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Prove yourself

The arrival of the Design for Performance (DfP) rating scheme in the UK will be enormously challenging for an industry that is not currently required to prove building performance in use.

DfP is based on the Australian Nabers rating system, which uses the principles of verification and disclosure. If a commercial building is underperforming in Adelaide or Sydney it will be graded accordingly and every potential tenant or owner will see how unfavourably it compares to the rest of the market. The office scheme was initiated by business but has now been adopted as a mandatory measure by public authorities in Australia.

The team behind DfP hopes the same will happen in the UK when it is launched in a year or so. Key to achieving better performance is the creation of a model that simulates the HVAC performance of a building on a regular basis, according to DfP technical lead Robert Cohen. Once this is optimised, the control systems should be defined, says Cohen, so they can be designed by the engineer.

The digital twin can then be used by commissioning engineers to check the real building is being controlled in the same way predicted in the model.

The trend for building data transparency is evident in our coverage of two buildings featured this month. The University of Newcastle's Urban Sciences Building (page 36), has more than 4,000 sensors that transmit live energy and environmental data, while Hoare Lea has created a digital twin of its London office to help tweak the performance of its HVAC (page 42).

By overlaying data from the BMS with environmental data such as temperature, occupancy and CO_2, Hoare Lea is seeking to discover how buildings influence people, and vice versa.

Overlaying different sets of data has also helped Hoare Lea get to the bottom of two issues in its London office. It worked out that one meeting room was prone to stuffiness because the PIR sensor triggering the ventilation fan was in the meeting room next door. And the reason for the building's high base load at night was found to be caused by the wrong sequence being entered when setting the fire alarm: the occupants did not know the shutdown was triggered in this way.

This year's famous Christmas lectures from the Royal Institution (Ri) will be the first to be broadcast since Dr Shaun Fitzgerald FCIBSE become the Ri's director. On page 57 he explains how he intends to put Ri at the heart of public debate on government policy around innovations such as artificial intelligence, autonomous cars and genetically engineered crops.

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CONTRIBUTORS

Hywel Davies
What skills will building services engineers need to learn to deliver zero carbon buildings in a digital world?

Vincent Fogarty
The legal obligations faced by designers and the circumstances when they have a duty to warn

Liza Young
What we can learn from the recent Design for Performance commercial building pilots?

Tim Dwyer
This month's CPD looks at the BB101 indoor environmental quality guidance for schools

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COAL DROPS YARD OPENS TO PUBLIC

Two Victorian coal sheds at King's Cross in London have been converted into a £100m retail development by architect Heatherwick Studio. The merging of two gabled roofs demanded a performance-based approach, so services engineer Hoare Lea tested and validated everything from pedestrian wind comfort and safety to daylight access. Seven historic chimney stacks were used to conceal extract and heat rejection systems, and a network of underground services linked buildings on the site. Historic architectural characteristics were integrated into the new design by hiding service corridors in the existing building fabric. Heating and cooling for the 61 retailers was supplied by district heating and cooling networks.

Industry alarm as turmoil continues over EU exit

Proposals for extended transition 'hugely unhelpful', says BESA

The 'deal or no deal' furore surrounding Brexit has been widely condemned by industry figures. Housebuilders and construction companies – such as Bovis, Persimmon and Redrow – saw the value of their shares fall by as much as 5% as a result of the turmoil surrounding the agreement with the EU, before some calm was restored to the markets.

As *CIBSE Journal* went to press, Prime Minister Theresa May was still struggling to persuade Parliament to support the deal, and an extended 'transition period' up to the end of 2021 was suggested. This has been criticised as 'hugely unhelpful' by the president of the Building Engineering Services Association (BESA).

Tim Hopkinson told the association's 2018 National Conference that 'the one thing businesses crave above all else is certainty' and the proposal to extend transition arrangements would further delay investment decisions. He also criticised the Prime Minister for labelling construction craft occupations as 'low skilled' and, so, subject to the strictest immigration restraints after Brexit. 'These are crucial skills that will be central to many of our projects,' said Hopkinson.

Other business leaders said controls on key construction workers from the EU would be 'disastrous'. Former cabinet minister Caroline Flint urged politicians to allow the industry to find solutions. 'It would be better if government did fewer things better,' she said in her keynote address to the BESA Conference.

However, she said concerns over how Brexit will affect the skills gap should not mask 'home-grown' problems. 'As a country we have to be honest about how we have not focused enough on training the people we need. We should not be relying on other countries to train our people for us,' Flint said.

Pilot projects reveal UK performance gap

Industry-funded initiative Design for Performance (DfP), which was established to tackle the performance gap, has tested elements of an office rating scheme based on measurable performance outcomes.

In pilot studies carried out over two years, six new offices – at varying stages of design and construction – tested key aspects of the DfP approach, based on the Australian office energy-rating system, Nabers.

In all cases, the study found that operational energy targets were not being specified within contractual requirements, so the priority and level of scrutiny that should be placed on operational energy performance was not filtering down the supply chain.

The study also highlighted that none of the pilot projects was able to measure base building performance easily because of inadequate sub-metering design. Advanced HVAC simulation is also not requested as part of the standard design process.

When running Nabers energy ratings using actual operational energy data for two pilot buildings – which had base building energy data available – the results were poorer than the design ratings suggested they should be.

One was 0.5 stars lower, achieving a 4-star rating, and the other was 2.5 stars lower, attaining a 2.5-star rating.

Robert Cohen, technical lead at DfP, said the systemic failings in the current design-for-compliance process were one of the key findings of the pilots.

Read more about DfP on page 24.

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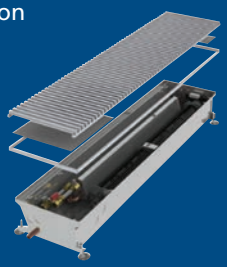

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Complacency blamed for Grenfell Tower fire

Building control officers signing off things 'they can't possibly understand', conference told

The Grenfell Tower tragedy was the result of complacency, according to experts. 'Before Grenfell, the number of fires and deaths in fires were in decline. This led to complacency and a race to the bottom on price,' said Conor Logan, technical director at Colt International. 'However, insurance claims were rising for a smaller number of fires, but nobody seemed to relate that to a bigger issue.'

Logan was part of an expert panel speaking at the 2018 BESA National Conference in London, which also heard that fire engineers were rarely involved at the design stage of building services projects.

'Fire engineering is often seen as an additional cost, not an integral part of the process – and, if the team is led by an architect, it will not be considered until well into the M&E phase, said Mark Farmer, CEO at Cast and author of the review of the construction labour market *Modernise or Die*.

He added that there had been little change in client behaviour since Grenfell – with everything still driven by lowest cost – and he called for more prescriptive regulations 'until we sort ourselves out'.

Will Pitt, mechanical engineering manager at NG Bailey, told the BESA Conference that competence was the single biggest issue to emerge from the aftermath of Grenfell – but that the whole project process had become so complex that building control officers were signing off things 'they can't possibly understand'.

'It is unreasonable to expect the MEP contractor to take responsibility for all of this and solve all the technical problems – other specialists need to step up,' Pitt added.

Lift scare after cable snaps in Chicago skyscraper

Six people have been rescued from a lift in Chicago that plummeted 84 floors after a cable snapped at the top of a 344m-high skyscraper.

Firefighters rescued passengers at the John Hancock Center – now known as 875 North Michigan Avenue – by making a hole in a wall from a car park between the 11th and 12th floors, where the lift had come to a halt.

No one was hurt during the incident but one occupant was treated for anxiety. As the lift came to rest in a 'blind shaft' with no openings, firefighters used the building's electronic system to locate it.

What happens when a lift cable snaps?

By Andrew Cooper, managing director at LECS Lift Consultants

Suspension ropes rarely snap as the lift undergoes routine maintenance. There is also a lot of redundancy: a lift can physically be suspended on a single rope, but standards require that we have a factor of safety that provides massive passenger protection and confidence.

In the event of a lift of this type overspeeding, a safety device called the overspeed governor would initially trip electrically at around 115% rated speed and cut off the power to the motor. This is to allow the lift to be stopped by the action of the brake (the device that holds the lift when it isn't moving).

However, there are situations where the lift will keep increasing in speed. These include: a gearbox failure; where traction is lost (the relationship between the suspension ropes and the traction sheave); and when suspension is lost, for instance when the ropes break and the lift car falls. In these circumstances, the overspeed governor, at around 125% rated speed, trips mechanically and the emergency brake holds the lift in position on the guide rails.

Wood burning is 'legal but lethal', says think-tank

Around 1.9 million households still use solid fuels, warns IPPR

The government should introduce tougher regulations to control wood burning in homes, according to a hard-hitting report from the Institute for Public Policy Research (IPPR).

Researchers from the think-tank said wood-fire emissions were 'lethal' to humans, adding that domestic burning was the largest single emitter of PM2.5 – 'one of the most harmful forms of particulate matter', blamed for 29,000 premature deaths in the UK every year.

Home fires account for 40% of total emissions of PM2.5, which is more than double that of industrial combustion (14%) and more than three times that of road transport (12%).

'Until very recently, public policy has focused on the lethal and illegal concentrations of air pollution predominantly arising from road transport, in the form of NO_2 pollution,' the report's authors said. 'Yet PM2.5... is measured in concentrations that are legal, but actually more lethal than NO_2.'

The IPPR said around 1.9 million households still use solid fuels and that the health cost was 'too high for policy to not go further and faster'.

Its report argues that the UK should commit to much stricter legal targets on air pollution after Brexit, in line with scientific evidence, and include a target to reduce emissions from the domestic sector to near zero by 2050.

'All this should be enshrined in a new Clean Air Act and backed by a powerful environmental watchdog with the legal powers to take action if the targets aren't met. It is an opportunity that must not be missed,' the report's authors added.

Sustainability pioneer Neil May dies

Sustainable building champion Neil May has died. Born in 1962, Neil was made an MBE for 'services to sustainability and energy efficiency in buildings and communities'. His rich and varied career included anthropology research in India, founding two sustainable building firms and groundbreaking work at UCL as a Senior Research Fellow.

Neil gained a First in modern history before taking a sociology MPhil in Delhi. He was a labourer for four years in the UK before setting up Neil May Builders. He went on to found Natural Building Technologies in 1999.

He bought together sustainable developers to address poor performance of housing and helped create numerous groups including the Good Homes Alliance, the Passivhaus Trust, and the Sustainable Traditional Buildings Alliance.

He joined the Institute for Environmental Design and Engineering at UCL, where he founded the UK Centre for Moisture in Buildings. May co-authored a BSI white paper on moisture in buildings which is being incorporated in *BS 5250 Code of Practice for the control of condensation in buildings*.

An industry colleague said: 'Neil knew what sustainability meant for buildings and crucially for people – the two were inseparable and had to be in harmony. This understanding elevated his work beyond a technical level and made him effective in communicating his vision to others.'

IN BRIEF

Renewables putting power into Scotland

Wind turbines were responsible for 98% of Scotland's electricity demand in October, and exceeded the amount of power needed on 16 out of 31 days.

On one day (23 October), 105.9MWh was generated and the energy produced by the turbines across the month was enough to power almost five million homes, according to data gathered by WeatherEnergy.

The Scottish government has committed to delivering 50% of the country's power for heat, transport and electricity from renewables.

ETI calls for more heat-network innovation

District heating networks could deliver up to 18% of UK heat by 2050 and help cut the cost of the country's transition to low carbon systems by up to £3bn, according to a report by the Energy Technologies Institute (ETI).

Currently, just 2% of UK heat comes from networks and the report, *Heat networks in the UK: Potential barriers and opportunities*, points out that greater innovation is needed to cut capital costs and open up the market. It called for designers to consider reduced flow rates, running pipes along the outside of buildings, and 'trenchless' technologies that minimise the need for groundworks.

Summers could be fossil-fuel free

British summers could be powered almost entirely without fossil fuels by 2050, according to an analysis of the wholesale electricity market.

Wind, solar and nuclear will supply more than 90% of the UK's electricity – up from 50% today – but gas-power stations will still be needed in the winter, according to Aurora Energy Research. It believes the price of power will drop to nearly zero between April and October because of lower demand and a glut of electricity from solar panels and windfarms. During the rest of the year, prices would hit around £70 per megawatt hour (MWh), higher than today's annual average of £50-60 per MWh.

This means the UK could cut carbon emissions by 80% by 2050 without destroying the wholesale energy market, and despite increased demand from a switch to electric heating and transport, the analysts said.

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Resource Data Management

Illegal refrigerant activity on the rise

Trade body calls for stricter controls at EU borders

Almost 90% of refrigeration and air conditioning contractors in 16 European countries say they are aware of illegal trading and rising theft of refrigerant gases.

A survey by the European trade body Area said HFCs, which are now subject to quota restrictions under the F-Gas Regulation, were particular targets – R134a being the most popular.

Area members said the authorities in their countries were trying to stamp out this activity, but lacked resources and/or expertise. They called for tougher penalties, an awareness campaign aimed at end users, and a clampdown on online sales activity.

'Authorities are ultimately responsible for the proper enforcement of the F-Gas Regulation and we call on all actors – including EU and national competent authorities – to play their part in enforcing stricter controls at EU borders,' said Area secretary general Olivier Janin.

Illegal trading in HFCs is on the rise

Chinese factories blamed for spike in CFC emissions

A spike in chlorofluorocarbon (CFC) emissions tracked by campaign group the Environmental Investigation Agency (EIA) has been traced to a number of factories in China. As a result, the signatories to the Montreal Protocol restated their commitment to strengthening monitoring and enforcement measures.

'The decision also calls on parties to take measures to ensure the phase-out of CFC11 is sustained in their countries and to share information relating to any illegal CFC11 production or use,' an EIA statement said. 'During the discussion, China shared information on a nationwide enforcement effort that has resulted in the discovery of two illegal CFC11 production sites.'

The EIA praised China for its efforts in tackling illegal production of CFC11, but said there were still significant challenges.

'This is a turning point for the Montreal Protocol – nothing less than a comprehensive overhaul of its compliance and enforcement regime will ensure this doesn't happen again,' said EIA's UK climate campaigns leader Clare Perry.

Use blockchain to increase trust and transparency

Platform would allow mounting frictional losses to 'completely disappear'

The industry should adopt digital transaction platform blockchain to overcome payment and trust problems that lead to costly delays and late delivery on thousands of projects, delegates at last month's BSRIA Briefing heard.

Will Squires, of Atkins Global, told the event that the reluctance of consultants and contractors to accept liability for other parties' work leads to the 'ridiculous' practice of repeated reworking of designs. This, in turn, leads to late payment, poor productivity and poor profit margins – all of which could be addressed with the transparency of blockchain.

'Blockchain would change attitudes to design because it shows everyone your dirty laundry – there's no hiding place,' said Squires. 'It also makes it possible for everyone to see the flow of money through a project.'

He added that, 'in a technological age', there was no reason why the collapse of Carillion should have led to so many other firms going under because they had not been paid on time. 'There is no programmability about how money moves in this industry – it is very transactional because of the way contracts are set up,' said Squires. 'This leads to frictional losses that mount up and become huge on major projects. These completely disappear in blockchain.'

Speakers debated other digital 'disruptors', including artificial intelligence, offsite construction, and the use of 'smart' transport infrastructure. Susan Hone-Brookes, from the Manufacturing Technology Centre, said new approaches were vital to address the industry's very poor productivity, which had improved by just 1.1% in two decades.

She said that even a modest one-third improvement in the sector's productivity could add £56bn to the UK economy.

Landsec sees bright future for London

Developer Land Securities has more than £2bn worth of commercial office projects in London on site, in design or at planning stage.

Its pipeline of office work is due to deliver more than two million square feet, including Deutsche Bank's new UK headquarters at 21 Moorfields, led by McAlpine, which is due for completion in 2021.

Landsec chief executive Robert Noel remains 'confident that London is a global city with strong, long-term prospects'. The company is working on 'revised plans for the development of Nova East and we are in pre-planning for the redevelopment of Portland House, underlining our strong belief in Victoria'.

Landsec is also assessing several new sites for 'mixed use' developments, including more than 4,000 homes.

'Occupational demand and pre-letting activity have remained steady, and we expect a continued flight to quality,' a company statement said.

'This trend may put pressure on second-hand space and we will continue to monitor the market for opportunities to deploy capital.'

Noel said Landsec was also looking at 'innovative ways of building more quickly and cost effectively', and had not ruled out 'building more speculatively' depending on market conditions.

IN BRIEF

Robot builds house in three days

An Australian technology company claims to have taken a 'quantum leap for construction' by completing a three-bedroom house in less than three days using the 'world's only fully automated, end-to-end bricklaying solution'.

The firm's Hadrian X robot built the 180m^2 house, which features two bathrooms. It delivered a two-course structure with a full combination of brick sizes, cuts and laying configurations, plus an 11-course pillar structure from slab to cap height, and a two-room structure from a 3D CAD model.

Problem of late payment persists

The Building Engineering Business Survey, carried out by four UK contractor bodies – ECA, BESA, SELECT and SNIPEF – has found that eight out of 10 engineering services organisations typically receive payment more than 30 days after the due date. This is despite 56% inserting less-than-30-day payment clauses in their contracts.

The commercial sector has the worst payers, with 83% of contractors receiving payment more than 30 days after completion. In the public sector, on average, 71% of respondents were paid after 30 days. Overall, almost a fifth said they were paid after 60 days and more than half of contractors reported that between 1% and 10% of their turnover was tied up in retentions.

Glass takes over as IoR president

Kevin Glass has been elected president of the Institute of Refrigeration (IOR).

During his inaugural address, the managing director of Bitzer UK stressed the need for the industry to 'come out of hiding' and thanked his predecessor Stephen Gill for setting up the Women in Refrigeration, Air Conditioning and Heat Pumps (RACHP) Group.

'For many years, a large group of members didn't feel part of the industry. Today, this new group is building a support network and opening up new opportunities that widen our appeal,' said Glass.

'We have come a long way since our predecessors rued that refrigeration, the silent service, was one of the world's best kept secrets. The secret is now out, and the task we have is to build on it.'

IN BRIEF

Inspiring the next generation

CIBSE Home Counties North East Region attended a 'Your Future 18' event at the Towngate Theatre, Basildon, in October.

Armed with enthusiasm, stacks of leaflets, banners and a levitating ball machine, the CIBSE volunteers spoke to parents and students about possible careers in engineering. With an emphasis on building services, they sought to enlighten them about the rewards and prospects of choosing to go into the sector.

It is rare to find a building services engineer who planned to become one, so it is essential that the industry does all it can to attract tomorrow's talent.

Such 'whole town' events make very good use of volunteers' time, and thanks go to Anas Yunis, Mohammad Rezvan, Andrew Saville, Curtis Gregory and Austin Williamson for their help in Basildon.

CIBSE UK membership application deadline

The next deadline for UK Associate (ACIBSE) and Member (MCIBSE) applications with IEng and CEng registration is 1 February 2019. A number of resources are available on the CIBSE website to help with the application process, including sample reports and webinars. CIBSE will be running application writing workshops and surgeries in the lead-up to the deadline. Find all the information you need to get started at **www.cibse.org/closingdate** and make sure you follow **#CIBSETopTips** on Twitter and LinkedIn for application advice.

Disruptive times ahead for services engineering

ANZ Region hears how industry must adapt to world of smart buildings

CIBSE Australia and New Zealand (ANZ) Region's seminar series, titled 'Anatomy of a smart building', in October, highlighted the many issues and challenges that building services engineers will face in the near future.

According to the World Economic Forum, engineering and construction have been slow to embrace technological opportunities. Rapidly changing expectations of building owners and tenants, however, mean the anatomy of a smart building will look very different from that of its traditional counterpart.

Jonathan Clarke, associate director, Norman Disney and Young, said: 'Why approach smart buildings in the same way as we have been doing automation for the past 15 years?'

Series speakers (from left): Wayne Gass, senior security consultant, Jacobs; Paul Dearlove, technical director, IBMS; Dr Hywel Davies, technical director, CIBSE; Jon Clarke, associate director and controls group manager, Digital Buildings, NDY; Brett Naylor, group manager – digital delivery, BECA; Chris Wallbank, head of energy and sustainability services, JLL Australia; and (front) Andrew Crabtree, CIBSE WA chair

According to seminar speakers, the industry can look forward to disruption. Companies' building management and control systems may have a limited future if they continue to focus on traditional architecture, with 'software as a service' and the Internet of Things solutions driven by organisations not normally associated with building services.

People working in controls will need to find new ways of doing things, while a few in the installation, maintenance and diagnostics space can expect to be replaced by artificial intelligence and 'plug and play' equipment.

The hard part will be guessing how this disruption will play out, presenters stressed. Sensor technology, for example, has come on in leaps and bounds, and it is now possible to measure all sorts of parameters – from occupancy and temperature through to CO_2 and Volatile organic compounds levels – throughout an occupied space. Who owns the data and has access to it, and how it's manipulated, need consideration.

Some new-generation sensors are coming from suppliers that have no track record. There may be concern about whether they will be in business in five or 10 years' time, and what this could mean for a building owner who commits to 5,000 sensors if the supplier folds.

The motivation for adopting new technologies and approaches is often the fear of being left behind, and the desire to do new and exciting things with our buildings. But as Matthew Clifford, head of energy and sustainability services, JLL, said: 'We need to avoid the situation where we create solutions looking for problems.' Speakers also pointed to the need for services engineers to adapt to the problems associated with cyber security.

For details visit **www.cibse.org/anz**

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Hong Kong, Hong Kong

Chang, Tsai Yuen
Singapore, Republic of Singapore

Kim, Minjung,
Wanchai, Hong Kong

Wong, Wai Ping
Tai Po, Hong Kong

Tang, Mei Yu
Tseung Kwan , Hong Kong

Lau, Tsz Chun
Kwun Tong, Hong Kong

Alhubail, Alabdulla
Isa Town, Bahrain

Lo Ho Yan, Kowloon
Hong, Kong

Robinson, Jonathan
Auckland, New Zealand

SoPHE Young Engineers Award winner named

Society donated £1,500 from the event to Engineers Without Borders UK

A filtration system cartridge design to eliminate arsenic from groundwater – by Darryl How and Yasmin Chamadia, from Arup – has won the Society of Public Health Engineers' (SoPHE's) Young Engineers Awards.

The awards are run in association with Engineers Without Borders UK and Caminos de Agua, which recently developed low-cost technical filtration media for fluoride removal and set the challenge to develop a similar one for arsenic. Entrants' designs had to be low-cost and openable with commonly available, reasonably priced tools. The containers needed to be refillable, air- and watertight, and be able to connect to other filter cartridges.

Judges were impressed by the FlexiFiltro solution, which used simple components to create an inexpensive and resilient design. Thought had also been given to expansion and scalability. How and Chamadia will be developing the design into a real product for use.

The awards were presented at the SoPHE annual dinner in November, when an Honorary Fellowship Award was also presented to Professor Mala Rao OBE for her outstanding contribution to addressing healthcare and social inequalities. Rao is a champion of climate change action and has worked closely with the World Plumbing Council to promote water conservation and access to safe water and sanitation globally.

Yasmin Chamadia with Edward Clarke, of SoPHE Education Group

With thanks

SoPHE would like to thank: ACO Building Drainage; Alumasc Water Management Solutions; Aquality Trading & Consulting; Aquilar; Baxi Heating UK; Blucher UK; European Vacuum Drainage Systems; Geberit Sales; GIRPI; Grundfos Pumps; Hamworthy Heating; Hargreaves Foundry; Heatrae Sadia Heating; Hydrotec (UK); Kylemore Services; Lochinvar; Marley Plumbing and Drainage; Pipex; Polypipe; ProEconomy; Rinnai UK; Roth UK; Saint-Gobain; Sentinel Performance Solutions; TClarke Contracting; Teekay Couplings; Waterscan; Wilo Group; and Zip Heaters (UK).

Ready Steady Light Middle East

The third Ready Steady Light Middle East took place at Light Middle East in Dubai in September. Held in partnership with Messe Frankfurt and Light.Func, the Society of Light and Lighting (SLL) event celebrates the art and science of lighting.

Seven teams competed to create an exterior installation in just 90 minutes. They were randomly allocated a site and given a limited selection of equipment.

This year's competition was themed around the Year of Zayed, marking 100 years since the birth of the founding father of the United Arab Emirates, Sheikh Zayed bin Sultan Al Nahyan.

The judges included Sharon Stammers and Martin Lupton, from Light Collective, who awarded prizes for the Most Creative Effect and the Best Technical Solution. The teams also judged each other for the Peer Prize. The Most Creative Effect and the Best Technical Award were given to Team 2 for its installation 'The Vision of Zayed'. The Peer Prize was awarded to Team 1 for 'The Garden of Eden'.

This year's event was supported by Creation, Cinmar, iGuzzini, Linea Light, Martin Professional Middle East, Venuetech and Zumtobel Group.

The winning installation

Cheung, Ka Ming
Ma On Shan, Hong Kong

Wong, Chun Yu
Tuen Mun, Hong Kong

Bailey, Anthony Mark
Cambridge, United Kingdom

Chan, Shuk Ching
Yuen Long, Hong Kong

Yiu, Cheuk Man Jonathan
Po Lam, Hong Kong

Kee, Hiu Lap
Sai Wan, Hong Kong

Poon, Chun Ming
Yuen Long, Hong Kong

Mitchell, Luke
Sheffield, United Kingdom

Carasa Aizpurua, Pablo
Manchester, United Kingdom

ASSOCIATE

Machado, Pedro Miguel
Epsom, United Kingdom

Competente, Ace
Makati City, Philippines

Ranjo, Joahna Carla
Makati City, Philippines

Remorque, Lemmuel
Makati City, Philippines

Litigar, Eric Dames
Makati City, Philippines

Dela Cruz, Rene
Makati City, Philippines

LICENTIATE

Ford, Dominic
Leigh, United Kingdom

Marsh, Naomi Marion
Folkestone, United Kingdom

Graham, David
Gateshead, United Kingdom

Ogle, Jeffrey
Perth, United Kingdom

Walker, Louis James
Manchester, United Kingdom

Skinner, Owen David
London, United Kingdom

Thwaites, Gavin Lee
Birmingham, United Kingdom

Ronan, Pierce
London, United Kingdom

Halls, Christopher
Cambridge, United Kingdom

Jules, Theodore Patrick
London, United Kingdom

Pogue, Jonathan Rhys George
London, United Kingdom

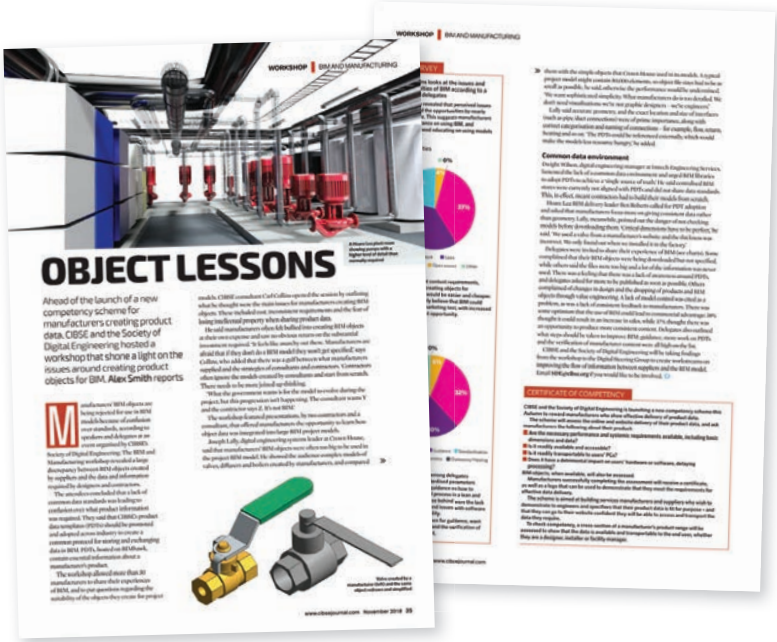
Edis, Christopher Francis
Bristol, United Kingdom

Mahmood, Omar
London, United Kingdom

Kenny, Jack Michael
Birmingham, United Kingdom

Few, Ellen
Woodstock, United Kingdom

FEEDBACK



WORKSHOP | BIM AND MANUFACTURING

OBJECT LESSONS

Ahead of the launch of a new competency scheme for manufacturers creating product data, CIBSE and the Society of Digital Engineering hosted a workshop that shone a light on the issues around creating product objects for BIM. **Alex Smith** reports

This month, readers discuss BIM data, heat pumps, and electric vehicles in tunnels

Mine of information

Re: BIM information from manufacturers (*CIBSE Journal*, November 2018), it seems that CIBSE and the Society of Digital Engineering have jumped into this issue too quickly, and focused on the MEP industry, without looking at the wider picture. Product Data Templates (PDTs) are only really useful for the construction and handover of a project. The article doesn't address the similar issues faced with asset management information.

BIM means we should be able to export the design information to aid in the operation of the building. However, BIM files received from manufacturers typically have different naming and measurement conventions. If manufacturers produced product information to the Construction Operations Building Information Exchange (COBie) format, you could easily extract data into PDTs, while transferring the information into asset management databases. COBie is a non-proprietary data format for the publication of a subset of BIM focused on delivering asset data, as distinct from geometric information. This, in theory, should not only work for MEP products, but for all construction items.

Euan Brownlie

Carl Collins, digital engineering consultant, CIBSE, responds:

In an ideal world, COBie would be the delivery mechanism for product data, but the IFC Schema upon which it is based does not have adequate fields to properly describe building services products.

We have focused on building services because that is the sector CIBSE represents. There are similar efforts being carried out by other organisations – for example, the Landscape Institute is also on a PDT mission.

We are confident that the use cases for PDTs are wider than information exchange at construction and handover. We have collated fields deemed important by consultants, contractors and FMs into each PDT, so the manufacturer only needs to complete this information once for a product type. The uses of that information feed into the design, procurement, delivery and construction phases, without further effort by the manufacturer.

Where we can, we have mapped our parameters onto the BuildingSmart Data Dictionary, the repository on which IFC fields are based. Around half of the parameters our expert teams identified were not in that dictionary – hence why we have not used only the COBie requirements, but the stated requirements of members of the design and construction supply chains. We have offered our findings of new field requirements to BuildingSmart, but its reaction times are limited by the consensus building process that surrounds new additions to the IFC Schema.

Love thy neighbour

I have a question for the heat pump gurus about the dilution of whichever source from which energy is extracted. If heat pumps are to be used in dense conurbations, how serious is this degradation?

For an air source heat pump, energy is extracted from the local atmosphere, which is cooled and which, therefore, increases all nearby buildings' heat losses. For a solid ground source, the ground is cooled and a similar problem exists, unless heat pumps dump heat to the ground from cooling during the summer. The problems may be less for groundwater and river-based sources, but in the Netherlands – where large quantities of water flow through the gravel from which their systems extract heat – there is a measurable 'downstream' effect.

In all cases, there is the potential for affecting one's neighbours, though a ground source would probably be the worst. River authorities have their restrictions, but – for the other two sources – there would probably be a slow reduction in the degree and extent of the urban heat island. But how far will it go when everything from transport to lighting is reducing its energy consumption? Will people ask for 'ancient heat' legislation analogous to 'ancient lights' law, or sue their neighbours for nuisance?

The conclusion must be that implementation should be limited – possibly restricted to carefully tested locations – and that we should concentrate first on insulation.

John Moss MCIBSE

Tunnel vision

Should a review of use of existing tunnels happen once electric vehicles outnumber those with internal combustion engines? As oxygen consumption and CO_2 and NO_x will be reduced massively, will formerly unusable tunnels become viable without special ventilation? Has research been carried out into this?

Bruce Latimer

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We reserve the right to edit all letters.

Skills for the future

Digital construction and zero carbon buildings are changing how the building services industry develops its engineers, says Hywel Davies

As noted in this column last month, the Intergovernmental Panel on Climate Change Special Report underlines the urgent need to change how we build, maintain and refurbish our built environment to reduce its emissions.

We are also seeing the advance of digital technologies into our sector: building information modelling; robotics; factory-based assembly using modern manufacturing techniques; and artificial intelligence in the design and construction of buildings. There is also greater use of sensors and information systems in buildings and infrastructure, to inform the operation of built assets.

We face the challenges of the Clean Growth Strategy, decarbonising the electricity grid, phasing out high-carbon fossil fuels, adopting lower-carbon heating technologies, and switching to electric vehicles. And we have the very clear call from Dame Judith Hackitt for a change in the culture of our industry.

All these demands require us to build and behave differently. So we must think about how we train the next generation of engineers in digital, low carbon construction, using decentralised energy and focusing on buildings as systems that need to be safe throughout their life.

What are the implications of this for our universities? What changes need to be made to the courses of study that those coming into our industry follow?

The move to low or zero carbon buildings will change the way we teach building design. Systems that we currently take for granted will be less favoured in future. Changes in the carbon intensity of electricity generation also alter some of the assumptions we make about heating systems. As we move to a decarbonised grid, the argument for fossil-fuelled heat generators changes, and the need for newer technologies – such as heat pumps – grows. But we know successful adoption of these technologies requires good design, and good design requires an understanding of the technology and the physics of the building as an overall system into which this technology will be installed.

As we move towards a distributed, decentralised energy system, with significant levels of renewable energy generation, the whole basis of the grid must change. Managing peaks of supply and demand will also become more challenging as we shift to more electric heating and electric vehicles. We will need new ways of managing demand to avoid the need for significant and costly upgrades to the distribution network – upgrades that, in some parts of the UK, may take years. We need storage to maximise the use of renewable energy on a mildly windy sunny day. Electric vehicles have the potential to be both an opportunity for storage and a challenge, by creating peak demand when everyone wants to recharge them – at night!

"A new set of skills is required in the design of buildings for a digital, decentralised, low carbon, post-Hackitt world"

These emerging trends require a new set of skills, not just in low carbon design of buildings, but in the design of the built environment for a digital, decentralised, low carbon, post-Hackitt world. This, in turn, requires courses that CIBSE and other professional bodies accredit to evolve, so that the skills of those who emerge from these courses keep pace.

This is nothing new. Several years ago, the need for a new skill set for the design of sustainable buildings led CIBSE to work with the Royal Academy of Engineering to recognise four Centres of Sustainable Building Design (see panel below).

Heriot Watt, Sheffield, Loughborough and University College, London set up the centres to address the need for interdisciplinary teaching to deliver graduates more able to meet the current and future needs of the built environment sector. They now offer training that bridges architecture and engineering, and considers the need for more sustainable buildings in everyday practice.

Those who lead the centres – and, indeed, all those who train the next generation of engineers for the built environment – are continuing to develop and evolve that training. They recognise that it is essential to meet the needs of our sector and to deliver a new generation of engineers equipped for the challenges of distributed energy, digitalisation and zero carbon.

CIBSE and its members should do all we can to support and encourage them.

DR HYWEL DAVIES
is technical director at CIBSE
www.cibse.org

CENTRES OF EXCELLENCE

In 2013, the Royal Academy of Engineering recognised four Centres of Excellence in Sustainable Building Design at the universities of Heriot Watt, Loughborough, Sheffield and University College London. The centres work as a network to produce built-environmental professionals with the knowledge and skills to deliver affordable sustainable design. For more information, visit bit.ly/CJDec18HDRAE

Highlighting the line of duty on building designs

Engineers have a duty to act with reasonable skill and care, but that doesn't necessarily mean their designs are fit for purpose under the law, says CNS Consult's Vincent Fogarty, who summarises designers' legal obligations

UK law provides that, in the absence of any written terms and conditions to the contrary, a professional designer has a duty to act with reasonable skill and care. This duty is implied in all contracts for service by virtue of the Supply of Goods and Services Act 1982.

There is a common-law test for negligence, which states that a professional person is not negligent if they carry out their work to the same standard as another reasonably competent member of their profession would have done.

The Bolam Test[1] established that, where special skill and competence are involved, it is not necessary for the professional consultant to possess the highest skill, provided their views or actions accord with those of a responsible body of opinion of that profession. So if a consultant can show they acted in accordance with the usual practice and professional standards for their particular business, current at the time the design was carried out, they will escape liability.

"Fitness for purpose is an absolute obligation to achieve a specified result, a breach of which does not require proof of negligence"

Fitness for purpose

A fitness-for-purpose obligation imposes a higher duty because it is an absolute obligation to achieve a specified result, a breach of which does not require proof of negligence. This duty stems from the Sale of Goods Act 1979, which imposes implied terms on any seller acting in the course of business that the goods supplied will be of satisfactory quality and – where the purchaser makes known any particular purpose – are reasonably fit for their intended use. In construction, for example, this means a contractor is effectively guaranteeing that the components and finished building will be fit for their intended purpose.

The distinction between these two levels of responsibility is important because professional indemnity insurance will cover the holder only in the event of a claim arising out of their professional negligence – for example, a failure to exercise reasonable skill and care. This leaves the designer uninsured against a claim for breach of a fitness-for-purpose obligation.

Without using the phrase 'fitness for purpose', absolute obligations may still be imposed. A common way for this to be achieved is to insert a requirement for the consultant to warrant that the completed works shall comply with the employer's requirements and/or any performance specification. Such wording commonly follows a reasonable skill and care obligation, which may lull a consultant into a false sense of security. For example, an amended clause may read 'the skill, care and diligence to be expected of a properly qualified and competent architect or engineer'.

Duty to warn and Grenfell

The Grenfell fault question is subject to an ongoing police investigation, but it could be reduced to who possessed the awareness of the fire risk associated with the cladding, and who ought to have had that awareness and an obligation to warn? If a party did recognise an error, there could be a duty to warn.[2]

English law is void of a general duty to warn, but circumstances may arise in which such a duty exists. There may be a duty of care in tort to warn a third party of a known danger, and – where there is a contract – a duty to warn may extend to dangers of which a party ought to have been aware, particularly where a potential threat to the wellbeing of people is extant, as in *Cleightonhills v Bembridge Marine*[3], when Akenhead J said: 'An obligation to ascertain or check whether designs or works are safe for human beings, his or her tortious duty of care may extend to warning or advising about inherent dangers of which he or she should have been aware.'

This obiter may prove to be relevant in the context of Grenfell and may determine who ought to have had a duty to warn on design decisions that were, perhaps, erroneously made.

VINCENT FOGARTY
is a director at
CNS Consult,
www.cns-consult.co.uk

References:

1 Bolam v Friern Hospital Management Committee [1957]
2 *Building a Safer Future*, December 2017, Dame Judith Hackitt, Cm 9551, Summary of the report, Interim report. The review has not been charged with investigating the specific circumstances at Grenfell.
3 Cleightonhills v Bembridge Marine Ltd & Others. [2012]

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REWARDING BEHAVIOUR

Judges for the 2019 CIBSE Building Performance Awards were delighted to see a much more user-centric focus among entries this year, as well as a move to use data to optimise buildings. **Alex Smith** reports


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Building operators are increasingly using live data to help optimise engineering services. The growth of digital services in building engineering was observed by judges during the shortlisting for the 2019 CIBSE Building Performance Awards, held at CIBSE's offices in Balham, London.

Fourteen categories were debated by 14 experts representing a broad cross- section of the building services industry. They included manufacturers, consultants, contractors, facilities managers, and property owners. The full shortlist can be seen on page 20.

Many company entries in the project of the year categories claimed optimal performance was being delivered by the constant analysis of live data-measuring building equipment.

Digital dashboards reporting key metrics to facilities management teams and building occupants were used to alert them to deviations from expected energy performance and comfort levels.

Judges also observed that entries were putting more emphasis on health and wellbeing and social sustainability than in previous years. Engineers were seen to be targeting good outcomes in indoor environmental quality and occupant wellbeing, as well as lower energy use.

Sophia Flucker, director at Operational Intelligence, noted that the entries were often focusing on human outcomes as much as technical ones.

'We seem to get better results when entries don't just talk about the technical solution. It's looking at how people interact with different stages of the project. They recognise there is a human element all the way through the project from the user perspective to the collaboration early in the design process,' said Flucker.

Judges for the Project of the Year – Commercial/Industry said the 'careful consideration of occupants' was a theme that ran through all entries in the category. They said they showed 'a real depth of understanding about the interaction of people and buildings'.

Judging for the three Building Performance Consultancy of the Year categories looked closely at how companies

ENGINEER OF THE YEAR

For the first time at the CIBSE Building Performance Awards, a prize for overall Building Performance Engineer will be announced. The award will be judged on 4 December. See the shortlist on page 20.

The judges for the award are: Isabelle Smith, principal mechanical engineer at Atkins; Les Copeland, commercial director, Ramboll; Philip King, Hilson Moran; Kevin Mitchell, global practice leader, Mott MacDonald; and Julie Godefroy, head of sustainability at CIBSE.


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JUDGING PANEL

1 **Hywel Davies,** technical director, CIBSE, and chair of judges
2 **Mark Hawker,** chief engineer, Anthesis Group
3 **Sophia Flucker,** director, Operational Intelligence
4 **Debbie Hobbs,** head of sustainability, Legal & General Property
5 **Sarah Ratcliffe,** programme director, Better Buildings Partnership
6 **David Stevens,** vice-chair, CIBSE Facilities Management Group
7 **Tamsin Tweddell,** senior partner, Max Fordham
8 **Susan Hone-Brookes,** chief engineer, MTC
9 **Gita Maruthayanar,** principal design engineer, Atelier Ten
10 **Nigel Clark,** technical director, Hilson Moran
11 **James Warne,** co-founding director, Boom Collective
12 **Sara Kassam,** head of sustainability development, CIBSE
13 **Andy Green,** technical director, Baxi Heating
14 **Simon Ebbatson,** principal, Elementa Consulting
15 **Jerry Lehane,** board director, chapmanBDSP

BOOK YOUR PLACE NOW

The 2019 CIBSE Building Performance Awards Dinner will take place at Grosvenor House Hotel, London, on Tuesday 12 February. To book a table visit www.cibse.org/building-performance-awards

CIBSE BUILDING PERFORMANCE AWARDS 2019

> "Judges also observed that entries were putting more emphasis on health and wellbeing and social sustainability than in previous years"

were developing their staff. They were impressed with the large – and diverse – number of small companies entering in the 'up to 100 employees' category.

They noted that many of them, despite their size, were leading their particular industry sector or region.

The judges were surprised to see that some product and project entries were lacking real evidence in their submissions. They thought that some would have benefited from waiting another year before being entered to allow for more evidence to be gathered.

Another observation was that often supporting data was difficult to decipher unless it had been visualised in a understandable format. 'We don't just want utility bills, we want graphs showing a trend,' said one judge. Entries presenting occupant building data in a clear, understandable way were given extra marks.

'We are looking for quality of data rather than quantity,' said one judge. 'How metrics are presented makes a big difference in the judging.'

In the international Project of the Year category, the judges were pleased to see that projects in markets outside Britain were hitting mandatory performance targets set by local government.

The judges felt there were lessons there for UK buildings, and these will have to be learned quickly if initiatives such as Design for Performance – which include operational performance targets – gain traction in the UK. CJ


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2019 SHORTLIST

BUILDING PERFORMANCE ENGINEER
- Antoni Sapina Grau, Engineer – WSP
- Chris Croly, Building Services Engineering Director – BDP
- Clara Bagenal George, Senior Engineer – Elementa Consulting
- Mark Dowson, Associate Sustainability Engineer – BuroHappold Engineering
- Simon Wyatt, Partner – Cundall
- Tunde Olaoye, Energy Performance Solutions Engineer – SSE Enterprise Energy Solutions

BUILDING PERFORMANCE CONSULTANCY (UP TO 100 EMPLOYEES)
- AESG
- Banyards
- Elementa Consulting
- $EECO_2$
- FairHeat
- Steven Hunt & Associates
- WARM: Low Energy Building Practice

BUILDING PERFORMANCE CONSULTANCY (101 - 1000 EMPLOYEES)
- BDP
- Cundall

BUILDING PERFORMANCE CONSULTANCY (OVER 1000 EMPLOYEES)
- Atkins
- BuroHappold Engineering

LEARNING AND DEVELOPMENT
- GATES Scheme – Hurley Palmer Flatt
- The Cundall Diploma – Cundall

COLLABORATIVE WORKING PARTNERSHIP
- Broadway Chambers – Woodford Heating & Energy
- Lark Rise – bere:architects
- TfL Palestra E.ON RE:FIT Optimisation – Transport for London
- Urban Sciences Building, Newcastle University – BuroHappold Engineering

ENERGY EFFICIENT PRODUCT OR INNOVATION
- Armstrong Tango parallel pumping solution – Armstrong Fluid Technology
- City Multi R32 Hybrid VRF – Mitsubishi Electric
- FX HFO – Mitsubishi Electric Hydronics & IT Cooling Systems
- i-NX – Mitsubishi Electric Hydronics & IT Cooling Systems

ENERGY SAVING PRODUCT OR INNOVATION
- Allure UNITOUCH – Distech Controls
- Insulation Retaining Clip – Crickhowell Contractors
- Menerga Adconair Adiabatic zeroGWP - FC-free supply-air cooling – Systemair
- The Encore Cistern – The Green Futures Initiative

ENERGY MANAGEMENT INITIATIVE
- 110 Fetter Lane Combined Chiller & Trigeneration Optimisation – Cavendish Engineers
- 2 Kingdom Street Demand Driven Strategy – Cavendish Engineers
- AXON: Intelligent Billing & Recharging Solution – Next Control Systems
- Energy Reduction Plan at the Broadgate Neighbourhood – George Birchall Service
- TfL Head Offices FM Portfolio – Transport for London

FACILITIES MANAGEMENT TEAM
- London Stadium – VINCI Facilities
- TfL Head Offices FM Portfolio – Transport for London

PROJECT OF THE YEAR – COMMERCIAL/ INDUSTRIAL
- Big Data Institute – Long and Partners
- BSD's Kettering office – Building Services Design
- One Angel Square, Northampton – BDP

PROJECT OF THE YEAR – INTERNATIONAL
- Aorangi House Revitalisation and Optimisation, Wellington, New Zealand – Beca
- Early Learning Village, Singapore – AECOM
- EY Centre, Sydney, Australia – Mirvac
- Golden 1 Center, California, USA – AECOM
- Hillman Hall, Missouri, USA – BuroHappold Engineering
- Musee d'Arts de Nantes, Nantes, France – Max Fordham LLP
- Silicon Valley Tech Office Drives Toward Zero, California, USA – Elementa Consulting
- The National Gallery of Ireland, Dublin, Ireland – BDP
- UC Santa Barbara San Joaquin Villages, California, USA – BuroHappold Engineering

PROJECT OF THE YEAR – PUBLIC USE
- Royal Birmingham Conservatoire – Hoare Lea
- TfL Palestra E.ON RE:FIT Optimisation – Transport for London
- Urban Sciences Building - Newcastle University – BuroHappold Engineering

PROJECT OF THE YEAR – RESIDENTIAL
- Cameron Close – WARM: Low Energy Building Practice
- Flagship Group, Orchard Close – Finn Geotherm
- Lark Rise – bere:architects

BOOK NOW cibse.org/BPA

THE SKY IS THE LIMIT

A recent Hilson Moran and CTBUH hackathon explored ideas for creating safe and vibrant residential towers. **Liza Young** joined in as the teams discussed the value in creating sky communities

Creating a sense of community and inclusion were universal themes across all five teams that competed at a hackathon, organised by the Council on Tall Buildings and Urban Habitat (CTBUH) and Hilson Moran.

The brief was to design a vibrant, inclusive and safe residential tower. For all the assigned demographics, mixed uses were located at various levels of tower blocks and the frequency of human encounter was intentionally amplified.

The winning blue team – comprising Mikel Lotina, of IDOM; Gregor Toland, of Marioff; Gonçalo Martins Pinheiro, of UHA; Takayuki Nakajima, of Eric Parry Architects; Mihai Leustean, of Westshore Engineering; and Chris Birch, of Hilson Moran – designed a tower for the semi-retired group.

Their futuristic design depicted a rotating tower – to give everyone access to daylight – made up of modular residential units that could be merged if needed.

The high-rise design had smart technology at its heart, with health monitoring built in, including systems to assess temperature, respiration rate and heart rate. The team said these systems would be linked to the smart building – which can ring the hospital or doctor – with which residents can interact by speaking to it.

The residential units were designed to have enhanced air quality, with filtration and monitors throughout. To ensure a safe outdoor space for residents, the team proposed a communal sky garden and horizontal and vertical drone taxis to move people up and down – and between – buildings.

In the future, the team suggested the living modules would eventually fly, reducing reliance on drone taxis.

The yellow team proposed a pair of 'synergy' towers for a young family. Rather than one overly tall tower, the team designed two medium-sized high-rise buildings, which have an easier buildability, quicker circulation time up and down the buildings, and narrower floorplates. To ensure connectivity throughout both buildings, the team designed bridges from one tower to the other. These shared spaces – or sky parks – were intended to encourage integration and bring light and fresh air into the building, creating a safer environment.

'What was important for us as a young family looking for schools was that each of the sectors within the building should be easily transferable and flow throughout it,' said James Pinkerton, architect at NBBJ.

Unlike a typical high-rise building, where retail is usually in the base and residential space above, the team proposed blending retail and greenery, housing and schooling through the tower on multiple levels to help with security.

Robin Cheeseright, director at d2e, said the team created 'vertical villages' to create a sense of community in the tower.

He said: 'If there's a stronger sense of community, there's a stronger sense of ownership, which creates a safe environment. If we can have a design that encourages lots of people to pass one another, they're always looking out for one another, which makes for an environment that is suited to a young family.'

Pinkerton added: 'Our design encourages

> "Most teams designed for a multi-demographic building with the purpose of bringing diversity into the vertical stack and ensuring the notion of 'me' is replaced with the notion of 'we'"

community cohesion throughout the tower, so it's not "them" and "us". By having different services, you're creating accidental collisions, where residents are going to bump into people from different sectors, age groups and backgrounds.'

He said that during the design process, the incorporation of operational processes within the building would be encouraged.

The green team's design for the single independent professional also focused on integration inside the high-rise and inclusion of the wider community.

The team referred to a 'sky community', where an events-based management team sets up events in the shared space at the top of the tower, creating a 'vertical street party' that is inclusive of the wider community.

The red team created a high specification student cluster for the young, educated workers. They envisaged blocks of bedrooms, complemented by a common lounge and co-working space – with internet services and connectivity – to encourage residents to interact.

The design also included a central 'hub' spread over a few levels to encourage people from both inside and outside the building to network.

The team said the profile of the future worker is that they will be autonomous, work remotely, and socialise and interact with other people by simply walking out of their bedroom door.

To ensure the high-rise block did not stay closed and alienated from the outside world, the lobby was designed to host different activities – for example pop-up markets – that anyone could take part in.

The pink team designed a tower for time-poor affluent couples, who are interested in socialising, safety and sustainability.

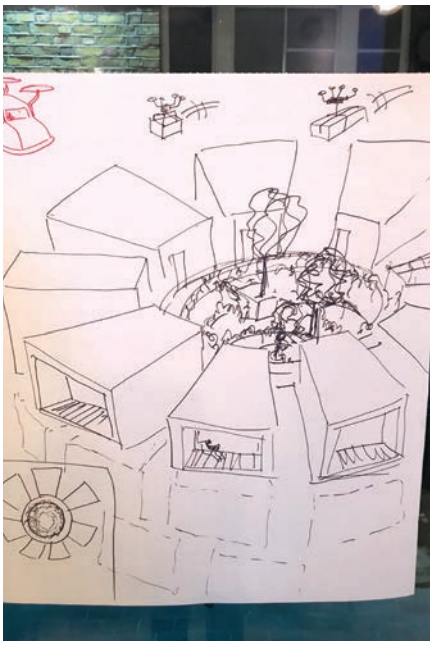
Their building, which has Internet of Things connectivity, included smart – but not intrusive – access control, where the lift allows residents into the building using facial recognition.

For socialising and networking opportunities, their design featured a shared flexible space to support different activities, including pop-up markets, performances, food stalls, community centres and shared kitchens, to 'create memories for the tenants'.

Despite the varied high-rise designs, all teams shared one objective – to create a community.

Most teams designed for a multi-demographic building with the purpose of bringing diversity into the vertical stack and ensuring the notion of 'me' is replaced with the notion of 'we'. **CJ**

The blue team sketching its design



The blue team's winning tower design

REACH FOR THE STARS

The Design for Performance initiative is partnering with pioneering developers to create a performance-in-use rating scheme in the UK that could transform office design and delivery, as **Liza Young** finds out

New buildings in the UK are supposed to be energy efficient, but the regulations intended to achieve this outcome secure efficiency in theory, but not always in practice. With operational energy performance rarely measured, this failure has been invisible, leading to the 'performance gap' between original design intent and how a building performs in use.

Design for Performance (DfP) is an industry-funded and backed initiative, established to tackle the performance gap and create a building-rating scheme based on measurable performance outcomes. The project looks to emulate the Nabers Energy Rating and Commitment Agreement that has transformed the prime office sector in Australia (see panel, 'What is Nabers?').

'This is not a "nice to have",' says Sarah Ratcliffe, chair of the DfP executive board, and programme director at the Better Buildings Partnership. 'The UK property industry desperately needs verification and disclosure of performance in use because, without these, the market cannot drive improvements in performance.'

Ratcliffe says the UK has been largely operating under the false impression that its regulatory and voluntary standards give a good indication of performance. 'But these standards measure only design intent, and buildings' actual performance is invisible,' she adds.

Currently, no metric exists to give the market visibility on performance, says Robert Cohen, technical lead at DfP, and technical director at Verco Advisory Services.

'Whether one building is better than its peers is unknown – the market is operating completely blind.'

Cohen says DfP is attempting to replicate what Nabers has done in Australia, where disclosure of the measured, base building operational rating is mandatory for commercial offices. In the UK, buildings must disclose their Energy Performance Certificates (EPCs), but these are based on theoretical calculations.

After a feasibility study and a series of pilot projects (see panel, 'DfP timeline'), the DfP team has secured the commitment of seven 'pioneer' developers to fund the establishment of a Nabers-like scheme and apply the Commitment Agreement process to at least one of their projects. They include: Landsec, Lendlease, The Crown Estate, TH Real Estate, Legal and General, Great Portland Estate, and Grosvenor.

Ratcliffe says DfP is currently in advanced discussions with Nabers about bringing the scheme to the UK. 'They will make the scheme

WHAT IS NABERS?

Australia's Nabers office energy-rating scheme targets in-use energy performance of the 'base building' – services typically under the control of the property owner, including heating, hot water, ventilation and air conditioning of the whole building, light and power in common areas, and lifts. For new office developments, clients, developers and their teams sign up to – and follow – a 'Commitment Agreement' to design, construct and manage buildings to achieve agreed levels of in-use performance.

infrastructure and intellectual property available for the UK and, over the next year, we will be adapting their rules, guidance and assurance processes for the UK market.'

The upskilling that will be needed across the sector will require vast industry collaboration, adds Ratcliffe, while industry engagement, training and accreditation to deliver DfP will be a critical next step.

Design for compliance

The key objective of the pilot studies was to test key elements of the DfP approach, to understand their viability and applicability in UK offices.

> "The UK has been largely operating under the false impression that its regulatory and voluntary standards give a good indication of performance. But these measure only design intent"
> – *Sarah Ratcliffe*

DfP TIMELINE

In 2012, Verco worked with the Better Buildings Partnership (BBP) to develop a Nabers-like 'landlord energy' rating scheme, which was piloted on 85 BBP members' buildings. It was found that applying the Nabers system to existing offices in the UK was a challenge because it was either too expensive or inaccurate. 'We needed to know how much energy was used for the HVAC throughout the building over a year,' says Cohen, 'but the landlord was only able to tell us the energy used for the central system and, often, this was supplemented by energy use from the tenants' supplies – for example, for fan coil motors or perimeter heating. These HVAC energy uses could not be disentangled from the energy used by tenants for their lighting and plug loads.'

As a result, DfP looked at creating the scheme for new buildings, where the 'blurred lines in metering and building services arrangements can be avoided because you're starting with a clean sheet of paper', adds Cohen.

In 2015, DfP ran a six-month desk feasibility study, looking at key components of the scheme with Australian experts and checking whether they could work in the UK, particularly for new developments. The pilot projects – completed over the past two years – then tested whether or not it was possible in actual office developments.

Last month, DfP announced the 'pioneers phase', which involves the development of a national Nabers-like scheme in the UK.

Cohen says the systemic failings in the current design-for-compliance process were one of the key findings of the recently completed pilots.

'The current system of applying energy efficiency requirements based on a theoretical model – the results of which are never, and can never be, verified by measurements – is so fundamentally flawed it is remarkable it's continued for so long,' he says.

Whole-building assessments started in 2008, after the EU directive on the energy performance of buildings was adopted in 2002, and Part L has been ratcheted up every five years. But Cohen says there is no evidence that buildings – especially those with air conditioning – have been improving their performance in use as a result.

'The evidence from Australia has brought everybody to their senses because, if they've had a total market transformation in the energy intensity of their buildings – which has been measured and verified – why can't we do that here?'

Most importantly, says Ratcliffe, the way targets are set has to change. 'We need to stop operating under the false impression that our design standards will deliver outcomes and, instead, specify performance outcomes as part of the brief.'

Advanced simulation

The other key finding, says Cohen, is the power of advanced modelling – now routine in Australia – which is rarely used in the UK because clients do not ask for it, and don't know why they should.

The moderate climate in the UK has made us complacent, he says. 'Our buildings are using two to three times more energy than their equivalents in Melbourne. The best buildings in Melbourne are using five or six times less energy than on average in the UK.' »

» 'If we are designing a sophisticated building – which most air conditioned offices are – why not run it virtually in advance of constructing it, and check that it's going to work?'

Software used in Australia – including IES and EDSL, which, ironically, is made in the UK – is set up to enable this to be done relatively easily. However, the capacity of the model to do that isn't used in this country, says Cohen, who adds that the model can be used to commission the building and fine-tune it in operation.

The modelling we currently do is all about the fabric of the building, says Cohen, while advanced simulation requires the full detail of the heating, ventilation and air conditioning (HVAC) system – including the ducts, fans, pumps, chillers, boilers – to be entered into the model, and modelling to be done at least hour by hour.

'On a time-step by time-step basis, you work out: how much heating or cooling is required in each zone of the building; how the HVAC system is going to provide that heating or cooling; how much air will be going down the ducts; what is the pressure drop in those ducts; and what the fan efficiency is, given the pressure drop,' he says.

'You have a power curve in your model to describe how efficient your fan is – for example, depending on what load it's working at – and you work out the amount of energy used for the fan at every time-step, so it gets accumulated to the figure for the whole year.'

As well as getting the model to create the right conditions in the virtual building, the control systems are defined, Cohen adds. This definition can be written into a draft description of operations, which is used by engineers to design the building's controls. The model can also be used by commissioning agents to check that the real building is being controlled in the same way as its virtual counterpart. 'You end up with a building that should operate the same as it does in its virtual twin,' says Cohen.

> "If you allow the market to drive the scheme, it can be very effective in getting the market to compete for higher levels of performance"

And it can be done; one of the pilot studies carried out high-quality advanced simulation work on an existing building and the corroborated model represented the real operation of the building. 'We were able to verify that the model could reflect what was happening in the real building,' says Cohen.

Reaching goals

As soon as you assign a rating to a building, it changes the conversation, adds Cohen, because you don't need to be an engineer to understand that – if a five-star building is using three times less energy than a two-star building – it's a better building.

Setting a minimum standard tends to become a race to the bottom, says Ratcliffe. 'If you allow the market to drive the scheme by setting its own goals, it can be very effective in getting the market to compete for higher levels of performance – as Australia has proven.'

'We want people to get confidence and experience with the pioneers project by testing the water carefully, setting fairly conservative targets without penalties for not achieving those targets, so contractors don't have to price it into the risk perspective,' says Cohen.

Nabers has had a long journey to get to the point where disclosure is mandatory, starting off as a voluntary initiative. 'It achieved market coverage by reducing, gradually, the size of the assets that needed to disclose,' says Ratcliffe, who hopes the UK will follow a similar trajectory, but in a much shorter timeframe.

'It's not just possible – it's a very exciting prospect,' says Cohen. 'The industry will warm to this because it will help M&E engineers attract and keep the best talent, as it's going to make their job a lot more interesting.' CJ

The best buildings in Melbourne are using five or six times less energy than on average in the UK

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The aftermath of a cladding fire at the Lacrosse building in Melbourne, Australia

PRESSURE POINT

The Grenfell Tower fire was a wake-up call for the construction industry – not just in the UK, but around the world. CIBSE South Australia chair **David Robinson** looks at his country's building fire safety legislation around pressurisation, smoke detection and hot smoke testing

The lessons to be learned from Grenfell Tower do not just apply to the UK. Australia has experienced fires in high-rise buildings, including a cladding blaze at the Lacrosse building in Melbourne that prompted an update to building codes.

Australia is divided into states and territories which are identified as New South Wales, Victoria, Queensland, Australian Capital Territory, Northern Territory, South Australia, Tasmania and Western Australia, all governed by their own individual legislative acts/regulations; but having the benefit of a uniform Building Code of Australia (BCA) that is mandated through each legislative process.

Ventilation system

The ventilation system specified for Grenfell Tower would not be permitted under the BCA because the mechanical ventilation set-up was an exhaust system to ventilate a fire-floor lobby.

In Australia, there are traditionally two smoke-control methods – zone pressurisation and stair/lift-shaft pressurisation – which can vary according to the occupancy use of the building.

Stairwell pressurisation

Stair pressurisation – and, alternatively, lift-shaft pressurisation – are for positive pressure/airflow, whereas exhaust systems provide negative pressure/airflow operation.

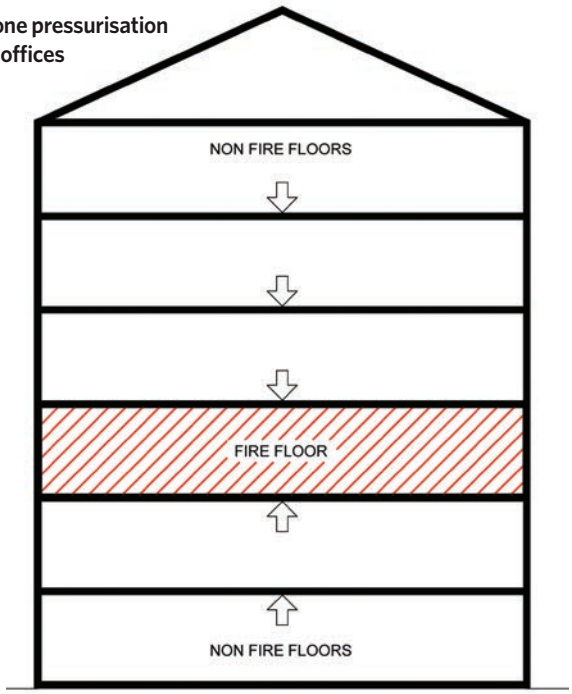
Stair pressurisation is still a requirement for buildings more than 25m high in Australia – in some cases supplemented by smoke lobbies, which are specified in the BCA but not adopted by all Australian states. Generally, smoke lobbies will be constructed for fire resistance and be impervious to smoke, with doors that close automatically on detection of smoke. Where two access doorways lead directly into a fire-isolated exit, smoke lobbies can be chosen as an alternative to stair pressurisation, unless stair pressurisation is already specified, in which case the smoke lobby will form part of the pressurisation provision.

Stairwell pressurisation is also a velocity-based airflow system. On start up, the stairwell is effectively sealed, so the airflow (supplied by the fan) needs to be regulated to control pressure so as to achieve the correct door-opening force (no more than 110N). When stairwell door(s) are opened, the fan speed increases to achieve the correct velocity of airflow across door openings, to minimise smoke ingress from the fire floor during evacuation. In earlier design criteria, the pressure control required was 50Pa. This requirement was removed in 1991, when it was realised that door-opening force was the more logical means of reasonable stair access.

Another way of relieving the pressure to allow doors to open is barometric dampers (that use adjustable counterweights so they open at a set pressure difference). However, the most common method is to use a variable speed fan. These systems operate on the whole volume of the stairwell irrespective of fire-floor demand, but – for safety – an additional storey, with a stair door that opens simultaneously with that of the fire floor, is needed. Air-relief shafts are also required, to achieve the velocity airflow design – which means more 'lost' space.

Stairwell pressurisation relies on outdoor air intakes external to the building, either from the roof or the façade. Calculations for delivery of air into a stairwell for pressurisation assume that all conditions are controlled. However, the outdoor environment is not controllable, so the system can be influenced by varying factors. These include: extreme temperature differences; the heat gradient from low to high level over the height of a multistorey building; wind direction that affects pressure at the air intakes and discharge points and the stair geometry, which may cause a vortex action as air passes into the stair, thereby failing to give the required positive directional airflow through the doors.

Zone pressurisation in offices



In zone pressurisation the fire floor is under neutral or negative pressure compared with 'non-fire floors'

> "Smoke lobbies are an option for fire resistant construction: doors close automatically on detecting smoke"

Zone pressurisation

For buildings (such as offices) more than 25m high with open-plan floors, zone pressurisation is used. This will not be applicable to sole occupancy units of Class 2 (apartmnets) or 3 (hotels, motels, and guest/boarding houses) – because there should be fire-resistant construction that contains flats/accommodation, and services, such as air conditioning and ventilation systems.

Zone pressurisation is applicable to all other building occupancies and is in addition to stair pressurisation. Also called 'sandwich' pressurisation, it is based on a 'fire floor' under neutral or negative pressure compared with all other 'non-fire floors' which are specified to maintain a pressure difference of 20Pa. This is based on a design theory within National Fire Protection Association (NFPA) 92A by John Klote (USA). It was first put into practice in 1980 for a building in South Australia, and proved so effective that it was mandated within the BCA.

This design can apply to central air handling systems and buildings with one air handling unit (AHU) per floor. The former has to have some redundancy in terms of reliance on a single system serving several storeys, whereas the latter arrangement automatically has redundancy because there are multiple air handling plants. Stair pressurisation is still a requirement, but the zone system can protect a stair without the need for separate, independent stair-pressurisation systems.

»

» Hot smoke testing

For complex building fire strategies hot smoke testing is essential; but Australia has for a number of years used hot smoke testing. Theatrical smoke has been considered too 'cool' with a lack of buoyancy to be truly effective and, as a result, the development for hot smoke testing was initially used for unique atria designs.

Initially considered to prove smoke control designs based on empirical formulae (and prior to the current trend advantages of CFD modelling), the test apparatus was based on developing an axisymmetric smoke plume using smoke 'bombs' to discharge through a flue pipe directly over the centre of a live fire. The fire source itself was derived from a series of different size metal trays containing methylated spirits to reflect the megawatts design fire scenario.

Now, hot smoke commissioning is usually set to prove actual design provisions in addition to the fire strategy sequence and operation of plant. As a result of the buoyancy 'drive' from hot smoke movement, these tests have also been advantageous in finding overlooked non-fire stopped penetrations in building elements which has led to bad performance of the intended smoke control strategy.

Smoke detection/alarm systems

Smoke detection for Australia Class 2 and 3 buildings differ in many respects.

Class 2 apartments are private residences and specifically considered as owner occupiers, whereas Class 3 relate to other accommodation occupancies as previously identified. Class 2 then has the requirement for individual smoke alarms within apartments supported by hybrid options for the common corridors; whereas monitored conventional/addressable detection/alarm systems are used for Class 3.

The difference relates to occupants who should be familiar with their own residence and building surrounds in comparison to a transient population occupancy, which can vary from any overnight accommodation to perhaps weekly.

However, the general manipulation by developers is that apartment buildings being submitted for approval are rarely occupied as an owner occupier residence, being sub-let almost constantly for short term rental or holiday use.

This is a degrading of the intended fire safety requirements traditionally considered for the accommodation of a transient population. **CJ**

DAVID ROBINSON is CIBSE committee chair for South Australia and an engineer specialising in fire-safety building code and fire-protection services

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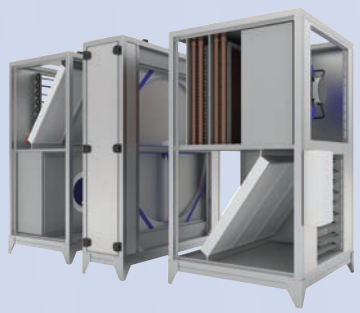

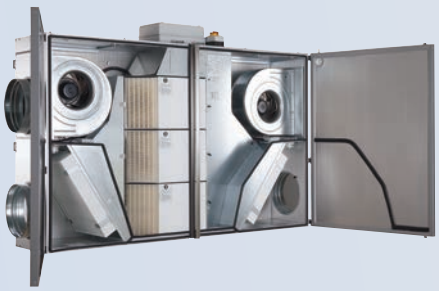
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MAKE LIGHT WORK

From before concept to beyond commissioning, lighting design involves a complex range of considerations. SLL president **Iain Carlile** looks at the many stages of the process needed to ensure a successful installation

Recent technological advances have resulted in LEDs becoming the most common artificial light source, with an increasingly diverse range of luminaire types and styles available to the lighting designer.

At the same time, LEDs – essentially electronic chips – have enabled the more sophisticated digital control of luminaires. Because they require control to be properly managed, control technologies are now also an intrinsic part of many lighting installations.

The upshot of this rise in products and technologies is a corresponding increase in what a lighting designer can achieve, and a proliferation of ways an installer can deliver this vision. So how can lighting designers be sure the scheme they have imagined and designed is realised by an installer – and how can they ensure it is appropriately maintained throughout its life?

The starting point for any lighting scheme is a brief from a client, ideally detailing what the design is to achieve. Where a client is unfamiliar with the latest lighting developments, however, the starting point in creating a brief may involve showing examples of what others have delivered – or even setting up workshops to demonstrate the capabilities of various light sources.

However it is done, establishing a well-defined brief is a difficult, but necessary, exercise to ensure the lighting concept is appropriate in its functional requirements. A brief may also reference affordability, maintainability and sustainability. Ultimately, it will enable the concept design to be developed and presented to the client for approval.

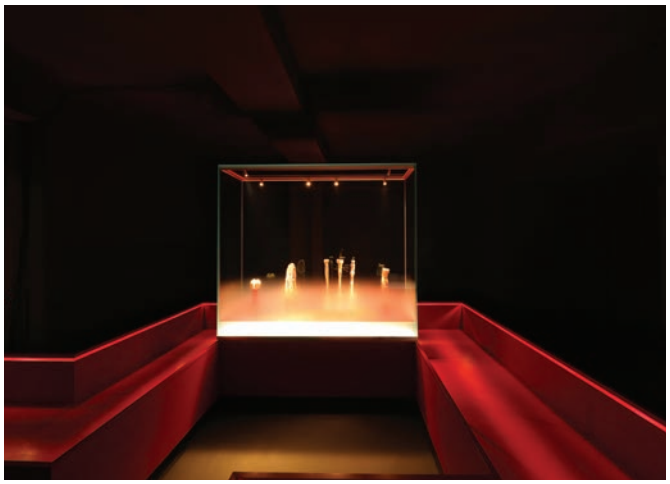
Development of the design details will allow this concept to become reality. This will involve the selection and specification of equipment, its location, and its proposed means of installation and integration with the architecture. Ideally, this stage of design will involve working closely with other members of the design team – possibly the architect and interior designer – to ensure the lighting scheme fits the reality of the space, materials and proposed finishes. Mock-ups of specific details will help demonstrate design intention and inform the maintenance and construction processes.

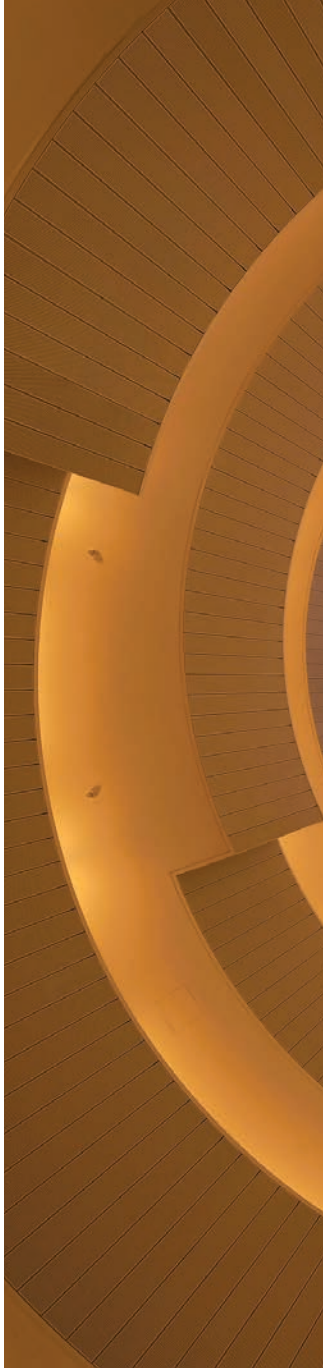
An initial conversation with the future facilities management personnel at this stage will also reap huge benefits, by highlighting any issues that will need to be addressed if the scheme is to be easily maintainable. These can include access, the expected degradation in lumen output from the light source and driver performance, and even the likelihood of degradation in output resulting from a potential build-up of dirt on the luminaire in a dusty work environment. The discussion could also encompass potential future changes in surface finishes and room reflectance.

Equally important at this stage is for the designer to talk with the contractor about realising the design on site, so that potential installation issues can be resolved early in the design's development.

Conversations with the contractor will be made easier if the scheme is being designed using building information modelling (BIM). As CIBSE members will be aware, BIM is a collaborative way of designing a building virtually, by collecting and sharing project data before construction starts, and Level 2 BIM is a requirement on all UK government projects. Its collaborative nature calls for close interaction between the design team and the lighting designer.

One of the challenges for lighting designers working in BIM is to





Left: Early involvement in the design process shows in Licht Kunst Licht's scheme for the German Ivory Museum

BUILD2PERFORM SESSIONS

Lighting and FM were major themes at Build2Perform, which featured sessions on:

Understanding lighting design through to handover
Chaired by Les Copeland, commercial director at Ramboll

Maintenance of lighting systems
Featuring David Stevens, vice-chair at the CIBSE Facilities Management Group, and Richard Caple, lighting applications manager at Thorlux Lighting

There were also sessions on daylighting considerations for integrated design. These included presentations from: Elisabetta Li Destri Nicosia, senior sustainability consultant, HTA Design; Luisa Brotas, sustainability and climate change officer and daylight consultant; and Paul Littlefair, principal lighting consultant, BRE.

Papers from many speakers can be downloaded from www.build2perform.co.uk

Left: Speirs & Major's Gasholders, at King's Cross, shows both integration, and the balance between natural and artificial light

ensure luminaire data is available in a standard format so there is compatibility and interoperability between modelling platforms. To speed up the development, dissemination and adoption of standardised product data, CIBSE introduced BIMHawk as part of its free online toolkit last year.

The toolkit includes a luminaire product data template (PDT) – a list of predefined, lighting industry-recognised parameters that describe a luminaire. CIBSE has partnered with Paul Marsland, design and BIM manager of NG Bailey, to create a BIMHawk website that allows PDTs to be integrated into BIM authoring systems.

Lighting Commissioning Code L

Ensuring what is contained in the BIM model (on the drawing board) actually gets delivered on site is frequently a challenge. The Society of Light and Lighting (SLL) has recently updated its Lighting Commissioning Code L, offering a definitive management process for electrical engineers and contractors, to enable a lighting scheme to be delivered in line with the designer's intentions.

The revised code is intended to be a guide to good practice for the commissioning of lighting installations, and to help define commissioning and handover procedures. It advises on the stages, activities and actions required to commission an installation, including its luminaires, emergency luminaires, lighting controls and the scheme's interfaces with other services.

The process described in the code aligns with the RIBA project stages of design, construct, completion and post-completion evaluation.

The code also emphasises the importance of giving customers accurate operating and maintenance information. This information is increasingly being supplied as an electronic operations and maintenance (O&M) manual, often incorporating BIM software models.

If all of the operational features of a building are present in the BIM model, there is no reason why the model cannot be analysed by the facilities management (FM) team for energy and operational performance. So part of the commissioning process should include a check for the accuracy and completeness of O&M media. Without accurate O&M information, it will be increasingly difficult and costly to maintain, fault find or extend the lighting installation during its life-cycle.

Code L also emphasises the importance of providing the appropriate levels of training as the lighting installation nears completion.

This part of the commissioning process is important because the facilities manager will be tasked with ensuring the installation operates to agreed service levels and that the building users understand how the lighting works, and the benefits it has been designed to deliver. End users may, for example, experience automatic changes in artificial light levels and colour in their working space, but may not understand the reasons, so, may try to prevent it from occurring.

Training is also important where manually operated lighting scene controls can be operated by end users. It will also be particularly important where there is a significant period of time between completion of the lighting installation and the occupants moving in.

Lighting and facilities management were key topics at CIBSE's fifth Build2Perform Live event in November, recognising that if a lighting design is to be realised – and the imagination behind the concept recognised – precise delivery of the scheme is critical. **CJ**

IAIN CARLILE is president of the Society of Light and Lighting

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Smart integration of systems must start with supply chain

Building control is becoming more complex as building management systems are having to be integrated with HVAC systems with onboard controls. InTandem Systems' Jon Belfield says further training is required for engineers

Smart, connected technologies are increasingly giving clients the ability to optimise building performance. Intelligence in buildings offers an enormous opportunity to reduce energy use and increase environmental comfort in both new and existing buildings.

However, this will only happen if consultants work closely with building management system (BMS) suppliers and integrators to ensure increasingly complex 'smart' systems meet design and through-life requirements.

There is growing competition for controls, which is making integration tougher to manage. More suppliers are adding controls to their products. For example, lighting systems might now come with PIR sensors, and specifiers now have the choice of HVAC with increasingly sophisticated onboard controls.

The boundaries are becoming blurred and specifications more open as designers have to decide whether it is better to buy controls for HVAC, or integrate the equipment through the BMS.

"Make the design and supply chain aware they can add value to the design"

As Building Controls Industry Association president, I am keen to raise both the professional status of BMS in the supply chain and increase controls awareness across the whole project team. Smart integration of building systems must start with the smart integration of the supply chain.

One big shift would be to make the design and supply chain aware that they can add value to the design, even if it isn't written in a specification. This isn't a new concept – it just isn't formally recognised. You will have sat in design review meetings, where a BMS engineer will offer advice – backed up by training and experience – on how to integrate a particular system to achieve operational requirements. These nuggets of expertise are golden when it comes to achieving building performance.

One opportunity is to identify how 'dynamic design' changes by BMS engineers can be managed and documented to become part of the measured outcomes.

Adding value to the design in this way doesn't necessarily mean adding cost – money can be saved while improving the design. Now there is a true definition of 'value engineering'

With more training and professional access to those doing the integration, designers' specifications are less likely to fall foul to outbreaks of 'vandal engineering', where systems or components critical to the success of the BMS are swapped for a cheaper alternative that undermines the ability of the building to operate properly.

Specifiers can name a preferred supplier, but they also have to offer contractors the chance to procure 'equal or approved' alternatives. But how does equal get assessed and what is the process for approval to ensure the skill set is there to deliver the project?

Many engineers making this choice lack the knowledge to make the optimum decision. The answer is training, so the appointed system integrators are competent and confident in selecting and using the BMS to integrate fully with all the systems in the building.

As part of this demand for increasing system integration capability, and to raise professional standards, a Trailblazer Apprenticeship for BEMS Control Engineers, supported by the BCIA, has been approved and will be launched next September (see June 2018 *CIBSE Journal*, **bit.ly/CJDec18JB**). The training scheme is not just aimed at young apprentices but also mature learners – maybe they are changing industry or upskilling – and existing controls engineers, so they have the opportunity to update their skills (by accrediting their previous experience). By definition, system integration is a never-ending learning programme; this has to be the mindset for any BMS engineer.

The ultimate goal is to ensure engineers will be awarded a BEMS gold card proving they are competent to ensure the final BMS selection really is equal or approved.

■ **JON BELFIELD FCIBSE** is managing director of InTandem Systems

COMMISSIONING COMPLEXITY

If systems and products are selected on their individual merit to meet client requirements, it is critical that a full audit is carried out after they have been integrated to ensure systems link neatly as a 'smart building solution'.

The audit should ensure the integration delivers an efficient and effective system that can be maintained and supported throughout the period between refurbishments and upgrades.

SENSOR SENSIBILITY

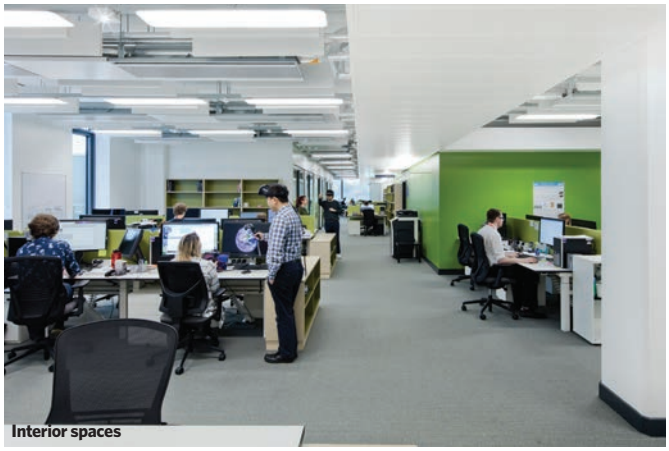
Newcastle University's Urban Sciences Building has 4,000 sensors to help optimise user comfort and energy performance. **Andy Pearson** reports

The Urban Sciences Building (USB) at Newcastle University has been designed to improve our understanding of the relationship between buildings and their wider environment. As such, it is wired to more than 4,000 sensors to allow academics to see how it performs and how it interfaces with the energy, water, internet and other networks to which it is connected.

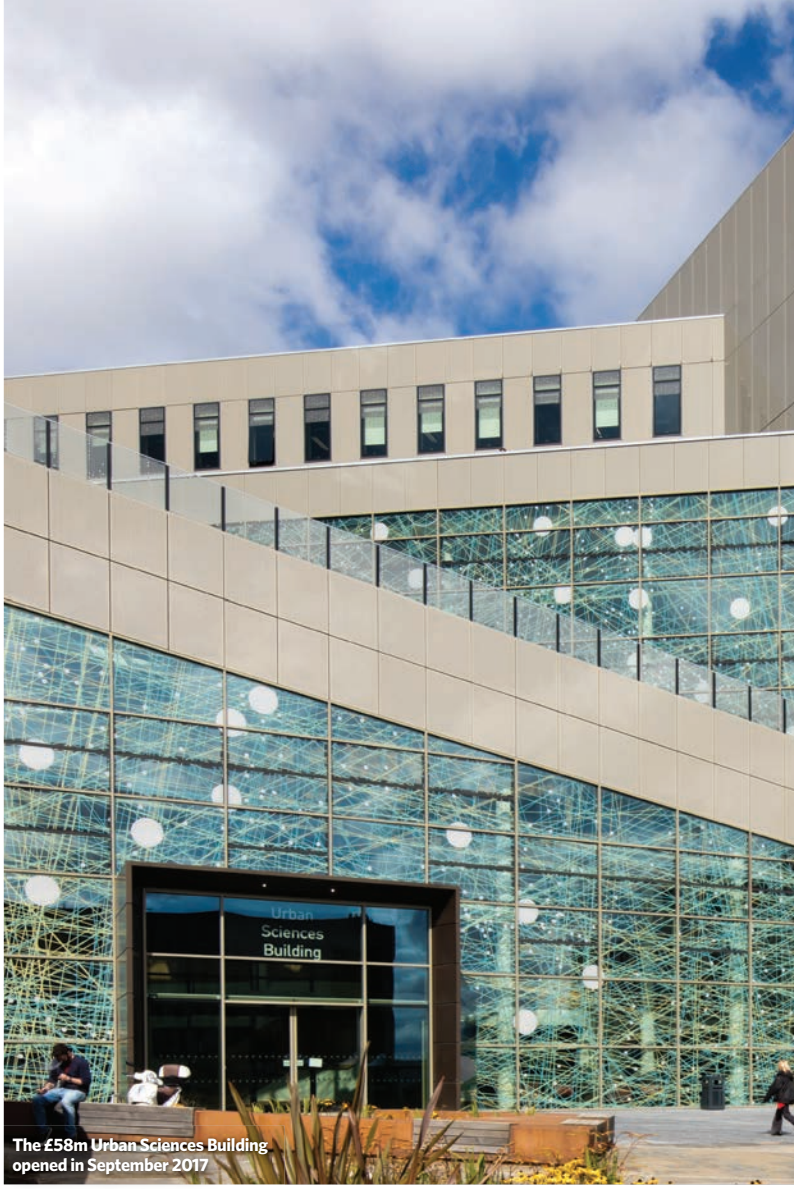
The £58m building, which opened in September 2017, is home to the National Green Infrastructure Facility, the National Centre for Energy Systems Integration, the university's School of Computing, and a series of research laboratories with an agenda to inform future urban infrastructure.

It has been designed for teaching, hosting events, laboratory research and – crucially for the university – as a facility in which to test smart technologies to promote urban sustainability. In short, it is a living laboratory.

'There was a lot of engagement with the academics who would be using this project. They were tasked with coming up with research projects to establish the technologies that had to be installed at the outset, or that could be bolted on in the future,' says Mark Dowson, an associate at BuroHappold Engineering, the scheme's MEP engineers.



Interior spaces



The £58m Urban Sciences Building opened in September 2017

The building is also a test bed for sustainability. As well as achieving Breeam Excellent (with a score of 78.1%), bespoke and auditable sustainability targets were developed by BuroHappold to drive sustainability beyond Breeam. These additional elements covered design, construction and in-use aspects of the building.

'Achieving Breeam Excellent does not necessarily result in a low-energy building,' says Dowson. It is a fact of which the university is only too aware, as one of its other Breeam Excellent buildings has a Display Energy Certificate (DEC) rating of F. To ensure USB performs as the designers intended, it is undergoing three years of post-occupancy evaluation (POE) as part a soft landings initiative.

The USB is the centrepiece of a new development called the Helix, being built on the former Scottish & Newcastle Brewery site in the heart of Newcastle. A triangular-shaped, six-storey building – facing onto a new square – its 12,800m² of teaching, research and laboratory space form two sides, while a giant, glazed atrium links these two blocks to complete the triangle.

The atrium contains the main entrance and incorporates a lecture theatre, a 'forum space', 'showcase labs' and a cafe. A staircase leads occupants through 'creative collision' spaces to the quieter research labs, alongside of which are the Urban Observatory and Decision Theatre. These spaces are used to process the huge amounts of data collected by sensors positioned throughout the building and across the city.

Unfortunately for the building services engineers, the glazed atrium faces south. 'It had to point towards the heart of the masterplan, which meant we had to do extensive parametric analysis to optimise the shading and glass performance,' says Dowson.

Modelling resulted in the addition of a digital artwork to the atrium exterior. This comprises a series of lines, circles and dots – a

composition that, according to the scheme's architect, Hawkins\Brown, 'represents the information resources in the university's websites, including their myriad networks and layers of connections captured at a particular moment in time'.

Whatever the design rationale, the artwork ensured the glazing met the required g-value so that comfort conditions could be maintained in the space without mechanical cooling. Instead, openable vents – at low and high level in the façade – allow air to flow through the space, and are controlled on temperature and CO_2 concentrations in the space. An underfloor low-temperature heating system keeps the atrium comfortable in winter. Sensors embedded in the concrete floor slabs measure their temperature and the data is used for academic studies on thermal mass and associated night-time purging.

Initially, the engineers explored an all-electric building services solution, to future-proof the facility against changes to carbon factors. Low-NO_x gas condensing boilers were added as the design progressed, however, to supply top-up heat to the heating and domestic water systems. 'The POE studies show it to be about 90% electric,' says Damian Wines, associate director at BuroHappold.

Beyond the atrium, environmental comfort for the majority of research and teaching spaces is provided by active chilled beams, which supply cooling and fresh air, and are connected to a water-to-water heat-pump system. Heating is from a perimeter system. Domestic hot water (DHW) is preheated from a water-to-water heat pump and there is a low temperature hot water (LTHW) top-up boiler. Comfort in event spaces is maintained by an all-air system.

The systems are controlled in HVAC zones that are strategically arranged, with sizes minimised to maximise future flexibility. HVAC systems ramp up or down depending on occupancy, CO_2 and temperature, to save energy. All permanent workspaces have natural daylight and opening windows.

On the roof of the building is a solar photovoltaic (PV) array that gives the building a source of renewable electricity. In addition, the roof holds innovative photovoltaic-thermal (PVT) hybrid solar collectors, generating electricity and thermal energy.

PROJECT TEAM

Client: Newcastle University
Mechanical, electrical, structural, fire and acoustic engineers, and client sustainability adviser: BuroHappold Engineering
Architect and interiors: Hawkins\Brown
Contractor: Bowmer & Kirkland, MEP contractor NG Bailey
Client sustainability adviser: BuroHappold
Contractor sustainability adviser: DSSR
Project manager: Turner & Townsend

Last year, the energy generated from the solar PV and PVT panels was 23.6MWh and 8.5MWh respectively – equivalent to energy savings of £3,200 per year. While this benefit is small, the value created through integration into the energy-storage test bed has secured £170,000 of funding from the Engineering and Physical Sciences Research Council for a project on building demand response.

The renewables are connected to an energy-storage test bed within the building, which includes a DC microgrid and smart technologies, such as micro metering of electricity and water, and regenerative lifts.

A 30kW vanadium redox flow battery will be installed by the university next year, to enable further research into intelligent energy storage. The addition will turn the Helix site into the UK's first electrical smart grid storage demonstrator project. This important research will investigate how the USB, and other buildings on the Helix campus, can be aggregated to give resilience to the grid through shedding and shifting non-critical, time-deferrable loads. Planning applications for two integrated, super-charging electric »

"The addition of a 30kW vanadium redox flow battery will turn the Helix site into the UK's first electrical smart grid storage demonstrator project"


Real-time visualisation of the building


The atrium facing onto the Helix site

» vehicle (EV) filling stations – of 175kW total capacity – have also been submitted.

The building itself is monitored by thousands of smart and micro sensors, which, in tandem with connections using open internet protocols, feed the control systems that ensure optimum building operation. To meet the stringent data-collection specification and resolve the challenges of finding BMS suppliers, the university adopted a strategic research partnership with Siemens. The controls will learn how the building is used and will respond by fine-tuning its energy needs.

The scheme was developed in BIM, and the BIM model is now helping with the operation of the building and showing the conditions recorded by each of the sensors (for real-time data, see: **3d.usb.urbanobservatory.ac.uk**).

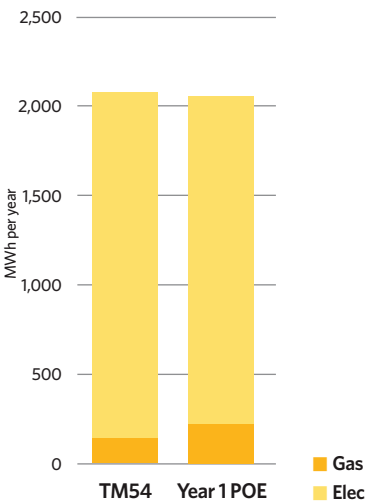
Unusually, the scheme has three (4m x 3.5m x 4m high) plantroom modules per floor, each capable of being monitored and controlled independently. The modules are stacked on top of each other to form three towers, reaching from the ground floor to the roof. Mounted on the roof, above each plantroom stack, is a dry air cooler to reject waste heat. The 18 plantrooms are intended to allow different zones, cores and floors to be more closely controlled and switched on or off as part of research into time-deferrable, load-shedding initiatives. Such modularisation means maintenance costs are lower over the lifespan of the building, says Dowson.

As part of the additional sustainability targets set at the outset of the project, the contractor was required to calculate the embodied carbon for the building, including all MEP systems and construction-site activities. However, none of the 13 MEP product manufacturers were able to provide Environmental Product Declaration certificates, so material quantities had to be calculated using the BIM model. The total embodied CO_2 was found to be at least five times higher than one year of operational CO_2 emissions.

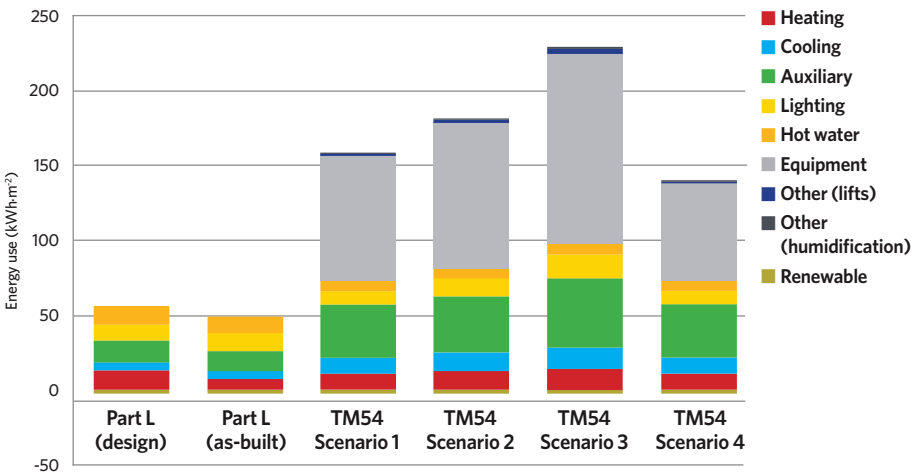
The building's total energy usage was predicted by NG Bailey, using CIBSE TM54 at the design stage, to be 140.6 kWh·m^{-2} per year for electricity and 16.1 kWh·m^{-2} per year for gas – equivalent to a DEC D. By comparison, Part L compliance figures were more than three times smaller, at 40 kWh·m^{-2} per year for electric and 7.1 kWh·m^{-2} per year for gas – which, Dowson says, is 'a good illustration of why Part L should not be used as a prediction for in-use energy performance'.

In addition to the baseline operational energy prediction, two further TM54 operational scenarios were run, resulting in DEC ratings of D (98) and E (125), depending on how the building and systems were used. Scenarios to achieve a C (75) rating were also prepared, to give the university an idea of how it would go about achieving this performance.

TM54 predictions v POE results



Part L compliance v TM54 predictions



'These gave the university confidence in understanding what end product it was actually going to get, which is rare in the industry,' says Dowson. It should be noted that the DEC benchmark of D (100) is based on a naturally ventilated university campus building, whereas the USB is fully air conditioned and houses a number of process-based activities.

After a year, the POE showed that the building had actually used 129.9 kWh·m^{-2} per year of electricity and 22.5 kWh·m^{-2} per year for gas. 'Impressively, the total energy use was 152.4 kWh·m^{-2} per year, which was within 3% of the baseline TM54 prediction,' says Dowson. The figures showed the building had used less electricity than TM54 had predicted, but more gas. »

URBAN WATER RESEARCH

As home to the National Green Infrastructure Facility, the USB project is a unique, £10m urban water research and demonstrator facility on the Helix site. Next to the building are full-scale sustainable drainage system (SuDS) demonstrators and experimental swales that can test the impact of attenuation, 'leaky barriers' and natural flood management during simulated heavy rainfall. Large-scale modular lysimeters are installed as green infrastructure to measure evapotranspiration.

The research facilities perform scientifically sound and repeatable experiments, to demonstrate at large scale how these might be used in cities, altering the way we consider key water issues that are vital to urban sustainability. The facility can hold 600m^3 of water and is capable of handling 50mm of rainfall in one hour – more than during the 2012 'Toon Monsoon'.

Live monitoring of SuDS infrastructure – including soil moisture and water levels – can be seen on the Urban Observatory monitoring website uoweb1.ncl.ac.uk This also contains data from 1,035 sensors across the Helix site and the city of Newcastle, including weather, noise, air quality and traffic congestion.

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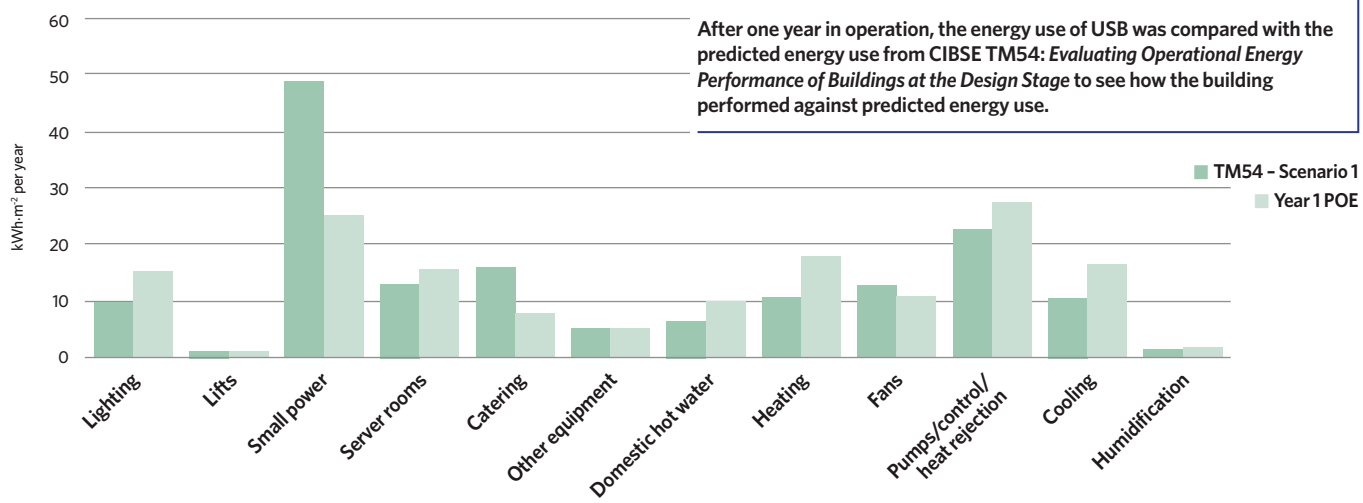
Comparison of energy by end use TM54 v POE



CIBSE TM54 COMPARED TO POE DATA

After one year in operation, the energy use of USB was compared with the predicted energy use from CIBSE TM54: *Evaluating Operational Energy Performance of Buildings at the Design Stage* to see how the building performed against predicted energy use.

» With the POE data in place, the design team can offer targeted advice to the university to try to achieve a DEC C rating for next year, with an aspiration to aim for a DEC B the following year. 'From our current position, a DEC C rating would require a total CO_2 reduction of 6.5%, which should be achievable, and a DEC B would require a 33.5% reduction in total CO_2 emissions,' Wines says.

One year after occupation, a Building Use Studies (BUS) survey was done, and the results compared with the BUS dataset and against the three university buildings where the USB's occupants were based previously.

The USB building scores better than the BUS benchmark mean and BUS-scale midpoint for all criteria, with the exception of BUS benchmark mean for noise. Some survey comments suggest the USB's open-plan spaces, which allow it to be easily reconfigured, are not universally popular: 'The offices were supposed to encourage collaboration, but they stifle it because some people want absolute silence, was one comment.' Others have praised the design: 'This area's large, open layout makes it easy to find and communicate face to face with my colleagues' and 'the atmosphere is conducive to working.'

The survey reported that 71% of users in the USB find its design makes it easier to collaborate and 76% said it was simple to find a workspace that suited their activity. Dowson believes USB will score better in subsequent surveys because, in the first year of occupation, snagging was taking place, which affected comfort and productivity. 'Further, directly in front of the USB is an active construction site, so this impacted on some of the noise scores,' he adds.

With two years of soft landings to run, and the building's 4,000 sensors, there is plenty of scope to fine-tune the USB's systems and to optimise its already impressive energy performance still further. **CJ**

CIBSE TM54 predicationed energy use compared to POE data from the Urban Sciences Building

	TM54 predicted (kWh·m-2 per year)	USB actual (kWh·m-2 per year)	Difference (%)	Explanation
Lighting	9.7	15.2	+56%	Increased use resulting from increased out-of-hours and weekend use. Also lights being left on in large areas where presence detection was overridden
Lifts	1.2	1.3	+4%	Original TM54 assessment did not include allowance for weekend use
Small power	48.9	25.2	-48%	The difference assumed to be because of students using laptop batteries in communal areas, use of lower power, higher efficiency ICT, and building may not be fully up to occupancy
Server rooms	13.1	15.7	+20%	TM54 based on RFI response. University to review if load has increased from original assessment and profile
Catering	16.0	7.9	-51%	At the time of the original assessment, the intensity of use was unknown, so simple benchmarks – for example, kWh per meal – were used
Other equipment	5.4	5.2	-4%	This includes doors curtains, PV, building meters and sensors, and external lighting
DHW	6.5	10.0	+54%	Input from DHW heat pump was less than estimated, so a larger proportion has been provided via the boiler-supplied LTHW system, and energy provided by gas has increased
Heating	10.7	18.2	+70%	Model assumed a winter heating temperature of 21°C. The user controls on site have full functionality to allow users to select temperatures up to 24°C in winter. Small power gains may also be a factor
Fans	13.0	11.0	-15%	Probably a result of additional demand control functionality incorporated into the BMS
Pumps, controls and heat rejection	22.6	27.4	+21%	A fault in the first year meant the main heating and cooling pumps were set to run 24/7, rather than shut down at night
Cooling	10.6	16.4	+55%	Actual temperature data shows summer temperatures warmer than average. Also, occupants have the ability to set room minimum below the 22°C used in the assessment
Humidification	1.3	1.8	+44%	Summer temperatures warmer than normal, requiring increased cooling of fresh air and resulting in dehumidification

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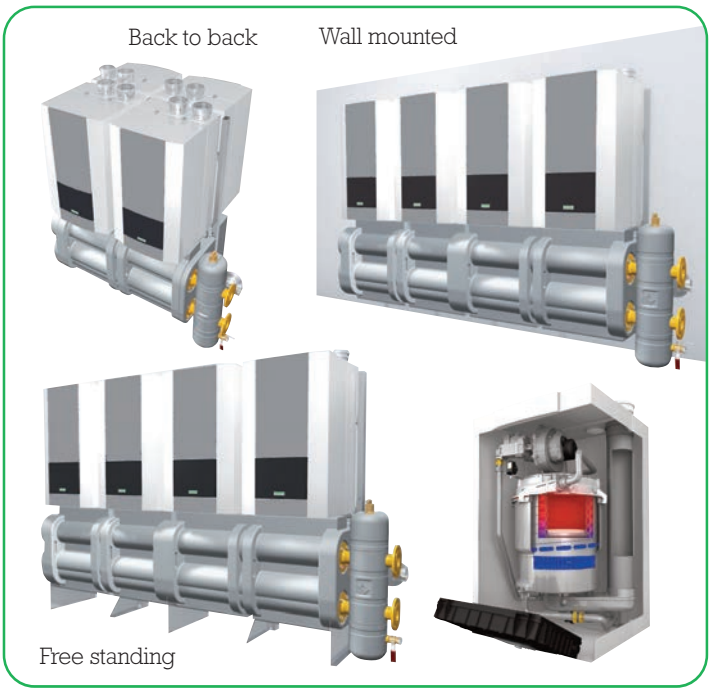

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Hoare Lea has created a digital version of its London office using BIM and IoT data

MAKING DATA COUNT

Hoare Lea's Living Lab is exploring how data can be used to optimise buildings for both energy use and the comfort of occupants. **Alex Smith** takes a glimpse into a smarter future

Building managers are in danger of being overwhelmed by data. Information from the BMS and increasingly sophisticated HVAC systems are creating 'a huge amount of dark data, which is collected but never sees the light of day', according to Hoare Lea partner Andrew Bullmore.

The problem is the sources of the different sets of data are often unconnected and also not presented in a way that can be easily understood by the building user, says Bullmore. 'Building innovation has been driven by technology companies. What should be driving organisations is how new technology can support user-centric design and operation.'

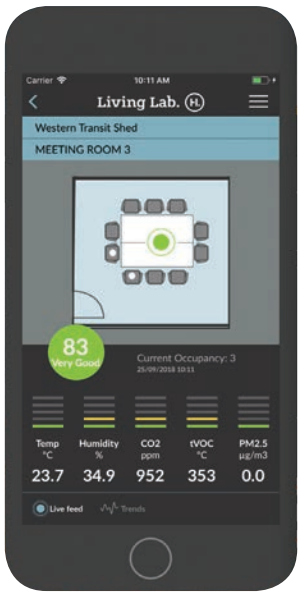
Bullmore believes data can transform building performance if it is used in a meaningful way. 'It should allow you to optimise the operation of the building and to inform design better,' he says. 'It's not just about minimising the construction cost of a hospital, for example – it's about how you can make that hospital so it gets people better.'

The Living Lab

Optimising data for the benefit of building users is central to the concept of Hoare Lea's Living Lab project. Its goal is to use the firm's offices to 'explore, demonstrate and integrate emerging technologies and techniques, and learn how these will help to design future-proofed and human-centric buildings.'

'The Living Lab is about the interaction between buildings and people, and how they influence each other,' says Bullmore. To explore this, Hoare Lea has aggregated data from live building systems in its London office, and layered it with occupancy and environmental data collected by Awair sensors. The metrics recorded are chemicals (TVOCs), fine dust (PM2.5), temperature, humidity and CO_2. The sensors also have the capability to measure ambient light and ambient noise, which will be enabled at a later stage. These are presented on a user-friendly dashboard that can be accessed by employees via an app.

The Living Lab's starting point was to make the data commonly accessible. Working together with their controls supplier they gained access to the BMS data and created a central platform on which all other data could be aggregated. 'It was not



Hoare Lea's app

easy,' says Bullmore. 'There are a huge number of sub-systems that don't talk to each other. We had to create application programming interfaces to pull a lot of data from the cloud.'

With data in a common format, correlations between sets of data could be identified. For instance, they could compare HVAC with lighting and where people were in the office. Partner Ashley Bateson offers two examples of control issues uncovered in the firm's London office by comparing datasets.

'From our occupancy profiles and plant operation, we can see that default control strategies aren't necessarily set for delivering comfort in the most efficient way. We have learnt to modify the HVAC settings to take advantage of passive night cooling,' he says.

The cause of a stuffy meeting room was also identified when passive infrared (PIR) data was analysed and compared to the operation of ventilation in the meeting rooms. It transpired that the PIR sensors had been wired to the adjoining rooms, so ventilation was only triggered by the PIR sensor being activated in the neighbouring room.

Bateson is open about the issues uncovered at Hoare Lea's office at Western Transit Shed in King's Cross, London. He is keen the building declares its D-rated display energy certificate (DEC) alongside its B-rated energy performance certificate, even though it is not mandatory to display DECs in commercial buildings. 'It's important that we share information,' he says. 'It's clear from the independent review on safety standards and building regulations by Dame Judith Hackitt that there are endemic issues with the delivery of buildings within the construction industry. Companies need to be open, and learn from each other to improve performance.'

Visualising data

Bateson believes visualisation of data is critical if it is to be understood by those managing buildings. 'Once it's visualised, it's not just a massive dump of data in a spreadsheet that only analysts would get to grip with,' he says. As well as apps showing real-time environmental readings, Hoare Lea is also creating a digital twin of its London office, based on data from the BIM model and live information from sensors.

Bullmore says there are four ingredients to successful optimisation using data: clear target outcomes; access to evidence relating to outcomes; a feedback loop; and the ability to take actions to close the gap between design and operation. To understand the behavioural response to the building, Hoare Lea is surveying staff to see if their responses correlate with environmental conditions, such as temperature, air quality, daylight and even desks next to plants. When the chiller failed in its King's Cross office in the summer, Bateson looked at the data to see if there was a link between high temperatures and productivity (see panel, 'Comfort cost').

> "There are endemic issues with the delivery of buildings. Companies need to be open and learn from each other"

The company has several clients targeting and measuring outcomes, including developer CEG at Number One, Kirkstall Forge, a seven-storey office building in Leeds. 'CEG is really interested in comfort and air quality outcomes,' says Bateson. 'We hope to identify factors in procurement or management that have been successful, or where improvements can be made.' The firm wrote the employer's requirements for the design and build project, and recommended using a clerk of works to check systems were installed and commissioned properly. 'CEG said they would always use a clerk of works now,' says Bateson. 'It means they will have a lot fewer performance gaps.'

Bateson predicts that more developers will ask for an integrated evaluation of performance that will include health as well as energy parameters. The Living Labs will help engineers understand the requirements of the occupants, he adds. 'There is a need to understand how people feel in buildings.' **CJ**

References:

1 *CIBSE TM40: Health issues in building services*, 2006 (soon to be updated)

Environmental conditions are being monitored at Number One, Kirkstall Forge in Leeds

COMFORT COST

In the London office, Hoare Lea has been using BUS and its own bespoke satisfaction occupant surveys to gauge whether staff have been satisfied with the design and comfort of the building. They were asked in the summer, just after the chiller system failed when internal temperatures exceeded 28°C. Not surprisingly, respondents found the conditions temporarily uncomfortable, rating the summer comfort lower than previous years. The landlord's chiller plant was repaired shortly after, demonstrating the importance of a resilient comfort strategy. Overall, satisfaction for the building over the year was rated in the top 70th percentile, benchmarked against a large sample of offices.

Bateson estimated the cost in lost productivity as a result of the chiller breakdown was probably between £10,000 and £20,000. This estimate is based on research[1] that shows there can be a 4-7% loss in productivity at 28°C compared to 21-23°C.

EYES ON THE PRIZE

Smart electricity meters are an integral part of the evolving smart electricity grid, and essential if we are to transition to a low carbon future, says Hoare Lea's **Nick Cullen**

According to ONS figures, there are about 25 million electricity and 21 million domestic gas meters operated by energy companies serving domestic and small non-domestic premises in Great Britain.

As of September 2018, there were around 13 million smart or advanced meters being operated. Of these, just over eight million were for electricity.

The government's smart meter implementation programme (SMIP), which began in 2013, aims to offer smart meters to every consumer – domestic and smaller, non-domestic sector – by 2020. Other premises in the non-domestic sector have been required to use advanced metering since April 2014.

The SMIP has its origins in an EU directive under the 2009 Third Energy Package. The directive was given UK legal weight through the Energy Act 2008. Subsequent acts have developed the powers, with the latest being the Smart Meters Bill currently going through parliament. Smart Energy GB is the national campaign for the smart meter rollout to improve UK understanding. Progress has been slow and, more significantly, the specification of the meters being installed has changed.

Why smart meters?

Smart meters are intended to be an integral part of smart energy grids that will enable more intermittent generation from renewables to be accommodated, and for energy to flow in both directions.

It is hoped that by increasing awareness of energy use, consumers will change their behaviour and reduce overall energy use. Over time, domestic appliances will be given the capability to respond to price signals on the grid.

One of the key requirements of the programme was to make switching supplier easier, ensuring the competition would keep prices as low as possible. The government's impact assessment assumed savings on bills for gas to range from 3.5 to 5.5%, and for electricity from 1.5 to 4%. Smart GB suggests savings of 2%. Energy suppliers will no longer have to send a meter reader to view meters. Bills will be accurate, and the more granular data will enable them to understand their energy use better.

The smart meter architecture

The configuration of the components associated with a smart meter varies depending on the type. Smart meters must comply with the Smart Metering Equipment Technical Specification (SMETS). As well as half-hourly profile data, SMETS 1 smart meters must also record:

- Active and reactive energy, imported and exported
- Usage data over various long-term periods (for example, daily, weekly and monthly).
- Maximum demand
- Average RMS voltage.

Smart meters are intended to be an integral part of smart energy grids

The most commonly deployed SMETS 1 meter is, as the name suggests, the first generation of smart meters rolled out under the SMIP. The meter shares data with an in-home display (IHD) and directly with the supplier via the home area network.

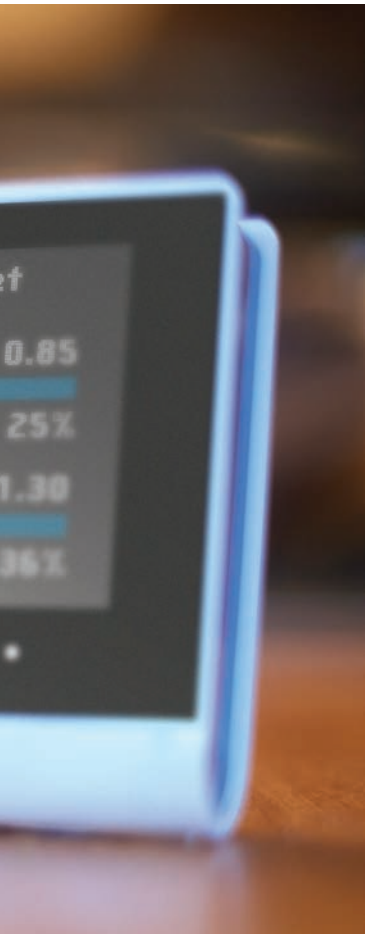
The process of switching suppliers has exposed the incompatibility of some systems and results in meters 'going dumb'. According to the British Infrastructure Group, more than half of smart meters are currently in dumb mode.

The second generation SMETS 2 meters, rolled out from October, will be compatible with other SMETS 2 meters from other suppliers.

Smart meters offer two routes to access data within properties. These are via a consumer access device (CAD) or via Smart Digital Communications Company (DCC), which was granted a government licence to manage the data and communications network connecting smart meters to energy suppliers. A CAD can send data to the cloud, allowing consumers to use apps to manage their use.

It is possible to pair a CAD with a smart meter, but most consumers are not aware of this, and the process is not mentioned in the Smart Metering Installation Code of Practice.

Future pairing is likely to be facilitated using the Zigbee standard where a consumer enters a code associated with the meter.



The second access route for data is the DCC, which manages the data, routing it to the relevant supplier, the network operators and other authorised bodies. The government has stated its intention to place an obligation on suppliers to enrol SMETS 1 meters onto the DCC platform within a reasonable timeframe.

Data via the DCC is half-hourly only, meaning the benefits of lower resolution data (up to 10-second intervals) that could be achieved via a CAD are not available.

Non-domestic premises

The smart meter rollout covers about two million non-domestic sites, the majority of which are microbusinesses and SMEs.

Currently, advanced meters have been installed in one million non-domestic properties, of the 2.2 million within the UK. Monthly installation rates of advanced meters, or automatic meter reading (AMR) devices, continue to outpace smart meters.

It had been thought the installation of AMR devices would be phased out after the installation end-date of 5 October 2018, removing the opportunity for non-domestic customers to choose between an AMR device and smart meter for their premises. Following a recent ruling however, energy suppliers will be allowed to offer small and medium-sized enterprises and larger business consumers a choice between an advanced meter and smart meters. This may further support advanced meters in the short-term and delay wider penetration of smart meters.

Advanced meters are already able to transmit half-hourly electricity and hourly gas data, and can grant access to this for the supplier and customer. Advanced meters may have additional functions found in a smart meter, but won't meet their full specification.

There are three different forms of AMR devices:

- Advanced meters – a remote reading device, connected to the meter
- Data loggers – remote reading equipment provided by transporters on a larger site
- Gas embedded meters – where the remote reading device is integral to the meter.

All these AMR devices create a remote communication channel between a business and its energy supplier. Data is retrieved from advanced electric meters by a data collector, data aggregator (DC/DA). There are many DC/DAs in comparison to the single operator system for smart meters (DCC). The DC/DA role is conventionally split into three – data retrieval, processing, and aggregation.

In practice, all three are performed by the same party. Non-domestic providers that appoint their own DC/DA, have access to their data for energy management purposes, analytics, dashboards, and so on.

Opportunities

The smart meter and the in-house display can encourage energy savings through behavioural change simply by increasing awareness of use. But there are greater possibilities. The improved data connectivity and granularity can help demand system response, which, for the customer, means use can be shifted from peak to low-cost periods to lower bills. For suppliers, it enables better grid management and optimum use of onsite storage, whether that be dedicated battery storage or vehicle-to-grid.

It will also encourage the development of online energy analytics platforms. BEIS is currently investing in several projects to develop data analytics for the small non-domestic building sector. One project, led by Hoare Lea, is developing a platform to offer energy saving advice to schools based on analysis of half-hourly meter data.

To date, 22 separate energy signatures have been identified, from which energy saving advice can be derived. The number is likely to be higher with the 10-second SMETS data.

Aggregating data across energy networks will enable operators to manage supply better, improving reliability and reducing costs. Policymakers will have real data to understand the energy landscape and will be able to receive more rapid feedback on the effectiveness, or otherwise, of policy and regulatory changes. CJ

NICK CULLEN is a partner at Hoare Lea

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Ventilation, thermal comfort and indoor air quality in schools – updated guidance

This module explores some of the main influences and requirements for the updated BB101 guidance for indoor environmental quality and standards in schools

Supplying appropriate indoor environmental quality in schools can be challenging for building designers, and the freely accessible, recently updated BB101 is designed to offer guidance by detailing the required standards and assisting with selection processes. This CPD will consider some of the significant areas that are encompassed in the 2018 revision to BB101.

In August 2018, the BB101 guidelines – first published in 2006 – were updated. They allow for recent developments in classroom and school design guidance (some of which are shown in the panel 'Recent publications that influenced the BB101 revision', below) that impact on thermal comfort, air quality, lighting and ventilation. The guidelines relate to any new school buildings and the refurbishment of existing buildings, and will be reviewed again in 2022. The Department for Education (DfE) consulted on the guidelines, getting significant input from academia and the wider industry and education communities.

RECENT PUBLICATIONS THAT INFLUENCED THE BB101 REVISION

The European Parliament-funded Schools Indoor Pollution and Health: Observatory Network in Europe (Sinphonie) project was the first Europe-wide pilot project to monitor the school environment and children's health in parallel across 23 European countries. Sinphonie has provided standardised methodologies and tools for better characterising schools' indoor environments and assessing the health risks to schoolchildren and staff. A key part of the project output is the *Guidelines for healthy environments within European schools*.[1]

In 2018, the Mayor of London commissioned a report on indoor air quality[2] to review existing evidence and investigate the level of indoor air pollution in London's schools. This report includes both a detailed presentation of Sinphonie's results, focusing on indoor air quality (IAQ) challenges in Greater London and 'best practice' evidence presented in CIBSE TM57 *Integrated school design*.[3]

The guidelines address issues around global warming and the need to reduce carbon emissions while offering enjoyable, healthy and productive school environments. The implementation of low-energy solutions has a positive effect on energy bills – and, therefore, on school budgets – and so is particularly attractive. Many older school buildings struggle with internal heat gains from additional equipment – such as IT resources – introduced since the building was constructed. Ambient noise can be also be a problem when using only natural ventilation – for example, opening the windows can make classrooms excessively noisy, as traffic volumes have increased significantly since many schools were built.

The updated BB101 guidelines follow the framework developed by Montazami,[5] by considering four different aspects of ventilation and thermal comfort. The 'Environmental Circle' (Figure 1) shows how the factors all have dependencies on each other and, therefore, the importance of taking a holistic approach to planning.

Visual comfort

The *CIBSE Journal* CPD module 88[6]

»

considered the benefits of using natural and hybrid lighting where possible for a beneficial impact on occupant wellbeing and on cutting carbon emissions and energy costs. There have been many research projects in the education sector that have linked daylighting with improved achievement rates, health and attendance. Historically, many classrooms were predominantly lit using large vertical windows at the back of the room. By applying natural daylighting systems, a classroom can be supplied with 300% more daylight,[6] while also reducing the lighting energy cost significantly.

Research has shown that there can be a conflict between classrooms built in this style, as they may not be thermally comfortable – being too warm in the summer and potentially draughty in the winter. Glare can also become an issue. BB101 points to CIBSE Lighting Guide LG5,[7] *Lighting in Education* to give the criteria for lighting design in schools.

Thermal comfort

Designs may require compromises in terms of thermal comfort. A building that is either mechanically or naturally controlled for thermal comfort may have particular system-related adverse impacts on acoustics or air quality, and these need to be holistically considered when evaluating the system needs.

The BB101 thermal comfort recommendations are derived from those in BS EN ISO 15251[8] and the guidance in CIBSE Guide A, 2015. However, they have been modified to account for the needs of children and schools in the UK.

To maintain comfort conditions for people with specific requirements – such as those with physical disabilities, pupils with special educational needs that affect their temperature response or for very young pupils – an assessment of their particular needs will be required. Higher categories of thermal comfort may be needed in all or part of a school.

Air quality

Good air quality is an essential element of the BB101 guidelines. It is evaluated by measuring CO_2 levels and delivered through appropriate natural, hybrid or mechanical ventilation. Air pollution can originate from inside the room, such as from furniture or occupants, or externally. In recent years there has been a heightened focus on external pollutants near schools and classrooms, such as traffic[9] or industry, and the effect it can have on schoolchildren's health.

BB101 has set the following performance standards for teaching and learning spaces:

1. Where mechanical ventilation is used, or when hybrid systems are operating in mechanical mode in general teaching and learning spaces, sufficient outdoor air should be provided to achieve a daily average concentration of CO_2 of less than 1,000ppm.
The maximum concentration should also not exceed 1,500ppm for more than 20 consecutive minutes each day.

2. In general teaching and learning spaces where natural ventilation is used or when hybrid systems are operating in natural mode, the following standards apply:

a. Sufficient outdoor air should be provided to achieve a daily average concentration of CO_2 of less than 1,500ppm, during the occupied period.

b. The maximum concentration should also not exceed 2,000ppm for more than 20 consecutive minutes each day.

c. The system should be designed to achieve a carbon dioxide level for the majority of the time of less than:

- 1,200ppm for a new building (800ppm above the outside CO_2 level, taken as 400ppm) for the majority of the occupied time during the year.
- 1,750ppm for a refurbished building (1,350ppm above outside air level) for the majority of the occupied time during the year.

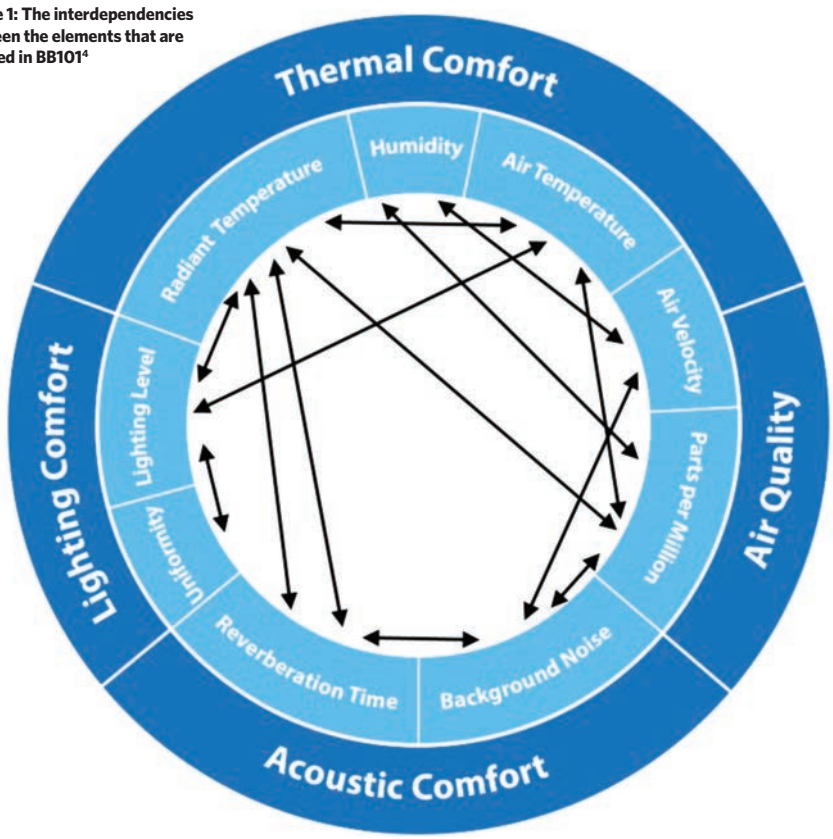
Calculations at concept design stage and scheme design stage need to be carried out for summer, winter and mid-season design conditions, to prove that the design will operate satisfactorily throughout the year.

NOTABLE BB101 UPDATES

BB101[4] has been updated to bring it in line with the output specification requirements for schools funded by the DfE.

- **It has been aligned with the revised *Gas safety in educational buildings* IGEM/UP/11 – published in 2018**
- **The guidance on pollutants has been brought up to date, and now covers airborne particles and the range of indoor and outdoor pollutants**
- **Advice is given on reduction of pollutants by positioning of air intakes and use of filters**
- **Extensive references are provided to research on air quality in schools**
- **A new calculation procedure for prevention of summertime overheating uses an adaptive comfort temperature and the Design Summer Year (CIBSE DSY1 2020 50th percentile range) for modelling**
- **Openings are sized using dynamic thermal modelling using CIBSE DSY 2020 (50th percentile range) weather file most appropriate for the location of the project.**

Figure 1: The interdependencies between the elements that are covered in BB101[4]



CO_2 levels should be measured at seated head height in all teaching and learning spaces. Designs must offer sufficient openable areas in suitable locations for winter, mid-season and summer conditions – and the means by which the occupants can control the openable areas must be provided.

Acoustic comfort

Acoustic comfort is another area where historically there could be a conflict between the guidelines for noise levels and ventilation needs. Previously, some argued that it was difficult to use natural ventilation in schools and still meet the requirements for acoustic comfort, but tests showed it is possible. In the case of mechanical ventilation, appropriate acoustic control may be required[10] in order not to exceed the required noise levels set out in BB93.[11]

Noise from building services, including mechanical ventilation systems, should meet the limits for indoor ambient noise levels (IANL) given in Table 1 of BB93, together with the tolerances on the IANL limits given in Table 2 of BB93 for different types of ventilation system under different operating conditions.

Noise generated by extract systems can cause a nuisance. It should not be loud enough to prevent the teacher's voice from being heard by students, or the students' voices being heard by the teacher, as this poses a significant hazard. If possible, it should be kept below 50dBA. Where this is not possible, higher noise levels of up to 55dBA will only be acceptable where the teaching staff have control over the ventilation system and it can be switched off locally as required for teaching.

Building simulation and BB101

Building simulation is a key element of the new BB101 guidelines. It ensures the design of the ventilation systems can give acceptable indoor air quality (IAQ) and thermal comfort levels. Dynamic thermal simulation software enables building systems designers to provide predicted performance of buildings and test compliance criteria before their construction or refurbishment. Results from such simulations are heavily dependent on the internal and external parameters (for example, weather data, occupancy profile and internal gains) and also assessment criteria.

Overheating and IAQ should be assessed using the CIBSE DSY1 2020 weather file (high emission 50th percentile scenario) most appropriate to the location of the school building. The change from applying the historic Test Reference Year (TRY) file to using the projected DSY1 2020 weather file not only allows for the performance to be tested against more stringent weather conditions (moderately warm summer), but also takes into account a climate change scenario. For climate resilience, it is advisable to model against predicted future DSY weather years – DfE is working with the CIBSE Schools Design Group to model recent designs using the 2050 and 2080 weather years.

The new guidelines offer consistency in the modelling of occupancy profiles, by defining the occupancy hours of 9am to 4pm, Monday to Friday, with a lunch hour noon to 1pm in all classrooms during all the summer weeks, with no school holidays. The guidelines allow for 32 occupants (with 70W sensible, and 50W latent, heat gains) and typical lighting (7.2W·m^{-2}) and equipment (10W·m^{-2}) gains for standard classrooms. The guidelines also set standard occupancy and gain profiles for other school spaces such as ICT rooms, sports and examination halls.

A room or building should comply to criterion 1 of the CIBSE TM 52[12] adaptive thermal comfort model (see 'Summary of CIBSE TM52 criteria for defining overheating...' panel) where the hours of permitted exceedance have been altered from the previous requirement of 3% of occupied hours to a maximum of 40 hours per year. (There are particular requirements for exam halls.) Criteria 2 and 3 should be reported for information only.

If a school design fails to meet criterion 2 or criterion 3, then designers should consider potential overheating mitigation measures and indicate which are viable for the project. Category II (normal expectation as described in BS 15251) in new schools and category III (moderate level of expectation) in refurbishment should be used for overheating assessment in all teaching and learning spaces of schools, unless they are occupied by vulnerable pupils (very young or pupils with complex health needs) where category I (high level of expectation) should be employed. Sports halls can be assessed against one lower category for both new construction and refurbishment if not used for examinations.

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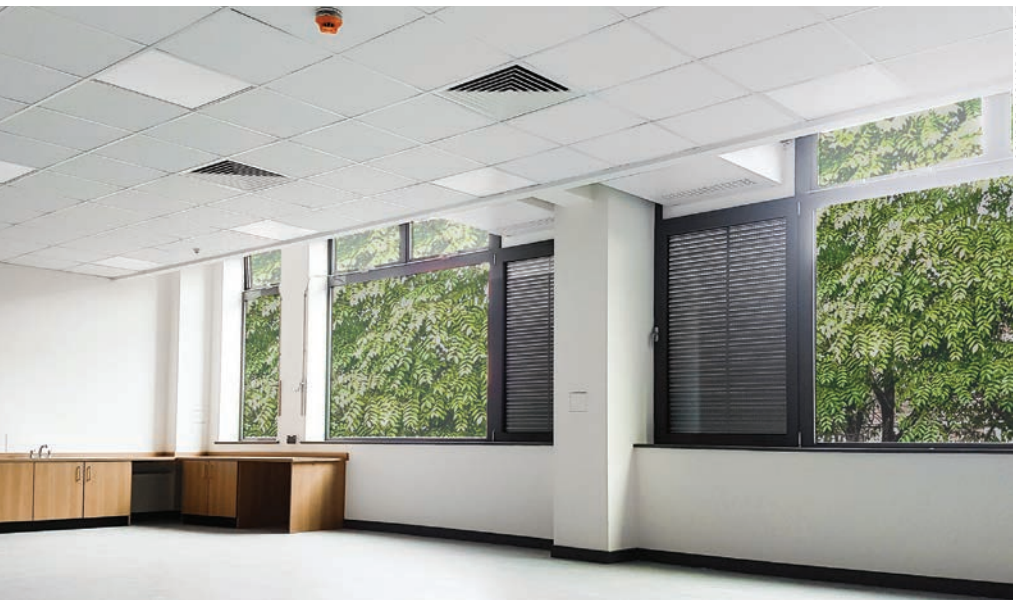
With thanks for the principal article content to **Masoud Tabatabaei** (Monodraught) and **Ruth Buckingham** (Monodraught), with additional input from **Dejan Mumovic** (UCL) and **Richard Daniels** (Department for Education).

Turn to page 50 for references.



SOURCE: MONODRAUGHT

SUMMARY OF CIBSE TM52 CRITERIA FOR DEFINING OVERHEATING IN FREE-RUNNING BUILDINGS

A room or building that fails any two of the three criteria is classed as overheating.

Criterion 1 – limits hours that operative temperature can exceed threshold comfort temperature by 1K or more during occupied hours of typical non-heating season

Criterion 2 – sets a daily limit for the severity of overheating within any one day, as a function of both temperature rise and its duration

Criterion 3 – sets an absolute maximum daily temperature for a room, beyond which the level of overheating is unacceptable.

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Module 138

December 2018

1. Who was responsible for publishing *Guidelines for healthy environments within European schools*?

- ☐ A CIBSE Schools Group
- ☐ B Department for Education
- ☐ C IGEM
- ☐ D Lord Mayor of London
- ☐ E Sinphonie

2. Which of these is not explicitly shown in the 'Environmental Circle'?

- ☐ A Air velocity
- ☐ B Humidity
- ☐ C Lighting level
- ☐ D Operative temperature
- ☐ E Reverberation time

3. What is the recommended source of lighting criteria in BB101?

- ☐ A BB3
- ☐ B BS EN ISO 15251
- ☐ C CIBSE Guide A
- ☐ D CIBSE TM57
- ☐ E LG5

4. What value of CO_2 concentration should not be exceeded for more than 20 consecutive minutes each day?

- ☐ A 800ppm above outside CO_2 level
- ☐ B 1,200ppm
- ☐ C 1,350ppm
- ☐ D 1,750ppm
- ☐ E 2,000ppm

5. When considering spaces other than exam halls, what is the maximum allowable number of hours that operative temperature can exceed threshold comfort temperature by 1K or more during the year?

- ☐ A 18 hours
- ☐ B 3% of occupied hours
- ☐ C 3% of total hours
- ☐ D 40 hours
- ☐ E Dependent on TM52 criterion 3

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References:

1 *Guidelines for healthy environments within European schools*, European Union 2014 – **https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/guidelines-healthy-environments-within-european-schools**

2 *Indoor Air Quality in London's Schools*, Greater London Authority, 2018 **www.london.gov.uk/sites/default/files/gla_iaq_report_with_nts.pdf**

3 CIBSE TM57 *Integrated school design*, CIBSE 2015 – **https://www.cibse.org/Knowledge/knowledge-items/detail?id=a0q2000000I7fKAAS**

4 BB101 *Ventilation, thermal comfort and indoor air quality*, 2018 –**www.gov.uk/government/publications/building-bulletin-101-ventilation-for-school-buildings**

5 Montazami et al, *A comprehensive review of environmental design in UK schools: History, conflicts and solutions*, Renewable and Sustainable Energy Reviews 46, (2015): 249-26.

6 CIBSE Journal CPD Module 88, CIBSE Journal November 2015 – **www.cibsejournal.com/cpd/year/2015/**

7 Lighting Guide 5, LG5 *Lighting in Education*, SLL/CIBSE, October 2011.

8 BS EN ISO 15251:2007 *Indoor environmental input parameters for design and assessment of energy performance of buildings addressing indoor air quality, thermal environment, lighting and acoustics*, BSI 2008.

9 **www.theguardian.com/environment/2018/jul/13/uk-schools-move-to-ban-the-school-run-to-protect-pupils-from-air-pollution**

10 Mumovic, D et al, *Winter indoor air quality, thermal comfort and acoustic performance of newly built secondary schools in England.*

11 BB93 *Acoustic design of schools - performance standards*, Department for Education, 2015 – **www.gov.uk/government/publications/bb93-acoustic-design-of-schools-performance-standards**

12 CIBSE TM52 *The limits of thermal comfort: avoiding overheating in European buildings*, CIBSE 2013.

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Swep's two-stage heat exchanger

Substations in heat network installations can be arranged in a parallel or two-stage set-up. The two-stage system is commonly used to reduce the returned water temperature. Returned water from the radiator circuit heat exchanger is used to preheat the domestic hot water.

The proportion of heat used for preheating and post-heating respectively are set in such a way as to make the most efficient use of the return temperature from the radiator circuit.

If the building concerned has a substantial demand for hot water, this connection arrangement generally results in a lower return temperature than would be the case from a parallel connection.

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Scottish university gets top marks for energy savings

The oldest university in Scotland, St Andrews, which can trace its history to 1413, has many proud boasts. Offering four faculties that serve nearly 8,000 students – and with a world-renowned reputation – it is fully committed to achieving the highest standards.

These ambitions can be seen in every aspect of the university's operation, which includes aspiring to reach stringent environmental and energy-efficiency objectives.

Grundfos Pumps has been working closely with the university and key estate specialists to achieve some impressive savings. An upgraded installation at one site alone will save 206,978kWh, which is equal to £22,768 per year.

Savings of this nature are achievable when assessing the whole life-cycle cost relating to a pump or pumping.

As much as 85% of the total life-cycle cost of any pump system is attributable to the energy that is required to run the pumps, so this is the area that should be focused on.

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CoolTherm flying high with two HVR awards

Justin Fisher, UK senior projects manager for CoolTherm, has been named the HVR Customer Service Person of the Year 2018. Fisher has worked in the industry for 10 years and has vast engineering knowledge, which he delivers to his customers in a kind and reassuring way.

In 10 years, he has climbed the ranks of the industry, starting as a junior installation engineer before becoming a senior installation engineer and, now, UK senior projects manager. He strives to find better, greener, smarter ways to achieve something, and his customers – and the environment – always come first.

Rob Young, director of CoolTherm, said: 'Justin is not only a credit to us at CoolTherm, but he is a credit to the whole industry. It is people like Justin that make me proud to be a refrigeration engineer.'

CoolTherm was also awarded Air Conditioning Product of the Year for its development of Circlemiser.

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Wolves absorb the pressure with Mikrofill

The Sir Jack Hayward Ground is the first-team training and academy base of Premier League football club Wolverhampton Wanderers.

The facility opened in 2005 and is named in honour of the club's late life president, and former owner, Sir Jack Hayward. It features two high-quality, undersoil-heated pitches, an indoor pitch, a fully equipped gymnasium and a hydrotherapy pool. In addition, the medical and physiotherapy facilities mean the club is the first in Britain to establish a fully accredited, onsite professional sports laboratory.

West Midlands contractor Lord Combustion Services proposed replacing existing PU equipment with a precommissioned Mikrofill pressurisation package. This included two 700-litre expansion vessels, two service-drain valves, and a Mikrofill 3 PU unit.

The precommissioning involved setting the nitrogen/air charge in each of the vessels to match the cold-fill parameter on the Mikrofill unit. This ensures that the vessels absorb the correct amount of volumetric expansion.

Call 03452 606020 or visit www.mikrofill.com

Heat interface units can be commissioned and maintained remotely over the internet

Evinox Energy has introduced remote commissioning and warranty validation for its ModuSat heat interface units (HIUs), which can significantly reduce the cost of commissioning, as well as the time spent on site by engineers checking and adjusting settings.

The electronically controlled ModuSat can be connected over the internet to remote servers, enabling Evinox to check the operation of each unit remotely and adjust settings where required.

Evinox's SmartTalk communication system allows it to carry out scheduled maintenance checks remotely over the internet. The system in each apartment – including timings and settings – can be fully controlled remotely, with remote-diagnostic capability and client support. This can avoid unnecessary call-outs as a result of user error. Fault alarms can also be checked by testing the operation of components.

Evinox offer after-care service and maintenance plans with one- or two-year contracts, providing flexibility. It also offers combined packages for energy billing and maintenance, all under one roof and with discounts available.

Call +44(0)1372 722277 or visit www.evinoxenergy.co.uk or www.evinoxresidential.co.uk

Myson introduces new unique height to LST Vertical range

After launching the LST Vertical heat radiator earlier this year, Myson has extended the range by adding a new unique height.

The new product comes in a height of 1,772mm and in four widths, ranging from 420mm to 870mm. This additional and unique 1,772mm height will give specifiers and installers scope when choosing LST solutions for commercial projects.

Designed for areas with lower heat requirements, but still with space restrictions, the new LST Vertical is designed with safety in mind and is equipped with a round steel casing that ensures pipework is concealed.

It comes with a 10-year warranty for both the emitter and casing, fully complies with NHS guidance notes 1998, and is now protected with anti-bacterial paint.

The new unique height joins Myson's ever-expanding LST family, creating a total range of 98 stocked sizes. This makes it an ideal heating solution for hospitals, care homes, schools and other public-facing facilities.

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Warm air, radiant and heating products now affected by European regulations

Warm air heaters are subject to Lot 21 of the directive and radiant heaters Lot 20. Minimum efficiency for warm air is now 72% and for radiant heaters 74%. Crucially, these minimum criteria apply to both new installations and when replacing existing products.

Nortek's ErP-compliant range includes the highly efficient OUHA series of energy-saving condensing gas red unit heaters, which have been ErP-compliant for years. OUHA units are fitted with a high-capacity axial fan for optimum air distribution.

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Helifix helps preserve historic Titanic dock pump house

Helifix non-disruptive and concealed masonry repair systems have been installed on the pump house next to the historic, 850ft-long Thompson Graving Dock, in Belfast, where the Titanic and its sister ship, Olympia, were fitted out.

More than 500m of stainless steel HeliBars were bonded into mortar beds to stitch cracks in the masonry, and were completely hidden from view. Bespoke manufactured SockFix-grouted sock anchors were used to reinstate failed arches and lintels, and reconnect main elevations to internal cross walls.

Call 020 8735 5200 or email alex.smith@helifix.co.uk

FlexTouch wall controller for underfloor AC systems

Underfloor air conditioning provider AET now offers the wall-mounted FlexTouch controller, allowing enhanced indoor environment control for occupants and facilities managers.

The new FlexTouch 3 model incorporates sensors for CO_2, humidity, volatile organic compounds (VOCs) and particulate count, all of which can affect indoor air quality and, as a result, the health and wellbeing of occupants.

The new controller, incorporating CO_2 and humidity mode control, is proving to be a popular option for occupants, with workspace equipped with underfloor air conditioning systems.

Call 01342 310 400 or email aet@flexiblespace.com

New TCUK branch will enhance support for customers in the North and Scotland

TCUK is opening a new branch in Stockport, near Manchester, to enhance support for its growing customer base for Toshiba, Carrier and CIAT products in the north of England and Scotland. The initiative is part of the company's drive to become a one-stop shop for integrated building services solutions.

The new 3,048m² facility, which will operate alongside TCUK's UK headquarters at Leatherhead, includes administration offices, a warehouse, a trade centre, and a heating, ventilating and air conditioning technology training centre. The trade counter will supply installation components and materials, such as copper pipe and insulation, enabling installers to source everything required for a project from a convenient, single source.

TCUK's managing director for sales, David Dunn, said: 'The new branch will implement local stocking and rapid technical support to our expanding customer base in the North and Scotland. We understand the importance of speed in responding to projects with increasingly short delivery times, and the Stockport branch will grant this.'

Visit www.toshiba-aircon.co.uk

New Vitocrossal 200 commercial boiler offers maximum output in a compact, easy-to-install package

Viessmann has introduced the new Vitocrossal 200 – an 800kW-1,000kW gas-condensing boiler, with an innovative MatriX pre-mix disc burner – that sets new standards for commercial boilers.

The Vitocrossal 200's numerous improvements include: an extended modulation range of 1:6, for greater efficiency at partial load; low-NO_x emissions of less than 40mg per kWh; a modular design for easier installation; and significantly smaller dimensions, making it suited to smaller plantrooms.

The heat exchanger and burner modules can be separated for easier carriage and individual delivery, while the front cover is hinged on a gas-pressure spring for easy opening. In addition, the side panels can be removed for unobstructed access to the MatriX disc burner.

Viessmann's commercial sales director, Jon Grist, said: 'The new Vitocrossal 200 represents a significant step forward in commercial boilers because of its compactness. Large industrial plantrooms are going out of favour, and being replaced by multiple boiler rooms – and the Vitocrossal 200 is perfect for those smaller spaces.

'This boiler is also desirable for its low NO_x emissions, lower minimum output with higher efficiency, and easier handling and serviceability.'

Visit http://bit.ly/2QhoNle

Hot wastewater pumping problem solved

One Creechurch Place offers high-quality office accommodation in the centre of London's insurance and financial district.

The location of the kitchens on many floors means gravity drainage is not possible. Very hot water may enter the wastewater system, so Pump Technology's DrainMajor was installed. This system is fitted with a robust Jung Pumpen 730HES pump, which has a cast-iron pump volute and stainless-steel motor housing, combined with a mechanical liquid-facing seal and motor lip-seal configuration.

Call 0118 9821 555 or visit www.pumptechnology.co.uk

Going soft on water treatment

Continuous flow gas, water and heating products provider Rinnai UK claims that stored hot-water systems suffer badly from the buildup of scale.

Zinc-based inhibitors are recommended by Rinnai for use with its appliances. This technology uses electrochemical dispersement to impart a precise amount of soluble zinc.

To ensure that limescale is never a problem, Rinnai heaters incorporate a scale-warning device that continually monitors the appliances for limescale deposits around the heat exchanger.

Visit www.rinnaiuk.com

Rinnai hot water flows with freedom at Maidstone fitness centre

Rinnai gas-fired, continuous flow hot-water and heating systems have been specified for use at a leading fitness centre in Maidstone, Kent, replacing an old thermal store configuration.

Rinnai proposed three 1500e continuous flow hot-water heating units, cascaded to cope with the high demands.

Its Infinity HDC1500i Low NO_x boasts the modulation 14:1, 56.6kW to 4.0kW, on both natural gas and LPG gas, and operates at a flow rate of as low as 1.5l/min. The HDC1500e Low NO_x is extremely lightweight, at just 31kg.

Visit www.rinnaiuk.com

Pioneering manufacturing building uses Kingspan insulation

The University of Nottingham is developing the manufacturing solutions of tomorrow at its RIBA award-winning research facility, featuring pipe and duct insulation from Kingspan Industrial Insulation. More than 7,000m of Kooltherm FM Pipe Insulation has been installed on pipework across the building. The product has an aged thermal conductivity as low as 0.025 W/m·K (at 10°C mean), making it the most thermally efficient pipe insulation in common use within the UK construction industry.

Call 01544 388 601, email info@kingspaninsulation.co.uk or visit www.kingspaninsulation.co.uk

Viessmann introduces air source heat pumps with innovative noise-reduction technology

Viessmann has introduced two new air source heat pumps – the Vitocal 200-A and Vitocal 222-A – both of which feature the company's new advanced acoustic design.

This combines a sound-optimised fan, designed to harmonise the acoustic frequency range, with intelligent speed control, to reduce airborne noise at full- and partial-load operation. This effectively stifles the lower-frequency sound of conventional heat pumps, which can be perceived as disturbing. The result is that the pumps are barely audible. They operate so quietly that they are suitable for densely built-up areas, such as terraced housing estates.

The energy rating of the new Vitocal heat pumps is A++, and their coefficient of performance (COP) – according to the EN 14511 standard – is up to 5.0 (A7/W35) and up to 4.1 (A2/W35).

No minimum distance is required between the indoor and outdoor units, no refrigeration leak test is needed – because the cooling circuit is hermetically sealed – and no F-Gas certificate is required because the connecting pipes to the outdoor unit are filled with water.

Visit www.viessmann.co.uk

Tel: 020 7880 6217 Email: callum.nagle@redactive.co.uk

Chris Barrett is newcomer to Hamworthy's sales team

As part of its ambitions to grow its salesforce, Hamworthy has recruited Chris Barrett as new area sales manager.

Barrett said: 'Throughout my career, I have regularly come across Hamworthy boilers and water heaters, and viewed them as quality products, manufactured by a professional, quality company. I have always enjoyed assisting engineers and designers to give the correct technical solution by using products that deliver exactly what is needed to meet the specific needs of the project.'

Call 01202 662500, email sales@hamworthy-heating.com or visit www.hamworthy-heating.com

Breathing Buildings' NVHR wins at HVR Awards

Breathing Buildings, the UK provider of controlled hybrid ventilation systems, is celebrating winning the Commercial/Industrial Ventilation Product of the Year at the HVR Awards. The Cambridge-based company's new energy-efficient NVHR scooped the award.

Commercial director at Breathing Buildings Matthew Bray said: 'The new BB101 2018 guidance sets more stringent air-quality targets, is tougher on summertime overheating, and recommends pre-mixing of incoming air to eliminate cold draughts – all of which are achieved by our new NVHR.'

Visit www.breathingbuildings.com

Carrier's new AquaForce Vision chiller wins top UK air conditioning award

Carrier's AquaForce Vision 30KAV chiller with Greenspeed intelligence has been named Air Conditioning Product of the Year in the chiller category at the Cooling Industry Awards 2018.

The Aquaforce Vision 30KAV chiller is one of a new generation of air-cooled liquid chillers developed by Carrier to deliver high performance and optimal energy consumption in demanding industrial and commercial applications.

Its combination of outstanding energy efficiency, intelligent controls, connectivity and real-time data access give end users the tools to proactively manage their buildings for optimum occupant comfort and energy efficiency.

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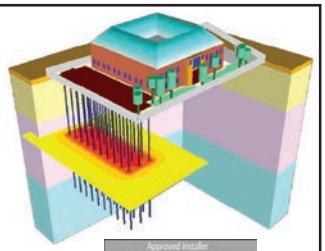

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Public Health Engineer
Berkshire, £45p/h

I have a requirement for a public health engineer to work on a temporary contract in Berkshire. You will provide designs through to completion on a large education project in London. The work is detailed design on above and below ground systems. This is a long-term contract with an immediate start. Ref: 5225

Senior Mechanical Engineer
London, £50k - £55k + bens

I am working on an exceptional opportunity for a senior level mechanical design engineer in London to join an award-winning international practice with a reputation for innovation and a sustainable approach to their work. My client has been established for over 25 years and have won numerous awards for their work and project delivery. They have grown a very talented and admired team of engineers in London and over the past few years have secured some of the most gifted consultants within the MEP industry. Ref: 5268

Associate Electrical Building Services Engineer
London, £60k - £65k + bens

A rare opportunity has arisen at a medium sized and well-established MEP design consultancy that boast impressive & diverse portfolio of projects including: residential, commercial, retail, historical, and healthcare. There is ample opportunity to progress to Director level in this rapidly growing business for someone with the right technical expertise, commercial acumen, and client facing abilities. Ref: 5134

Lead Electrical Engineer
Greater London, £60k + bens

We are currently working with the design team within one of the largest main contractors in the UK. You will have the opportunity to lead projects from conception to completion including aftercare. Projects span the commercial sectors ranging from £70 - £165 million in and around London. The requirement is for an ambitious electrical engineer to join the team. Ref: 5010

Resident Electrical Engineer
Berkshire, £40p/h

I am working with an international consultancy who have been providing engineering and design services on some of the UK's most iconic projects. They have a requirement for an electrical resident engineer to be site based on a critical site in Berkshire. You must be able to communicate effectively at all levels to clients and contractors. Ref: 5249

Intermediate Electrical Engineer
Berkshire, £35k + bens

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The Ri has hosted Christmas lectures since 1825


Professor Alice Roberts

Public knowledge

Disruptive 21st-century technology is making the Royal Institution's public engagement role more important than ever, says director Dr Shaun Fitzgerald


Dr Shaun Fitzgerald

The Royal Institution of Great Britain (Ri) has championed the advancement of science for more than 200 years. In the 19th and 20th centuries, the public would cram into its lecture hall on Albemarle Street in London to hear about revolutionary discoveries from the likes of Michael Faraday (electric motor), John Tyndall (recorded sound) and JJ Thomson (electron).

In the summer, Ri appointed Dr Shaun Fitzgerald as director. He was previously chief executive officer at Breathing Buildings, which helped devise the natural ventilation strategy at the headquarters of Apple and Bloomberg.

Fitzgerald is now in charge of Ri's new five-year strategy, which aims to double the charity's size and involves plans for new research, a national science club, and open-forum public policy debates.

Ri still holds scientific talks and demonstrations at its Albemarle Street HQ, but it now also promotes science with online videos and animations via its YouTube channel, which has 464,000 subscribers. The institution is famous for its now-televised Christmas lectures, which were started by Faraday in 1825. This year's lecture, entitled 'Who am I?', is hosted by Professor Alice Roberts and genetics expert Professor Aoife McLysaght, and is likely to be broadcast on BBC4 (schedule to be confirmed).

Why did you decide to move to Ri?

I have spent my career trying to inspire people to get involved with science and engineering. Even while CEO of Breathing Buildings, I made time to teach students at universities. It is crucial that we enthuse about a topic and explain why it is so important. The opportunity to get involved with the Ri felt like a natural thing to do; I care passionately about its mission, which is to build on its heritage to create opportunities for everyone to discover, discuss and critically examine science and how it shapes the world around us.

What excites you about the role?

The most exciting part is the rapidly increasing importance of Ri's mission. Technology and science is developing at an ever-quickening pace. While science forges ahead, the ethical issues that arise from certain developments are often tackled later – and, of course, the legal frameworks to cater for these languish further behind.

It is these discussions – not just the marvelling at new developments – that are truly fascinating and important for society to tackle.

This is the heartland of the Ri in terms of the events we put on, and the plans for further developments are exciting.

The second area of true excitement for me is our work with young people. We need more trained people in engineering and science, and the engaging programmes that Ri is developing, to reach and inspire the next generation, are incredible.

Why host public policy debates?

We want people to have a voice. When making policies, the government hears from practitioners and academics, but they don't hear those killer questions from the public about real-world issues concerning new technology.

We engage the government and business decision-makers in the early stages of policies, and put these to the public.

We want to conduct public policy debates with other organisations. I expect to work with the institutions – they have access to panels of experts and practitioners.

What is the national science club?

The concept is, first and foremost, about the young people it aims to serve. Although the Ri has clear plans for the development and implementation of this, it relies on partnerships with other groups working in science engagement.

For example, many towns and cities have science centres where hands-on demonstrations are given and young people can undertake experiments that they may not be able to do at home.

These are wonderful resources, and we are keen to ensure our audience and club members get involved with their local science centres, and meet up with fellow young scientists.

So partnerships are vital. We will provide digital resources – which we will be best placed to create and deliver – and this will be a focal point of the Ri's contribution.

SHAUN FITZGERALD FCIBSE is director at the Royal Institution

EVENTS

NATIONAL EVENTS AND CONFERENCES

SLL LightBytes
24 January, Liverpool
28 February, York
The 2018-19 LightBytes series in collaboration with the CIBSE Facilities Management Group. The peer-reviewed presentations cover: how to specify a luminaire; retrofit and upgrade; emergency lighting; and the Internet of Things.
www.cibse.org/sll

CIBSE TRAINING

For details, visit **www.cibse.org/training** or call **020 8772 3660**

Energy saving opportunity scheme
4 December, London

Energy monitoring and targeting
4 December, London

Energy strategy reports
5 December, London

Air conditioning and cooling systems
5 December, London

Low carbon consultant design training
5-6 December, Manchester

Building services explained
5-7 December, London

Fire safety in the design management and use of buildings: BS 9999
6 December, London

Fire Sprinkler Systems: Design
6 December, London

Overview of IET wiring regulations (18th edition)
7 December, London

Earthing and bonding systems
7 December, London

Mechanical services explained
11-13 December, London

ISO 50001: 2018 half-day update
17 December, London

Overview of IET wiring regulations
8 January, London

Successful design management
15 January, London

Fire risk assessment to PAS 79
16 January, London

Building services one-day overview
17 January, London

Energy efficiency building regulations: Part L
18 January, London

Low carbon consultant building operations training
21-23 January, London

Practical controls for HVAC systems
23 January, London

Mentoring skills workshop
24 January, London

Power system harmonics
25 January, London

Low carbon consultant design training
28-29 January, London

The New London Plan
29 January, London

Electrical services explained
29-31 January, London

Energy savings opportunity scheme (ESOS)
1 February, London

Standby diesel generator
4 February, London

CIBSE GROUPS, SOCIETIES AND REGIONS

For more information about these events, visit: **www.cibse.org/events**

CIBSE Application workshop
3 December, London
Workshop to help with the Engineering Practice Report for Associate and Member applications.

South West: Membership development evening
3 December, Bristol
An opportunity for members and non-members to learn about progressing with CIBSE membership.

HCNE and SPACES: Technical event
4 December, London
Technical meeting looking at the new version of BB101 guidelines on ventilation, thermal comfort and indoor air quality for school buildings, followed by Christmas lunch.

North East: Career review – Ant Wilson
6 December, Newcastle upon Tyne
Ant Wilson, director at Aecom, will give a review of his career in building services engineering.

Merseyside and North Wales: Introduction to CO_2 heat pumps
6 December, Liverpool
Presentation by Richard Jones, of Mitsubishi Heavy Industries.

CIBSE ANZ: WA chapter annual lunch
7 December, Perth
Annual Christmas lunch, with speaker Juan Carlos Guzman, head of software and computing group at CSIRO Astronomy and Space.

North East: Building information modelling
8 January, Newcastle upon Tyne
Presentation from Ian Chapman, of Mott MacDonald.

West Midlands: Soft landings
9 January, Birmingham
Presentation on the 2018 update on the Soft Landings Framework and new publications to support the clients and project delivery teams.

North West: Annual celebration dinner
25 January, Manchester
Annual celebration dinner offering the opportunity to mingle with familiar and new faces from the industry.

HIGHLIGHT

Ant Wilson will speak on 6 December

CIBSE Building Performance Awards 2019

12 February, London

The shortlist has been announced and, now, we eagerly await the awards dinner to find out who will take home the trophies. (See page 20 for the shortlist).

The awards recognise the people, products and projects that demonstrate engineering excellence in the built environment, and are the only industry awards to focus on actual, measured performance outcomes.

With categories including Consultancy of the Year, Collaborative Working Partnership, Project of the Year for Leisure, Residential and International and – new for 2019 – Engineer of the Year, these awards are tough and offer winning companies high kudos.

The prestigious event takes place at London's Grosvenor House Hotel and will be attended by more than 750 guests. This is a great opportunity to see what can be achieved by those who are developing strategies for energy-efficient operation of buildings, designing new builds, and developing products to support them.

■ For more information and to book your place visit **www.cibse.org/bpa**

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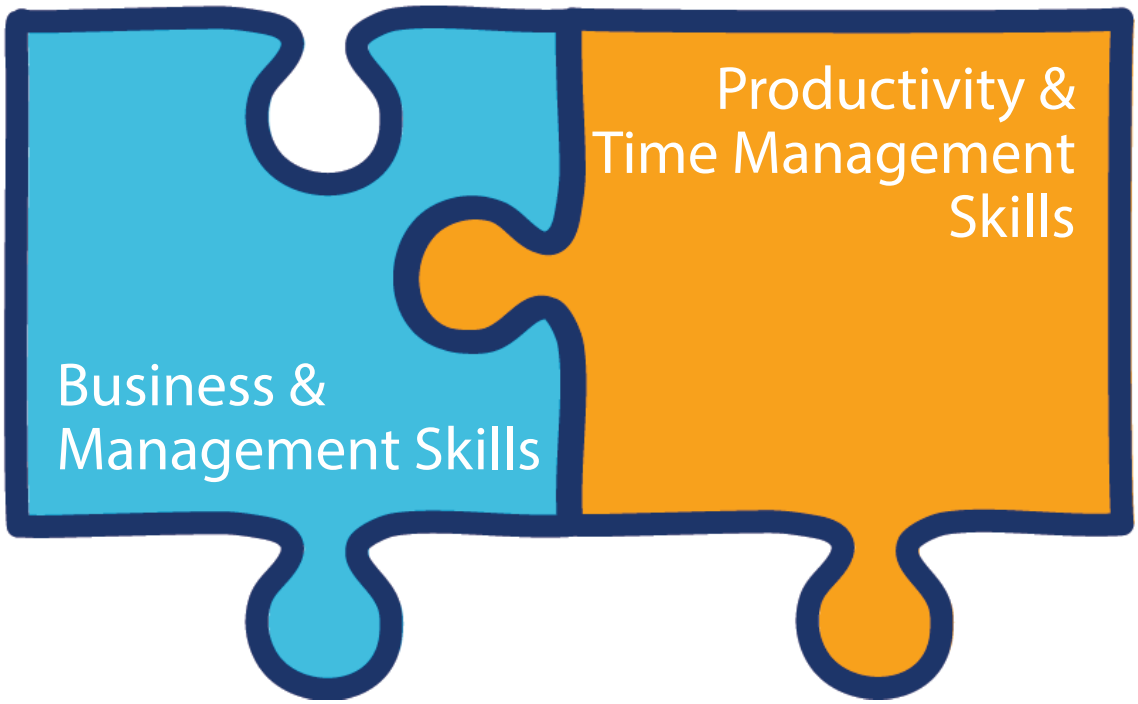

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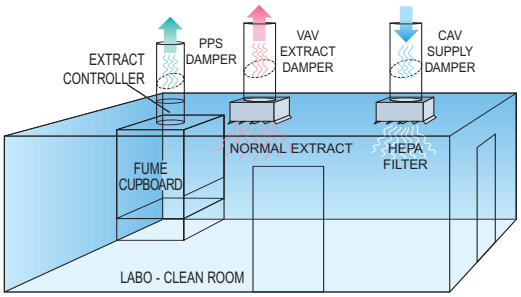

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