

CIBSE **JOURNAL**

#Build2Perform

July 2018

www.cibsejournal.com

**ENERGIESPRONG
LANDS IN THE UK
SMOKE VENTILATION
AT GRENFELL
AIR POLLUTION AND
THE IMPACT ON IAQ**

SPIRITUAL DOME

Shining a light on fire engineering at The Macallan underground whisky distillery

Tigris K1

Commercial Press-Fit System

The case for installation is watertight.

- ④ Multilayer composite pipe resistant to oxygen diffusion.
- ④ Patented hexagonal nose with a thermal expansion comparable to copper.
- ④ Defined leak window reveals unpressed fittings at pressure test.
- ④ Robust PPSU fitting for corrosion and temperature resistance.
- ④ Flexible pipe means fewer fittings and faster, lower cost installation.
- ④ The system carries a 25 year guarantee and WRAS approval.



Proven performance. Unique benefits. Real value.

Connect to better at www.wavin.co.uk

Water management | Plumbing and heating | Waste water drainage
Water and gas distribution | Cable ducting



Questioning evidence



Attending the launch of the British Council for Office's (BCO's) new study on health and wellbeing, it was encouraging to hear that a chapter of the *Wellness Matters* report is devoted to a review of existing evidence for wellbeing in buildings.

The report states that high levels of confusion about what really mattered were in part caused by 'exaggerated health or wellbeing claims that cannot be substantiated' – what the BCO terms 'wellness washing'.

Such is the concern about misinformation that the report offers detailed advice about how to question evidence. It says the knowledge base collated by Well and Fitwel consultants could reduce the risk

of misinformation, but adds that neither qualification can come close to the deep understanding gained through practising medical doctors, public health professionals, environmental psychologists and academic researchers.

But the consultant or 'accomplished generalist' can really add value by navigating the wealth of evidence and prioritising action, the report says. This sentiment was reinforced at the launch by Professor Derek Clements-Croome, who said every health and wellbeing project needed an integrator to ensure measures that cut across different professions are coordinated from design to implementation and operation.

The BCO study scoured existing certification and ratings systems to come up with 55 wellbeing outcomes. Organisations, the report says, can pick the outcomes that best suit their workplace requirements. The idea is that small firms can prioritise wellbeing measures without spending a lot on certification.

As Edward Garrod, Elementa principal and co-author of the report, says, air quality may be the priority for organisations in the city, while those on a business park in the countryside may be more concerned with accessing health facilities. The report offers methods of measuring each of the outcomes, and states that data should be acquired before the project begins, to measure the effect of the intervention.

Focusing on measurable performance outcomes, rather than prescriptive standards, is an emerging trend. Dame Judith Hackitt has called for an outcomes-based regulatory framework – rather than one based on rigid rules – and refers to 'serious penalties' for those who put occupants at risk.

The same principle of placing construction risk with those who deliver buildings exists in the Energiesprong mechanism (page 24), which sets performance targets for new and retrofitted homes, and makes contractors pay social housing providers if bills are higher than forecast. It's a sure way of forcing project teams to identify risks at the start of the project, rather than further down the line, when it's often too late.

ALEX SMITH, EDITOR asmith@cibsejournal.com

Editorial

Editor: Alex Smith

Tel: 01223 378034

Email: asmith@cibsejournal.com

Deputy editor: Liza Young

Tel: 01223 378048

Email: lyoung@cibsejournal.com

Technical editor: Tim Dwyer

Designer: James Baldwin

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

Editorial copy deadline: First day of the month preceding the publication month

The opinions expressed in editorial material do not necessarily represent the views of the Chartered Institution of Building Services Engineers (CIBSE). Unless specifically stated, goods or services mentioned in editorial or advertisements are not formally endorsed by CIBSE, which does not guarantee or endorse or accept any liability for any goods and/or services featured in this publication.

Advertisement sales

Display and sponsorship Jim Folley

jim.folley@redactive.co.uk

Tel: +44 (0) 20 7324 2786

Products & services Callum Nagle

callum.nagle@redactive.co.uk

Tel: +44 (0) 20 7880 6217

Recruitment advertising Dario Cappelli

dario.cappelli@redactive.co.uk

Tel: +44 (0) 20 7324 2756

Advertising production Jane Easterman

jane.easterman@redactive.co.uk

Tel: +44 (0) 20 7880 6248

Editorial advisory panel

George Adams, engineering director, Spie Matthew Hall

Patrick Conaghan, partner, Hoare Lea Consulting Engineers

Rowan Crowley, managing director, CIBSE Services

Chris Jones, Fläkt Woods

Philip King, director, Hilson Moran

Nick Mead, engineering consultant

Jonathan Page, building services consultant engineer, MLM

Geoffrey Palmer, director, Sweco

Dave Pitman, director, Arup

Christopher Pountney, senior engineer, Aecom

Paul Reeve, director, ECA

Andy Ford, director of research, School of Built Environment and Architecture, LSBU

Gethyn Williams, regional director, Amerlux

Hannah Williams, mechanical engineer, Atkins

Ant Wilson, director, Aecom

CONTRIBUTORS



Hywel Davies

An update to the EPBD offers a further opportunity to revise the entire regulatory framework



Wendy Belfield

Employers should take advantage of Trailblazer Apprenticeships to plug the skills gap in their sector



Adam Selvey

Engineers must design buildings now that can incorporate appropriate car charging



Tim Dwyer

This month's CPD looks at dynamic thermal simulation of building ventilation solutions



CONTENTS

News

6 News

Grenfell inquiry evidence; BIM could save £400m a year; BCO calls for focus on wellbeing outcomes

12 CIBSE news

New SLL president; SoPHE chair takes up post; entries open for SoPHE awards; call for overheating research

Voices

16 Primary concerns

Hywel Davies considers the implications of EPBD revisions

18 Setting the trend

Wendy Belfield on why we should give Trailblazer Apprenticeships the attention they deserve

20 Should we stop specifying gas boilers?

Matthew Hill looks at how greenhouse gas emissions targets could be met

65 Q&A

The Rumford Club's R70L vice-chair Tony Thomas

Features

24 A forward leap

Alex Smith looks at how Melius Homes guarantees performance using Dutch process Energiesprong

28 Out of juice?

Why engineers must act now to ensure buildings can deal with the unprecedented demand for electricity once electric vehicles replace diesel and petrol cars

32 Learning the limits

The effects of outdoor pollution on indoor air quality in schools and commercial premises based in and around London



Technical

SPECIAL FEATURES
Fire and smoke design and management / air conditioning

37 Time for change

Liza Young finds out what went wrong with the smoke-extract system at Grenfell Tower, and what the industry can do to prevent a similar disaster

43 Fire news

More Grenfell Tower report findings, and product news

46 COVER FEATURE Spiritual dome

How Speirs + Major's lighting design bought the Macallan distillery to life, and how Arup dealt with the fire hazard

51 Not just a phase

CIBSE award-winning cooling system NewMass offers the energy savings of passive design and the control of mechanical cooling

28



CIBSE JOURNAL

www.cibsejournal.com

The official magazine of the
Chartered Institution of Building
Services Engineers

SOCIAL MEDIA



@CIBSEJournal



CIBSE LinkedIn



CIBSE Journal newsletter



www.cibse.org

FOR CIBSE

Journal production manager: Nicola Hurley
Tel: 020 8772 3697, nhurley@cibse.org

CIBSE, 222 Balham High Road,
London SW12 9BS

Tel: +44(0)20 8675 5211

©CIBSE Services Ltd. ISSN 1759-846X

SUBSCRIPTION ENQUIRIES

If you are not a CIBSE member but would like to receive *CIBSE Journal*, subscribe now! Costs are £80 (UK) and £100 (international). For subscription enquiries, and any change of address information, please contact Nicola Hurley at nhurley@cibse.org or telephone +44 (0) 20 8772 3697. Individual copies are also available at a cost of £7 per copy, plus postage.

The 2017 US annual subscription price is £100. Airfreight and mailing in the US by Air Business, C/O Worldnet Shipping NY Inc, C/O Air Business Ltd / 155-11 146th Street, Jamaica, New York, NY 11434. Periodical postage pending at Jamaica NY 11431. US Postmaster: Send address changes to *CIBSE Journal*, C/O Air Business Ltd / 155-11 146th Street, Jamaica, New York, NY 11434.

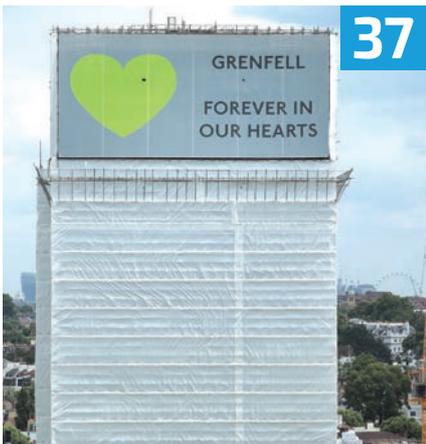
CREDITS

Cover image Spiers + Major and Magnum Photos P06 Getty Images / Jeff J Mitchell P07 Getty Images / SOPA Images P09 iStock.com / Sturti P12 iStock.com / RyanKing999 P16 iStock.com / 35007 P28 iStock.com / Wallix P32 iStock.com / PetarPaunchev P33 iStock.com / Bowdenimages P37 Getty Images / Dan Kitwood P08 Getty Images / Handout / Handou P08 iStock.com / Alex Donohue P43 Jens Haugen/Anti P46 -49 Credit / Spiers + Major Magnum Photos / Robertson Construction / Mark Power/Magnum Photos



ABC audited circulation:
18,331 January to December 2016
Printed by: Warners Midlands PLC

37



■ CPD

55 Dynamic thermal simulation for the evaluation of building ventilation solutions

The application of evolving dynamic thermal simulation software tools and their use in the assessment of building ventilation systems

■ Classified

60 Products

A round-up of systems and services for the industry

■ Jobs

64 Appointments

Jobs at jobs.cibsejournal.com

■ Events

66 Looking ahead

Build2Perform Live; 9th Symposium on Lift and Escalator Technologies; CIBSE training; CIBSE groups, regions and societies

32



IN BRIEF

Accountants cash in on Carillion crash

Accountants and lawyers will earn £70m for managing the aftermath of the collapse of Carillion, while construction subcontractors will receive a fraction of what they are owed, according to the National Audit Office (NAO).

The final bill to the taxpayer will be at least £150m, it stated.

Subcontractors will receive just £164m of the £2bn unpaid when Carillion went into liquidation, says a NAO report produced for the Cabinet Office. Accountancy firm PwC is expected to earn more than £50m for managing the insolvency process and had received more than £17m in fees from Carillion in the decade before its collapse. Lawyers are expected to earn more than £20m.

Cardiff University signs campus deal

Bouygues UK is to build Cardiff University's new Innovation Campus on a disused railway yard.

The campus, at Maindy Park, is being funded by the UK Research Partnership Investment Fund (£17m), the Welsh European Funding Office (£13m) and the Welsh Government (£12m). It will bring together researchers, students and industry to create products, spin-outs, start-ups and social enterprises.

There will be two centres on the campus – one will host the social science research centre Spark, plus a creative space called the Innovation Centre, while the other will be home to the Institute for Compound Semiconductors and the Cardiff Catalysis Institute.

Schools set for T Level take-off in 2020

The new T Level technical qualifications will be offered in 52 English schools and colleges from 2020. They are vocational alternatives to A Levels and involve a 40 to 60-day work placement.

The first subjects to be taught will be Digital, Construction, and Education & Childcare, with Engineering to follow from 2021. A full set of subjects should be available from 2022.

T Levels were announced by the Chancellor Philip Hammond in 2016 and he allocated an annual fund of £500m towards their development, in partnership with industry.

Digital hope for Mack rebuild

Glasgow council leader 'not writing off the Mackintosh building just yet'

The Glasgow School of Art could still be saved, despite experts suggesting the second fire in four years to ravage the world-famous building had left it structurally unsound.

Initial estimates have put the cost of a second reconstruction of Charles Rennie Mackintosh's masterpiece at £100m. It was still undergoing a £35m rebuild – led by Kier Construction – after the 2014 fire when it was engulfed in flames again on 15 June.

After the first fire, a complete digital record of the original building was made, which makes a rebuild a possibility. A Glasgow School of Art team also created a digital model of the building, using photographic records and drawings.

However, Glasgow Council leader Susan Aitken said the building was not in danger of collapse and the city was 'not writing off the Mackintosh building just yet'. She added that estimates for rebuilding were 'purely speculative' at this stage.

It took 120 firefighters almost three days to get the latest blaze under control, but the main structural elements of the building remain intact. The scaffolding surrounding the building as part of the ongoing restoration project helped the main section to remain standing. However, the Eastern wing, built in 1899, appears to be severely damaged with some of the stonework clearly weakened.

Early reports suggest the sprinkler system installed as part of the rebuilding work was not working, as the water pumps had yet to be fitted.



London mayor launches roadmap to make the capital smarter together

In his vision to make London the world's smartest city, mayor Sadiq Khan has launched a city-wide initiative to harness the capital's tech talent in tackling some of its most pressing challenges – including poor air quality, urban design and digital connectivity.

Smarter London Together sets out how Khan will help public services use tech and data to improve the lives of Londoners. It cites more than 20 initiatives, including the Civic Innovation Challenge. This will establish London as a test-bed for technological innovation, as well as support the development of smart infrastructure and help attract investment in new businesses. It aims to match tech start-ups with leading companies and public bodies.

Khan's plans also include supporting the commission of a new generation of smart

technology – such as lamp-posts incorporating air quality sensors, publicly accessible Wi-Fi and electric vehicle charging points – and developing a pan-London cyber-security strategy.

Rob Barling, strategy and development director at Spie UK, said: 'Organisations that operate in the built environment are beginning to realise the importance of their role in combining engineering expertise with technological ingenuity and the effective use of big data, to address social and economic issues. But there is still much more that needs to be done within the industry.'

'The new smart London plan presents experts in the built environment with a fantastic opportunity to make a profound difference to the way our cities are designed, built and managed, to have a positive impact on our planet.'



Grenfell residents failed by safety features, inquiry told

Compartmentation compromised by doors and gas pipe

A host of fire-safety regulations failures were presented to the Grenfell Tower public inquiry on 18 and 19 June.

Arup fire engineer Dr Barbara Lane, who wrote a report into the cause and spread of the fire, told the inquiry that the lifts were substandard, fire doors had not been replaced, and combustible material was fitted around windows.

She also emphasised that the stay-put policy, permitted by Building Regulations for some high-rise buildings, relies heavily on compartmentation, which only works alongside other protection measures. Fire-safety systems in tower blocks are designed to respond to fires in a single flat, not multiple fires throughout a building, as happened at Grenfell.

Lane's report, released last month, stated that several additions or refurbishments at Grenfell Tower did not comply with regulations. The lifts in the building were not up to the standard for firefighters – they had no escape

hatches, making them unsuitable for the evacuation of disabled people.

Only 106 of the 120 doors in the tower were replaced after refurbishments in 2011, so it is assumed that the others had been there since 1974, when doors were required to be fire resistant for 20 minutes. The current regulations raise this to an hour. The dry rising mains in the tower were also unsuitable. A wet fire main should be installed in buildings above 50m; Grenfell's topmost residential floor was at 62.8m.

A gas pipe installed in 2016 penetrated the protected stair compartment wall and the protected flat compartment walls, added Lane. She said the pipe – one of six gas risers running vertically up the block – had incomplete compartmentation and ventilation around it to protect it from fire.

Lane also revealed that EDPM, a combustible material, was used to weatherproof the window seals of the tower, and no cavity barriers 'of any kind' were installed around any windows.

■ [Read our Grenfell report on smoke ventilation on page 37](#)

The Grenfell Silent Walk at Kensington Memorial Park on 14 June marked one year since the fire

Consultation proposes ban on combustible cladding

The government is consulting on changing legislation to enforce a combustibles ban for high-rise buildings. It proposes prohibiting the use of material that is not class A1 or A2 in any part of the external walls, at any height, of 'flats and similar building uses' over 18m high.

Currently, Building Regulations allow the external surfaces of high-rise walls to be 'Class 0' materials and insulation to be 'limited combustibility'.

'Dame Judith Hackitt's review has identified serious systemic failings with the construction industry and the regulatory system, and has proposed a radical approach to address them,' the consultation document said.

'Reform of the scale envisaged by Dame Judith will take time and the government considers that, in addition to longer-term reform, there is a case for immediate action in relation to external fire spread. Dame Judith also indicates that when choosing between products that are non-combustible or of limited combustibility and products undergoing full-scale system tests, the lower-risk option is to use products that are non-combustible or of limited combustibility.'

The government proposes making the change by amending the Building Regulations 2010, rather than through guidance. Failure to comply with the ban would result in prosecution and unlimited fines.

The document said the ban would add between £25,000 and £75,000 to the cost of renovating a 15-storey building, and a total cost of £7.5m across the country.

To respond to the consultation, which closes on 14 August, visit bit.ly/CJJul18cladding

Building control interventions worth £1.85bn, claims study

The net economic benefit of public service building control interventions in construction projects could be as high as £1.85bn, according to the University of Wolverhampton. It was commissioned by trade body LABC, which represents local authority building control departments in England and Wales, to study 90,000 plans from 2016/17, in a bid to establish the economic and social benefit of interventions.

'This value is important to everyone, including policy-makers, ministers, local government, property owners, managers and [construction] professionals,' said LABC chief executive Paul Everall. 'Complying with building standards has a real payback. It is not a question of ticking boxes for their own sake. Our current system – despite its flaws – still improves the quality, performance, safety and lifespan of buildings. This is integral to all our homes, communities, workplaces and economic life and it needs to be better understood and appreciated.'

Everall committed the organisation to supporting further research to establish a 'robust figure for the social return of building control compliance accepted by the wider industry'. LABC is working with the Construction Industry Council to identify suitable construction projects to study.

Surge in fire-safety projects bring contractors £661m worth of work

British contractors are benefiting from a multimillion pound surge in fire-safety projects in the wake of the Grenfell Tower blaze last June.

In the 12 months since the tragedy, local authorities and housing associations have overseen a 56% increase in fire-safety retrofit and improvement tenders.

According to information from the procurement data firm Tussell, 10 of the biggest projects are worth £593m alone. It said fire-safety tenders from housing associations rose by 39%, while local authority work doubled. More than 220 tenders, worth up to a total of £661m, have been published.

'It is heartening to see that Grenfell has prompted long overdue investment in fire safety – particularly in local government,' said Tussell chief executive Gus Tugendhat.

The firm estimates that London local authorities had spent £100m on safety works since the fire. However, this has led to some criticism, as it has diverted spending from scheduled council housing refurbishment projects.

IN BRIEF

Women engineers feature in Honours List

The Queen's Birthday Honours list has this year recognised six industry professionals, including four women.

Naomi Wendy Climer, past president of the Institution of Engineering and Technology, William Hood Dodds, the Scottish government's head of building standards, and David Orr, chief executive of the National Housing Federation, have been made CBEs.

RIBA's immediate past president, Jane Duncan, Denise Ann Bower, professor of engineering project management at the University of Leeds, and BSRIA's chief executive, Julia Evans, have been made OBEs.

Meanwhile, BSRIA has published the fifth edition of its *Design Framework* guide BG6.

BG6/2018 is designed to help building services consultants, contractors and clients establish areas of responsibility, and define the extent of their design activity and deliverables on projects.

BIM could save government £400m a year, PwC claims

Using the 3D digital process during design would improve efficiency by 5%

Accountants at PwC claim the use of BIM Level 2 could save the government £400m a year on its capital building programme.

The firm analysed the Environment Agency's Foss Barrier upgrade in York and the refurbishment of the Department of Health's HQ in Victoria Street, London, and estimated

overall financial savings of 1.5% and 3% of whole-life expenditure. 'Across the design, build and commission, and handover phases, our quantified estimates were 0.7% and 1.4% of capital expenditure respectively,' the PwC report said. 'If this level of saving could be achieved across the National Infrastructure Commission's projected spending of £31.7bn in 2018/19, this would imply savings to UK taxpayers of £226m-£429m (in 2017 prices).'

Potential cost savings in asset maintenance were identified as the largest benefit. Using BIM during the design phase would also improve efficiency by 5%, save time in build and commissioning, and reduce costs through improved clash detection.

PwC said setting up methods for measuring financial savings 'would encourage greater focus on the importance of realising savings from the use of BIM and help to increase understanding of how and what data and evidence needs to be collected to support benefits measurement'.

International standards in pipeline

Two international BIM standards will be published later this year.

BS EN ISO 19650-1: *Organisation of information about construction works - Information management using building information modelling - Part 1: Concepts and principles*, and BS EN ISO 19650-2 *Organisation of information about construction works - Information management using building information modelling - Part 2* will supersede their equivalents in the PAS 1192 series.

FREE webinar

How can energy storage help cut your energy bills while keeping your lights on?

12 July 2018 | 13.00 BST



SIGN UP NOW ►► bit.ly/cibsewebinars

Brought to you by:

CIBSE JOURNAL

ABB

FREE webinar

Ventilation Solutions to improve air quality for Part F

Speakers:
Martin Passingham - Product Manager
Warren Clark - Product Specialist

AVAILABLE ON DEMAND



WATCH NOW ►► bit.ly/cibsewebinars

Brought to you by:

CIBSE JOURNAL

DAIKIN



FMB calls for review of apprenticeship levy

Some training providers abusing system by using apprenticeship levy to train people who already have degrees

The Federation of Master Builders (FMB) has called on the government urgently to review the Apprenticeship Levy system after news that construction apprenticeship starts were 28% lower between August 2017 and March 2018 than the previous year.

Chief executive Brian Berry said large companies should be allowed to pass more of their levy vouchers to smaller firms in their supply chains. Currently, they can only pass on 10%, which means much of the levy is not being used. 'Larger firms often do not employ onsite tradespeople directly or train apprentices, so there is a real danger [the industry] will continue to fail to take advantage of the Apprenticeship Levy,' said Berry.

Meanwhile, the chief executive of training organisation JTL, Jon Graham, said as many as 50 universities were abusing the levy system by registering as approved apprenticeship training providers to gain a share of the levy-funded market.

'This is an outrageous abuse of the system,' he said. 'MBA apprenticeships do not meet any sensible definition of apprenticeships as we know it, and we're pretty sure that using training levy money for these MBA apprenticeships was never envisaged by the government.'

See Wendy Belfield's column on Trailblazer Apprenticeships on page 18.

New safety rules disrupt UK's water-heater market

The Gas Appliance Regulation (GAR) has forced several manufacturers to remove their water-heating products from the UK market at short notice, *CIBSE Journal* understands. GAR is a safety regulation that applies to products burning gaseous fuels and to components used in gas appliances. It replaced the Gas Appliances Directive (GAD) in April.

Along with the low NO_x emissions standards to be introduced by the Energy-related Products (ErP) directive in September, it has forced several manufacturers to stop selling some of their atmospheric water heaters.

Appliances produced now must have a GAR certificate and all gas fittings - including controls and other safety components - must be CE marked. Many of the most widely sold ranges of water heaters no longer comply. Importers and distributors must now also prove that the products they handle are GAR-compliant.

Network guidance backs hot-water storage

The Hot Water Association (HWA) has produced guidance aimed at improving the efficiency of residential hot-water storage systems linked to heat networks. It includes a design methodology for installers, detailing the key factors to consider in the planning process, plus many of the possible options for storing hot water.

The HWA guide document states that there has been a marked shift in recent years towards promoting instantaneous hot-water generation. As a result, the benefits of storage solutions were often underestimated.



Aegean – fan coil A new range of fan coils for heating and cooling commercial applications



**For a wide range of applications,
with the ability to rapidly heat and
cool large areas efficiently**

- Incorporating the latest EC motor technology, for full BMS integration
- Variable speed control as standard
- Free 5-year parts and labour guarantee
- Suitable for traditional and renewable heat sources
- Independently certified by BSRIA
- Designed and made in the UK



01245 324900 | sales@smithsep.co.uk
SmithsEP.co.uk | @SmithsEP_UK | #ThinkSmiths

THINKING OUTSIDE THE BOX

Digital consumer firm Photobox Group has converted a former printworks and artists' studios into its new 37,000ft² HQ in Clerkenwell, London.

The parent of the Moonpig, Hofmann and posterXXL brands worked with London-based design and build firm Oktra to create a four-storey, open-plan space, incorporating flexible working, stand-up areas and collaborative spaces.

The company opted to maintain the industrial roots of the site, with exposed, original concrete walls, pillars and ceilings, and an old crane that hangs over the reception area. The mechanical engineer on the project was Conditioned Environments, and the electrical engineer was Bridgegate Electrical.



Technical symposium call for papers

'Transforming built environments – driving change with engineering' is the theme for next year's Technical Symposium, and CIBSE is calling for research papers, technical reviews, case studies and opinion presentations, which will be peer-reviewed.

The symposium offers an opportunity to examine and share research, developments and applications that will influence the regulation, creation and maintenance of the built environment in future. It also presents evidence of where clear opportunities to benefit from established practices still exist.

It will be held at the University of Sheffield on 25–26 April 2019. To submit 250-word abstracts by 17 September 2018, and for more details, visit cibse.org/symposium

CIBSE Ireland marks its 50th with gala dinner

More than 700 people are expected to attend a gala dinner in Dublin on 30 November, as part of CIBSE Ireland's 50th anniversary celebrations.

The event, at the Clayton Hotel, Burlington Road, will also feature the first CIBSE Ireland Awards presentation. These accolades will recognise and promote best practice in design and installation of building services, including new-build and refurbishment projects.

Entries must be submitted jointly by both the consultant and contractor, for projects in the hospitality, leisure, healthcare, commercial, industrial, retail, pharmaceutical, educational and office sectors.

Visit www.cibseireland.org for tickets to the dinner and for more details about how to enter the awards.

BCO urges focus on wellbeing outcomes

Report says measure must be supported by evidence and data

Health and wellbeing in the built environment should be focused on performance outcomes and not just certification systems, according to a new British Council for Offices (BCO) report. *Wellness Matters* states that an outcomes-focused approach would allow project teams to develop innovative solutions.

The BCO has compiled 55 wellness outcomes based on a review of frameworks such as Breeam, Ska and Leed, and on outcomes within the Well Building Standard and Fitwel Rating Systems. Other references included the NHS and Public Health England.

Sixteen of the outcomes focus on reducing exposure to adverse environmental factors, such as air pollution, noise, poor lighting and volatile

organic compounds (VOCs). Others are based on spatial issues, such as access to healthy food outlets, hospitals and exercise areas, and storage areas within offices.

A roadmap is included to help stakeholders identify which factors are of prime importance to their organisation, and how health and wellbeing targets can be applied during the life-cycle of the building.

The BCO study analysed the evidence supporting wellbeing measures, and its report warned that claims made around wellbeing were often exaggerated or could not be substantiated. 'Trust in the new breed of health and wellbeing consultants had to be founded upon reliance on an evidence base presenting itself as robust, credible and relevant,' it said.

The study gives guidance on how evidence should be assessed for relevance and rigour. It states that a new generation of research is starting to improve the quality of the health and wellbeing evidence base, and that wellness strategies must be underpinned by data collected before, during and after fitout.

'Without effective baseline data, it is impossible to quantify benefits or demonstrate the value of wellness strategies,' the report said.

'Post-occupancy evaluation is an essential ongoing activity and valuable source of data.'



Guidance at every step

Because some decisions are too important to leave to chance...

At Whitesales we understand the complexities of smoke control in the built environment - whatever the building, whatever the sector.

We design, manufacture and maintain Smoke and Access Systems to ensure safer living and working environments.

For expertise you can trust,
call us today.



IN BRIEF



Final call for entries to Young Engineers Awards

The deadline for entering the CIBSE Young Engineers Awards is fast approaching.

Comprising Employer of the Year and Graduate of the Year, the awards celebrate the industry's best examples of young engineering talent and employers' dedication to recruiting, nurturing and empowering young people.

Entries must be received by 1 August. Winners will be announced at the awards event on 11 October. Visit www.cibse.org/yea

Next digital engineering online modules published

Three new digital engineering (DE) online learning modules have been launched by CIBSE.

DE4: *Common Data Environments*, DE5: *Asset Information Requirements*, and DE6: *Security Requirements* each offer two hours of training content.

The DE series is designed to enhance the knowledge and abilities of engineers and technicians working digitally in all aspects of BIM and digital engineering. The final three modules in the series will be released later this year.

On completion of all nine DE modules, learners will be awarded a certificate in CIBSE Basics of BIM.

CIBSE is offering *Journal* readers 20% off the cost of the new modules using the discount code DE20. For further details, visit www.cibse.org/training-DES

Gaunt vows to build on society's recent success

New SoPHE chair aims to establish links with like-minded institutions

The Society of Public Health Engineers (SoPHE) welcomed Jonathan Gaunt as its new chair at its AGM in June. He takes over from Steve Vaughan, who held the position for three years.

'I have been privileged to watch the society grow and develop over the years, and now look forward to building on previous successes,' said Gaunt. 'I envisage this will include establishing collaborative links with like-minded professional institutions and organisations; increasing production of

technical guidance for our members; raising awareness of the public health profession to the wider construction and built environment industry; and developing robust apprentice training courses for NVQ students, in collaboration with regional colleges.'

Gaunt thanked Vaughan for his passion, dedication and hard work in the post over the past three years. Handing over the role, Vaughan said: 'I would like to express my sincere thanks to all those who have assisted me over the past three years.'

'During my tenure, we have had some great successes: the formation of a young engineers network focusing on public health engineering; the new look *Journal*; the launch of technical bulletins; and London technical trips.

'The Young Engineers Award has continued to flourish as we work with Engineers Without Borders (UK). New regions have also been formed, including the UAE and Midlands, ensuring technical events are available to more members than ever.

'The contractors working group has grown with its engagement with technical colleges to address the skills shortage and enhance apprentice training. They will soon be launching the SoPHE School of Excellence, in collaboration with Havering College. This opportunity will bring much-needed enhancement to students' technical skills and offer career aspiration and encouragement to progress within the industry.'

Other new members of the steering group elected at the AGM were vice-chair Peter White and education chair James Day.



Filter-cartridge designers sought to enter SoPHE awards

The Society of Public Health Engineers (SoPHE) Young Engineers Award 2018 is seeking designs for a refillable cartridge for a filtration system.

The awards are run in association with Engineers Without Borders UK and Caminos de Agua. For the past few years, Caminos de Agua has been working to develop a media-based filtration system to remove arsenic and fluoride from groundwater. It has already developed low-cost technical filtration media for fluoride removal, and is now working to develop a similar one for arsenic.

The challenge for entrants is to design a low-cost, refillable cartridge for the filtration system that is openable, and has commonly available, reasonably priced tools. They must be air- and watertight, and be able to connect to other filter cartridges.

Individuals or teams of up to three people, aged 18-35 on 30 September, are eligible to enter. They should submit either two five-minute videos or an A1 poster with their design concept. All submissions should be received by 7 September.

For more information visit www.cibse.org/sophe



SLL president Iain Carlile with outgoing president Richard Caple

SLL awards

Presented at the SLL AGM:
Lighting Award: Dr Kit Cuttle
Regional Award: Manny Stone
Honorary Fellowship:
 Dr Peter Boyce
Honorary Fellowship:
 Graham Phillips
Leon Gaster Award: Kees Teunissen
Walsh Weston Award: Ling Xia

New SLL president to spread message of quality lighting

Society must keep developing tools and guidance to help members, says Carlile

Iain Carlile was appointed the new president of the Society of Light and Lighting (SLL) at its AGM on 24 May. He will continue to further the aims, set out by previous president Richard Caple, to develop and support the next generation of lighting professionals, and engage with volunteers, members and the public in spreading the message of quality lighting.

Carlile told the AGM about his first involvement with the SLL, at a conference in Dublin in 2004, when he was bowled over by the passion and dedication of the speakers and the community of lighters in attendance.

In an appeal to practitioners of light, Carlile highlighted one of the key strengths of the society – its membership, and the diverse backgrounds and career paths that they represent. Citing inclusivity as one of the major factors in deciding to join the society, he outlined his aims to assess what the SLL offers and the ways in which it can provide public benefit.

Carlile also asked what the society can do to stay relevant to its current membership of more than 4,000 people. He referred to the need to continue to develop tools and guidance to help members succeed within their careers, achieve professional recognition and find enjoyment in the work that they do.

The new president recognised the need for the SLL to address challenges in relation to changing technology, and in the way that it communicates and disseminates valuable information. Referencing CIBSE President, and SLL Past President, Stephen Lisk's inaugural address, Carlile highlighted the need for CIBSE and its divisions, societies and special interest groups to collaborate, to offer the most value to members and to the public.

'I would like to reach out to these individuals and groups, reinforcing what the society can do for them and how they might become involved in the society's activities, and get the message of good lighting to a wider audience, for the benefit of all,' Carlile told the AGM, at which new president-elect Jim Shove was also inducted.

Call for academic research on overheating

The *Building Services Engineering Research and Technology (BSER&T) Journal* is publishing a special issue dedicated to overheating, scheduled for 2019, and is calling for abstracts on the subject from academic research.

Rising external temperatures as a result of intense urbanisation and climate change, and more airtight buildings, will increase the risk of overheating in buildings, especially those that rely on natural ventilation. High indoor temperatures affect occupant thermal comfort, health and wellbeing, and productivity.

If you and your team are doing academic research into overheating, *BSER&T* would like to hear from you. It is specifically looking at:

- Quantifying the risk of overheating, now and in the future, for domestic and non-domestic buildings, for new and existing stock
- Interaction between outdoor and indoor temperatures
- Role of ventilation in providing indoor air quality
- Implications of outdoor pollution and noise on the cooling effect of natural ventilation
- Impact of overheating on health and productivity
- Affect of overheating on vulnerable population groups, people with pre-existing health conditions, the elderly and young
- Energy and energy-infrastructure implications of increased mechanical cooling demand to deal with overheating.

Please send an abstract of no more than 300 words, by 31 July 2018, to technical@cibse.org

Stay alert to blue-light danger

Professor Steven Lockley presented on 'The right light at the right time; redesigning light for alertness, sleep and health', at a Daylight Group meeting in May.

He told the meeting that light is the primary stimulus for circadian entrainment and, where circadian rhythms used to be considered important only for sleep, it has become apparent that they drive biological processes in the body by turning genes on and off at the 'correct' time. Exposure to light that has a higher colour temperature (generally, higher blue content) in the hours before bed will reduce the quality of slow-wave sleep – the restorative stuff. Professor Lockley is particularly concerned about young people being exposed to blue-enriched electronic devices in the evening, because growth hormone is only produced during deep sleep. He outlines two general principles:

- In an environment where people don't sleep, you should try to make them alert. Spectral adjustment is not required unless for specialised use – for example, in dermatology.
- In environments where people sleep, there are advantages in being able to reduce the blue content and lower the intensity in the evening.

Dr Richard Hobday delivered a second presentation on 'Myopia and daylight in schools: a neglected aspect of public health?' Videos of the presentations, and others, are available at: bit.ly/CJJul18Day

THE CHARTERED INSTITUTION OF BUILDING SERVICES ENGINEERS

Minutes of Extraordinary General Meeting

An Extraordinary General Meeting of the CIBSE was held at The Royal Society, 6-9 Carlton House Terrace, London, SW1Y 5AG, on 8 May 2018. Peter Y Wong, President, chaired the meeting. Chief executive Stephen Matthews read the notice convening the meeting.

SPECIAL RESOLUTION - CHANGES TO THE BY-LAWS AND REGULATIONS

Peter Y Wong informed members that the changes to the by-laws and regulations had been presented as a single resolution, as they were interdependent.

Deputy chief executive Stuart Brown introduced the resolution, explaining the background to the board's proposals to amend the by-laws and regulations of the Institution.

The proposals were intended to modify the arrangements for the election and appointment of Institution officers and board members. The intention was to achieve a better balance between the right of members to stand for election and the need to ensure the effectiveness, stability and continuity of the board as the governing body of a significant charity, and to allow an improvement to the timescales involved in the nomination and election process.

The detailed changes proposed to the by-laws and regulations were set out in the calling notice for the meeting, and the key changes that would be effected were:

1. All candidates for officer and board member positions would be considered by the nominations panel; the panel would invite suggestions from the membership at large, and would give consideration to all candidates suggested.
2. Candidates for president-elect and for board members would be nominated by the board, having considered the advice of the nominations panel. Any candidates considered by the panel but not nominated

by the board would have the option to go forward for election, subject to obtaining nominations from 10 corporate members, with a ballot held in the event that there were more candidates than vacancies.

3. The three vice-presidents and the honorary treasurer would be appointed by the board, having considered the advice of the nominations panel, rather than being elected. The nominations panel would seek to recommend candidates who had previously been officers or members of the board, where possible.
- 4) There would be no subsequent opportunity for candidates to be nominated that had not been considered through the nominations panel process.
- 5) Fellows who have served as honorary treasurer would be eligible for nomination as president-elect, in addition to those who had served as vice-president.
- 6) The honorary treasurer could be a non-member of the Institution, should a candidate be available whom the board considered suitably qualified for the role.
- 7) In the event of a ballot, all candidates will be invited to submit a profile, in a format agreed by the board, for circulation to the voting membership. Widespread canvassing by candidates or others on their behalf would not be permitted.

Peter Y Wong emphasised the importance of ensuring that CIBSE continued to have an effective board; its members were the trustees of the charity, and carried responsibility for ensuring that the Institution acted in accordance with its charitable objectives in the public

interest. The proposals were intended to ensure that the Institution at all times had a strong and experienced board, while allowing opportunities for members to come forward and have the opportunity to be elected to board positions. He also confirmed the proposals had been subject to consultation with council, the Institution's key consultative body, which included representatives of all sections of the Institution.

Clarification was requested of the composition of the nominations panel and the meeting was informed that the board had reduced the number of current board

members automatically serving on the nominations panel to two. The panel currently comprised nine members, including: the immediate past president; the President; the most recent past president no longer serving on the board; three senior members; and three members of council. It was also clarified that while the board was required to consider the advice of the nominations panel, the final decision on candidates nominated by the board would remain with the board as the governing body of the Institution.

Clarification was requested of the term 'corporate member'. It was explained that corporate members hold the grade of Fellow, Member, Associate or Licentiate.

“Wong emphasised the importance of ensuring CIBSE continued to have an effective board”

Regarding timelines, it was explained that the nominations panel met during the summer of each year to consider candidates, with its recommendations normally being considered by the board in September.

Under the proposed new system, it was hoped that nominations and appointments could be published following the September board meeting, with any ballot required being held during the autumn.

Some delay to this process was, however, likely in the current year, because of the timing of the EGM and the need to await Privy Council approval for by-law changes.

Peter Y Wong moved the adoption of the special resolution, which

was seconded by Paddy Conaghan. A vote was taken by a show of hands, with 31 members in favour and none against.

The meeting was informed that 86 proxy votes had been received, of which 82 had been cast in favour of the motion, with four against.

The resolution was therefore carried with a total of 113 votes in favour, four against and no abstentions.

New members, fellows and associates

FELLOWS

Wong, Chak Pui Richard
Kowloon, Hong Kong

Parker, Anthony Steven
AlAzaiba North, Oman

Thomas, Mark Edward
Mold, United Kingdom

Appleton, Stephen John
Glasgow, United Kingdom

Ward, Michael Harold
Market Harborough, United Kingdom

Chapman, Michael Stuart
Sheffield, United Kingdom

Gathergood, Stephen Paul
Evesham, United Kingdom

Hill, Justin
Christchurch, New Zealand

Pietrzyba, John Francis
Maidenhead, United Kingdom

Wallace, Robert Ray
Macclesfield, United Kingdom

Pritchard, Garry
Dagenham, United Kingdom

MEMBER

Martin, Joe
Sydney, Australia

Brogan, Derek
Blessington, Ireland

Nasser, Nasser George
Business Bay, United Arab Emirates

Strachan, Michael
Doha, Qatar

Ali, Mizan
Da Kao War District 1, Vietnam

Hameeduddin Haqqani, Mohammed

Al Raka, Al KHobar, Saudi Arabia

Hui, Chi Fai
Shatin, Hong Kong

Lau, Yun Sun
TKO, Hong Kong

Fung, Siu Wang
Kowloon, Hong Kong

Khan, Obaidullah
Clemton Park, Australia

Lee, Wai Keung
Kowloon, Hong Kong

Tang, Wai In
Kowloon, Hong Kong

Chan, Kwok Choi
NT, Hong Kong

Osborne, Stephen
Edinburgh, United Kingdom

Somi Krishnamoorthy, Pradosh Kumar
Sharjah, United Arab Emirates

Doherty, Paul Thomas
Waterford, Ireland

Hough, Max
Lewisham, Australia

McSera, Sean
Castlemartyr, Ireland

O'Brien, Oliver
Ballinspittle, Ireland

O'Brien, Brendan
Brisbane, Australia

Fallon, Mark
Arklow, Ireland

Bones, James
Wellesley Street, New Zealand

Stephens, Victoria
Wellington, New Zealand

Barry, Declan
Dublin, Ireland

Dib, Sam
Petersham, Australia

Dawson, Paul Martin
York, United Kingdom

Yip, Long To
Tai Po, Hong Kong

Tao, Yiran
Ma On Shan, Hong Kong

Cheung, Kam Lung
Shatin, Hong Kong

Cheng, Tin Tak
Kowloon, Hong Kong

Fung, Kwok Shing
Tokwawan, Hong Kong

Kirk, Callum John
Glasgow, United Kingdom

Swanton, Jonathan Joseph
Dublin, Ireland

Vaughan, Richard
Terenure, Ireland

Qarnain, Syed Shuibul
Bengaluru, India

Carrasco-Szulc, Manuel J
Brighton, United Kingdom

Chung Ng, Melvin
London, United Kingdom

Darragh, Jamie Lee
Dubai, United Arab Emirates

LICENTIATE

Hymers, James
Chesham, United Kingdom

Cripps, Jonathan
Loughborough, United Kingdom

Moldovan, Ioan
Northampton, United Kingdom

Pasterfield, Daniel William
Wickford, United Kingdom

Auditor, Zubair
East Ham, United Kingdom

Wilson, Michael
London, United Kingdom

Dowell, Richard
Manvers, United Kingdom

King, Sean
Maldon, United Kingdom

Tuson, Alex
Hoddesdon, United Kingdom

Dash, Jack
London, United Kingdom

Finn, Thomas
Bristol, United Kingdom

Griffin, Aidan
Solihull, United Kingdom

Baltrukiewicz, Wojciech
Bristol, United Kingdom

Reeves, Stacey
Warlingham, United Kingdom

Adkins, Dean
Surbiton, United Kingdom

Hubbleday, Daniel
Birmingham, United Kingdom

Cologne, Neil
London, United Kingdom

Ghauri, Salman
London, United Kingdom

Stevens, George
Woodstock, United Kingdom

Randall, Bryan
Hockley, United Kingdom

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



VELOGRID
Velocity Averaging Sensor



P-Sensor

CMR are the inventors and manufacturers of both the P-Sensor and the Velogrid. The Velogrids are made to measure to fit any ductsize up to 3m x 3m and the P-Sensor has a keyboard to easily enter : duct height - width - density - magnification factor and the scaling in m/s - m³/s - m³/h - l/s. It can even work out the Air Change rate. And the BMS gets three linear volume signal outputs of 0..10V 4..20mA and an addressable Modbus rtu bus.

CMR CONTROLS Ltd

22 Repton Court Repton Close
Basildon Essex SS13 1LN GB
www.cmr-controls.com

Tel +44 (0) 1268 287222
Fax +44 (0) 1268 287099
sales@cmr-controls.com



Primary concerns

The latest revisions to the Energy Performance of Buildings Directive have now been published. Hywel Davies considers the implications and possible consequences for energy-related regulations for buildings in the UK

The revised Energy Performance of Buildings Directive (EPBD) was published in the *Official Journal of the European Union*¹ on 18 June 2018. Unlike the 2010 recast, which was a completely new text, we now have a series of amendments to the recast text, making it a little harder to digest. Some significant changes are clear, however. They will also trigger a chain of further consequences for the regulation of buildings in the UK.

The amended EPBD (Annex 1, new section 1) requires the energy performance of a building to: *be expressed by a numeric indicator of primary energy use in kWh/(m².y) for the purpose of both energy performance certification and compliance with minimum energy performance requirements. The methodology applied for the determination of the energy performance of a building shall be transparent and open to innovation.*

The consequence of this change is that the national calculation methodology (NCM) and the SAP and SBEM tools will need to be reviewed. We will also need to consider how the NCM is affected by a further requirement in the revised Annex, which is that *'Member States shall describe their national calculation methodology following the national annexes of the overarching standards, namely ISO 52000-1, 52003-1, 52010-1, 52016-1, and 52018-1'*.

We are due to be building 'nearly zero-energy buildings from January 2021',² so we will also need to define what meets that requirement.

The existing directive already requires member states (and we are still one) to review their current energy standards every five years.

Having last reviewed Part L in England, and its equivalent in Wales, in 2013 – with reviews of Part F in Northern Ireland and Section 6 in Scotland at a similar time – we now need to review them anew. This offers a significant opportunity to address known areas of concern with the current guidance and requirements, as well as to review the NCM.

The Clean Growth Strategy and the associated Grand Challenge, announced last month, commit us to this, too. They also commit us to reduce the use of high-emission fuels off the gas grid, so we need to encourage greater use of low carbon technology there, and the future-proofing of new off-gas grid buildings so they can be moved onto lower carbon systems. And that is not all. With a rapidly



“We must seize the chance to review the regulation of energy and comfort in buildings”

decarbonising grid, there are calls to reconsider the role of fuel factors and the carbon emissions factors used in Part L that should not be ignored.

There are increasing reports, and expert witness appointments, in relation to overheating of new dwellings and other buildings, with implications for cooling energy and, therefore, a knock-on impact on the NCM. If cooling to mitigate overheating becomes typical, the revised Annex will require it to be included in the NCM. We need to think again about how we address overheating in Part L.

Finally, various studies consider the impact of (and compliance with) current airtightness provisions. The Association of Noise Consultants is developing guidance to address the increasing challenge of delivering acoustic and thermal comfort together effectively.

While they are termed 'comfort' issues, there is growing evidence that buildings – especially homes – that overheat, are poorly ventilated or are unduly noisy (or even very quiet) are creating yet another latent drain on our overstretched health

EU directives apply to the UK because it is still an EU member state



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

Diversity report

Refrigerant choice should come down to a number of factors, not just environmental impact, says Graham Wright



services. So they are health and welfare issues, and fall within the scope of the Building Regulations. We should now take a systematic and holistic look at these aspects of the regulations in the Part L review. We may also need to look at Parts F and E.

The Grenfell tragedy has caused the most intense scrutiny of how we regulate and manage the operation of buildings since the Ronan Point explosion 50 years ago.³ Dame Judith Hackitt's assessment 'that the whole system of regulation... is not fit for purpose', has triggered a major programme of work, details of which the government has promised to announce in the autumn.

I am certain this will result in the greatest change to our system of Building Regulations in at least a generation. We must seize the chance to review the regulation of energy and comfort in buildings alongside that, to ensure that what we build and refurbish is both safe and healthy to live in.

References:

- 1 'Directive 2018/884 amending the Energy Efficiency Directive (EED) and Energy Performance of Buildings Directive (EPBD)', which can be found in all EU official languages at bit.ly/21bIK4P
- 2 Building Regulations 2012, Regulation 25B requires this from 1 January 2021.
- 3 On 16 May 1968, a gas explosion in the kitchen of an 18th-floor flat resulted in the collapse of the south-east corner of Ronan Point, a 22-storey east London tower block, causing four deaths and 17 injuries. The subsequent inquiry led to a significant review of Building Regulations and the treatment of progressive collapse. bit.ly/218wG4I

The HVAC industry is adopting lower-global warming potential (GWP) refrigerants for air conditioning, heat pumps and refrigeration, in response to the F-Gas Regulation phase-down. There is no 'one size fits all' low-GWP refrigerant, however, and a range of gases – including R32, R410A, HFO blends, CO₂ and hydrocarbons (such as propane and butane) – will continue to be produced for years to come.

Selection of a refrigerant depends on the application, required capacity, and temperature range, considering safety, environmental impact, efficiency and cost-effectiveness. Refrigerants must be safe throughout the equipment's life-cycle, including transport, storage, installation, use, servicing, recovery and recycling. Some may be safe for one application, but not for others.

A refrigerant's environmental impact is measured by its carbon dioxide tonne equivalent (CO₂e), calculated by multiplying system charge by GWP. Heat-transfer capacity and heat-exchange efficiency are key, as they determine the volume of gas needed. Refrigerant production, leak potential, plus recovery, reclamation and destruction should also be assessed.

Efficiency should consider a system's ability to provide cooling and heating, and its total equivalent warming impact (TEWI), measuring the impact of refrigerant losses and CO₂ emissions from generating power to run the system. Efficient systems, and those using lower-GWP refrigerants, have lower TEWI.

Cost-effectiveness must consider refrigerant availability, additional charge requirements, unit size, ease of installation, the refrigerant contribution to reducing operation and maintenance costs, plus recovery and recycling.

R32 is the frontrunner for comfort cooling applications. It has a lower GWP (675 compared with 2,088) and is 10% more efficient than R410A, plus its higher 'volumetric efficiency' means smaller units deliver the same capacity with less refrigerant. R32 VRF/VRV systems are becoming available – Daikin launched a high-capacity R32 VRV earlier this year – but those for every application are some time away. Until then, R410A VRF/VRV systems are still a wise choice: safe, efficient and cost-effective, they represent the best way of minimising environmental impact.

Rest assured, the HVAC-R sector will support refrigerant diversity and keep systems working throughout their lifetimes.



GRAHAM WRIGHT is legislation and compliance manager at Daikin UK www.daikin.co.uk



Setting the trend

Trailblazer Apprenticeships offer a chance for employers to plug the skills gaps in their sector and change vocational training for the better – so let's give the scheme the attention it deserves, says InTandem's Wendy Belfield

There has been much discussion in the media about the new apprenticeship scheme, introduced last year under the Trailblazer Apprenticeship Standard.

The key change from the previous system is that it is now employer-driven, to ensure the skills and knowledge included are what employers need.

To achieve this, the standard has to be written and developed by an employer group made up of a representative sample of the specific industry sector, and this is often facilitated by a trade association.

Good examples are the BESA and the Building Controls Industry Association (BCIA), which have put employers in touch with one another, enabling them to form an employer group and develop relevant standards for their specialist areas.

On the whole, the building services industry has been very proactive in developing specialist Trailblazer Apprenticeships, and a number of them are already approved for delivery – the Building Services Engineering Service & Maintenance Engineer, for example. Many more are in the pipeline, including the BEMS Controls Engineer, submitted for approval in May.

The main benefit of the Trailblazer approach is that funding for training is available for a much wider range of age and experience – unlike the old apprenticeships, which were aimed at 16 to 24-year-olds – and it can be funded throughout an apprentice's life.

For employers, it is flexible enough to meet their changing skills needs and those of their – often diverse – workforce. An apprenticeship can include a mix of training courses and off-the-job training defined by the business, for the business. The main proviso is that external training providers must be registered with the Institute of Apprenticeships (IoA), and there must be a 'lead' provider, such as a local college for City & Guilds courses or the BCIA for specialist courses. However, employers can still deliver some elements of training in-house too.

Funding for the scheme comes via the Apprenticeship Levy – paid by UK employers whose wage bills are more than £3m – which was set up to 'encourage' more employers to do training, rather than leaving it to the few. So all businesses can now benefit from more funding for a wider range of training. Non-levy payers – primarily SMEs – contribute 10% of the training cost, with the government



“This is a real opportunity to attract, train and retain more engineers, installers and technicians than ever before”

paying the remaining 90%, so there's a significant incentive to invest in your staff.

It is essential that levy-paying employers draw down their training credits within 24 months; if they don't, they will lose them. So these employer groups need to be supported – and, preferably, need active participation – so that the right skills are developed for the sector.

Employers can also drive the development of the end-point assessment (EPA), which must be contained within every Trailblazer Standard. This measure of occupational competence is critical, and is carried out by independent bodies such as National Electrotechnical Training (NET). If a job role is to be professionally recognised, the industry must feel confident that any qualified Trailblazer apprentice has been tested for their all-round competence – and that is why the EPA is key to the validity of the whole scheme.

Arguably, the success of Trailblazers depends upon employer groups working together to ensure that:

- The EPA is accessible and affordable for all employers (large and small, and whatever their geographical location)

and is designed to assess the knowledge and skills that a competent person needs to fulfil their role

- All employers can put in place a development programme for individual trainees based on their entry qualifications and experience.

Inevitably, this massive change in the approach to apprenticeships and their funding will lead to some disruption – but we need to address concerns, rather than just dismiss them. This is a real opportunity to attract, train and retain more engineers, installers and technicians than ever before, but it will need focused effort and support.

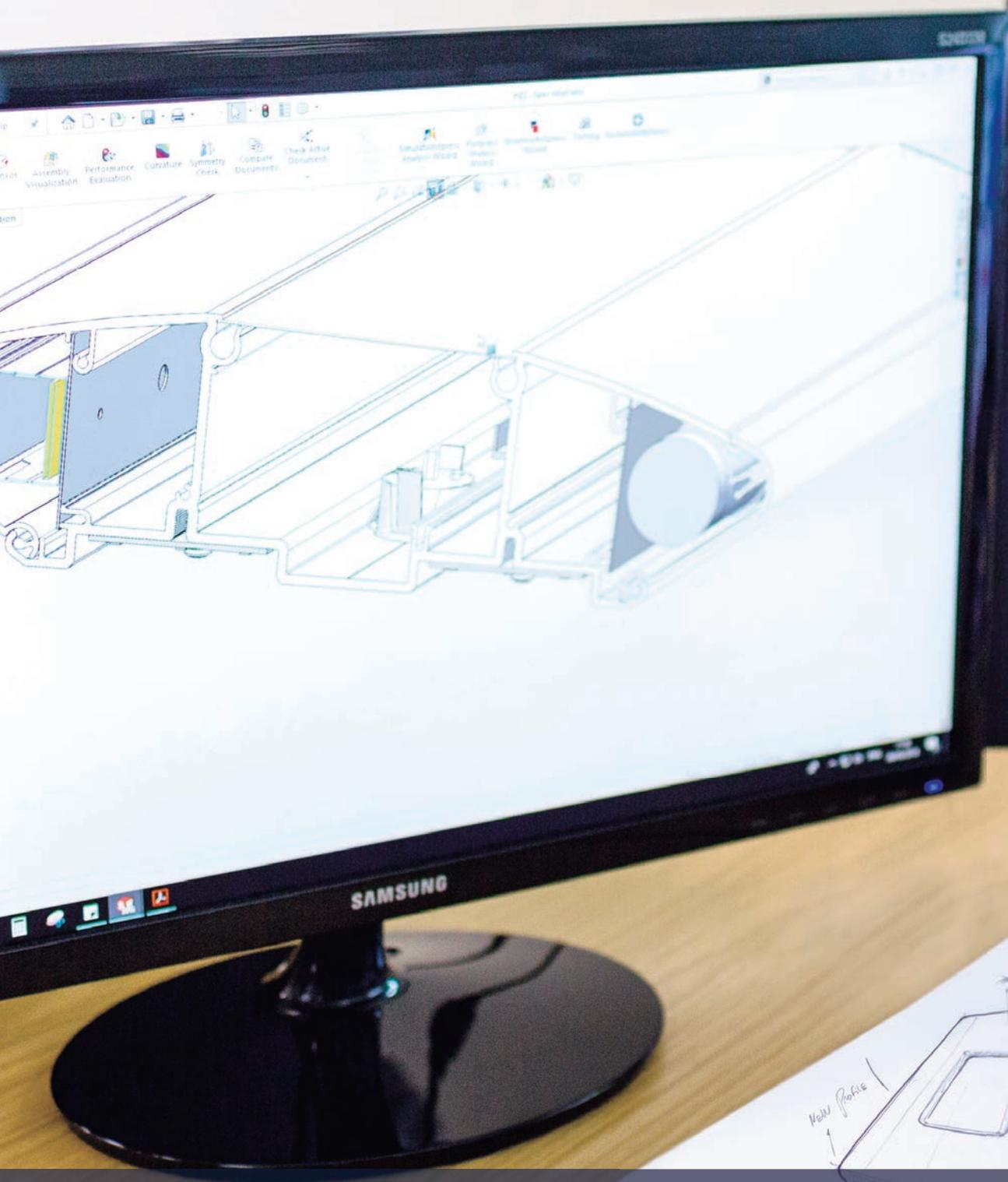
Our challenge is to engage employers, and encourage them to embrace the Trailblazer schemes within our sector, as well as to continue to work together once the apprenticeships are launched. We, as employers, have been given the opportunity to change training for the better to meet our skills shortages, so let's give them the attention they deserve.

Get in touch

For details, see IoA, BCIA and the BESA websites and, to be involved in the BEMS Controls Engineer Trailblazer, contact wendy@intandem.org.uk

WENDY BELFIELD
is commercial director
at InTandem Systems

Luminaires designed with you in mind...
To see how we can help you
visit tamllite.co.uk



Product Design for a Living

As a UK manufacturer we have one of the widest lighting ranges across:



Communal



Education



Emergency



Healthcare



Industrial



Office



Retail
& Leisure



Sports



Urban



Warehouse
& Logistics

T | 01527 517 777 E | sales@tamllite.co.uk

Should we stop specifying gas boilers?

To meet future government targets on greenhouse gas emissions, we need to start thinking about reducing natural gas use now, says LEDA's Matthew Hill

In a recent *CIBSE Journal* article on the future of heat (April 2018), Hywel Davies said that 'conventional fossil-fuel heating systems may no longer be the obvious choice for new buildings'.

He was writing about how we might meet future government targets on greenhouse gas emissions. While these may shift and change over the years (remember zero carbon new housing by 2016?), we are meant to be reducing CO₂ emissions by 60% by 2030. To achieve this, we will have to reduce the use of natural gas drastically – and because the gas boilers and water heaters we specify in 2018 should still be in use in 2030, we have to start thinking about this now.

It's easy to say 'stop specifying gas boilers', but it's harder to offer practical, cost-effective alternatives for all types of buildings, both new and refurbishments. So what's the best approach to solving this problem?

We could start by further reducing the heating requirement for buildings on new-build and refurbishment projects – for instance, by specifying thermal insulation to Passivhaus standards and being sensible about the extent of glazing on buildings. Then there are the options for heating and hot water to review.

Before going any further, however, I need to mention the solution offered by some proponents of the hydrogen economy that involves changing to a hydrogen gas grid.

This is not a new idea, and Northern Gas Networks has recently been given £9m by Ofgem to look at the practicality of converting the city of Leeds from natural gas to hydrogen. Creating a hydrogen gas grid is not without its safety and technical problems, however, and the process of producing hydrogen using electricity is currently only 50% efficient.

So while a hydrogen gas grid is an interesting idea, it's not yet a good idea, and not one we can rely on to solve all our problems.

Biomass boilers, using wood chip or pellet, can meet some of our heat requirements using sustainable timber sources, but it will only be a small percentage of the total. There is a limit to the total area of the UK that we can use for forestry, and truly sustainable wood



"We need to be able to specify small, high-efficiency domestic heat pumps that cost no more to install than a decent gas boiler"

management is not easy to achieve on a large scale. Anyone who saw the recent TV programme about the lack of biodiversity in USA woodlands that supply Drax power station with a million tonnes of wood pellets a year will know what I mean.

Heat pumps – air-source and ground-source – are already a common option for new commercial buildings and some eco-housing. However, they can't replace a gas boiler in a standard wet heating system – which uses 70°C or 80°C flow to panel radiators – and are not very efficient supplying hot water at 60°C.

District and community heating is an increasingly popular option and is another area into which some government money is going. District heating, using heat from waste incineration plants, is one way of getting away from using fossil fuels – apart from burning all the non-recyclable plastic packaging we throw away, that is. Those systems relying on gas or diesel-powered combined heat and power don't fit the bill, however.

Little Kelham, a mixed-use development in Sheffield, has electric heating mats embedded in the internal walls of some rooms



MATTHEW HILL
is director of energy consultancy and building services engineering at Leeds Environmental Design Associates (LEDA)

Time for flirting with BIM is over

The Hackitt Review has brought digital engineering to the fore, says Robin Vollert



We have had many false digital dawns in the construction sector, but now feels different. Progress on building information modelling (BIM) is picking up pace and innovations such as 3D printing are being embraced more widely.

The Hackitt Review of regulations and building safety after the Grenfell Tower fire included a clear demand for BIM to be 'mandated' in the design, construction, refurbishment and operation of all new high-rise residential buildings. Information technology, in general, will play a crucial role in creating the 'golden thread of information' identified by the review and endorsed by new CIBSE President Stephen Lisk in his inaugural address. He noted the importance of preserving the original design intent of a building to ensure it remains safe and energy efficient throughout its operational life. This means embracing the digital tools that can help us hand over high-quality technical information to the people charged with running and maintaining the building.

The Hackitt Review also stressed that digital records should be produced in an 'open and non-proprietary' format, because ease of access to detailed information about the building will be crucial if its proposed new regulatory system is to work. 'Having BIM-enabled datasets during occupation means that duty holders will have a suitable evidence base through which to deliver their responsibilities and maintain safety and integrity throughout the life-cycle of a building,' the Hackitt report said.

Many of the recommendations made by Dame Judith's committee are within our industry's grasp thanks to the growth in digital innovation. Manufacturers have a crucial role to play by developing and delivering digital tools designed specifically for our specialist sectors. Many of us are already well advanced in our efforts to provide solutions. At Swegon, we have been working hard on methods that underpin a collaborative way of working that involves all of our supply-chain partners and addresses many of the 'systemic' problems identified by the Hackitt Review.

While we have been flirting with true digital engineering for some time, the Grenfell tragedy has reinforced the importance of using technological breakthroughs for design consistency, and to support ongoing building management, safety and efficiency.

Swegon
Air Management

■ **ROBIN VOLLERT** is the new managing director of Swegon Group UK&I www.swegonair.co.uk

New housing is an area in which ending the use of gas boilers is going to be a challenge. Developers are reluctant to pay three or four times as much for a heat-pump installation as they would for a gas combination boiler.

Well-insulated new houses can use more energy for hot water than for heat, and heat pumps aren't so clever at providing hot water at 60°C.

The small heating requirement for new housing also makes district heating less attractive because it inevitably increases the proportion of heat lost in distribution pipework.

Using electric resistance heating in Passivhaus standard houses is an option, but this doesn't deal with hot-water requirements. It's also clear that, if we are going to end up with an electricity grid supplied entirely from renewable energy, we have to be careful about using electricity to maximum effect.

Some innovation is required. We need to be able to specify small, high-efficiency domestic heat pumps that cost no more to install than a decent gas boiler. Could we find a simple solution to storing hot water at the temperature we use it – say, 45°C – without worrying about legionella?

I may have presented more problems than solutions, but the aim was to highlight an issue that we need to address sooner rather than later.



Perform » Reward » Celebrate



CIBSE BUILDING PERFORMANCE AWARDS 2019

OPEN FOR ENTRIES»»

Recognising the people, products and projects that demonstrate engineering excellence in the built environment

ENTER NOW

Entry deadline:
Friday 14 September 2018

Winners announced:
Tuesday 12 February 2019

Sponsorship enquiries please contact jim.folley@redactive.co.uk or 020 7324 2786

@CIBSE Awards
#BPA2019



In association with:

CIBSE
JOURNAL

CATEGORIES

» Collaborative Working Partnership



This Award recognises examples of collaborative working that have delivered outstanding outcomes.

» Consultancy of the Year



Recognising consultancies that are meeting and exceeding clients expectations of building performance and are actively spreading knowledge and best practice of building performance.

Open for entry to consultancies worldwide, three categories for entry include: up to 100 employees, 101-1000 employees, and over 1000 employees.

» Energy Management Initiative



Recognising building owners or occupiers that are achieving outstanding building performance in their building or building portfolio.

» Facilities Management Team



Recognising achievements of in-house and out-sourced facilities management (FM) teams who are delivering outstanding building performance from a building or portfolio of buildings.

» Learning and Development Award

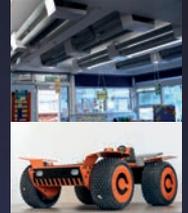


Recognising organisations and academics that have delivered learning and development initiatives designed to improve the understanding of building performance.

» Products & Innovations

- Energy Efficient
- Energy Saving

These awards recognise building services solutions that help to reduce the amount of energy used in buildings by either reducing energy demand or through efficient use of energy by the product or innovation.



» Project of the Year

- Commercial/Industrial
- Leisure
- Public Use
- Residential

Project of the Year is divided into four sector-specific categories - Commercial/Industrial, Leisure, Public Use and Residential. The award recognises new build and refurbishment projects delivering outstanding measured building performance and high levels of user satisfaction and comfort.



» International Project of the Year

Recognising new build and refurbishment projects, completed outside the United Kingdom, that have delivered outstanding measured building performance and high levels of user satisfaction and comfort.



For terms and conditions of entry and full entry criteria, visit:
cibse.org/BPA

A FORWARD LEAP

Energiesprong is a Dutch housing process that encourages developers to consider real-world performance. Alex Smith looks at the first UK pilot and Melius Homes' strategy for guaranteeing outcomes in a retrofit

The first 10 homes in the UK to be refurbished under the Dutch Energiesprong initiative could not have been given a sterner test. The retrofit of properties in Sneinton, for social landlord Nottingham City Homes (NCH), was completed just before the 'Beast from the East' hit in February and March, bringing heavy snowfall and unseasonably cold temperatures to the UK.

'The Siberian blast is not the test I would have volunteered for,' says David Adams, technical director of developer Melius Homes, which won the construction tender to build the homes. While the temperature outside was -4°C, however, Adams reported a 'remarkably stable' 20°C inside.

This was a striking turnaround for residents; before the retrofit, they had to spend £1,300-1,400 a year to adequately heat their poorly insulated homes, according to Adams. As a result, some residents didn't turn on their heating, while others limited it to the living room. 'For a social tenant, the high energy costs made the homes pretty much unheatable,' says Adams.

The housing – a terrace and three bungalows – was earmarked for improvement by NCH, which had the option of demolishing and rebuilding them for £120,000 per house or finding a way of refurbishing them at a reasonable cost. This is where Energiesprong (Dutch for 'energy leap') came in.

Going Dutch

In The Netherlands, 1,000 homes a year are built or retrofitted using the Energiesprong model. It is as much a funding mechanism as a housing standard, and is designed to unlock finance for new-build and existing homes.

Energiesprong homes are designed to pay for themselves over 30 years. The idea is that one-off retrofitting costs are paid for by the subsequent reduction in planned maintenance and energy bills – cuts to the latter being passed on, in part, to the landlord.

Adams is upbeat about the early performance of the homes in Nottingham. Data shows that the retrofit – based around prefabricated external insulation, a community energy centre, photovoltaic (PV) and battery storage – is performing as well as his models had predicted. (See panel, 'The design'.)

This was vital to Melius because, at the heart of Energiesprong, is a performance contract with the developer that gives homes a 30-year warranty. If they fail to perform as the design intended, the contractor is liable to a financial penalty.

'It's normally always the client risk, and they have very little control of the construction process,' says Emily Braham, head of sustainability at NCH. 'It's right that the risk sits with those installing and designing the homes. It makes it more complicated for the contractors, particularly as there is little evidence of how things work.'

The stepped-down asymmetric roof, with the shipping container housing the energy centre visible at the bottom of the picture



"Energiesprong gives homes a 30-year warranty. If they fail to perform as the design intended, the contractor is liable to a financial penalty"





Panels were craned into position in eight days

SNEINTON PILOT OUTCOME TARGETS

- **Internal temperature:** 21°C in living areas, 18°C elsewhere
- **Installation time:** 15 days
- **Overheating:** Temperature should be no greater than 26°C for 11 days a year
- **Hot water:** 140 litres a day per home
- **Net energy:** <1,500kWh/year per home
- **Indoor air quality:** New home Building Regulations



Missing teeth in a lovely smile – some private landlords opted out of the retrofit project



The energy centre is sited in a container at the end of the terrace



PVs were installed on site, but the aim is to prefabricate on future projects

‘Energiesprong looks at real-life performance over a long period, not just modelled performance,’ says Nicholas Doyle, who is part of the marketing development team at Energiesprong UK, as well as a director at Adecoe, an energy and environmental consultancy. ‘The fundamental thing we are trying to change is that the desired outcomes are delivered to the tenants.’

Energiesprong specifies performance outcomes, which means development teams are not tied to any particular system or design’ (see panel ‘Sneinton pilot outcome targets’). In The Netherlands, the targets include the requirement that all energy use – including plug-in appliances – must be net zero carbon.

At Nottingham, PVs are helping to get electricity imported from the grid down to 1,500kWh/year per home. There is an overall allowance of 2,300kWh/year for households, which includes tenants’ own energy use. Adams says the space for PVs on dual mono-pitch roofs made it impractical for enough electricity to be generated to achieve net zero.

Tenants can be expected to pay a £300 total energy bill if they use 2,300kWh of electricity and 140 litres of hot water per day, and heat their homes to 21°C in the living room and 18°C in other rooms. Tenants also pay a £300 energy plan charge, of which a proportion will go back to NCH to help pay some of the costs of the retrofit.

Competitive tender

After putting the contract out to tender, NCH compared contractors on quality and whole-life cost, rather than capital costs. ‘We think bidding on capital costs drives the wrong behaviour and, ultimately, the wrong decision,’ says Braham.

‘The quality part of the tender was how well they met the design brief, and the price element was the whole-life cost and the income the homes could generate.’

Each bidder had the opportunity to present its proposals to tenants. ‘The tenants liked the fact it was focused on them, and the bidder that won was more engaged with what the tenants thought,’ says Braham.

Adams adds: ‘The tenants felt they had control, and it was clear what they liked and didn’t like. The design responsibility stays with the tenderer, but the tenants were involved >>>

» in the process. Our solutions were being critiqued during the process.' Braham said that it was important that every party was working towards the same outcomes right from the start of the process. 'It means everyone wants the long term performance to work, and the whole life cost to be reduced,' she says.

With Melius taking on the risk, Adams believes it is important that the developer had a good understanding of component and system performance. 'I'm not interested in the lab performance of plant, however nice the salespeople are,' he says. 'We want to know about real performance with real humans.'

Melius can hold manufacturers to account for their system's performance outputs and warranty periods, and Adams says that PVs are pretty reliable and come with performance guarantees. 'Mostly, it's about us being confident that the equipment works. We're taking an informed view based on our experience,' he adds.

Through prefabrication, smart technology and economies of scale, the aspiration is that Energiesprong homes can be retrofitted at a cost approaching £40,000. As the Nottingham pilot was the first of its kind in the UK, however, the fixed price was £65,000. The monetary gap was narrowed using EU funding for Energiesprong projects and by aggregating UK grants such as Eco and Feed-In Tariffs. Braham believes pooling the available money into an upfront investment makes sense. 'If we did it all on an incremental basis, you wouldn't achieve net zero homes,' she says.

UK Energiesprong retrofits will pay for

THE DESIGN

Seven terraced homes, 2.5- to three-storeys high, and three bungalows were refurbished. The private landlords of two homes in the terrace chose not to participate. Originally timber-frame structures with precast concrete party walls, there was scant insulation in the homes. Heat loss was exacerbated by a lack of insulation in the kitchen and living room floors, which were above an open store and external walkway respectively.

Three prefabricated panels, with 200mm of insulation, were installed on the front and rear elevations of each home, on insulated foundations. The undercroft below the living room was enclosed and turned into a habitable space, while the soffit under the kitchen was insulated. The works resulted in space heating of less than 40kWh·m⁻² per year.

The insulated roof cassette incorporating PV panels supplied by Viridian Solar could not be prefabricated on site because of the shape of the roof. 'We had to re-skin it on site. Structurally, the roof was quite challenging as it was asymmetric and had a step in it,' says Adams.

Two ground source heat pumps (GSHPs), a battery and two thermal stores were installed at the end of the terrace, in a 20ft shipping container, which will be landscaped. One GSHP produces water at 55°C and 60°C for domestic hot water, and the other is optimised for 35-40°C. The extra insulation meant the heating requirements fell considerably, and Melius could use the existing radiators with water temperatures at circa 40°C.

Battery storage (32kWh) stores electricity from the 50kW peak PV scheme. 'We want to avoid using the grid during peak periods,' says Adams. Demand control ventilation from Aereco, consisting of trickle vents and extraction in wet areas. Overall, the pilot has reduced CO₂ emissions by circa 70% (the minimum requirement was 24%).



themselves once the process industrialises, says Doyle. 'We need to get scale so we can deliver at pace and bring costs down,' he says. 'All the housing panels [at Sneinton] were pre-insulated and finished in the factory, but, in The Netherlands, they're also installing pipework offsite. We can move away from subsidies with more scalable solutions.' Braham, who also works in the Energiesprong market development team, agrees: 'We need to bring together more housing providers and the supply chain to make Energiesprong happen at scale.'

The next phase

Having completed the pilot, NCH is ready to start work on around 200 more homes using Energiesprong, with a further 200 properties in the pipeline. Energiesprong in the UK is gaining traction and many social housing providers are looking to build pilots. For example, the Greater London Authority has committed to 10 pilot schemes (under the moniker 'Energy Leap'), while Devon County Council is leading a three-year Energiesprong project called Zero Energy Buildings Catalyst with Exeter City Council, North Devon Homes and Sanctuary Housing. This will result in homes being retrofitted in 2019 and 2020.

Adams, who has a background in manufacturing, says Melius Homes is keen to develop the next 200 homes in Nottingham, and will create its own factory to prefabricate panels to improve efficiencies and reduce costs. 'We need to minimise the time on site,' he says. 'We shouldn't treat it as a traditional construction project. It's all about repetition, and driving costs down and performance up.'

It took Melius eight days to crane the panels into position, but another 30 days to integrate them. In the next phase, the fixings could be simplified and the PVs integrated in the factory. 'Part of the reason we didn't do it in the pilot was because we didn't have enough time, and we wanted to make sure we were taking sensible steps. We didn't want to try everything at once,' says Adams, who adds that experience at Sneinton would inform the next phase. 'This doesn't happen enough in construction. We need to keep applying the lessons learned.'

Adams says Energiesprong is an opportunity to change tenants' lives for the better. 'This is all about the regeneration of communities – the technologies and processes are just a means to an end,' he says. Two private-sector landlords did not take part in the pilot, however, which – in the words of Stuart Elmes, CEO of PV supplier Viridian Solar – makes the homes look like 'missing teeth in a lovely smile'. NCH 'will try to complete the terrace', says Braham, who says the completed homes have increased in value by 25%, from £80,000 to £100,000. This is a bonus for NCH, and could be just the encouragement private landlords need to participate in future phases. CJ

TERRAIN

You wouldn't expect your watch to arrive like this. Why should your drainage stacks be any different?



For a quicker, more cost-effective installation, Polypipe Terrain will design, manufacture and deliver complete drainage stacks, directly to site, with minimal assembly required.

Drainage stacks from Polypipe Terrain. Why install any other way?

For more information, visit polypipe.com/terrain-drainage-stacks

 **Polypipe**

OUT OF JUICE?

With electric vehicles set to replace diesel and petrol cars by 2040, Ramboll's **Adam Selvey** says engineers must act now to ensure buildings can deal with the unprecedented demand for electricity

Electric cars have almost doubled in popularity in the UK over the past year, and sales will continue their steep trajectory as the industry prepares for the phase-out of petrol and diesel vehicles by 2040.

Alternatively fuelled vehicles – of which plug-in hybrid electric vehicles (PHEV) and battery electric vehicles (BEV) make up the vast majority – represented 5.8% of the total market for new cars in May, a record for the UK.¹

The government is aiming to ensure that almost every car and van on UK roads will be zero-emission by 2050. This policy ambition, shared by many nations and automotive manufacturers, is aimed at creating cleaner air in our cities.

Roadside nitrogen dioxide (NO₂) is a public health problem that needs addressing urgently, and more electric vehicles (EVs) are seen as a key way of tackling this. Through tax incentives, grants and funding, the UK government hopes to stimulate interest in EVs, sales of which are now increasing faster than their combustion-engine counterparts.

Rapid growth in electric vehicle sales will require vehicle-charging infrastructure to match. We will have to change the way we refuel our vehicles, and service stations will no longer be the only place to do this.

Whether at work, rest or play, we spend a large proportion of our life in buildings: a couple of hours shopping; nine hours at our

place of work; or 12 hours relaxing at home. Our vehicles can be charged at all these locations.

As a result, significant charging infrastructure will be needed in various building sectors. These charging-point capacities are likely to lead to large load increases in buildings if we do not design appropriate infrastructure. With creative design, we can mitigate these increases to reduce demand on the UK electrical infrastructure. Through load management and by considering the time of day that we charge our vehicles – as well as the potential use of battery storage technology – significant amounts of energy are already available within the UK grid, for seven hours at night.

Even in December, when the UK load peaks at around 56GW, the electrical demand stays stable from midnight to 7am, at around 35GW. If building services engineers grasp the challenge, this existing energy generation could power a large proportion of the 323 billion miles travelled on UK roads every year. As the National Grid has said: 'If electric vehicles are not charged smartly, to avoid peaks and troughs in power demand – such as when people return home between 5pm and 6pm – peak demand could be as much as 8GW higher in 2030.'



323 billion

Number of miles travelled on UK roads annually. Could propulsion power be supplied by existing building infrastructure?

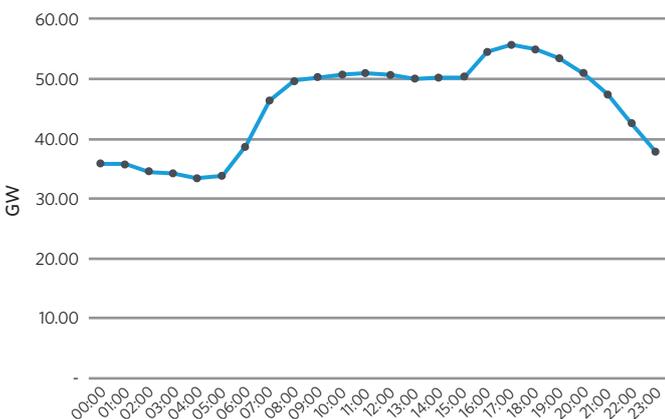


Figure 1: Typical UK electricity consumption over 24 hours in December 2017

Plug-in hybrid v battery electric vehicles

Space on board PHEVs is limited because of the need for a combustion engine, so the battery storage capacity is typically around 7kWh to



10kWh. On some larger vehicles, such as SUVs, battery storage can increase to 174kWh. Typical BEV storage capacity is between 14.5kWh and 36kWh. These figures ignore Tesla's range, which would skew the maximum onboard battery storage to 100kWh. (See Figure 2.)

PHEVs generally have single-phase AC charging connections, while BEVs tend to have both single-phase AC and rapid-charge DC connections. Only some BEVs can take a 3-phase AC charging connection. When the vast majority of PHEVs and BEVs are connected to a 3-phase charging point, they will only draw a single-phase load. If all the buildings connected to a local utility network had 3-phase AC charging points, they could create significant imbalances in the local network. So it would be better to install single phase AC or large DC charging points within buildings.

A PHEV's range on pure electric drive is between 20 and 35 miles, depending on the size of the vehicle and battery storage. The range of a BEV vehicle is between 90 and 190 miles. (See Figure 3.) A Nissan Leaf has a 155-mile version, while Tesla has a range-busting Model S that is capable of driving between 250 and 325 miles without being charged.

Charging points

As engineers, we should try not to use the term kW when we talk about charging points; instead, we should describe each charging point as a mile of range every hour (MREH) connected.

"If electric vehicles are not charged smartly, peak demand could be as much as 8GW higher in 2030"

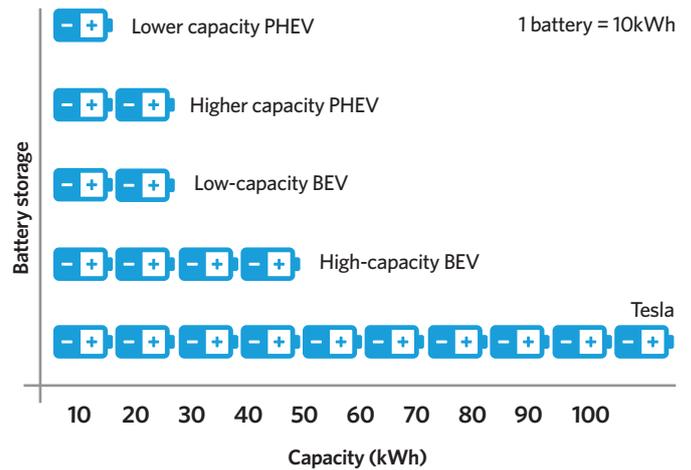


Figure 2: Storage capacities for PHEV, BEV and Tesla batteries

Figure 4, on page 30, is a diagram of typical range for each kW charging point. The variance is generally down to the weight and aerodynamics of the vehicle. Over a typical nine-hour period at work, a 3.7kW charging point could give you between 54 and 108 miles; at home, it would give 72 to 144 miles.

The current trend is to install a small number of charging points, that are as large as possible, within car parks. While the impact of a few vehicles charging may not be significant on the overall load of a building at the moment, this may not be the case in future.

The panel 'Impact of EV charging on workplace electricity loads' (page 30) shows that the existing electrical infrastructure for most places of work will not be big enough to cope with a large number of electric vehicles being connected to them. It is imperative that discussions are held with developers, occupiers and building owners to ensure that we do not unnecessarily increase total loads by specifying and installing too large a vehicle connection point (see Figure 5).

Mitigation of load

There are several options available to reduce the impact that EV-charging points have on

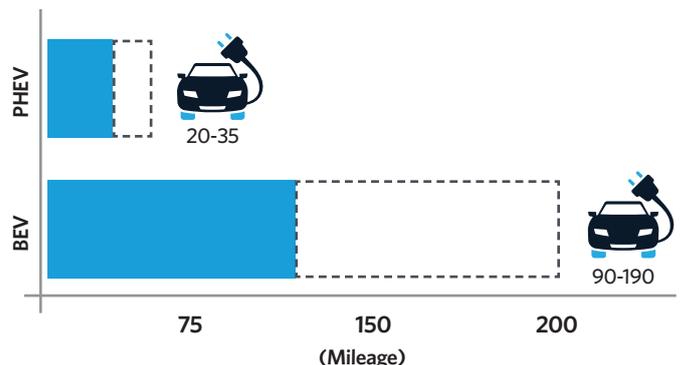
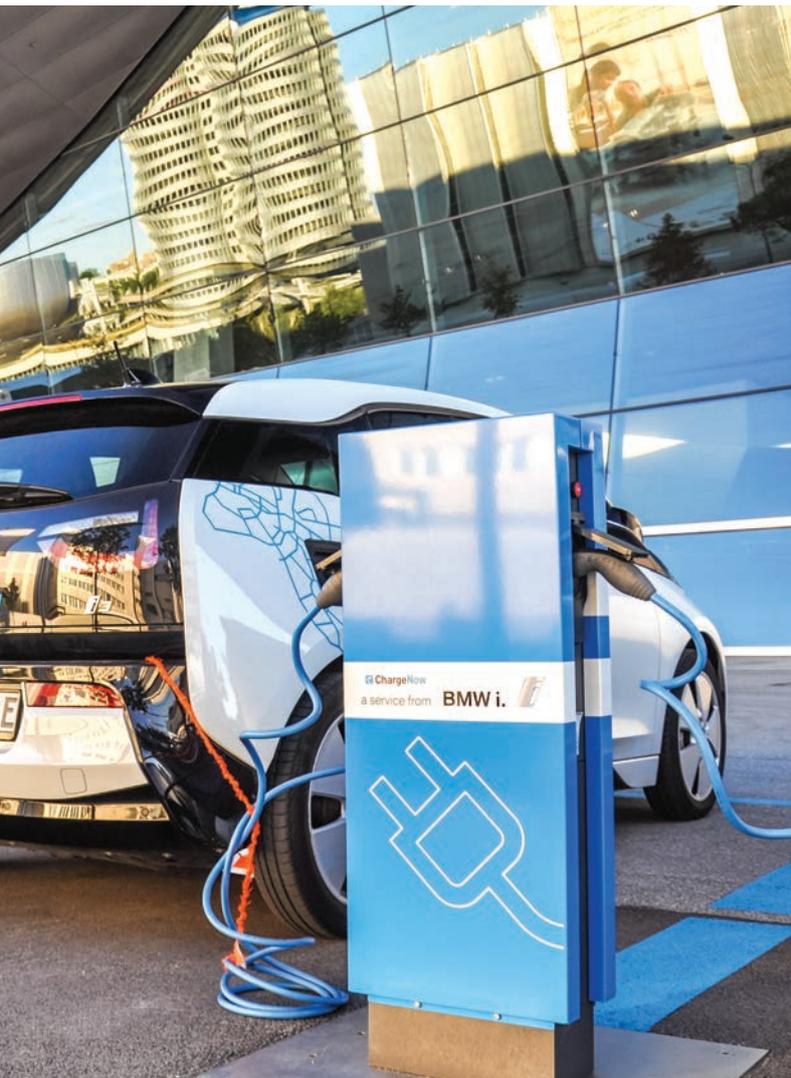


Figure 3: Typical range of a PHEV and BEV



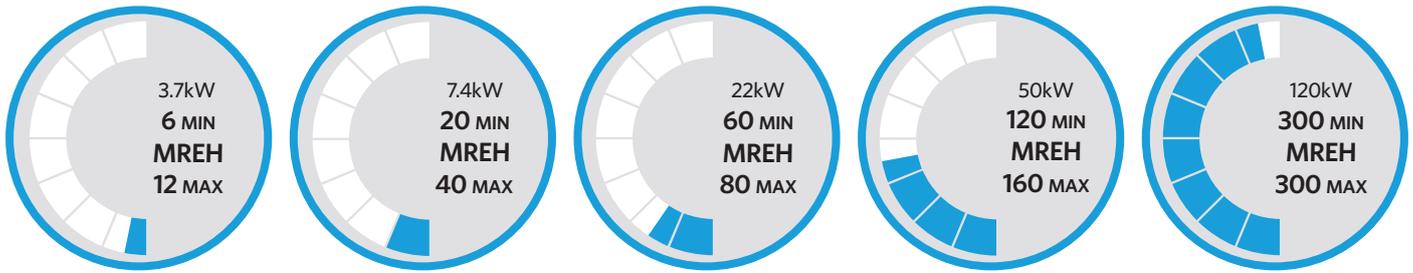


Figure 4: Range, in miles of range every hour (MREH) connected, for charging points from 3.7kW to 120kW

the overall load on buildings. One of the main methods is to install a load-management system. This works by regulating the power to each charging point.

There are different ways in which this can be done. One is to offer a fixed load from the load-management distribution board; another is to regulate the charging rate to each point. Preferential treatment could be given to customers, so that – for a price premium – they would secure the higher charge rates.

To try to reduce further the overall impact that electric vehicles have on buildings, battery storage could be installed within properties. This would enable night-time electricity to charge batteries, so that EVs could draw power when they need a charge as rapidly as possible, without large increases in building infrastructure or incoming electrical supplies (see Figure 6).

In the work scenario, load management and battery storage may make it possible to serve 33 spaces while working within the current building incoming supply.

Moving to EVs will require a shift in the way we think about how we refuel vehicles. Most probably, we will be plugging our vehicles in overnight and charging them when we arrive at work. Charging facilities at leisure destinations may not prove as popular

and necessary, as the vast majority of charging would be done where we are stationary for the longest.

All of the above assumes that, by 2040, we will still own cars; autonomous vehicle technology may change our approach to vehicle ownership and, hence, car charging. This emphasises the importance of planning our future, by managing typical building loads that do not account for vehicle charging currently.

Load management and battery storage technology are vital to ensuring that buildings can cope with the introduction of the charging of electric vehicles. **C**

ADAM SELVEY is building services director at engineering and environmental consultancy Ramboll

References:

1 Car registrations, May 18, Society of Motor Manufacturers and Traders, bit.ly/2t5tQHN

IMPACT OF EV CHARGING ON WORKPLACE ELECTRICITY LOADS

If each car parking space within an office building or place of work had a 3.7kW single phase AC circuit, the maximum number of parking spaces in a typical 2,500m² office could be about 83, which would give a load of 310kW.

At 80W/m², the office load would be about 200kW. Allowing all vehicles to charge could result in a 250% increase in incoming electrical supply to a site – for example, 500kW instead of 200kW.

If the number of parking spaces was reduced by half – or half the number of spaces were connected to a charging point – the load increase would be around 175%: 355kW instead of 200kW.

If a 7.4kW load was allowed for each electric vehicle (EV) car parking bay, the loads above would be doubled – so the total load for the 2,500m² office could be about 614kW or 814kW, depending on the number of parking spaces. Without EV charging points, a 200kW supply would have been OK.

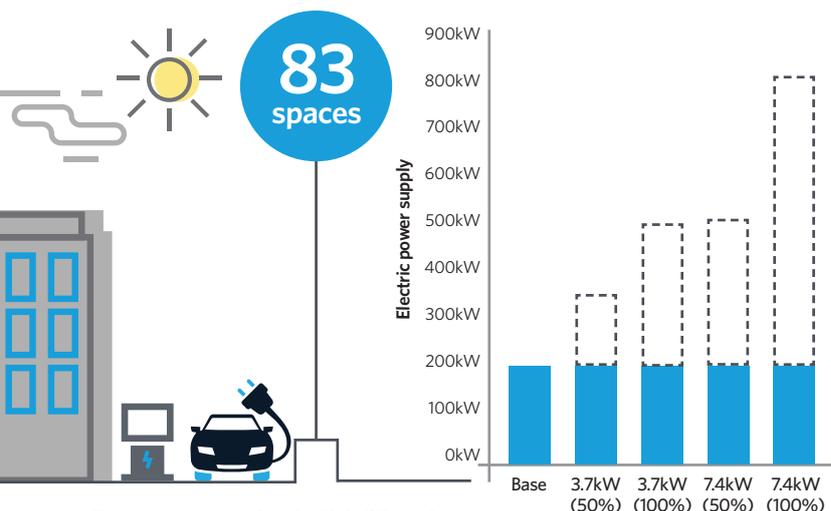


Figure 5: Increase over base load in buildings when 3.7kW and 7.4kW charging is added for 100% and 50% of car parking spaces

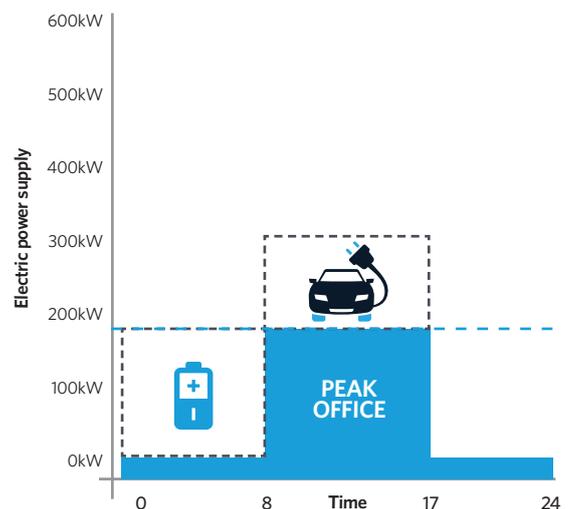
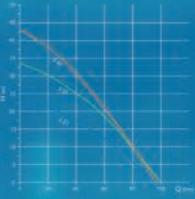


Figure 6: How battery storage could be used to cover extra charging load



GRUNDFOS IN THE PALM OF YOUR HAND



THE GRUNDFOS PRODUCT CENTER ONLINE TOOL LETS YOU SIZE PUMPS, BROWSE THE GRUNDFOS PRODUCT CATALOGUE, FIND APPROPRIATE REPLACEMENT PUMPS AND FIND PUMPS FOR HANDLING SPECIFIC LIQUIDS

- Search in the way that meets your needs by application, pump design or pump family
- Experience faster sizing thanks to a new intelligent “Quick Size” function
- Documentation includes pump curves, technical specs, CAD drawings, BIM packages, available spare parts, installation videos, and much more
- Optimised for your PC, tablet or smartphone

As a registered user you will have access to saved preferences, products and projects and recent browsing history.



Scan to see our How to Video or
Visit grundfos.co.uk/gpc



LEARNING THE LIMITS

The quality of the air people breathe is vital for their health and wellbeing. *CIBSE Journal* looks at two reports focusing on how outdoor pollution affects indoor air quality in schools and commercial premises based in and around London

The UCL Institute for Environmental Design and Engineering – in collaboration with the University of Cambridge’s department of chemistry – has published a new report investigating levels of indoor air pollution in London’s schools.

Commissioned by the Mayor of London, the report examined five primary schools and one nursery. It found that children living – or going to school – near busy roads were exposed to higher levels of vehicle pollution, and had a higher prevalence of childhood asthma and wheeze. In addition, research published this month by We Design For has revealed that indoor air quality in buildings tested by the consultancy was worse than outdoor air quality. Premises in central and north London, and in Wycombe were found to be exceeding particulate matter (PM) guidance limits by up to 520%.

Tacking IAQ issues in schools

UCL’s *Indoor air quality in London’s schools* report evaluated indoor air quality (IAQ) at the primary schools and nursery. It found differences in pollution levels between classrooms depending on a range of factors, including building characteristics, design and maintenance. A significant proportion of indoor air pollution is caused by outdoor pollution.

For nitrogen dioxide (NO₂), which is strongly related to the risk of asthma attacks and asthmatic symptoms, outdoor sources accounted for 84% of the variation between classrooms, highlighting the

importance of tackling emissions from road traffic and preventing it from entering the building. The findings suggest that the protection offered by the building increases the further away it was from the busiest roads and that airtight buildings may offer greater protection. The report also found that, in most classrooms, annual exposure to small particles was higher than the recommended World Health Organization (WHO) guidelines, although this was caused by a combination of indoor and outdoor sources.

Principal investigator Dejan Mumovic, director at UCL Institute for Environmental Design and Engineering, says: ‘Now we have sufficient evidence that children living or attending school near high-traffic-density roads are exposed to higher levels of motor-vehicle pollutants, and this increases the incidence and prevalence of childhood asthma and wheeze. Policy should be directed towards city-wide planning, such as making streets pedestrianised and urban greening around school buildings within 150-250 metres of the major roads.’

A risk assessment of potential outdoor and indoor sources of pollution at design stage can inform the environmental strategy of a building, and lead to implementation of appropriate mitigation measures. Air filtration near busy roads would be necessary to reduce the concentration of particulate matter in indoor air. Activated carbon filters can help reduce concentration of NO₂.

Dr Esfand Burman, UCL lecturer in building performance, carried out post-occupancy evaluations in five modern schools constructed under the UK Innovate Building Performance Evaluation programme.

'It is important to strike the right balance between air quality and energy efficiency in a building,' he says. 'While a mechanical solution may help in high-traffic, urban areas, natural ventilation can still bring environmental benefits where outdoor air pollution is not high.'

CIBSE's best practice guidelines, TM57 *Integrated school design* (CIBSE, 2015), indicate that a well-implemented natural ventilation strategy could be the default design solution for the ventilation of school teaching spaces when the ingress of external noise levels can be avoided. This is assuming external pollution levels do not exceed established health IAQ guidelines, which is currently not the case across London.

A significantly more stringent regulatory regime for diesel vehicles and measures to reduce traffic around buildings occupied by people who are more vulnerable to air

pollution – for example, schools and hospitals – can help cut the outdoor sources of pollution.

The mayor announced actions to clean up London's bus and taxi fleets, bringing forward the introduction of the world's first Ultra-Low Emission Zone and introducing the Toxicity Charge (T-Charge) for the oldest polluting vehicles in central London. This might be insufficient, but it is a big step in the right direction.

At building level, a review of existing regulations and guidelines for energy efficiency and air quality could be helpful. An integrated approach to energy and air quality could, for example, offer an allowance to adjust energy efficiency requirements in heavily polluted urban areas in exchange for specific measures to control air pollution. On the other hand, tough energy efficiency requirements where the risk of outdoor air pollution is not high can incentivise natural ventilation and passive measures.

Dr Lia Chatzidiakou, research associate at the University of Cambridge, and Dr Joe Williams, researcher at Feilden Clegg Bradley Studios, who carried out research on indoor air quality in schools while at UCL, say the mayor's office has offered funding to 50 schools and nurseries in high-pollution areas to help improve indoor air

»

INDOOR AIR QUALITY AND TEMPERATURE IN SCHOOLS – KEY FACTS

1. Evidence indicates that lower temperatures, in the range between 25°C to 20°C, improve student performance by 2-4% for every 1K reduction.
2. The thermo-physiological (PMV) and the adaptive comfort approach form the basis of the current standards for thermal comfort in schools. Both approaches have been developed from the findings of studies on adult subjects. However, research evidence suggests children in temperate climates prefer lower temperatures than adults. More specifically, comfort temperatures for children were found to be 4K lower than the predicted mean vote (PMV) and 2K lower than the EN 15251 adaptive comfort model predictions.
3. Higher indoor CO₂ levels have been associated with increased probability of communicable infection, asthmatic symptoms, absenteeism, and impaired academic performance of children. For every additional 1L·s⁻¹ per person, illness absenteeism rates in children were estimated to reduce by at least 1%.
4. Currently, there is no evidence on the effect of VOC levels on cognitive performance of students. Higher levels of total volatile organic compounds (TVOCs) were associated with Sick Building Syndrome (SBS) symptoms and dissatisfaction with IAQ. Control of indoor sources – together with CO₂ levels below 1,300ppm (95% confidence interval, CI: 1,200 to 1,400ppm) – may result in TVOCs levels below 200 µg/m³, which is the lowest threshold for discomfort in some countries.
5. Increased ventilation rates can reduce indoor mould concentrations (an increase of 1 colony-forming unit per m³ of microbial concentrations for every 1ppm increase in CO₂); however, thresholds for mould concentrations are not well defined. Sufficient evidence associates high microbial concentrations with general and respiratory symptoms in children.
6. Traffic-related pollutants, such as particulate matter, ozone and carbon monoxide, were linked to increased illness-related absenteeism and asthma incidence. Exposure to nitrogen dioxide was related to asthma incidence and exacerbations. Indoor levels of traffic-related pollutants should be considered separately, because low CO₂ levels do not guarantee a healthy environment, although they offer a first indication of exposure.

THREE STEPS TO CONTROLLING THE IAQ IN BUILDINGS

1. Manage the sources of pollutants by:
 - a. Removing them from the occupied space – for example, regular ductwork cleaning
 - b. Isolating them from occupants by means of physical barriers, or by pressure difference. During renovation work that produces dust, for example, seal off inlets and outlets to prevent spread of dust throughout the building
 - c. Controlling the timing of their use; during renovation work that produces dust, do not operate the heating and cooling system until after cleaning up the dust.
2. Use purge ventilation to dilute pollutants and remove them from the building. For example, always ventilate when using products that can release pollutants into the air, such as paints and lacquers, paint strippers or varnishes.
3. Use filtration, if necessary, to clean the incoming air. In high traffic areas, for example, installation of filters with low resistance to airflow filtering up to 95% of PM10 and PM2.5, and removal of nitrogen dioxide.



» quality. 'It is essential to set up a scientifically robust study to evaluate the effectiveness of measures that are implemented.'

'The majority of studies on indoor air quality so far have focused on CO₂ measurements as an indicator of IAQ, reflecting the difficulty and expense of obtaining measurements of specific pollutants,' adds Mumovic. His top tips are:

- If your school is on a busy main road, ask your local council to evaluate its IAQ. Installation of a mechanical ventilation system with particulate and gaseous pollutants filtering might be required. Also, check if it is possible to introduce no-vehicle zones around your school.
- Consider replacing carpets with low-emission hard flooring, which is easier to clean and not prone to becoming a source of microbes and allergens. As children move around the classrooms, unsuitable finishing elevates indoor PM concentrations through resuspension of previously deposited particles. Reconsider fleecy materials in school classrooms: no upholstered chairs, teachers' armchairs or fleecy notice boards – use cork pinboards instead. Avoid storing books on open shelves in classrooms: use closed cabinets in corridors.
- Store cleaning and artwork materials outside the classroom to eliminate indoor sources of air pollution. Switch to low-emitting cleaning products and paints.

IAQ in commercial buildings

The research by We Design For – which was launched by three former Battle McCarthy

"Policy should be directed towards city-wide planning, such as making streets pedestrianised and urban greening around school buildings within 150-200m of major roads"

colleagues – has revealed London's indoor air quality may be worse than its outdoor air quality. Data from the study shows indoor air standards in some buildings is failing to comply with WHO guidance and Building Regulations.

We Design For has recorded air quality in a number of locations around London since September 2017, and its data shows indoor air quality in public and private spaces – such as commercial offices, retail spaces, residential houses and apartments – is consistently poor. In many cases, it is worse indoors than outside – meaning fresh air supplies are far from fresh – and could pose a long-term health risk.

The research found that the studied properties – in central and north London, and Wycombe – are exceeding PM guidance limits by up to 520%, and it is unlikely that many comply with the Building Regulations' annual mean limit for NO₂. More than 60% of the buildings tested in the past year had higher levels of harmful NO₂ and PM2.5 inside than out.

Building Regulations state that exposure to nitrogen dioxide should not exceed 288 µg/m over a one-hour average, and 40 µg/m over a long-term average. Many buildings are failing to satisfy these targets, yet there is rarely monitoring in place to measure, record or tackle this issue.

All buildings are required, by law, to offer a level of ventilation to help reduce the risk of damp and condensation, prevent the build-up of bacteria and remove allergens and pollutants. If the air being brought into homes and offices is not fresh or clean, however, the process can become counterproductive.

Dr Dominic Clyde-Smith, from UCL – and head of research at We Design For – says: 'The test results we have been gathering over the past year show indoor air pollution is a serious problem within our homes, offices, shops, schools and other premises.

'Most interestingly, our test results have highlighted that ventilation alone is not a viable solution – recognised industry guidance regarding the control of ventilation systems and location of fresh-air intakes needs updating.

'What we are seeing in London is conclusive evidence that the ventilation and filtration systems simply aren't up to the task, leaving Londoners to breathe in pollutants and harmful particulates at levels that are far from safe.

'As an industry, we need to design for appropriate levels of filtration and look to reduce sources of air pollution. This is a problem that we are very capable of solving.'

Pete Carvell, director at We Design For, adds: 'People tend to believe that the widely publicised effects of air pollution do not affect them when they are indoors – either at home or at work; they assume the air indoors is cleaner than on the street. Our results prove this is not the case and that conditions indoors are often worse.

'Urban dwellers need to be asking more questions about their indoor air quality. We need to be looking at what we can do to make indoor air quality better, just as we work to reduce outdoor air pollution.' 

- For details, see a selection of the data at www.d-for.com/iaq-data-june-2018
- A detailed summary and report can be read at www.d-for.com



See results on the We Design For website

EcoAir Box goes to great lengths in the Pods

Project: The Pods – Scunthorpe Academy



Construction of The Pods in Scunthorpe is part of an initiative by North Lincolnshire Council to kick-start the regeneration of the town. The high quality leisure facilities will help reinvigorate the area, providing a focal point for sport and recreation in Scunthorpe.

The winning building design was chosen by a specialist panel and via public consultation as part of a RIBA led international competition. It features an unusual interlinked geodesic dome structure which will be covered with a variety of materials including sedum, glass, metal, timber and plastic to complement and extend the external landscape whilst creating a series of unified internal spaces. The key objective of the design team was to create a 'gentle but bold vision of how an important and active facility can work in harmony with its landscape'.

The Pods were crowned the most sustainable building/development of the year at the Property Industry Awards

The building envelope comprises glass and steel for the entrance dome (reception and café), timber for the small pool and fitness areas, sedum for the main pool and membrane for the sports hall. It is thought to be the first time in the UK that timber framed pods and sedum roofs have

been used in a major leisure facility. The roof structure for the pods is supported by an engineered timber glulam frame comprising hundreds of interlinked bespoke roof cassettes. A central structural spine links a series of individual shells accommodating wet and dry sports facilities including an eight lane, 25 metre swimming pool; separate training pool; state-of-the-art gym; dance studio; crèche and a six court sports hall. The structure will enable the internal layout to change and adapt over time according to demand.

The facility aims to achieve an energy performance rating of 22 which is a category A 0-25

EcoAir Box in Bromsgrove supplied their CRS2 10000S packaged heat recovery unit to control the humidity and airflow to the main pool and learner pool areas. The system provided air volume of 4.0 m³/s at an incredible 80% efficiency through a single composite plate heat exchanger. This solution was the most energy efficient and cost effective with ensuring comfortable bathing and keeping the fabric of the building intact. With the pool areas being the most costly part of the building in energy, we would not have been able to achieve the energy performance criteria without the aid of this form of heat recovery.



British manufacturing at its best

THE COMPLETE SOLUTION

STOKVIS
ENERGY SYSTEMS

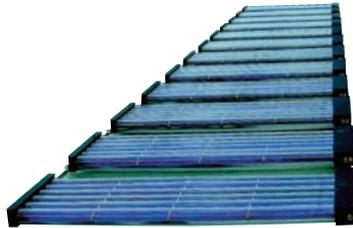


R40 Evolution wall mounted, fully modulating, condensing boilers - 6 models range from 56 to 130KW

Stokvis R600 Evolution floor standing, fully modulating condensing boilers - 7 models range from 142 to 540 KW



Econoplate H Series - Heat Interface Units



Solar thermal panels and vessels



Econoplate - comprehensive range of packaged plate heat exchangers



Econopress - complete range of electronic pressurisation sets



Heatpak - totally packaged plantrooms

STOKVIS
ENERGY SYSTEMS

THE CONSULTANTS' & CONTRACTORS' CHOICE.

For further information or to receive a technical guide tel: 0208 783 3050 or email: info@stokvisboilers.com

www.stokvisboilers.com

HVAC2018

9-11 OCTOBER NEC

AT THE HEART OF
THE HVAC INDUSTRY

ATTEND

CPD accredited seminars about wellbeing

LEARN

about the latest H&S and building regulations

MEET

new and existing solution providers and suppliers

DISCOVER

10,000 innovative products and services

hvaclive.co.uk



PART OF
UK CONSTRUCTION WEEK 2018



SUPPORTED BY



**REGISTER
FREE**

TIME FOR CHANGE

The Grenfell Tower fire-safety investigation report found faults with the building's smoke-extract system, among other failures. **Liza Young** finds out what went wrong, and what the industry can do to prevent a similar disaster

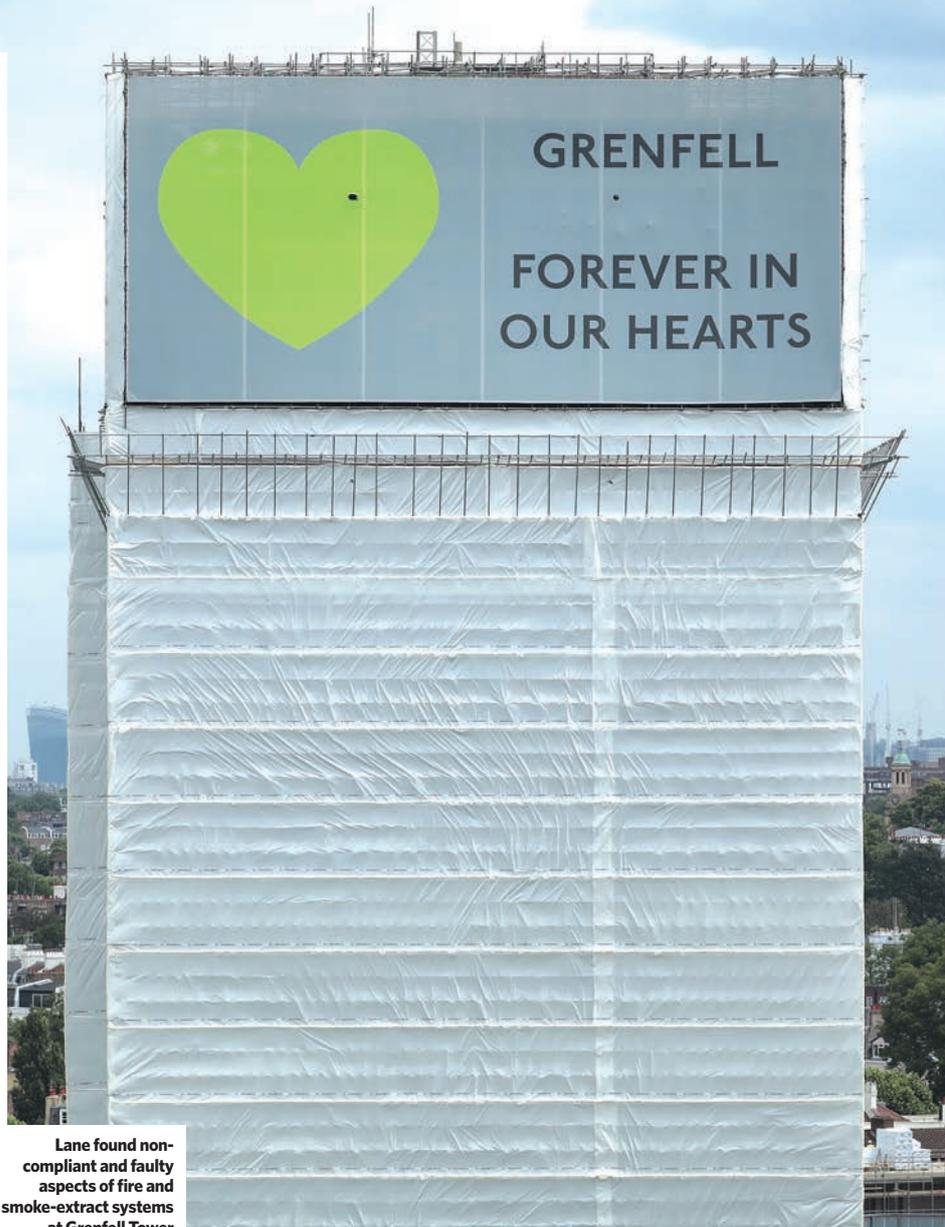
The failure of the Grenfell Tower smoke-control system has been identified by experts as a factor in the building's escape route filling with thick smoke, which may have prevented evacuation and rescue.

The system was designed to extract smoke from lobbies outside flats in the event of a fire and protect the staircase.

In her report, Arup fire engineer Dr Barbara Lane – appointed by the Grenfell Tower Inquiry – said the single escape stairs and lobbies, and the fire-safety provisions within them, were designed to operate on one floor only, based on the assumption that fire would be contained in one flat. The smoke-control system could not have protected the staircase from smoke on multiple floors.

Because of the cladding fire, however, a whole-building fire occurred, so the stairs and its lobbies became the most important life-safety feature. However, Lane said she had 'considerable concern' about the fire-safety provision within them. In her report, she said the smoke-ventilation system design did not follow guidance in Fire Safety: Approved Document B (ADB) 2013 because it was a bespoke system. There was also evidence that it did not perform as designed, with automatically opening vents (AOVs) not closing correctly.

Martin Kealy, managing director at MKA Fire and chair of CIBSE Guide E *Fire safety engineering* steering group, says Lane's report showed that industry codes and standards for fire protection needed to be revamped.



Lane found non-compliant and faulty aspects of fire and smoke-extract systems at Grenfell Tower

Smoke ventilation failure

Lane's report said the system, installed in the tower's 2012-2016 refurbishment, was neither a natural smoke dispersal system nor a pressurisation system. It was a bespoke, combined natural and mechanical system, so did not follow the guidance in ADB 2013 or the recommendations in BS EN 12101-6:2005 *Smoke and heat control systems. Specification for pressure differential systems*. The original smoke-ventilation system was non-compliant with CP3 1971. It, too, was a bespoke system, and the new system was an upgrade of this.

'Since the required performance criteria are not specifically defined and, as currently described, do not relate to the provisions of the statutory guidance, I cannot confirm the bespoke system complies with the Building Regulations (B1 and B5),' said Lane.

However, she added that, even if the system had been compliant, it was designed to offer smoke control on one level only, not to clear smoke simultaneously from multiple floors. (See panel, 'How the smoke-ventilation system was intended to work', on page 40.)

'Therefore, in Grenfell Tower, where all lobbies from level four to level 23 became smoke logged, the system would have been able to





The smoke-extract system at Grenfell was designed to be effective on a single floor only

“The smoke-control strategy needs to be part of the golden thread, which often gets lost on a job”

said: ‘All other active and passive fire/smoke protection measures are designed to address the scenario of a fire on a single floor, not on multiple floors as occurred at Grenfell Tower.’

It added: ‘Max Fordham will wish to examine the extent to which secondary fire/smoke-protection measures or “layers” are affected and/or overcome by a fire that so extraordinarily bypasses the primary, and overarching, layer of protection that is the principle of compartmentation.’

The bespoke system was also found to be faulty, which, Lane said, contributed to the spread of smoke to the single route of escape. She found evidence that the environmental ventilation system – which was required to automatically shut off in fire mode – was not isolated from the smoke system.

Lane’s site inspections found smoke staining within the north and south shafts, indicating that – potentially – AOVs were open on multiple floors, rather than on a single floor as the system intended. So, although a functioning smoke-extract system would not have given complete protection to the escape stairs during the fire at Grenfell Tower, the system was intended to be switched off and restarted on a different floor by firefighters.

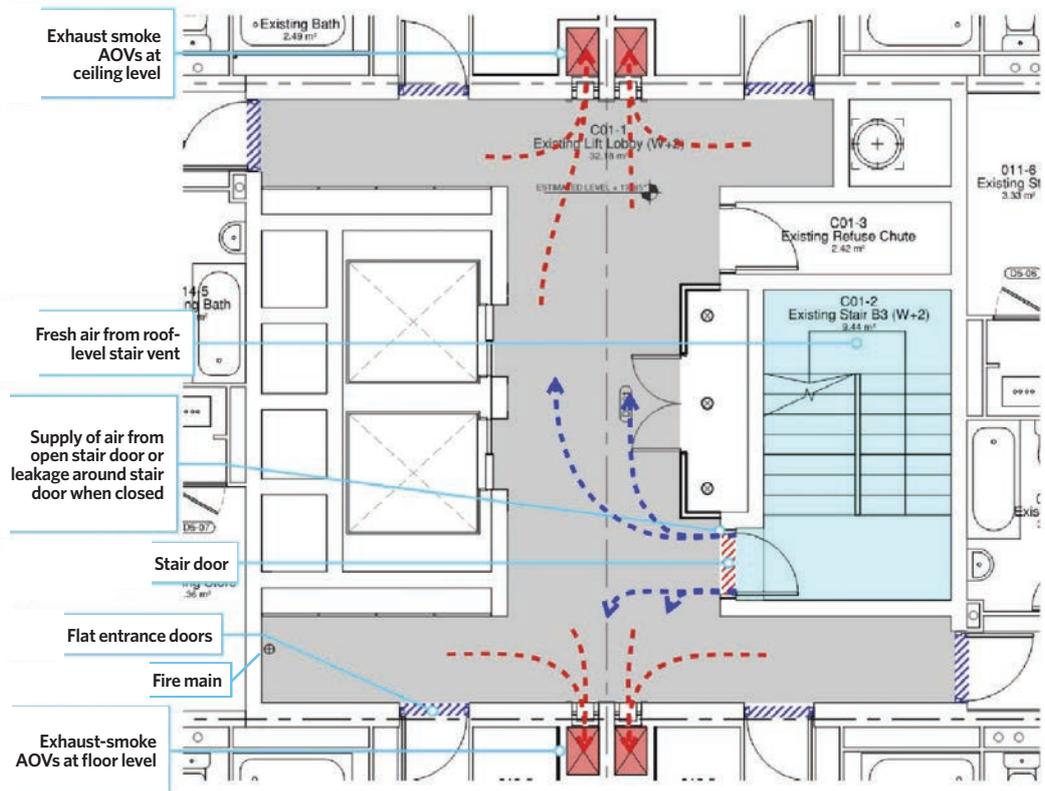
‘Had the smoke-control system operated correctly, and the fire service been able to take control, they might have used the system to sequentially vent smoke from the lobbies on each floor of Grenfell Tower,’ Lane told the inquiry.

In its opening statement, PSB UK, which designed the system using

» provide smoke control to one lobby only. It would not have been capable of preventing the spread of smoke to the stairs from lobbies on other levels,’ Lane’s report stated.

Fire-safety provisions in the current statutory guidance are not intended for a multi-storey, whole-building fire – but only for a localised fire event, said Lane.

The requirements for the system were initially provided by Max Fordham to PSB UK, which developed a proposed design for a smoke-control system to replace the existing one at Grenfell Tower. In its opening statement to the inquiry, Max Fordham



Design intent of the smoke-extract system in Grenfell Tower (source: Dr Barbara Lane’s Grenfell Tower report)

depressurisation principles, said its 'design approach was appropriate, given the limitations posed by the nature of the refurbishment, and that its system functioned effectively when it was commissioned'.

It added: 'The Building Regulations provide guidance as to how the requirements may be met, while confirming that there may well be other ways of achieving compliance with the requirements – and, thus, there is no obligation to adopt any particular solution contained in an Approved Document if you prefer to meet the relevant requirement in some other way.'

PSB said that 'so far as design is concerned, smoke-control systems are, therefore, only intended to address the effects of a fire on one floor' and that its system 'could not have prevented smoke from fires on multiple floors impacting lobbies and the common stair on multiple levels'.

Smoke control that protects only one floor is common in the UK, says Kealy, but fire- and life-safety engineers should design robust and simple smoke-management systems, and avoid overly complex systems with the potential for multiple points of failure. In the Middle East, where Kealy has worked for many years, the American National Fire Protection Association (NFPA) standards – which require stairs above 23m to be pressurised – have been adopted.

In a building where sprinklers are installed, the NFPA requires air pressure of 12.5Pa. The equivalent UK code – BS 5588 – requires a minimum of 50Pa. 'It is almost impossible for a mechanical engineer to engineer this system and make it work,' says Kealy. 'That's why, in the UK, pressurised systems are avoided and alternative systems are used.'

These systems have multiple components, including motorised dampers, AOVs and controls, all of which have their own likelihood of failure, says Kealy. 'To minimise the risk of failure, engineers should design a system with the least amount of failure points. A pressurisation system is very simple – fans turn on when the signal calls – and protects the stair regardless of fire-floor location. The need for complex firefighter override controls is avoided, with firefighters given a simple start-stop switch.'

The BS 5588 series of standards, which are referred to in ADB, were replaced by BS 9999 in 2008, but ADB still refers to BS5588, despite being updated in 2010 and 2013.

'The Approved Documents are not fit for purpose – Dame Judith Hackitt has acknowledged that in her report,' says Kealy. 'So, as professional engineers, we must now use codes and standards that are fit for purpose and are internationally respected – for example, the International Building Codes (IBC) and NFPA codes and standards, which I have used for 30 years on projects in the USA, the Middle East and Asia.'

Pushing for robust standards

Lane's report identifies a number of non-compliant and faulty aspects of the fire and smoke-extract systems at Grenfell Tower. The single stair and lobbies – and the fire-safety provisions therein – were not designed to create a safe escape route in the event of a whole-building fire.

The bottom line is, says Kealy, our codes and standards need to change. 'In the USA, the NFPA codes require residential buildings over four storeys to have another staircase, in case the sprinklers fail.'

'We need to pressurise stairs in tall buildings above 23m, but we need a sensible pressurisation standard,' he says. 'I propose that, until such time as the UK ADB are updated to our >>



NON-COATED FIRE RESISTING DUCTWORK

UK • EUROPE • MIDDLE EAST • ASIA



- Quality manufacture assured by 3rd party certification
- High performance to BS476:Part 24 & EN1366:Pts1&8
- Specified on 500+ international projects since 2003
- Installation verified by Certificate of Conformity
- CE Marked • LPCB Approved • UL® Listed



In-house
CPD
Seminar

Bookings contact:

mark.elliott@firesafeductwork.co.uk

+44 (0) 1706 227 935

CASWELL FIRESAFE® is licenced to manufacturing partners worldwide by



firesafeductwork.co.uk

» satisfaction as professional fire engineers, we use NFPA codes and standards.’

Because Building Regulations and standards in the UK are performance-based, engineers are permitted to do this, says Kealy. ‘We should not just design to the bare bone and hope everything works. As engineers and architects, we have to be brave and drive this forward ourselves.’

The single stair and stay-put policy, which dates back to the post-war studies of 1946 –

when balconies were provided for escape up to 14 yards (12.8m) above ground level, is out of date too, says Kealy. ‘No other developed country has a stay-put policy for an unlimited-height building where there is a single stair.’

Compartmentation is also questionable these days, he adds. ‘Over time, residential buildings become less fire resistant as we drill holes in walls for TV and internet cables, and change fire doors.’

Kealy believes building projects – especially high-rise ones – should be designed holistically, so that someone has an overview of how all elements, including fire and smoke-protection, work together. ‘That’s called a fire strategy,’ he says. ‘The smoke-control strategy needs to be part of the golden thread, which often gets lost or frayed on a job.’

Marriott International requires all of its fire systems – including smoke control – to be witness tested with theatrical smoke, to ensure all fire systems work as intended. Kealy says: ‘Theatrical smoke is released and we observe the detectors operate, the alarms sounding, the lifts grounding, the smoke extracts starting up and the fans taking smoke out of the building. The fire systems must operate automatically and in the correct sequence. We also walk all the egress routes – as if escaping – to make sure they are clear, signed, lit and have no obstructions.’

Independently testing systems before buildings open to the public is essential, adds Kealy, even if the commissioning engineer’s paperwork says they work.

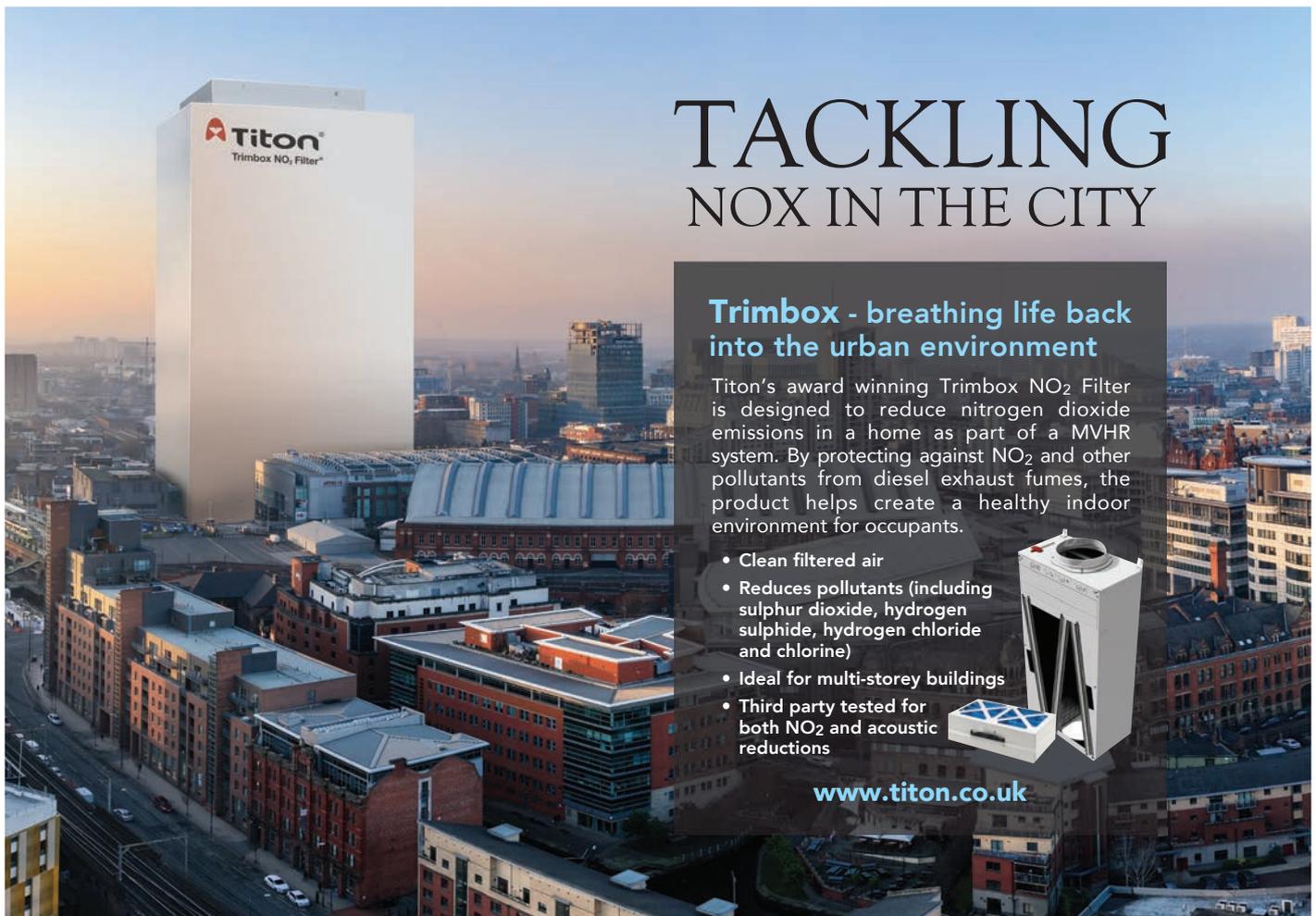
‘You wouldn’t sell a car without checking whether the brakes work; safety should be taken as seriously in a building,’ he says. ‘As an industry, we have to take the lead and do this ourselves.’ 

HOW THE SMOKE VENTILATION SYSTEM WAS INTENDED TO WORK

During a fire, the system was intended to extract smoke, using mechanical fans, from the fire-floor lobby only, through two pairs of smoke shafts – north and south.

Smoke detectors in the lobby should automatically activate the smoke system, shutting down and isolating the environmental ventilation, isolating all lobbies – except for the fire floor – by shutting automatically opening vents (AOVs) on all other floors, and activating the extract fans serving the north and south shafts.

In smoke mode, as air and smoke is extracted from the lobby, it would draw air into the lobby from the stairs, which had a permanently open vent at roof level. The flow of fresh air from the stairs to the lobby was intended to prevent smoke from entering the stairway.



TACKLING NOX IN THE CITY

Trimbox - breathing life back into the urban environment

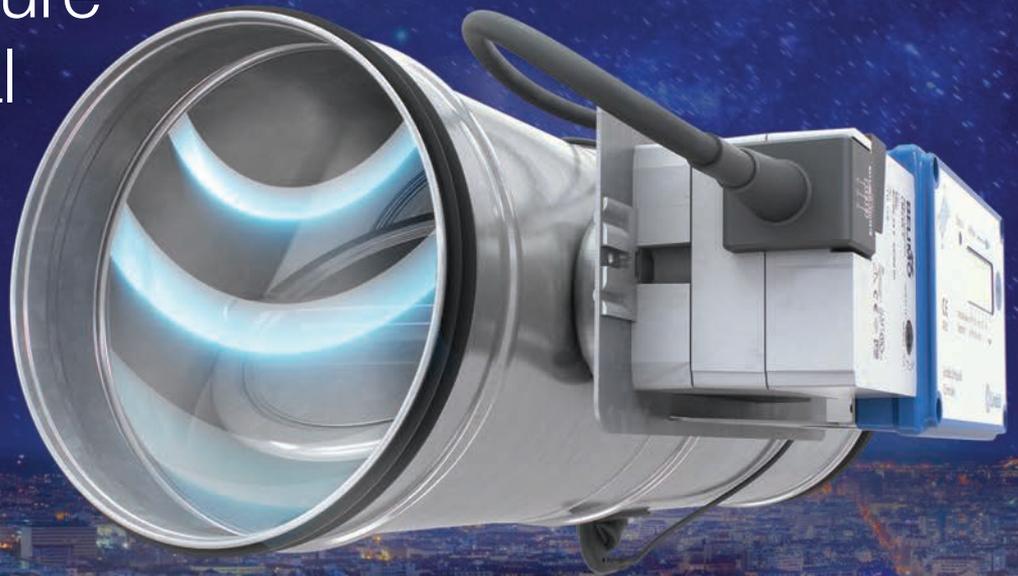
Titon’s award winning Trimbox NO₂ Filter is designed to reduce nitrogen dioxide emissions in a home as part of a MVHR system. By protecting against NO₂ and other pollutants from diesel exhaust fumes, the product helps create a healthy indoor environment for occupants.

- Clean filtered air
- Reduces pollutants (including sulphur dioxide, hydrogen sulphide, hydrogen chloride and chlorine)
- Ideal for multi-storey buildings
- Third party tested for both NO₂ and acoustic reductions

www.titon.co.uk



The only thing you
cannot measure
is its potential



Now with
 **Bluetooth™**

UltraLink – next generation

A revolutionary technology for precise measurement and regulation of airflow

UltraLink provides an exact measurement of the entire flow area including at low flow rates of $\pm 5\%$ down to 0.5 m/s (or ± 1 l/s whichever is larger) without extra pressure loss in the ventilation system. It is a unique and energy-saving method of measuring airflow.

The technology is based on ultrasound sensors, which means there are no parts in the airflow on which dirt can collect.

Instead, you experience uninterrupted airflow without extra pressure loss, offering unique benefits in terms of comfort, energy efficiency, commissioning, installation, maintenance and cleaning.

UltraLink is now possible to integrate in new as well as already installed VAV systems to make the system completely energy optimised.

Smoke... tamed.



TAME SMOKE TO SAVE LIVES WITH THE UK'S LEADING SERVICE SPECIALIST

Brakel Airvent, the smoke control service specialist, has joined the Kingspan Light + Air family, combining our expertise with the strength and resources of the Kingspan Group. You can rely on us to protect your building and your people, ensuring your legislative compliance in the most cost-effective and pragmatic way.

To ask a question or arrange a **FREE** no obligation meeting call 029 2077 6160 | www.airvent.co.uk



The UK's leading provider of whole-life service to smoke control systems

WORLD'S TALLEST TIMBER BUILDING RELEASES FIRE STRATEGY

The tallest timber building in the world will be able to withstand even the most extensive fire, according to fire consultant Sweco Norge.

The Mjøstårnet hotel in Norway will be 81 metres and 18 storeys high when it is completed in 2019. Its structure will be glue-laminated timber (glulam) beams, which Rune Abrahamsen – CEO of the manufacturer, Moelven Limtre – says will retain a load-bearing structure in a burnout fire. 'Our fire tests show that glulam acquires a protective layer that denies the fire the ability to keep going. Even after long exposure to fire, a glulam structure with such sturdy dimensions as Mjøstårnet will have a sufficiently great load-bearing core of fresh wood.'

Additional fireproofing measures will be incorporated, including sprinklers, a fire alarm linked to the fire brigade, and a control room with graphical overview. Fire strips will protect the steel sheets and dowels in the junctions and joints, and each floor, apartment and hotel room is designed as separate fire cells.

Outer wall elements have been treated with a fire-retardant material and cavities in the façade are broken on each floor.



Hackitt Review recommendations

Grenfell steering group to tackle sector competency

A new industry steering group has been formed to look at the competency of workers in construction, in line with recommendations in Dame Judith Hackitt's *Independent Review of Building Regulations and Fire Safety*.

The steering group on competences for building a safer future is a sub-group of the industry response group set up after the Grenfell fire. It will look to improve competences for those working on the design, construction and operation of higher-risk residential buildings.

The group will develop a plan for a body to oversee competence requirements and support the delivery of competent people.

Identifying and developing competency frameworks and accreditation pathways will be undertaken by 11 working groups. CIBSE past president George Adams, FCIBSE, is chairing working group one of the competence programme, which is the engineers working group.

The steering group will peer-review the outputs from the 11 working groups.

Graham Watts, chief executive of the

Construction Industry Council, is the chair of the new steering group, while the deputy chairs are CPA deputy chief executive Peter Caplehorn and Peter Yates, professional technical consultant at the Local Government Association.

'Our aim is to ensure a joined-up approach to achieving a comprehensive, coherent and robust framework for the competence of all those creating, maintaining and managing higher-risk residential buildings,' said Watts.



New fire guidance for catering equipment installers

The Catering Equipment Distributors Association (Ceda) and Fire Industry Association have published guidance for integrating catering equipment with fire-fighting systems.

Ceda said suppliers of catering equipment have problems ensuring connections are made between the controls of the fire-protection and other systems, such as the BMS, extract fans and fuel supplies. They are averse to make connections for fear of setting off the fire-protection system and a reluctance to work in another contractor's control box. There is a lack of understanding about the relevance of inter-connections between systems.

Ceda's technical support adviser, Peter Kay, said: 'Fire-suppression systems are normally supplied with volt-free contacts to trigger other systems, such as fire alarms and gas interlocks. It is not uncommon, however, to find that these are never used because it was unclear about who was responsible for making the connections.'

Ceda members can download the document from www.ceda.co.uk, and non-members can request a copy from fiona@ceda.co.uk

Rockwool launches fire-rated ductwork insulation system

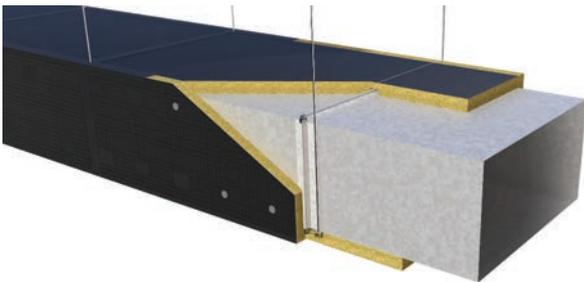
Stone-wool insulation manufacturer Rockwool has launched DuctRock for ventilation and smoke-extraction ducts.

The fire-protection insulation is designed to meet EN fire-resistance standards for a variety of ductwork applications. It is part of the existing FirePro range and the manufacturer says it meets EN1366 for A and B ventilation-duct types and EN1366-8 for smoke-extraction ducts.

DuctRock comes in three thicknesses of insulation and has a fire rating

ranging from EI 30 up to EI 120, in accordance with EN13501-3 (fire ducts and dampers) and EN 13501-4 (smoke control systems).

It has a black outer foil finish, which Rockwool says offers 'design freedom' to architects and engineering consultants. The DuctRock system is quick and simple to cut, handle and install, and is CE marked to meet BS EN 14303, covering thermal insulation products for building equipment and industrial installations.



The DuctRock fire-protection insulation comes with a black outer foil finish

Domus expands its fire-compliant ducting range

Domus Ventilation has added new products to its fire sleeves and collars range, to ensure its ducting range is fire compliant with Building Regulations.

The fire collars and sleeves are made using a galvanised steel shell containing graphite-based, intumescent material that has been tested to BSEN 136603:2009. The fire sleeves are designed to fit the smallest Domus duct (round 100mm/rectangular 110x54mm) and provide a 120-minute fire rating. The fire collars can fit the smallest and largest sizes (100mm and 150mm) and have a fire rating of 60 to 240 minutes.

Domus says the fire sleeves are designed for vertical and horizontal cladding, and round and rectangular ducts, while the fire collars are for round, vertical ducting and have a fire rating of up to four hours.

The products can be installed without any specialist tools or fixings, according to the manufacturer.

FIRE SAFETY SOLUTIONS

WE CARE FOR YOUR AIR

Our extensive range of tested and CE certified products are made to ensure people and buildings are protected in case of fire.

All of our HT fans have been independently tested to the new European standard EN 12101-3:2015, creating the widest range of approved smoke extract fans with invertors.

For more information visit www.flaktgroup.co.uk or email uksales@flaktgroup.com

FläktGroup

DENCO HAPPEL SEMCO FLÄKT WOODS DELBAG ILOXAIR

Breaking the barriers to retrofit sprinkler installations

A new report by Geberit makes a compelling case for change in fire safety laws regarding sprinklers in existing buildings.

Fire safety remains top of the agenda following Dame Judith Hackitt's review and the inquiry into the Grenfell Tower disaster. While much of the debate has centred on the use of combustible cladding and the need to improve fire safety management systems, there are strong calls from the industry to tighten the law on the installation of fire-suppression methods too.

Industry leaders, politicians and fire safety experts, including Dany Cotton, Commissioner of the London Fire Brigade, are among those who have called for sprinkler systems to be installed in all tower blocks, irrespective of their age. The National Fire Chiefs Council, RIBA and the London Assembly Planning Committee have also argued for change.

Now a compelling new white paper published by Geberit – a leading manufacturer of sanitary products and piping systems, including sprinkler pipes and fittings – offers CIBSE members a comprehensive insight into the sprinklers category and why the law must change.

A resource for engineers

Available to download for free from the Geberit website, *Pressing matters*:

SPRINKLERS: THE FACTS

2%

Only 2 per cent of council tower blocks in the UK have full sprinkler systems fitted

6.5%

Just 6.5 per cent of buildings more than five storeys or 18m high have sprinklers

99%

Research by the National Fire Chiefs Council shows that sprinklers are 99 per cent effective at containing, controlling or extinguishing fire when activated

Breaking the barriers to retrofitting sprinkler systems in existing building stock has been published as a best practice guide for mechanical and building services engineers.

The document serves as a valuable resource for engineers to showcase the benefits, innovation and reliability of modern sprinkler systems to their customers, whether social housing providers, refurbishment contractors, management companies or developers.

"Nobody has ever died in the UK from a fire-related incident in a building with a working sprinkler system."

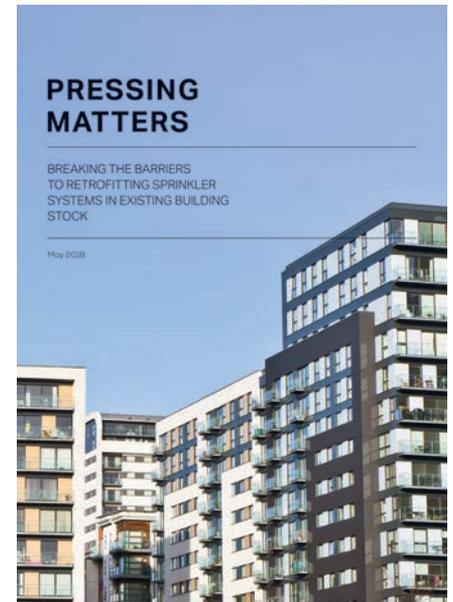
After summarising the background to fire safety laws in light of recent disasters, the white paper clarifies the current regulations. It also lists the most common perceived barriers to retrofit sprinkler installations, including cost, disruption to residents, aesthetics and the need for hot works in occupied properties.

Geberit then showcases modern press-fit technology, which is helping to overcome these barriers by facilitating cheaper, quicker, easier and less disruptive sprinkler system installations in existing buildings, including tower blocks, schools, retail buildings and hospitals.

There is also a foreword from Welsh Assembly Minister Ann Jones. An advocate of fire safety and a former Fire Brigades Union national official, Jones campaigned successfully for sprinklers to be installed in all new domestic buildings in Wales.

A case for mandatory sprinklers

Nobody has ever died in the UK from a



fire-related incident in a building with a working sprinkler system. Even in advance of any change in the law, retrofit sprinklers are proving to be a viable and potentially life-saving measure for many local authorities across their high-rise housing stock.

In Birmingham, for example, the city council has approved a project to install sprinklers in all 213 of its tower blocks, despite initial funding concerns – and other local authorities are investing too.

Now, for the first time in one place, Geberit is giving engineers the facts they need to make a compelling case for retrofit sprinkler installations, helping to overcome the perceived barriers with proven fitting methods.

Find out more

To download *Pressing matters: Breaking the barriers to retrofitting sprinkler systems in existing building stock* from Geberit for free, visit www.geberit.co.uk/campaign/pressing-matters

GEBERIT

SPIRITUAL DOME

Half submerged in the Scottish hills, The Macallan distillery is a dramatic visual representation of the distilling process. **Andy Pearson** looks at how Speirs + Major's lighting design brought the process to life and how Arup dealt with the fire hazard

The design of The Macallan's new £140m distillery successfully combines a state-of-the-art whisky distillery with a dynamic visitor experience in a single building. Designed by Rogers

Stirk Harbour + Partners, working with engineers Arup, the 14,800m² building is cloaked by a laminated-timber grid roof, incorporating four circular hillocks and a fifth larger one. Its undulating surface is covered by native grasses and wildflowers to help it settle into the landscape of the northern highlands of Scotland.

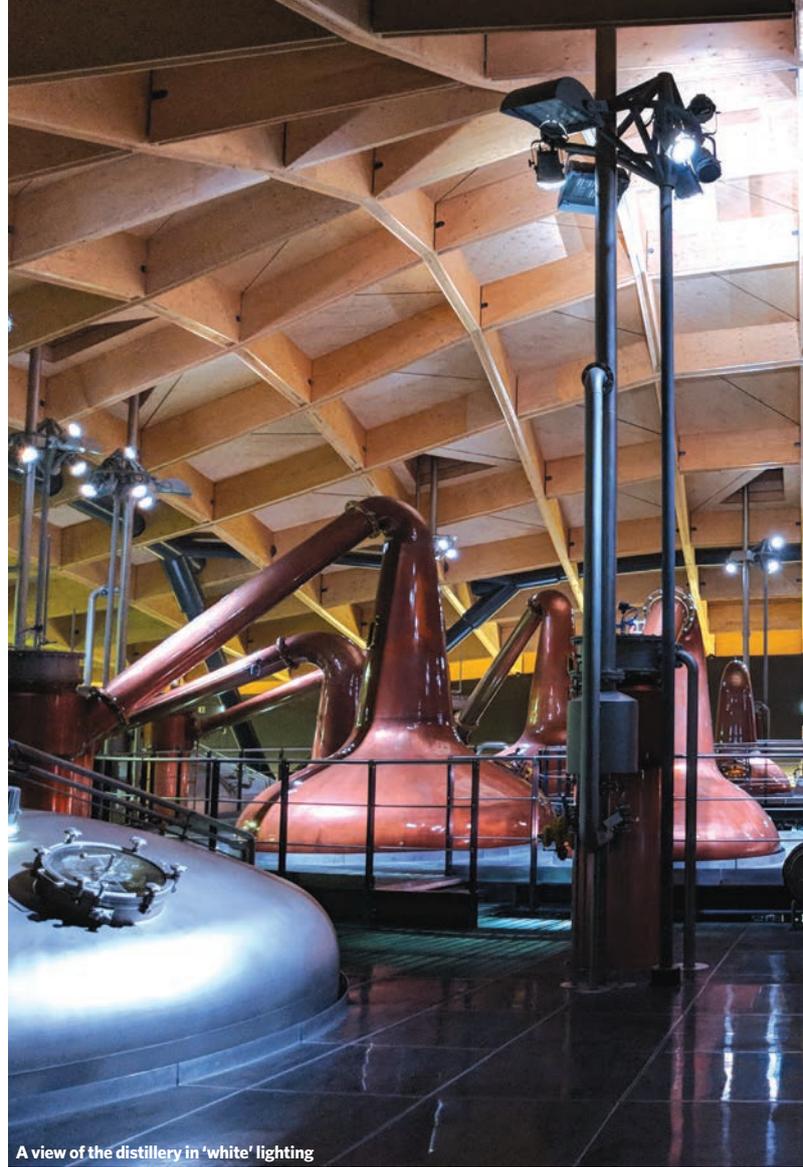
'The form of the building is dictated by the production process; distilling generates a

PROJECT TEAM

Architect: Rogers Stirk Harbour + Partners
Structural, fire, building services and civil engineering: Arup
Exhibition designer: Atelier Bruckner
Landscape architect: Gillespies
Lighting consultant: Speirs + Major
Process engineer and fabricator: Forsyths
QS and PM: Equals consultancy
Main contractor: Robertsons Construction Group

 **£140m**

The design of The Macallan's new £140m distillery manages to combine a state-of-the-art whisky distillery with a dynamic visitor experience in a single iconic building



A view of the distillery in 'white' lighting

lot of heat, so the roof has been domed over the distilling vessels,' says Adam Jaworski, structural engineer at Arup.

The building is aligned along a north-south axis. At its northernmost end, one of the small domes covers the mash hall (see panel, 'How malt whisky is made'). The dome is accompanied by a line of three similarly sized mounds, each emphasising the location of the distillation halls, with their unique circular arrangement of onion-shaped copper stills below. This spectacular roof shelters what is, effectively, a single-storey distillery, with the exception of a small mezzanine floor that affords visitors an aerial view of the production plant. The fifth, larger dome marks the visitor centre, bar and obligatory shop.

Two of the biggest challenges the engineers had to deal with when engineering the distillery building were heat and ethanol (alcohol) vapour. Macallan's process engineers use the ATEX hazardous area classification system to identify places where ethanol vapour might concentrate and create a potentially explosive atmosphere. All classified areas required special precautions to prevent sources of ignition – such as switches and controls – from causing a fire or an explosion.

Classification varies from Zone 0 to Zone 2:

- Zone 0 is a place in which an explosive atmosphere is present continuously – such as in the vessels and stills
- Zone 1 is a place in which an explosive atmosphere is likely to occur occasionally in normal operation
- Zone 2 is a place where an explosive atmosphere is not likely to occur in normal operation but – if it does occur – it will persist for a short period only. Generally, the lower area of the distillation halls, below mezzanine floor level, are Zone 2.



HOW MALT WHISKY IS MADE

Barley is malted by steeping it in water and spreading it out on malting floors to germinate. This process activates enzymes. After about a week, the barley is dried in a kiln kept at a temperature below 70°C, so as not to destroy the enzymes. The dried malt is then ground into a grist – a process that takes place outside the distillery building

At The Macallan’s new distillery, the grist is mixed with borehole water and heated in a mash tun, housed under the first dome of the roof, at the northern end of the building. In this vessel, the barley starches are converted to sugar by the enzymes activated by germination. The sugary liquid wort is then cooled to about 20°C and pumped into giant, stainless steel vessels, called washbacks, where yeast is added and fermentation begins (the yeast converts the sugar to alcohol). This takes a minimum of two days, after which the ‘wash’ will contain about 8% alcohol by volume.

Rogers Stirk Harbour + Partners’ design incorporates the fermentation and distillation vessels into circular clusters beneath the three remaining small roof domes. To concentrate the alcohol in the wash, it is distilled in the big copper pot stills. In the wash still, the wash is heated to just below boiling point so that the alcohol and other compounds vaporise. This vapour is condensed back into a liquid in the neck of the still by a large copper coil, kept cool by passing water through it from the River Spey.

The distillate, known as low wines, now contains about 20% alcohol by volume. This is transferred to a spirit still, where it is distilled for a second time to produce a spirit that is about 68% alcohol by volume.

The final part of the process is storing this colourless spirit in oak casks – which may have contained sherry or bourbon previously – for 10 years or more, for maturation into single malt whisky.

In addition to ethanol vapour, the other big challenge the engineers had to deal with was heat. ‘In the production part of the building, there is an awful lot of heat from the whisky-making process, which is dispersed by a mechanical ventilation system,’ says Jim Deegan, mechanical engineer at Arup.

This ventilation system draws in air at low level from a trench recessed into the ground bounding the east side of the building. This untreated air is then divided into two, with half ducted to the west side of the building through large concrete ducts constructed beneath the process hall. Banks of fans push this fresh air into the distillation hall at low level to help cool space and to dilute the ethanol vapour present.

“All classified areas required special precautions to prevent ignition sources from causing a fire or an explosion”

‘The system runs continuously to ensure that the air in a zone 3m above the floor changes six times per hour,’ says Deegan. ‘Above this 3m zone, the solution relies on the natural process of heat rising up from the plant to dilute the ethanol vapour.’

The warmed air exits the building through a series of triangular vents set into its undulating roof. The expected concentration of ethanol vapour in the air means that the roof area adjacent to the vents has an ATEX Zone 1 classification. Ethanol concentration will be at its highest here when the washbacks and stills are being filled with a new charge of liquid, a process that displaces >>



The distillery roof’s undulating surface is covered by native grasses and wildflowers





View of the pipework arrangement beneath the deck

» the concentrated ethanol vapour from inside the vessels.

Classifying the roof area around the vents as Zone 1 means the lightning-protection scheme incorporates masts to lift the finials above the Zone 1 area.

As might be expected, the distillery incorporates a cutting-edge fire-protection system, incorporating a combination of sensors: conventional optical sensors; Very Early Smoke Detection Apparatus (Vesda); and ethanol gas detection, flame and heat detection.

Detailed fire-engineering predictions allowed the roof to be kept free of sprinklers, although these are present on both sides of the giant, glazed fire-compartment wall that offers a transparent division between the production facility and the visitor centre. This

“A small AHU, incorporating an evaporative cooler, maintains conditions in the circular basement at 12°C, 70% RH, to regulate evaporation from the casks”

fire-rated wall is kept cool by sprinklers, which spray on the side where a fire has been detected. A representative, full-scale sample of the components that form this solution was tested at BRE.

The southern end of the building houses the visitor centre, which includes a circular basement – called the Cave Privée – the walls of which support 300 wooden casks of maturing whisky. A small air handling unit (AHU), incorporating an evaporative cooler, maintains conditions in this space at 12°C, 70% RH, to regulate evaporation from the casks.

Ventilation to the visitor centre is provided by a single, large AHU. This maintains comfort in the summer by keeping a high air-change rate while, in winter, heat generated by the whisky-making process is reclaimed to heat the space. ‘After the river water has been used in cooling the condensers, it comes back to a holding tank before being returned to the river,’ says Deegan. ‘We use a small fraction of this heat to heat the building.’

Sustainable heat for the process plant comes via steam mains from Estover’s Speyside combined heat and power (CHP) plant, about 2km from the distillery. The plant burns local farm and forestry waste (there are 750,000 acres of forestry within 50 miles of the plant), plus waste products from the distillery, to generate 12MWe. ‘The Macallan



750,000 acres

The area of forestry within 50 miles of the plant, which burns farm and forestry waste – and distillery waste products – to generate 12MWe. ‘The distillery uses about 80% of the steam produced by the plant and some of the low carbon power it generates,’ says Deegan

SHEDDING LIGHT ON WHISKY PRODUCTION

'The client had the enthusiasm to do something brave and exciting,' says Clementine Fletcher-Smith, associate partner at Speirs + Major, the project's lighting designer. 'We could have lit the distillery simply to look beautiful, but we also wanted the lighting to help tell the story of how whisky is produced.'

The concept for the building had been established by the time Speirs + Major became involved. For a scheme that initially appears to be buried in the grounds of the Easter Elchies estate, the long, thin building is fully day-lit on one side – so the starting point in developing the lighting scheme was a daylight study. 'The majority of visitors will come in the summer, when it is light up to midnight, so the design needed to have an impact on a bright summer's day, as well as on a dull winter afternoon,' says Fletcher-Smith.

The major challenge in lighting the distillery was to establish the extent of the ATEX hazardous area classification zones. These are based on the likely concentration of ethanol fumes in an area, making it potentially explosive. 'When we started our design, the whole plant was classed at the highest rating, which severely limited the kit we could use. As the process design progressed, however, the zoning became less restrictive, so only a one-metre zone immediately surrounding the production plant and the area below the mezzanine deck, plus the Cave Privée, were ATEX zones,' says Fletcher-Smith.

The entire scheme is lit by LEDs. In response to the zoning, all of the dynamic light fittings – RGBW spotlights – are located above the mezzanine/visitor level in the production area. Below the mezzanine, ATEX-compliant LED floodlights, fitted with dichroic filters, are used. To achieve ATEX compliance, the starting point was an IP68 fitting, which was then subjected to additional tests. 'We knew the colour hues we wanted, so the ATEX-compliance testing was carried out on one IP68 fitting, which was then fitted with different colour filters,' says Fletcher-Smith.

Above the mezzanine, the dynamic fittings are installed on lighting columns, which are next to the process vent-pipes. 'The architect's

concept was that the roof appears to float freely over the landscape of the production plant, so we arranged the light fittings into clusters surrounding the vent-pipes,' Fletcher-Smith explains. The lighting infrastructure was also coordinated with the precisely and neatly arranged process pipework.

Alongside the dynamic lighting scheme, Speirs + Major had to ensure the production engineers were able to produce the spirit that is matured into whisky. 'The building is, effectively, a factory, so there is a layer of robust functional lighting to enable the production team to do their job. This is overlaid by much more dynamic lighting with a theatrical control system, to provide the visitor experience,' says Fletcher-Smith.

There are two modes of dynamic lighting: an automated set of scenes that sequence throughout the day, to create a dramatic backdrop to the visitor centre bar; and one that uses a theatrical control system to enable the distillery to run visitor tours of the plant. These are led by a guide who uses a tablet computer to cue programmed scenes, which vary from a strong focus on a single entity to a full-lit view of the space.

Colour is used to give visual cues; cool blue for the stainless steel cold-process equipment, and amber-red hues for the hot copper stills. 'At the beginning of the tour, all lighting in the process plant is turned off, so that the interior is day-lit and the views are out to the landscaping. As the tour commences, the washbacks are lit up, followed by the stills and so on, to provide a sense of revelation,' says Fletcher-Smith.

The tour culminates in an immersive experience in the Cave Privée, a circular whisky store where programmable dynamic light combines with black polished surfaces to create kaleidoscopic effects.

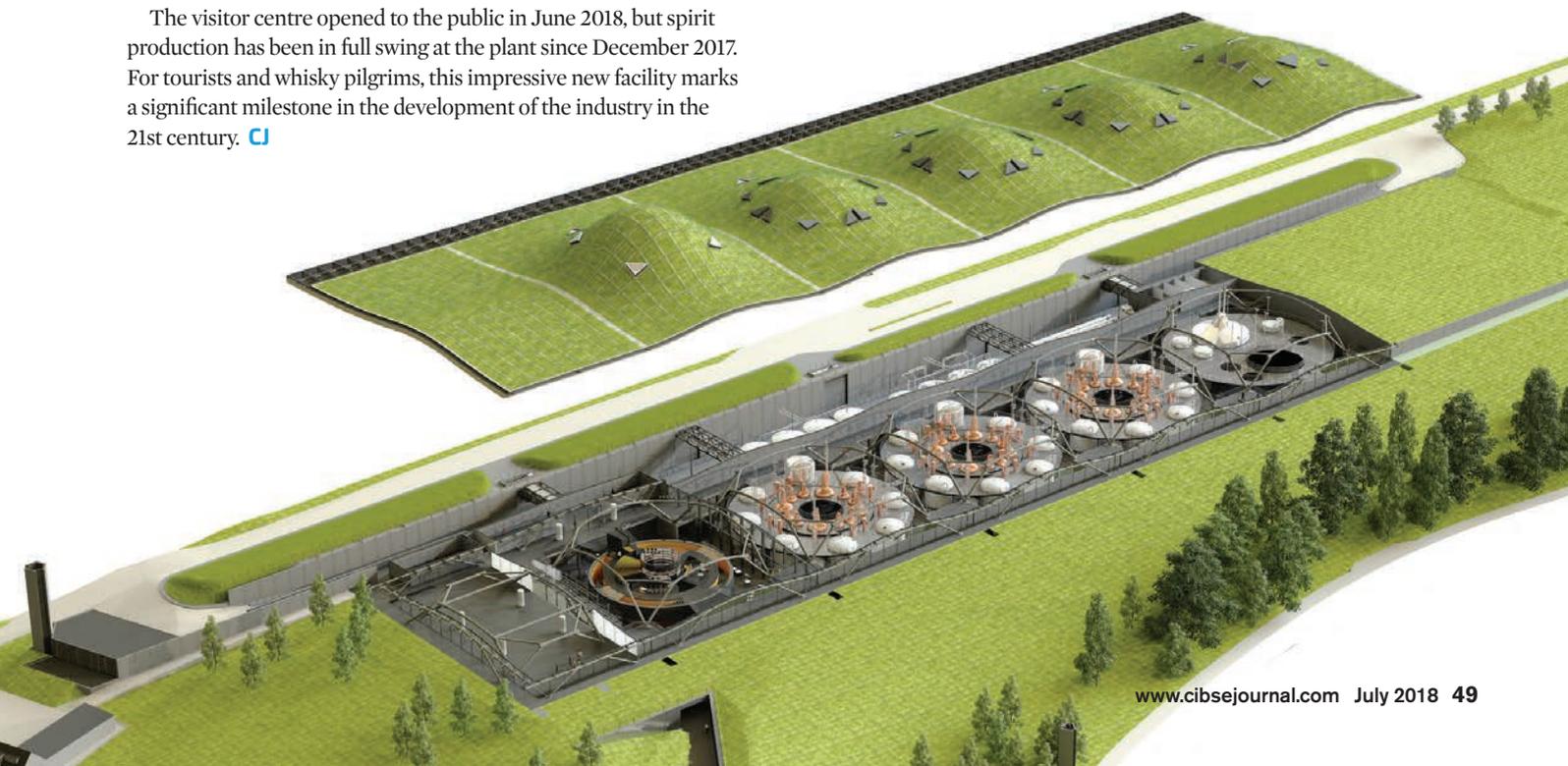
A visitor centre adjoins the production plant, and includes a bar and exhibition space. It is separated from the production plant by a glass screen, so visitors can see it lit. In the visitor centre, Source Four LEDs are used to provide a colour overlay to the space. 'We worked with exhibition designers to integrate lighting with audio visual exhibits,' says Fletcher-Smith.

distillery uses about 80% of the steam produced by the plant and some of the low carbon power it generates,' says Deegan.

The plant should keep the distillery fed with low carbon steam for 95% of the year. When the plant is not running, the distillery has two gas-fired boilers, rated at 10MW each, which produce 18MW of medium-pressure steam. These are at the south end of the building, and connect to the process area via a corridor.

The visitor centre opened to the public in June 2018, but spirit production has been in full swing at the plant since December 2017. For tourists and whisky pilgrims, this impressive new facility marks a significant milestone in the development of the industry in the 21st century. **C**

The form of The Macallan building is dictated by the production process. Distilling generates a lot of heat, so the roof has been domed over the distilling vessels. The largest dome marks the visitor centre.





Reduces cooling costs naturally

SAVE

15-25% annual cost savings

MORE

20-30% higher output for most systems

GREEN

less electricity, more eco-friendly

The **EcoMesh** system for air cooled chillers, refrigeration, dry coolers and unitary units continue to meet with global success.

Airports

Supermarkets

Datacentres

Power/Industrial Plants

Air Conditioning

Refrigeration

Unitary

Hotels

Office Buildings



How EcoMesh works

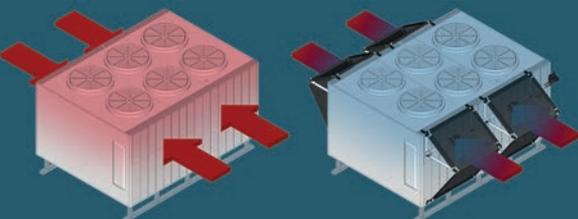
EcoMesh's unique design harnesses two natural cooling effects.

By regulating the spray of a fine water mist onto the mesh we can adjust the adiabatic cooling properties of the **EcoMesh** system. This can cool the ambient air by as much as 28°C (82°F)!

Coupled with this is the shade provided by the mesh itself instantly reducing the solar radiation impact. This can have a 3–8°C (37–46°F) cooling of the incoming air.

BEFORE

AFTER



better protection

EcoMESH provides protection against harsh weather conditions.

maintenance free

EcoMESH is a maintenance free system. It also reduces the maintenance frequency of the cooling unit.

easy retrofit

Can be retro fitted to any model, make and size of air conditioning and refrigeration unit.

extended chiller life

EcoMESH extends compressor reliability and life.

minimised water use

Spray is intermittent and only activated when required, hence it consumes 79% less water than any other wet systems.

no health risks

Eliminates health risks including Legionella from the use of coarse water.

no chemicals

No water softeners or other chemical treatment plant required.

NOT JUST A PHASE

NewMass cooling systems offer the energy savings of passive design and the control of mechanical cooling. **Phil Lattimore** speaks to BuroHappold's Gideon Susman about the CIBSE award-winning innovation

The winner of the Energy Efficient Product or Innovation category at the CIBSE Building Performance Awards demonstrates how investment in research can benefit a commercial business.

NewMass was developed as part of a BuroHappold-sponsored engineering doctorate in environmental technology, completed at Brunel University by Gideon Susman – now strategic energy planning lead for the company's US west coast region.

It comprises an array of finned tubes that sit below the ceiling of an occupied space. The tubes are filled with a phase change material (PCM) that passively absorbs excess heat from the space by changing from a solid to a liquid. At night, this absorbed heat is passively discharged to the night air or rejected to a chilled water loop. Depending on ambient dry- or wet-bulb temperatures,

the chilled water loop may be able to supply free cooling – otherwise, a chiller can sink the heat. The chiller can also operate on particularly hot days, to boost cooling as required.

Susman says year-round performance is not guaranteed in passive systems because there are often periods when the PCM becomes saturated with heat and can no longer limit temperature rise. Active systems – using tanks to store the PCM instead of locating it in the space – generally don't save energy, and should only be installed to shift load.

His system, Susman says, combines the best passive and active features. 'This saves energy by prioritising passive operation for the majority of the time. If the array can absorb excess heat from a space, without any extra input energy, it will do that. The chilled water loop can pull heat from the PCM and/or the space whenever required.' The system can also operate in heating mode when supplied with hot water from a boiler or heat pump.

Optimisation

The system is optimised for heat transfer within the body of the PCM and at the surface of each unit, which helps maximise and sustain cooling capacity. PCMs do not have an inherently high conductivity. BuroHappold has increased it by employing Raschig rings – small aluminium cylinders – that allow the system to maintain a higher cooling capacity for a longer period. This, effectively, increases thermal capacity and aids the discharge of accumulated heat.

At the surface, convective and radiative heat transfer is enhanced by using a radiant/absorbent surface and increasing natural convection with an optimised external fin configuration. This enables cooling capacity and heat discharge rates to be maximised.

As a modular system, an array can be sized according to the cooling load in a space, with the active cooling function ensuring that the desired cooling set points are always achieved. Each unit has an associated cooling capacity and thermal capacity. Arrays are sized with reference to the cooling load and the cooling capacity of each unit.

The system is installed in banks of four or eight units, held in place by brackets hung from the ceiling slab. Each bank is connected to insulated pipework that can carry chilled and hot water. Balancing valves may be used at each point of connection, but – after commissioning – all control is achieved at the central plant, with no moving parts in the space served.

An algorithm was developed to control all units, based on room air temperature, relative humidity and the state of phase of the PCM. >>

NewMass installation in Brentfield's IT suite

CALL FOR BPA 2019 ENTRIES

The 2019 CIBSE Building Performance Awards are now open for entries. They recognise the people, products and projects that demonstrate engineering excellence in the built environment, and are the only industry awards that focus on actual, measured performance outcomes, not just design intent.

The 13 award categories are open to any organisation, worldwide, responsible for the design, commissioning, construction, installation and operation of low-energy buildings, as well manufacturers whose products enable efficient energy consumption.

■ **Entry deadline:** 14 September ■ **Shortlist announced:** 15 November
 ■ **Awards dinner:** 12 February 2019 ■ **Visit** www.cibse.org/bpa

 **CIBSE BUILDING PERFORMANCE AWARDS 2019**

» This allows the units to absorb the maximum possible heat passively, before the chilled water loop engages. Passive discharge is prioritised by deferring active discharge until conditioned spaces become occupied.

Testing

A prototype design was tested at Brunel and compared against other commercially available, passive PCM products. The tests revealed competitive temperature moderation in passive mode and excellent temperature control during active operation.

Informed by the measured system characteristics, a bespoke modelling tool – coupled with IES VE software for full building modelling – gave a prediction of 34% energy savings for a typical UK office building.

BuroHappold partnered with ICE Architects and received funding from the Technology Strategy Board for development and installation of the system in Brentfield Primary School, Brent, London. The system was monitored for a year and tested in various modes of operation, including heating, to understand performance.

Results were used to calibrate an EnergyPlus integrated model of the system and building. This demonstrated 36% energy savings compared with a passive chilled beam system of the same capacity. The researchers also reported comparable, or improved, thermal comfort compared



NewMass is installed in banks of four or eight units

with existing passive systems. The system performed similarly in terms of passive temperature control and far better than the alternatives in active mode, the team reported. The Brentfield school tests gave valuable calibration data, says Susman. ‘This allows us to model the system in alternative configurations, climates and building typologies – essential for demonstrating its potential in different markets.’

The units, designed to be disassembled and recyclable, are constructed of three main materials – PCM (SP21e, Rubitherm), aluminium and copper – plus fittings and a paint finish. Of these, only the fittings are composites. A life-cycle assessment will be conducted to refine any processes that could be particularly harmful to the environment. At the end of a unit’s life, the molten PCM can be poured off and returned to the manufacturer for recycling.

Work is continuing to bring the system to market, and papers on the system will be published later this year. **CJ**

■ Partners and collaborators for NewMass include Brunel University, Brentfield Primary School, Brent Council, ICE Architects, Chalfont Energy Investments and HA Marks



DAIKIN APPLIED (UK) LTD
Technically better...

Daikin Applied (UK) is proud to launch a new generation of highly efficient air-cooled scroll chillers with R-32 refrigerant. The new air-cooled chiller range is available for cooling only and heat recovery applications.

- › New R32 refrigerant replacing old R410a chillers
- › Extensive Range from 80 kW up to 700 kW cooling capacity
- › Low GWP of just 675 compared to 2088 of 410a
- › SEER efficiency improved by 10% (Ecodesign Lot21 compliant)
- › Low noise with compact footprint
- › Fully compatible with Daikin on Site remote monitoring platform
- › Inbuilt master/slave sequencing



 Contact us to book your Chiller CPD

For all your Chiller, AHU, Spares & Service enquiries contact us on:

0345 565 2700

www.daikinapplied.uk

- AHUs**
- CHILLERS**
- PROJECTS**
- SERVICE**



TRANE[®]



DATA CENTRE SOLUTIONS FROM THE CHILLER EXPERTS

- Four refrigerant choices including environmentally friendly low-GWP and HFO options
- Scroll, Screw and High speed centrifugal compressor choices
- Free Cooling and Adiabatic Cooling options
- High leaving water temperatures
- Rapid restart
- 24/7 service back-up



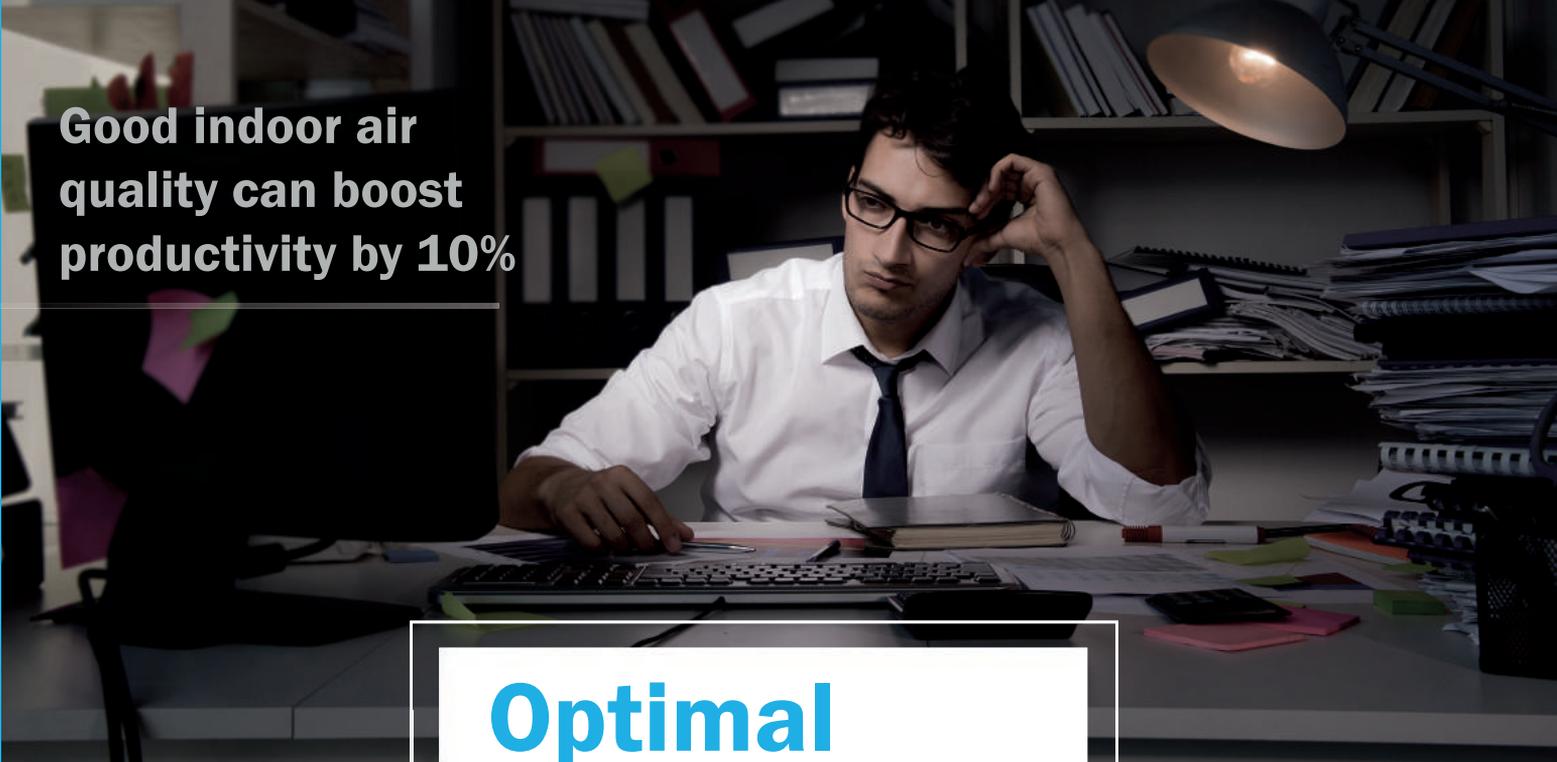
HVAC EQUIPMENT | CLIMATE RENTAL | ENERGY MANAGEMENT | SERVICE | MAINTENANCE | SPARE PARTS



TRANE[®] A BRAND OF **IR** Ingersoll Rand.

Ingersoll-Rand UK Limited TEL: 08457 165 162 EMAIL: customer.care@trane.com WEB: www.trane.co.uk

**Good indoor air
quality can boost
productivity by 10%**



Optimal Working Environment

Our award-winning natural cooling and ventilation system monitors temperature and CO₂ levels to determine exactly how much fresh air and cooling is required. It uses a patented Phase Change Material acting as a thermal energy store together with extremely low energy fans to cool the building.

Cool-phase is able to provide regulated temperature and fresh air for a building with exceptionally low running costs and a large reduction in carbon footprint.



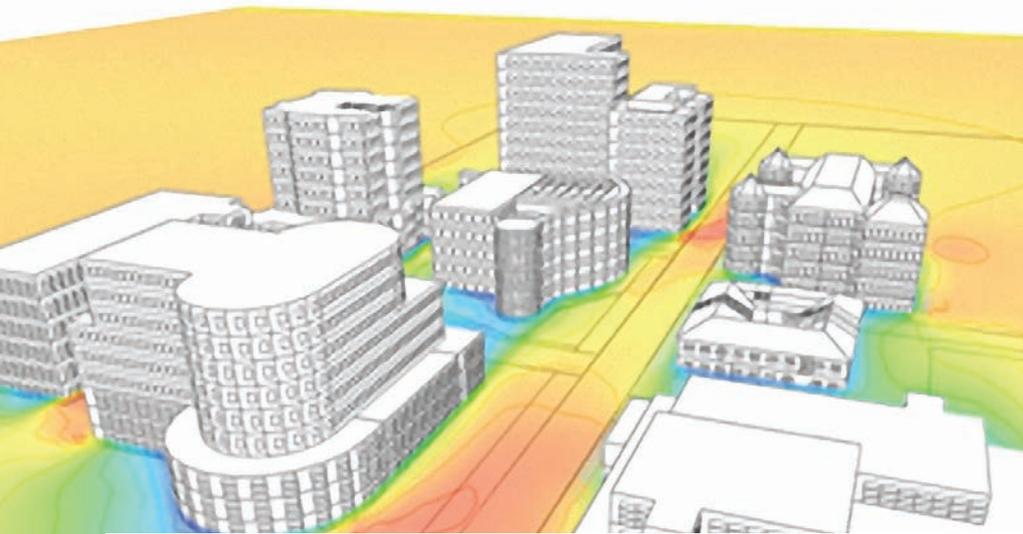
THE QUEEN'S AWARDS
FOR ENTERPRISE:
INNOVATION
2018



Continuing professional development (CPD) is the regular maintenance, improvement and broadening of your knowledge and skills, to maintain professional competence. It is a requirement of CIBSE and other professional bodies.

This *Journal* CPD programme can be used to meet your CPD requirements. Study the module and answer the questions on the final page. Each successfully completed module is equivalent to 1.5 hours of CPD.

Modules are also available at www.cibsejournal.com/cpd



Dynamic thermal simulation for the evaluation of building ventilation solutions

This module considers the application of evolving dynamic thermal simulation software tools and their use in the assessment of building ventilation solutions

The development of dynamic thermal simulation software has enabled building systems designers to carry out detailed modelled simulations and, ultimately, move towards increasingly accurate replications of predicted performance of buildings before their construction.

As discussed at length in CIBSE AM11¹ *Building performance modelling*, when setting up a modelling capability, the choice of software is important. The software selected and appropriate training of staff require significant resource, so the choice of simulation tools will be a strategic decision. Factors influencing the decision include: the software pedigree; validation; integration with other software; computer requirement; user-friendliness; training required; support; and so on. CIBSE AM11 provides a checklist to assist such decision-making, including guidance on the type of software that may be appropriate, as in Table 1.

'Steady state' calculations are typically carried out for 'rule of thumb' checking or to evaluate early-stage design parameters operating on a typical 'summer day' or 'winter day'. These may be undertaken with spreadsheet tools or simple load-calculation software tools and analytical models (such as the CIBSE Admittance Method²). Such methods are limited by the assumed simplifications of the internal and external parameters, as well as their inability to dependably consider antecedent operating periods.

In contrast, by carrying out a full dynamic thermal simulation, a user is able to model a whole year (and beyond) by employing data from a site-specific weather file across an unbroken period of time – which could potentially span years of simulation – broken into step lengths of minutes. Basic weather data files are available for many areas in the world³, while more detailed CIBSE weather files⁴ are available for 14 UK locations, based on weather data obtained by the UK's Meteorological Office. Each CIBSE weather file integrates data measured over a 30-year period, between 1984 and 2013, to provide a reliable representation for each location. CIBSE has also published a series of predicted future weather files for 2020, 2050 and 2080.

These have been based on climate-change projections and can allow designers to carry out simulations using the predicted future weather scenarios.

Practical considerations in systems assessment

As highlighted in AM11, it is important that the user appreciates the models are a simplified – and possibly idealised – view of the real world, regardless of apparent complexity and the inferred precision in the output data and graphics. The quality and level of detail of the input data – including any assumptions – are fundamental to the value of the output. Wherever there is uncertainty in the input values, it is prudent to undertake some sensitivity analysis on the output by adjusting the input range to account for the possible input variance. So, for example, occupants are unlikely to operate a building exactly as assumed in the model and, despite employing appropriately sourced weather data, the external conditions assumed for energy modelling will not represent a real year of operation. Also, because of the differences in employed methods, outputs from different models are unlikely to completely coincide. >>

		Design question						
		Risk of overheating	Size of openings for natural ventilation	Local plant sizing	Central plant sizing	Energy demand	Renewables	Part L compliance
Concept	Dynamic thermal modelling CIBSE steady state and admittance methods BRE environmental design manual	Rules of thumb CIBSE AM10 Computational fluid dynamics	CIBSE steady state and admittance methods Dynamic thermal modelling	Rules of thumb Dynamic thermal modelling	Benchmarks Dynamic thermal modelling	Rules of thumb London Renewables Toolkit Dynamic thermal modelling	SBEM Dynamic thermal modelling	
Scheme	CIBSE steady state and admittance methods Dynamic thermal modelling	CIBSE AM10 Computational fluid dynamics	CIBSE steady state and admittance methods Dynamic thermal modelling	CIBSE steady state and admittance methods Dynamic thermal modelling	Dynamic thermal modelling	Dynamic thermal modelling	SBEM Dynamic thermal modelling	
Detail	Dynamic thermal modelling	CIBSE AM10 Computational fluid dynamics	CIBSE steady state and admittance methods Dynamic thermal modelling	CIBSE steady state and admittance methods Dynamic thermal modelling	Dynamic thermal modelling	Dynamic thermal modelling	SBEM Dynamic thermal modelling	

Table 1: Examples of design questions and suggested type of software to apply at various design stages (Source: CIBSE AM11)

» Throughout the non-heating season, adaptive thermal comfort considerations mean that the acceptable temperature limits vary, based upon the external air temperature. The CIBSE weather file can supply the variable adaptive temperature limit, so by undertaking dynamic thermal simulation, a user is able to analyse the performance of their building – or the sizing of the ventilation and cooling systems – against the variable adaptive temperature limit, as illustrated in the example model output in Figure 1.

Although a ventilation system is more likely to be designed to operate during occupied periods of the day, the unoccupied periods can impact significantly on the room conditions, and this can be readily taken into account with dynamic thermal simulation. Examples of where dynamic simulation can give essential insight could be perimeter rooms with a large amount of external glazing, or university IT rooms where computers may be left on 24 hours a day. Normally, with the use of summer night-time cooling, the ventilation system would remove any vitiated air to ensure that the room is ready for occupation at the start of the following day. However, where a large amount of IT equipment is left on overnight – and particularly during periods when external air temperature remains in the mid-20°Cs – it may not be possible to fully dissipate the internal heat gains. With the use of a dynamic thermal simulation, it is possible to model the effects of these heat gains during the unoccupied periods. For example, scenario modelling can be done to determine the influence of varying the accessible thermal mass of the room, or to assess the impact of an urban location on the potential designs to optimise opportunities for night-time cooling.

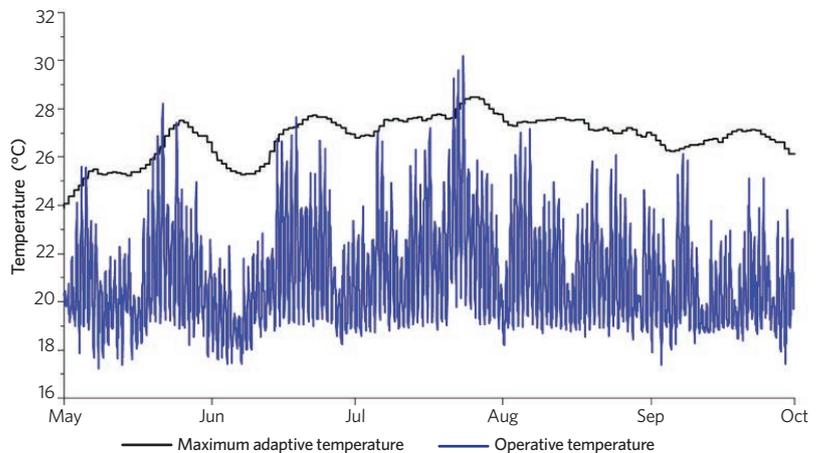


Figure 1: Example of modelled operative temperature and recommended maximum adaptive temperature, as derived from the CIBSE weather data (Source: Monodraught)

Such simulation may well require the linking of computational fluid dynamics (CFD) software with the thermal simulation tool.

Design complexity

A key advantage with dynamic thermal simulation software is the ability to alter readily the level of granularity that a user can apply to the modelling. Taking occupancy profiles as an example, these are formed by creating daily profiles, which are combined to offer a weekly profile and, in turn, used to determine an annual profile.

At its extreme, it would be possible for a user to create a different varying daily profile for every single day of the year. A practical example that might justify such detail is an assembly hall in a primary school. It is likely that this could be used, for example, for: assemblies of 30 minutes with the whole school; a single class doing PE; lunchtime dining; after-school activities; special school events; or local community events during evenings or at the weekend.

Another common challenge is assessing, effectively, the coincidence of separate peak loads in a model – such as maximum theoretical occupancy, peak period of solar gain, or peak lighting and equipment gains – that may occur simultaneously only occasionally during the year or for short periods of time. So, instead of just assessing the room based upon a (possibly very rare) worst-case scenario – which could lead to over-engineering of the scheme – dynamic simulation can be used to examine the typical room use and the occasional peak room use, with both being incorporated into one model. The peak load could then, for example, be applied to the room once

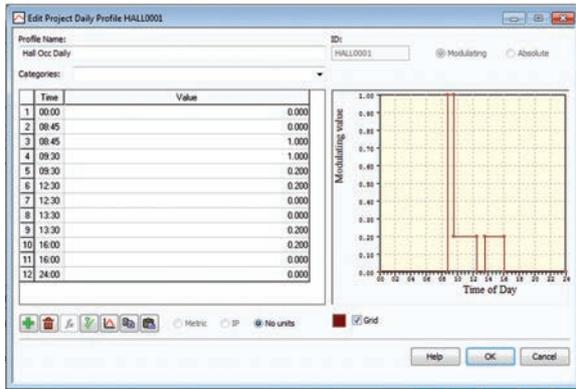


Figure 2: Example of occupancy profiles, as defined in a simulation mode (Source: Monodraught/IESO)

a week, once a month, or even for a couple of consecutive days during periods when external conditions are most extreme.

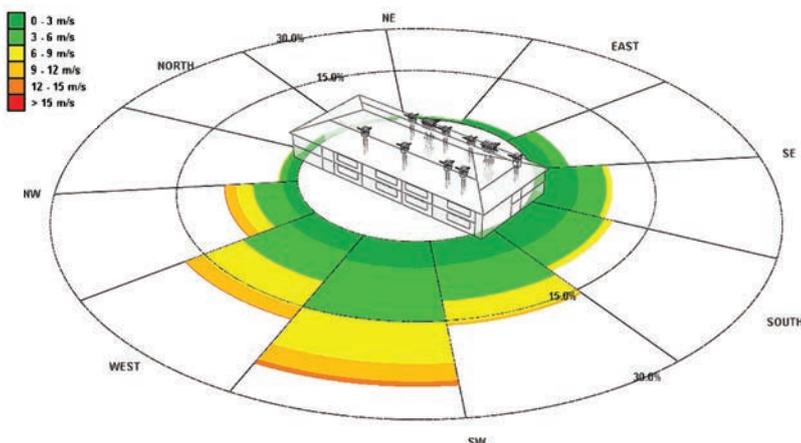
Key concerns when assessing the potential performance of natural ventilation systems is how a system will operate to supply fresh air when there is no external wind, and what is likely to happen during a hot summer's day. Dynamic simulation, using appropriate detailed weather files, can usefully be applied to examine these worst-case scenarios. With a steady-state calculation, the sizing of the natural ventilation systems is typically based on specific conditions, such as the external and internal temperature difference, a conservative wind speed value and a specific wind direction. However, when employing a dynamic simulation, it is a common misunderstanding that natural ventilation is simply just applied as a set ventilation rate (for example, $8L\cdot s^{-1}$ or $10L\cdot s^{-1}$ per person), on the assumption that a natural ventilation system or opening will provide this requirement. However, as indicated in Figure 3, wind data and the coincidence of particular values will vary widely across the year. Dynamic simulation allows rooms on different aspects of the building to be modelled against the variable wind direction without the constraining assumption that the notional 'prevailing' wind will be the dominant design criteria. This will probably determine that rooms located on different aspects of a building, although identical in form and openings, will experience very different levels of ventilation throughout the year, so giving the opportunity to design and select natural ventilation systems and openings appropriately.

Post-occupancy evaluation

Dynamic thermal modelling can also be applied to as-built simulations, and link in with post-occupancy evaluations. The design-stage model that was simulated against a predicted weather file before the construction of the building can then be simulated against the real-life weather file data. For example, the Meteorological Office collects data from more than 3,600 locations around the UK, and the data from a desired period of time can be collated into a weather file suitable for running a dynamic simulation. This type of simulation offers opportunity for post-occupancy commissioning, and generates diagnostic data and improves understanding that can usefully be employed in future designs.

Both passive and active building ventilation systems are increasingly likely to include integral data logging and recording facilities that also communicate with the

Figure 3: A wind-rose representation indicating the frequency (by the radial length) of wind direction and speed (by colour) for a particular site (Source: Monodraught/IESO)



building management system. At its simplest, these can provide critical information for those responsible for maintaining and servicing the equipment to analyse, troubleshoot and improve the installed system performance. But this data can also be used to compare the performance of the design simulation against the recorded building performance data. As with all modelling exercises, there will inevitably be variations between the modelled and real data. However, should there be a large variation between the results, more advanced analysis and assessment can follow to improve the system design and operation. Factors that typically cause such differences include: how a room is actually used compared with what was assumed at the design stage; variations in the type of construction materials and fabrication methods; and control issues with the operation of the heating or ventilation systems.

The future of dynamic simulation

Simulation models are developing swiftly to allow even non-expert users to undertake holistic analyses of whole buildings, as well as more extensive simulations of estates and cities. Data collected from increasingly ubiquitous sensors – including those supplied as part of manufacturers' equipment – give opportunities to identify periods where buildings or individual systems may not be performing as they have been designed, which, in turn, may affect the adjacent room, space or building. Aside from identifying and assisting in resolving problems, the ability to integrate real-life performance data into a dynamic simulation can allow designers and manufacturers to develop and improve their systems. For example, this data could be used to identify periods when ventilation systems may be supplying too much – or too little – airflow, and then dynamic simulation can be undertaken to further optimise the system design.

Although able to provide useful interpretations of real-world building systems, dynamic simulation software is still far from mature. It will continue to develop with, for example, quantum computing capability and more effective simulation algorithms; improved understanding of the built environment and elemental performance; accumulated feedback from installed equipment and systems; and the increased use of artificial intelligence. When coupled with the enhanced simulation outputs using augmented and virtual reality techniques, there will be unprecedented opportunities to properly understand – and advance – the effective operation of real building systems.

© Tim Dwyer, 2018.

Turn to page 58 for references.



» Module 129

July 2018

1. Which CIBSE Application Manual provides the most extensive guidance on building performance modelling?

- A AM10
- B AM11
- C AM12
- D AM13
- E AM14

2. At the concept stage of the project, which of these tools (among others) does CIBSE recommend to examine the risk of overheating?

- A Benchmarks
- B Dynamic thermal modelling
- C London Renewables Toolkit
- D Rules of thumb
- E SBEM

3. In the illustration of the example modelled operative temperature, which month included the most days on which predicted operative temperature exceeded adaptive temperature?

- A May
- B June
- C July
- D August
- E September

4. Which of these is noted as potentially being needed to link in with dynamic thermal simulation when assessing more complex scenarios such as night-time cooling?

- A Admittance method
- B Artificial intelligence
- C Computational fluid dynamics (CFD)
- D Rules of thumb
- E SBEM

5. Approximately how many observation locations are used by the Meteorological Office in the UK for monitoring weather?

- A 600+
- B 1,600+
- C 2,600+
- D 3,600+
- E 4,600+

Name (please print)

Job title

Organisation

Address

.....

.....

Postcode

Email

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

The CIBSE Journal CPD Programme

If you would like to receive information about Monodraught, the sponsor of this CPD module, please tick here:

By entering your details above, you agree that CIBSE may contact you with information about CPD and other training or professional development programmes, and about membership of CIBSE, if you are not a member.

Go to www.cibsejournal.com/cpd to complete this questionnaire online. You will receive notification by email of successful completion, which can be used to validate your CPD records. Alternatively, fill in this page and post it to: N Hurley, CIBSE, 222 Balham High Road, London, SW12 9BS

References:

- 1 CIBSE Application Manual, AM11 *Building performance modelling*, CIBSE 2015.
- 2 CIBSE Guide A, *Environmental design*, CIBSE 2015.
- 3 <https://energyplus.net/weather> - accessed 9 June 2018.
- 4 www.cibse.org/weatherdata - accessed 9 June 2018.





**YOUNG
ENGINEERS
AWARDS
2018**



CIBSE Employer of the Year 2018

**ENTER
NOW**

Tell us your story...

The annual CIBSE Employer of the Year Award is open to any organisation that pro-actively champions young people in the building services sector.

For more information visit:
cibse.org/employer-award

Email completed entry forms by Wednesday
1st August 2018 to yea@cibse.org

www.cibse.org/yea



Chartered Institution of Building Services Engineers
222 Balham High Road, London, SW12 9BS
CIBSE is a registered Charity No. 278104

Supported by:



Sponsored by:



PRODUCTS & SERVICES

✓ Dunham-Bush fan convectors for historic cultural venue

Middlesbrough Town Hall has undergone a £7.7m restoration recently. The challenge for DTA Consulting Engineers, was to design a heating system for the main hall that would deliver the most ecological and efficient heating.

Dunham-Bush Series BM7 reverse airflow chassis fan convectors - with high-output, low water content WA3 coils - were selected to meet the requirements at stage level in the main concert hall, which can seat 1,420 people.

■ Call 023 9247 7700, email info@dunham-bush.co.uk or visit www.dunham-bush.co.uk



CREDIT: IAN GRUNDY

✓ Luceco scores at Al Jazira Club

A football club in Abu Dhabi has had its public areas relit by Luceco and energy partner Gargash Lighting Systems. The design brief included energy efficient, low-maintenance lighting, that would provide Al Jazira Club - which plays in the UAE Arabian Gulf League - with cost savings, while enhancing the overall experience at the stadium.

Carbon Downlights were installed in corridors and lounges, replacing compact fluorescent downlights and offering running cost savings of more than 60%. Designed to retrofit ceiling cut-outs of common compact fluorescent downlights, the Luceco Carbon is supplied with interchangeable bezel options.

The required reduction in energy consumption meant LED LuxPanel luminaires were installed throughout other facilities, including the players' massage area. Cost-effective and energy efficient, they give more than 50,000 hours of illumination without maintenance and are easy to install using plug-and-play drivers.

■ Call 01952 238100, email uk_sales@luceco.com or visit www.luceco.com



Terminal takes off with Grundfos ✓

Since 2015, Aberdeen Airport has been working on a masterplan to enhance its passengers' experience.

Some of this work, which is part of a £20m terminal transformation, is obvious to the three million people who travel through the hub every year. The new baggage-reclaim areas, for example, and the upgrades to the infrastructure itself.

Grundfos has supplied pumps from its TP, MAGNA3 and UPSN circulator pump families, which are at heart of the airport's mechanical and electrical (M&E) solution. They provide the pump requirements to support all HVAC and hot-water supply (HWS) needs within Aberdeen's new terminal.

To achieve the best outcome, Grundfos worked with consultants WSP and installers Richard Irvin Energy Solutions to ensure every step of the process met the ambitions of this far-seeing project, which is due to be completed in 2019.

■ Call 01525 850000 or email grundfos-uk@sales.grundfos.com



◀ Bob Smith bolsters Hamworthy Heating's Yorkshire sales team

Boiler manufacturer and hot-water specialist Hamworthy Heating has welcomed Bob Smith to its sales team for South and West Yorkshire, including Sheffield and Leeds.

Smith started in the heating sector at LIFF Industries, before moving onto Indux. He later specialised in mechanical chimney draft at Danish manufacturer Exhausto and Docherty Chimney Group. For the past 10 years, Smith has been a sales representative at A O Smith, as well as a continuing professional development specialist in commercial solar thermal solutions.

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

✓ Nortek's ErP-ready range

Nortek's ErP-compliant range includes the PREEVA EC (heating and ventilation unit), for combined heating and ventilation with optional cooling.

Units are available as non-condensing heaters with thermal efficiencies above 91% or as fully condensing heaters with thermal efficiencies of 102% (ncv). The design combines high thermal efficiency, quality components and ease of maintenance. An EC plug fan provides a wide range of air duties and external static pressures, while the optional mixing box enables air filtration.

■ Email erp@nortek.com or visit www.nortekhvac.com



▶ Insulduct launches phenolic foam wraparound insulation for spiral ducting

Insulduct has launched a phenolic foam wraparound insulation for spiral ducting. Insulduct is an approved Kingspan delivery partner, with specialist machinery to produce the grooved Kooltherm panels that can be formed into a circular duct wrap with associated bends and tees.

Kooltherm requires only half the thickness of conventional foil-faced mineral insulation to conform with BS 5422. Kooltherm FM duct insulation, and its rigid thermoset insulation core, are Class 0, as defined by Building Regulations 73.

■ Call 0208 800 0124



Genesis Biosciences extends probiotic cleaning range to empower consumers

Genesis Biosciences has made its innovative products available to everyone by launching its probiotic cleaning range on Amazon.

Specialising in beneficial bacteria fermentation, the Wales-based global biosciences firm is the first company to develop, manufacture and offer both microbial and antimicrobial products.

The strategic decision to make the Evogen Professional range available to the wider public is seen as a positive move.

Genesis Biosciences' mission is to deliver responsible cleaning agents - free of damaging chemicals - that are sustainable for both users and the environment.

■ Visit www.genesisbiosciences.co.uk



New Evinox online tool helps designers with HIU specification

Evinox has launched the ModuSat heat interface unit (HIU) online selector. This intuitive tool is available via the Evinox Energy website and recommends the ideal HIU for a district or communal heat network development, based on project parameters entered by the user.

With more than 15 years' experience in the design and manufacture of interface units for heat-network systems, Evinox created the selector with M&E consultants in mind.

It is designed to be easy to use and can help with sizing and selection, while saving specifiers valuable time.

'This unique new tool is an extension of the Evinox Heat Network Design Guide that is used by many M&E consultants in the UK,' said Helen Gibbons, Evinox technical and design manager.

As well as the functionality detailed, the user can save unit selections and calculations for each project, and come back at any time to access or edit them.

■ Call 01372 722277 or visit www.evinoxenergy.co.uk or www.evinoxresidential.co.uk

New collection for Swegon's Air Diffusion range

Swegon has added the Ceiling Collection to its Air Diffusion product range. These diffusers have been designed with all parties in mind, to ensure they are simple to install and provide a comfortable environment.

The diffuser's faceplate discs can be rotated easily to change spread pattern without affecting airflow, pressure drop or sound level - something that often leads to system imbalance and performance issues later in a building's life-cycle.

In addition, hinges that clip into the diffuser's backing box enable easy access inside the ductwork and allow for simple replacement of the faceplates - which is very convenient for an operator when standing on a ladder.

The ALS commissioning box has a unique design that aids installation. It can be rotated 360 degrees, increasing the installation possibilities. Its perforated interior reduces the level of sound generated in the ductwork, so is an ideal choice for spaces where noise disturbance needs to be kept to a minimum.

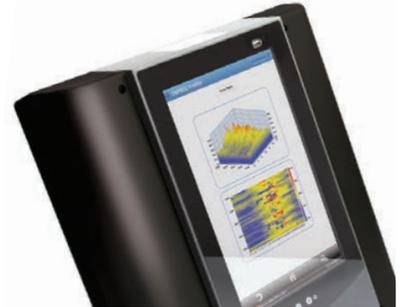
■ Call 01746 761921, email sales@air-diffusion.co.uk or visit air-diffusion.co.uk/ceiling-collection



Open protocols and energy management with RDM's DMTouch

DMTouch, the powerful control system front-end from building controls and remote monitoring specialist Resource Data Management (RDM), gives users the ability to communicate across open protocols to incorporate existing infrastructure. With built-in energy-monitoring features, it can also facilitate due diligence at a local level, without the need for additional software solutions. The time taken by users to interrogate and analyse data is dramatically reduced, while user experience and interactions are heightened, simplifying the energy management process.

■ Email hello@resourcedm.com or visit www.resourcedm.com



Kingspan KoolDuct achieves lasting results at national library



More than two decades after it was first installed, the Kingspan KoolDuct system is still delivering excellent thermal comfort, humidity control and ventilation performance at Llyfrgell Genedlaethol Cymru - the National Library of Wales.

The system was fitted during construction of the Third Library Building in 1995, when the HVAC specification took full advantage of its slimline design. No issues and no relevant maintenance have been recorded with the ductwork, and a recent inspection showed that the system was in good condition.

■ Call 01544 387 384, email info@kingspaninsulation.co.uk or visit www.kingspaninsulation.co.uk

AET's underfloor air conditioning upgrade for London agency

AET Flexible Space has completed a full upgrade of the underfloor air conditioning system on the 26,000ft² first floor of 16-18 Kirby Street, London, occupied by creative agency 7Fold. The CAM-C downflow units were retained, but the AC fans were changed out for new high-efficiency EC fans. Fantiles were cleaned and relocated, and an additional 12 units supplied to cater for increased cooling loads anticipated by the client.

■ Call 01342 310 400 or email aet@flexiblespace.com



Daikin Applied UK expands its 'Bluevolution' range by introducing new chiller series with R-32 refrigerant



Daikin Applied UK has introduced a new generation of air-cooled scroll chillers with refrigerant R-32.

The EWAT-B range will be available for cooling only and heat-recovery applications from 80kW to 700kW cooling capacity at nominal conditions.

Compared with the previous R-410A range, the seasonal energy efficiency ratio (SEER) is improved by 10%. The chiller range also fully complies with the efficiency requirements of current European legislation (Ecodesign Lot21).

The global warming potential (GWP) of R-32 is 675, one-third of the commonly used refrigerant R-410A.

Choosing R-32 (chemical name difluoromethane) minimises the global warming impact of scroll compressor chillers thanks to the lower GWP, in combination with high energy efficiency.

■ Visit www.daikinapplied.uk and follow @DaikinAppliedUK on Twitter



Rinnai's infinity hot-water heating range ideal for LPG use

Rinnai offers an energy-efficient and cost-effective range of LPG-compatible, A-rated, eco-labelled continuous flow hot water heating products for any type of site or application.

The infinity range includes the 16i (36.8kW output, giving 16l of useable hot water per minute) and the 17e, for external mounting (29.7kW output, giving 17l of hot water per minute).

For heavy-duty applications, the Infinity HDC1600i/e produces the lowest NO_x emissions on the market – less than 20ppm NO_x.

■ Visit www.rinnaiuk.com



Awareness of the health risks of poor IAQ on the rise

UK consumers' awareness of the potential health impacts of poor indoor air quality (IAQ) is on the rise, according to a recent survey by BEAMA.

Vent-Axia offers ventilation solutions to improve IAQ for households. For new builds, its Sentinel Kinetic mechanical ventilation with heat recovery (MVHR) system boasts 94% thermal efficiency. For private refurbishments, Vent-Axia's Lo-Carbon Svava offers quiet, disturbance-free running, while Lo-Carbon Revive has been designed with social housing in mind, offering an effective ventilation solution for residents.

■ Call 0844 856 0590 or visit www.vent-axia.com

HygroMatik launches system, for condensation-free steam

Humidification equipment manufacturer HygroMatik has launched the DDS, an enhanced pressure-steam system for the production of condensation-free steam.

The DDS 20 and DDS 40 regulate air humidity to maintain a consistent atmosphere and is for environments that require controlled conditions, such as hospitals, galleries and clean rooms. They are available in stainless steel and mixed material, offering a steam output ranging from 180kg/h to 770kg/h. Compact and lightweight, flanged connections make it easy to install the DDS to an existing source of steam.

■ Visit <https://www.hygromatik.com/en/dds>



Mikrofill equipment top of the class at Shipston High School

Construction of a two-storey, stand-alone block at Shipston High School, Warwickshire, featuring nine classrooms, office space and a reception area, got under way in 2017. Adjacent to the existing school, it has been designed so staff and pupils can move around the site safely and easily.

Building services engineers Built Environment Consulting selected two Mikrofill Ethos 90kW stainless steel condensing boilers, with a Mikrovent low loss header and pressurisation package, to serve a radiant panel system and LST radiators. The boilers' combined modulation of 20 > 1 (180 > 9 kW) and NO_x levels of 33 mg/kWh far exceed legislative requirements.

The hot water is covered by an Extreme 200l loading cylinder, designed to maximise condensing boiler efficiency by operating at a Δt of 30°C. Coupled with an unvented kit, it can produce more than 2000 l/hr at 60°C.

■ Call 03452 606020 or visit www.mikrofill.com



Wieland lights and powers up 15 Bishopsgate

Wieland Electric has supplied a variety of its Gesis pluggable systems for the supply of lighting and power throughout 15 Bishopsgate, Grade A office space that forms part of the Tower 42 estate in London.

The Gesis system includes GST18 connectors that contain mechanical coding to prevent incorrect mating, and assist with quick and easy connection. It saves up to 70% in installation time and up to 30% in cost reduction.

■ Call 01483 531213 or visit www.wieland.co.uk

✓ Carry on caravanning with Rinnai hot water for every type of commercial site

Rinnai's HDC 1500e external unit, fuelled by LPG, has been installed at a caravan park and multi-activity centre in Herefordshire. The hot water was for very specific functions - the disabled, laundry and dog washrooms - and needed to supply more than 940l/hr at times of high demand. The unit has a maximum output of 54kW and weighs just 31kg.

The Rinnai 1500e unit was selected because of space and configuration constraints, and was installed on an external façade, with a pipe-cover box.

'SMART' controls for the secondary return DHW systems allow safe running of water at 42°C core temperature during the day and 60°C when the building is closed. By the time the building reopens, core temperature is 42°C.

Rinnai's HDC range offers condensing technology with up to 107% gross efficiency, ultra-low NOx of less than 20 ppm, an expansive modulation range of 59.5kW-2.8kW and flow rates of 37l/min.

■ Visit www.rinnaiuk.com



↑ Air Handlers Northern
 Alfred Procter House
 Bute Street
 Salford
 Manchester
 M50 1DU
 ■ Call 0161 745 8888,
 fax 0161 743 9190,
 email sales@airhandlers.net
 or visit www.airhandlers.net

✓ Dunham-Bush expands its fan convector range

Several new models have been added to the fan convector range of manufacturer Dunham-Bush.

The Smart-Vector will help maximise indoor air quality, particularly when Building Bulletin 101 is a requirement. It will be ideal for classrooms and offices, where the highest standards of air quality are needed for the wellbeing and productivity of the occupants. All models are available with EC motors and connectivity via BMS for increased controllability and comfort levels.

■ Call 023 9247 7700, email info@dunham-bush.co.uk or visit www.dunham-bush.co.uk



➤ DIRECTORY Your guide to building services suppliers

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

Air Handling

Manufacturer of high quality bespoke AHU's.
 Specialists in refurbishment and site assembly projects.
 Rapid delivery service available.

Aircraft Air Handling Ltd
 Unit 20, Moorfield Ind Est,
 Cotes Heath, Stafford, ST21 6QY
 Tel: 01782 791545 Fax: 01782 791283
 Email: info@aircraftairhandling.com Web: www.aircraftairhandling.com

Energy Efficiency

Ground Source Heat Pump Installations
 Meeting Renewables Targets

Tel: 02392 450889
 Fax: 02392 471319
www.groenholland.co.uk

Certificate Number MCS 1201 Heat Pumps

Air Conditioning

For total solutions in air-conditioning

E: info@clivet-uk.co.uk
 W: www.clivet.com
 T: 01489 572238
 W: www.versatemp.co.uk

Heating & Hot Water Specialists

PRACTICAL, EFFICIENT & SUSTAINABLE BUILDING SERVICES SOLUTIONS

- BESPOKE SYSTEM DESIGN
- COMBINED HEAT & POWER
- HEATING & HOT WATER
- PACKAGED PLANT SOLUTIONS
- MAINTENANCE & SERVICE PLANS

T: 01252 551 540
 W: <https://adveco.co/>
 E: enquiries@adveco.co/

CIBSE JOURNAL

To advertise here, contact Callum Nagle on 020 7880 6217 or email: callum.nagle@redactive.co.uk

b-a-r beebey anderson recruitment

For further information and to apply, please call us on **+44 (0)203 176 2666** or email **cv@b-a-r.com**

Mechanical Design Engineer

London, £35k - £45k + bens

Technically exceptional and practical hands-on engineer is required for a medium-sized, privately owned building services consultancy. They have a renowned reputation for delivering national frameworks, large retail, commercial, residential, leisure, and hotel projects. Their reputation has been built on constantly delivering high-quality designs, as a result most of their projects come from repeat business and highly regarded referrals. Ref: 5041

Lead Electrical Engineer

Greater London, £55k - £60k + bens

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

Intermediate Electrical

North London, To £38k + bens

I am working on behalf of a nationally renowned multidisciplinary consultancy looking to strengthen their electrical offering due to a growing workload. With at least 4 years' consultancy experience in a client facing role, you will work on London's biggest master planning schemes, high spec residential projects, prestigious hotels, and district heating schemes. An exceptional benefits package offered. Ref: 4997

Contract Mechanical Engineer

London, £42p/h

A CIBSE accredited design consultancy are looking for a degree qualified (preferably chartered) senior mechanical engineer to assist them on a large mixed-use development in London. This assignment will last a minimum of six months. Ref: 5019

Senior Electrical Design Engineer

Central London, £42 p/h

Due to continued success our client a prestigious multi-disciplinary consultancy has a need for a building services electrical engineer. You will assist the electrical team working on a portfolio of large scale entertainment & leisure projects UK wide. This is a long-term contract (HV experience essential). Ref: 4960

Senior Electrical Engineer

London, £45k - £55k + bens

With an iconic portfolio of projects across the globe, an award-winning and highly commended multi-disciplinary consultancy who have built an enviable reputation for their pioneering work and talented team of engineers are looking to secure a gifted and ambitious electrical engineer. They work on a diverse project list including art & leisure, scientific, urban developments, commercial, and education schemes. Ref: 5041

Thinking of your future

www.b-a-r.com



**CIBSE
Benevolent
Fund**



How you can help us

The CIBSE Benevolent Fund is made possible by voluntary donations from Members. It is a service provided by Members, for members.

There are several ways you can help the work of the CIBSE Benevolent Fund.

Simply:

- Pay the voluntary contribution along with your annual CIBSE membership subscription
- Write a cheque payable to the CIBSE Benevolent Fund, return to CIBSE, 222 Balham High Road, London, SW12 9BS
- Set up a regular standing order or direct debit (please email benfund@cibse.org)

- Remember the Fund in your will
- Run a local fundraising event – talk to your local Almoner: www.cibse.org/CIBSE-Benevolent-Fund/Almoners

Thank you

"I would like to take this opportunity to thank CIBSE members for their continued support, without which the work of the Benevolent Fund could not be sustained."
– David Wood, Chair of the CIBSE Benevolent Fund Trust.

www.cibse.org/cibse-benevolent-fund



2017 Graduate of the Year finalists

Tony Thomas

Serving up a legacy

As part of its 70th anniversary celebrations, The Rumford Club launched a charitable initiative, R70L. Vice-chair Tony Thomas explains what it entails

The Rumford Club, a private dinner debate club for the building services and built environment, was formed in 1947 to address technical topics around air movement and air conditioning. Since then, it has broadened its view of subjects, covering all aspects of the building engineering services sector. In 2017, the club marked its 70th anniversary and, to celebrate, it launched the Rumford 70 Legacy initiative – R70L. This gives financial aid and technical expertise to an adopted school under the Design, Engineer, Construct (DEC) learning programme, which delivers GCSE-level qualifications specifically for the built environment.

Seventy years is a long time – how did The Rumford Club start?

A small group of senior managers came together over dinner in 1947, to discuss the many issues and concerns facing the building services engineering (BSE) sector after the war. They initially discussed technical concerns, such as air movement and air conditioning. The club takes its name from Count Rumford, who became a Fellow of the Royal Society and received acclaim for his design of domestic fireplaces. Its patron is Lord Redesdale of Redesdale.

What do members gain from joining The Rumford Club?

Members enjoy debating a wide range of current issues affecting the sector in convivial surroundings. The club invites prominent guest speakers from across the sector, which is key to the success of the dinners. Members invite guests to enjoy the evening and participate in the discussions, particularly in their area of interests.

The Rumford Club awards bursaries each year to the second- and third-placed CIBSE Graduate of the Year. The club chair presents cheques of £600 and £300 respectively to the runners-up at the Institution of Mechanical Engineers event, and the recipients are invited to report at a future club dinner.

Any late dinner cancellations are offered to young engineers through the Young Engineers Network. This encourages young professionals to become members.

Why has the club created the Rumford 70 Legacy?

Members wanted to mark the club's 70th anniversary with a legacy initiative that positively addressed an industry concern by engaging directly with the membership. The Rumford Club agreed to 'adopt a school' through Class of Your Own and

entrusted the coordination and management of this to a newly formed charity, Rumford 70 Legacy, now R70L.

The club pledged £4,000 towards the £12,000 required for the scheme, with an additional gift of £250 to assist with R70L's incidental administrative costs. The remaining £8,000 required for the legacy initiative will be raised by the R70L charity through various fundraising activities.

How does the charity support the students and schools?

Schools wishing to offer the Design, Engineer, Construct (DEC) qualifications at Levels 1, 2 and 3 (Level 3 relates to A Levels) require the active involvement and support of employers. This DEC qualification – approved across England, Wales and Scotland – offers knowledge and expertise specifically designed for the built environment.

R70L supports the school by organising guest lectures by industry specialists from across all construction engineering disciplines. It also offers access to live projects and industry environments – for example, a visit to BSRIA to witness some of the imaginative projects being undertaken.

R70L provides short industry work placements for teachers and supports them through mentoring. The charity also supports the provision of work placements or shadowing days for students, to inspire and raise their awareness of career opportunities across the construction engineering sector.

The school chosen is Norbury Manor Business and Enterprise College, for girls aged 11-16; the sixth form has a mixed entry.

The Rumford Club sounds a little exclusive – is it open to everyone?

It is a private dining and debating club open to all professional people closely involved in the building services engineering sector. The club has a desire to represent contracting, consulting and academia by active promotion across the BSE sector.

Does the club have any other initiatives planned?

The club is dynamic and each chair brings a fresh style and priorities, so any further initiative will be led by the chair, supported by The Rumford Club executive and members.

■ **TONY THOMAS** is vice-chair at R70L

NATIONAL EVENTS AND CONFERENCES

9th Symposium on Lift and Escalator Technologies 19-20 September, Northampton

With keynote speaker Dr Bryan Laubscher, of the International Space Elevator Consortium (ISEC), which promotes the development, construction and operation of space-elevator infrastructure. Dr Laubscher will also give a talk on the evening of 18 September, hosted by the University of Northampton. <https://liftsymposium.org>

CIBSE TRAINING

For details, visit www.cibse.org/training or call 020 8772 3640

Air conditioning inspection for buildings 3 July, London

Practical project management 3 July, London

Emergency lighting to comply with fire safety requirements 4 July, London

Low carbon consultant building operations 4-6 July, London

Gas safety regulations 6 July, London

Energy Savings Opportunity Scheme 10 July, London

Designing water-efficient hot and cold supplies 11 July, London

Mechanical services explained 11-13 July, Manchester

Low carbon consultant design training 12-13 July, London

Overview of current fire legislation and guidance 13 July, London

Building services explained 17-19 July, London

Energy efficiency building regulations 17 July, London

Fundamentals of digital engineering 19 July, London

Energy surveys 2 August, London

Below-ground building drainage 3 August, London

ISO 50001: 2011 Energy management systems 29-31 August, London

Mechanical services explained 11-13 September, London

Overview of IET wiring regulations 14 September, London

Low carbon consultant design training 17-18 September, London

Fire risk assessment to PAS 79 18 September, London

Earthing and bonding systems 20 September, London

Energy efficiency building regulations 21 September, London

Heat networks code of practice 25-26 September, London

Surface water-source heat pump systems – an introduction 25 September, London

Surface water-source heat pump systems – implementing 26 September, London

Building services explained 26-28 September, Birmingham

Power system harmonics 27 September, London

Introduction to Heat Networks Code of Practice 28 September, London

Gas safety regulations 28 September, London

CIBSE GROUPS, SOCIETIES AND REGIONS

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

South West: Charity pub quiz 4 July, Bristol

Organised by YEN committee and sponsored by Hydrotec.

CIBSE closing date surgery 5 July, London

Member applicants for 1 August closing date can book a 20-minute slot with a CIBSE interviewer to discuss the draft

engineering practice report and the interview process.

YEN South Wales: Electric vehicle charging 5 July, Cardiff

Presentation from Schneider Electric.

HCNW: Work, career and inclusivity: collaborative working 11 July, London

Continuing the region's soft-skills programme, with this event focusing on: interacting and communicating more clearly with colleagues; how to resolve conflicts; and how to contribute to building high-performing teams.

West Midlands: Social – speed hill climb 14 July, 4 August and 25 August, Alberbury

Social to watch speed hill climb at Loton Park.

SoPHE: Aluminium multi-layer pressfit systems 18 July, Manchester

Society of Public Health Engineers technical evening.

HVAC Systems Group: Future technologies in HVAC engineering 19 July, London

With rapidly changing customer demands, technological development and sustainability issues, HVAC solutions need to respond accordingly. The evening gathers together seven experts to speak about seven, rapidly moving technology areas, followed by an open discussion.

SFE City walk and lecture 25 July, London

Society of Façade Engineering city walk and lecture, with Pritesh Patel, of AHMM, and Anri Doda, of Patrick Ryan Associates.

South West: YEN summer social 27 July, Bristol

With a cruise along Bristol Harbour.

Northern Ireland: Golf outing 2 August, Bangor

At Clondeboye Golf Club.

CIBSE application workshop 4 September, London

A workshop designed to help applicants with their engineering practice report for Associate and Member applications.

HIGHLIGHTS



Chris Twinn, of Twinn Sustainability Innovation, at the HVAC Group on 19 July



Anri Doda, of Patrick Ryan Associates, at the SFE city walk on 25 July

Build2Perform Live 27-28 November, London

CIBSE is hosting its fifth Build2Perform Live exhibition and seminar at Olympia, London, in November. The free-to-attend event focuses on three key themes in 2018 – design, deliver, and perform.

Last year, 180 speakers – including Dr Robin Pender (pictured) – presented more than 70 hours of CPD content across seven theatres.

The programme for 2018 is just being finalised, and is due to be announced in early July, but visitors can expect sessions that focus on changes to legislation and the most critical issues facing today's built environment professionals. Attendees will learn from the most innovative and influential practitioners in the industry, and discover some of the most cost-effective solutions for delivering building performance.

More than 60 exhibitors are expected, and the exhibition area will feature major manufacturers and suppliers from the building services engineering sector. They will be showcasing best practice in building performance and demonstrating the latest products and innovations.

For more information and to register, visit www.build2perform.co.uk



Dr Robin Pender

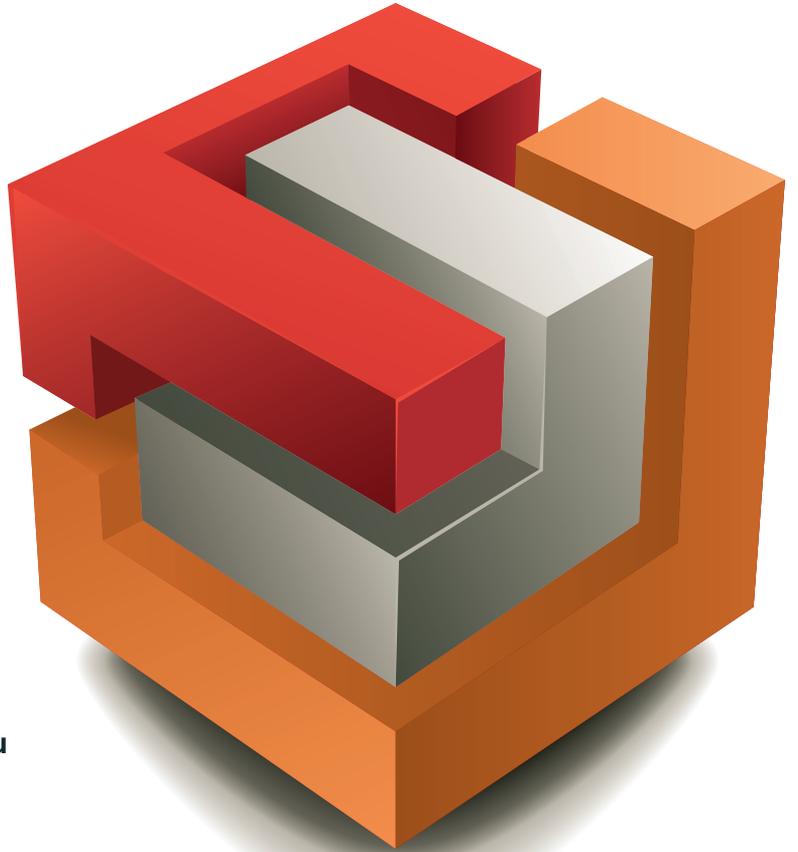


**BUILD2
PERFORM**
27-28 November 2018
Olympia London

**DESIGN.
DELIVER.
PERFORM.**

**5 reasons to register
your interest today:**

- **Free to attend**
Get ahead of the game and be the first to find out about the new programme line-up and to secure your place at the event.
- **70 hours CIBSE CPD available**
All sessions at Build2Perform Live provide CIBSE CPD. The Engineering Council requires CPD records be submitted from January 2019, make sure you are ready.
- **Leading Suppliers to the sector**
60+ Suppliers, manufacturers, consultants and advisors will be on hand to answer questions, discuss solutions and help maximise your time at the event.
- **Practical 'takeaways'**
the programme is built around providing you with both inspiration and practical knowledge to take away and use in your business.
- **Multiple seminar streams relevant to you**
There will be dedicated presentation areas with specialist speakers covering a wide range of subjects invaluable to built environment professionals.
- **2 CPD theatres**
Platinum & Gold exhibitors, will be delivering valuable CIBSE accredited CPD presentations.



Register your interest now at
www.cibse.org/Build2PerformLive

Supported by



Headline Theatre Sponsors



Parallel Support and Learning



Media Partner



Networking Area Sponsor



CMR

in complete control

CMR Controls manufactures low air pressure and air volume measurement sensors and control systems for standard air conditioning, clean rooms, sterile laboratories, containment facilities, and fume cupboard extract systems.

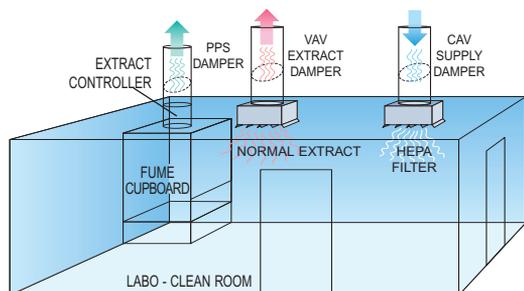


DPM PRESSURE SENSOR

Panel Mount Pressure or Velocity Transducers with remote alarms, analogue and digital interfaces. Traceable calibration certificates supplied as standard.

AIR MANAGEMENT SYSTEM

A complete turn-key system to control room pressure to +/-1Pa. Fume cupboard face velocity to 0.5m/s at high speed and provide constant air changes into the labo - clean room.



DPC CONTROLLER

Fast and accurate controls to drive high speed dampers or invertors. Full PID stand alone controls with BMS interface.

CAV AND VAV DAMPERS

Accurate air flow measurement with the unique CMR Venturi built into the airtight shut-off damper to control room pressure or constant volume.



Metal Damper

PPS EXTRACT DAMPER

Poly-propelene control and shut off valve incorporating the CMR Venturi Nozzle. This is essential when dealing with corrosive extract air especially from fume cupboard systems.



PPS Damper

PRECISION COMPONENTS FOR VENTILATION AND PROCESS CONTROL

CMR CONTROLS

A Division of C. M. RICHTER (EUROPE) LTD

22 Repton Court, Repton Close,
Basildon, Essex SS13 1LN. GB
Website: <http://www.cmr.co.uk>

Tel: +44 (0)1268 287222
Fax: +44 (0)1268 287099
E-mail: sales@cmr.co.uk

