

JOURNAL CIBSE



The official magazine of the Chartered Institution of Building Services Engineers

July 2013

TEAM PRINCIPLE

How construction benefits from a diverse workforce

THE WAY AHEAD

CIBSE Presidents tackle industry challenges

NEXT LEVEL

British Land raises carbon targets after cutting energy use by 38%

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Work in progress

There is a 'fair way to go' before a truly diverse workforce is achieved in the building services industry.

That is the opinion of Buro Happold's head of inclusive design, Neil Smith, who says the lack of diversity means industry is missing out on new ideas and good quality staff.

The situation is changing – the Disability Discrimination Act and Equality Act have encouraged more diversity, says Smith, and the number of female members of CIBSE is steadily climbing, albeit from a fairly low base of 844 in 2008 to 1,501 now.

Encouraging more people into engineering from all sectors of society isn't just the right thing to do, it's vital if engineering is to avoid an acute skills shortage. There will be an annual shortfall of about 40,000 skilled engineers up to 2020, according to EngineeringUK.

The changing demographics of the workforce means industry has to recruit workers with more diverse backgrounds. Traditionally, engineers have been white men aged under 45, but Education for Engineering says they make up only about 20% of the working population (see page 28).

Professional Engineering Institutions (PEI) such as CIBSE are now starting to tackle the barriers to diversity. Eight PEIs signed

a pledge to increase diversity among their professional membership and communicate their commitment to equality. It is hoped the agreement will extend to all 36 PEIs.

CIBSE has taken its own steps by launching a Diversity Panel chaired by Andy Ford, and by supporting the new WiBSE network, which has already attracted 375 members this year.

Diversity is a key theme in George Adams' presidential year (see page 20) and he says fresh thinking brought about by more diverse working environments will help engineers

tackle the challenge of cutting the carbon output of our cities.

One factor that Adams felt was putting off young people coming into the industry was the sense that their input on building projects was not being measured in terms of building performance.

British Land is an example of a firm that is monitoring the energy performance of its buildings and making huge savings as a result (page 24). It is upping its carbon cutting targets by 50% from a 2009 base and believes it will do so, in part, by re-commissioning plant and reducing its capacity. That will please the occupiers who have also saved £5.2m on their energy bills in four years.

Alex Smith, Editor

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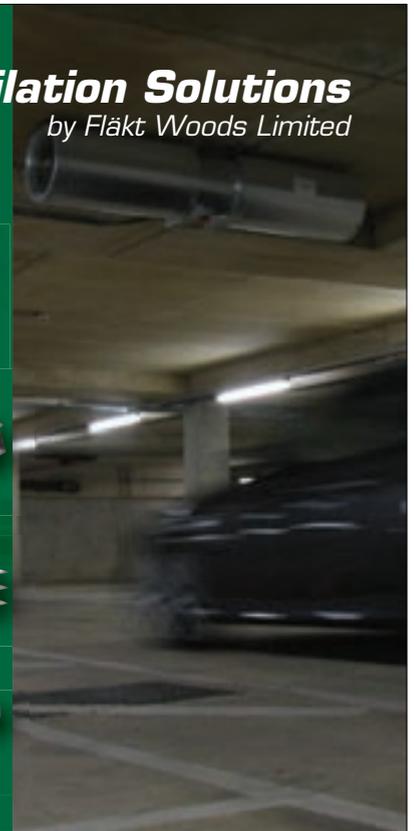
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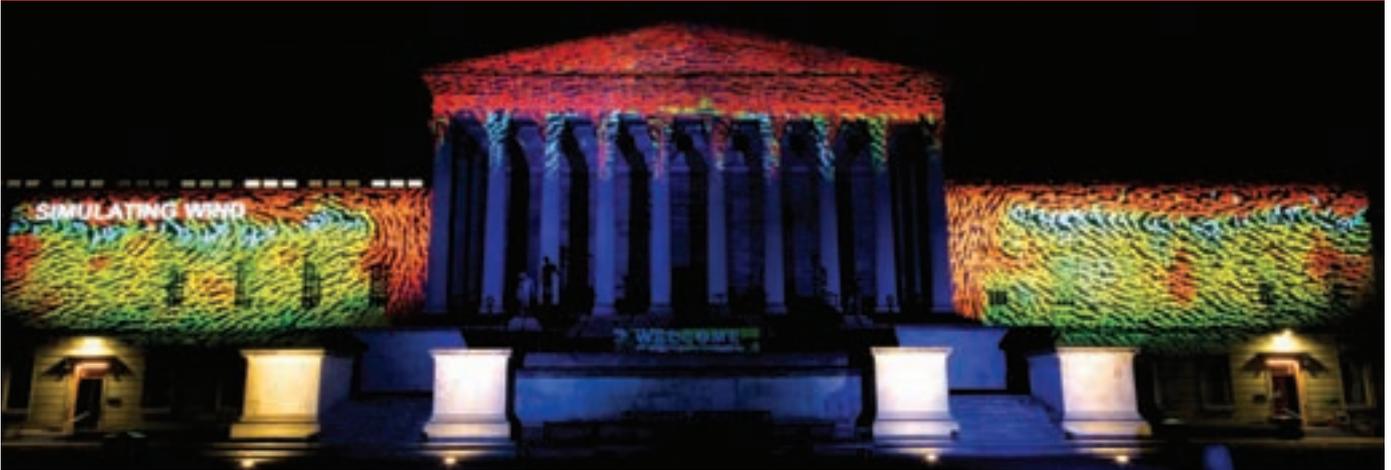


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ENGINEERING RESEARCH LIGHTS UP UNIVERSITY COLLEGE LONDON



UCL has celebrated over 10 years of research into virtual environments, imaging and visualisation (VEIV) with a spectacular light show at its Wilkins Building in Central London. CIBSE is among the 65 organisations

that have sponsored engineering doctorates since the department was founded in 2001. A free copy of a book showcasing 72 research projects is available from Dejan Mumovic at d.mumovic@ucl.ac.uk

Clients should pay for Soft Landings, says government

● Contractors must expect to be engaged for three years on Whitehall projects

Contractors will be expected to remain involved in central government projects for three years after handover at clients' expense under the Government's 'Soft Landings' (GSL) framework.

Roy Evans, head of the GSL Work Stream for the Government's BIM Task Group, said GSL would be in place for such projects from 2016 with an obligation on the client to engage the engineering team to return 'at least once a year' after handover.

'There will be a time payment element built into the

contract,' he told the Crystal Clear BIM conference, organised by Amtech, last month. 'This is a good investment, because it will cut clients' running costs.'

'We want contractors to remain involved for three years post-occupancy – rather than just getting into an argument with clients about performance,' said Evans, who also called for more time to be allowed for the commissioning process.

The Ministry of Justice has already imposed GSL on its projects and is enjoying significant running cost-savings, according to Evans.

Project teams will be expected to appoint a 'GSL champion' to ensure there is end-user engagement in the design and construction process.

In brief

BRITISH LAND HITS TARGETS

Developer British Land has delivered 4.9m ft² of BREEAM Excellent office and retail space over the last four years, according to its latest corporate reporting. Ninety five per cent of development waste was diverted from landfill, it added. It also reported 'strong progress on Community Charter commitments', with local procurement and employment initiatives at its 5 Broadgate and The Leadenhall Building projects. See *Energy Masters* feature on page 24.

STRONGS IN ADMINISTRATION

The Liverpool-based building services contractor Strongs is now being run by administrators from Duff & Phelps. Strongs, founded in 1969, had diversified into renewable energy systems, including solar panels and heat pumps.

CLYDE PULLS OUT OF BOILERS

UK Heating Group (UKHG) has announced that its Clyde division has stopped selling new boilers, spares and service. The company made the decision following a review of the commercial heating market. UKHG will now focus on the commercial radiator market.

Urban growth raises power stakes

The rapid growth of urban populations will accelerate the pace of development for smart grids and energy demand management systems, according to a leading engineering strategist.

Julie Alexander, director of urban development at Siemens, said the UK was very close

to having power cuts, which were only being averted by demand management control systems that divert power from industrial users at times of peak residential demand.

'Smart grids and demand management will be vital to reduce the huge cost of increasing national power

generation capacity,' she told the Crystal Clear BIM conference.

Cities have to take a close look at how they manage future requirements, said Alexander, as they account for 70% of global emissions and will contain 70% of the world population by 2050.

In brief

RIBA SIMPLIFIES PLAN OF WORK

The Royal Institute of British Architects has published the much-anticipated 2013 version of its Plan of Work. This version, which replaces the 2007 plan, is a simplification with the original 11 stages, designated by letters, reduced to eight, numbered 0-7. The plan is available online via the RIBA website at www.architecture.com/planofwork

ASHDEN AWARD WINNERS

Sustainable Energy Academy (SEA)/United House and Monodraught have won Ashden Awards for practical, local energy solutions. SEA/United House were awarded the overall UK Gold Award for the interior wall installation process. Monodraught secured the Impax Ashden Award for Energy Innovation for its Cool-Phase cooling and ventilation system. It also won the Energy-using Product Award at the CIBSE Building Performance Awards in 2012.

CORRECTION

New Honorary Fellows David MacKay and Peter Sheaves were incorrectly labelled in last month's *CIBSE Journal*. They were awarded Honorary Fellowships, alongside Robin Nicholson, by CIBSE's immediate past president David Fisk at the presidential inauguration of George Adams. The correctly labelled images appear on page 13, along with details of the Silver Medal awarded to David Cooper, whose picture also appeared in the article.

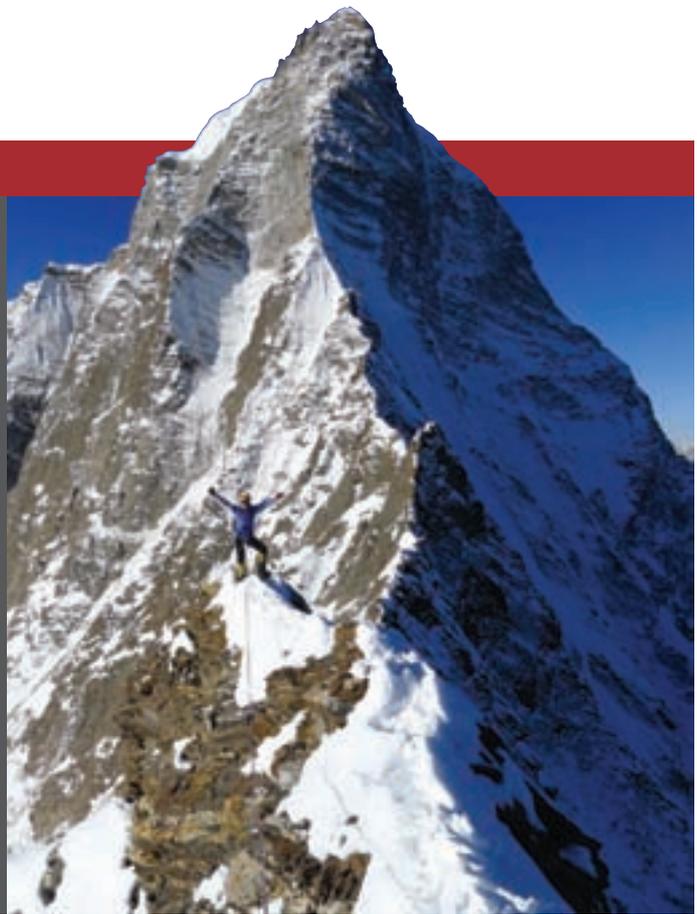
PEAK PERFORMANCE



The managing director of health and safety consultancy Integral HSE has won a mountaineering 'Oscar' after forging a new route up one of the world's trickiest peaks.

Together with his climbing partner, Mick Fowler, Paul Ramsden was awarded a Piolet d'Or (Golden Axe) after the first ascent of the 6,142m Prow of Shiva in the Pangri region of northern India.

Success is nothing new for Ramsden – also a founder member and vice-president of the Institute of Local Exhaust Ventilation Engineers. In 2002 he received his first Piolet d'Or after climbing the Central Couloir of Mount Siguniang in China in 2002 also with Fowler, who works as a director at HMRC.



Renewables could cause fall in living standards, says think tank

● **Renewables Obligation would need to rise to £1.6bn to achieve targets**

Renewables are not economically viable and will force thousands of families into fuel poverty, according to the independent think tank Civitas.

In a new report, *Are green times just around the corner?*, it argues that renewables cannot realistically maintain modern living standards because they are too expensive. Shifting to renewable heating would add £200 to the typical household annual bill, leading to the first fall in living standards 'for hundreds of years'.

Civitas calculates that the Renewables Obligation would need to rise to about £1.6bn by 2020 to achieve the government's target to increase renewables' share

of energy use from the current 6% to 15% by 2020. This would work out at a cost of almost £600 per household; one third of which would be repaid through energy bills.

The report also said that subsidising renewables 'discouraged invention and innovation'.

The oil-fired heating body OFTEC is pressing the Government to look for less expensive ways of cutting carbon emissions.

'Many homes in rural areas, which currently rely on oil, are unsuitable for renewables without major renovations to the fabric of the building, or replacement of the entire heating system,' said director general Jeremy Hawksley.

'Off-gas households would be better off upgrading existing boilers to high-efficiency condensing ones.'

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Exhibition Dates: South-West 10 September | Midlands 12 September | North-East 17 September | Scotland 19 September | South-East 24 September

Specialists congratulate 'enlightened' TfL

BIKEWORLDTRAVEL / SHUTTERSTOCK

● New procurement model will see direct links with engineering specialists

M&E contractors have welcomed a new procurement model announced by Transport for London (TfL).

The major engineering client is revamping the framework contracts it uses to procure £70m of projects annually in favour of more direct links with specialist contractors. Formerly, its system was biased towards major multi-service firms.

The new contracts will offer four-year specialist engineering packages and is designed to encourage bids from smaller, specialist contractors and joint ventures, according to commercial director Andrew Quincey. He said the new procurement approach would improve 'the efficiency of project delivery'.

'We've started developing a new set of framework agreements, which will allow us to keep improving and maintaining London's transport services for our customers while delivering the best possible value for money,' said Quincey.

As well as its major civil engineering schemes, TfL procures large M&E packages; project management;



and environmental services. It said it hoped the new frameworks would improve relationships with specialist contractors.

'It is great news that such a major client has recognised the value of encouraging direct working with specialist M&E firms,' said Roderick Pettigrew, deputy chief executive of the Building & Engineering Services Association. 'It has been shown time and again that involving experts with specific project knowledge early in the design process leads to significant financial savings and improved delivery.'

Interested parties should email PSFW@tfl.gov.uk

In brief

BIRTHDAY HONOURS LIST

The following building services and energy figures have been recognised in the Queen's Birthday Honours: Jim Skea, Professor of Sustainable Energy, Centre for Environmental Policy, Imperial College London, for services to sustainable energy; Professor Jeremy Watson, Arup's director of global research, for services to engineering; and Nicholas Kendall, assistant manager of building services at the British Museum, for services to the British Museum Collections.

SYMPOSIUM CALLS FOR PAPERS

The fourth CIBSE Technical Symposium, co-hosted with ASHRAE, will be in Dublin on April 3-4, 2014. There is opportunity to present fully reviewed papers and posters as well as case studies. *Moving to a New World of Building Systems Performance* aims to showcase practice and research including:

- Enhanced building engineering solutions through modelling and prediction
 - Innovation in passive and active building systems
 - Design and operation of future cities
 - Improving operation of built environments
 - Maintaining and improving legacy building systems
 - The development and impact of benchmarks, standards and regulations
 - Communication, skills and workforce development
- www.cibse.org/symposium2014

Construction turning the corner

A resurgence in housebuilding activity is leading a slow recovery in the construction sector, according to a number of sources.

Activity rose in May for the first time since last October on the back of the government's Funding for Lending and Help to Buy schemes. This prompted some analysts to predict up to 2% growth across the economy for the rest of 2013.

The Chancellor George

Osborne's observation that the economy was 'healing' was supported by the Halifax, which reported that house prices rose by 2.6% in the three months to May.

Morgan Stanley said prices could be up 8% by the end of next year and 4,000 planned homes have been reserved under the Help to Buy loan scheme, which was introduced in March.

Gloomy construction figures

from the Office for National Statistics were dismissed as being behind the times.

'The construction industry's long lag times mean there is usually a disconnect between official construction output figures and clients' commitment to projects,' said Steve McGuckin, managing director of the global construction consultancy, Turner & Townsend.

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North-West 26 September Also with Bitesize Briefings in Northern Ireland, North Scotland, South Wales & East Anglia

LEAD SPONSOR



Part L faces further delay



The government is still committed to zero carbon homes by 2016

● Building Regulation may not be implemented until April 2014

Fears are growing that the implementation of changes to Part L of the Building Regulations may be pushed back by six months to April 2014.

The Department for Communities and Local Government (DCLG) missed its own deadline to publish 'a detailed plan' by May, following the consultation process that ended in April 2012.

Energy efficiency campaigners fear this will derail plans for zero carbon homes by 2016.

A meeting of the Building Regulations Advisory Committee (BRAC), due to be held in early June, was cancelled. It is normal practice for the government to consult with BRAC before any changes to the regulations are announced.

Officially, the new Part L is still on track to be implemented this October, but many observers now believe this is unlikely because of the tradition that the government gives industry six months

to prepare for new regulations. It is also normal practice for new regulations to come into force in October or April.

CIBSE technical director Hywel Davies said the Institution's members were getting increasingly concerned about the future role of Part L.

'The government says it is still committed to zero carbon new homes by 2016, but that deadline is getting very tight,' he said. 'The whole thing is looking flaky.'

Davies added that there was 'a serious risk that key chunks of the regulations will be disposed of' and criticised the failure of senior political figures to commit to energy efficiency measures.

'This government has a real appetite for deregulation, which it sees as removing a burden on industry – the U-turn on consequential improvements being a case in point.'

Meanwhile, the Association for the Conservation of Energy (ACE) confirmed it was pressing ahead with its legal challenge to the decision to omit 'consequential improvements' from Part L. It said it was hopeful of a 'speedy resolution' so that the benefits identified during the consultation could be realised.

These include £11bn savings to the economy and 2.2m more households benefiting from the Green Deal, an ACE statement said.

Humidity control can cut flu outbreaks

Maintaining relative humidity (RH) at 40% and above can significantly reduce airborne transmission of the influenza virus, according to a study by the US National Institute for Occupational Safety and Health (NIOSH).

An estimated 7.6m working days are lost in the UK each year as a result of flu-related illness at a cost to our economy of more than £1.35bn.

To test the effects of humidity on airborne flu, NIOSH arranged for aerosols of the virus to be 'coughed' into a room's atmosphere by a mechanical manikin at humidity ranging from 7-73%RH. At the same time, the air intake from a breathing manikin in the room was monitored.

The research showed that maintaining relative indoor humidity at 40%RH and above significantly reduced the infectivity of the influenza virus.

'This study shows how important it is to maintain an optimum humidity in the workplace to reduce absenteeism, especially in areas of high risk to airborne viruses, such as hospitals and doctors' surgeries,' said Tim Scott, director at JS Humidifiers.

'Although many professional bodies – including BSRIA, CIBSE and the HSE – recommend indoor humidity at above 40%RH, it is not uncommon to see humidification systems being turned off to reduce operating costs.'

Lower humidity is less noticeable to employees than changes in temperature, so this can go unnoticed, added Scott. 'However, the true cost of not maintaining indoor humidity can be poor staff health and an increase in absenteeism, which can far outweigh the cost of operating a humidification system.'

Public votes on smart meters

Three quarters of the British public think smart meters are a good idea, according to a survey for the Energy Saving Trust (EST). While 44% of householders would like to have their energy use displayed on an in-home unit – 9% would prefer to use a smart phone.

More than 50% would like to

compare their energy bill with friends and neighbours, and 45% of householders would like to be able to compare

their energy use with similar homes, according to the survey of 2,000 UK homes conducted by IPSOS Mori.

The study follows the decision to delay the start of the government's smart meter roll out plan from 2014 to 2015. The original intention was to have one in each home by 2020.

Almost three-quarters (73%) of those asked said they would welcome smart meters into their homes, finding the concept of this

technology 'appealing' and almost two thirds (64%) of respondents said they were keen on becoming more energy efficient, but needed more help.

In-home displays are regarded as the most popular method for people to view this information, with 44% preferring this method.

Stephen Passmore, technical delivery manager at the EST, said: 'Research has shown that people use less energy

if they are more engaged with how much they are using and where and how it is being used.'

However, Julie Alexander of smart technology provider Siemens said there needed to be a rethink of the government's smart meter strategy.

'We need a new model because many of the technical proposals are not working,' said Alexander, who highlighted problems with smart meter communication links.

'Over 50% would like to compare their energy bill with friends and neighbours'



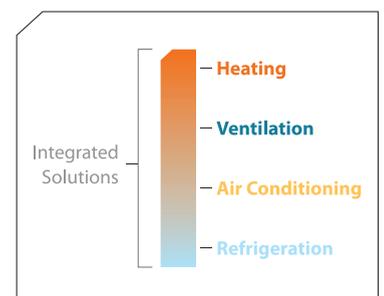
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Entries for SoPHE Young Engineers Award now open

Entries are now being accepted for the Society of Public Health Engineers (SoPHE) Young Engineers Award 2013.

The challenge is to develop an innovative system for urine management, which minimises contamination in small towns where conventional sewerage networks are not appropriate or financially viable, such as in Tanzania.

The winning team will make an in-country technical visit, in conjunction with WaterAid, to verify the applicability of their design.

Submissions must be received by 6 September.

Full details are available at www.cibse.org/sophe

CIBSE TV series airs on Sky

The latest episode of programmes produced by Business Channel.tv, in association with CIBSE, was screened on 18 June.

The Innovative Engineering and Building Performance series focused on the business case for specifying the latest products and services to meet challenges faced by CIBSE members. It explored innovations in building engineering, as well as new solutions to facilitate saving energy, reducing carbon and achieving efficiency for clients.

With buildings accounting for almost 50% of damaging carbon emissions, innovative services design is essential in bringing improvements in energy efficiency.

Expert commentary came from Fronius, Nationwide Filter, Lowara Xylem, SAS International and Victaulic.

Programmes are broadcast on Sky Channel 212 and Freesat channel 401. Previous episodes, and this latest programme, can be found at www.thebusinesschannel.tv or from the link on the CIBSE homepage, www.cibse.org

CarbonBuzz debuts at City Hall



Free online tool with energy-use application attracts attention

London's Living Room at City Hall was full to capacity on 6 June, when more than 160 delegates gathered to celebrate the launch of the new CarbonBuzz energy benchmarking platform.

CarbonBuzz is a free online tool that enables users to record, share and compare the real energy use of their buildings, and track the operational energy use of existing buildings against design intent.

Keynote speakers, Justin Snoxall, head of the business group at British Land, and Ian Taylor, partner studio leader at FCB Studios introduced the platform.

'Benchmarking building energy data and sharing knowledge is key to firms ensuring that they manage energy performance more comprehensively,' said Snoxall. 'We recognise there is a disconnect between the design and management process and we believe that through CarbonBuzz, we can close this gap.

Over the next 12 months, British Land will feed the data acquired from its buildings into the CIBSE standards to share best practice and enable objective comparisons to be made against similar buildings.'

The keynote speakers were joined on stage by

Judit Kimpian, director of sustainable architecture and research at Aedas, and Richard Jackson, head of environmental sustainability at UCL, for a panel discussion chaired by Hywel Davies, technical director at CIBSE. 'We are encouraging architects and building services designers to upload their projects to CarbonBuzz,' said Davies.

CIBSE and RIBA have helped spearhead the publication of a project's energy consumption data through their annual awards, and CarbonBuzz is a way for entrants to the CIBSE Building Performance Awards to demonstrate their energy credentials.

The event included a demonstration of the platform by Sophie Chisholm, building performance specialist at Aedas. She explained how annualised energy records were stored to capture the year-on-year energy consumption of buildings. She highlighted how the anonymised database and published datasets can be filtered and reports generated to assess the energy consumption of projects.

The tool caters for the needs of a broad range of stakeholders, including local authorities; government portfolio managers; developers; landlords; investors; architects; engineers; and facilities managers, and has been piloted extensively with them.

For more details, visit www.carbonbuzz.org

SLL rewards excellence at AGM

The Society of Light and Lighting's (SLL) 2013 Presidential Address and Annual Awards took place at the London Irish Centre, Camden in May, with the evening incorporating the society's AGM.

The awards recognised those individuals who had made outstanding contributions to the society or lighting industry

over the past year. Among the awards presented were the Lighting Award to David Holmes for his efforts with technical publications, and the Presidential Medal, awarded to Dr Peter Boyce for his contributions to the industry in a career spanning more than 50 years.

At the AGM, Dr Kevin Kelly,

who was inaugurated as SLL president, said he planned to focus on collaborative working, holistic building design and proper measurement of systems during his time in office.

The evening ended with a drinks reception.

The full presidential address and details of the awards can be viewed at www.sll.org.uk

Announcing the three Ken Dale Travel Bursary winners

● International travel secured for three research projects

Three young building services engineers have won Ken Dale Travel Bursaries. The awards give the opportunity to experience technical, economic, environmental, social and political conditions in another country, and examine how these factors impact upon building services engineering. The three winners are funded by the Ken Dale Bursary, Society of Public Health Engineers and the Richard Tully Fund. **The three winners are:**



Katie Wallace

Katie Wallace will undertake her research into 'CO₂ heat reclaim' in Scandinavia, focusing on CO₂ refrigeration in supermarkets. As an energy efficiency consultant for Sainsbury's, Wallace is developing a theoretical model of heat

reclaim as a retrofit option for existing stores. This research will enable her to learn from the experts.

Angela Reid



Angela Reid, associate sustainability consultant for Wallace Whittle, has identified three international sustainable mixed-use developments in Vancouver, Sydney and Beijing that she will visit to research overall sustainability, focusing on energy reduction and supply.

The research will investigate what lessons can be learned and applied to similar projects.

Kayley Lockhead



Kayley Lockhead, of NG Bailey, has elected to study renewable technologies in Africa to alleviate poverty and protect the environment. This research will take her to Tanzania, Kenya and Uganda, where she will visit existing renewable energy systems and contact local policy

makers to discuss constraints, benefits and progress development.

For more information on the Ken Dale Travel Bursary visit www.cibse.org/bursaries

New publications on overheating

The next CIBSE Technical Memorandum is *TM52: The limits of thermal comfort: avoiding overheating in European buildings*. Sponsored by CIBSE's Overheating Task Force, the report will help designers, developers and others responsible for defining the

environment in buildings.

TM52 is an update to advice given in *CIBSE Guide A* (2006) and will be available in August to download or purchase in hard copy, at www.cibseknowledgeportal.co.uk This will be complemented by *TM49*:

Probabilistic design summer years for London, which will be published online. Future reports will be published in the *Journal* on *TM13: Minimising the risk of Legionnaires' disease* and *TM54: Evaluating energy performance of buildings at the design stage*.

Board dinner success

The Athenaeum Club in London's Pall Mall played host to the CIBSE Board and its 30 guests in June. Multiple sectors of the industry were represented, including consultants, contractors, clients and building operators, with guests enjoying an evening of networking, discussing issues that directly affect the profession and society.

Justin Snoxall, of British Land, gave a talk on the role of landlords in ensuring buildings operate efficiently.

Last call for Employer awards

If you put the development of young engineers at the heart of your business, then you could be eligible to enter the CIBSE Employer of the Year Awards.

The awards recognise those employers – large and small – which have shown excellence and innovation in developing the engineers of the future.

Judging will take place across three categories – small, medium and large companies – with the overall winner being announced in at the Institution of Mechanical Engineers (IMechE) on 9 October, where they will receive the prestigious Employer of the Year trophy and £1,000 of CIBSE training vouchers.

The awards close on 31 July. Entry forms and full details are available at www.cibse.org/yea

Honorary Fellows and Silver Medallist

Immediate past president David Fisk presented Honorary Fellowships to David MacKay, Peter Sheaves and Robin Nicholson OBE during George Adams' inaugural address as CIBSE president in May.

MacKay is the chief scientific adviser at the Department of Energy and Climate Change

and author of '*Sustainable energy – without the hot air*'. Sheaves was managing director at Oscar Faber and worked on the original CIBSE governance task group, which introduced the new structure of the board and advisory council. Architect Nicholson is a senior member of Cullinan Studio and is convenor

of the Edge think-tank, which debates cross-disciplinary issues.

David Cooper, was presented with the Silver Medal for his contribution to CIBSE. David has been influential in the lifts and escalator sector and has been an expert witness and project director on many significant schemes.



David Fisk and Peter Sheaves



David MacKay



Robin Nicholson



David Cooper

Annual general meeting

● Board reviews Institution's progress in 2012-13

The annual general meeting of CIBSE was held at the Royal Society, Carlton House Terrace, London on 9 May. David Fisk, outgoing president, chaired the meeting. Chief executive Stephen Matthews read the notice convening the meeting.

The minutes of the 35th AGM of CIBSE, held on 10 May 2012 and published in the July 2012 issue of *CIBSE Journal*, were accepted as a correct record and signed by the chair.

ANNUAL REPORT AND FINANCIAL STATEMENTS

David Fisk introduced the Annual Report for 2012, referring to the Institution's focus on strategy during the year. The Olympics had been a great success for the construction industry, with CIBSE members making a significant contribution. However, the wider economic situation had proved challenging, as had the international position. It was important for CIBSE to be as fit for purpose as possible. He referred to his call for a return to normal engineering, which he believed was being reflected in society.

David Fisk went on to refer to the 2012 Annual Lecture by Alistair Buchanan, which had highlighted the insecurity of UK energy supply. CIBSE raised its engagement with DECC during the year, and the importance of building services engineering in relation to the demand for energy was becoming better recognised.

The CIBSE Knowledge Portal was launched in 2012, and has been a considerable success. The Knowledge Management committee was created to ensure that CIBSE continued to develop its knowledge, and David Hughes was thanked for his work as chair of the committee. The need for authenticated knowledge was stressed, as reflected in the number of downloads from the portal.

Efforts to strengthen the future of the industry included engagement with social media and with international development. Regional activities continued to be important for the Institution, and the establishment of the Diversity Panel was also noted. Internationally, particular attention was drawn to the 25th Anniversary of the Australia and New Zealand region. David Fisk noted the recent death of Grahame Gibbs, one

of the founders, and a past chair of the region, but was thankful that Grahame had been able to participate in the anniversary celebrations of the region he had helped establish.

The success of the Building Performance Awards was noted, and David Fisk also recorded his appreciation for those entrants who did not win awards.

Finally, David Fisk expressed his thanks to others for their work, acknowledging in particular the support of Andy Ford as Immediate Past President and George Adams as President Elect. He thanked the volunteers who supported the Institution and particularly those who served on council for their advice and guidance to the board. He also thanked the staff, noting that Marie Dignan and Tiny Cardy had moved on from the Institution, and had been replaced by Carilyn Clements and Elaine Rafferty. He recorded his personal thanks to Stephen Matthews as chief executive and Janet Wigglesworth for managing the President's diary.

In response to questions, it was confirmed that all regional chairs continued to be members of the CIBSE consultative council.

David Fisk then introduced Bill Devitt, Audit Partner of Chantrey Vellacott DFK LLP, who read the audit report and confirmed that the accounts provided a true and fair view of the Institution's affairs and had been prepared in accordance with all relevant standards.

Nick Mead then introduced the financial statements, stating that total income was somewhat increased over 2011, with subscriptions and investment income up. The breakdown of income was noted. CIBSE Services was a key component of income, and a more detailed breakdown of its income was presented. CIBSE expenditure had also risen slightly, and the detailed breakdown of expenditure was noted. Members also heard that improved investment values had produced a substantial impact on the accounts. As a result, the Institution's net assets were now just over £3m.

In response to questions on the improvement of the pension scheme deficit figure, it was explained that changed investment managers, and improved market conditions, had made a significant impact.

David Fisk summarised that the financial

position was positive, membership had increased, and CIBSE's influence and knowledge were both being developed. It was noted, however, that conditions remained challenging, with the industry facing continuing difficulties.

AUDITORS

Nick Mead proposed that Chantrey Vellacott be appointed as the Institution's auditors for 2013, and that the board be empowered to agree their remuneration. This was seconded by Andy Eastwell and approved unanimously.

SPECIAL RESOLUTION

Nick Mead presented the special resolution for membership subscriptions for 2014, drawing attention to the proposal for free membership for full-time students following the introduction of this initiative during the last year.

Nick Mead proposed adoption of the special resolution, as set out in the calling notice for the meeting, and this was seconded by George Adams.

In response to questions about the need for an increase, Nick Mead explained that while the financial position was positive, the Institution needed to continue to develop and, in particular, the development of content for the Knowledge Portal had to move forward more quickly than in the past. Stephen Matthews also explained that the Institution had embarked on a major IT strategy development. This involved substantial costs, but was needed to allow CIBSE to meet members' expectations alongside much larger

Continued on page 58 ➔

'It was important for CIBSE to be as fit for purpose as possible'

Board and Council for 2013/2014

Stephen Matthews declared the following individuals elected to serve as officers, board members and council members following the AGM 2013:

Officers:

President:	George Adams
President-elect:	Peter Kinsella
Immediate past president:	David Fisk
Vice presidents:	John Field Nick Mead Peter Wong
Hon treasurer:	Stuart MacPherson

Members of the board:

Elected members:	Gay Lawrence-Race
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Members of council:

Elected members:	Derek Mowlds David Palmer Peter Sutcliffe
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PHASING OUT

With HCFCs set to be banned in Europe from 2015, **Hywel Davies** explores the impact on those who design, install, maintain and manufacture air conditioning and refrigeration systems

HCFCs, sometimes called 'F-gases', contain fluorine and are powerful greenhouse gases. Many are also ozone-depleting substances (ODS), which damage the ozone layer in the upper atmosphere. They are widely used in refrigeration and air-conditioning equipment, heat pumps, firefighting fluids and high voltage switchgear, as well as aerosols, solvents and foam-blowing agents used in insulation products. End users, system designers, contractors, equipment manufacturers and distributors may all have obligations under these regulations.

Regulation (EC) No. 1005/2009 on substances that deplete the ozone layer controls the production; import, export; placing on the market; recovery, recycling, reclamation; and destruction of substances that deplete the ozone layer. The Regulation prohibited the use of virgin hydrochlorofluorocarbons (HCFCs) from 1 January 2010 (even if the HCFC was obtained before that date). The next deadline under the Regulation is the total ban on the use of HCFCs in any form, which takes effect from 1 January 2015.

While the Regulation is directly applicable in the UK, with no further legislation required, Article 29 of the Regulation requires Member States to introduce secondary legislation to cover the necessary penalties applicable for breaches of the Regulation, and the rules to ensure these are implemented. In the UK this has been done through the Environmental Protection (Controls on Ozone-Depleting Substances) Regulations 2011.

The main effect of the ban is to make it illegal to "use" HCFCs. This applies to any system

which uses an HCFC refrigerant, of which R22 is probably the best known example. The word 'use' requires some further explanation. The guidance in Defra's *Information Sheet RAC 8: R22 Phase-out*, states that:

'It should be noted that the bans described above refer to the "use" of HCFCs. In terms of considering what action needs to be taken it should be noted that 'use' in relation to equipment containing HCFCs means – 'the utilisation of controlled substances in the production or maintenance, in particular refilling, of products or equipment'.

This means that it is permissible to carry on using equipment that contains HCFCs beyond the phase-out dates, but there must be no maintenance or servicing undertaken on the equipment that involves breaking into the refrigerant circuits.'

So, systems containing HCFC refrigerant may continue to be used after 31 December 2014 as long as they do not require any maintenance to the refrigeration circuit. However, once there is a leak or a loss of refrigerant charge then they may not be recharged with HCFC. They will need to be recharged with a suitable drop in replacement refrigerant, or replaced.

For a mission critical system this clearly represents a risk, as it may not be possible to replace the refrigerant and recommission the system in a timely way, or there may be a premium for getting the necessary work carried out urgently. It would, therefore, be wise for those who operate any HCFC charged systems to

assess the risk to their business of continuing to operate the system after 31 December 2014 and to consider their options for replacement of the HCFC before that date.

This will present the owners of such systems with two options. They can either modify the system to operate with a legal alternative refrigerant, or they can replace part, or all, of the system.

If they take the first option, *CIBSE Guide B* advises that numerous refrigerants have been developed as drop-in replacements for HCFCs. But it warns that 'most, if not all, will result in reduced capacity and/or efficiency and may require oil flushing and replacement and some system modifications.' Guidance from the manufacturer of the proposed replacement refrigerant should be sought.

If they opt for the second option, then they should reassess their requirements and consider whether the system is still essential, and, if so, what the most appropriate replacement is. Either way, the ban on using the systems is only 18 months away, so there is an urgent need to assess existing systems, plan conversion or replacement, and make the necessary arrangements.

Whichever option is chosen, it is also vital to remember that other rules cover maintenance and replacement of these systems, as well as the disposal of the refrigerants that they contain.

Existing regulations require system operators to minimise leaks and to carry out – and keep – records of regular leak testing and any supply of refrigerant. They also require that services are only

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carried out by qualified, registered, personnel, and that any refrigerant to be disposed of is treated in accordance with all relevant waste handling and pollution control regulations. All in all, there is a string of legal duties here for system operators to comply with, and a similar string of penalties – some potentially quite significant.

Enforcement

The Regulations empower the Environment Agency and local environmental health officers to enforce them. It is notable that the powers available to them in connection with these Regulations enable them to serve an enforcement notice and, if that notice has not been complied with after 28 days, to have the work required to achieve compliance undertaken, and submit the invoice to the offending party. It is also an offence to obstruct enforcement, or to provide false or misleading information to an enforcement officer.

These are significantly greater enforcement powers than under the Energy Performance of Buildings (EPB) Regulations for air conditioning inspection reports. Under these regulations, trading standards officers (TSO) have no power to challenge occupiers who claim not to need an inspection. Even if one is installed, TSOs have no power to request any information about the system, only a copy of the report.

An air conditioning inspection will almost certainly identify those systems which will have to be shut down on 31 December 2014, and will also provide much of the information needed to make a decision about whether to convert to an alternative refrigerant or replace the system.

It is curious that the government has given far greater powers to enforce the F-gas and Ozone Depletion Regulations than they give TSOs for the EPB Regulations. The recast EPBD requires member states to set penalties for breaches of the EPB Regulations, which must be 'effective, proportionate and dissuasive', and member states should ensure that they are implemented. The F-gas provisions are welcome: is it time that similar requirements were also applied to air conditioning inspections?

Information Sheet RAC 8: R22 Phase-out, can be found at: <https://www.gov.uk/managing-fluorinated-gases-and-ozone-depleting-substances>.

BIS guidance

Managing fluorinated gases and ozone-depleting substances contains guidance from the Department of Business, Innovation and Skills for commercial, industrial and public sector organisations using fluorinated greenhouse gases and ozone depleting substances. It is online at <https://www.gov.uk/managing-fluorinated-gases-and-ozone-depleting-substances>. It also contains links to a number of additional factsheets.

F-gas support

For all enquiries relating to the F-Gas and ODS Regulations, contact the **Environment Agency**: fgassupport@environment-agency.gov.uk **National Customer Contact Centre tel no: 03708 506506**

● **HYWEL DAVIES** is technical director of CIBSE www.cibse.org

Your feedback

TIME FOR A RETHINK?



In last month's *CIBSE Journal*, Steve Hale suggested building engineers needed to improve their communication skills. The overwhelming response on LinkedIn suggests he may have struck a chord

Janet T Beckett

One of my first networking encounters was with a Chamber of Commerce guy in a grey suit at a breakfast meeting.

He looked me up and down and said 'Not another energy consultant?' I didn't even know what he meant. In my world, the snake oil salesmen didn't exist or, if they did, they were not like me, I was wrong. Engineers are not salesmen, but maybe we need a rethink?

Mike Barber

An incandescent bulb has flickered to life in my head. What if increased diversity could improve CIBSE? The more diverse an organisation, the better it would have to communicate, internally and externally?

Tony Johnstone

Talking with one voice from an informed position and allowing no alternative view to be unanswered is the trick. We don't do that – we talk with individual opinions – when the opposition is organised into enthusiastic or powerful pressure groups.

Andrew Wolstenholme

There is a plethora of initiatives, including Green Deal, CRC, EPBD, RHI, FITs, BREEAM and LEED, giving multiple opportunities for sales folk to sell the entire sustainability, low carbon, save-a-fortune packages on the back of 'free' consultancy.

Steve Hale

It strikes me that the issue starts when engineers start their training. We spend so much time on technical subjects, there is no time left for softer subjects. It is important for us as employers to ensure

that we focus on communication skills in the mentoring of our young engineers.

Simon Owen

I think non-technical people do well because they give a solution, talk knowledgeably, have shiny marketing and the same corporate accreditations as everyone else. A 'no jargon' guarantee may help.

Zack Taylor

I have found that giving clear decisive and informed opinions to clients gives a better impression of your reliability, knowledge and experience, over the guy who just turns up and tells a client that they should put a ground source heat pump into their 100m² modular office.

Paul Norton

Unfortunately, we are still seen by many as the poorer cousins of the architect, structural engineer and PQS. There is still that blank look on people's faces when you say 'I am a building services engineer'. If we are to present ideas on how we can save energy, then simple pictures/diagrams, graphs and life-cycle costs are often the most effective way of communicating.

Karl Redmond

Some CIBSE people will have the skills required to communicate the right message to the client. Others will miss the points and talk in a language the client will not absorb or understand, which is counter-productive.

● Join the debate on the CIBSE LinkedIn group at www.linkedin.com

WHAT'S THE COLOUR OF YOUR BUILDING



Do you know how much energy your building uses? **David Clark** says embodied carbon and transport should be taken into account when calculating a structure's carbon footprint

Increasingly more stringent building regulations are leading to energy efficient building designs. Unfortunately, we are rarely delivering low energy buildings.

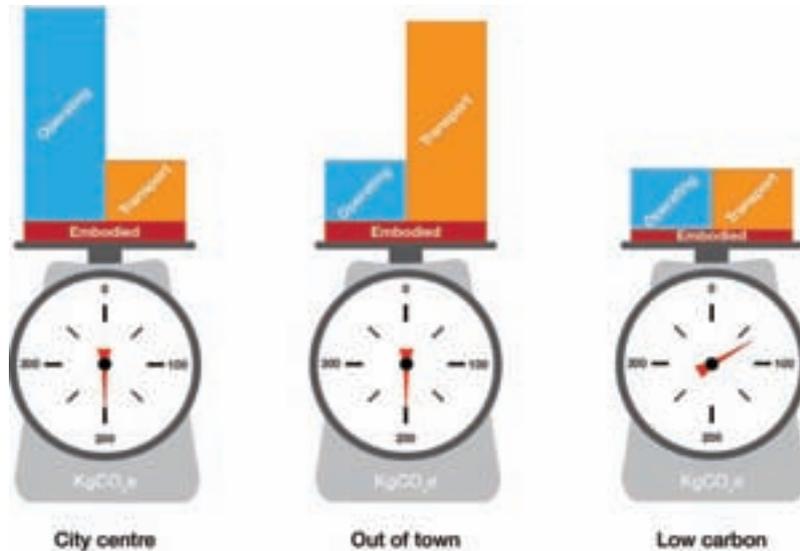
The UK government in particular has failed to grasp the significant difference between efficiency and consumption. We are congratulating ourselves with A-rated Energy Performance Certificates (EPCs) while ignoring real energy reduction. Studies show there is almost no correlation between an EPC and energy use in commercial buildings.

How many of you know whether the office you're sitting in has operating carbon emissions of less than 100 kgCO₂ per m² – and whether this is good or bad? What floor area did you use? What emission factors to convert electricity and gas into CO₂? This is why we need to use simple benchmarking tools based on actual energy consumption and stop relying on virtual reality – EPCs – to inform the design and operation of buildings.

In most offices, energy represents less than 1% of the tenants' costs – people (90%), rent and rates are the main expense. So reputation usually becomes the biggest driver to tackle energy consumption. However, until real energy performance is placed in the public domain, there is little incentive for the decision makers sitting in boardrooms to do anything about it.

The property industry needs reliable energy data so that we can all learn from what is really happening in buildings, rather than what the computer models tell us could be happening.

If design teams had to guarantee the actual carbon performance of a building in its first five years, it would lead to a very different design approach – we'd gain a deeper understanding of how buildings work and how people's behaviour influences energy use. We'd also get proficient at arguing whose fault it was the targets weren't reached. Perhaps this is an argument we need to have to make the next leap forward.



Whole-life carbon emissions: why your footprint may be bigger than you think

6 The embodied carbon of building services equipment is poorly understood and could account for 10 to 20% of the initial construction carbon

The embodied carbon of buildings, – the CO₂ released during the manufacture, transport and installation of materials – is gaining attention. It is equivalent to the emissions arising from about five to 10 years' operating energy in offices. Should older inefficient buildings be knocked down and replaced, or should they be refurbished to a higher standard to provide a lower overall carbon footprint?

Until the industry can agree common carbon measurement metrics and benchmarks for operating and embodied carbon, it is difficult to answer this question definitively.

The embodied carbon of building services equipment is particularly poorly understood and could account for 10 to 20% of the initial construction carbon. However, the services are replaced more regularly over time than the building fabric, so services could represent a higher proportion of the embodied carbon over the life of the building. We need more data and Environmental Product Declarations from suppliers to start tackling this issue.

Then there is the component usually missing from whole carbon footprint assessments – how people get to and from a building. The whole carbon footprint of a low energy rural office

may not be dissimilar from that of a typical city centre building. This is because most people travel to city centre buildings by public transport, whereas out-of-town buildings rely more on cars.

When the commuting emissions are added to operating energy, the answers can be surprising. Because rural buildings usually have more opportunities for natural ventilation and renewable energy – they tend to be low rise with narrower floor plates and have less noise and air pollution issues – should they be required to meet higher energy performance standards than urban buildings? An interesting philosophical debate.

Ultimately, we need to start benchmarking the whole carbon footprint of buildings in operation so that we make informed decisions when planning, designing, constructing and maintaining the built environment.

DAVID CLARK is a partner at Cundall and author of *What Colour Is Your Building: defining and reducing the whole carbon footprint of buildings*, to be published by RIBA Publishing on 25 June. www.whatcolourisyourbuilding.com

Embodied Carbon and Building Services, by Roger Hitchen, was published last month by CIBSE. Research Report 9 is available on the CIBSE Knowledge Portal www.cibseknowledgeportal.co.uk



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(Left to right) David Fisk, Stephen Matthews, Peter Kinsella, Hywel Davies, George Adams and Andy Ford



The PRESIDENTS' BRIEFING

New CIBSE president **George Adams** recently addressed the challenges facing the industry in an expert roundtable discussion featuring past and future presidents, and came up with actions on tackling climate change in cities, integrating FM and attracting young people to a career in building services

Building services engineers are in the frontline when it comes to tackling climate change and play a huge part in creating great buildings in which to live, play and work. This was George Adams' message at his inauguration as CIBSE president at the Royal Society in May.

Adams reminded the audience that carbon dioxide levels in the atmosphere had reached 400 parts per million for the first time in several hundred millennia, and that the decarbonisation of cities was key to limiting global temperature rises.

Engineers will need to take a leading role improving the energy efficiency of the existing built environment as well as minimising CO₂ in new and refurbished

buildings, said Adams.

To address how CIBSE engineers could contribute to the adaptation of cities to mitigate against climate change, Adams hosted a roundtable debate with past presidents David Fisk and Andy Ford, and president-elect Peter Kinsella.

Together with CIBSE chief executive Stephen Matthews and technical director Hywel Davies, the gathering represented years of engineering expertise across the industry, from consultants and contractors, to academics and government scientists.

The group discussed key themes in Adams' manifesto, including the challenge of existing cities; how facilities management can be integrated into building delivery; and how young people could be attracted into building services engineering.

The ensuing discussion threw up a lively debate that has been distilled into a special *CIBSE Journal* presidents' briefing, which offers thoughts and actions on how CIBSE can help building services engineers across



industry get to grips with some of the many challenges of climate change.

The briefing

Engineers have a role beyond the design of services in buildings. A global temperature rise of just 1°C will see a huge rise in peak summertime temperatures in cities, and lead to overheating and energy shortages in urban areas. Adaptation was, for a long time, a pariah word because if you could adapt cities to deal with overheating, it was seen as reducing the pressure for abating emissions. But as the globe sets to hit at least 3°C of global warming, we don't have a choice but to help prepare cities for what is to come.

The knowledge of CIBSE engineers will be key to making city living bearable in the future. For example, through *CIBSE Guide A: Environmental Design*, engineers understand what temperatures are tolerable and what they should be designing to.

There's a whole set of existing infrastructure which isn't ready for the climate that's going to hit it. It will be an extraordinary cost to society – cities will overheat and run out of energy
David Fisk

Closing the feedback loop

Engineers need to understand how their buildings actually perform. For too long the industry has had no idea whether energy efficiency measures actually work. It has never collected evidence of performance and this makes it difficult to persuade clients to adopt energy efficiency solutions.

The government needs to focus on outputs rather than inputs. There have been about 8,000 heat pumps installed under the Community Energy Saving Programme (CESP), but nobody knows if any of them actually work. The theory behind the renewable heat incentive is that people are paid to produce heat, but it's not known how well boilers are performing – whether they were balanced properly or achieved the right return temperature. Improving the feedback loop will make us better engineers.

More people would adopt energy efficiency schemes if they thought they would work. The most successful low energy initiatives such as LED lights are being rolled out in huge numbers because you know exactly how much energy will be saved.

In other industries, such as the aeronautical business, where the outcomes are precisely measured, it is possible to identify individual contribution. There is a risk that the best talent will be deterred from entering the building services industry because they cannot see how

We need to move on from just concern about individual buildings to the wider challenge of decarbonising and adaptation of our existing cities as well
George Adams



“ The real fruit comes by getting the operational side involved in the design and construction phases. That’s when the big wins come about
George Adams



“ If there is funding available based on providing feedback, then that would shortcut a lot of the learning cycle
Peter Kinsella

➤ their skills and vocation will have a positive impact on the world.

Project teams should be encouraged to share performance data using platforms such as CarbonBuzz, a joint venture between CIBSE and RIBA that was launched last month. It has always been incredibly difficult for organisations to share data from post-occupancy evaluations. Those involved in design and construction aren’t happy to allow ‘warts and all’ exposure of poor delivery and operation. CarbonBuzz allows you to post data anonymously, which should encourage more project teams to participate.

Make facilities management part of the design process

Facilities management (FM) should be integrated into project delivery or refurbishment to improve operational performance. It should be embedded into the design process, and CIBSE engineers need to communicate the benefit of early involvement of FM to clients.

Those running FM should be trained to handle the systems delivered. Complex engineering systems should not be the responsibility of people who have limited understanding of building services.

Engineers should focus on delivering building services that can be operated by the facilities manager, and designers should be encouraged to look at minimising the requirement for building services, so that buildings are simpler to operate. Some of CIBSE’s most relevant papers in the Knowledge Portal could be rewritten in a more pragmatic style for a FM audience.

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“ I wish Lord Sugar’s ‘apprentice’ was more like a real apprenticeship. I did a technician’s apprenticeship – it’s a perfectly acceptable route through
Andy Ford ”

Encouraging more young people into the industry

CIBSE should encourage young people to join the industry as engineers and look at increasing the number of people who enter the industry as engineering technicians. It should be more involved in the STEMNET scheme, which encourages young people to understand the importance of science, technology, engineering and mathematics.

CIBSE could help mentor more young people by making CIBSE Fellows industry ambassadors. A technician route to becoming an engineer should be given as much weight as an academic qualification – CIBSE should take inspiration from the well-established education system for training in Germany and Austria.

There should be a clearer path for young architects who are considering a career in engineering. Architect courses are oversubscribed but many applicants are potentially stronger on the technical side

and should be encouraged to consider a career in building services.

Papers in the Knowledge Portal should be rewritten for students to show the many opportunities and continuing training in a building services career.

The CIBSE Young Engineer Network (YEN) is a signpost for the future and should be nurtured. CIBSE should also embrace diversity at every step, to help build the industry skills.

Building services is one of the few engineering professions that has a close connection with humanity and this should be strongly emphasised to young people.

CIBSE has a role in encouraging more people into the industry. Many of the large employers recognise they have a skills problem, but they don’t know how to solve it. As apprenticeships and sponsorship of young people are costs on the balance sheet for businesses – for them, the easiest thing to do is not engage in the issue. **CJ**



THE PANELLISTS

George Adams CEng FCIBSE – CIBSE president 2012-13
Adams began work in the building services division of Matthew Hall, where he completed a formal engineering apprenticeship and degree, before moving to his current position of energy and engineering director for Spie Matthew Hall.

Peter Kinsella, CEng FCIBSE – president-elect
Kinsella is engineering manager with AE Smith in Melbourne, Australia. He was elected to the CIBSE Board in 2009 and is a board member of Air Conditioning Refrigeration and Building Services (ARBS). He is currently chairman of the CIBSE Australia & New Zealand Region.

David Fisk FRAEng FCIBSE FRIBA (Hons) FloP – CIBSE immediate past president 2012-13
Fisk is director of the Laing O’Rourke Centre for Systems Engineering and Innovation at Imperial College London. In 1996 he was made a CB for services to the Department of Environment.

Andy Ford CEng FCIBSE – CIBSE past president 2011-12
Ford is the Professor of Systems Engineering in Built Environment at London South Bank University. Previously he was a founding director of Fulcrum and a director at Mott MacDonald Fulcrum.

Stephen Matthews, chief executive
Responsible for external relations with government and the construction industry.

Hywel Davies, technical director
Responsible for technical activities of CIBSE, including technical input into publications and government policy consultations.

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INTEGRATED CONTROL SOLUTIONS

British Land was crowned Carbon Champion of the Year at the CIBSE Building Performance Awards. **Andrew Brister** talks to Justin Snoxall, John Gentry and Matthew Webster about how the property giant is setting its sights on even greater energy savings

ENERGY MASTERS

CIBSE BUILDING PERFORMANCE AWARDS 2013 WINNER
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The CIBSE Building Performance Awards recognise, reward and celebrate the businesses, teams, products and projects that demonstrate engineering excellence in the built environment.

Entries are now open for the 2014 awards. For further information on how to enter and this year's winners please visit www.cibseawards.org

British Land just can't stop smashing its targets. The commercial property giant has been so successful in its energy-reduction initiatives that they continually get revised upwards, and the firm grabbed the top gong at this year's CIBSE Building Performance Awards, winning the Carbon Champion of the Year accolade – alongside the Client Energy Management Award, which it bagged for the second year running.

British Land's carbon-cutting journey goes back to 2008 when the corporate responsibility (CR) team started to set portfolio-wide targets for energy reduction. First came a desire to achieve a 20% energy reduction from landlord services by 2012, against a 2009 baseline. This was quickly exceeded, so much so that the target was doubled to 40% by 2015. Now, with its 2013 CR report showing that energy reductions across the portfolio have already hit 38%,

this target looks set to be revised upwards again.

'We think that we can push towards 50% landlord-influenced energy savings across all of our buildings,' predicts Justin Snoxall, head of the business group within British Land's CR team. 'To date at York House, our head office in London, we have already achieved 60% savings.'

The team's success is built, not on expensive retrofit equipment, but on sound energy management practices by data monitoring and matching central plant running times to the user-habits of tenants. 'We did have metering in our buildings, but there wasn't any real-time analysis of it. We had struggled to achieve anything more than 5% energy savings and, clearly, we needed additional support,' said Snoxall.

That help came in the shape of EP&T Global's Edge Mars energy monitoring, analysis and reporting tool, which allows

15-minute metering data to be analysed and performance optimised. A pilot study at York House achieved 15% energy savings, giving the team the ammunition to propose a roll-out to occupiers in a mix of offices and shopping centres.

'We wanted a proposition where EP&T would guarantee savings and each occupier would pay back the costs through energy savings,' says Snoxall. 'We were able to say to tenants that they had nothing to lose. We would put the money up-front, there would be no operational disruption and we guaranteed the savings. And, if there weren't any savings, EP&T would make up the shortfall.'

While a sound argument for tenants, it's fair to say that the team did have to overcome some initial resistance from its own estates department.

'Many building engineers were apprehensive about it,' recalls John Gentry, associate director of engineering at Broadgate Estates, the British Land subsidiary that manages some of the company's high-profile developments. 'There was a concern that the system's ability to drill down into detailed data would provide ammunition with which to criticise engineers.'

'However, once the system was introduced, the engineers quickly realised that it was a tool that could help them drive real improvements in their buildings.'

'There was a light bulb moment when they saw that there were some good savings to be made by changing the way they operated the buildings, and kudos to be gained from achieving those efficiencies. This inspired an element of healthy competition.'

EP&T's analytical data pinpointed exactly where energy was being consumed and quickly highlighted some easy wins.

'For example, if we saw that there was very little on-floor power consumption at a time when we were still running all the plant, we could go to the occupiers and ask: "Do you need all the plant running at seven o'clock in the evening – it looks like you've got very little load on your floors at that time?" Their typical response was: "Well, actually no, we don't. We've all gone home by six o'clock".'

The results are impressive, with energy reductions having so far saved occupiers some £5.2m on their energy bills since 2009, cutting carbon emissions by some 40,000 tonnes in the process. Across the office portfolio, Snoxall explains that four

“ We think that we can push towards 50% landlord-influenced energy savings across all of our buildings ”

From left to right: John Gentry, Justin Snoxall and Matthew Webber



British Land credits success to sound energy management practices that match central plant running times to user-habits of tenants

Steps towards 50% energy savings

As British Land has almost hit its 40% energy reduction target from landlord services by 2015 against a 2009 baseline, how does it aim to get towards 50% savings? Justin Snoxall explains:

- Working with BMS partners to drive more functionality from the BMS; for example, where space is unoccupied, we want the BMS to turn off air-handling units and other plant automatically
- Re-commissioning central plant in each building at least every five years; buildings are designed and commissioned based on an initial set of occupational assumptions. These assumptions may change or never be realised. For example, at our head office at York House, the building was commissioned to accommodate 200 people on each floor. Today there are 100 people on each floor. There is, therefore, an opportunity to review the heating and cooling loads to the floors to ensure that

we are not over-supplying conditioned air to the space

- Plant and lighting replacement opportunities; this requires effective engagement by the building management to seek approvals from all occupiers, explaining the commercial case for capital investment. At Exchange House, occupiers agreed a pilot installation of a variable speed drive on a chiller. When we found that the projected 40% energy reductions were exceeded, with 50% reductions, occupiers have subsequently been keen to install variable speed drives on all chillers
- Long-term asset replacement plans; these forecast our plant replacement up to 10 years ahead. Having already achieved significant energy reductions, in many cases we can reduce the overall capacity of the plant, further reducing overall capital costs

measures have generated the most reductions:

- 15% reductions from aligning central plant run times with occupiers' operational requirements
- 10% reductions from eliminating heating and cooling conflicts and increasing intake of external ambient air to reduce needs for heating and cooling
- 5% reductions from adjusting set points
- 5% reductions from installing light sensors or replacing lighting in the common parts

'We've tried to take tenants along an educational path,' says Matthew Webster, energy executive at British Land. 'Energy management is not simply about turning things off; it's about optimising and running things in the most efficient way, moving away from base-build operations [the part of a multi-tenant building that directly serves and affects everyone] to recognising the way that people actually use the property.'

Some contractual changes were needed to make this shift. British Land has now enforced a core hours philosophy to move away from

British Land's head office York House has achieved a 60% reduction in landlord-influenced energy use



HOW DO YOU RATE YOUR LANDLORD?

The landlord's role in the energy performance of a building is crucial in the lettings arena, yet there is no way for tenants to compare one landlord with another. Display Energy Certificates do indicate the energy performance of the whole building but, with the landlord responsible for approximately 50% of the energy use in a typical multi-let office, surely there is a need for an energy rating for the landlord's element?

British Land has been working with the Better Buildings Partnership (BBP) for the past year to introduce an operational rating scheme for landlords, which it is calling the Landlord Energy Rating or LER.

'The idea is that, just as the BRE Environmental Assessment Method (BREEAM) Excellent rating has become the market requirement for new space, a Landlord Energy Rating of five stars should become the energy efficiency requirement for new lettings in existing space,' says Snoxall. 'We believe that this single initiative could have a big impact on transforming the market.'

The LER specification has been drawn up and piloted, and there is currently a debate within the BBP as to what the next step should be.

running central plant for practically 24 hours. At first, core hours ran from 7am to 8pm but, as occupiers have become comfortable with the principle, they have recently agreed to a further two-hour reduction from 7am to 6pm. Then, out-of-hours energy billing was introduced, giving six months' prior warning to enable occupiers to adjust their operating practices.

Previously, all occupiers paid for out-of-hours energy consumption, irrespective of their own demands, leading to some businesses being subsidised by others. 'This step was critical to get occupier engagement on energy reduction in the building,' says Snoxall. 'There were clearly winners and losers in this but, importantly, we were seen to be introducing a fair, transparent measure for all occupiers.'

Another important step has been to wean occupants off override switches for heating and cooling out of hours – a measure which

could see central plant running a further four hours for, perhaps, just one person. Now, when occupiers want heating and cooling after 6pm, they schedule their out-of-hours requirements with the building management who, in turn, ensure the plant runs only for those hours requested, with the occupier billed directly for this use.

'The occupier response has been very good,' says John Gentry. 'Together, we've been able to make further changes and further savings. We're also looking at opportunities to drive reductions from capital investment, seeing what savings we can make and what the return on investment would be for occupiers through the life cycles of their leases.'

'All in all, it's been an absolutely positive journey. I think that there's still a way to go, so we're continuing to engage with occupiers and – I believe – we will continue to make further savings.' Anyone betting against further increases on those energy reduction targets? **CJ**



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Recruiting engineers from a wide range of backgrounds can help bridge the skills gap, and give your business a competitive edge. Carina Bailey reports

BROAD *appeal*

6 We all know everybody's different, and that we all bring something different – whether it's life experience or professional experience – to our job

The engineering industry is set to suffer a huge shortfall of skilled professionals unless more is done to attract people from a much wider range of backgrounds, according to leading engineering organisations.

In the 10 years to 2020, the UK Commission for Employment and Skills has predicted there will be a shortfall of 300,000 engineering jobs across all disciplines¹.

For professional engineering roles, the problem is acute. Findings from EngineeringUK² suggest that, every year up to 2020, an average of 87,000 posts will need to be filled by skilled engineers with a Level 4+ qualification (HNC or equivalent) – currently the UK only produces about 46,000 people qualified to this level.

The need to recruit from a broad range of backgrounds provides opportunities for businesses, says Fiona Cousins, principal at Arup. 'A diverse workforce enriches the business environment by providing the ability to gather a number of different perspectives on a problem,' she says. Her view has been borne out in *The business case for equality and diversity*³ a report commissioned by the Department of Business, Innovation and Skills (BIS), which has collated studies that show evidence of firms reaping benefits from diversity and equality.

According to the Education for Engineering's (E4E) *Aspiration and Opportunity*³ report, the engineering professions have to look beyond their traditional sources if they are to replace their dwindling workforce and expand it to



cope with the expected growth required to fulfil the green agenda.

The report says the engineering workforce traditionally consists of mainly white, able-bodied men under 45 years old. However, it notes that by 2011 they only represented 20% of the workforce. It said that to maintain a skilled workforce the industry must attract engineers from different backgrounds and attract more women, ethnic minorities and people with disabilities.

The Royal Academy of Engineering has received government funding to address this problem. Bola Fatimilehin, diversity in engineering programme lead (job share) at the Royal Academy, says a diverse workforce is needed now more than ever if the engineering sector is to fill the vacancies. 'We do actually have to encourage more people into engineering and remove the barriers that stop people from considering a career in the industry,' she says.

So, why aren't more young people and those from diverse backgrounds opting for a career in engineering? According to Cousins, one problem is the perception that engineering is neither creative – nor really a profession – but a 'pale male' club.

Cousins says the importance of a diverse workforce cannot be overestimated: 'The best performing team I have ever been in included 10 people, five of whom were women. The team as a whole included five nationalities, spread over an age range of 20 years and with university degrees in seven different



disciplines, from communications to policy to engineering to architecture. The difference in their perspectives was vital to problem-solving.'

Last year Alan Milburn MP, chairman of the Panel on Fair Access to the Professions, described the glass ceiling – faced by the least represented sections of the workforce – as being 'scratched, but not yet broken', and accused the professions of not doing enough to improve access for all.

Cousins might agree with Milburn's 'scratched glass ceiling' analogy. By her own admission, she has been 'the oldest woman in the room' for the last 20 years. 'I have also frequently been the only one, and this continues, especially in external meetings, and especially during construction,' she says.

But, there is some heartening news – architectural firms have made the transition to include more women, more quickly, than contracting firms, so design teams are now frequently evenly mixed. And CIBSE female membership is growing – from 844 in 2008 to its current total of 1,501. (In comparison, male membership stands at 2,109). At senior level, CIBSE has only 16 female Fellows out of 979, although this compares favourably with 2008, when there were only three out of 1,039. The CIBSE women's network, WiBSE, was created to build on this momentum and has gained more than 375 members since it launched in May this year.

However, Sarah Davis, chair of the WiBSE group, is under no illusions that the barriers have been broken down. 'We have 375

members at present, but we are nowhere near touching the surface yet. There are a lot of women doing their own thing and keeping their heads down because they are working in a male-dominated environment and don't want to draw attention to themselves.'

To help address the issues of inequality within engineering, the institution has launched a Diversity Panel. This aims to break down the barriers to those under-represented groups in the profession, such as ethnic minorities, those with disabilities and women.

Andy Ford, chair of the Diversity Panel, is proposing that the incumbent CIBSE president should automatically become the chair of the Diversity Panel once their presidency ends.

President George Adams FCIBSE, is a keen supporter of equality and diversity, which feature in his key themes for his presidential year. 'We're starting to see that diverse teams can do better in creating sustainable solutions in building services. It's all about creating working environments that nurture fresh thinking'. He sees embracing diversity in the BSE world as a big step towards de-carbonising our cities and drastically reducing the energy consumption of the built environment.

It is this top-down leadership that Ford hopes will promote a change in culture in the world of building engineering. 'It's a logical step,' he said. 'We need to engage a wider skills set within the industry and we need a bigger pool of talent.'

CIBSE was one of eight professional engineering institutions (PEIs) that signed a Diversity in Engineering concordat at the Royal Academy of Engineering in May. The document requires PEIs to increase diversity among professional membership, communicate commitment to equality and monitor and measure progress. The Academy says it will encourage all 36 PEIs to sign-up.

The Construction Industry Council has a similar project with its Fairness, Inclusion,



BARRIERS TO DIVERSITY

E4E has identified a number of barriers that prevent a diverse range of young people from moving into engineering. Its latest report says these are:

- The current direction of education policy in England, with the emphasis on academic qualifications and a low recognition of the value of technical, practical subjects
- The removal of statutory careers education from schools in England. The approach is particularly damaging for young people from poor backgrounds, and flies in the face of the government's commitment to improving social mobility
- The removal of the Education Maintenance Allowance, and the increase in student tuition fees

'Age does not necessarily reflect competence'



Young Engineer of the Year Lee Tabis is a man who knows his own mind. He left school at 16 and enrolled on an apprenticeship scheme, not a popular choice with his teachers and not the route into employment that many espouse today. He started an advanced apprenticeship in building services engineering with NG Bailey



and says: 'I soon realised how effective an apprenticeship route can be for building the

foundations of a career.'

But it wasn't always plain sailing. 'Initially there was an underlying feeling of being perceived as young and insignificant, regardless of experience. I think as younger engineers have developed, it is proven that age does not necessarily reflect competence, and the perception of value is changing accordingly.'

Important lessons to learn



Developing a culture of inclusivity should be a top-down process, says Farah Naz, the co-chair of the Women in Sustainable Construction and Property (WSCP) group.

Naz, who trained as an architectural engineer in the USA, has worked on projects across three continents and has seen a lot of creativity and innovation across the building services disciplines.

However, the sustainability and building services engineer,



who now works in the UK for Ramboll, believes that the full benefit of an inclusive culture will only be seen when 'we

become more actively involved in inviting people from other disciplines, cultures and backgrounds through events, networking opportunities, and design competitions to create a platform of knowledge sharing.'

Education is integral to this, says Naz, and the message should be driven home from primary school onwards. 'Inclusivity needs to become part of our thinking process, not an afterthought.'

Parade of nations



Dorte-Rich Jørgensen is a member of CIBSE's new Diversity Panel. Her best experience of diversity was during the London 2012 Olympics, which saw people from all over the world – with a variety of ethnic backgrounds – working together.

'Our sustainability team had a high proportion of women, and people from different nations and disciplines. Our collaborative approach and diverse team meant that solutions could not be "off the shelf" or from their last job. Being from different backgrounds also meant people couldn't speak in their own professional code.'

➤ Respect (FIR) agenda. As stakeholders in two professions, CIBSE members have a foot in both construction and engineering camps. During the past few years, gathering evidence suggests a diverse workforce not only creates fairness and equality, but has economic and business benefits too.

In January, the Department of Business, Innovation and Skills (BIS) published a report looking at the business case for diversity in the workplace.⁴ In one case study – Eversheds LLP – following actions taken to make it easier for staff to work flexible hours, productivity actually increased by 5%, with flexible working nearly doubling from 48% to 91%. Although the company's overall goal was to increase its female partners to 25% by 2015, there is no conclusive evidence that this increase in productivity was solely down to increasing the number of females in senior positions.

In another case study, Enterprise Rent-A-Car – which aims to increase its female talent so that women are represented at all levels within its organisation – increased the number of women in its workforce by 3% in 2011.

This took its total number of women to 37%,

plus 89% of women returned to employment after maternity leave. And, following the introduction of a mentoring programme led by senior directors, there was a 9% promotion rate of women to senior roles.

The BIS report warns there is no single approach to tackling diversity, and stresses that it needs to be embedded in the business strategy, 'not treated as an ad hoc addition'.

Neil Smith, head of inclusive design at Buro Happold, says a diverse workforce is crucial to company success. 'We all know everybody's different, and that we all bring something different – whether it's life experience or professional experience – to our job. If we are creating a workforce that doesn't allow for differences to be catered for, we are potentially missing out on new ideas and quality staff.'

However, he admits that in the UK there is still a 'fair way to go' before a true diverse workforce is achieved. 'There's an obvious improvement in terms of disability. Thinking back to the first project I worked on, there was no Part M [of the Building Regulations] we didn't have the Disability Discrimination Act or the Equality Act. And we didn't have a basic level of accessibility in the built environment.'

With these Acts in place, new buildings are being built that provide a greater opportunity for people to work and live independently.

He adds: 'I wouldn't say we're at a point of true equality, but we are in a better place than we were.' **CJ**

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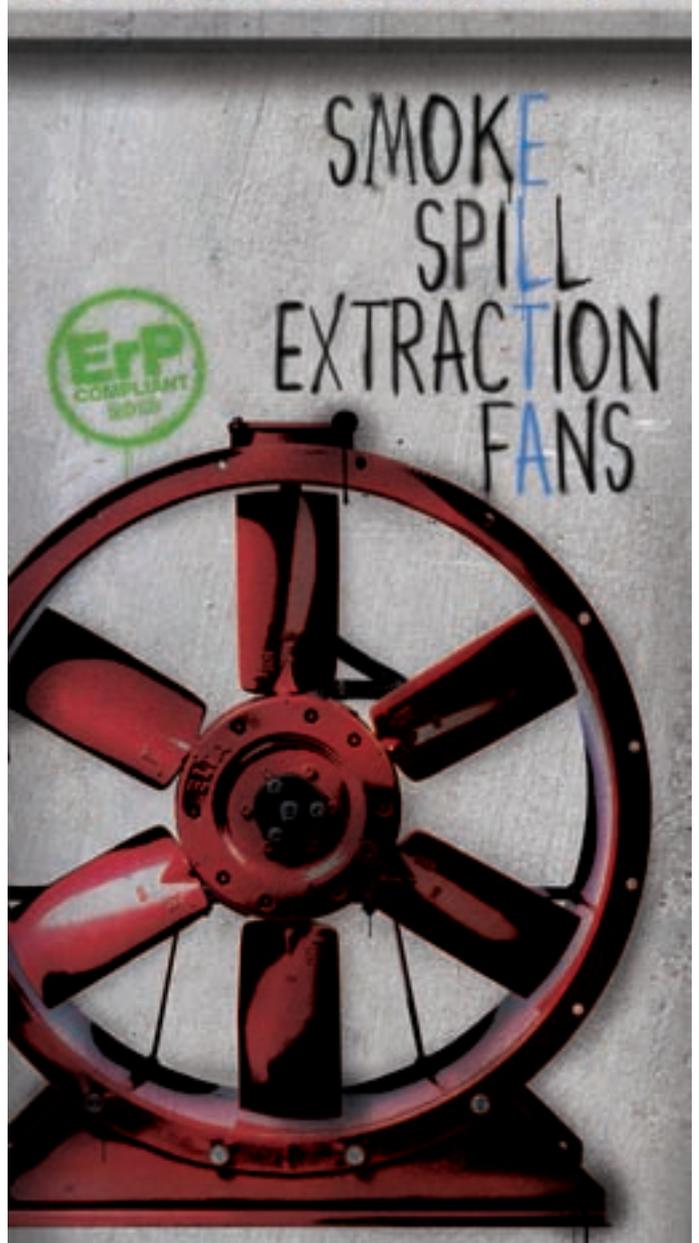
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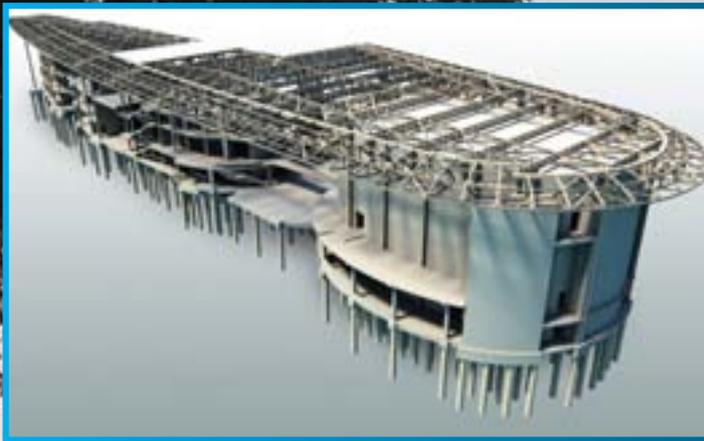
The age of enlighte

Building information modelling is transforming the way buildings are designed. Mott MacDonald used the Royal Welsh College of Music and Drama to set the tone for future BIM strategy. **Jo Stimpson** reports



PROJECT TEAM

- **Client:** Royal Welsh College of Music and Drama
- **Structural, mechanical and civil engineer:** Mott MacDonald
- **Acoustician:** Arup Acoustics
- **Main contractor:** Willmott Dixon
- **Architect:** Flanagan Lawrence



nmmement

BIM capabilities are developing at an impressive rate. But sometimes ambition outstrips the technology available, as Mott MacDonald's mechanical, electrical, and plumbing (MEP) team found when working on an extension to the award-winning Royal Welsh College of Music and Drama.

When modelling work began in 2009, the team was eager to stretch its BIM legs, but BIM packages for MEP were still in their infancy. With some resourceful thinking, the engineers made early forays into using BIM for plant-room detailing and services clash detection.

The results were a revelation, launching the

team on an upward trajectory toward creating the sophisticated MEP BIM models of today.

Before this £22.5m development, the college's existing 1970s building had no concert hall, and lacked rehearsal spaces for drama students and its symphony orchestra. The extension enabled a new 450-capacity concert hall, 160-seat theatre, rehearsal rooms and a new exhibition space to be created.

The new facade wraps around the older building. It features a distinctive, wood-clad concert hall at the north end and a central atrium with glazed walls on its east and west sides. The building is topped by a 'floating' roof that cantilevers on the south end.

When the project started in 2006, consultants were commonly using BIM for structural design, but not for building services engineering, says Mott MacDonald buildings and infrastructure director David Eastland. MEP staff tended to have limited BIM expertise, and UK-compatible MEP-specific software wasn't yet available.

'Whether you're in the UK, US or Australia, a structural element is very similar, but MEP is very component-based,' says Eastland. 'As it was, the software tended to draw on imperial-measured components based on US standards. We were all waiting for the Europeanisation of the software.'



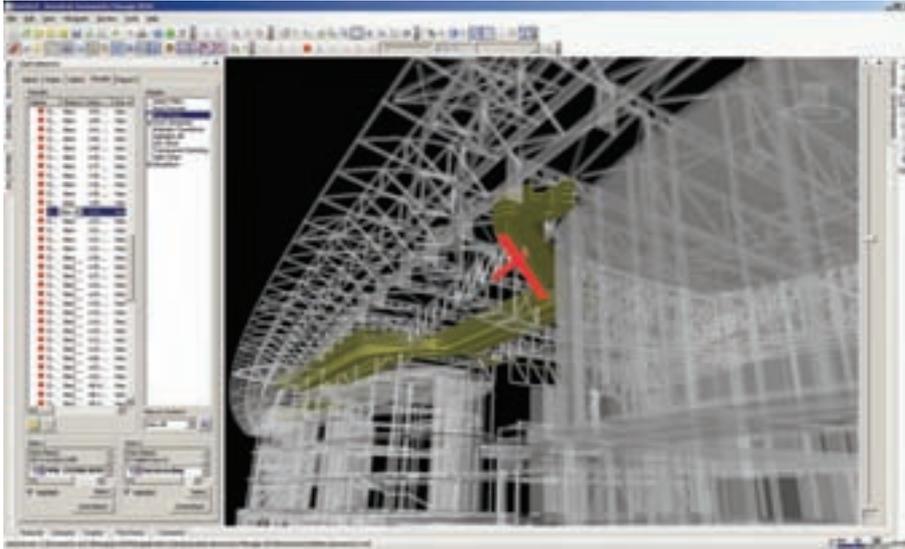
THE PATH TO MATURE BIM

The path for building information modelling (BIM) is progressive from: maturity Level 0 to 3:

- Level 0 – Application of 2D CAD files
- Level 1 – Both 2D and 3D information applied to projects, but often little connection is made with others (Lonely BIM)
- Level 2 – Production of 3D models by all in the team (possibly in isolation but also interoperable using BS 1192 practices) and eventually on to
- Level 3 – A single fully integrated/interoperable data driven model is

used by the whole 'supply chain' from inception to ultimate building deconstruction.

The term 'BIM' is applied variously by practitioners along the path to maturity Level 3. It sometimes simply relates to their adoption of software solutions but as their understanding and application matures 'BIM' will represent the development, management and exploitation of the shared data resource that represents the physical and functional characteristics of the built environment. *Tim Dwyer*



Clash detection meant no remedial design work was required during construction

With some resourceful thinking, the engineers made early forays into using BIM for plant room detailing and services clash detection. The results were a revelation

The Mott MacDonald team, however, was keen to take advantage of BIM's benefits – even if that required improvisation with the non-MEP software packages that were available. 'We had seen what structural engineers were doing with AutoCad Revit. We wanted to dip our toes in the water with BIM – and then realised the power of the technology,' says Eastland.

Revit Structure had been used on the college to build a structural model of the building. Services engineers initially used a basic 3D-modelling programme to build an indicative model showing the layout of ducts and cables. They also created simple services routes through the structural engineer's model, using a US-based software package. Eastland says this process was a 'great leap' compared

with anything the MEP team had done with BIM before, but the effort paid off when the new model was successfully integrated with the existing structural model.

Navisworks project review software was then used to detect clashes. 'Suddenly, everyone could visualise and understand our challenges,' says Eastland. The team used the model to determine whether each clash could be avoided by creating a new opening, or whether the services needed to be rerouted. It allowed the team to resolve significant problems early on. It became clear that BIM could enable more efficient coordination between architectural, structural and building services design.

The team turned to BIM later in the project, when a value engineering opportunity arose, involving a so-called 'tower of plant' on the south side of the building. This would house boilers, chillers and other plant, but could be eliminated, with the plant placed in the basement instead.

The plant's new central location meant that the length of the distribution routes were reduced, and access requirements to high-level roof structures were eliminated. It also had aesthetic benefits; the building gained an elegant roof overhang in the space where the tower would have stood.

Mott MacDonald mechanical engineer Tony Koo was tasked with communicating the change to the client, opting to build a 3D model of the revised design. The client could immediately see the benefits, and the project could continue without further ado. 'Suddenly, the penny dropped,' says Eastland. 'The 3D model saved a lot of time and money.'

The refurbished and extended Royal Welsh College of Music and Drama is now a landmark building in Cardiff that has been recognised with accolades, including a prestigious RIBA Award for architecture, and the ACE Engineering Excellence Award for Building Services by a large firm.

The MEP team's experience laid stepping-stones on a path that has become well-trodden in subsequent years. Now, Eastland says, the team 'would be unlikely to undertake a project as complex and unique as this without using BIM for building services'.

There are a number of other aspects of the project that would have benefited from BIM if today's software and expertise had been available at the time. A prime example is the electrical distribution around the new concert hall and theatre, where a highly complex network of cables was required in an environment that was painstakingly designed for excellent acoustics.

The college building stands adjacent to a

The future of BIM

From tentative first steps in Cardiff to corporate giant leaps, the Mott MacDonald MEP team has seen firsthand how fast BIM proficiency and technology can improve. So how will things progress in the coming years?

'What happened with Microsoft Excel is what will happen with BIM,' says Eastland. 'When they invented the Excel spreadsheet they had no idea how varied its applications could be. But just look at what they're doing with spreadsheets now.'

Eastland believes that new graduates will play an instrumental role in discovering the full potential of BIM. 'What we have now is a bunch of bright young things who are going to grab BIM with both hands and tell me how they're going to use it,' he says. 'The graduates we are employing now will have a fresh perspective. They will not know 2D CAD – they'll think in 3D and BIM interoperability.'

Eastland predicts that within the next few years all building projects will be modelled in

3D CAD. Clients will become more familiar with BIM and will begin to demand that they be given access to a model and the associated data, he says. He also believes that, just as MEP has caught up with structures in terms of BIM use, other sectors will follow over the next three years or so and become more interested in BIM – particularly clients, asset managers and manufacturers.

Improvements to software packages are likely to be forthcoming. Eastland imagines that BIM programmes will have better user control interfaces and that there could be a common operating platform for use with multiple software packages.

BIM could also reshape contracts, programme scheduling and payments. 'Consultant appointment documents will change to reflect the workflow of BIM projects,' Eastland says. 'The documents will reflect the fact that when you use BIM the bulk of work is done up-front, rather than later in the project.'

noisy main highway, and is in constant use by a large number of people, but it was paramount that nothing compromised the acoustic integrity of the concert hall. Complex acoustic design was required to deliver a concert-standard performance space.

The hall features a circular outer skin, within which sits a concrete box comprising a 400 mm-thick drum and a 300 mm-thick lid. Any penetrations between these outer and inner walls had to be acoustically detailed to minimise vibration and break-in noise. There could be no rigid connections; only flexible ones were permitted to isolate all vibrations.

However, the plant required in and around the concert hall was extensive. In total, 75 theatrical audio and communications outlet boxes and 75 theatrical power and lighting boxes were sited, each with up to 16 cable outlets. The cable interconnections differed in origin and route. ‘Cabling doesn’t get much more difficult than this,’ says Eastland. ‘It was like trying to bring some kind of order to a plate of spaghetti.’

Managing this intimidating network of cables within the controlled environment of the concert hall was a considerable challenge, both in terms of data management and physical co-ordination of the cables. The task fell to Mott MacDonald senior electrical engineer Suthan Kaneswaran, who says the BIM capabilities available to him today would make a job like this much easier.

For example, a 3D model of the primary cable routes would be built, meaning the team could easily understand where the plant was and have a dynamic record of each cable’s properties. BIM would mean that the cable network could be easily adjusted and refined remotely, without the need to go on site. ‘It’s difficult to visualise everything in 2D, and on this project we had to go on site to determine restrictions in places where we wanted to trunk cables together,’ Kaneswaran says.

These aspirations have been realised on subsequent projects. MEP software suitable for different international environments is now widely available.

The MEP team sees the Royal Welsh College of Music and Drama as the “flashbulb moment” that started a rapid journey toward BIM excellence. ‘We’re at the stage where we can really do this now,’ says Eastland. ‘We’ve come a long way in the three years since we started modelling on the Royal Welsh College in 2009. Experiences such as that on the college are why Mott MacDonald is now so committed to BIM for MEP.’

BIM proficiency requires the presence of three elements that, historically, were not in



The Royal Welsh College of Music and Drama as seen from neighbouring Bute Park

place, says Eastland: the software, the hardware and the ‘liveware’ – that is, the staff proficiency. ‘Now we’ve got all three, and we have staff expectation that this is the future. They are driving it forward,’ he says.

Even the ‘old guard’ of engineers – who felt more comfortable working in 2D and drawing by hand – have been won over, Eastland says. ‘It’s Darwinian – adaptation is essential to survival. Anyone resistant to BIM will find they can’t access the information and everyone else can. They will then have to switch their computer back on and catch up.’ **CJ**

JO STIMPSON is a technical writer at Mott MacDonald

“We wanted to dip our toes in the water with BIM – and then realised the power of the technology”
David Eastland

Going underground

Mott MacDonald is now providing architectural, civil, building services engineering and structural design on three underground stations for the new Klang Valley Metro Rail Transit Blue Line in Kuala Lumpur, Malaysia.

The project relies heavily on BIM as a means of remote international working. Revit and Navisworks are used in conjunction with online collaboration tool GoToMeeting to allow teams in different countries to coordinate in real time on the same model.

The complexity of the model – which will incorporate 4D (programming) and 5D (cost) – is ‘staggering,’ says

Eastland. It has enhanced stakeholder engagement, enabled automatic scheduling, and prevented clashes between complex MEP and the building shell.

In London, the £700m Victoria Station Upgrade has also been greatly enhanced by BIM. London Underground was one of the first clients to set out requirements for BIM, and Mott MacDonald’s use of BIM on the project won Bentley’s Be Inspired Award for Innovation in Rail and Transit in 2010.

All project partners – including principal contractor Taylor Woodrow Bam Nuttall – are working collaboratively from a single, shared 3D model.

A common data environment means that all participants have controlled access to the correct information at all times.

BIM has allowed the modelling of complex geometries around existing utilities, and the automatic positioning of drilling rigs. It has also been used to evaluate value engineering alternatives.

The model includes both information from ‘as built’ records and from laser sweep surveys, and all information is tagged with its provenance. Multidisciplinary inputs are integrated into a single model, meaning that interface issues are identified and resolved before construction.



DRIVING HOME FIRE SAFETY

Jet fans have long been the go-to technology for effective car park ventilation, but developing safe and reliable systems is often challenging. **James Allen** discusses the need for greater understanding of smoke control in car park design

It is important to remember that fans selected for a car park ventilation scheme form part of a collection of fans, which interact with each other and their surroundings

Practical, powerful and cost-effective – it's no wonder thrust fans, which includes both jet and induction technology, are now the first choice in car park ventilation throughout the UK and worldwide. Tracing their roots to the tunnel fans pioneered in the 1960s, their adaptation for enclosed car parks over the last 20 years has elevated them above traditional ducting design.

Yet, despite their technological and practical superiority, there is often a lack of cohesion in the industry when designing new systems and using thrust fan technology effectively.

The cut and thrust of design

There are currently two design approaches for a thrust fan system: smoke clearance and smoke control. Firstly, smoke clearance systems meet the requirements of the

Building Regulations – Part B and Part F, which define air change rates for smoke and pollution extraction, based on a set number of air changes per hour (10 and 6 ac/hr respectively). However, a smoke clearance system doesn't take into account the potential size or location of a fire, and neither does it aid escape or firefighter access. British Standard 7346 Part 7¹, which was published in 2006, has gone some way to address this issue by including design parameters for smoke control systems, while ensuring the use of thrust fans does not worsen conditions for escaping occupants or firefighters.

The second option for building services engineers is a smoke control system. These are designed to manage smoke movement, while facilitating firefighter access within the necessary visibility and temperature criteria. Despite not yet being a requirement in the UK, these type of systems are fast becoming a preferred choice for new car park construction, where the parking area on a single floor is sufficiently large enough (typically floor areas greater than 4,000m²).

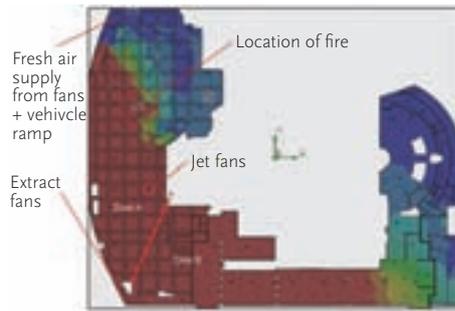


Fig 1

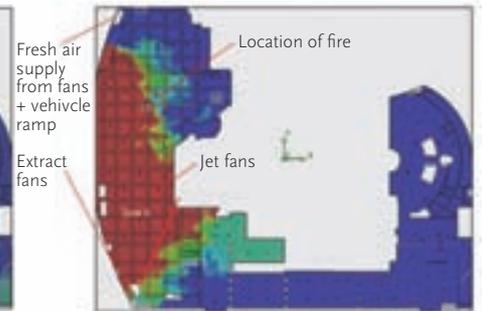


Fig 2

Fig 1 and Fig 2 show a system with two zones, A and B. Fig 1 demonstrates smoke travelling beyond the boundary of zones A and B, caused by the selection and operation of too many jet fans within zone A.

from the boundary conditions applied to represent walls and ceilings, to the choice of model for the fire source.

Consequently, many fan manufacturers are now using this technology to provide their own data and aid engineers in the design process, highlighting some key factors to consider when specifying a system. It is important to remember that fans selected for a car park ventilation scheme form part of a collection of fans, which interact with each other and their surroundings. So, it is essential that they are specified taking a holistic approach – encompassing the whole system – rather than treating each fan separately.

Some of the key points to take into account during the design stage include: jet fan performance; lateral spacing; the total number of fans specified; and installation effects.

Thrust fan performance

Jet performance can vary widely from product to product, with the effectiveness of each fan fluctuating, depending on how each is installed. So, by using the velocity profiles supplied by the manufacturer as reference data, engineers can obtain vital information about the throw length and width of a jet from the fan. Plus, it demonstrates the total quantity of air moved over a specific distance when installed. It's this level of detail that can help systems meet a higher level of safety by going beyond the standard technical datasheet.

In addition to the effects of building geometry, the lateral spacing – distance between neighbouring fans – has a significant effect on system performance. For example, the effect of installing a 400mm diameter fan at, say, 10m spacing instead of 15m, can have a dramatic effect on the velocity profile. With larger gaps

between the thrust fans, isolated velocity profiles can form, preventing a uniform flow. This may require higher extraction rates to be employed to effectively fill the gaps, especially if the flow is expected to control smoke from a vehicle fire in all areas.

However, the potential issue here is that the extract flow is usually already fixed by the size of the shafts or openings – again highlighting the need to incorporate such data into the early stages of system design.

Installation effects

In car parks there are a variety of obstructions to airflow, such as pillars, down-stand beams and larger impediments, including internal rooms and stair cores. Other significant losses in airflow include the pressure developed by a fire, its location – whether the fire is in a corner or is some distance away from a wall – and large increases or decreases in floor-to-ceiling height. These factors are referred to as 'installation effects' and they need to be fully understood by the ventilation system designer.

Not all thrust fans will have a direct influence on the extract flow rate. Selected fans will be used for distributing air, while others accelerate air and smoke towards an extract point. If thrust fan systems operated by automated controls are not balanced – and there are too many fans – it can result in backflow of smoke or, worse still, rapid acceleration of smoke beyond zone boundaries, particularly in large multi-zoned car parks. (See figs 1 and 2.) **CJ**

Reference

1. BS 7346-7:2006, Components for smoke and heat control systems.

JAMES ALLEN is senior CFD applications engineer at Fläkt Woods

Car parks smaller than 4,000m² become less suitable for smoke control due to greater confinement of the fire, fewer options for control over the direction of airflow, and reduced plant room space. In these cases smoke clearance is usually the chosen path.

Whichever method is chosen, there are a number of factors that must be considered during the design stage to ensure building design engineers avoid future problems, as well as reduce the possibility of worsening conditions during a fire.

For more than 10 years, computational fluid dynamics (CFD) has been relied upon to design and demonstrate an effective thrust fan system. The use of CFD is considered essential because of the complexities of air movement involved. However, on some occasions, the timescales required for calculating airflow and fire conditions for a variety of scenarios can make CFD expensive. Furthermore, the outcome of a CFD simulation is only as good as the input data, with the accuracy of results varying significantly according to what information is used – ranging

UNDERSTANDING *the* RISK

Fire suppression can be used as an alternative to fire protection, says **Craig English** who took the risk-based approach on the four-storey podium structure of the Beetham Tower

6 The relatively high cost of fire suppression systems means few, if any, studies have been carried out to determine their ability to act as a trade-off for passive structural fire protection in steel-framed buildings

It's widely accepted that the main fire risks to life in small buildings arise during the evacuation periods as heat and toxic products spread rapidly throughout the building. Local or disproportionate failure of the structure, which may happen during the later stages of fire development, are a secondary concern, providing no sleeping risks exist, adequate warning of fire is given and sufficient exit width is provided.

It's understandable, therefore, that some fire engineers have questioned the need to protect structural steel elements in low rise buildings. This is particularly so when it appears that fire protection is being used at the expense of other safety measures, such as suppression systems, which are possibly the most effective of all.

Unfortunately, the relatively high cost of these means few, if any, detailed studies have been carried out to determine their ability to act as a trade-off for passive structural fire protection in steel-framed buildings. This is unfortunate because fire suppression systems, in attacking blazes at source, will also

protect against content, infrastructure and environmental losses in a way that structural protection alone, cannot.

In 2007, a unique opportunity arose at the Beetham tower to determine if the building's fire suppression system could be used safely as a trade-off for structural protection in the four-storey steel-framed podium structure. The work was carried out using a risk-based approach similar to that used to develop new fire resistance periods in BS 9999¹. The opportunity only arose because the suppression system was being installed at the request of the operator (Hilton) and not as a means of satisfying any safety requirement.

Risk-based design approach

The risk-based approach used Monte Carlo simulations – the parametric fire in Eurocode 1² and the limiting temperature technique as set out in BS 5950-8³. It was executed on the basis that all steel columns and beams in the building would have been passively fire protected to achieve two hours of resistance. The likelihood of individual steel elements being heated beyond their limiting temperatures in any one room was first calculated for the fire-protected option and then for the alternative option which relied solely on a suppression system being present in the room.

For each case, the number of steel elements heated beyond their limiting temperatures in

Fig 1 Illustration of methodology





WSP carried out fire suppression on the four-storey podium structure, right, of the Beetham Tower



Fire suppression systems, in attacking blazes at source, will also protect against content, infrastructure and environmental losses in a way that structural fire protection alone cannot

individual rooms was recorded and the results included into event trees. Each event tree allowed the risks to be compared relatively. The relative nature of the approach allows some of the limitations of the underlying fire and structural models to be overcome.

The methodology consisted of four main stages as illustrated in Figure 1.

Monte Carlo analysis

The Monte Carlo analysis (Figure 2) uses different values; these typically being those attributed to fire load density and ventilation in the room of blaze origin. Each variable is assigned a distribution of values and this controls the frequency that different values are chosen when a set number of fire simulations are run. The technique is ideally suited to problems of this nature as the calculations are based on physical theory and experimental measurement. This helps compensate for a lack of information about real-life circumstances in a manner that other risk-based methods cannot. Furthermore, all assumptions are explicit and a measure of the sensitivity of these can be made by changing the value for a variable, re-running the simulations and then comparing the new results with those originally generated.

At the end of the process, 10,000 values of maximum steel temperature [protected and unprotected] have been calculated for each

room in the building. The frequency that individual limiting temperatures would be exceeded is then calculated by dividing the number of exceeds by the total number of fire simulations run in that room. The overall risk for both design options is then computed by multiplying the relative risk by the frequency that fire was expected to reach the fully-developed stage. The required reliability of the suppression system for an equivalent risk level is then back calculated. The results are shown in Table 1.

The analysis assumes that if the sprinkler system operates successfully then flashover and damage does not occur.

The results of the study show that the fire suppression system is capable of providing a level of structural safety at least comparable to that achieved should all structural elements in this building be fire protected to achieve 120 minutes fire resistance and that the required reliability of the suppression system for equivalence ranges between 11% and 87.0%. The average reliability rate for precise equivalency in this case is 53%.

There is no reason to suggest that the low-pressure water mist system used on this project would not achieve this overall performance level.

When analysing the results of this work consideration should be given to the following:

- The building did not need a fire

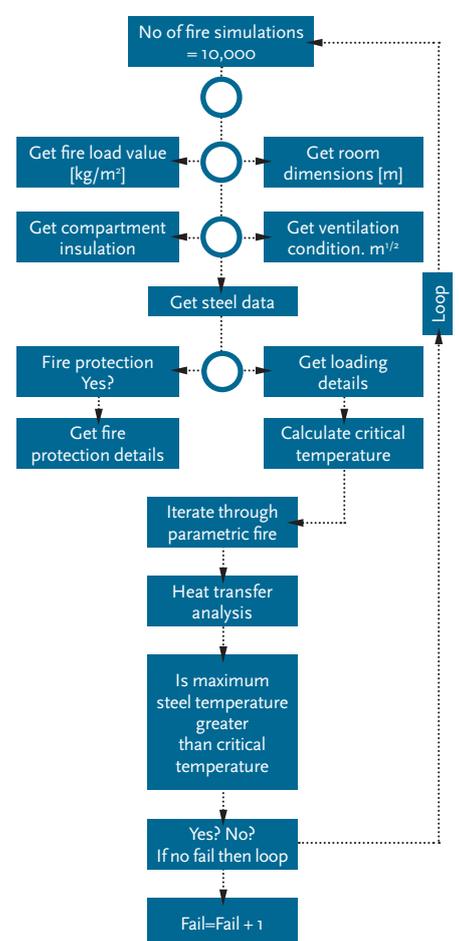


Fig 2 Flow diagram outlining the Monte Carlo process

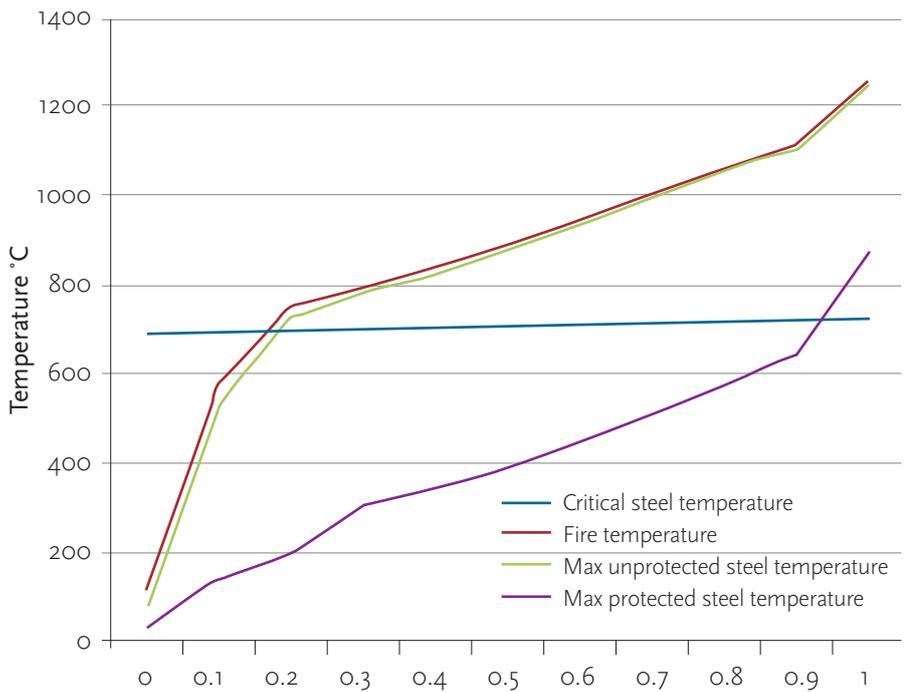


Fig 4 Cumulative plot of fire, protected steel temperatures and unprotected steel temperatures

- suppression system to satisfy safety objectives.
- The podium is four-storeys high and has a composite steel frame that is structurally independent of the main tower. It is separated from the tower by a compartment wall that has 60 minutes fire resistance
- As the podium is structurally independent of the main tower, it could have been argued that a 60 minute fire resistance period was

applicable for elements of structure. The fact that 120 minutes fire resistance was adopted suggests that the reported results may be conservative

- The analysis assumed all passive fire protection to be correctly installed, well maintained and, therefore, 100% reliable. This may not be the case in practice
- Had likely reductions in direct and indirect losses, as a result of using a suppression system, rather than passive fire protection only, been factored into the calculations, the cost and safety benefits of this alternative may have appeared much greater

In 2007, the work was reviewed by BRE and approved by Manchester City Council. Then, the building was thought to be the first to be designed using the risk-based techniques outlined here and probably the only low-rise steel-framed building that has a structure protected entirely by a fire suppression system. **CJ**

CRAIG ENGLISH is technical director of the fire engineering team at WSP London

References

- 1 Report to FSH/14/-/2 DD9999, Task Group Activity: Commentary to a New Approach to Specifying Fire Resistance Periods
2. BS EN 1991-1-2. Eurocode 1: Actions on structures – Part 1-2: General actions – Actions on structures exposed to fire
3. BS 5950. Structural Use of Steelwork in Buildings. Part 8: Code of Practice for Fire Resistant Design, BSI, London, 1990.

Case number	Probability of fire starting	Assumed suppression success rate	Probability of flashover occurring	Number of failures based on 10,000 fires	Probability of failure based on 10,000 fires	Relative risk of failure	Required suppression success rate for equivalency
1fp	1	X	0.590	2055	0.205	0.121	X
1sp	1	95%	0.029	9565	0.95	0.029	78%
2fp	1	X	0.590	8775	0.87	0.517	X
2sp	1	95%	0.029	9881	0.98	0.029	11%
3fp	1	X	0.590	3889	0.39	0.23	X
3sp	1	95%	0.029	9229	0.92	0.027	58%
4fp	1	X	0.590	850	0.09	0.04	X
4sp	1	95%	0.029	8665	0.86	0.02	90%
5fp	1	X	0.590	1760	0.17	0.10	X
5sp	1	95%	0.029	8760	0.87	0.025	79%
6fp	1	X	0.590	1852	0.18	0.109	X
6sp	1	95%	0.029	9075	0.91	0.026	79%
7fp	1	X	0.590	1158	0.11	0.06	X
7sp	1	95%	0.029	9349	0.93	0.027	87%

x = not applicable, fp = fire protection option, sp = steel protected by suppression system only

Table 1 Results of risk assessment process showing required reliability of fire suppression system for equivalency to be achieved

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COLD CUTS

Variable refrigerant temperature controls make the latest VRF heat pumps 28% more energy efficient than previous systems, claims Daikin's **Martin Passingham**

The first step for designers aiming to improve energy efficiency is to reduce actual energy demand by improving the thermal effectiveness of the building fabric.

An additional benefit of these highly insulated buildings is that they are also suited to energy efficient solutions, such as air source heat pumps.

The Energy Related Products (ERP) Directive, affecting the seasonal efficiency of VRF (variable refrigerant flow) and Daikin's VRV (variable refrigerant volume) heat pumps, is scheduled to start in 2016. Because seasonal efficiency measures energy use across the entire operating range, it is a more accurate measurement of the real-life effectiveness of systems and gives an indication of how well an air conditioning system operates over an entire cooling or heating period.

Seasonal improvements for VRV heat pumps are achieved by the incorporation of a variable refrigerant temperature control.

This automatically adapts the VRV system to an individual building's

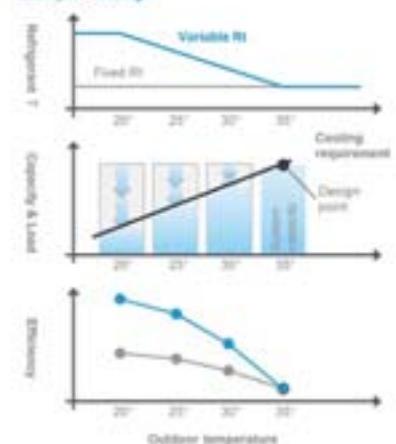
requirements, significantly reducing running costs.

The variable refrigerant operating conditions may be present to ensure that the balance between the demands of comfort and efficiency are optimised, and can deliver annual cost savings of up to 25% for heat pumps with the variable refrigerant temperature control. In traditional, less efficient systems, control will rely on varying the refrigerant flow rate while maintaining a constant refrigerant temperature set point.

The automatic variable refrigerant temperature mode works by reducing the speed of compressors and by increasing the evaporation temperature, as it cools outside. This delivers higher efficiency due to lower compression ratios (Fig 1). So the more the refrigerant temperature, the higher the efficiency, as variable refrigerant temperature is applied to meet load. **CJ**

MARTIN PASSINGHAM is product manager at Daikin
UK www.daikin.co.uk

Example: cooling



Basildon hospital

Daikin variable temperature systems were installed to provide comfort air conditioning into the eight kitchens of Basildon Hospital's Jubilee Wing.

Two heat pumps with 22.4 kW cooling capacity were installed externally on one of the hospital's roofs. Both pumps were connected to six wall-mounted units. Maintenance can be carried out from the front of the unit, so causing little disruption to the workflow in the kitchens.

Each of the heat pump systems are controlled using a wired remote control, as well as being centrally controlled via the hospital's building management system. This has been pre-programmed to switch on the systems at specific times (for example, when the kitchens are being used), to save energy.

The scheme has also been designed to be



expanded easily, or replicated across other areas of the hospital, when refurbishment or maintenance programmes allow.

Because the installation is recent, no actual running data is available yet, but projected energy consumption modelling has been carried out, and similar monitored live installations on other projects outside the UK are showing an increase in energy efficiency

of 28% over the previous high efficiency VRV units.

The heat pump also has a continuous defrost cycle, which can operate alongside the heating system, making it a viable alternative to traditional heating systems. This is important as, during the heating operation, all heat pumps accumulate ice, which must be melted periodically, using the defrost operation to reverse the refrigeration cycle. This allows for continual operation and maintaining of a comfortable internal environment, even when external temperatures are severe.

To ensure that the site works most effectively, customised monitoring and control software is used for simplified commissioning, servicing, configuration and customisation. The software also allows systems to be managed across multiple sites.

Professional development



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The terminology and concepts used to determine the magnitude and direction of incident solar radiation

This module looks at solar geometry and the effect of climatic attenuation on incident solar radiation

There are many stunning examples of significantly glazed buildings that, through thoughtful design, can also have moderate cooling loads. To achieve effective designs requires a good understanding of how the building responds to changes in the external environment. Some of the aspects of thermal mass (and admittance) have been covered in earlier articles (January 2013 and May 2011). This article will consider the solar geometry and the effect of climatic attenuation on incident solar radiation that may then be applied to evaluate the effectiveness of shading devices and calculate solar heat gain through fenestration.

Solar gain through glazing will be primarily dependent on the intensity of the incident solar radiation and the relative position of the sun to the surface of the translucent material. There are standard methods and algorithms that have been developed to synthesise solar data – these are given in detail in CIBSE Guide J.¹ However, the terminology used and the assumed background knowledge may be unfamiliar to many building professionals.

The intensity of the sun

At the outer reaches of the earth's atmosphere, the incident sun's energy has

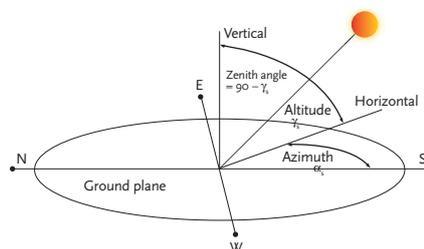


Figure 1: The relative position of the sun to a point on the earth's surface

an intensity of about $1,367 \text{ W} \cdot \text{m}^{-2}$ and, since the sun is large and 149,600,000 km from the earth, the sun's rays are assumed as practically parallel on entering the atmosphere. As the electromagnetic radiation passes through the atmosphere, it is attenuated by gases, aerosols and particulate matter. The attenuation (that, apart from ultraviolet, principally takes place in the troposphere) and the scattering (known as 'Rayleigh scattering') of the solar radiation will relate to the depth of atmosphere through which the radiation passes.

The effective atmospheric depth will be affected by the apparent angle of the sun's rays with the ground (the relative solar position is illustrated in Figure 1). The actual path length (Figure 2) through the atmosphere is described using the term

'relative air mass', AM. This value will depend on the height of the site above sea level and the solar altitude – at higher values of relative air mass, less solar radiation will reach the earth's surface and the higher frequencies (blue/green light) are increasingly scattered, so leading to light dominated by lower frequency red/orange.

An AM value of 2 (relating to a solar altitude angle of 30°) is typically used in standard data for solar irradiance.

To account for the effect of the climate (including permanent pollution) at a particular location, the 'Linke turbidity factor', T_{Lk} , represents the multiple of clean dry atmospheres that would produce the equivalent solar attenuation to the actual atmospheric conditions at a particular location. This ranges from a value of 2 for very clean, cold air to 3 for warm air, and above 6 for a location with heavily polluted air.



Figure 2: The effect of solar altitude on atmospheric depth

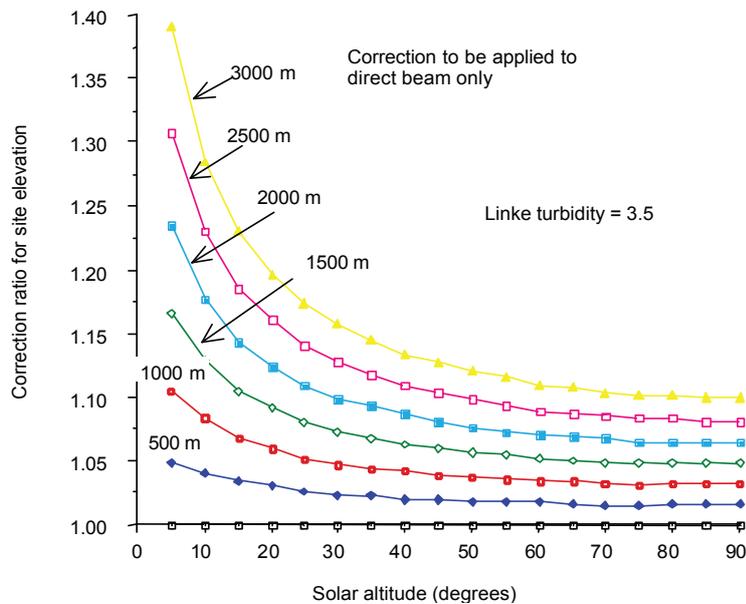


Figure 3: Effect of site elevation in metres on the predicted beam irradiance expressed as a ratio to the sea level beam irradiance at different solar altitude angles (Source: CIBSE Guide J)

When the solar radiation reaches the earth's surface the direct component of the solar energy, known as the 'beam irradiance' (measured perpendicular to the direction of the sun) will be affected by the site elevation. Locations such as Denver, Colorado – which is 1.6 km above sea level – have a significantly shorter atmospheric path (with a troposphere depth of around 17 km above Denver) than will a location at the same latitude but at sea level. By comparison, in the UK the highest town is 500 m above sea level. To account for this, an altitude correction factor is applied to the basic beam irradiance that will also be dependent on the sky clarity. This correction factor is shown in Figure 3 for a Linke turbidity factor of 3.5.

After passing through the atmosphere, the normal beam irradiance has a maximum value of approximately $950 \text{ W} \cdot \text{m}^{-2}$. In addition to the direct irradiance, there is a diffuse component that – as the name suggests – is non-directional and will depend on the atmospheric (notably climatic) conditions, as well as the surrounding surfaces.

As the Linke turbidity factor increases, the diffuse irradiance at a given solar altitude rises (as indicated in Figure 4), since there is greater scattering of light.

The diffuse irradiance typically ranges from $100 \text{ W} \cdot \text{m}^{-2}$ for a 'clear' sky, up to $450 \text{ W} \cdot \text{m}^{-2}$.

The colour and reflectivity of adjacent constructions, ground and vegetation will

affect the reflected component of solar radiation – this is considered as diffuse radiation, and its magnitude is directly related to the surface 'albedo' (the fraction of sun's radiation reflected from a surface).

The albedo of different common materials ranges from about 0.14 for tarmacadam to 0.23 for aged concrete. A recent report² on a project indicates that surrounding surface finishes should play a significant part of the design analysis when considering the environmental performance of buildings, as they may significantly affect heating and cooling loads.

It is normally assumed that, of the reflected diffuse radiation, 50% will strike the adjacent vertical surface, while for sloping surfaces, Guide J provides a simple relationship in terms of the slope angle, β .

The ground reflected irradiance is given by:

$$R_{gh} = \rho_g \cdot r_g \cdot G_c \text{ (W} \cdot \text{m}^{-2}\text{)}$$

Where

ρ_g is the ground albedo, r_g is the ground slope factor and G_c the clear sky global irradiance on a horizontal surface ($\text{W} \cdot \text{m}^{-2}$),

the ground slope factor is given by: $r_g = (1 - \cos(\beta)) / 2$ and so for vertical surfaces $r_g = 0.5$

If there is mirror-like 'specular' reflection (such as from highly reflective polished metal cladding), the reflected component would need to be specifically modelled for the application.

In common with other sources, CIBSE-published solar data applies a ground albedo of 0.2 and a Linke turbidity factor of 3.5, with various correction factors, k , being applied to the data to account for localised site conditions.

The 'global irradiance', G_c at a particular surface is the sum of the beam and diffuse components.

The relative position of the sun

The relative position of the sun may be practically determined for any time during the year with simple trigonometry plus some empirical data relating to the earth's orbit around the sun and the axial tilt (of 23.4°) of the earth that drives the seasonal variation in incident solar radiation

As shown in Figure 5, the value of solar declination, δ , is independent of location but related to the time of year (varying from $+23.5^\circ$ around 20 June to 0° at the vernal and spring equinox, and -23.5° around 22 December, due to the relative tilt of the earth's axis as the earth revolves

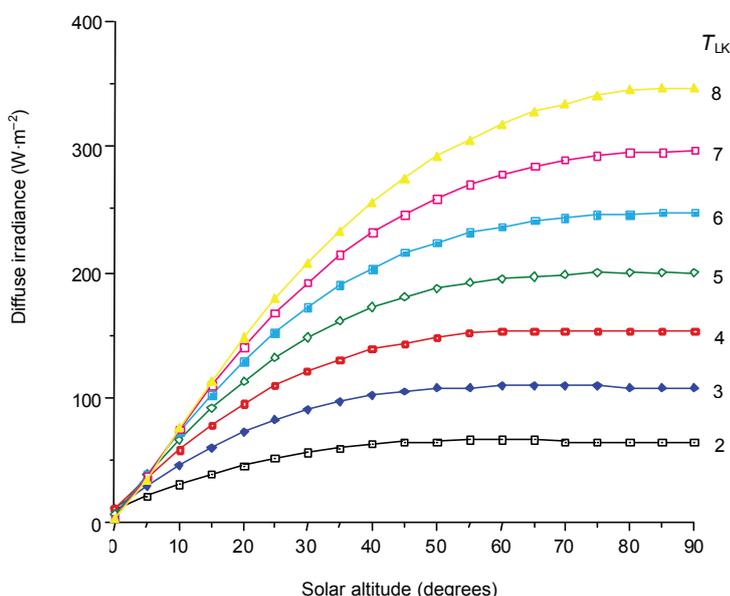


Figure 4: Diffuse irradiance on horizontal surfaces (at sea level) from the clear sky at mean solar distance as a function of solar altitude, for Linke turbidity factor, T_{LK} , values from 2 to 8 (Source: CIBSE Guide J)

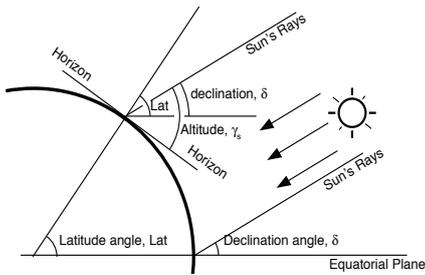


Figure 5: Solar geometry at a point on the earth's surface relative to the tangential visual horizon

around the sun), and may be determined by a simple sinusoidal functions. Only locations in the 'tropics' (latitudes between 23.5°N and 23.5°S) can have the sun vertically above (at a solar altitude of 90°, zenith of 0°). When considering a particular location, the angular height of the sun above the horizon, the solar altitude, γ_s , and its angular position in the horizontal plane, the solar azimuth, α_s , may be calculated.

So:

$$\sin(\gamma_s) = \sin(\delta) \cdot \sin(\phi) + \cos(\delta) \cdot \cos(\phi) \cdot \cos(\omega)$$

and,

$$\cos(\alpha_s) = (\sin(\gamma_s) \cdot \sin(\phi) - \sin(\delta)) / (\cos(\phi) \cdot \cos(\gamma_s))$$

$$\sin(\alpha_s) = \cos(\delta) \cdot \sin(\omega) / \cos(\gamma_s)$$

with the $\sin(\alpha_s)$ calculation being required to establish the quadrant where α_s resides.

ω = absolute value of the hour angle (e.g., noon = 0°, 2pm = 30°, 9am = 45°, etc.)
 ϕ = latitude

If $\sin \alpha_s < 0$, then $\alpha_s = -\cos^{-1}(\cos(\alpha_s))$;
 if $\sin \alpha_s > 0$, then $\alpha_s = \cos^{-1}(\cos(\alpha_s))$.

CIBSE Guide J provides a full set of formulae that may readily be applied to spreadsheets to provide the relative position of the sun at any particular time.

The purpose of establishing the solar

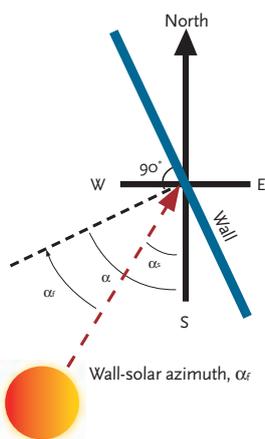


Figure 6: The wall-solar azimuth angle, α_f

position and the irradiance is to be able to apply it to the surfaces of a building, and so the relative position must be established. As indicated in Figure 6, the angle that the surface faces (in the horizontal plane) is known as wall azimuth angle, α , measured relative to south (in the northern hemisphere). The difference between the wall azimuth angle and the solar azimuth, α_s , is known as the wall-solar azimuth, α_f , with values to the east of the north-south meridian negative and values to the west being positive.

$$\text{So } \alpha_f = \alpha_s - \alpha.$$

The basic solar data having been determined, the intensity of beam irradiance, B , ($\text{W} \cdot \text{m}^{-2}$) falling on a horizontal plane may be established from

$$B = B_n \cdot \sin(\gamma_s) \text{ where } B_n \text{ is the normal beam irradiance}$$

and for a vertical plane (taking account of both the altitude of the sun and the orientation of the surface)

$$B = B_n \cdot \cos(\gamma_s) \cdot \cos(\alpha_f) \text{ where } \alpha_f \text{ is the wall-solar azimuth.}$$

For a sloping surface, it requires a rather more complex set of trigonometric equations, so it is convenient to separately establish the angle of incidence of the solar radiation with a sloping surface

$$\nu(\beta, \alpha) = \cos^{-1}(\cos(\gamma_s) \cdot \cos(\alpha_f) \cdot \sin(\beta) + \sin(\gamma_s) \cdot \cos(\beta))$$

And so for a sloping surface with a slope β and wall azimuth α ...

$$\text{when } \cos \nu(\beta, \alpha) > 0 \dots B(\beta, \alpha) = B_n \cdot \cos \nu(\beta, \alpha), \text{ otherwise } B(\beta, \alpha) = 0, \text{ as the surface}$$

will not be exposed to direct sun.

The positional data for the sun is shown conveniently using a sun-path diagram (Figure 7). This cylindrical projection has the azimuth plotted along the horizontal axis, with the altitude plotted vertically. Each of the curves represents the path of the sun throughout a day for each month of the year. As with the preceding solar calculations, the sun-path is represented using local apparent time – this is the sun time (that is, for the northern hemisphere, midday is when sun is due south). Similar data is available in a tabulated form for all global locations, based on the basic formulae from a number of sources including that on the NOAA Earth System Research Laboratory website at <http://1.usa.gov/141WG7W>

The terminology and basic techniques in this article may be applied when determining the potential impact of solar radiation on the external faces of a building. Practically, the most effective way to undertake this is by employing the formulae (together with other underlying calculations from Guide J) using a spreadsheet, or with one of the industry standard modelling packages.

A future follow-up to this CPD will apply this knowledge to building fenestration, and then examine the effect of the material from this and the earlier CPD articles on moderating cooling loads in buildings.
 © Tim Dwyer, 2013.

References

- 1 CIBSE Guide J, *Weather, solar and illuminance data*, CIBSE 2002.
- 2 Yaghoobian, N. et al, *Effect of reflective pavements on building energy use*, Urban Climate, Volume 2, December 2012.

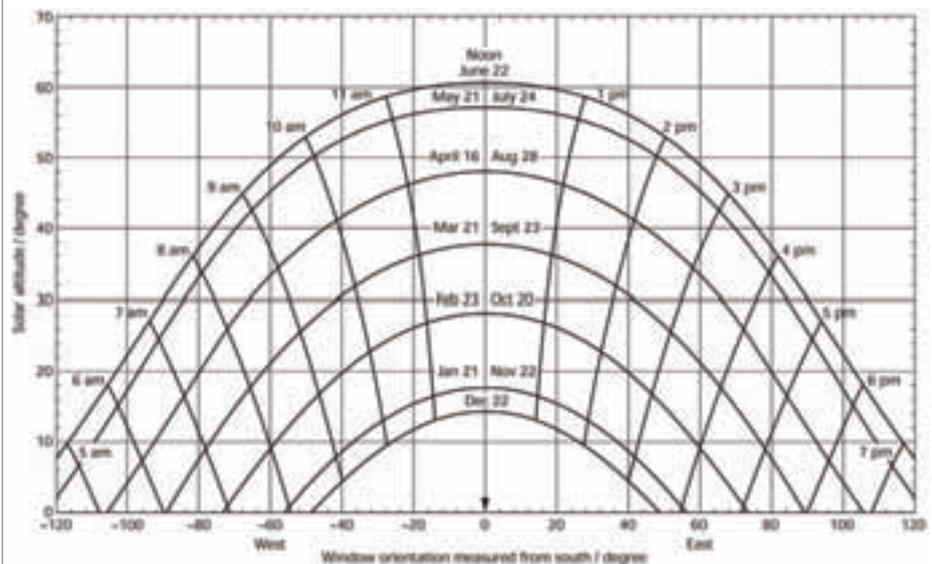


Figure 7: Example sun-path diagram for 52°N latitude related to local apparent time (suntime) (Source: CIBSE Guide A)

Module 54

July 2013

1. What is the approximate intensity of solar radiation on the outer limits of the earth's atmosphere?

- A 970 W · m⁻²
- B 1,070 W · m⁻²
- C 1,170 W · m⁻²
- D 1,270 W · m⁻²
- E 1,370 W · m⁻²

2. When the zenith angle is 60°, what is the approximate basic value of the relative air mass for solar radiation passing through the atmosphere?

- A 0
- B 1
- C 1.5
- D 2
- E 2.5

3. When the solar altitude is 20° in Denver, Colorado, what value of site elevation correction factor would be applied to solar data that is based on a Linke turbidity factor of 3.5?

- A 1.00
- B 1.05
- C 1.10
- D 1.15
- E 1.20

4. The large car park around a single storey office has its old concrete surface covered with tarmacadam. What will be the effect on the reflected solar radiation striking the office windows?

- A It will reduce by about a third
- B It will reduce by about a sixth
- C It will increase by about a half
- D It will double
- E It will stay virtually the same

5. What date and local apparent time will the solar altitude be 20° and the azimuth -40° for a site in France at 52°N?

- A 11am, 21 January
- B 9.30am, 23 February
- C 2.30pm, 20 October
- D 11am, 21 March
- E Noon, 22 June

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Elta announces launch of new SCC fan

Elta Fans has added another product to its 'Elta Select' range. The newly launched Viper SCC (UK patent application number 1211017.7) is a new duct-mounted, centrifugal fan which produces high pressure even with low volumes. The fan is described as ideally suited for installation in sports and leisure facilities, schools, colleges, retail centres, factories and similar duct-mounted installations.

● Call 01384 275800 or e-mail bs@eltafans.co.uk

Air curtain collaboration at Drapers Garden

Air curtain specialist, JS Air Curtains, and entrance specialist, Blue Chyp, have recently supplied and installed four revolving door air curtains at Drapers Garden office complex in the City of London. JS Air Curtains' Rotowind range was designed to meet the specific conditions of a revolving door, which can act as a low-speed fan, forcing a mass of cold air into a room with each rotation. By combining a Rotowind with a revolving door system, cold air is prevented from entering.

● Call 01903 858656 or email sales@jsaircurtains.com



New CPD-accredited seminar: 'Limiting fire hazard and cable protection systems'

Thomas & Betts has introduced a

new continuing personal development (CPD) approved seminar, 'Limiting fire hazard and cable protection systems'. It covers all the key topics connected with limiting fire hazards and providing protection for electrical cables within public areas. The seminar is aimed at electrical consultants and architects who play a major role in the specification process. Contractors, facilities managers, estate managers, designers, project managers and safety officers will also find the CPD invaluable.

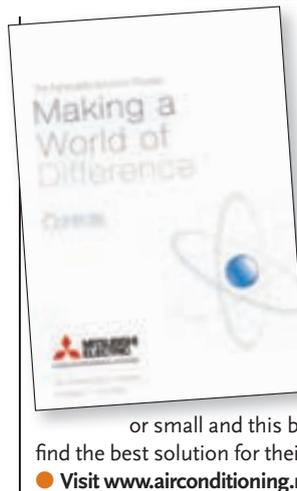
● Call 01675 468200, email john.austin@tnb.com or visit www.tnb.com

New guide to PICVs

Marflow Hydronics, the specialist solution providers for the balancing, controlling and metering of water distribution systems in the HVAC industry, has launched a brand new 'Definitive Guide to Pressure Independent Control Valves'. The aim of the guide is to provide understanding and knowledge to help anyone using the products, ensuring that systems are designed to optimise the best performance levels.

The guide describes the design and operation of Pressure Independent Control Valves (PICVs), explaining how they work, their operational limits and the control options available.

● Call 0845 564 1555, email solutions@marflow.co.uk or visit www.marflowhydronics.co.uk



Brochure shows how controls can reduce running costs

Mitsubishi Electric has produced a new brochure designed to highlight the financial and performance benefits from taking full control of a building's energy use. The 16-page brochure seeks to help building operators optimise the performance of their air conditioning system to reduce running costs and minimise carbon emissions. Sebastien Desmottes, product marketing manager and controls expert for Mitsubishi Electric, said: 'Good controls will benefit any application, large

or small and this brochure is designed to help our customers find the best solution for their situation.'

● Visit www.airconditioning.mitsubishielectric.co.uk or call 01707 282880



Titan Products launches TPZ-Net Zigbee wireless range

The TPZ-Net is a new range of wireless environmental products from Titan Products. Incorporating Zigbee wireless technology, the range creates extremely stable, self-healing mesh networking capabilities. The TPZ-Net range is designed to monitor temperature, CO₂, humidity, light and occupancy levels wirelessly and transfer this information back to the Titan Products coordinator, where the information can be transferred onto a BACnet network or to other Titan product controllers, or I/O (input/output) devices.

● Visit www.titanproducts.com or call 0161 406 6480

Aquatech Pressmain and Autron racing ahead

Sponsors of this year's Ginetta Junior Championship car, Aquatech Pressmain & Autron have been watching closely from the track side as their blue car has been driven hard by the youngest, and only, female in the championship, 14-year-old Jamie Chadwick. Now mid-way through the season, tension is mounting as Jamie increases her knowledge and experience. You can view her progress on ITV4 on Sundays, as part of the coverage of The British Touring Car Championships.

● Visit www.agm-plc.co.uk



Why humidify? HygroMatik CPD offers the answers

HygroMatik provides humidification answers in its in-depth CIBSE-approved CPD. The CPD provides details on the relative humidity requirements and different systems including, isothermal and adiabatic, for a range of environments to answer sector specific demands. This updated presentation, from one of the leading suppliers of commercial air humidifier systems, discusses the following areas, which can be addressed to provide optimum humidification, including comfort and health, prevention of static electricity, materials storage, process control, historical restoration, and 'protection and prevention'.

● Call 02380 443127, visit www.hygromatik.com email info@hygromatik.co.uk



Crane launches new range of TCVs

Valve manufacturer Crane Fluid Systems has launched a new range of thermal circulation valves (TCVs), designed for use in domestic hot water systems to help kill Legionella bacteria, which causes the deadly Legionnaires' disease. The Crane Fluid Systems' TCV range is WRAS approved and available in sizes DN15 low flow and DN15 and DN20 standard flow. The valve is compact and includes an isolation valve, thermometer access point and a settable temperature sensing

cartridge which is pre-set at a standard 57°C. The installation of a TCV into hot water systems ensures that the water is maintained at a temperature that Legionella cannot survive in. Crane Fluid Systems' new TCV range aids self-balancing and thermostatically controlled regulation of water flow and thermal disinfection. This type of thermal circulation also reduces commissioning time and therefore cost too. Sizing and selection of TCVs is very important and Crane Fluid Systems offer a 5x2 double panel.

● Visit www.cranefs.com or www.cranesbu.com

CO₂ monitoring in workplaces and schools

Tinytag carbon dioxide data loggers are being used by leading Danish environmental monitoring company, ArbejdsmiljøCentret ('works health centre'), to help ensure optimum conditions are maintained in workplaces and schools. CO₂ is recorded to check whether ventilation is sufficient for the room compared to the number of people that are using it, preventing a CO₂ build-up, maintaining air quality and ensuring the wellbeing of occupants. The loggers are small, discreet and wall mountable. Made in the UK, prices from £325.

● Call 01243 813008, email info@tinytag.info or visit www.tinytag.info



Myson's new ULOW-E2 – technology in motion

Against a climate of rising energy prices and a revolution in better property insulation, Myson unveils its new heating solution, the ULOW-E2; the UK's first ultra-efficient radiator, driven by E2-Technology. Specifically designed to work with lower system temperatures, and to produce high heat outputs from smaller sizes, the ULOW-E2 uses innovative E2-Technology to automatically switch between static and dynamic operation in a single heat emitter. Static operation allows the ULOW-E2 to operate as a traditional radiator; while dynamic operation will activate in-built fans, significantly enhancing the heat output.

● Visit www.myson.co.uk



Two decades of CableCalc Level P marked with a free version of new twin and earth calculations

To mark 20 years of CableCalc, Castline Systems has released a free version of its popular CableCalc program, which will calculate single-phase radial and ring circuits wired in twin and earth cable. It includes free technical support by email. CableCalc Level P is a fully working, unlimited-use version and provides far more than just simple volt drop calculations. CableCalc Level P can be downloaded from www.castlinesystems.com free of charge.

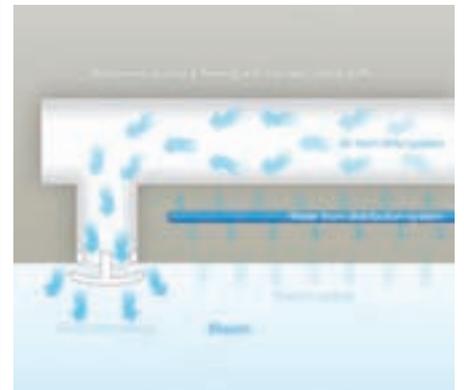
● Call 01293 871751 or visit www.castlinesystems.com



Actimass supports design teams on thermal mass projects

Thermal mass heating, cooling and ventilation specialist Actimass offers design advice, thermal modelling and project support on innovative building schemes. The firm supports feasibility, design and installation stages for passive, air, water or new patented combined systems. Experience includes commercial offices, universities, schools, utilities and retail. For innovative feasibility or design proposals, contact the firm by email for an informal and confidential discussion regarding your project or building.

● Email enquiries@actimass.co.uk or visit www.actimass.co.uk



Lochinvar extends indirect options to meet changing demand

The increased use of renewable energy sources in combination with traditional gas-fired systems is driving demand for more flexible commercial heating and hot water solutions. As a result, boiler and water heater manufacturer Lochinvar has expanded its wide range of indirect storage vessels. These products are capable of capturing energy from a variety of renewable sources, including solar thermal systems.

● Visit www.lochinvar.ltd.uk





Grundfos Hydro MPC booster sets win WRAS approval

Grundfos Pumps has recently attained WRAS (Water Regulations Advisory Scheme) full product approval status for its range of Hydro MPC E/F/S booster sets. This approval is only granted following rigorous mechanical testing and ensures that these complete booster sets comply with the various strict byelaw regulations and requirements as they currently exist in the UK. The scope of this recent approval covers Grundfos Hydro booster families that comprise of between two to six pumps, are up to a 16 bar PN rating and pump models up to CR(E)90. Over the years, Grundfos has built up a great reputation in supplying booster sets to the highest standards. With all the elements relating to the design, engineering and build combining

to deliver to the most exacting standards, these sturdy, yet compact sets are perfect for a wide range of applications from hotels to education establishments, high rise developments to industrial demands as well as within the water utility industry itself.

● Email grundfosuk@grundfos.com, call 01525 850000 or visit www.grundfos.co.uk



CP's controls reduce running costs for West Dorset District Council

CP Electronic's Vitesse Plus and Vitesse Modular lighting control systems have been installed to great effect in the impressive new offices of West Dorset District Council. The council has moved from its previous location of Stratton House to smaller and more energy efficient offices called South Walks House in Dorchester, Dorset. The new building has helped the council immediately reduce its running costs and its impact on the environment.

● Email enquiry@cpelectronics.co.uk



Carbon monoxide – the latest guidance

Kidde Fyrnetics has launched its guide to carbon monoxide safety in housing – updated with details of new models to the TenYCO range of 10-year guaranteed CO alarms – at the 2013 Gas Safety Management Conference. This CORGI organised event is the inaugural Conference for the Association of Gas Safety Managers (AGSM) and the first National Inter Authority Gas Forum. Kidde Fyrnetics – a sponsor of the Conference – launched its guide to carbon monoxide at the event.

● Email kiddefyr@ukgateway.net



Circuit protection and control solution for 19 Dumfries photovoltaic installations

Dumfries contractor JB McCormick has used Hager circuit protection and control for the installation of photovoltaic (PV) panels on 19 public buildings. Dumfries and Galloway Council's investment in solar PV is to reduce its carbon footprint and energy costs in line with the Scottish Government targets set out in the climate change (Scotland) 2009 Act. The contract covers primary schools, secondary schools, ice rinks, swimming pools and other buildings. To date the council has saved about 500,000kWh of power and generated 600,000 kWh.

● Call 0870 240 2400, email info@hager.co.uk or visit www.hager.co.uk

Remeha helps Luton school cut energy use by more than half

Three Remeha Quinta Pro 115 condensing boilers on a cascade system have more than halved Farley Junior School's energy usage and carbon emissions. VSRW specified Remeha's market-leading Quinta Pros to replace ageing atmospheric boilers two years ago, with low temperature radiators and fan heaters added last year to maximise energy savings. Gas consumption has plummeted from 660,995kWh to 273,148kWh with carbon savings in the region of 53 tonnes a year, enabling Farley to reduce its carbon footprint by a further 15 per cent this year. The financial savings will be used for the direct benefit of the school's pupils.

● Visit www.remeha.co.uk, call 0118 978 3434 or email boilers@remeha.co.uk



Wandsworth launches 'spec-your-own' accessories

Wandsworth Group has launched a new range of grid mounting outlets, offering specifiers a flexible selection of combined electrical sockets, USB charge points and multimedia outlets to coordinate with switches and sockets for a tidy and aesthetically cohesive look in any environment. Compatible with any plate finish in Wandsworth's Series 2, Series 3, Penthouse and Decorative ranges, the new grid mounting outlets include conventional sockets and television aerial points, along with USB charge points and a range of multimedia outlets, including HDMI, ADSL, SVGA, satellite TV and speakers.

● Call 01483 713400, email info@wandsworthgroup.com or visit www.wandsworthgroup.com

Greenbuild shows no north/south divide over heat pumps

Mitsubishi Electric has hailed the success of Manchester's Greenbuild Expo as proof that interest in low carbon heating is just as strong in the north as it is in the south of the UK. The heat pump manufacturer had already reported increased interest from both commercial and residential sectors at London's Ecobuild in March and saw a similar level at Greenbuild. 'We were particularly impressed by the quality of the enquiries over the two days of Greenbuild, disproving any notion that the sluggish economy is dampening down interest in renewable heating,' explained John Kellett, general manager of the heating division.

● Visit www.heating.mitsubishielectric.co.uk



CIBSE approval for Pentair

Pentair Thermal management has recently been awarded CIBSE approval for its latest continuing personal development (CPD) seminar: 'Innovation for single pipe hot water services.' The seminar looks at how to deliver energy efficiency, comfort and safety as well as carbon reductions and how an 'act now' policy results in benefits now and in the future.

European product manager Jonathan Jones said: 'Given the need for carbon reduction in the built environment, it is essential that access to this information is free and easy to reach.'

● Call 0800 969013, fax 0800 968624, or email SalesUK@tycothermal.com

A1 Flue Systems appoints new directors

Commercial Chimney and flue manufacturer, A1 Flue Systems has announced the promotion of senior managers TJ (Tracy-Jane) Moir and John Hamnett to directors. They will join the board with immediate effect. TJ 41, is the daughter of founder Colin Moir and, since joining the company in 1988, has worked her way up to director having held management roles in purchasing, estimating, finance, HR, administration and marketing. Both TJ and John have recently gained their qualifications with the Institute of Leadership and Management for Director Development, accredited to Coventry University.

● Visit www.a1flues.co.uk, email info@a1flues.co.uk or call 01623 860578



Hager launches Type 1 + 2 surge protection devices

Hager has launched type 1 + 2 surge protection devices (SPDs) that are designed to optimise arc extinction for both direct lightning strikes and for type 2 8/20 waveforms. The device uses Spark Gap technology that has been further developed to limit follow current to a 500A peak to help minimise the problem of upstream MCBs or fuses tripping. It is also encapsulated to avoid any leakage current. Hager's type 1 + 2 surge protection devices have good energy co-ordination to help prevent damage to sensitive electronic equipment.

● Call 01952 675689, email info@hager.co.uk or visit www.hager.co.uk



HygroMatik's high-pressure nozzle system fully certified

As of 1 July, under the Construction Products Regulation, CE marking will become mandatory. HygroMatik,

the international provider of humidifiers and steam bath generators, can accommodate project needs with its High Pressure Nozzle System, HDS, which is CE marked as well as fully certified with the hygiene conformity test certificate for air conditioning and for hospital sectors. HDS humidifies the air in air-conditioning and ventilation systems and provides very high humidification performance for an extremely low energy requirement yet with maximum control accuracy.

● Call 02380 443127, visit www.hygromatik.com or email info@hygromatik.co.uk



Bob Cowlard to lead Carel UK team

Carel has announced the appointment of Bob Cowlard as its new UK

managing director with effect from 3 June 2013. Bob joins Carel from Sanyo, where he covered various managerial roles, including vice-president of Sanyo Air conditioners Europe and, more recently, the position of managing director of Sanyo sales and marketing GmbH. Well known in the air conditioning industry, Cowlard brings extensive technical and commercial knowledge of the air conditioning market.

● Call 0208 391 3540 or visit www.careluk.co.uk



Remeha Commercial launches Gas Absorption Heat Pump range

The new Remeha Gas Absorption Heat Pump (GAHP) range offers a high efficiency, low-carbon, low-NOx alternative to low grade heating and hot water generation in commercial new build developments. The proven technology delivers continuous heating at exceptionally high fuel efficiencies of around 144% (GCV), reducing energy usage, operating costs and carbon emissions. Suitable for use in conjunction with commercial condensing boilers or in cascade operations, it is available as a single unit or in cascades of up to 48 units. The Remeha GAHP meets all legislative requirements including the ErP Directive. It is suitable for natural gas and LPG operation.

● Visit www.remeha.co.uk, call 0118 978 3434 or email boilers@remeha.co.uk



SE Controls enhances fire safety and comfort at flagship apartment development

Berkeley Homes' flagship Woodberry Park apartment development in North London is using an advanced smoke and natural ventilation system from SE Controls to not only provide protection for residents in the event of a fire, but to also create a better environment by actively managing any excessive heat build up in corridors. SE Controls was commissioned to design and install a SHEVTEC mechanical extraction smoke ventilation systems within two separate low rise private residential blocks within Woodberry Park, which provide a total of 117 luxury apartments.

A key part of SE Controls' project specification and design brief was that the smoke ventilation system should also incorporate an 'environmental ventilation' mode, enabling it to monitor heat build up in communal corridors and lobbies while also managing the operation of automatic vents to reduce the temperature and introduce fresh, cooler air into the building.

● Visit www.secontrols.com or call 01543 443 060



Free online energy management training now available

The first module of a new e-learning course on energy management, which is currently being developed by the Energy Institute (EI), is now available free of charge. The full course will be released in July. E-learning has surged in popularity over the last few years and the EI has developed this course to offer a flexible approach to the training needs of anyone

working in this sector. The course is interactive and provides a series of practical questions and scenarios for learners to engage with.

● www.energyinst.org/energy-management/e-learning



Ecoflam chips in to project and drives energy-efficient installation

Ecoflam has supplied two BLU 700kW LPG burners as part of a refurbishment of the heating and hot water system at Woodbury Park Hotel and Golf Club, near Exeter in Devon. The low NOx BLU burners were fitted on the existing boilers – which supply the hotel and leisure facilities – to upgrade the ageing system from oil to LPG. The M&E contractor was Exeter-based M.A.T Electrics Ltd.

● Call 01386 556092

Rada chosen as Asda supplier

Rada, the experts in commercial showering and washroom controls, has become a preferred supplier for Asda. Rada's T4 120 timed flow mixer tap has been installed at a number of Asda superstores across the UK due to the product's reliability, durability and safety. Combining a stylish yet contemporary finish, the T4 range enhances the appearance of any washroom, and its easily adjustable flow and time settings allow for significant water and energy savings.

● www.radatimedflowcontrols.com/pdf/timeflowprod.pdf

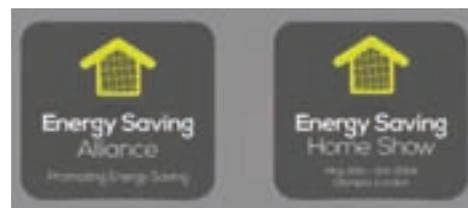


Rural Energy unveils biomass management system

UK biomass boiler technology expert Rural Energy has unveiled a new management system on all its small and medium sized boilers as part of its partnership with leading European manufacturer Herz.

The new Herz T-Control provides an interactive way of managing the functionality of biomass boilers with a touch of the user-friendly screen. The biomass system can also be monitored from anywhere, using an app for remote PCs, tablets and mobiles and clients' Building Management System (BMS) can plug in directly and interrogate all the data.

● Visit www.myriadceg.com/biomass or call 0203 189 0654



Energy Saving Home Show

Industry expert Dan Caesar is determined to unite industry in tackling the energy crisis: 'While Government is working to stimulate demand, the energy saving industry continues to wait for consumer initiatives to succeed. Now is the

time then, for industry to stop waiting and start selling the financial benefits of energy saving to the millions of homeowners actively looking to lower bills.' Dan and his team are taking two exciting concepts to market – the Energy Saving Alliance & the Energy Saving Home Show.

● Email team@energisevents.co.uk

PRODUCTS & SERVICES

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GIP ducting, now available from Greenwood

Greenwood Airvac, a Zehnder Group company and supplier of innovative ventilation solutions, adds a new product to its Guaranteed Installed Performance range with the introduction of ComfoTube ducting. A major part of whole house ventilation systems, ducting plays a key and crucial role in the delivery of Guaranteed Installed Performance (GIP) as it can impact the performance of ventilation by up to 50%, and it is especially important in whole-house systems where the ducting is installed within the building fabric.

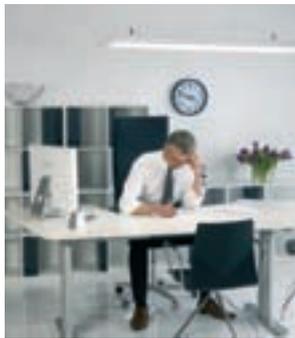
● Visit www.gip-ducting.co.uk



Mikrofill arrives at Marylebone

The Marylebone Project is a partnership between Church Army (founded in 1882) and the Portman House Trust, and is a Registered Social Landlord. Although the building itself had been updated over the years, changes to the heating system were long overdue. The five x 100 kw boilers were replaced with three Mikrofill Ethos 130 kW condensing boilers reducing output to the heating system and adding a welcome boost to the hot water system with two new Extreme 500 hot water loading systems. A Mikrofill EFD (Electronic Filling Device) and a 1000L expansion vessel were also included as the system had originally been open-vented.

● Call 0845 260 6020.



Riegens extends LED range

Riegens has extended its range of LED solutions to include the Cirrus LED suspended lighting luminaire. Specifically designed for office and commercial interiors, Cirrus LED has a sleek, slim profile and an eye-catching appearance provided by a matt anodised aluminium border. Cirrus LED uses an innovative optical system with anti-glare micro prism panels, the latest diffuser technology and a dedicated back reflector. These features combine to ensure the optimum distribution of direct/indirect light. Offering low energy consumption, energy efficiency is achieved by the optics high output ratio >83 lm/W.

● Email riegens-lighting@riegens-lighting.com

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See: Taking Control - CIBSE Journal Dec 2011

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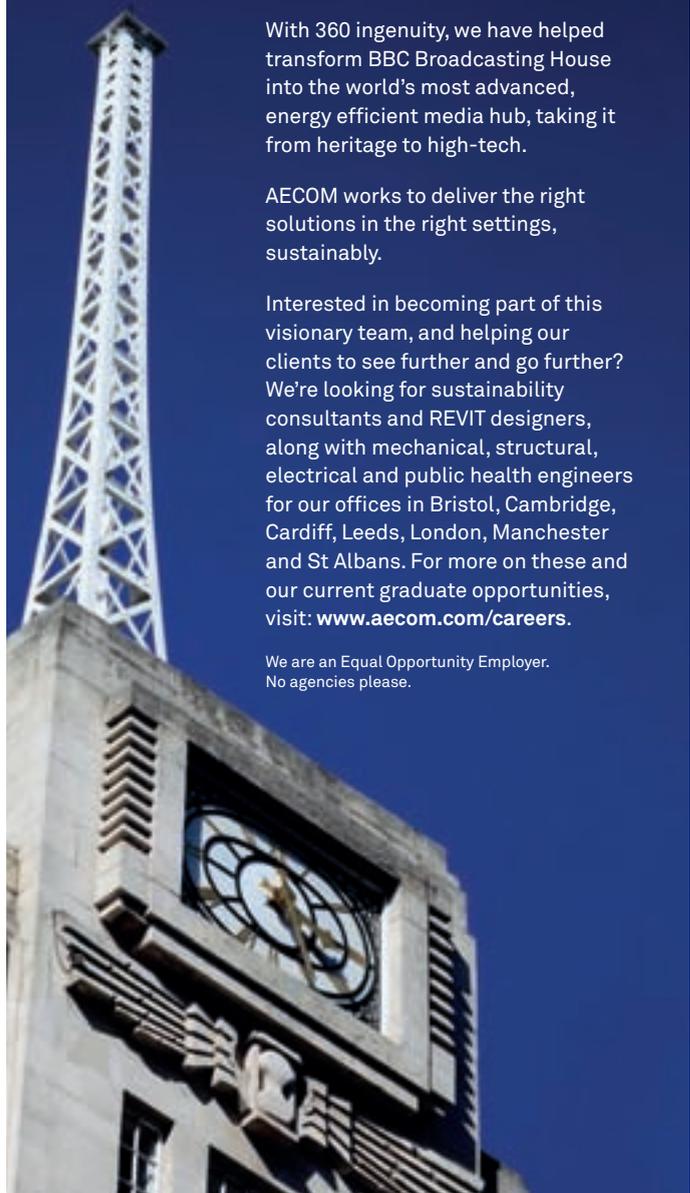
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A major engineering practise is looking to take on design engineers on a long term contract arrangement. You will be working on premium design projects which are based both home and abroad. Ideal candidates will be able to demonstrate proven ability to undertake building services mechanical engineering designs and assisting with project management. **Contact: darren.warmington@bsvrecruitment.co.uk**

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One of the UK's top 50 M&E Consultancies is looking to expand on its Building Services Design team in London with the addition of Intermediate Electrical Design Engineers. Expected to hit the ground running and work without supervision, but continued support and career development opportunities are provided. **Contact: max.encke@bsvrecruitment.co.uk**

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This award winning Building Services consultancy, who are specialists in Environmental Engineering, are looking to add a Mechanical Engineer to their fold. Working closely with the Directors, this is a great opportunity to gain experience on a wide range of projects, including Data Centres and Office fit-outs, taking them from the cradle to grave. **Contact: max.encke@bsvrecruitment.co.uk**

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Electrical Building Services Design Engineer | Southampton
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A small building services consultancy require an Electrical Design Engineer to work at their office in Southampton. The ideal candidate will have experience within residential and commercial developments, and have at least 6 years' experience within a building services consultancy. Candidates should ideally be a Chartered or Incorporated Electrical Design Engineer, with minimum HNC / HND qualification. You will work on high-end residential and healthcare projects which are at the cutting edge of design.

Associate Director of Mechanical | Nottingham
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Senior Mechanical Design Engineer | London/Herts | to £35LTD | ref: 3687

Our client is a leading International multi-disciplined engineering consultancy. Candidates will ideally have a strong background working on large scale commercial offices. 3-6 month contract.

Int Mechanical Design Engineer | London | to £35-£40K+ | ref: 3631

A busy, growing M&E consultant is looking for a degree qualified mechanical engineer. Ideal candidates will be IES proficient with a strong consultancy background. Leisure and rail sector experience is desirable.

CAD/BIM Manager | London | to £NEG! | ref: 3664

Our client is a large M&E Contractor who has a full order book running into 2014. Candidates will have a track record of managing their own internal cad team or external cad bureaus. This is a fantastic opportunity to build your own team.

Senior Electrical Design Engineer | London/Herts | to £35LTD | ref: 3688

Our client needs 3 senior engineers to work on large prestigious projects based in the UK and overseas. Candidates will be expected to complete detailed designs at stage E-F and have a track record within the commercial sector.

Senior Electrical Design Engineer | London | to £40LTD | ref: 3682

An international blue-chip consultant with a newly formed London office requires experienced electrical engineers with major new build and refurbishment data centre experience. Long term opportunity.

Senior Mechanical Design Engineer | Hampshire | to £45K+ | ref: 3615

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Breathing Buildings seminar

25 July, Manchester
The Priority Schools Building Programme Output Specification Regulations and how designers need to consider these for ventilation strategies. Led by Dr Shaun Fitzgerald. Robert.ferry@bdp.com

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2 July, London
An evening event from the Home Counties North East region. andrew.saville@armville.com

Young Engineers Network (NW committee) social – comedy night

9 July, Manchester
An evening of laughter at top comedy club XS Malarkey. An entry fee is payable. www.cibse.org/events

Young Engineers Network (NW committee) meeting

11 July, Manchester
CIBSE YEN NW continue the monthly evening meeting in interesting pubs around Manchester to discuss events ideas and planning. Meetings are informal and all ideas encouraged and welcomed. www.cibse.org/events

Screening of Home – a film by Yann Arthus-Bertrand

11 July, London
An exclusive screening of the film *Home*, which delivers its environmental and sustainability

message through aerial photography. A free event (online registration essential) organised by Home Counties North West region. www.cibse.org/events

SOPHE – drinking water ring main

17 July, Manchester
An evening event organised by the North West region, looking at the importance of putting water into the forefront of design. Attendance is free by registration. www.cibse.org/sophe

Bristol social event

18 July, London
www.cibse.org/events

CIBSE Home Counties North West Regional membership workshop

18 July, Berkhamstead
An advice workshop and networking evening offering practical advice on applying for Engineering Council registration and CIBSE membership, as well as a chance for informal mentoring. Registration is essential. www.cibse.org/events

CIBSE Homes for the Future Group Debate

18 July, London
groups@cibse.org

CIBSE Golf Outing

1 August, Belfast
An afternoon golf outing at the Knock Golf Club organised by the Northern Ireland region. d.willis@blgroup.co.uk

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Low carbon buildings for local authorities

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The carbon reduction commitment

10 July, London

Energy monitoring and targeting

11 July, Newcastle

Air Con 4: automatic controls & refrigeration

11 July, London

Mechanical services explained (3 days)

16 July, Birmingham

Electrical services explained (3 days)

16 July, Manchester

Lighting and energy efficiency

17 July, London

Display energy certificate training

23 July, Birmingham

Annual general meeting...

Continued from page 14

three-year programme of development approved by the board would cost around £1m in total, and while this was a substantial commitment for the Institution, the board was convinced that it was necessary to maintain CIBSE as a premier institution.

Regarding the reasons for not offering free subscriptions for part-time – as well as full-time – students, it was explained that the majority of part-time students were in employment and supported by their employers. Arrangements for part-time students might be reviewed in future, but the intention of free membership for full-time students was to expand the Institution's reach into a diverse range of engineering courses.

It was suggested that part-time students

were more likely to be retained in membership for the future, and that many of the benefits of membership were already provided to part-time students by their employers, thus potentially reducing the incentive to join. It was also noted that many employers did not cover the cost of membership. It was reported that analysis had been undertaken on the impact across different grades, and the benefits of each grade continued to be reviewed.

Stephen Matthews noted that CIBSE had secured the biggest percentage increase in engineering council registration for any of the significant institutions, and pointed out that the scheme for free student membership was very much a trial stage. The loss of part-time student income would be significant, and CIBSE was in line with many other institutions in

offering free membership for full-time students. Detailed figures were considered in depth by the board, and the success of the strategy would be reviewed, with the points raised at the AGM about part-time students being taken into account.

It was noted that the basic increase proposed was 3%. It was suggested that the reasons given at the meeting should be explained to members so that the need for the increase was appreciated. The possibility of using gift aid was suggested, and while it was noted that this would not be applicable to those claiming tax relief on their subscriptions, it was agreed that this could be considered at least for retired members. It was also noted that provision had been made for relief on subscriptions for those in hardship, as well as access to reduced-cost courses.

The resolution was approved unanimously.

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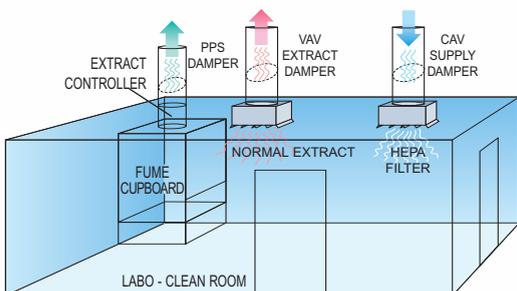


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