-cycle, using a global warming potential (GWP) indicator. They provide a comprehensive and independently verified assessment of a product's life-cycle environmental impacts, going beyond just GWP emissions. EPDs are developed from Product Category Rules (PCRs), which provide sets of rules, requirements and guidelines that have been developed following existing standards, such as BS EN ISO 14025<sup>1</sup> and BS EN 15804.<sup>2</sup>

TM65, and the various additions, serve as a valuable interim methodology for approximating embodied carbon emissions when EPDs are not available. TM65 is specifically relevant when assessing the environmental impact of MEP systems, particularly as it notes that they can constitute a significant portion of a building's embodied carbon. This is considered to be in the order of at least 30% in new buildings (excluding refrigerant leakage), and potentially up to 75% in retrofit projects. The methodology provided in the TM emphasises the importance of considering the entire life-cycle of

these products, including manufacturing, installation, maintenance and end-of-life disposal. While carbon is a primary focus, the document also highlights the importance of considering other environmental and social impacts when specifying products.

TM65 stresses that requesting EPDs created by manufacturers should be the first step in determining the embodied carbon of MEP products. However, owing to the limited availability of EPDs for MEP products, TM65 provides two interim calculation methods that deliver an ersatz alternative to an EPD:

- The 'basic' calculation method that requires less information from manufacturers, primarily relying on product weight and material composition breakdown. It uses a scale-up factor to account for life-cycle stages beyond material extraction.
- The 'mid-level' calculation method demands more detailed information, including energy consumption during final factory assembly, transport distances and refrigerant leakage rates. It offers a more comprehensive assessment of embodied carbon compared with the basic method.

(See boxout, 'TM65 methods', for more detail on the two methods.)

Both calculation methods use a standardised life-cycle stage framework based on BS EN 15978:2011,<sup>3</sup> categorising emissions into modules (cross-referenced to the life-cycle modules of BS EN 15978). For example, TM65 currently includes A1-A4 (product and transport), B3 (repair), C2-C4 (end-of life processes) and, in terms of refrigerant leakage, B1 (use) and C1 (deconstruction). B4 (replacement) is aimed at being calculated at a system level. This consistent approach allows for comparisons between products, and contributes to building a broader understanding of embodied carbon in MEP systems.

Regional adaptations of TM65 are crucial for improving the consistency and relevance of these assessments in different geographical contexts. Since the original publication of TM65 in 2021, there have been further publications that focus on specific sectors and regions. The significance of the addenda is emphasised by the very significant financial and technical input provided by organisations, as acknowledged at the start of each publication.

TM65LA, *Embodied carbon in building services: Using the TM65 methodology outside the UK*,

provides a toolkit that defines the process for adapting the TM65 methodology for use outside the UK by offering a step-by-step approach for creating local addenda. It emphasises the importance of considering regional variations in factors such as transport distances and carbon intensities. It also provides guidance on how to use the TM65 methodology for individual projects in regions lacking local addenda, and aims to promote the consistent assessment of embodied carbon emissions in building services globally. Localised addenda have been produced, and co-funded, with local experts, companies and organisations (as acknowledged in each publication).

TM65ANZ, a local addendum that focuses on Australia and New Zealand, provides alternative assumptions tailored to these regions. Key adjustments include local transport scenarios; refrigerant leakage rates; and a specific carbon factor for landfill. This revises the refrigerant leakage rates to align with Australian and New Zealand standards and practices – this is significant, as refrigerant leakage can have a substantial impact on a product’s overall embodied carbon footprint. So, for example, it replaces Table 4.4 in TM65 with Table 2.1, providing updated annual leakage rates for the ‘use’ phase (B1) and end-of-life leakage rates for the ‘deconstruction’ phase (C1). These revised rates are based on the Australian Institute of Refrigeration, Air Conditioning and Heating (AIRAH) guidelines that were originally outlined in *Methods of Calculating Total Equivalent Warming Impact*.<sup>4</sup>

The GWP values for refrigerants are aligned with those used in the Green Star rating system, a prominent sustainability

benchmark in Australia and New Zealand. As such, Table 2.2 in TM65ANZ supersedes Table 2.2 in TM65, offering updated GWP values sourced from various bodies, including the California Air Resources Board, the Institute of Refrigeration, and the Intergovernmental Panel on Climate Change’s (IPCC’s) AR5 report.<sup>5</sup>

TM65ANZ acknowledges the unique geographical characteristics of Australia and New Zealand by modifying the transport assumptions. Table 2.8 in TM65ANZ introduces region-specific transport distances, distinguishing between products manufactured within Australia, within New Zealand, or globally (Asia). These revised distances better reflect typical supply chains in the region, which can make a significant impact on the final carbon footprint. For example, products manufactured nationally in Australia are assumed to travel 2,000km by heavy goods vehicle (HGV), whereas products manufactured globally (Asia) are estimated to travel 10,000km by ship and 300km by HGV.

TM65ANZ provides more granular carbon factors for electricity, accounting for variations across Australian states and New Zealand regions. Consequently, Table 2.6 in TM65ANZ supersedes Table 4.10 in TM65, offering region-specific values based on data from the Australian government’s then Department of Industry, Science, Energy and Resources (DISER – now Department of Industry, Science and Resources), and the New Zealand Ministry for the Environment.

Adjustments are made for the carbon factor for landfill emissions (C4) to reflect local waste management practices, by

using a value of 0.2kgCO<sub>2e</sub> per kg waste that has been sourced from the Australian government’s DISER (and compares with 0.0089kgCO<sub>2e</sub> per kg waste in TM65). While TM65ANZ retains the same embodied carbon coefficients for materials (A1) as the original TM65, it emphasises that using locally-sourced EPDs is preferable whenever they are available, and TM65ANZ serves as a valuable interim methodology until EPDs become more widely available in the region.

The most recent addendum to TM65, TM65NA, published in conjunction with ASHRAE, relates to North America (United States, Canada and Mexico). As with TM65ANZ, it incorporates regional factors such as electricity and gas carbon factors based on location, specific transport scenarios, and updated refrigerant leakage rates derived from US regulations. Just as with TM65ANZ, this is not designed as a standalone document; it is intended to be used in conjunction with the core TM65 methodology.

TM65NA introduces North American-specific embodied carbon coefficients for materials such as fibreglass, rockwool and general insulation, sourced from the Embodied Carbon in Construction Calculator (EC3) database.<sup>6</sup> TM65NA updates the refrigerant leakage rates to align with North American standards and practices. It replaces Table 4.4 in TM65 with Table 2.2, providing updated annual leakage rates for the ‘use’ phase (B1) and end-of-life leakage rates for the ‘deconstruction’ phase (C1). These rates are sourced from ASHRAE Standard 34.<sup>7</sup> The GWPs for common refrigerants are based on the IPCC’s AR5 and AR6<sup>8</sup> reports. TM65NA recommends the use of AR6 values (published after the original TM65), as they represent the latest scientific estimates, and Table 2.3 in TM65NA replaces Table 2.2 in TM65.

The geographical scale of North America and the diversity of its supply chains have necessitated revised transport assumptions. Table 2.5 in TM65NA replaces Table 4.9 in TM65, introducing new transport distances based on product complexity, and distinguishing between transport by HGV, rail and sea. This includes assuming that nationally manufactured products (high complexity) travel 6,000km by truck. Additionally, more detailed information is provided in Table 2.11 ‘Default transportation scenarios for North America (A4)’, including common North American scenarios such as ‘partial cross country’ (with 50km HGV and 4,800km by train). This also includes estimates that products sourced from Asia to the West Coast travel

## TM65 methods

**Basic calculation:** Requires fundamental product information, including: the product weight; material composition breakdown (at least 95%); refrigerant type and charge (if applicable); and the expected product service life.

This simplified approach involves:

- Calculating emissions from material extraction
- Estimating emissions from component repair/replacement during the product’s life
- Applying a scale-up factor based on product complexity to account for other life-cycle stages
- Adding a buffer factor for a conservative estimate
- Calculating and adding emissions from

refrigerant leakage (if applicable).

**Mid-level calculation:** Demands all the data used in the basic method, plus the estimated proportion of factory energy use by fuel type attributed to the product, and the final assembly location. A more granular assessment that includes:

- Calculating emissions for each life-cycle stage
- Adding a buffer factor for a conservative estimate
- Calculating and adding emissions from refrigerant leakage (if applicable).

The mid-level calculation method is considered more robust, as it incorporates more detailed information about the manufacturing process and transportation.

10,000km by sea, and European manufacturing (to the east coast) 5,600km by sea.

Recognising the variability in electricity generation mixes across North America, TM65NA provides more relevant carbon factors for electricity. Table 2.6 includes specific values for various US grid regions, while Table 2.7 offers values for different Canadian provinces. TM65NA emphasises the importance of understanding how the location of manufacturing can affect embodied carbon results, especially in the mid-level calculation method.

The carbon factors for landfill emissions (C4) are aligned with waste management practices in North America. Table 2.12 in TM65NA replaces Table 4.15 in TM65, using a value of 0.052kgCO<sub>2e</sub> per kg waste sourced from the US Environmental Protection Agency (EPA). TM65NA acknowledges the need for consistent documentation and calculation methodologies, and highlights ongoing efforts by organisations such as ASHRAE, CIBSE, the International Living Future Institute (ILFI)<sup>9</sup> and US Green Building Council (USGBC)<sup>10</sup> to improve alignment in North America. It also references initiatives such as the MEP 2040 Challenge,<sup>11</sup> which aims to reduce the carbon footprint of building systems.

There are localised worked examples (in both TM65NA and TM65ANZ) for both the basic and mid-level calculation methods. These examples demonstrate how to apply the methodology step by step, and offer insights into data requirements and interpretation of results. A sensitivity analysis is crucial in embodied carbon calculations, particularly when using methodologies such as TM65, to understand the influence of various factors and assumptions on the results. As TM65 was initially developed for the UK context, it relies on assumptions that may not accurately represent other regions – TM65LA stresses the need for local addenda to address these regional differences. Sensitivity analysis helps in quantifying the impact of variations, such as: transport distances; electricity grid carbon factors; end-of-life processes (recycling rates and disposal methods); and refrigerant choices and leakage rates. This aids more informed decision-making about material choices that might include considering alternative sources of steel (which often determines a large part of a manufactured item's embodied carbon), such as the lower-carbon steel explored in the boxout 'Reducing steel's environmental impact'. Other areas that may be highlighted are manufacturing locations,

## Reducing steel's environmental impact

**The quest for reduced embodied carbon has encouraged steel producers to develop processes that reduce emissions in manufacturing. By drawing on renewable sources of electricity to heat electric arc furnaces, and incorporating significant proportions of recycled scrap metal, substantial CO<sub>2</sub> reductions can be delivered, compared with traditional methods. For example, an international steel manufacturer<sup>12</sup> claims that CO<sub>2</sub> emissions can be as low as 0.3kgCO<sub>2e</sub> per kg of finished steel when the source material is 100% recycled scrap steel. (This compares with traditional steel production methods, especially those using blast furnaces, that typically emit around 2–3kgCO<sub>2e</sub> per kg of steel.) The air handling unit (AHU) in Figure 1 is an example of how this might make a**



**Figure 1:** Reduced-carbon steel lowers the embodied carbon of this range of AHUs by approximately 15% (depending on the size), and approximately 25% for acoustic duct attenuators (Source: Swegon)

**practical impact on the embodied carbon of MEP products while maintaining function and performance.**

system suppositions and areas where more data collection – or refinement of assumptions – are needed. Such analysis may be employed to compare the results obtained from basic and mid-level calculation methods, assessing the potential for overestimation or underestimation in the basic method. This comparison helps identify potential discrepancies – such as where the basic method might not adequately capture the embodied carbon impacts – that can prompt further investigation or refinement of the methodology. The practical examples on sensitivity analysis in both TM65NA and TM65ANZ reveal potentially significant differences in embodied carbon depending not only on the manufacturing location, but also between the two geographic zones, highlighting the importance of regional variations.

So far, there have been three addenda produced to address the needs of particular industry sectors, to understand system-level impact. All three have extensive discussion, applications and worked examples of employing the TM65 methods, and have been developed and co-funded by experts in the respective sectors, as acknowledged in each addenda. In brief, TM65.1 specifically examines the embodied carbon impact of space heating and hot-water systems for residential new-build developments in a UK context, following the same calculation methodology as TM65 at the product level. A lighting-specific perspective on embodied carbon assessment is provided by TM65.2; it offers guidance on material selection, system boundaries, and reporting specific

to lighting equipment. The third sector-related addendum, TM65.3, addresses the embodied carbon in logistics centres, encompassing both MEP and material handling equipment (MHE). It analyses the impact of different building types and systems commonly found in logistics facilities.

TM65 is not intended to replace EPDs, but rather to bridge the gap until EPDs become widely available for all building services equipment, supporting decision-making related to embodied carbon. However, those who apply TM65 are encouraged to request EPDs from manufacturers to signal that there is industry demand, and so encourage manufacturers to invest in EPD development. At the same time, TM65 encourages users to share their embodied carbon calculations with CIBSE to help develop a comprehensive database and refine the methodology further.

A primary aim of TM65 remains to provide an understanding of whole-life carbon and embodied carbon in building services, moving towards a future where EPDs become widely available.

All TM65 resources, including calculation tools, can be accessed at [cibse.org/tm65](https://www.cibse.org/tm65). Upcoming addenda will include guidance tailored to heating, ventilation and air conditioning (HVAC) systems for office environments, and adaptations specific to the United Arab Emirates region. ●

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● **We thank Louise Hamot, of Introba, for her valuable expertise and contributions to this article.**

# Module 243

December 2024

1. **What is the main purpose of CIBSE TM65?**
  - A To analyse the embodied carbon in lighting systems only
  - B To calculate the energy efficiency of buildings
  - C To provide guidance on calculating embodied carbon in MEP products
  - D To reduce operational energy in public buildings
  - E To standardise refrigerant leakage rates in Europe
  
2. **What role do Environmental Product Declarations (EPDs) play alongside TM65?**
  - A They are the same as TM65 calculations
  - B They estimate embodied carbon without verification
  - C They offer verified life-cycle environmental impact data for products
  - D They primarily focus on operating carbon emissions
  - E They provide specific data on refrigerant leakage rates
  
3. **What is the main difference between TM65 and EPDs?**
  - A TM65 focuses only on carbon, while EPDs cover multiple environmental impacts
  - B TM65 includes refrigerant leakage, while EPDs do not
  - C TM65 is an interim method, while EPDs are independently verified
  - D TM65 is for new buildings only, whereas EPDs are for retrofits
  - E TM65 is only applicable in the UK, while EPDs are global
  
4. **What is the 'basic' calculation method in TM65 primarily based on?**
  - A Detailed information on manufacturing energy consumption
  - B Global warming potential of finished products
  - C Local transport distances for products
  - D Product weight and material composition
  - E Specific refrigerant types and leakage rates

5. **What is one of the methods identified that steel manufacturers employ to reduce the environmental impact of steel production?**
  - A Employing less electricity to power electric arc furnaces
  - B Employing more traditional steel production methods
  - C Increasing the size of production facilities
  - D Increasing the use of recycled scrap metal in production
  - E Using natural gas as the primary heat source in blast furnaces

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### References:

<sup>1</sup> BS EN ISO 14025:2010 *Environmental labels and declarations. Type III environmental declarations. Principles and procedures*, BSI 2010.

<sup>2</sup> BS EN 15804:2012+A2:2019 *Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products*, BSI 2019.

<sup>3</sup> BS EN 15978:2011 *Sustainability of construction works – Assessment of environmental performance of buildings – Calculation method*, BSI 2011.

<sup>4</sup> *Methods of calculating Total Equivalent Warming Impact (TEWI)*, AIRAH 2012 – [bit.ly/CJDec24CPD1](http://bit.ly/CJDec24CPD1) – accessed 26 October 2024.

<sup>5</sup> IPCC AR5 report – [bit.ly/CJDec24CPD2](http://bit.ly/CJDec24CPD2).

<sup>6</sup> Building Transparency Embodied Carbon in Construction calculator (EC3) Database – [bit.ly/CJDec24CPD3](http://bit.ly/CJDec24CPD3) – accessed 26 October 2024.

<sup>7</sup> ASHRAE Standard 34-2019 *Designation and Safety Classification of Refrigerants*, ASHRAE 2019.

<sup>8</sup> IPCC AR6 report – [bit.ly/CJDec24CPD4](http://bit.ly/CJDec24CPD4).

<sup>9</sup> *Embodied Carbon Guidance*, International Living Future Institute (ILFI) – [bit.ly/CJDec24CPD5](http://bit.ly/CJDec24CPD5) – accessed 26 October 2024.

<sup>10</sup> *Driving Action on Embodied Carbon in Buildings*, USGBC, 2023 – [bit.ly/CJDec24CPD6](http://bit.ly/CJDec24CPD6) – accessed 26 October 2024.

<sup>11</sup> MEP 2040 Challenge – [bit.ly/CJDec24CPD7](http://bit.ly/CJDec24CPD7) – accessed 26 October 2024.

<sup>12</sup> [bit.ly/CJDec24CPD8](http://bit.ly/CJDec24CPD8) – accessed 26 October 2024.





### Domus Ventilation expands energy-efficient axial fan range

Domus Ventilation has introduced two new models to its energy-efficient axial fan range: the DBF100 (100mm) and the DKF150 (150mm), with timer control and a combined humidistat and timer version that reacts to

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● Visit [www.nittan.co.uk](http://www.nittan.co.uk)



### Hull museum's energy-efficient heating upgrade

Hull Maritime Museum, which is undergoing a major restoration, now has two 240kW Imax Xtra 2 condensing boilers, from Ideal Heating Commercial. The new setup provides up to 97.7% full load efficiency and up to 108.2% part-load efficiency, and reduces energy use by operating in a cascade system. Manufactured in Hull, the boilers' compact design and robust build were key factors in their selection.

● Visit [www.idealcommercialheating.co.uk](http://www.idealcommercialheating.co.uk)



### Jung Pumpen products and events on LinkedIn

Follow pump expert David Johnson on LinkedIn for the latest updates on Jung Pumpen wastewater and sewage solutions.

Discover product features such as floats, seals and tank designs, and learn about upcoming events, including a visit to Jung Pumpen's facility in Germany. David, a SoPHE committee member and marketing director at Pump Technology, Jung Pumpen's largest UK distributor, shares valuable insights.

● Connect with David on LinkedIn or visit [jung-pumps.co.uk](http://jung-pumps.co.uk)



### UK first for Panasonic's 20HP sustainable cold chain unit

Dunstaple Farm in Devon, home of Farmer Tom's Ice Cream, has become the first company in the UK and outside

Japan to use Panasonic's 20HP cold chain condensing unit. The energy-efficient system uses the natural refrigerant R744 (CO<sub>2</sub>), and complements two previous Panasonic 10HP units at the farm. It shortens ice cream freezing time by six hours daily.

● Visit [www.aircon.panasonic.eu](http://www.aircon.panasonic.eu) or [www.keepitcoolsouthwest.co.uk](http://www.keepitcoolsouthwest.co.uk)

## Directory

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# Q&A

CIBSE Gold medal winner **Colin Ashford** has made a huge contribution to building services through his work around education and technical guidance

Colin Ashford, an active CIBSE member since 1982, received a Gold medal at the 2024 President's Awards, for exceptional service in advancing engineering. Starting as an energy manager in 1980, he advanced his career through CIBSE committee roles, including Home Counties South East chair and CIBSE Council membership for 37 years.

Despite having no formal training, Ashford has spent part of his career developing guidance and training for building services engineers. He has contributed to influential CIBSE documents, such as TM41 and AM15, and served on the CIBSE Domestic Building Services Panel for more than 20 years. He has also developed degree-level training, delivered more than 800 presentations, and trained more than 7,000 facilities managers on sustainability.

Career highlights include serving as energy manager at Hackney Council and Kent Schools, and working at the Carbon Trust as a principal consultant.

## Q What was your first job in engineering?

A It was at Muirhead's, in Elmers End, Kent, where I expanded my electronics hobby into instrumentation. I worked on production design and the winding equipment for precision resistors, using wire one-tenth the thickness of a human hair. I had to read research papers to solve challenges, which taught me to read very efficiently – balancing speed with comprehension.

## How did you reduce building energy use?

By setting clear operational targets for energy efficiency and linking these to financial benefits, we aimed for reductions of at least 30%, making the impact undeniable. One memorable moment was when finance complained



that our achievements disrupted their energy budget calculations – a clear sign of success!

The second key area was supporting the weights and measures officials to ensure accurate custodial transfer data on fuels and water. We installed metering equipment to determine fuel-delivery quantity accuracy.

The third was improving building services equipment and systems by changing control valves for better control authority, and minimising standing losses, such as from multiple parallel connected boilers. Over five years, Hackney's energy and water costs across 280 buildings decreased by 35%.

For Kent's 2,700 buildings, establishing an accurate energy and water database allowed us to spot anomalies, such as high energy use during school holidays, when boilers should have been off. Weekly energy

**“Stay curious and informed about research in the field”**

data provided clear insights into problem areas, enabling targeted interventions. Kent achieved a 35% reduction in energy and water costs over five years.

## Apart from CIBSE, which research projects are you most proud of?

From 1990 until 'retirement' in 2003, I contributed to building research projects for the Carbon Trust. One key project was the development of the energy management matrix, used by organisations to assess how well they were managing energy. This led to the development of major technical guidance on 'Heating systems and their control', and 'Control of variable loads'.

From 2003 to 2013, I worked for the Carbon Trust in Northern Ireland and Scotland, focusing on problem-solving for energy in buildings and industries. Training programmes based on real-world survey findings helped audiences identify and address root causes of energy inefficiency.

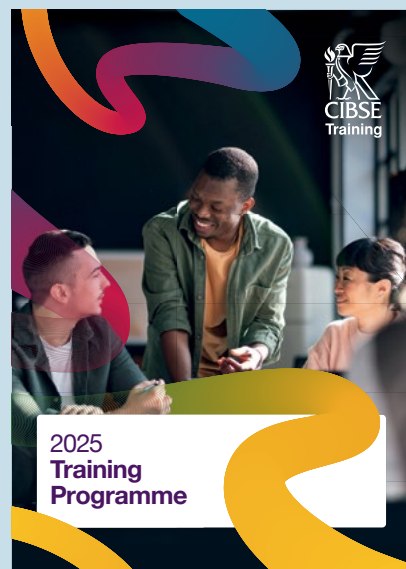
## What advice would you give to young engineers?

Stay curious and informed about research in the field. Sharing knowledge and presenting evidence-based insights elevates the authority of building services engineers, allowing them to lead rather than follow.

## On what should CIBSE be focusing?

Improving the practical experience of engineers in addressing occupant comfort – not just thermal, but also visual and acoustic environments. Training should develop engineers' authority in architect-led design teams. They need hands-on experience to understand the long-term operational challenges of their designs. This practical knowledge, combined with strong presentation skills, will elevate the status of building services engineers across the industry. ●

# The 2025 CIBSE Training Programme has landed



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# 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.

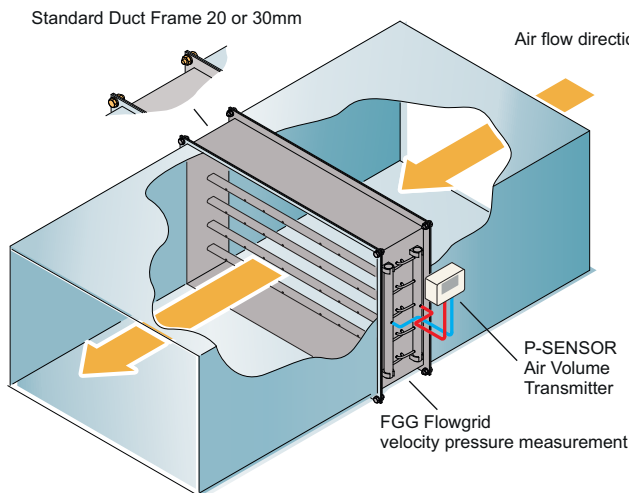
Another great advantage of the FGG Flowgrid is, that it can measure bi-directional as it is manufactured equally on both sides. This means, the air flow is measured in one direction and should there be a reverse flow, this can be detected and measured when using the CMR P-SENSOR.

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

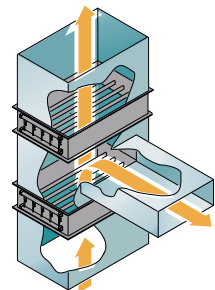
**The Flowgrids are installed in many projects such as**

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

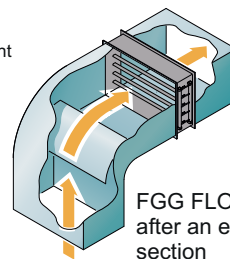
FGG FLOWGRID and P-SENSOR providing accurate average air volume measurement in ducts.



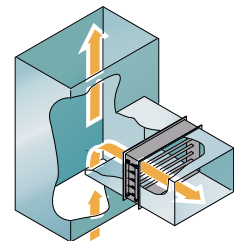
**P-SENSOR**  
With LCD display  
and keyboard



**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**

