

CIBSE

JOURNAL



The official magazine of the Chartered Institution of Building Services Engineers

December 2014

TRAVELLING LIGHT

Heathrow soars as designers maximise use of daylight and LEDs at Terminal 2

WITH THIS ISSUE
Lighting Special

FOLLOW MY LEADER

Industry experts reveal all at CIBSE conference

KING'S COLLEGE DIGS DEEP

Data analysis unearths huge energy savings

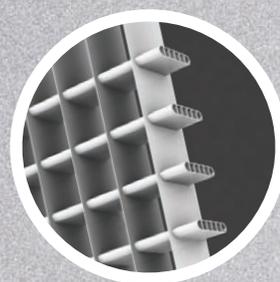
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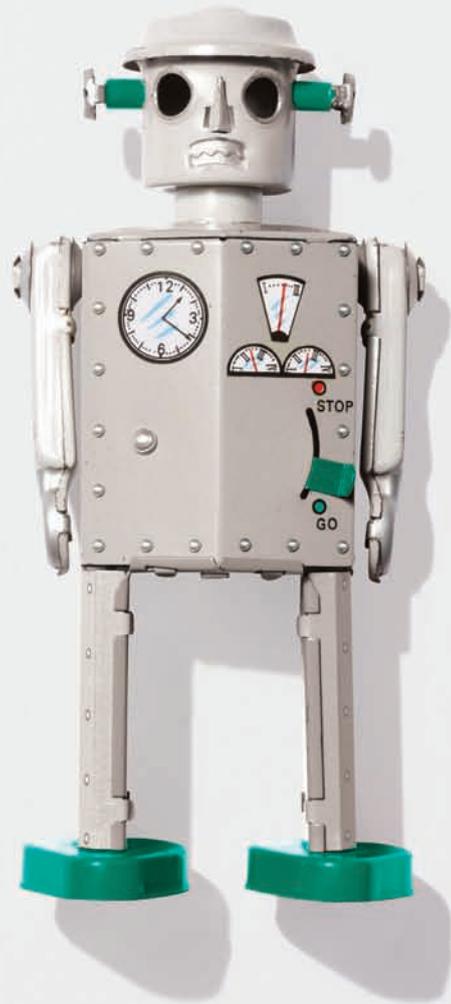


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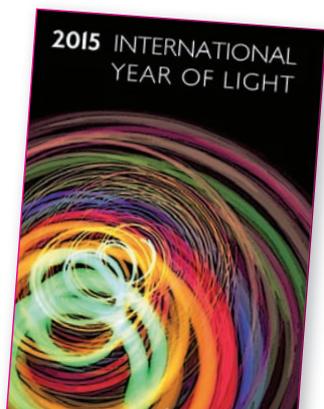
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The great debate

There was much food for thought at CIBSE's first Leadership in Building Performance Conference and Exhibition in London last month. Expert speakers covered a wide range of issues affecting the operation of buildings – from soft landings, to availability of finance, to use of BIM.

If any evidence were needed on why construction urgently needs to debate performance, it was provided by Kerry Mashford, chief executive of the National Energy Foundation. She revealed findings from InnovateUK's Performance Evaluation programme 2010-2014, which found that non-domestic structures were typically using 2.5 times more energy than predicted at design stage (see page 18).

InnovateUK found many reasons for the performance gaps – inadequate commissioning, complex controls, and inadequate integration of multiple HVAC systems, to name but three – but the prime cause that linked them all was a lack of collaboration among members of the project team, and a lack of communication with the building end-users.

A familiar story – and it was the theme of the key address by RIBA president Stephen Hodder, who said buildings would continue to fail if the silo culture persisted. Thankfully, Hodder and other speakers

did offer some hope by providing plenty of examples of best practice and innovation.

Hodder spoke of his Student Castle apartment project in Manchester, where the consultants worked closely with the contractor, both to understand design and project risk, and to improve efficiency and cost certainty.

A debate on soft landings drew attention to CIBSE's new Guide M, which describes a route

from design to operational efficiency, and Tamsin Tweddell explained how Max Fordham was addressing risk with the project teams at Keynsham Town Hall in Somerset.

There was also evidence that building users were beginning to invest in better buildings in order to reduce operational costs in the long run. Principal at Monomoy Richard Francis said that office tenants were becoming more choosy about office space, and were turning their backs on inefficient rentals.

Meanwhile Louise Ellison, head of sustainability at Hammerson, said the property giant had benchmarked its shopping centres to identify poor performance. For more on the conference, turn to page 20, and let me know what you think of the issues discussed at the email address below.

Alex Smith, editor
asmith@cibsejournal.com



In brief

SCHOOLS URGED TO SEIZE SALIX FUNDS

Applications for Salix-funded, interest-free loans for schools, academies and sixth-form colleges close on 19 December. The money is available for measures to reduce energy consumption and CO₂ emissions.

Salix loans are part of the government's Condition Improvement Fund, and can be used to finance lighting upgrades, boiler replacements, and renewal of roofs, windows, cladding and curtain walling. A project must have a target pay-back period of four to eight years, although viable projects with longer pay-back periods may be funded through a part-loan/part-grant system.

WIND CAN SLASH UNITED STATES POWER COSTS

The US Department of Energy has published a report showing that the country would cut its annual energy costs by US \$7.68 bn by installing 54 gigawatts (GW) of offshore wind power.

The National Offshore Wind Energy Grid Interconnection Study identified 209 potential sites for offshore wind farms, with the capacity to generate 134 GW.

SOUTH BANK COMBINES M&E AND ARCHITECTURE

London South Bank University (LSBU) marked the creation of its new School of the Built Environment & Architecture at a evening reception last month, supported by CIBSE Patrons.

The school brings together civil, structural and building services engineering with architecture, property and surveying.

Andy Ford FCIBSE, Professor of Building Systems Engineering at LSBU, said: 'We are honoured to be able to bring together this collective of disciplines all under one roof and hope our students will benefit from this transition.'

LSBU now has seven new schools: Applied Science; the Built Environment and Architecture; Arts and Creative Industries; Business; Engineering; Health and Social Care; and, Law and Social Sciences.

NATIONAL GALLERY MASTERS LED LIGHTING



The National Gallery, in London – which houses paintings from the 13th to the 20th centuries, and welcomes 6m visitors a year – is now benefiting from intelligent lighting control. A combination of highly efficient LEDs and Open Technology's LiGo control system has achieved 85% energy savings. Overall

the improvements are estimated to produce annual energy savings for the gallery of 765,000 kWh, at a cost reduction of about £53,600, with reduced maintenance contributing a further saving of £36,000. Watch a video at www.cibsejournal.com or on tablet via www.cibsejournal.com/app

RHI rules relaxed for social housing

The government is making it easier for social landlords to access payments from the domestic Renewable Heat Incentive (RHI).

From spring 2015, registered social landlords will no longer need a Green Deal Assessment to apply for the RHI scheme, as long as they have an Energy Performance Certificate that is less than two years old, the Department for Energy and Climate Change

(DECC) has announced.

'Social landlords often provide homes for some of the most vulnerable people,' said Amber Rudd, Parliamentary Under Secretary of State for Climate Change. 'By making the RHI more accessible, we hope more of their tenants will enjoy warmer homes and lower bills.'

According to DECC, 365,000 people in fuel poverty live in social

housing, out of a total of 2.28 million fuel-poor households. The problem is particularly acute in homes off the gas grid, where many householders have to pay up front for their heating.

'[These changes to the RHI] will reduce the bureaucracy and costs for social landlords,' said the National Housing Federation's Andrew Burke. 'But the real benefit will be for their tenants, who will have warmer homes and lower energy bills.'

US man jailed for venting AC gas

Air conditioning and refrigeration engineers have urged the UK to follow the example of the US, and introduce heavy legal penalties for breaches of clean-air rules.

A man in Columbus, Ohio, has recently been sentenced to two and a half years in prison after his conviction for deliberately releasing refrigerant gas into the atmosphere while stealing air conditioning units. The man – who was found guilty of violating the federal Clean Air Act – was caught cutting supply pipes on 49 units so he could remove the copper and spare parts.

He pleaded guilty to 'knowingly venting refrigerant gas into the environment', and his sentence will run concurrently with his prison term for the thefts.

Mike Nankivell, marketing and business development

director of Daikin air conditioning distributor Space Air, said the UK industry had advised the Environment Agency that 'the venting of refrigerant during the process of stealing air conditioning equipment or the connecting copper pipes could be an opportunity to introduce prosecutions specifically for this environmental offence'.

Nankivell said criminal charges could be a good way of raising awareness of the potentially serious environmental impact of venting of refrigerant gases. He added that this case presented 'another chance to raise the matter with the relevant authorities', and to support efforts to 'embed the European F-Gas Regulation in UK working practices'.

See Regulations on page 16 for more on F-Gas rules.

Conaghan calls for joined-up BIM

Models are often 'dumb' says CIBSE BIM group chair

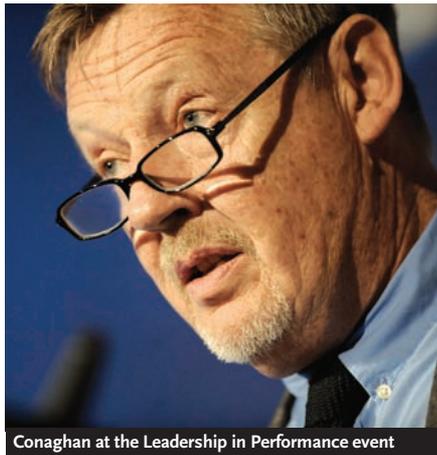
Supply chains still have to work with more than one BIM model on each project, according to the chairman of the CIBSE BIM Group.

Paddy Conaghan FCIBSE told the CIBSE Leadership in Building Performance Conference that the 'elephant in the room' was the fact that contractors' BIM models were 'dumb' and would not help a client operate their building.

'We are often asked why we should produce models at all if the contractor is going to change the work,' said Conaghan. 'Contractors want more information at a different stage – often to allow them to price a project, or to build it.'

He added that clients were struggling to see the value in BIM models, even though a 2% increase in investment to produce an 'as fixed' BIM model could deliver 33% cost savings over the operational life of a building. 'We need to explain this better,' he said.

However, Andy Sneyd FCIBSE – president of the Building and Engineering Services Association (B&ES) – told the conference that the real problem was contractors not being able to get the BIM models they needed, because the industry was allowing software companies to lead the development process.



Conaghan at the Leadership in Performance event

'We are not being asked what we want in the BIM models, or how we want to use the model to increase efficiency during the construct and commissioning stage – so we end up doing our own, which does not help collaboration,' he said.

Essential data

Consulting engineers should, Sneyd added, provide commissioning data alongside the design information in the model. 'More comprehensive data is essential to satisfy clients who are looking for better performance standards from their buildings, assessed against

RIBA president Stephen Hodder on collaboration:

- 'Amazed I am the first RIBA president to address a CIBSE Conference.'
- RIBA Plan of Work 2013 'promotes collaboration' – new Stage 7 'is all about delivering whole-life value and improving the handover process'.
- 'We have a unique opportunity to position the UK as global leader in BIM, but there are big challenges, including: a shortage of architects with BIM skills; poor supply-chain penetration; and [a lack of] open information standards.'

more ambitious financial models,' he said.

Stephen Hodder, the first RIBA president to address a CIBSE conference, said that effective BIM implementation was regarded as 'the central plank in construction's response to the government's Construction 2025 strategy'.

He added that supply-chain collaboration was a key theme of his presidency, but that professional institutions were not even 'collaborating on collaboration'. 'Can you imagine a car where the different suppliers and trades fail to collaborate,' asked Hodder.

See page 20 for more on the event.

Carbon cuts must not compromise comfort

Environmental targets must not be delivered at the expense of occupant comfort or attempts to reduce building running costs, last month's CIBSE Conference heard.

Ed Gray, head of carbon and energy for Marks & Spencer – CIBSE's 2014 Carbon Champion of the Year – told the Leadership in Building Performance Conference and Exhibition that the retailer's 'Plan A' scheme for energy efficiency is expected to bring savings of £145m in 2013/14.

However, he said savings were not being made at the expense of customer satisfaction, and that it was 'vital to create a positive store environment that improves the health and wellbeing of our staff and customers'.



Gray: Positive store environment 'vital'

Richard Francis, from The Monomoy Company, agreed that carbon reduction targets needed to be 'aligned with occupant and consumer performance' to increase uptake.

Similarly, Jonathan Hines, from architects Archetype, warned that over-emphasising carbon or energy targets could lead to inappropriate technology choices being made.

Study reveals reality of poor building performance

Non-domestic buildings typically use 2.5 times more energy than predicted, according to public body Innovate UK's Building Performance programme.

The initial findings of the study were revealed by Kerry Mashford, National Energy Foundation (NEF) chief executive, at the CIBSE Leadership in Building Performance Conference and Exhibition. It looked at 100 new-build projects and three refurbishments between 2010 and 2014, including 56 non-domestic constructions across 13 building types.

Mashford said, in some cases, buildings used 4.5 times more energy than predicted, and that the Innovate UK programme had revealed a number of reasons for this performance gap. These include: non-standard and

unregulated loads; inadequate commissioning; complexity of – and lack of training in – building management systems; integration of multiple HVAC systems and installation; and operation and maintenance of renewables.

In an article in this month's *Journal* (page 18) Mashford said: 'There is still much to do in terms of the procurement of new buildings, and the management and improvement of existing structures.'

NEF is involved with Legal & General and Building Energy Solutions in a new voluntary display energy certificate (VolDEC) scheme, which aims to establish a methodology for measuring building performance. VolDECs provide landlords and tenants with energy performance data for areas they control.

Study focuses on UK electricity distribution

Engineering consultancy Parsons Brinckerhoff is leading a consortium carrying out a detailed analysis of the UK's future electricity distribution network.

The study – on behalf of the UK's Energy Networks Association (ENA) – will consider how the grid in 2030 should be designed to cope with 'smart technologies', and facilitate the growing number of low-carbon connections. The consortium is due to publish its findings next summer.

'As the UK moves towards a sustainable energy future, our distribution networks will need to adapt,' said ENA chief executive, David Smith.

Illegal HCFC trade poses risk

The threat from a black market in ozone-depleting substances (ODS) is increasing, according to a charity's briefing to the 26th Meeting of the Montreal Protocol, held in Paris last month.

In its report, the Environmental Investigation Agency says there are significant discrepancies between China's reported exports of the refrigerant HCFC-22 to various countries, and those countries' reported HCFC-22 imports. It also draws attention to alarmingly high atmospheric concentrations of the highly toxic ODS carbon tetrachloride (CTC), which was banned in 2010.

For more details, visit bit.ly/1qzccZj Read about EU policy on HCFCs on page 16.

DECC provides backing after CIBSE work on heat networks

£7m for 118 community heating projects

The Department of Energy and Climate Change (DECC) has welcomed the work carried out by CIBSE and the Combined Heat and Power Association (CHPA) to develop technical standards for heat networks – and says these would be underpinned by a Code of Practice.

DECC has also announced £7m of financial support for 118 community heating projects in England and Wales, including: heat pumps capturing heat from waste and mine water, and rivers; CHP powered by gas, biomass and energy from waste; and a number of deep geothermal schemes. It also unveiled a 'package



of new actions' to improve uptake of large-scale water source heat pumps.

Under Secretary of State, Amber Rudd, called for a 'concerted effort to deliver more lean heat' from carbon-saving sources during her speech to the Heat Conference, organised by the CHPA and the Energy Institute. She said the UK would not meet its climate targets 'without changing the way we produce and consume heat'.

'Heat networks have the potential to decarbonise and diversify our sources of heating,' she said. However, Rudd admitted widespread deployment 'requires that some fundamental barriers are addressed' – including providing adequate expertise and support to local authorities, via the department's Heat Network Delivery Unit.

Capital has 20% of all UK's Legionnaires' disease cases

More than 20% of UK Legionnaires' disease cases were reported in London last year, according to Public Health England. During 2013, 384 cases were reported in England and Wales, 284 of which were confirmed cases of Legionnaires' disease. Of these, 58 were in the London area – up from 26 in 2011 and 40 in 2012.

The threat from this potentially fatal disease was highlighted in the run-up to the 2012 Olympic Games, when the Health and Safety Executive said London was at risk from a 'catastrophic' outbreak because of poor management of evaporative condensers and cooling towers near Games venues and transport hubs.

This new study appears to show that the situation has not improved. Rob Boon, head of Legionella Control International's London and south-east team, said: 'It is essential that business owners, landlords, property owners and those responsible for managing properties ensure that legionella is not ignored.'

The report gives no clear-cut explanation for why London seems to be at increased risk, but Legionella Control said: 'Compliance with the law is still a problem in the area. Fortunately, it is relatively easy to implement risk-management controls to ensure that the bacteria do not get a hold.'

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London office development doubles – but more needed

● UK capital has been the location for 22 new major office projects in past two quarters

The amount of new office space being developed in London has almost doubled over the past six months, according to Deloitte Real Estate. However, long-term trends suggest developers will struggle to meet occupier demand, because of relatively low levels of new supply, and the fact that more than 5m ft² of space is set to be demolished.

The business advisory group revealed that 22 new major office projects – accounting for 2.1 m ft² – have begun in the past two quarters. However, the overall volume of office space under construction in central London has fallen to 7.7m ft², from the previous average of 10 m ft².

Several commercial office projects, covering 3.7m ft² have recently been completed.

In the City of London, 10 new office developments have now started, so the region is benefiting from the ‘steepest jump in new construction projects’, according to Deloitte’s head of City leasing, Steve Johns.

‘This includes more than 1 m ft² in the City core, and more than 500,000 ft² in ‘tech city’ – accounting for



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three-quarters of the volume of space across all the new schemes we have recorded.’

Johns said 10 new starts have also been seen in the West End of London, but with occupier demand remaining strong, gaps are emerging in the market.

‘Of the total 7.7m ft² of space under construction, 41% is already let. Despite a healthy pipeline of activity, 2015 is likely to deliver the lowest volumes of space in 20 years,’ said Johns.

‘Over the next three years, it is now likely that demand could outstrip supply when it comes to the ‘best space’, he added.

IN THE NEWS: Paul Flatt, Hurley Palmer Flatt

‘Our mission is to add value beyond M&E’

Hurley Palmer Flatt’s purchase of the majority of shares at commissioning engineer Andrew Reid & Partners (AR&P) is the mechanical engineer’s first acquisition since it returned to sole ownership in 2012.

AR&P provides consultancy services in the design and commissioning of mechanical and electrical building service works. For group chairman, Paul Flatt, the investment will enable Hurley Palmer Flatt (HPF) to understand more about building performance, and help clients to cut energy costs.

‘Our mission is to add value beyond M&E engineering. You can’t afford to be just a building services engineer today,’ he says.

Flatt adds that HPF is, effectively, a multidisciplinary business in the datacentre sector, where established corporate clients have asked it to provide the whole design service. He says there is a benefit in seeing the consequences of services design in the operation of the building.

‘Engineers need to stand up and be counted,’ declares Flatt,

who believes the combination of engineering and commissioning skills provided by AR&P can help bridge the performance gap.

‘Most buildings could save 5-10% very easily,’ he says, ‘but people don’t want to pay the initial capital costs, because they look at the profit and loss rather than the long-term view.’

The trend for building owners to outsource maintenance is putting M&E engineers further away from



Paul Flatt: ‘Engineers must stand up and be counted’

the building operation, and creating a risk for property owners, insists Flatt. ‘There is a big expense in maintaining buildings, compared to building them,’ says Flatt, ‘and we’re starting to see problems. That’s when the engineer suddenly becomes the most important person in the room.’

AR&P will continue to work independently of HPF, but will collaborate on projects. ‘AR&P is a top-four commissioning engineer. Best in class, no doubt about it,’ says Flatt. ‘They have worked on big jobs with us – such as 5 Broadgate and Sea Containers House.’

AR&P has a turnover of more than £30 m and employs 30 staff. ‘We sit on the board, but it’s still an independent business and that’s the way we want to keep it,’ says Flatt. ‘What we want is to make sure we have the first line into the business.’

Flatt will chair the AR&P board, while Mike O’Mahony has been appointed managing director at AR&P, replacing David Lake, who will continue as a consultant.

Wye Solutions snapped up by property consultants

Building and property consultancy Tuffin Ferraby Taylor (TFT) has acquired M&E consultancy firm Wye Solutions.

As well as supporting TFT’s existing capabilities – such as technical due diligence, project monitoring and dilapidations – Bristol-based Wye will add M&E design capability and facilities management. The acquisition will also help TFT to continue developing its sustainability consultancy work.

Wye Solutions’ clients include Siemens, Highcross Strategic Advisers, and Ashdown Phillips.

Mitie M&E business posts £6.9m loss

Property and facilities management contractor Mitie has announced a £1.3m pre-tax loss for the six months to September, due to ‘exceptional costs’ of £58.3m.

The group’s M&E business – which is to cease trading – lost £6.9m over the same six-month period, and this figure is expected to rise to between £11m and £15m by the end of the financial year.

However, Mitie’s facilities management business ‘delivered a strong performance’ in the first half of the year, and is ‘expected to gain further positive momentum through the rest of the year’, according to chief executive, Ruby McGregor-Smith.

Amtech acquired by Trimble

US company Trimble has bought the UK building services software specialist Amtech Group, from Primary Capital and its own senior management, for an undisclosed sum.

The Milton Keynes-based firm provides mechanical, electrical and plumbing (MEP) software, including the: LUCKINSlive estimating and pricing system; ProDesign electrical design software; NES specification compiling software; and 3D systems that support BIM designs.

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Biomass guide free on CIBSE app

through the CIBSE app – at www.cibse.org/AM15.

Biomass has become one of the key low carbon technologies expected to help the UK achieve its tough 2020 carbon-reduction targets. However, this emerging industry has been hampered by a lack of expertise and technical guidance. A Carbon Trust report in 2012 stated that many large construction projects treat biomass systems like standard gas-boiler installations – the end result being a failure to achieve expected cost and carbon

savings. A survey in 2010 revealed that only 30% of installations were working well, according to the Carbon Trust.

This new publication provides detailed guidance on the engineering principles and practices necessary to design, install and operate safe, effective, economic biomass systems.

The publication was launched at the National Woodfuel Conference in October, with a presentation by lead author David Palmer, of Campbell Palmer Partnership.

Join the Training and Development Panel

CIBSE is seeking volunteers to join its Training and Development Panel, which meets three times a year in Balham. It approves company and individual training programmes leading to Member, Associate and Licentiate grades of membership, and supports scheme administrators and participants.

As well as the meetings, panel members are expected to take part in up to three company scheme review visits per year.

Potential candidates will have experience of supporting or developing the training of graduates or apprentices in their company.

Being a panel member is a voluntary position, so there is no salary or fee. Reasonable travel expenses will be paid to cover attendance at panel meetings and company reviews. If you are interested, submit a short statement and your CV to membership@cibse.org explaining how you can contribute.

Around the Regions Home Counties NW

The CIBSE Home Counties North West Region (HCNW) has about 2,000 members, including 60 young engineers, and is keen to help Affiliates move to Associate or Member level.

It is a very active region, and holds a large number of seminars and social events each year. It organised the Home Counties Conference, which included immediate

past president George Adams being interviewed by Ruth Davies, from Greenpeace, and the first Presidential, Past, Present and Future Debate.

HCNW members have widened the display of Energy Performance Certificates on property advertising. They also engage the community through joint technical events with Transition Towns Letchworth, Berkhamsted and Downham Market, and by liaising with Letchworth Garden City Heritage Foundation. In 2014, the region welcomed its first woman vice-chair, Athina Papakosta, and regularly organises joint events with WiBSE.

Chris Jones, region chair, said: 'Regions are incredibly important. The interaction, and our speciality debates, offer members different perspectives – with the added benefit of networking with colleagues.'

Key projects:

- Queen Elizabeth II Hospital, Welwyn Garden City
- Regeneration of Milton Keynes theatre district
- The Stables entertainment venue, Wavendon

Projects in the region include the QEII Hospital in Welwyn GC (above), while social events have taken in Sambrook's Brewery (left)





Hugh Ogus (centre) receives a gold medal from CIBSE President Peter Kinsella FCIBSE (Right) and Kevin Kelly FCIBSE (left)

President's Dinner recognises industry talent

- Hugh Ogus receives gold medal at annual event

Hays Building Services President's prize

Oliver Pengelly, from Leeds Metropolitan University, won the CIBSE Undergraduate Award, and a prize of £500. The award, sponsored by Hays Building Services, has been in existence for more than 20 years, and is designed to encourage students to develop their potential, and aim for excellence. It is awarded to those in their final year of a building services course accredited by CIBSE, and recognises their academic achievements.

A trophy was also awarded to Leeds University as acknowledgement of its achievement.



Oliver Pengelly (left) receiving his award from Richard Gelder, Hays Building Services, and Peter Kinsella, CIBSE President



Michael White accepted the University Award from Richard Gelder, on behalf of Leeds University

Technical Awards

Two awards for technical papers published in the *Building Services Engineering Research and Technology* journal were awarded on the night.

The Napier Shaw Bronze Medal – awarded for the most highly rated paper published in the year – went to Andy Shea, Katherine Wall and Pete Walker for their paper 'Evaluation of the thermal performance of an innovative prefabricated natural plant-fibre building system'.

The Carter Bronze Medal for best paper relating to application and development was awarded to MC Georgiadou, T Hacking and P Guthrie, for their paper 'Future-proofed energy design for dwellings: Case studies from England and application to the Code for Sustainable Homes'.

The Happold Brilliant Award

This award recognises excellence in the teaching of building services engineering and, this year, was presented to South Bank University. The award was accepted on behalf of the university by Gordon Lowry.



Gordon Lowry accepting the award from Andy Keelin CEng MCIBSE, director of The Happold Trust

CIBSE Medals

The nomination panel gave medals to Hugh Ogus MBE CEng FCIBSE FSLL (gold), Neil Oliver (silver) and Francis John Ferris MCIBSE (silver), in recognition of their contribution to the industry.



Francis John Ferris receives the CIBSE silver medal



... while a silver medal was also presented to Neil Oliver

Members respond to annual CPD audit

CIBSE has recently completed an audit of continuing professional development (CPD) records for more than 200 members. With 90% of those audited submitting their records through the online portal, we were pleased to see the range of CPD activities members undertake.

The CPD Audit is an annual event for which members are selected at random from a range of grades and locations around the world. Carilyn Clements, director of membership, said: 'CPD is a long-term commitment to enhancing your competence. It is about learning and putting into practice new competences, and investing in your future.'

CPD is not limited to attending formal lectures and seminars; it can include a variety of activities: on-the-job learning; private reading and study; CIBSE regional, group, society or network meetings; academic studies; professional institution committee work; and supporting or mentoring others.

All members are required by the Code of Professional Conduct to maintain their professional competence. Members can find out more about continuing professional development – and can record and update their CPD activities – at www.cibsecpd.org.uk

@ Feedback

Remeha defends two-boiler stance; obtaining cost and performance data; and LinkedIn members discuss the *EFA Design Guide*



JESSE KUNERTH / SHUTTERSTOCK

Is the *EFA Design Guide* too complicated?

Two better than one?

In David Palmer's response letter (*CIBSE Journal*, October 2014 issue) to the Remeha article on renewable technologies (*CIBSE Journal*, September 2014 issue), he reinforces one of the 'key steps' outlined in the piece, namely that oversizing should be avoided as it leads to poor seasonal efficiency and combustion/furnace problems.

Our suggestion – to consider using two biomass boilers, rather than one larger boiler, at the school – might be slightly more expensive, but it would not double the cost, as Mr Palmer claims. Importantly, it would improve the turndown ratio, which would give a better response to varying system loads. The two-boiler scenario would also give some redundancy, while still generating RHI payments.

With regard to low utilisation, the same can be said of gas boilers or heat pumps: in this instance, the biomass boilers would be switched weekly, to even up the running hours, and avoid leaving one in slumber mode.

Finally, while – on paper – there may be some benefit to using a thermal store over a buffer vessel arrangement, in reality, the difference cannot always be stored, especially with one single large boiler output and a small base load.
Mike Hefford, head of renewable technologies, Remeha Commercial

Sourcing data

The articles on ground source heat pumps in August and September omit any facts about the metered energy performance of buildings with them, good or bad.

How can your readers compare the energy performance and cost of their own buildings with that of the buildings that you feature?

Larry Spielvogel FCIBSE, consulting engineer, L G Spielvogel

Editor's reply

We endeavour to include data from projects, but it can be difficult to obtain, either because it's not always available. We await with interest the results of Innovate UK's Building Evaluation Programme, the initial findings of which appear on page 18. We are also looking to include regular articles on building services costs in the *Journal* next year.

CIBSE LinkedIn group on the *Education Funding Agency Design Guide*

Kevin Wright

What a fantastic guide for increasing energy, life-cycle/capital costs, and overly complicated design and compliance. As

Complicated calculations are worth very little unless they can be verified in the actual building

a parent, I would rather see our money spent on more training for the teaching staff, and better salaries to attract talented people.

Axel Jacobs

Couldn't agree more, especially with the *EFA Daylight Design Guide*. Let's keep things simple. Complicated calculations are worth very little unless they can be verified in the actual building. It is also worrying that we are losing the human perspective and, instead, concern ourselves solely with the energy consumption of the building. There must be a way of reconciling the two approaches, but the EFA guide does not show how this should be done.

Dan Lash

I have to disagree. Quite clearly, existing standards are not working, as is evidenced through post-construction testing and platforms such as CarbonBuzz. While it is unlikely that these standards will solve everything that is wrong with new school design, it is an evolutionary step in the right direction. I do agree that the new metrics are more complicated, but the daylight factor (DF) is overly simplified and has had its day.

Gordon Hudson

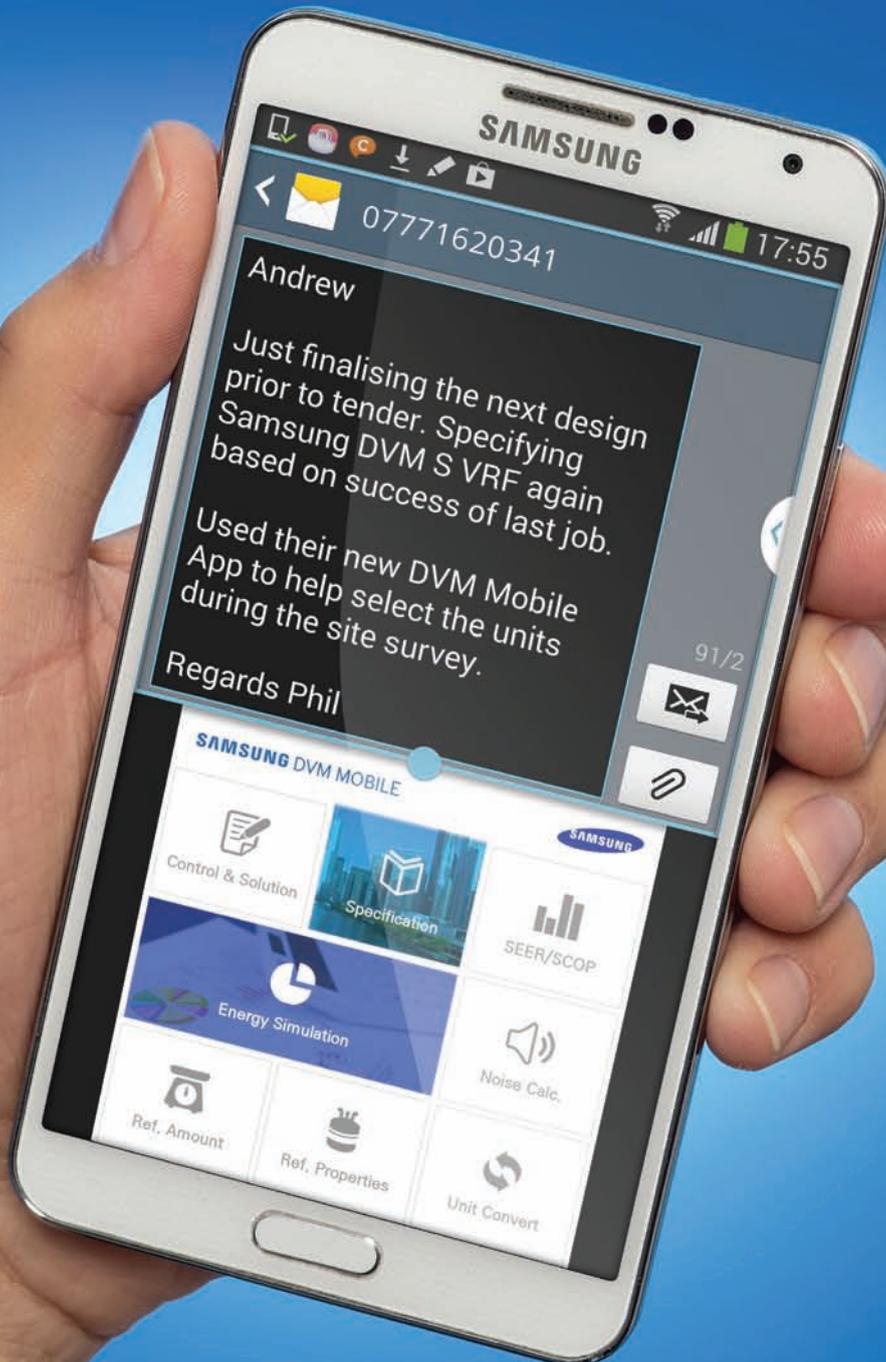
It would be useful to look at buildings that are good examples of daylight design. Good design, as you say, is about considering lots of metrics, not just DF. I don't think it is right to say that existing standards are not working and, therefore, we need new standards. Many factors are in play in the perception that buildings are not performing to targets.

CIBSE Journal welcomes readers' letters, opinions, news stories, events listings, and proposals for articles.

Please send all material for possible publication to: editor@cibsejournal.com, or write to Alex Smith, editor, *CIBSE Journal*, CPL, 275 Newmarket Road, Cambridge, CB5 8JE, UK. We reserve the right to edit all letters.

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Air conditioning and
heating solutions

EU'S 2020 VISION FOR HFCS

Last month, this column looked at emerging EU policy on resource efficiency. Here, **Hywel Davies** describes other Brussels initiatives with implications for building services engineers

As a part of the EU, the UK has to implement agreed directives – such as the Energy Efficiency Directive. It is also subject to EU regulations, such as the latest F-Gas Regulation. These take direct effect as law in each member state, whereas directives have to be transposed into law by each country. Regulations, therefore, give greater certainty and consistency of outcome, and reduce the scope for nations to interpret the meaning of EU measures.

Two recent examples of regulations that affect the building services sector are the Construction Products Regulation (CPR) and the aforementioned F-Gas Regulation. The former – which replaces the old Construction Products Directive (CPD) – requires that all construction products incorporated into works within the EU be ‘CE’ marked, for which they must comply with the requirements of the relevant harmonised European Standard or Technical Approval.

As a result of the previous directive, many of these standards and approvals have been in place for some time, so products that complied with the CPD will still comply under the CPR.

However, the six ‘essential requirements’ under the CPD have given way to seven ‘basic works requirements (BWR)’, which include BWR7, introduced to cover ‘sustainability’.

No Member State currently regulates for ‘sustainability’, so there is no requirement on the EU to instruct CEN, the European Standards body, to revise any of the harmonised standards to take BWR7 into account.

However, this has not prevented the European Commission (EC) from issuing a discussion paper on how it will do this once a member state does regulate for sustainability! Once this happens, we can expect a significant volume of activity within CEN to update product standards.

Future-proofing the air conditioning system just became a whole lot harder, thanks to these regulations



The building services sector needs to be alert to new EU regulations

This will require vigilance by CIBSE, trade bodies and individual manufacturers to ensure we are all aware of what is happening.

Steep cuts

The F-Gas regulation 2014 replaces a previous regulation, so its status has not changed. What is different is the scale of endeavour of the new regulation.

It proposes steep cuts in the use of high global warming potential (GWP) refrigerants, leading to a complete phase-out of HFCs in 2020, along with restrictions on the servicing of equipment containing high GWP refrigerants.

The cuts will be achieved through the introduction of a quota for F-gas production and use in Europe, with progressive reductions in the total carbon dioxide equivalent of refrigerant over the next 15 years.

Because the quota is based on CO₂ equivalent, high-GWP products will rapidly use up the quota, so there will be market pressure to reduce the use of high-GWP gases quickly. This means they may become scarce, or they may become expensive – possibly both.

While the 2014 measure was negotiated with the industry – and is not as draconian as first proposed – it still represents a serious challenge to the delivery of refrigeration and air conditioning in buildings.

In particular, it means that systems that contain high-GWP refrigerants will not be able to be serviced – or refilled – after 1 January 2020 (just as it will be a criminal offence, from 1 January

EU REGULATIONS AND DIRECTIVES AFFECTING CONSTRUCTION

Regulation (EU) No 517/2014 of the European Parliament and of the Council, of 16 April 2014, on fluorinated greenhouse gases and repealing Regulation (EC) No 842/2006. Available from bit.ly/1uPYReQ

For further information on EU policy on fluorinated gases see bit.ly/1p1m397

Construction Products Regulation (EU) No 305/2011 of the European Parliament and of the Council, of 9 March 2011, laying down harmonised conditions for the marketing of construction products, and repealing Council Directive 89/106/EEC. Available from <http://bit.ly/1qqNb2d>

For further information on EU policy on construction products see <http://bit.ly/1tdZ1aA>

Information on the HCFC ban is available in Guidance Note 15 from the Institute of Refrigeration, <http://bit.ly/1voXshm>



2015, to service or replenish systems containing HCFCs, such as R22. See page 8 of news for story of American man jailed for releasing refrigerant gas). So there will have to be a serious piece of work done by those who operate these systems, to identify what they have, and to plan for the future.

Of course, those who have obtained an air conditioning inspection report for their building systems will know where they have HCFCs and HFCs. However, the remaining 80-90% of buildings with air conditioning systems and no inspection report, will need to find out what they have – and where – before they can make a plan.

Advising clients

The regulation is also highly relevant to consultants who are advising clients on air conditioning systems for the future – they need to understand which refrigerants are affected by the phase down, and to have a plan for recommending future refrigerant strategies for their clients.

A system with a 15-year design life, which is being specified now, will be operating in 2030 when the current phase-down is complete. Future-proofing the air conditioning system just became a whole lot harder, thanks to these regulations.

The EU HFC phase-down is being discussed as a pathway for the rest of the world. As this column was going to press, the annual meeting of parties to the Montreal Protocol on protecting the ozone layer was being held in Paris, to discuss a possible global phase-down of hydrofluorocarbons (HFCs).

The *CIBSE Journal* will be watching with interest. Meanwhile, air conditioning designers may want to do some reading on this topic before they write their next system specification.

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

EVERYMAN A NATURAL WINNER



The RIBA Stirling Prize winner scores highly on sustainable engineering, says David Fitzpatrick

The building services industry is usually disappointed with the choice of RIBA Stirling Prize winner. The award has a history of rewarding aesthetic ‘cleverness’, but a patchy track record on sustainability and giving credit to engineers. This year, however, the reaction to the coronation of the Everyman Theatre, in Liverpool, has been almost universally positive.

When the building was shortlisted, engineering knives were out because many – wrongly – assumed it had been chosen for the ‘portrait wall’ on its façade. In fact, it was primarily because of the benchmark it had set for collaboration between client, architect and engineer.

Natural ventilation lies at the heart of the design, with four soaring chimneys creating both a striking architectural feature and a low-energy solution. It is not the right answer for every building; early excitement about a cutting-edge solution has, too often, given way to the disappointment of uncomfortable occupants. Happily, our industry – and some of its clients – are learning from past mistakes.

In many places, a mixed-mode approach is adopted, so that natural ventilation can play its part in lowering a building’s carbon footprint and improving its indoor air quality, but is backed up by mechanical systems.

However, the biggest lesson from the BREEAM Excellent-rated Everyman is that – no matter how innovative the engineering – the

finished product must deliver the right experience for the occupants. As the theatre’s executive director, Deborah Aydon, said: ‘Haworth Tompkins has [created] something that is as beautiful as it is functional... and that supplies joy beyond expectation to every visitor, and those of us lucky enough to work here’.

Going beyond expectations is only possible if you marry innovative engineering with a clear sense of how the building is to be used. As well as its natural ventilation, the Everyman boasts a range of sustainable techniques, including CHP, air source heat

pumps, and rainwater recycling. However, the simple decision to use paper towels, rather than hand dryers, sums up everything that is good about this building. The choice was made not only to cut

energy use, but also to speed up the passage of audience members through the toilets during the interval. It is the ultimate example of the engineering team working in perfect harmony with the client.

Ruskin Air Management is a market leader in air distribution, and fire and smoke control. It combines the Actionair, Air Diffusion and Naco brands. The companies work together to provide complete HVAC solutions for the built environment.

The use of paper towels sums up everything that is good about this building



VOLUNTARY DECs CAN FILL THE GAP



Non-domestic buildings use about 2.5 times more energy than predicted, according to InnovateUK. **Kerry Mashford** says voluntary DECs would inspire firms to tackle the causes of operational failure

Although the UK has made progress in improving energy efficiency in non-domestic buildings, there is still much to be done in terms of the procurement of new buildings and the management and improvement of existing structures.

Energy used in non-domestic buildings accounts for 18% of the UK's carbon emissions but, with a targeted focus, savings significantly more than 20% can often be made in both carbon emissions and energy costs.

The InnovateUK's Building Performance Evaluation programme 2010-14 involved studying more than 100 new-build projects and three refurbishments, including 56 non-domestic buildings across 13 building types. It found that non-domestic buildings typically use 2.5 times more energy than predicted, irrespective of sector. However, this figure was often as high as 4.5 times. Earlier studies showed it could be up to five times.

This discrepancy is now widely recognised and often referred to as the performance gap. Changes to the way we design, deliver and operate buildings can close this shortfall, but it's only gradually becoming clearer what might have the biggest impact.

Gap analysis

The InnovateUK programme revealed a number of emerging themes that contribute to failing buildings and the performance gap:

- Non-standard hours and unregulated loads
- Inadequate commissioning.
- Sub-metering strategy and reconciliation
- The complexity, functionality, commissioning and training around building management systems
- Complexity, operating instructions and labelling of controls

- Overuse of artificial lighting, zoning and control
- Fabric performance, its specification and construction
- Integration and control of multiple HVAC systems
- Installation, operation and maintenance of renewables
- Poor implementation of energy strategies, including communication during delivery and commissioning.

For new-build, we need to respond to these themes through meta-analysis to clarify the magnitude of individual issues in relation to the whole. We need to analyse and address the root causes. A useful resource is the National Energy Foundation's book: *How Much Energy Does Your Building Use?*

The industry has to introduce improved process standards in the new-build cycle and share experiences through resources such as the National Energy Foundation's Building Performance Exchange or CarbonBuzz.

Finally, we need to implement smart mitigation actions, especially embedding good practice and enshrining it in industry contracts to improve client expectations and 'pull'. It's often difficult to understand how

New tools and techniques are emerging that can help us construct better buildings and improve our existing structures

Method and benchmarks

Item	Statutory DEC	VolDEC
Methodology	Uses the methodology in CIBSE TM47	Uses the methodology in CIBSE TM47
Benchmarks	Uses CIBSE TM46 benchmarks – only one benchmark for all office types	Uses CIBSE ECON19 benchmarks for offices – provides four different office types. Energy is broken down by end-user for each type
Landlord/tenant split	Unable to provide a separate landlord/tenant DEC in the same building	Uses energy breakdown in CIBSE ECON19 to provide composite landlord and tenant benchmarks for five different building scenarios

much energy an in-use non-domestic building is using, and how it breaks down into uses, time periods, zones and tenants. Tools including CIBSE's TM22 and voluntary DECs – an initiative by the National Energy Foundation, Building Energy Solutions and Legal & General Property – are available for owners, managers and tenants as well as specialist energy consultants.

Voluntary DECs (VolDECs) are a response to the fact that many commercial office buildings don't have an appropriate means of measuring and highlighting energy performance in a relatively simple and consistent way. In particular, there are issues associated with the landlord and tenant energy split and the lack of relevant benchmarks for performance to be measured and compared sensibly and consistently.

Better benchmarks

VolDECs are a not-for-profit scheme, aiming to benefit the industry by establishing a consistent methodology. Based on relatively simple data, they are inexpensive and quick to produce. They use the same methodology as statutory DECs but with an extended G-rating for greater differentiation.

VolDECs provide landlords and tenants with comparative energy performance of the areas they control, providing a clear driver for improving performance. Importantly they give a reputational and financial value to energy performance. They should enable the development of better benchmarks as illustrated in the table.

Whether aiming to close the performance gap on a new-build project or tackling the performance of an existing building, new tools, techniques and guidance are emerging that can help us construct better buildings and improve our existing structures.

- For more information on VolDECs, contact NEF at www.nef.org.uk or 01908 665555.

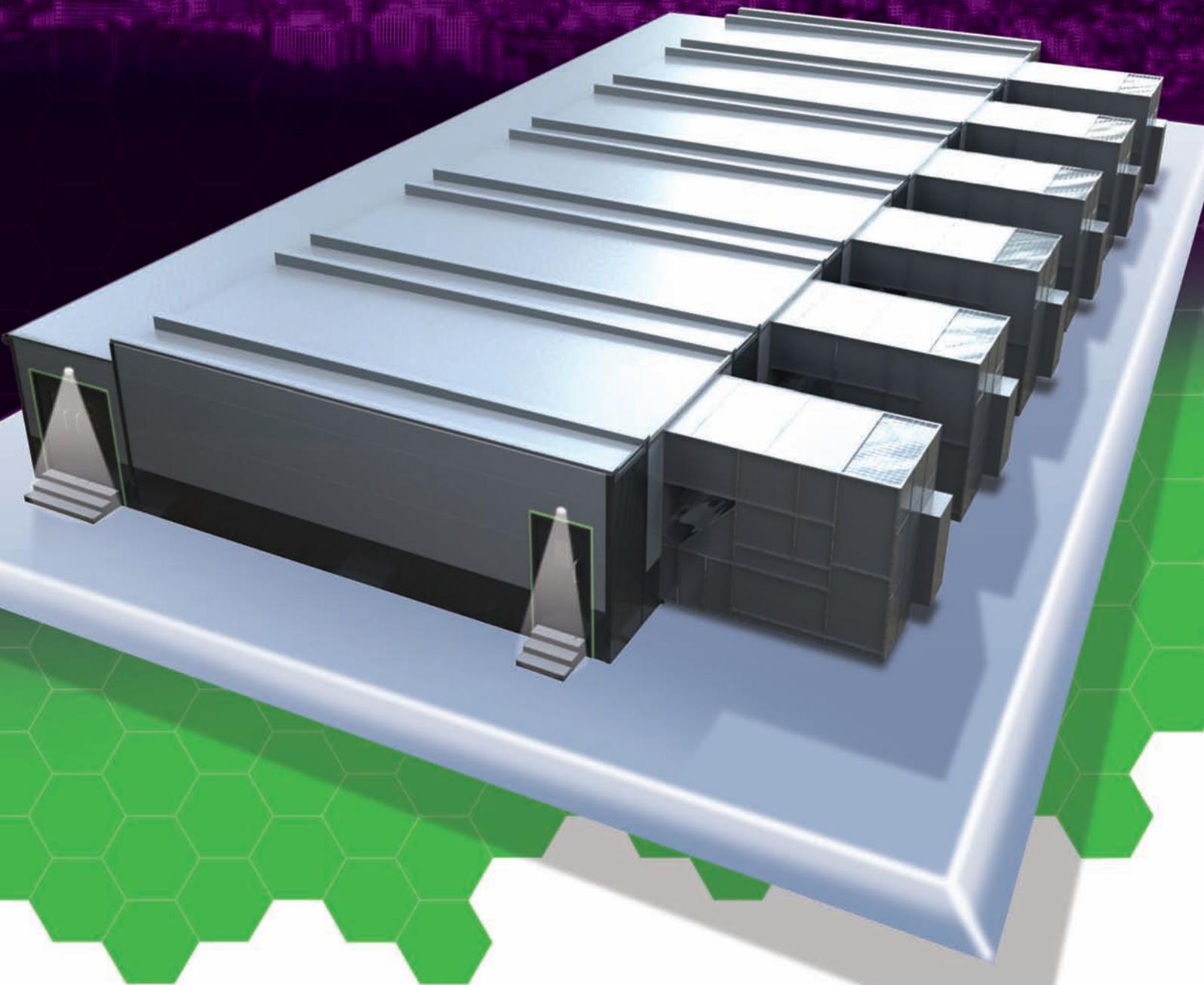
DR KERRY MASHFORD, CEng FIMechE FRSA, is chief executive, National Energy Foundation

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Taking THE LEAD

Improving building performance is paramount, but not at the expense of comfort and financial stability. **Alex Smith** and **Liza Young** listen to the experts at CIBSE's Leadership in Building Performance Conference and Exhibition



“Rising energy costs would make Sainsbury's unsustainable unless we took energy saving measures – *Steve Roberts*”



EXHIBITOR LIST

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LABM
Lochinvar Ltd
Matchtech
Remeha Commercial
Rinnai
Schneider Electric
Sentinel Commercial

Consultants must learn to collaborate on projects or buildings will continue to suffer from poor performance. This was the warning given by RIBA president Stephen Hodder at CIBSE's new flagship event – the Leadership in Building Performance Conference and Exhibition.

‘It can't be us and them,’ Hodder told delegates. ‘For savings to be made in construction there must be collaboration.’

Hodder, who was the first RIBA president to speak at a CIBSE conference, said collaboration was essential to deliver excellent buildings and high cost certainty. He drew attention to 37-storey Student Castle in Manchester, where the project team worked together to ensure the contractor understood design and project risk. ‘With collaboration we had efficiency,’ explained Hodder, who said the building had 80% cost certainty.

The two-day event at the QEII Conference Centre, London, in October discussed issues affecting building performance, including BIM, soft landings, zero carbon standards, indoor air quality, and availability of finance.

One recurring theme was that energy savings should not come at the expense of occupant comfort and financial performance.

Ed Gray, head of carbon and energy for Marks & Spencer, said that the retailer's Plan A scheme for energy efficiency was expected to bring £145m of savings in 2013/14. But he said this was not at the expense of building comfort. ‘Anybody can build a low-energy building – the real skill is building one that people want to dwell in.’

M&S was CIBSE's Carbon Champion of the Year in 2014, but Gray said its energy targets will become more challenging, as the market is moving towards smaller stores that Gray said were more energy-inefficient than large ones, such as its flagship Cheshire Oakes store.



WATCH NOW

Watch video from the conference now at cibsejournal.com/app

Power aid

The first panel session on power networks couldn't have been more timely, with the National Grid announcing that spare capacity over the winter would be at 4.1% its lowest since 2006/07. In its Winter Outlook report, the National Grid said the capacity margin could drop to 2.8% in the event of a severe winter.

Huw Blackwell explained how the closure of nuclear power stations and an increase in wind power, was leading to a reliance on fossil fuels to ‘rebalance’ the grid during peak demand. Blackwell, a decentralised energy project officer at Islington Council, said that heat networks and large combined heat and power (CHP) plants, such as Avedøre Power Station in Copenhagen, could help provide cheap electricity during peak demand.

Sainsbury's electrical technical manager, Steve Roberts said that the retailer was working on two heat networks in Nine Elms and Fulham Wharf, along with a host of energy-saving initiatives such as battery storage, anaerobic digestion and voltage optimisation.

‘Rising energy costs would make Sainsbury's unsustainable, unless we took energy-saving measures,’ said Roberts, who said £1 saved in energy costs at Sainsbury's equated in value to £5 of product sold.

‘We wouldn't do this if it wasn't viable. We aim to do the right thing, but we aim



Stephen Hodder: collaborate to make savings in construction

In America, mandatory display energy certificates were exposing deficiencies. Francis noted that one of the worse-performing buildings in New York was the new Bank of America Tower, which was LEED Platinum, yet used twice as much energy per square foot as the 83-year old Empire State Building.

Softer landings

CIBSE's FM group chair Geoff Prudence FCIBSE, who chaired a session on soft landing, reminded delegates that 'a building is for life, not just for commissioning'. The poor standard of building handover was a recurring theme at the conference.

CEO at the National Energy Foundation Kerry Mashford, revealed findings from Innovate UK's Building Performance Evaluation Programme. It found that energy used in more than 500 buildings was between 2.5 and 4.5 times what was predicted (see Kerry Mashford's column on page 18). Many of the reasons for failure would have been picked up by a soft landings where HVAC and controls are tested and fine-tuned until the buildings meet the performance targets defined by design engineers.

In the same session, Tasmin Tweddell, from Max Fordham, explained how the consultants were working on achieving an 'A' DEC rating at Keynsham Town Hall. She said a risk register had been created to identify any potential issues affecting the successful delivery of the project.

Louise Ellison, chair of the Better Buildings Partnership and head of sustainability at Hammerson, said that the feedback loop was essential for improving and maintaining operational performance, but she said feeding back operational learnings to development teams responsible for new retail was challenging. She said Hammerson had benchmarked all its shopping centres to identify any errant developments.

On the second day of the conference, speakers addressed the role standards played – and will play – in designing future homes.

Nick Cullen FCIBSE, research and development partner at Hoare Lea, said most people were not willing to pay for low carbon technologies, and the 'only way we can effectively deliver more environmentally sustainable buildings was through regulation'. But Jonathan Hines, director at Architype, challenged aspects of BREEAM and the Code for Sustainable Homes because at times they were 'contradictory'.

He said while working on a project for a special school – for children using wheelchairs – cycle racks were provided to earn BREEAM



Nick Cullen: we need regulation

for a commercial benefit,' said Roberts.

Generating electricity through PVs and CHP is a key part of Sainsbury's energy strategy but Roberts revealed that there were long delays in connecting renewables to the National Grid.

Steve Halsey, distributed generation development manager, UK Power Networks, said there were 20,000 applications for distributed generation (DG) projects – such as those installed by Sainsbury's – in 2014. 'It's a challenge for all distributed network operators (DNOs),' said Halsey, who added that various technical issues had to be addressed for electricity to flow into the National Grid. He said UK Power Networks – one of nine DNOs in the UK – had accepted more than 2.5GW from DGs and, by March next year, planned to connect another 800MW.

Financial incentives

Principal at Monomoy Richard Francis said the property industry was becoming more aware of the financial benefits of energy efficiency, and that there was a correlation between performance and property values.

'Technology and the market is forcing transparency and creating a different type of customer,' said Francis. 'There has been a rise in short-term tenancies and occupants want to see energy bills – if property owners don't have proof of performance, they will be blacklisted.'



Janet Beckett: the culture must change



Kerry Mashford revealed new evidence for the performance gap



TOP #CIBSECONF TWEETS

Hamworthy Heating @heatingatwork

To close the building performance gap CapEx and OpEx must talk to each other.

Anne Dye @AnneDyeResearch

Francis:in USA & Germany consultants employed on basis of measured performance of their previous bldgs. Cld UK follow/

@CIBSE

StephenHodder talks:the 4Cs facilitating collaboration. Culture, Contracts, Clients & Computing. Improving time, costs & certainty

@AnabasFM

Use less and reuse more. The challenge is keeping comfort.

RebeccaHanford@BnES_Becks

@BESAssoc_Andy opening the debate at: We all need to tell software vendors what we want and what we need from BIM

■ For more social media coverage on the conference and exhibition visit the CIBSE Storify page at www.storify.com/CIBSE/cibse-conference-and-exhibition-2014

points. 'In other cases, BREEAM allowed you to score points for rainwater harvesting, where mains water could have been more sustainable,' said Hines.

He added that the idea of zero carbon was also flawed because it was based on offsetting rather than reducing. 'There are many complicated buildings with "add-ons", rather than simple, sustainable buildings,' he said.

An advocate for Passivhaus, Hines said designers should take a fabric-first approach.

'Passivhaus is like using a thermos flask – rather than a coffee maker – to keep your coffee warm. It's about creating well-insulated buildings, but also being comfortable while using the least amount of energy.

'Our vision is to do Passivhaus as standard, but to do it with affordability. We can achieve this by rethinking the process of design and construction and focusing on things that actually matter.'

Foroutan Parand, building physics technical director at URS, said although the code was a good instrument for integrated design, it failed to cover overheating, ventilation, air quality, thermal comfort, acoustics and cost of build. While working on the North West Cambridge development – which relies on natural ventilation through windows – Parand said URS had to test passive ventilators as noise prevented opening windows on some façades.

He said: 'Whether it's a voluntary code, Part L, zero carbon, or even a Passivhaus-type of approach, what is important is an integrated design and doing a lot of analysis at an early stage. It's important to work in a new way – in an integrated way.'

This theme continued into the BIM section,

which highlighted the importance of storing and sharing data between all industry sectors.

Paul Marsland, CAD/BIM systems development manager at NG Bailey, said that without 'a common language and common data, you can't achieve fantastic buildings'.

Janet Beckett MCIBSE, director at Carbon Saver UK, agreed: 'We need a culture change – we have to learn to share and not be overprotective with our data. If we manage expectations and are honest with clients, we will be able to achieve Level 1 and 2 BIM.'

Rob Manning FCIBSE, Government Soft Landings implementation lead at BIS BIM core team, said that people were too fixated on the model. 'The model is not a key part of handover, but the data that goes into the data store is. The parameter of that model may become redundant in 10 years, so you have to keep the data and documentation up to date.'

He said Level 2 data management is about having data and documentation and a native model to carry it. 'Are the asset operators ready for the skill requirement and cost of maintaining a native model up to date to accommodate all the changes that take place during operation? I do not think they are.'

InnovateUK lead technologist Rick Holland said that models were 'a lie searching for the truth', so integration between hardware and software, and suppliers and users of buildings, was key. (See news for more on BIM, including Paddy Conaghan's assertion that BIM is the 'elephant in the room'.)

Open about data

Paul Ruysssevelt, professor of energy and building performance at UCL Energy Institute, said that the industry's reluctance to share data was stymying good building: 'Whatever the question, the answer requires data. Data is held by many different players but it's rarely shared and, in isolation, it's not as useful.

'There seems to be a reluctance to release energy data into the wider public domain and a tendency only to give information if it's anonymised in some way.

'In the US, it is mandatory to declare the performance of your building. We need data from many buildings and it needs to be higher resolution data, and contextual data.'

He said the big question mark is what happens to data from our smart and sub-meters. 'What is the strategy for using that data in an intelligent way?'

Closing the second day, CIBSE immediate past president George Adams FCIBSE said the institution had an important role to play in bringing the industry together to share ideas and transfer knowledge between all sectors. **CJ**

CLIMAPRO TO OPTIMISE THE ENERGY PERFORMANCE OF BUILDINGS



From their vast experience as a leading HVAC solution provider, Climaveneta has designed ClimaPro: the plant room optimiser.

Following their vast experience as leading HVAC solution providers, Climaveneta has designed a highly specialised control and optimisation solution dedicated to HVAC.

As a matter of fact, Building Management Systems (BMS), typically installed in all modern buildings, integrate and collate data from various sub-systems which control specific areas or functions, and represent a basic

and generic solution to manage the air conditioning system.

ClimaPRO, the Climaveneta dedicated solution for optimal control of the entire plant room, offers additional and unique functions that allow you to carve out the control of the plant room HVAC equipment from the BMS, thereby achieving an unchallenged quality of optimisation.

Created with an in-depth understanding of all thermodynamic variables involved in managing plant room HVAC equipment, ClimaPRO enables optimum control of every device and its integration into a single synergistic system.

Optimisation is not achieved by the use of a single algorithm designed to ensure the best efficiency, but is rather a continuous process articulated through different levels of smart software functions, which contribute to ensure the best result.

In order to achieve and maintain the high level of efficiency as per original design, optimised plant room management is essential. Every single element of the system involved in the production and the distribution of the energy must therefore operate in perfect harmony.

For this reason it is essential to use a dedicated optimisation & control software system which includes high-end logic, to ensure real energy savings as well as delivering long term reliability.

Without accurate and continuous HVAC commissioning, even the best system degrades over time. The acquired data is accurately compared with the design data of each single unit at various working conditions to measure and calculate efficiency and performance indices of the whole plant room, allowing real condition based system maintenance.

ClimaPro ensures complete control and accessibility, thanks to a web based access, making information easily available for all professionals involved on-site and remotely. User profile based access, allowing individual visibility tailored to the specific user needs: building management and maintenance, system design and commissioning.

The great advantages given to the building are already evident in the ClimaPro installations: Aporti Palace office building in Milan, Sheraton Mirage Resort in Australia, Amazon's new logistic hub in Piacenza. Different applications and different locations with the same achievements: increased energy efficiency, rationalized maintenance costs, energy management and BMS support.

ClimaPRO is therefore the best investment to harness the energy saving potential offered by HVAC plant room equipment, driving real energy saving routines, effectively reducing your total energy bill and achieving something real in terms of sustainability.

Considering the total world CO₂ emissions, it is essential to underline how the largest part of them, 74%, comes from energy. Again considering the total energy consumption, heating and cooling accounts for 36%. To have a comparison it is useful to know that transport is just 35% of the total!

Going in depth into heating and cooling we can consider that, in commercial buildings, HVAC accounts for 45% of total energy consumption, 65% of which is used in the plant room alone!

The plant room can be considered the heart of HVAC. It is where hot and cold water is created for distribution to other subsystems throughout the building.

Typically a plant room includes: chillers, heat pumps and boilers; with source systems including: air, water, ground; and distribution equipment such as: pumps, valves and pipework.

Chillers and heat pumps are the heaviest energy consuming components, accounting for 78% of the total plant room energy consumption.

Optimisation of the energy used within the plant room is therefore critical to the overall building energy profile, and can only be effectively managed by suitably experienced technical experts.

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● PERFORMANCE ● RELIABILITY ● OPTIMISATION

Sowing THE SEEDS

CIBSE's new head of sustainable development, Sara Kassam, has spent her career empowering people to improve building performance. **Alex Smith** finds out how

Sara Kassam clearly left her previous employer on good terms. CIBSE's new head of sustainable development was the sustainability and energy manager at the University of East London (UEL) for five years, and – while taking me on a recent tour of its Stratford campus – she was constantly interrupted by ex-colleagues wishing her well.

Engaging with staff is key to ensuring that the operation of buildings is optimised, says Kassam: 'It is the people on the ground who are using them. They have much better ideas on improving buildings and making them more comfortable.'

Kassam is an enthusiastic and effusive speaker, and her CV is studded with groups she has established to share knowledge and best practice on sustainability. These haven't just included her peers either, but older professionals from whom Kassam says she can learn a lot.

She set up and chaired a carbon reduction sub-group of the London Universities Environment Group, because she wanted to learn from other energy managers working in education, and encourage them to share ideas and experiences. 'I like having a gang – you don't feel as though you're doing it all yourself,' Kassam says. 'I was quite new and they had more experience in the sector – I wanted to pick their brains. It was a brilliant opportunity

to exchange ideas, and a nice support network.'

Much of Kassam's career has involved engaging people to ensure sustainability policy is followed through on the ground – whether it be recycling waste, cutting energy-use in buildings, or ensuring the successful integration of renewables.

A geography undergraduate at Nottingham, she sat on the university's estates committee as the Students' Union environmental and social justice officer. She was able to lobby for green electricity supply contracts, and worked with the Nottingham Green Partnership to provide glass recycling for students living offsite.

'It gave me an early insight into how you can persuade people to change,' says Kassam, who helped Nottingham to become one of the first Fairtrade universities in the country, through her work with students, staff and suppliers.

Having proved she was someone 'who gets things done', Kassam joined the National Graduate Development Programme – a fast-track scheme designed to unearth talent for local authorities. She was placed at Ashford Borough Council, in Kent, and completed a diploma in local government management at the University of Warwick.

Ashford then offered her a full-time role as a sustainable development coordinator, and she worked with agencies in Kent – including the county council and Kent Wildlife Trust – to build sustainable communities. However, the



KASSAM ON CIBSE

On Guide L: 'I'm working on a revamp of CIBSE's *Guide L: Sustainability*, and looking at a new way of presenting knowledge. Things have moved on so quickly, and we have to look at how we get the most up-to-date knowledge to members, and how they can contribute.'

'I want CIBSE to be out there. I want non-building services engineers to see Guide L and see how relevant it is to their role.'

On building performance: 'We need to bring people together – how do we get different professions together using networks?'

On design: 'You shouldn't design systems in isolation – it needs to be holistic. You have to think a lot more about interactions.'

role had taken her away from the grassroots. 'I was done with policy,' says Kassam. 'I wanted to see the direct impact of my work.'

She joined the London Borough of Richmond upon Thames as a sustainability officer. 'At Richmond, I was doing things with people, rather than organisations,' says Kassam. 'There was a much shorter timescale between policy and getting things done.'

She worked with building operators to reduce energy use, and carried out Display Energy Certificate (DECs) assessments for schools in the borough, and encouraged them to keep track of energy data. 'We organised carbon-management training for bursars, caretakers and anybody involved in the management of schools, including



UEL's Stratford campus library, which has been shortlisted for a CIBSE Building Performance Award – www.cibse.org/bpa



‘We organised carbon-management training for bursars, caretakers and anybody involved in the management of schools, including headteachers

headteachers,’ says Kassam. ‘It went down well. They need to know everything – otherwise they don’t see the whole picture, and where they fit in.’

Kassam also looked to engage with council employees and the public, through staff campaigns and talks. One small legacy of which she is proud is a giant game of environmental snakes and ladders that she devised. It has been reproduced around the UK, and even spotted at a local community fair.

After Richmond, Kassam moved to UEL, and became responsible for energy management on three campuses – Docklands, Stratford, and University Square Stratford (USS). During her time there, three major projects were delivered on each of the sites.

Ensuring that everyone’s views on building operation were listened to – whether they were users, facility managers or engineers – was something Kassam embedded into the UEL strategy. She established a sustainability board, which was chaired by the financial director of the university. ‘It shouldn’t be us versus them, maintenance versus user, capital projects versus FM,’ says Kassam, adding that the involvement of the financial director ensured there was a long-term approach to sustainability during her time at UEL.

‘He was convinced of the benefits of sustainability. He was responsible for pushing ISO14001 certified environmental management, and he recognised you need more resource to continue the high standards.’



CAREER TIMELINE

- **August 2014**
Head of sustainability development, CIBSE
- **2009-2014**
Sustainability and energy manager, University of East London
- **2007-2009**
Sustainability officer, London Borough of Richmond upon Thames
- **2006-2007**
Sustainable development coordinator, Ashford’s Future
- **2004-2006**
National Graduate Development Programme, Ashford Borough Council

While at UEL, Kassam qualified as a CIBSE Low Carbon Energy Assessor, which helped with energy strategy. She says: 'I wrote a carbon management plan for the university. We upgraded software, engaged with the utilities, made sure we knew where the meters were, and sent in up-to-date meter readings.'

Other initiatives included growing food, bike-maintenance classes and sustainable catering. Kassam also worked with an organisation – Change Agents (formerly Studentforce for Sustainability) – which promoted sustainability. She used every channel possible to reinforce her message, from tea towels to payslips.

During her five years at UEL, Kassam was involved in the delivery of three buildings – the SportsDock sports centre, in Docklands; the new library at Stratford campus; and University Square Stratford campus. Kassam made sure key users understood the sustainable and energy-saving features of the buildings, for example, when the SportsDock opened, she organised staff tours of the PV system and biomass boilers. 'It was important for people to see this stuff, and understand it.'

One of her biggest challenges for the sustainability team was persuading UEL

to invest money for long-term operational benefits. The university had enough resource to include soft landings on one project – the library. 'Soft landings made sure the sub-meters were calibrated, so we could obtain useful data. They weren't feeding data back properly, so at least soft landings ironed this out,' says Kassam.

Monitoring extended to the project teams; the architecture and M&E strategies were peer reviewed and the internal project manager, Mark Janko, made sure everyone with an interest in the building identified risks that could be fed into design teams early on.

Kassam is now bringing her experience of operating buildings to CIBSE. She is keen to break down the walls that separate professions, and for institutions to speak to each other about better ways of working.

The Chartered Institute of Management Accountants is one body with which Kassam wants to work – and she recommended we talk to Sandra Rapacioli, its head of sustainability research and policy (page 69).

'The people responsible for capital expenditure are not connected,' says Kassam. 'Their decisions need to be based on long-term operational costs.' CJ



It shouldn't be us versus them, maintenance versus user, capital projects versus facilities management.
– Sara Kassam

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commercial

BIM BREAKS THROUGH

Building services engineers are well on their way to working on collaborative BIM, according to the 2014 CIBSE BIM Working Group Survey. **Tim Dwyer** reports on its findings

The CIBSE BIM Working Group conducted an online survey of BIM users and non-users in the summer of 2014. It attracted input from a wide range of industry participants, but – as might be expected in a CIBSE-originated survey – more than half of the respondents categorised themselves as building services engineers/designers, and the responses are likely to reflect that bias.

Any findings from such a survey should be viewed with caution, as the group that completes it is self-selecting, and may not be representative of the industry. All those who took part in the survey made a subjective assessment of how well informed they are about BIM. It is clear, from following the discussions of ‘BIM’ over the past few years,

that the interpretation of the term – building information modelling/model – differs wildly from person to person. However, the collected thinking appears to indicate that – regardless of how individuals interpret BIM – they believe they are becoming better informed about it (Figure 1).

This is good news for the government’s BIM Task Group, which has been working for the past three years to move forward understanding and implementation of 3D collaborative BIM as one of the key facets of the 2011 Construction Strategy.

The perceived importance of BIM goes beyond the current users, with almost three-quarters of those who do not currently employ its philosophy and technology considering that it will be a key requirement

Figure 1 – How well informed do you think you are about BIM?

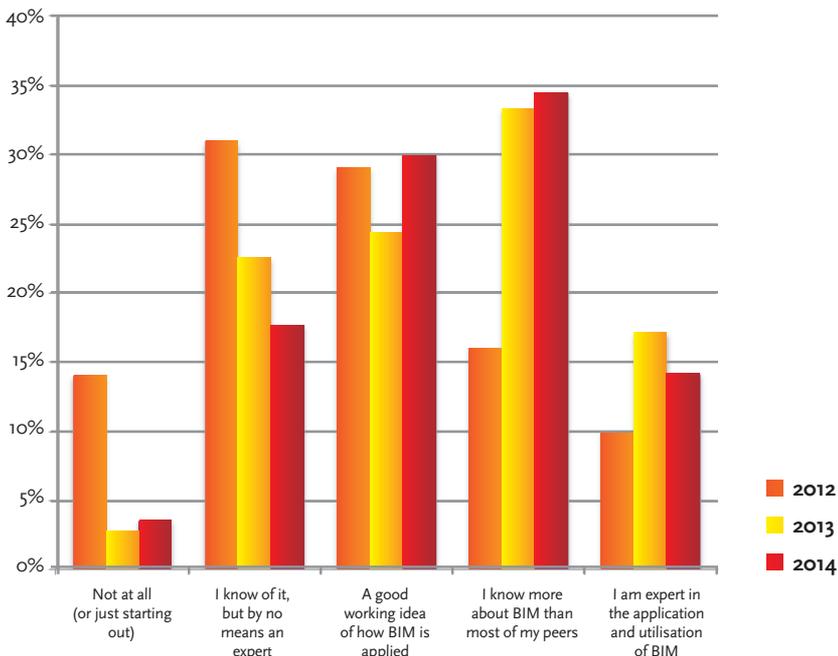
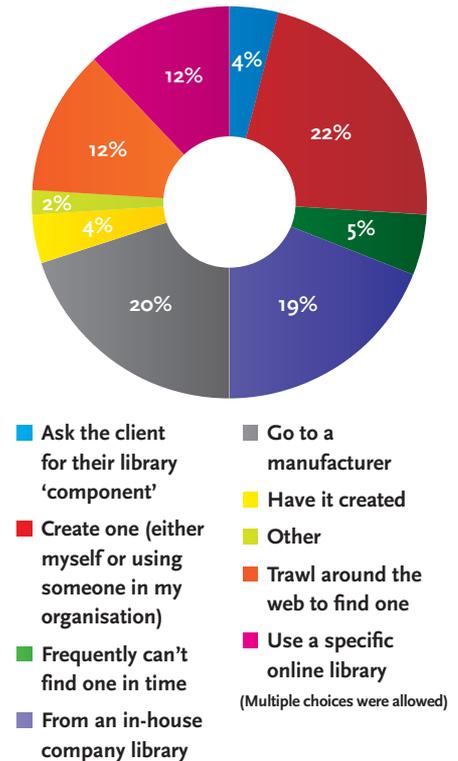


Figure 2 – How do you obtain BIM ‘components’ ?



for their future work – and more than 40% seeing it as essential.

About three-quarters of respondents had been involved in projects that have used BIM, and the proportion that has been actively involved with it for between two and three years almost doubled compared with last year.

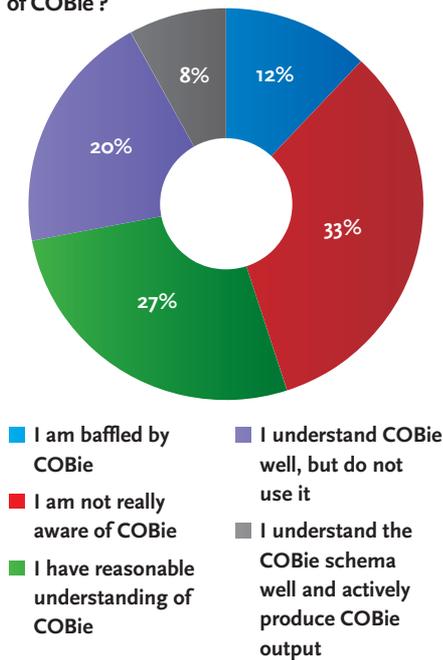
The number of vendors that were seen as providing the software for BIM activity was almost identical to last year.

Despite the apparent increased awareness and take-up of BIM, the source of the components (families/objects) by users has not shifted significantly in the past year – still, nearly a quarter produce their own components (Figure 2). This is somewhat surprising, because manufacturers have been promoting the increased availability of components suitable for BIM.

However when looking at the current BIM activity (Figure 3), more than a third of activity focuses around levels (of detail) 1 and 2 – neither of which require complex parametric information, and often comprise primitive geometric/wire-frame outlines. To feed the requirement for reliable non-proprietary BIM components, more than 75% of respondents see a need for an independent library of generic building services objects.

The aim of the government’s BIM Task Group is to move the ‘level of maturity’, so that, by 2016, government projects are

Figure 5 – How well do you consider you understand the purpose and make-up of COBie ?

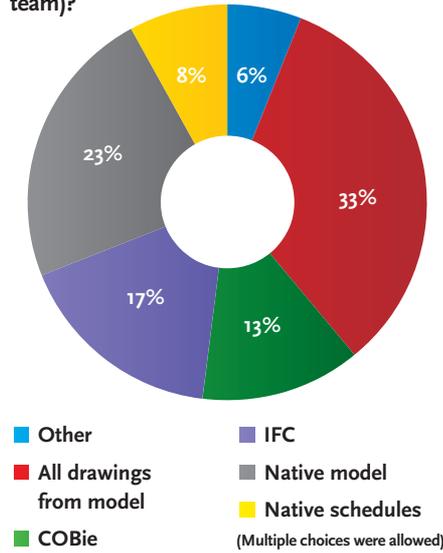


delivered with collaborative 3D BIM – complete with fully electronic project and asset information, documentation and data. The survey indicates that there has been a massive shift in 2014, with more than half of BIM-active respondents considering that they work to maturity level 2 (Figure 4).

The survey’s question set was expanded beyond that of previous years, to cover resolution of the ‘client’ expectations of output from the BIM. These considered the immediate output requirements and information that would provide intelligence for the operational stage of the buildings life.

Although only 39% of the BIM-active respondents were outputting data explicitly

Figure 6 – What are you asked to produce as output (by clients/colleagues/construction team)?



for use in facilities management, almost all users and non-users believe BIM will help support the design and delivery of strategic facilities management. When it came to the importance of the information delivered by BIM, operational and maintenance data were seen as important, practically, as design data.

The information output promoted to meet the 2016 UK government requirements is Construction Operations Building Information Exchange (COBie) – and more than half of the survey responses indicate a reasonable awareness of COBie (Figure 5).

The actual output currently requested from BIM users by clients, colleagues or the construction team was dominated by requests for ‘traditional’ drawings (Figure 6). This perhaps is indicative of a supply-chain data disconnect, where traditional drawings are

required not only for site application, but also to bridge the interoperability gaps between design and fabrication software.

The survey respondents saw CIBSE as leading the standardisation of BIM for Building Services Engineering, followed by a group of institutions and then by the British Standards Institute (BSI). Both CIBSE and the BSI have been active in the development of methods and standards over the past year – BSI with PAS 1192 part 3, which considers the operational data requirements, and CIBSE with the product data templates used to provide manufacturers’ product data into the BIM– see www.cibse.org/bim for details.

The surprise from this survey, to those in the CIBSE BIM Working Group, was the advanced level of maturity that many were working towards. However, with increasing levels of perceived competence in BIM – and the confidence to progress to higher levels of detail – it indicates that BIM is taking hold in this industry.

There continues to be a wider debate about the benefits of BIM; with the technology permeating the industry, there may now be an opportunity for some holistic analysis of whether BIM provides a return on investment that encompasses all aspects of building construction and operation – the *CIBSE Journal* would be pleased to hear of any such analysis. **CJ**

● See more charts go to www.cibsejournal.com or www.cibsejournal.com/app for tablets. Full survey results are at BIMTalk.co.uk

PROF TIM DWYER FCIBSE CEng is teaching fellow at UCL Institute for Environmental Design and Engineering, *CIBSE Journal* technical editor, and technical consultant to CIBSE

Figure 3 – To what level of detail (not UK government maturity) do you use BIM?

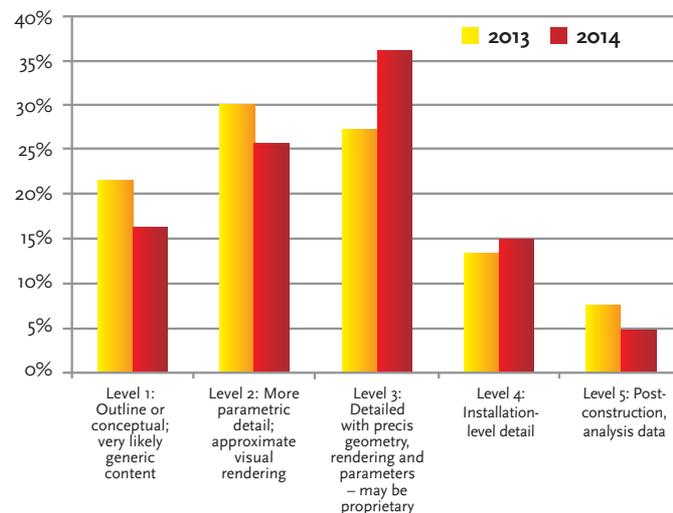
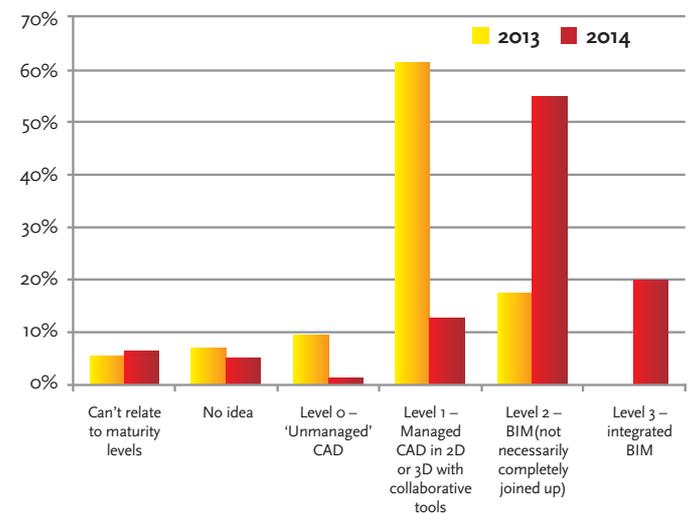


Figure 4 – What UK government-defined BIM ‘level of maturity’ are you working to?





ON COURSE

The power of the River Derwent will help to generate 1.1 million kWh of energy as part of the refurbishment of Derby's 1940s council headquarters. **Tim Findlay**, of Hoare Lea, and **Olly Paish**, of Derwent Hydro, explain

6 The Environment Agency required the hydraulic flow model to use a flow rate corresponding to that caused by a one-in-100-year flood, plus a further 20%

The River Derwent has long been a source of energy; it was the force behind the first water-powered cotton mill – at Cromford, in Derbyshire – which gave birth to the Industrial Revolution. Now, nearly 250 years later, Derby City Council boasts its very own hydro-electric power plant, having refurbished its 1940s Council House.

The success of the project depended on overcoming a number of technical, legal and financial issues. However, the result is a building that produces enough carbon-neutral electricity to gain a –25 and A+ Energy Performance Certificate, as well as a BREEAM Excellent rating. Here's how it was achieved.

Planning process

The redevelopment of Council House involved the demolition of a 1970s extension, within what was the central courtyard. This was then in-filled, and a new

floor built at roof level, increasing the floor area from 5,600m² to 18,637m², enabling all city centre council staff to be located on one site. The refurbishment featured a host of sustainable features (see box 'The route to BREEAM Excellence').

Although the hydropower project at the adjacent Longbridge weir did not start at the same time, it became clear – from an early stage – that the two projects should be linked. This was not only because of their proximity, but also because of the significant value of feeding the generated power directly into a council-owned building.

However, the hydropower project took much longer than expected. Despite consultant Derwent Hydro conducting the feasibility study in 2006 – and the council cabinet granting approval in 2007 – the generator only became operational in March 2013.

Over the course of several years, £150,000 of the project's £2m cost was spent on fees to get it through planning, largely because of negotiations with the Environment Agency (EA) – over the licence to transfer water from the river – which took until October 2009.

Part of the problem was the lack of coordination of the various EA departments

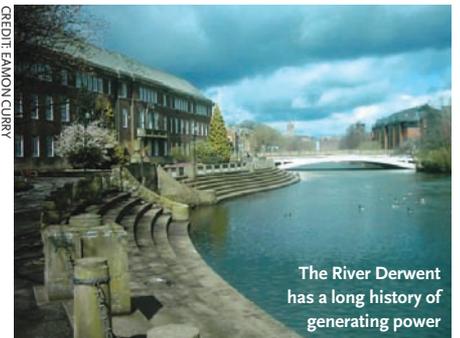


CREDIT DANIEL SHEARING



The floor area in Council House has more than tripled

CREDIT EAMON CURRY



The River Derwent has a long history of generating power

(permitting, fisheries, flood defence and ecology), so communication was required with all parties – simultaneously – to make progress. This delayed the project for almost six months.

Satisfying the EA's flood-defence team was the most challenging aspect of the negotiations. It was only achieved after the council employed Black & Veatch to carry out an open-channel, hydraulic flow modelling exercise, to assess the proposed building's probable impact on river levels – both up and downstream – during a flood. The EA required the model to use a flow rate corresponding to that caused by a one-in-100-year flood, plus a further 20%. The model showed that the presence of the hydro building had a minimal effect upon the flood levels, and that only 2m³/s from the 400m³/s flood flow actually crossed the site behind the building.

At the same time as planning approval was being sought, an unexpected legal issue arose. After the Feed-in Tariff (FIT) was launched, the business case for the hydropower plant incorporated payments available under this scheme for exporting power back to the National Grid. However, at a Local Government Association (LGA) workshop in 2009, it became clear that

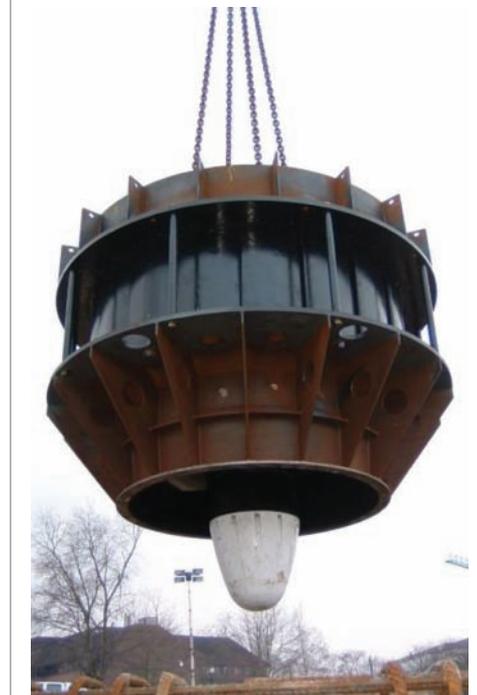
the Local Government (Miscellaneous Provisions) Act 1976 forbade councils from selling power generated by renewable means, unless it was generated in association with heat. Unless the law was changed, Derby council would have to give away or 'burn off' all surplus generation.

While the value of exported power was only about 8% of the business case, it was, nonetheless, a part that the council did not want to lose. It worked with law firm Eversheds and the New Local Government Network to lobby the government to change the legislation. The campaign was successful and, in August 2010, the law was revised to allow councils to sell electricity generated from renewable sources, such as wind and hydropower.

Technical matters

Run-of-river hydropower generally requires turbines that can operate on low-water heads. Archimedean screw and Kaplan propeller turbines are both able to work in such conditions, with screw turbines suited to flow rates of up to about 6m³/s. Kaplans become the more economical option from around 3m³/s.

The turbine selected at Longbridge weir was a two-metre-diameter, double-regulated



The turbine being assembled at Longbridge weir

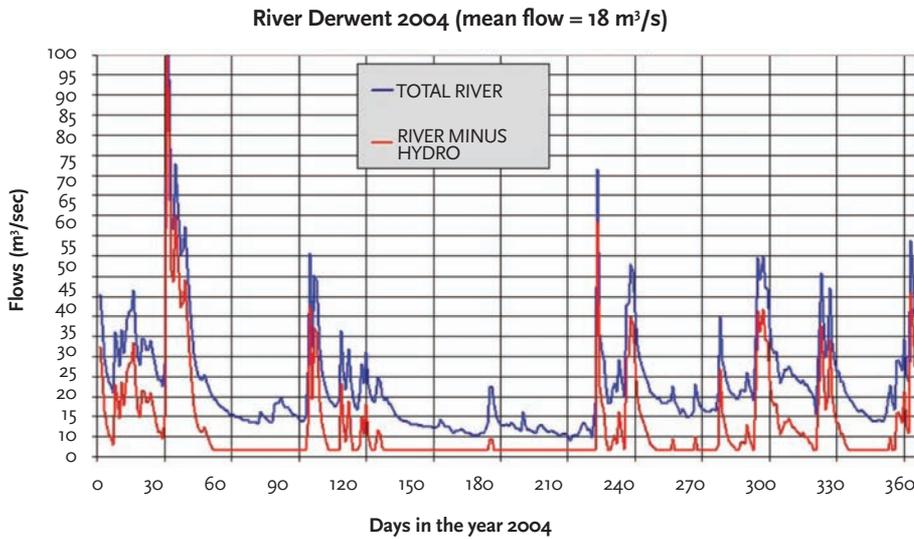


Figure 1: The area between the lines represents the total energy available to be captured and converted into electricity

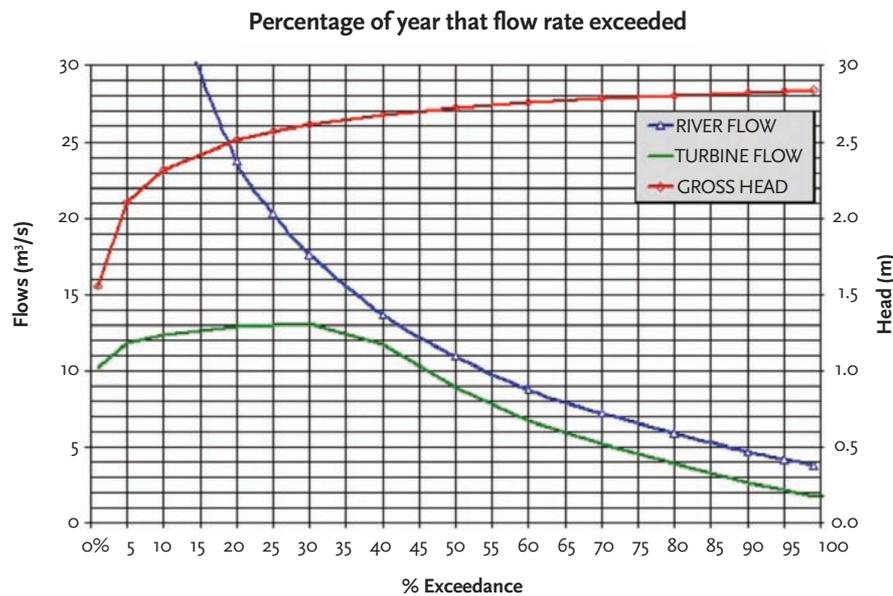


Figure 2: The area under the green line represents the available energy captured by the hydro



The route to BREEAM Excellent

The Council House design team followed the usual carbon-reduction process of using less – and using it more efficiently – and employing renewables as much as possible. However, maximising the potential of the River Derwent allowed them to go beyond what many other projects can achieve.

Using less involved: reinsulating the roof and walls; replacing windows with high-performance glazing; improving airtightness; adding solar shading; exposing thermal mass, using stack ventilation; and incorporating natural lighting via three atriums.

A number of approaches were adopted to use energy and water efficiently. These included: central ventilation with heat recovery; the

reduction of mechanical cooling; Turbocor compressors in the chillers; use of adiabatic cooling via the exhaust airstream and heat wheels; energy-efficient comfort cooling from displacement ventilation and ECDC fan-coil units; intelligent lighting – controlled by occupancy sensors – and daylight-linked dimming; power-factor correction; rainwater harvesting; and low-water sanitary ware.

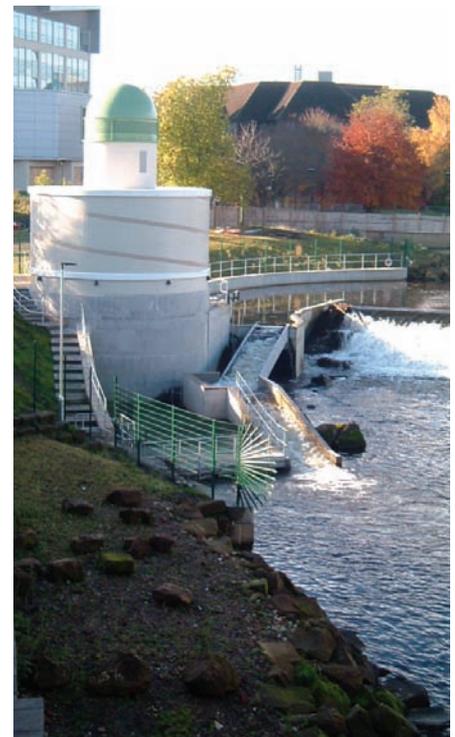
In addition to hydropower from Longbridge weir, the renewable technologies in the Council House project include: solar thermal panels for hot water; solar photovoltaic panels for additional electricity generation; river water for cooling the fresh supply air; and air source heat pumps.

vertical Kaplan type, operating in a siphon chamber (see ‘Turbine Design’ box). It has a design flow of 13m³/s, falling to a minimum of 2m³/s, and the design output is 230kW, dropping to a minimum of about 40kW.

To establish the turbine design, it was important to understand the considerable variation in the river’s flow rate across the year (see Figure 1). While the peak flow briefly exceeded 100m³/s, the average was 18m³/s, and the minimum 5m³/s. There are abstraction points downstream from Longbridge weir, so the flow within the Derwent to these points is artificially maintained at or above 4m³/s by releases from reservoirs. This means hydropower schemes along the river will always have some water from which to generate power.

The red line in Figure 1 represents the typical flow over the weir with the turbine operating, while the area between the two lines represents the total energy available to be captured and converted to electricity.

The graph in Figure 2 translates the fluctuating river flows into a simpler format, showing the percentage of a year that any given flow rate is exceeded. It also shows how the head across the weir drops with increasing river flow. The two characteristics have been combined to form the anticipated turbine flow line. This shows it tracks the river flow – from a minimum turbine flow of 2m³/s, at a head approaching 2.8m; up to a practical design maximum of 13m³/s, at about 2.5m head; and back to zero when the



The Kaplan turbine can be easily started and stopped



The automatic trashrack keeps the river clear of debris

head, in flood conditions, drops below 1m. The area under the green line represents the available energy captured by the hydro.

The original annual output forecast for the plant was 1.25 million kWh, but this had to be reduced to 1.1 million kWh when the EA insisted on a 12.5mm intake-screen gap, as well as a 40mm bar-spacing tailrace screen, both of which increased the parasitic head loss and so reduced the potential output. Total generation from March to the end of November 2013



The gearbox for the generator

exceeded 570,000kWh. Given that, during this period, there were the usual teething problems, an enforced two-week shutdown, and unusually low river flows, the forecast annual output of 1.1 million kWh does appear to be achievable. **CJ**

TIM FINDLAY CEng MCIBSE is an executive engineer at Hoare Lea, having previously worked for Derby City Council. He was the commissioning client for the hydropower project. **OLLY PAISH** is a director of Derwent Hydro, owner/operator of several hydropower installations along the River Derwent



HYDROPOWER PROJECT TEAM

- Building services engineer/architect/client: Derby City Council
- Project manager/cost consultant: Faithful and Gould
- Hydro consultant: Derwent Hydro
- Project continuity: Hoare Lea
- Main contractor: Balfour Beatty
- Hydro manufacturer/installer: Hydro

COUNCIL HOUSE PROJECT TEAM

- Client: Derby City Council
- Project manager: Mace
- Architect: Corstorphine and Wright
- MEP/BREEAM/Acoustic consultant/fire engineering: Hoare Lea
- Main contractor: BAM
- Building services contractor: Emcor



Turbine design

The selection of a two-metre-diameter, double-regulated, vertical, Kaplan syphonic turbine has a number of benefits. It can be started and stopped, easily – using a vacuum pump and air inlet valve – and does not need expensive, slow sluice gates, which are prone to damage and can be difficult to maintain.

The double regulation of the turbine also means that the inlet guide vanes and the turbine runner blade pitch are adjustable. The control system modulates both, to hold the turbine speed at 1,000rpm. The gearbox steps up the rotational speed to 2,500rpm for the generator. Once it is started and synchronised

to the grid, holding the runner at 1,000rpm maintains the synchronisation.

An upstream water-level sensor in the intake canal is used to control the turbine water throughput, to hold a minimum 50mm water depth over the weir crest. This represents a minimum flow over the weir of about 2m³/s.

The lead time for the turbine was a year, so the order was not placed until all the main permissions were in place, and the scheme viability was assured. There are very few turbine manufacturers in Europe producing turbines of the necessary type and size. The chosen supplier was the French manufacturer Hydro.

“The lead time for the turbine was a year, so the order was not placed until all the main permissions were in place, and the scheme viability was assured

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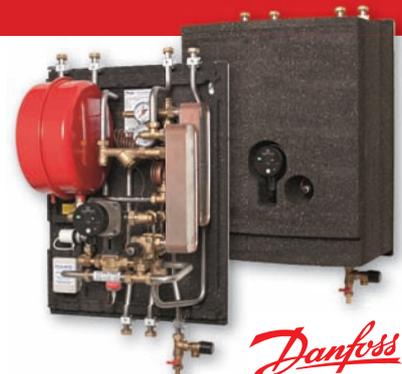
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Richard Wilson's 'Slipstream' sculpture is an impressive presence in the terminal building



FLYING COLOURS



The soaring roof at Heathrow Terminal 2 combines natural and artificial lighting to help banish memories of the oppressive building it replaced. **Jill Entwistle** reports

Arriving at Heathrow's old Terminal 2 was a miserable way to start a journey. If the trip to the airport hadn't left you feeling fraught, the passage through check-in usually ensured a stressful departure. The low ceilings were oppressive and, with the building's dated lighting, the overall effect was like being trapped in a 1970s branch of WH Smith.

Thankfully, the emphasis on height and light in the transformed terminal quickly banishes memories of its predecessor. The synergy

between natural and artificial luminescence is seamless, and a measure of how far the design of transport hubs has moved on in the past 20 years or so.

What puts illumination at the heart of the terminal design is the 54,000 m² roof system – a complex, undulating structure, with integrated rooflights designed by Luis Vidal and Architects. With its colour-changing backlighting and translucent ceiling membrane, it filters natural rays, and provides electric lighting.

The membrane denotes the key stages of the passenger journey – check-in, security, and lounge/boarding – by changes in height in the transitional areas.

'The aim was to ensure the terminal looks great under both natural and electric light,'



says Dominic Meyrick, partner at Hoare Lea Lighting (HLL) one of the two leading UK consultancies to work on the lighting scheme.

HLL produced the initial designs, and carried out the daylight analysis of Terminal 2 (see panel, Living daylight). StudioFractal took over when HLL's contract ended, replanning the lighting to suit client-led modifications, and ensuring a cohesive lighting approach across individual project elements. The firm, through a separate design and construction contract, also provided the lighting for the car park and the central, covered court, with its large sculpture.

The roof system – which snakes its way through the terminal – features linear LED luminaires integrated into the lower lip of the roof section. These provide backlighting to the edge of the membrane, mimicking and supplementing daylight, ensuring a harmonious transition between areas of varying brightness. Downlights at high level impart general illumination to the concourse.

'The result is an integrated lighting solution that works intuitively with the architecture, and accentuates the form of the ceiling,' says Meyrick.

The clerestory design ensures views to the sky, while the north-facing rooflights supply a

consistent level of natural light throughout the interior. This is complemented and reinforced by the RGB LED colour-change backlighting system, controlled by photocells and automatic time clocks linked to external sky conditions. When exterior daylight levels fall at dawn and dusk, the system kicks in.

The colour change – controlled by a bespoke programme – is slow and subtle, reducing the contrast from the daylight and providing a link to the outside world, as well as a strong, consistent decorative element to the departures level.

This aspect of the lighting was complicated to position and install because of the geometry of the roof system, says Tim Downey, senior partner of StudioFractal.

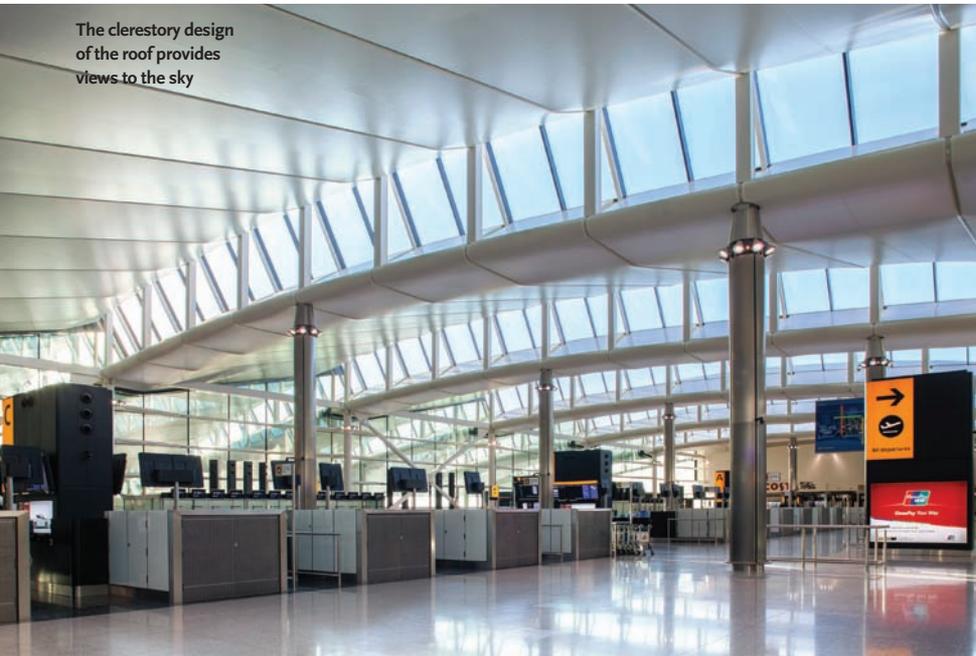
'The lighting equipment, and associated bracket and diffuser assembly, had to be positioned within the roof void, directly under the rooflights – but they also had to be concealed, so that only the overall lighting effect was visible,' he says.

'All elements needed to be sufficiently adjustable to accommodate the undulating curvature of the roof, while also giving access for maintenance and removal if required. The lighting had to suit each individual bay without

Majestic makeover

Also known as the Queen's Terminal, Heathrow's new £2.5bn Terminal 2 has taken six years to complete. Covering 200,000m² across five floors, it will be home to 22 Star Alliance airlines, and will accommodate 20m passengers a year. Sustainability was crucial to its design and construction. It has been heralded as one of the world's most efficient air-travel facilities, producing 40% less carbon dioxide emissions by using extensive natural lighting, LED technology, and energy-generation technology that includes photovoltaic cells.

The clerestory design of the roof provides views to the sky



Height and light are integral to Terminal 2's design



► emphasising the roof structure within.'

A full-scale roof bay was constructed off site, so that design options could be tested. The eventual solution involved around 2,000 bespoke, adjustable mounting brackets and 'shelf' diffuser assemblies. These carry the colour-change systems within the roof voids, but also allow the fittings to be pulled up, out of the voids, for maintenance purposes.

In theory, maintenance will be minimal – although, obviously, cleaning will still be necessary – as the LEDs will be significantly under-run, and should have a lifetime of more than 30 years, according to Downey.

StudioFractal worked closely with fit-out architect Pascall and Watson to replan the lighting for the terminal's interior spaces, to complement the roof element and to maintain a consistency of appearance throughout. The consultant's role was also to ensure that the most efficient installation was coordinated with a wide variety of architectural, structural, and associated building services.

'The relationship between lighting and the materials palette was carefully mapped throughout the terminal,' says Downey. 'Construction-quality lighting details were produced for the entire installation, to ensure consistency. Throughout the terminal, specially selected lighting was used to support intuitive passenger wayfinding – the baggage reclaim hall is a perfect example.'

The covered court is an impressive expanse, dominated by Europe's largest permanent sculpture – Slipstream, by British artist Richard Wilson – made from riveted aluminium on a wooden frame, and longer than an A380 airbus.

Lighting a large, highly reflective surface next to expansive glazing, and with multiple viewing angles, was a tricky proposition. 'Given



Living daylight

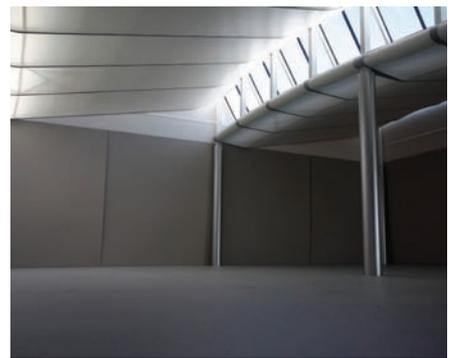
Dominic Meyrick, of Hoare Lea Lighting, outlines the daylight analysis that helped to shape the roof configuration

Central to the architectural concept of Terminal 2 is the distinctive 54,000 m², wave-like roof. The challenge was to design it to provide adequate, low-glare daylight to the concourse, while minimising solar gains. Hoare Lea Lighting worked with the architectural team to achieve this, aiming at an average daylight factor of 2%, based on a survey carried out by HAL in other airports.

Daylight and sunlight differ sufficiently to require separate approaches and calculations. Daylight is the natural light from the sky or clouds, which is always available and does not cast strong shadows – and the levels it produces are not intense. Direct sunlight is more intense and casts strong shadows, the direction of which change throughout the day and with the seasons.

The undulating roof – with its north-facing rooflights that follow an 18m grid – captures daylight, while blocking sunlight. The rooflights vary in height along the east-west section of the building. Daylight and thermal building simulations showed that many options were likely to cause problems – including visual discomfort and excessive solar heat gains – because of the large areas of horizontal rooflight glazing, which allowed in too much summer sunlight.

Parametric studies helped define the optimum shape and opening of the 'shark gill' rooflights, while computer visualisations allowed for appraisals by the team. These studies meant the roof shape and 3D model could be autogenerated by software. Levels of natural light were then calculated for each option.



The spatial distribution of daylight factors within the terminal is not uniform, but follows the rhythm of the north lights. The 3D mountain plots and sections revealed how daylight levels change throughout the space. With this knowledge, the roof shape was modified to ensure daylight factors are always above the desired 2% in the three major zones: check-in, security, and departures lounge.

One of the biggest challenges with daylighting is that windows and rooflights are bright, but the adjacent walls and ceilings can be relatively dark (as in the picture above). Preferably, the luminance ratio between the two should not exceed 1:20. Hoare Lea captured photometrically accurate luminance maps, to measure the distribution of ceiling luminance, and quantify the extent to which visually comfortable ratios were exceeded.

The wide grid spacing of 18m resulted in high contrasts between the ceiling above the rooflights and the one below, which gets no natural light. To achieve a smooth luminance gradient, a translucent ceiling membrane stretches between the front and back lips of the roof section. The glazing of the rooflights is sloped, so that daylight back-illuminates the lower edge of the saw-tooth sections, reducing the contrast.



Concord



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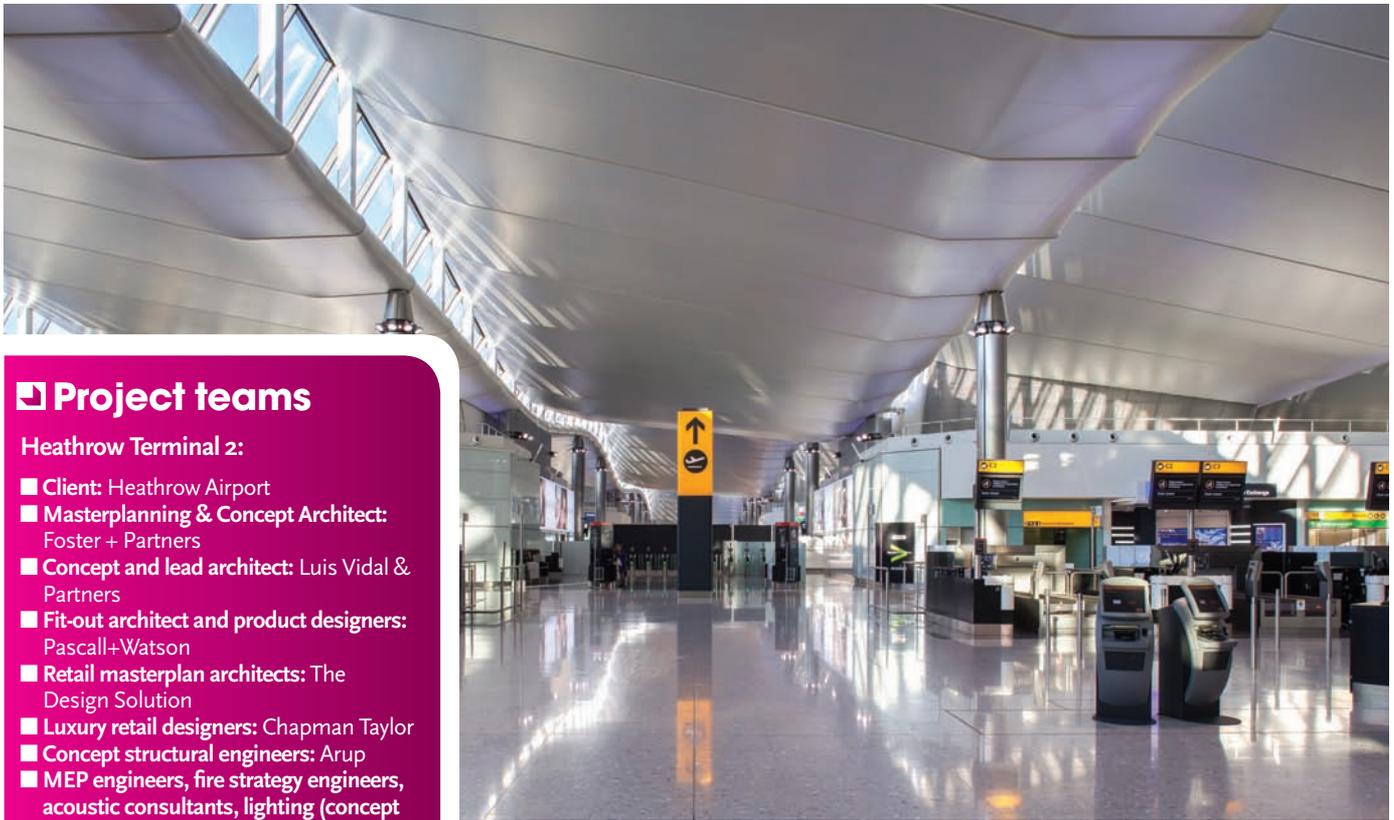
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Winner of the Lighting Controls category



Project teams

Heathrow Terminal 2:

- **Client:** Heathrow Airport
- **Masterplanning & Concept Architect:** Foster + Partners
- **Concept and lead architect:** Luis Vidal & Partners
- **Fit-out architect and product designers:** Pascall+Watson
- **Retail masterplan architects:** The Design Solution
- **Luxury retail designers:** Chapman Taylor
- **Concept structural engineers:** Arup
- **MEP engineers, fire strategy engineers, acoustic consultants, lighting (concept and phase 1 scheme) designers, vertical transportation consultants:** Hoare Lea
- **Civil engineers and ASIAD consultants:** TPS
- **Structural engineers: (scheme and production) Merebrook**
- **Lighting designers: (phase 2 scheme, production and commissioning) StudioFractal**
- **Principal contractors:** HETCo

Car park and covered court:

- **Client:** Heathrow Airport
- **Concept architect: (MSCP2) Gibberd**
- **Concept architect: (covered court) AHR / Grimshaw**
- **MSCP2 and covered court lead architect:** AHR
- **Information design and wayfinding:** Space Agency / D2 Design
- **Landscape designers – CTA masterplan:** HED
- **Landscape (scheme) designers:** Grontmij
- **Landscape (production) designers:** AHR (landscape)
- **Structural, civil, MEP and acoustic engineers:** Buro Happold
- **Lighting designers:** StudioFractal
- **Principal contractors:** Laing O'Rourke

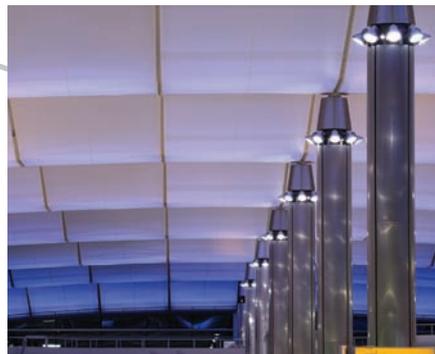
Car park and covered court:

- **Senior partner:** Tim Downey
- **Partner:** Ian Payne
- **Senior lighting designer:** Steve Kettle and Dennis Smith
- **Lighting designer:** Alex Lang

Hoare Lea Lighting:

- **Partner:** Dominic Meyrick
- **Associate:** Jonathan Rush
- **Lighting designer:** Juan Ferrari

Aside from cleaning, maintenance should be minimal as LEDs are expected to have a lifetime of around 30 years



the importance of the sculptural centrepiece, looking up into overhead lighting would have been a distraction,' says Downey.

The answer lay in balancing out the lighting with a specially devised LED system, housed in the balustrade supports. A range of optics was needed to meet a variety of lighting requirements, under both normal and emergency conditions. As a result, small amounts of light are focused on specific areas of the sculpture, suggesting motion, and emphasising the sheer scale of the structure.

'By day, the undulating rooflights bathe the sculpture in strong daylight, conveying speed, strength and solidity,' says Downey. 'As night falls, the subtly changing roof colours create a really atmospheric setting, complementing the sculpture's sinuous rolling forms, and lending it a softer, more graceful appearance.'

As with the entire project, a combination of artificial and natural light brings out the optimum effect. 

Lighting a large, highly reflective surface next to expansive glazing, and with multiple viewing angles, was a tricky proposition





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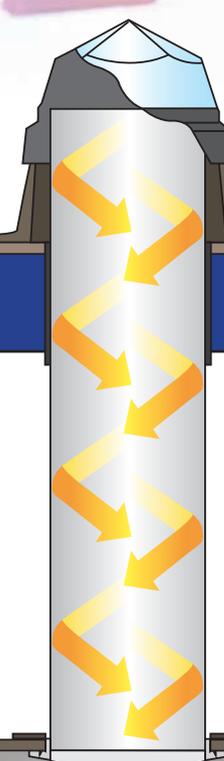
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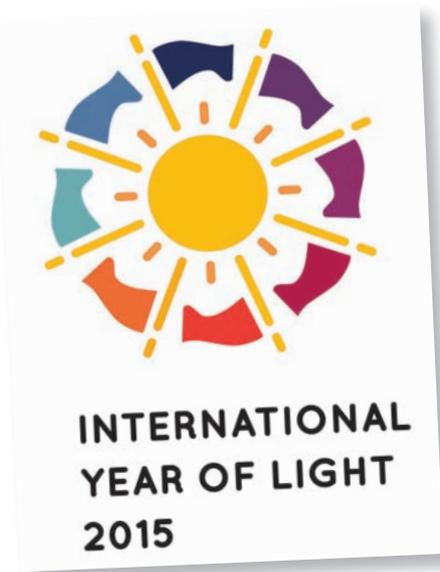
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THE YEAR TO SHINE

The UN has declared 2015 the International Year of Light. Will it be a golden opportunity for designers in the field to enlighten and educate the public, as well as fellow professionals? **Jill Entwistle** finds out



In case it has passed you by, 2015 is the Unesco International Year of Light (IYL) and Light-based Technologies. This should be a cause for jubilation among lighting experts. After all, designers – in particular – spend a fair amount of time explaining what they do, and the lighting industry is constantly discussing the need to educate fellow professionals and the public in ray-related matters.

However, it has taken some time to sort out where our industry – illumination of the built environment – fits into the IYL agenda. The impetus for the 12-month initiative has come from the scientific community, not the building industry. Its founding partners include the Institute of Physics, the IEEE Photonics Society, The Optical Society, and the European Physical Society – and the preoccupation has been with the technological benefits of areas such as nanophotonics and quantum optics.

As the United Nations (UN) has defined it: 'IYL2015 is a global initiative adopted by the UN to raise awareness of how optical technologies

promote sustainable development and provide solutions to worldwide challenges in energy, agriculture, communications and health.'

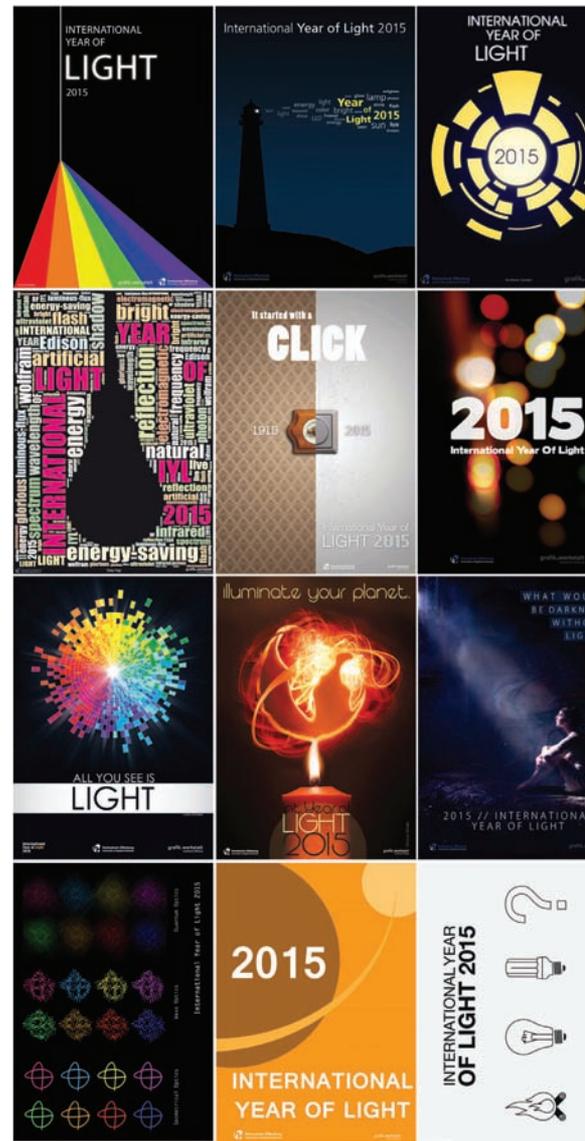
There is still a distinct whiff of physics and photonics about the year's agenda, but polite agitation from lighting bodies – such as the Society of Light and Lighting (SLL), now signed up as a Gold Associate sponsor – has alerted the powers that be that a rather important aspect of lighting had been overlooked. Clearly, energy efficiency, light pollution, human wellbeing, and use of natural light in buildings – to cite but a few of the more practical lighting issues – are crucial national and international considerations.

To be fair, the IYL prospectus does refer to some of the issues. 'The project is not only about science – light also touches on culture, history and education. Issues of sustainability and development are also of central importance,' it says. The educational value of promoting widespread interest in natural light phenomena, for instance, is viewed as a route to inspiring interest in the scientific aspects, as well as highlighting environmental issues, such as energy usage and light pollution.

'This theme will raise awareness of the beauty and accessibility of science through activities that will encourage and support observation of light and colour in the natural world,' continues the prospectus. 'And, of course, this theme provides a natural place to consider how observing light in nature often means turning off the lights from modern society.'

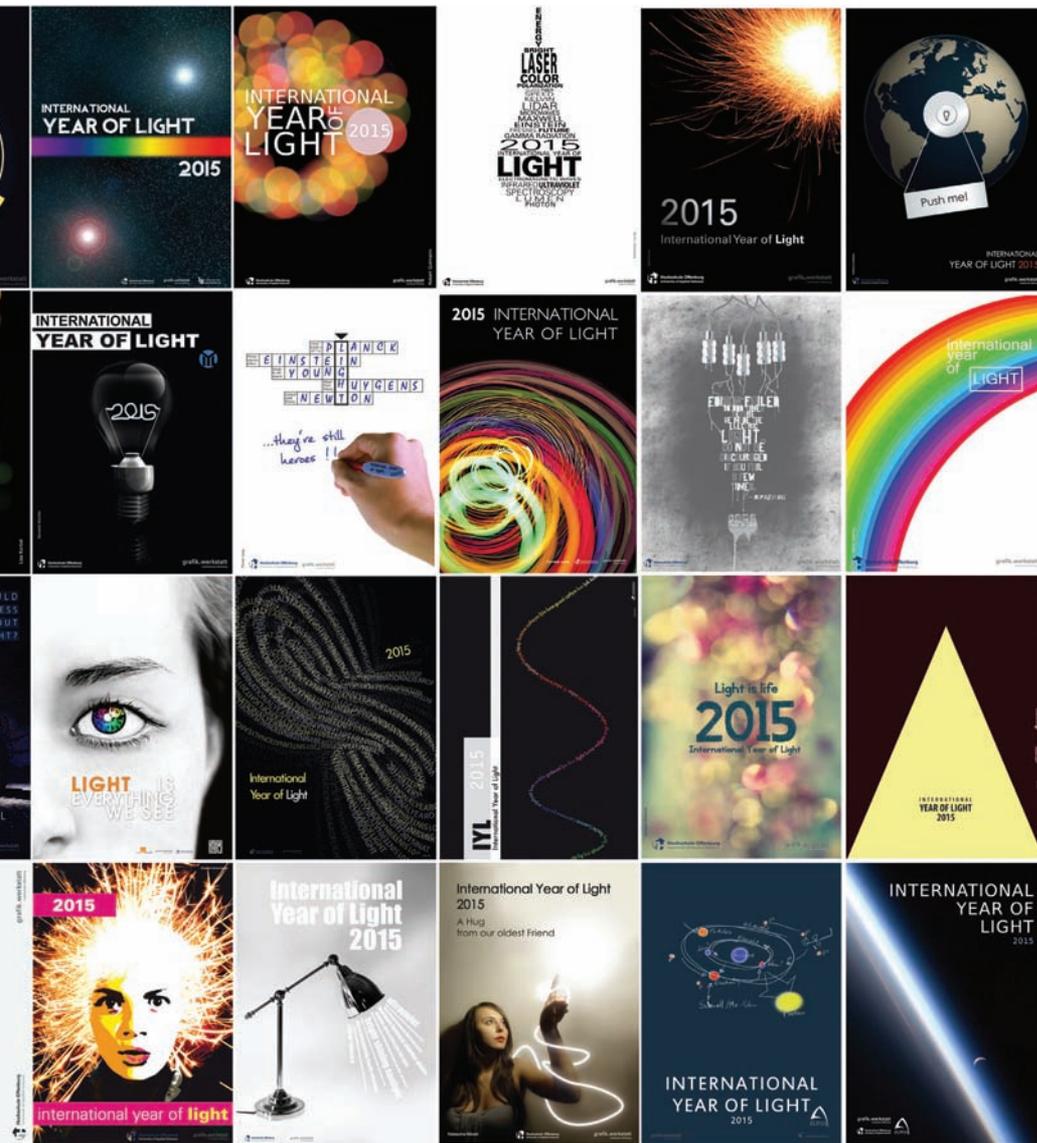
'While modern lighting provides important and crucial opportunities and advantages in improving quality of life, raising awareness of the issue of light pollution will also be an important feature of this theme.'

More specifically though, the efforts of the lighting-design community have meant that lighting in the built environment now appears on the IYL homepage, and relevant events are



“The importance of the role of the lighting designer in a project team is not recognised in many parts of the world. This is the main reason why the campaign Let's #LightUp2015 received more than 1,000 signatures in the first four weeks

– **Chiara Carucci**



A selection of posters designed for the International Year of Light by media and information technology students at Offenburg University, Germany

World stage

'In proclaiming an international year focusing on the topic of light science and its applications, the United Nations has recognised the importance of raising global awareness about how light-based technologies promote sustainable development, and provide solutions to global challenges in energy, education, agriculture and health. Light plays a vital role in our daily lives and is an imperative, cross-cutting discipline of science in the 21st century. It has revolutionised medicine, opened up international communication via the internet, and continues to be central to linking cultural, economic and political aspects of the global society.' Visit www.light2015.org for more information.

Aims

- Improve public understanding of how light and light-based technologies touch the daily lives of everybody, and are central to the future development of the global society
- Build worldwide educational capacity through activities targeted on science for young people, addressing issues of gender balance and focusing, especially, on developing countries and emerging economies
- Enhance international cooperation by acting as a central information resource for activities coordinated by learned societies, educational establishments and industry
- Focus on particular discoveries in the 19th and 20th centuries that have shown the fundamental centrality of light in science
- Highlight the importance of research into the fundamental science of light and its applications, and promote careers in science in these fields
- Promote the importance of lighting technology in sustainable development, and for improving quality of life in the developing world
- Highlight and explain the intimate link between light, and art and culture, enhancing the role of optical technology to preserve cultural heritage
- Maintain these goals and achievements in the future beyond the International Year of Light

included on its long and eclectic calendar.

'I feel the original omission of light in the built environment was a symptom of the fact that we all take light for granted. It is up to us – and similar bodies – to develop the opportunity, now that this has been added,' says John Aston, SLL president. 'Only at the end of 2015 will we know if the balance was suitably addressed.'

'We already have plans – through the next president, Liz Peck – to engage more closely with RIBA [the Royal Institute of British Architects]. If we can make some progress with them concerning the use of natural and artificial light in future buildings – and the IYL can help – so much the better. But we need to engage with a wider audience so that everyone sees light as being important in all its guises.'

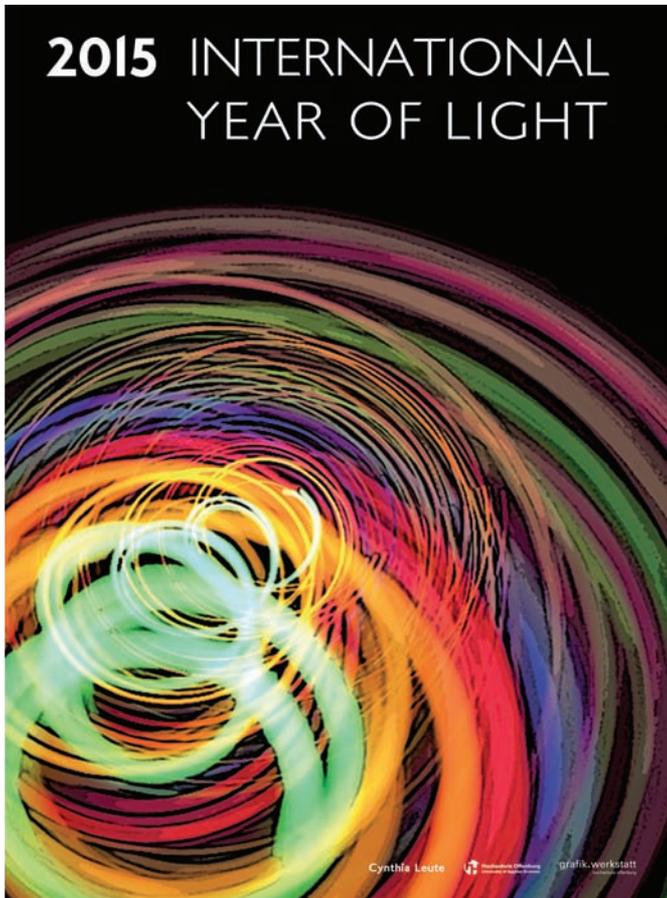
The onus, as Aston suggests, is on lighting bodies to exploit the opportunity with further initiatives. The primary coordination is coming from Lighting Related Organisations (L-RO) in Italy, a group organised by Chiara Carucci, a designer with Susanna Antico Lighting Design

Lighting the way

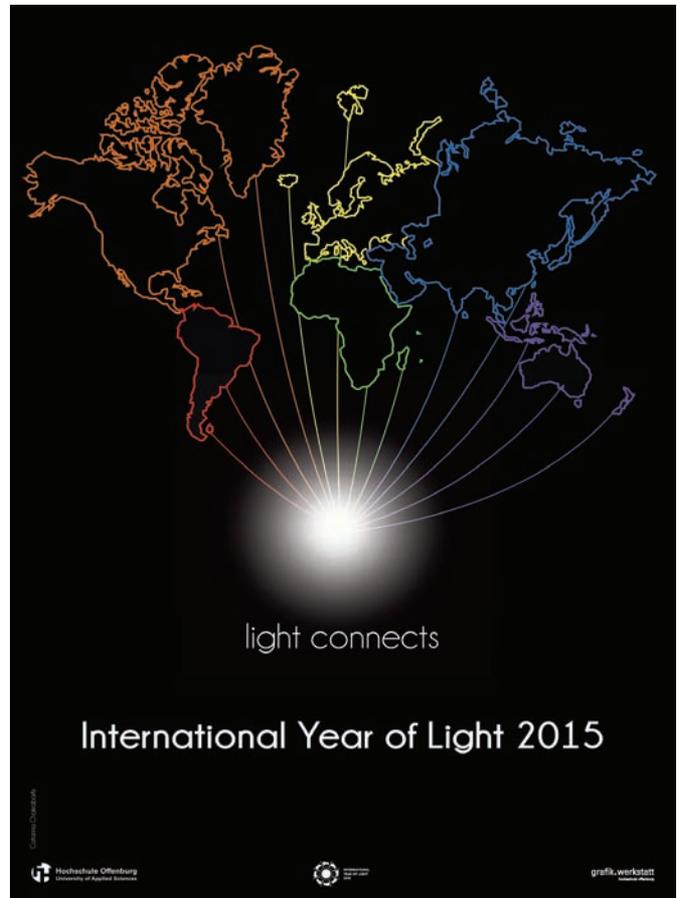
The International Year of Light gives lighters an opportunity to:

- Let political bodies know we exist. To raise their agendas above the base level of 'ban the bulb' and streetlighting switch-off
- Articulate the benefits that design can bring to quality of environment, human health, welfare, effectiveness, and reduced impact on the environment (be it energy, light pollution, ecology, or recycling)
- Advocate the better consideration of daylight in building design
- Educate people about the potential benefits of design beyond the purely aesthetic
- Promote high-quality and ethical manufacture
- Identify lighting design as a profession to the education sector
- Initiate research in the topics we all need to support evidence-based design

– Mark Ridler, lighting director, BDP Lighting



IYL poster created by Cynthia Leute



IYL poster created by Catarina Chakrabarty

► Studio in Milan. She is working with the SLL, the Institution of Lighting Professionals (ILP), the International Association of Lighting Designers (IALD) and the Illuminating Engineering Society of North America (IESNA).

Carucci says: 'The importance of the role of the lighting designer in a project team is not recognised in many parts of the world. This is the main reason why the campaign Let's #LightUp2015 received more than 1,000 signatures in the first four weeks.'

Brendan Keely, SLL secretary, says: 'Chiara Carucci is the one who was banging the drum so loud at the beginning of the year to get the lighting profession recognised.'

'Anyone can submit a proposal for an event as part of an L-RO, and it gets reviewed and streamlined – and, then, hopefully it happens.'

So this is the moment for lighting to shine. Until recently, it seems, it was rather hidden under a bushel. 📌

For more information visit:

www.light2015.org/Home.html

For a programme of events visit: www.light2015.org/Home/Event-Programme.html

All posters shown were created by students of Offenburg University, Department of Media and Information Technology

www.magic-of-light.org/iyl2015/download.php



Busy time ahead

Brendan Keely, secretary of the SLL, outlines what the society has planned for IYL 2015

The SLL is supporting the Unesco International Year of Light 2015 – in recognition of the role light plays in society – to promote awareness of lighting in the built environment, and the lighting-design profession and industry, as well as members of the society.

Various events will take place throughout the year, in conjunction with the Institute of Physics (IoP), the UK Steering Committee, and the European Physical Society (EPS). The society's profile and events will be included on the website of the IYL 2015, along with educational material, including fact files for free public download. This will enable the SLL to reach further than its membership base in offering advice and support.

We will help with events arranged through the Lighting Related Organisations (L-OR), as well as deliver activities under the IYL 2015 banner. We hope that events will be jointly hosted by the professional lighting bodies operating in the UK.

One of the IYL 2015 themes is the empowerment of women. Coincidentally, the society will have a female president halfway through the year – Liz Peck – as will the ILP, IALD and RIBA. This will help reinforce the role of women in

lighting. The SLL will also continue to strengthen links with RIBA and encourage collaboration between the lighting and architectural professions.

All professional bodies will promote light and lighting applications to schools through Stern and other initiatives.

In May 2015, at the AGM, the society will confirm the winner of the Jean Heap Bursary, to enable an individual to further their research for the benefit of the industry and the society's members.

Upcoming SLL events

24:00:00, Arup, Fitzrovia, London, 21 January

A private preview of Arup's latest exhibition, which focuses on the role played by light and light technology in modern society.

200 Years of Fresnel, Royal Institution, 10 March

At this major celebration of the 200th anniversary of Fresnel's wave theory of light, Peter Philippon will examine how his work is still relevant today.

'Fresnel produced prolific and profound lighting research that still affects our understanding of what light is,' says Philippon. The evening will include guest appearances, artefacts and experiments. For more details and to book (essential) email sll@cibse.org



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A SOUND CASE FOR LIGHTING

Andrew Bissell, Cundall Light4 director, and **Andrew Parkin** Cundall acoustics partner, discuss the results of collaboration between their disciplines – and the need for more widespread cooperation in the future

Seeing and hearing are critical human senses for communicating. We may be able to live without one – or, indeed, both – but the quality of our interaction is improved immeasurably when these senses work together, allowing us to read emotions through expressions, as well as hear words and sense the speaker's tone.

Earlier this year, the Society of Light and Lighting and the Institute of Acoustics held a collaborative event – Casting Light on Sound – to share research, and highlight best practice, on light and sound. The talks ranged from how to help people communicate with light and sound, to the methods used by security personnel to disable and interrogate people with light and sound. What was clear is that there is more association between these disciplines than one might have thought – and there is also much more that could be done.

Obvious areas for partnership are in education, healthcare and offices, where verbal and visual communication are key. There are many less obvious collaborations between light and sound taking place at events such as Luminale, in Frankfurt, and numerous light festivals – and within groups such as the Subliminal Design Collective, and United Visual Artists (UVA).

In the spotlight

In May, Cundall Birmingham moved to a new office. From the outset of the design process, the

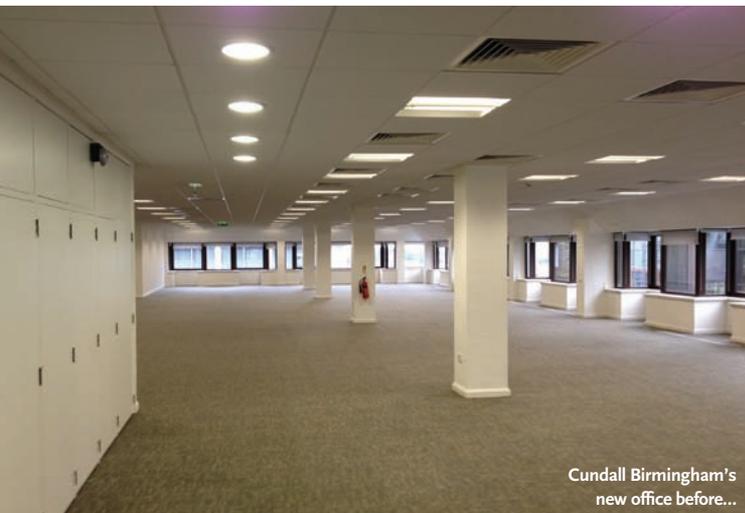
integration of services was key – and, in particular, the coordination of light and sound. In fact, it was more than just the alignment of light and sound; our goal was that acoustics should be as much about the visual solution as it was about acoustics – and vice versa.

With that in mind, we conducted a study of existing office spaces. Alongside this, there was an exploration of the space Cundall had leased, and an assessment of what was possible as part of the refurbishment within the budget.

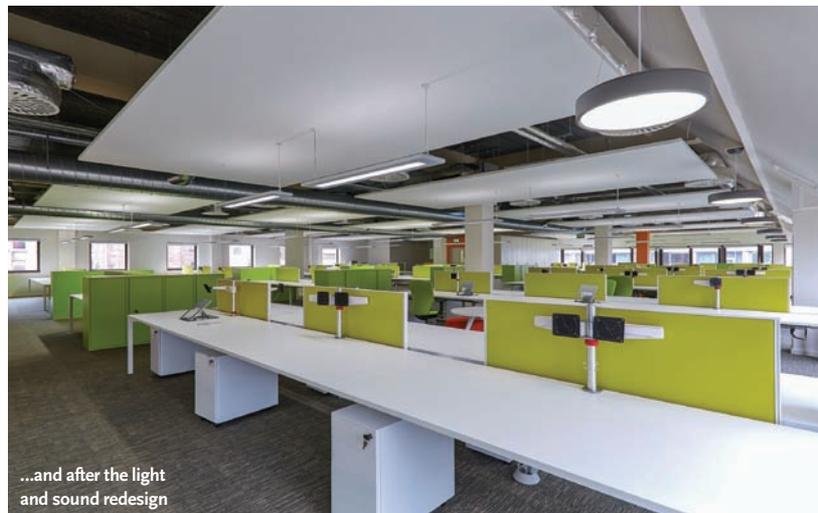
From the study of existing office spaces, it was apparent that many tried to coordinate the lighting and acoustic elements. However, one or the other element always seemed to be a compromise, or a bolt-on. Various questions arose: did this always have to be the case? Was it inevitable, or a budget constraint? How do we avoid ending up with the same problem?

Having discussed the principle that communication is key – and that the most important element is the people – the review of the leased space became all about where people were positioned, where the communication would take place, and how to deliver a coordinated design that enhanced the quality of that interaction.

As we developed the design and established the type of lighting and acoustic equipment we required, we found that to deliver the right solution we needed to fix the desk layout and offer only limited future flexibility. For example, the lighting and acoustic solution requires the



Cundall Birmingham's new office before...



...and after the light and sound redesign

lights and acoustic panels to be positioned precisely over the desk position, so if desks were repositioned then lights and acoustic panels would need to be moved. Technically this is how we should design a space, however an agent may say this is an inflexible solution to most tenants.

With desk positions fixed, providing services became simpler. Through collaboration between the architect, engineers and lighting designers, the solution emerged. The biggest lesson was the time it took to fine-tune this detail.

If you suspend the luminaire from the centre of the acoustic panel, for example, do you fix it to the panel or pass through it? If the panel needs to be removable to access mechanical systems, in what order is everything dismantled – and how do you ensure everything is put back in the right place and looks as good as on day one?

The solution puts the light where it is needed – to light the desk task area and the face of staff. At Cundall most people have a webcam and the lighting provides a high quality of cylindrical illuminance, along with reflected light from the white desk, to give a high definition view of the staff on the video conferencing system.

The acoustic panels visually match the desk layouts, are cut to match the lighting layout, and function to reflect the light around the occupant task area. The lighting load (with daylight) is just 4W/m² to deliver 400-500 lux on the desks.

The Manchester sound

Sound and light experiences are becoming more common. In March 2015, an installation will be completed for a new public area in Manchester city centre, which is surrounded by new and soon-to-be-refurbished offices. In the heart of the space will be three functional elements, the sculptural shapes of which lend themselves to being more than just static practical objects.

The development team always wanted to light them, and commissioned Cundall Light4 to create a concept. From the outset, there was an

opportunity to blend light and sound to create a richer, more immersive experience for visitors.

The lighting elements and solution had to be aware of the sculptural form and components, while also respecting the functional aspect. Once more, questions needed to be asked to help form the solution: what needs lighting, and why? Who are the beneficiaries and how do we retain engagement with them over time? Why simply light an object that – like any predetermined lighting scene or lit advertisement – will quickly be lost in the background, or forgotten as we become familiar with the patterns of light or the order of the sequence?

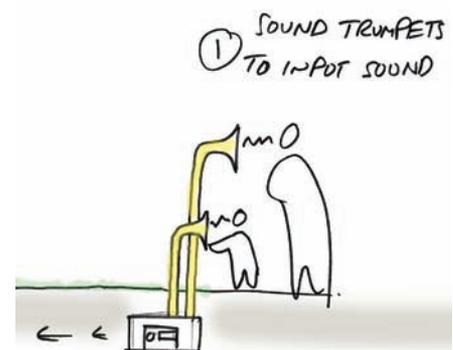
The solution is interactive, and uses light and sound both as inputs and outputs. Addressable RGBW LED strips will be mounted vertically, with a 100 mm pitch, to provide abstract images based on the various audio and social media inputs. Linear RGBW LED units, with a 30 mm pitch, will be mounted horizontally to complete the surround vision.

There is a playful element that turns sound to light – a series of 'sound trumpets', which can be used by passers-by – but the installation also reflects the wider city, with coloured light scenes that can be coordinated with particular events. There will also be an app to allow interaction and information to be exchanged with visitors, with links to mobile phones and social media. These will allow messages to be converted to light to form part of the sequence of images in the show.

With the long-term infrastructure designed into the solution, the possibilities are endless, and will ensure the design is always fresh and engaging. The goal is for the installation to become a destination in its own right.

With the two examples above – and the many more presented at the Casting Light on Sound event – it is clear that lighting and acoustic designers, alongside their clients, recognise the emotional, functional, and financial value of collaboration between these disciplines. 

Why simply light an object that will quickly be lost in the background, or forgotten as we become familiar with the pattern or sequence?



Sound trumpets will feature in the Manchester installation

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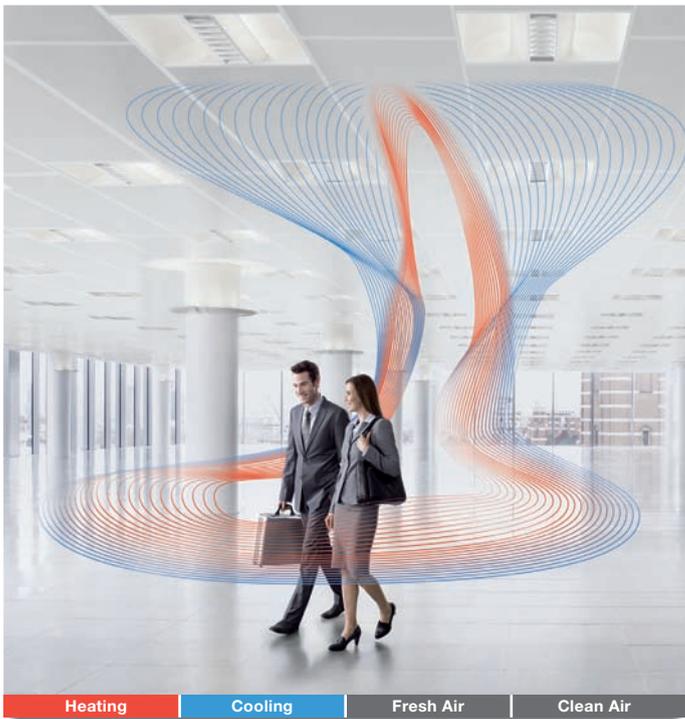
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CREATING A HEALTHIER & SAFER ENVIRONMENT

This month: Recruiting controls engineers, Demand Logic's energy-efficiency software at King's College London, and best practice for designing and specifying controls

Calling in the CAVALRY

To plug the skills gap in the building controls sector, one company has turned to recruiting and training ex-armed forces personnel. **Liza Young** finds out about its fast-track programme



FILCHER UK MINISTRY OF DEFENCE: SGT STEVE BLAKE RLC

The skills shortage in the building controls sector has led to an unusual recruitment drive by one company. Trend Control Systems – manufacturer and supplier of building energy management systems (BEMS) – has introduced a fast-track training programme that enables former armed forces personnel to transfer their skills, qualifications and technical expertise to the sector.

After a six-week training course, Trend matches the new recruits with vacancies among its systems partners, and provides on-going support.

Trend estimates that – because of the ageing workforce – more people will leave the building controls sector than enter it over the next few years. Armed forces technical personnel have been targeted by the company because of their qualifications, which include NVQs in mechanical and

electrical (M&E) disciplines, and City & Guilds wiring regulations.

They are also confident using test equipment and carrying out cabling terminations, as well as with technology, such as programmable logic controllers.

Ian Lewis, training manager at Trend, joined the company after serving 30 years in the Royal Air Force. He says: 'I'm well aware of the qualities that forces personnel possess, and firmly believe they have all the attributes required to be successful in the BEMS industry – including technical skills, a mature and disciplined outlook, and a work ethic that is second to none.'

The BEMS fast-track training maps the skills that participants have, identifying any knowledge gaps. An individual programme is then created, and backed up by mentoring from Trend's industry experts.

The initiative follows Trend's Attitude Apprenticeship scheme – a vocational learning programme that allows an employee to participate in structured education that delivers the Level 3 NVQ Diploma in Installing BEMS.

'As part of the defence cuts, many armed forces personnel have, unfortunately, lost their jobs,' says Mike Witchell, regional sales director at Trend.

'We have recognised that these people – and others leaving the armed forces – want careers in exciting industries that offer opportunities and prospects.

'The BEMS sector ticks all these boxes, which is why, by offering a path into the energy-management and controls sector that can be completed in a matter of weeks, our new fast-track training programme is proving popular.' CJ



IN PRACTICE: TURNING SOLDIERS INTO CONTROLS ENGINEERS



Trend Control Systems' training manager, ex-RAF Sgt Ian Lewis, explains the benefits of the company's fast-track training scheme

When I arrived, I found that the training courses – which were more like death by PowerPoint – needed to be changed.

I had to ensure that the engineers would be trained up in the shortest possible time, so that they were 'off the road' for the minimum period.

The Trend training programme is on-going. Looking at our partners' needs – and those of the ex-service personnel – [regional sales director] Mike Witchell and I wanted to provide a good

grounding in the basics of the Trend system. So I changed the running order of the courses, to create a more logical order to learning about the system.

A new engineer coming into the industry can now complete the majority of our courses in six weeks – whereas, under the previous set-up, it could take up to three months.

This will improve as we move forward, and better understand the requirements – and skill levels – of ex-services personnel.

I would recommend the programme to other former military personnel. They have many skills – some which are hidden in their normal day-to-day life – and qualifications that are desired by civilian companies.



KNOWLEDGE IS POWER

A new data platform that extracts and analyses information from the existing BMS has made annual savings of almost £400,000 at King's College London. **Liza Young** finds out how Demand Logic works

Finding energy-saving opportunities in heating, cooling and ventilation systems of large, complex buildings, can be like searching for a needle in a haystack. However, a new web-based platform that extracts and analyses data from building management systems (BMS) has identified 47 opportunities to save energy at King's College London – which have, so far, resulted in annual savings of £390,000.

The system – developed by online energy-efficiency company Demand Logic – uses 'big data' techniques continuously to stream and analyse thousands of BMS data points, including control signals, sensors, valve positions, set-points and meters.

It stores this information in a cloud database, and uses it to provide a suite of infographics to help find common, but highly wasteful, faults – such as items of plant left in manual control, out-of-hours running, or simultaneous heating and cooling (see graph on page 51).

The primary aim is to find low-hanging fruit by identifying the 'energy insanities' that are still happening in commercial buildings. The extracted data has the potential to be used alongside dynamic simulation tools, such as EDSL Tas, and resource management and reporting software, such as Verco's Carbon Desktop, to verify energy projections – and identify energy-saving opportunities – when designing new buildings.

Immediate benefits

Tom Randall, development manager at Demand Logic, says: 'Many buildings – even from new – could be riddled with problems, partly because there are not many people onsite to look under the bonnet of what their BMS is doing.'

'It's cost-effectively fast-tracking the snagging at the building optimisation phase, which can take two to three years – at the point where it's most painful to the client, in cost terms.'

By avoiding unnecessary plant operation, the platform can help extend the life of equipment, and support condition-based maintenance. It allows facilities managers (FMs) to monitor equipment and focus maintenance – and to replace problem equipment, rather than playing a 'big game



KING'S COLLEGE LONDON

- Carbon saving 2,500 tonnes per year
- Money saving £390,000 per year
- Project start date January 2013
- Major plant items tracked 554
- Data points More than 100,000
- Biggest source of savings Run time of major plant



Demand Logic was installed at three King's College campuses, including Denmark Hill (left) and Guy's

of roulette' by arbitrarily replacing working equipment at set intervals.

Another application of the system is during commissioning and the defects liability process. It can monitor all building services over extended periods, and ensure witnessing does not take place until services are within performance criteria. It can then monitor performance during defects liability, providing robust evidence for identifying issues and assigning responsibility, while avoiding 'finger pointing'.

The platform is aimed at a key group of people in the building – the 'actors' – who have access to the plant, and can act on the findings. 'Onsite FMs are the best-placed professionals to pick up and run with this,' says Randall.

Energy insanities at King's

At King's College, where the pilot project has been running since January 2013, the system has so far unearthed 47 energy-saving opportunities, 38 of which have already been addressed, saving an estimated 2,500 tonnes of carbon per year.

The problems at the college, which spends £5m a year on energy, turned out to be diverse. Boilers were rapidly cycling on and off because they had inadequate load, and several conflicting temperature set points



A personal heater in one of these rooms at King's College caused the central chillers to come on in the middle of winter

had been applied to the same open-plan office, causing heating and cooling in the same space. In addition – having uncovered a large chiller running all day in the middle of winter – the system found that a 2kW personal electric heater was fighting the centralised cooling plant, kicking in an enormous chiller and central pumping, which kept the cold water circulating.

Joe Short, chief executive officer at Demand Logic, says: 'This discovery was possible because the system monitors each of the many hundreds of ceiling-mounted air conditioning outlets in the building, and it was able to identify the one demanding unusual amounts of cooled water.'

The system is different from a metering approach, however, where the objective is to get a full picture of energy flow. 'That's not our end game,' says Short. 'What we're asking is whether energy is being wasted unnecessarily. It is often easier to find and fix an energy wastage than to measure it.'

Closing the performance gap

Funded by Innovate UK – formerly the Technology Strategy Board – the £900,000 project is a huge learning resource.

Randall says the generation of performance data – which will be as open as possible – will provide industry, academia and government with a pool of data for further analysis.

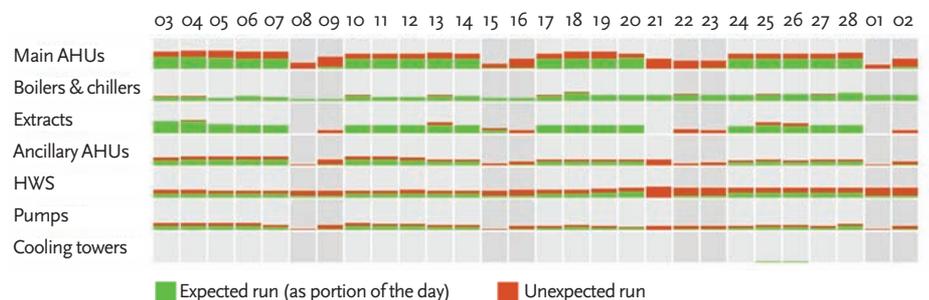
He adds: 'We're streaming about three million data points a day, from lots of buildings, so there's huge potential to carry out data analytics with our partner, London South Bank University.'

By working with Verco and EDSL Tas, the continuous data stream would also be used to verify – and add accuracy to – building physics models to help close the performance gap.

Demand Logic intends to develop methodologies for identifying the energy savings made that are compliant with the international performance measurement and verification protocol – a globally recognised approach to claiming savings achieved. The aim is to include approaches, allowed by the protocol, that use calibrated building physics models.

Alan Jones, managing director of EDSL Tas, says the system is a continuation of the BIM process. A design model, which has gone through compliance calculation, ➤

Plant run-times from 3 February 2014 to March 2014



At-a-glance overview of whether main plant was running out of hours at King's College



A college campus represents a real challenge for energy efficiency because of the diversity in building types and patterns of use



AUTOMATION

Demand Logic extracts trend information from the BMS to interrogate the issues.

In-house specialists can sift through potential problems, but the team wants more and more of the abnormality detection to be done automatically.

Short says: 'Even a medium-size office has 20-30,000 elements that could be queried, and – over the years – several groups of engineers would have come and labelled them in a different way.'

'We are developing a simple machine-learning technique to explore these text labels, because we're faced with all of this data in an unknown building, and we've got to turn it into something that the owners and managers of that building know is their plant.'

Short says the most powerful thing Demand Logic provides is the simple element of being able to add comments on every query view. 'It's a place where you can air your hunches and suspicions about a building, in a free and uncriticised way.'

'We're getting beyond the technology, and learning about what context people are working in, professionally – what incentives are driving them, what culture they are working in, what politics are going on, and what set-up encourages them to act.'

is changed into an expected operational performance model. A second copy of that model will be taught by the system about what the building is doing, identifying how and why variations occur.

The client would know that the compliance energy calculation is different from what they are actually seeing, whether that is because they are using it for twice as long, or running it poorly. 'These questions could be answered, and we would be able to look at projecting future implications of these discrepancies,' says Jones.

Moreover, the system would potentially provide an evidence base for building owners to invest in higher-cost energy-efficiency measures. Randall says: 'If a landlord decides to make a big change to the building system, they would have a calibrated thermal model with which they can get a better insight into the effect it would have.' This data could then be used in the design of another building with similar characteristics.

Dave Worthington, managing director

of Verco, says getting to the bottom of the discrepancy between design-stage assumptions and reality is challenging – it could be because of weather effects, occupant behaviour, or changes in the kit that was installed or its parameters.

'It really is a "big data" challenge, which needs the collaboration of the different brains around the table that we have on this project,' he says.

'The performance gap is becoming a hotter and hotter topic. Significant progress has been made in the domestic sector, but the non-domestic sector is more difficult.'

'This gap exists because of a lack of access to credible data that people trust and understand, and can make business decisions on the back of them.'

Verco will look to feed the results back to government so it can ensure its energy-related targets are on track and it is coming up with evidence-based policies that incentivise the right behaviours in non-domestic buildings.

An exciting future

By applying Demand Logic – and having better access to data – Randall says there is potential for FM companies to take more ownership of their energy management programmes and performance risk. The bigger picture is to optimise operational performance of buildings and help close the performance gap.

'If we succeed, we should make a profound difference to the tools that building services engineers have to hand to deliver buildings that actually work,' says Randall.

'It gives us a potentially interesting future, where we are looking after our buildings long-term, and getting value into our businesses.' **CJ**

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Tim Scott,
Head of Sales, Condair plc

Controls have been configured
in accordance with BS EN15232
at Exeter Technical College



Taking CONTROL

There are common principles to consider when designing and specifying control systems, whether they are for an academy or residential tower. Siemens' **Ian Ellis** discusses their application

By thinking of the controls as a single system, it is possible to link building services – such as heating and ventilating – to other areas, such as lighting

CIBSE acknowledges that, for those who are not experts in the field, building controls can 'seem impenetrable and incomprehensible' (1). In its *Guide H Building Control Systems* it states that a lack of understanding can lead to poor specification and commissioning of controls, and suboptimal performance.

This article provides some simple and straightforward guidance to controls and BEMS, which will help consulting engineers apply the technology effectively. It will also support more predictable outcomes in terms of energy use in new-build and refurbishment projects.

An excellent first step is to use a British and European Standard, *BS EN15232: Energy performance of buildings – Impact of building automation, controls and building management*. Although standards may not always seem particularly practical, BS EN15232 offers very useful guidance on types of control equipment, and how they impact on energy efficiency in new and existing buildings.

The standard is based on a structured list of controls and building automation technologies that have an impact on energy use in buildings. It also includes a method to

define minimum requirements for controls in different types of non-dwellings, such as offices, hospitals, schools, retail, and restaurants. There is a detailed method for assessing the impact of different controls on the energy performance of a given building.

One of the most useful aspects of BS EN15232 is that it assigns classes (A, B, C or D) to levels of control, and then shows the resulting energy savings that can be expected. The elements of each class are listed in a brand-neutral way, so it is clear which technology is included in each class.

While the standard is clearly useful for new-build projects, it is equally applicable to refurbishment work. It is possible to use it to assess the controls in a building, and to use that analysis as the basis for upgrading. What's more, the standard will give an indication of energy savings – and, hence, payback – for any investment made in the controls and BEMS.

BS EN15232 was devised in support of the European Energy Performance of Buildings Directive, and is now also incorporated into the non-domestic Compliance Guide that accompanies Part L (2013). The guide recommends level C as the minimum installation level for controls.

➤ At the heart of BS EN15232 are principles of building control application that should be considered. First, a holistic approach is vital. It is a principle familiar to engineers engaged in the design of energy efficient and low carbon buildings, but is particularly challenging for controls. This is because the traditional contracting approach puts building controls within the mechanical contract, while other energy-using elements – such as lighting – fall under the electrical contract.

Consulting engineers are well placed to tackle this situation, and it can pay dividends in terms of long-term operational efficiencies. By thinking of the controls as a single system, it is possible to link building services – such as heating and ventilating – to other areas, such as lighting. Although this seems like an obvious approach, it is surprising how often lighting control operates on a system that is separate from the rest of the BEMS. Planning ahead will create greater opportunities for energy saving, and give occupants more control over the space.

This touches on a second important principle for controls. Demand-driven use of building services is a simple, but effective way to ensure that energy is not used unless required. If a space is unoccupied, heating, ventilating and lighting are not required. As a corollary of this, boilers, fans and lamps are used less, reducing maintenance and replacement costs.

An important third area to consider is controls protocols. It is here that ‘non-experts’ often feel that building controls are at their most confusing. However, terms such as BACnet, KNX, Modbus and others simply refer to common software languages that are used by the various controls manufacturers, and suppliers of other building services equipment, such as fans, air handling units, and boilers.

Checking on the protocols that are used in an existing building – or that are going to be used on a new project – is also vital. Open systems mean it is much easier to extend in future, so clients can be assured that their building is future-proofed. The use of a building often changes over time, and open systems support flexibility. Technology in the controls sector develops quickly, so it is good to ensure that new products can be incorporated in the future.

The fifth area of consideration for today’s controls is data collection. Online access, ‘big data’ and cloud storage – clients may want all the bells and whistles, but consultants should help them to think about what features they will actually use. Collection of data on energy



use is a requirement for most buildings, but it is important that they are collected with an end in mind. For instance, it is possible to collect information from meters every few minutes, but this can create a mass of data that is not required. Speak to the client about which analysis tools they are thinking of using. Many existing options offer excellent feedback on energy use in a building in an easy-to-use format. Or is the client thinking of using an external service provider for this?

Finally, handover of the controls system probably has the greatest impact on how effective it will be in the long term. Unless clients know how to use the controls, they will never get the most out of them. Building controls and BEMS are not fit-and-forget systems; they should be regarded as valuable business tools, in the same way as a software system for the accounting department. Energy is an increasingly costly commodity, and the results of not paying attention to the BEMS – of ignoring alarms or of letting energy use drift – will be expensive.

Consulting engineers play a crucial part in ensuring the efficient operation of buildings, and they should feel confident to discuss controls and BEMS with their clients, and with controls specialists. By considering these basic principles it is possible to make effective use of the latest technologies, so that building owners and occupiers benefit. CJ

References:

- 1 CIBSE Knowledge Series: *Understanding Controls*, principal author Gay Lawrence Race FCIBSE

IAN ELLIS is marketing manager for Siemens Building Technologies UK



SPECIFICATION CHECKLIST

1. Start with the BS EN15232 Standard as a basis for reviewing, or specifying, controls and BEMS
2. Think holistically, in spite of different mechanical and electrical contracts
3. Demand-based control is a simple, but highly effective strategy for long-term energy efficiency
4. Don't shy away from considering which protocols are being used. Open protocols are the most effective way to ensure the building is flexible and future-proofed
5. Data collection has to be considered in the context of client requirements
6. Handover and education are vital to ensure the users can make the best of what they have paid for
7. BEMS and controls should be considered business tools with which to manage a valuable business asset – the building.

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Liquid desiccants for dehumidification in building air conditioning systems

This module considers the application of liquid desiccant dehumidification systems to reduce air moisture content

Desiccants have been used for dehumidification in industrial processes for many years – since at least the 1930s – as well as, to a lesser extent, in commercial air conditioning. This CPD will explore some aspects of the application of liquid desiccant dehumidification systems as a means of controlling air humidity – a technology that is increasingly being seen in building services applications.

The control of humidity is the attribute that changes simple tempered ventilation into 'air conditioning'. There are many types of humidifiers available (as discussed in *CIBSE Knowledge Series 19 – Humidification*¹). However, in air conditioning systems, dehumidification is normally undertaken simply by cooling air below its dew point, to condense the associated water vapour and so reduce the absolute moisture content. Traditionally, air conditioning systems have used cooling coils that sensibly cool the air so it reaches its 'dew point' temperature. Thereafter, if the dry-bulb temperature is further reduced, the air's absolute moisture content is reduced, as water vapour condenses from the air – as shown by the process A-C in the psychrometric process illustrated in Figure 1.

Often, dehumidification is followed by

reheating the air to provide an appropriate supply air temperature (H in Figure 1). The combined process can consume significant energy cooling the air (typically using a vapour compression refrigeration system), followed by some form of reheat (process C-H in Figure 1) – using hot water, electric or condensing refrigerant coils.

Desiccant systems work in quite a different

way to the 'dew-point temperature' systems. Cool desiccant – liquid or solid – will readily absorb or adsorb (see box for an explanation of these terms) water vapour from the surrounding air, until its vapour pressure is in equilibrium with that of the air. The strength of a desiccant can be measured by its equilibrium vapour pressure – the pressure of water vapour that is in equilibrium with the desiccant. In the case

Absorption or Adsorption?

There are many – often conflicting – definitions of 'absorption' and 'adsorption', both of which are 'sorption' processes. This explains the terms as used in building services engineering:

Absorption is when a substance is fully integrated into another and the molecules undergoing absorption are taken up in the volume of the material – whether it be gas, liquid, or solid – and evenly distributed within the material. This can be a chemical (reaction) or physical (dissolving into a liquid) process. Absorption is an endothermic reaction, as it requires energy to alter the molecular state to form the new compound, and so it draws heat from its surroundings. Lithium chloride and sodium chloride (salt) are absorbents.

The absorption cycle is commonly used in HVAC absorption chillers, typically using a solution of water and lithium bromide, or ammonia and water (as the absorbent) for cooling systems.

Adsorption is when one substance is being held inside another by physical bonds on the maze of internal surfaces. Activated carbon, silica gel and zeolite (volcanic rock) are examples of adsorbents. The desiccants will not chemically combine, but a film of adsorbate is created on the complex and extensive network of 'surfaces' (internal and external) of the adsorbent. Heat energy is released in the process, as the water vapour is adsorbed – that is, it is an exothermic process. Adsorption chillers – using a solid adsorbent, together with water as the refrigerant – for building services are rather more rare than absorption chillers.

of a liquid desiccant, this equilibrium vapour pressure increases roughly exponentially with the temperature of the desiccant/water system.

Solid desiccants are often used in a wheel, having a similar appearance to a thermal wheel, using the adsorbent silica gel (sodium silicate) as the part of the packing in the wheel (as in Figure 2). As the wheel turns, the desiccant passes alternately through one air stream – where the moisture is adsorbed – and then through another air stream, where the desiccant is dried and the moisture expelled. This second process is known as regeneration. Typically, 60% of the face area would be used for the dehumidification process.

Since the desiccant is solid, there is no carry-over of the desiccant into the airstream. Regeneration is normally carried out by the use of a heating coil – such as a water or steam coil – or a direct-fired gas burner to heat a stream of hot air that then passes through the remaining segment of the wheel (about 40% of the total face area). Silica gel can be regenerated successfully at temperatures of 60°C to 70°C, although higher temperatures are often used to provide more effective operation.²

Liquid desiccant systems

The basic process appears little different to that of solid desiccants – one of sorption and regeneration. Liquid desiccant systems will normally use the hygroscopic properties of a salt solution to dehumidify the air. The solution is exposed to the high relative humidity airstream – typically, outdoor air – and attracts water vapour from the high vapour pressure air to the lower vapour pressure liquid desiccant. The air will follow practically a psychrometric process line of almost constant enthalpy as it passes through the dehumidifier (process A-D in Figure 3). The dry-bulb temperature of the air can then be reduced through a sensible cooling coil (process D-C) for supply into the room. The air power required for moving the air through the device will be less than that for an equivalent solid desiccant wheel.

The regenerator uses heat to drive off the absorbed moisture and ‘reconcentrates’ the diluted desiccant. Liquid desiccants require lower temperatures to regenerate than their solid counterparts. Once the desiccant is regenerated, it is cooled, and can then be used again in the conditioner.

The cooling of the desiccant solution may be achieved by using water – often from a cooling tower – or by using an evaporator of a small refrigeration system that, in turn, provides heat through its condenser, to heat the desiccant solution in the regenerator. Yao³ recently reported that the regeneration process may be made significantly more efficient – that

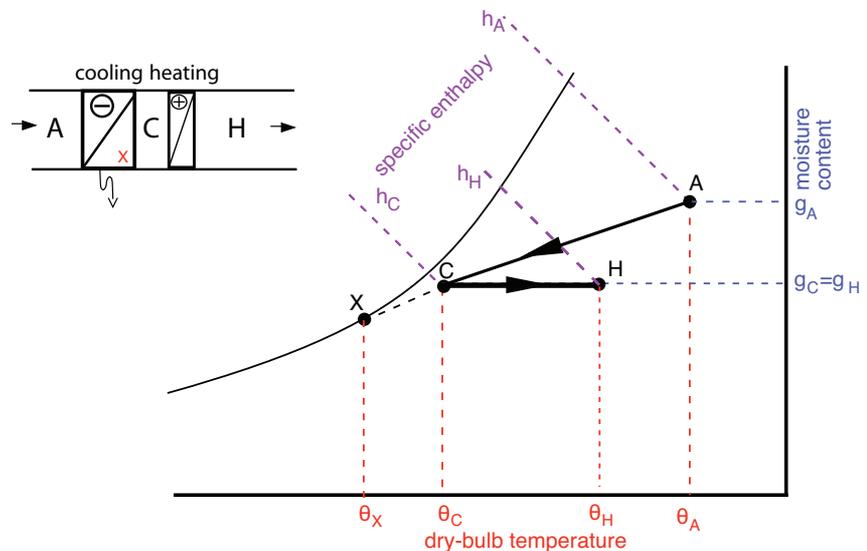


Figure 1: Example psychrometric process of a cooling and dehumidification process followed by a reheater

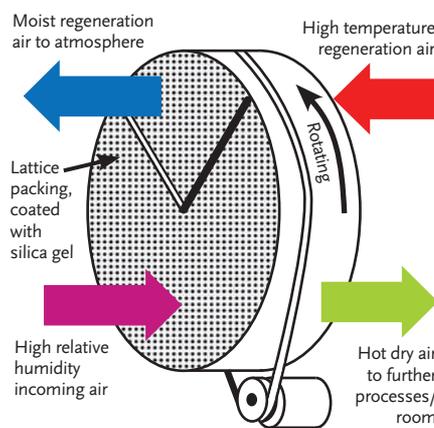


Figure 2: Example of a solid desiccant wheel

is, require less heat energy and also reduce the temperature increase of the concentrated solution – by applying ultrasonic disturbances to the regenerating fluid.

Liquid desiccants for air conditioning applications include solutions of lithium chloride (LiCl), lithium bromide (LiBr), and calcium chloride (CaCl₂). As pure salts, these have a vapour pressure of practically zero. An example solution of 40% lithium chloride (in solution with water) at 30°C will have an equilibrium vapour pressure so that – when it is in contact with humid air – it produces an air dew-point temperature of 3.7°C. Calcium chloride is 10% of the cost of lithium chloride, and using 50/50 blends of the two desiccants can provide equilibrium vapour pressures – and resulting air moisture content/dew point – very similar to that of using a single solution of lithium chloride.⁴ These salts are all very corrosive to metals typically used in air conditioning systems.

Higher desiccant concentrations and lower temperatures will reduce the equilibrium dew-point temperature. However, as the concentration increases towards 50%, the risk

of crystallisation is very high – and this will stop the system working. These liquid desiccants can also act as a filter against microbial contamination and moulds carried in the incoming airstream.

Triethylene glycol has been used to provide sorbent dehumidification in industrial applications. It is less corrosive than the salt solutions, but it evaporates readily into the air. An alternative, cheaper desiccant – potassium formate – has recently been shown⁵ to be as effective and more environmentally benign, as well as less corrosive, and to be particularly appropriate for high-humidity, high-temperature applications. However, there may still be some qualitative issues² – such as odours and biological performance – that need investigation.

The possible configurations and/or the composition of the components that make up a liquid desiccant dehumidification system can vary widely, depending on the desiccant and the application. However, Figure 3 shows a simplified outline of the principal components in a system. (The eliminator plates prevent the carry-over of liquid desiccant into the leaving airstreams.) Where the system is predominantly used to moderate the fresh air moisture content, the capacity of the dehumidifier is likely to be configured to treat only the ‘fresh-air’ ventilation component of the airflow. The regeneration temperatures are such that the heat may often be provided from waste heat sources or solar panels.

In the experiments by Qiu⁴, a system was demonstrated working effectively as part of a combined system placed in series with an evaporative cooler – which was used to reduce the sensible temperature of the finally delivered airstream – where the heat for regenerating the desiccant was waste heat from the flue gas of a biomass boiler, using an in-flue heat exchanger.

Module 71

December 2014

1. Which one of these is most likely to be an adsorbent in HVAC applications?

- A Ammonia
- B Calcium chloride
- C Lithium chloride
- D Sodium silicate
- E Water

2. Which part of the liquid desiccant system increases the concentration of the solution?

- A Conditioner
- B Desiccant cooler
- C Desiccant heater
- D Heat exchanger
- E Regenerator

3. With 40% solution lithium chloride at 30°C, what is the lowest potential dew-point temperature to which air can be conditioned?

- A 0°C
- B 3.7°C
- C 11.8°C
- D 30°C
- E 50°C

4. Which researcher was noted as investigating the application of biomass heat recovery as a heat source?

- A Harriman
- B Jain
- C Qiu
- D Lowenstein
- E Wang

5. Which of these is least likely to be a good application for liquid desiccant dehumidification?

- A Busy food supermarket with multiple, open, refrigerated cabinets in temperate area of Paris suburbs, France
- B Municipal office building in northern English town with a local, small-scale hydro plant generating electricity
- C A three-storey office block in Singapore, with roof-mounted solar thermal panels
- D Air conditioned offices of a timber logging company on the outskirts of Kampala, Uganda
- E The busy executive suite of a Florida baseball stadium

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PCM offers thermal solution

Phase Change Materials (PCMs) are ideal products for thermal-management solutions. This is because they store and release thermal energy during the process of melting and freezing – in the same way an ice cube maintains a prolonged cooling effect in a glass of water. This very simple concept enables a bridging of the gap between energy requirement and energy use. When applied correctly, PCMs can offer free cooling, increased efficiency, and lower system-running costs. PCMs between 8°C and 20°C can be simply charged using a free cooler overnight – without the use of a chiller – and, later, the stored free energy can be used to handle the daytime sensible building loads.

● Call 01733 245511, email info@pcmproducts.net or visit www.pcmproducts.net



NO_x class 5 condensing boilers for care home

The Avondale mental healthcare centre, in Liverpool, is a 50-bed unit, established in 1991 by charity Delphside. When first built, the centre was fitted with Atlantic Boilers' world-leading Optimagaz and Condensagaz E Series gas condensing boilers. The centre has just undergone a complete refurbishment, and two of these long-life boilers have been replaced by the latest technology. Two VF 100kW, pre-mix, low-NO_x gas condensing boilers – computer-controlled and programmed for continuous comfort and maximum economy – have been installed.

● Call 0161 621 5960, email nabeela@atlanticboilers.com or visit www.atlanticboilers.com



Scottish crime campus wins awards

A new £75m Scottish Crime Campus in Lanarkshire has continued to win both acclaim and awards from many different sources since its formal opening by HRH the Princess Royal last summer. It provides an excellent example of how a combined approach can deliver a solution that is fit-for-purpose, practical and sustainable.

This new crime-fighting hub brings together various agencies, including the police, forensics, customs and the prosecution service. It has a remit to spearhead Scotland's approach to tackle organised crime and terrorism head-on.

Housed in a new four-storey building and occupying 22,500 m² of floor space, every aspect of the new building was carefully planned and designed. This included the M&E system that Grundfos Pumps worked in association with Vaughan Engineering to ensure that this aspect also met the highest standards and demands.

Selecting only the most energy-efficient pumps from the Grundfos portfolio, the new building has been fitted with state-of-the-art pumps. These include models from the award winning MAGNA3 circulator range, TPED in-line twin head pumps as well as a Hydro MPC-E booster set and pressurisation equipment.

● Call 01525 850000, email grundfosuk@grundfos.com or visit www.grundfos.co.uk



Adiabatic air-inlet cooling

EcoMESH is a mesh and water-spray system that improves the performance of air-cooled chillers, dry coolers and refrigeration plants, while reducing the energy consumption by up to 44%. EcoMESH has been fitted to troublesome units worldwide, where its patented water-spray technology eliminates problems and, once fitted, is virtually maintenance-free. It can be retrofitted to any model, make or size of air conditioning and refrigeration unit.

● Call 01733 244224 or visit www.ecomesh.eu



Airedale adds cooling solutions to range

Airedale is one of the UK leaders for chillers, precision air conditioning (PAC), IT cooling, air handling units (AHUs) and controls integration solutions. The SmartCool chilled water PAC provides up to 30% more cooling per kW/m² than rival systems. Other new products include the TurboChill FreeCool chiller with low global warming potential refrigerant R1234ze and double the free-cooling of thermosiphon equivalents, and the AireFlow AHU, which offers huge fresh air free-cooling potential and, being an indirect system, eliminates the risk of ingress of contaminated air, reducing dependency on back-up mechanical cooling.

● Call 0113 239 1000, email connect@airedale.com or visit www.airedale.com

Urmet welcomes new London showroom

Urmet is pleased to announce the opening of a new showroom display situated at The Building Centre, central London. This convenient new location is open from Monday to Saturday, all year round, excluding bank holidays. The aim is to enable a wide range of potential users, from architects and developers to security consultants and installers – in fact anyone involved in the door-entry sector – to see Urmet's products for themselves.

● Call 01376 556 010 or email marketing@urmet.co.uk



Potterton Commercial improves Sirius Two WH boiler range

Potterton Commercial has extended its Sirius two WH commercial boiler range with the addition of a range of new cascade frame kits. The Potterton Commercial Sirius two WH wall hung stainless steel condensing commercial boiler range, which comes with a five-year warranty, can now be installed in multiple configurations thanks to the flexible cascade frame options. These allow up to six boilers, each delivering an industry-leading modulation range of 9:1, in one installation with outputs from 100kW up to 660kW.

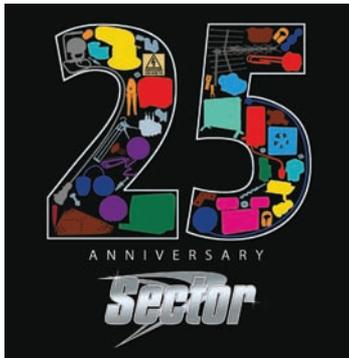
● Visit www.baxicommercial.co.uk



Think smart with Logic HIU from Ideal Commercial Boilers

Ideal Commercial Boilers has launched its brand new range of Logic Heat Interface Units (HIUs), the latest heating system solution designed to maximise efficiency in multi-residential buildings served by central boiler plant. Providing localised control for residents, the Logic HIU operates as an interface between the centralised heating plant, usually consisting of one or more commercial condensing boilers, and the central heating and domestic hot water system within each individual dwelling.

● Call 01482 492251 or visit www.idealcommercialboilers.com



WF Senate celebrates 25 years of its Sector range

WF Senate, a UK leader in the distribution of electrical supplies and services, is celebrating 25 successful years of its Sector own-brand range of innovative products. WF Senate is one of the UK's largest electrical wholesalers, distributing electrical products from manufacturers in all electrical areas, along with its in-house brands. The company boasts more than 20,000 products. With instant access to stock, over 90 branches are computer linked by an IT system which provides stock answers within seconds.

● Visit www.wfsenate.co.uk

Vent-Axia Wins at Housebuilder Awards



British ventilation manufacturer Vent-Axia is celebrating winning Product of the Year at the prestigious Housebuilder Awards 2014. Scooping the award for its revolutionary Lo-Carbon Response (dMEV) solution, the Sussex-based company received the accolade in London, at a glittering ceremony held at the Tower Hotel near Tower Bridge. This announcement follows hot on the heels of the Lo-Carbon Response winning the Best Brand New Product Award at the Housebuilder. Product Awards 2014 in July.

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



Remeha engineers for maximum energy savings at No.1 Brunel Square

Two energy-efficient Remeha Quinta Pro 115 gas condensing boilers have been installed at No.1 Brunel Square, the newly-transformed conference and education space of Brunel's ss Great Britain in Bristol, to meet the new requirements of the building. They will provide improved comfort for visitors while offering significant energy and carbon savings from the higher heating efficiencies.

'Remeha boilers are reliable, user-friendly and one of the most carbon and energy efficient boilers on the market,' said M&E Contractor Bob Padfield of BS3 Services. 'The personal service, competitive price and back-up support from Remeha's technical department makes these boilers "first choice" when asked to recommend a suitable boiler.'

● Call 0118 978 3434, email boilers@remeha.co.uk or visit www.remeha.co.uk

PEL supports fashion retailers on New Bond Street

PEL Services has been appointed by three world-famous luxury fashion brands to fit their stores with sound, security and fire alarm systems in New Bond Street, London, one of the most expensive strips of real estate in the world. PEL Services, a leading UK systems company specialising in sound, fire, security & audio visual solutions, has supplied a range of these services to Hugo Boss, Fendi and Jimmy Choo's stores.

● Call 0333 123 2100 or visit www.pel.co.uk or www.pelav.co.uk



GEZE's Slimchain scoops design award

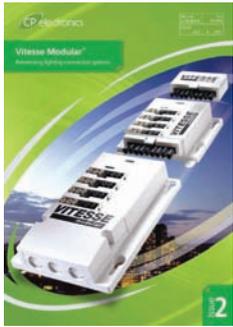


An innovative chain drive from GEZE has been recognised for its exceptional design at the Universal Design Awards 2014. The versatile Slimchain window drive, which was

launched in the UK by GEZE UK last year and is suitable for both natural ventilation and in smoke and heat extraction systems, is one of just 13 winners at this year's event. The awards, which were founded in 2008, are judged by two panels, one of industry experts and a second of consumers.

● Call 01543 443000 or visit www.geze.co.uk

CP Electronics' Vitesse Modular – reinventing lighting connection systems

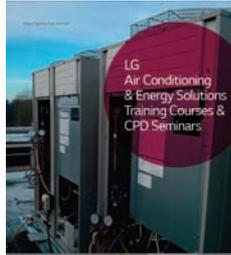


Lighting control specialist CP Electronics has launched a comprehensive and intuitive brochure for its Vitesse Modular range. CP Electronics is working to help businesses reduce costs by utilising products from its

advanced range of energy saving controls. The modular design of Vitesse Modular allows users to extend the system, adding modules as and when they are needed from four-way to 16-way. It provides a cost-effective solution for controlling lighting in commercial, retail and industrial applications.

● Call 0333 900 0671 or visit www.cpelectronics.co.uk

LG's autumn/winter training



Air conditioner manufacturer LG strongly believes that, as technology advances rapidly, training is more important now than ever. The company offers free courses aimed at contractors, giving the opportunity

to develop both practical and theoretical knowledge of the firm's products. The courses cover LG's Multi V IV VRF, Split and Multi-split systems, Eco V Ventilation and the MCS accredited Therma V air-to-water heat pump systems, and are held in LG's state-of-the-art Training Academies in Slough and Leeds.

● Call 01753 876773 or email aircon.training@lge.com



Dalkia is in the swim at Bracknell

Dalkia is continuing its 18-year relationship with Bracknell Forest Council by supplying new CHP units at both Bracknell Leisure Centre and Bracknell Coral Reef. In a £265,000 contract Cogenco, Dalkia's specialist small-scale CHP division, is to replace existing plant with new 135kW CHP units at each site, contributing running cost and carbon savings to these key leisure facilities. Annual CO₂ savings over conventional electricity supply from the grid will be 430 tonnes.

● Visit www.dalkia.co.uk or www.veolia.co.uk



Building owners and industry warned to 'be prepared', as forecasters predict cold winter

Carrier Rental Systems, the leading temporary heating and cooling specialist, is urging industry and building managers to be prepared following predictions of an unusually cold winter. In anticipation, and as part of its strategic growth plan, CRS has expanded its fleet of temporary heating plant, to ensure it is ready to meet expected high demand for emergency heating. It has doubled capacity at its Thorpe headquarters, and invested in a new fleet of high-efficiency boilers.

● Call 0800 026 4717, email info@carrierrentalsystems.co.uk or visit www.carrierrentalsystems.co.uk

Cool-Therm opens office in university science park



Cool-Therm has opened a Midlands office at the University of Wolverhampton Science Park. It will provide a base for the continuing development of Cool-Therm's activities in the Midlands, and enable the company to expand and improve its service to customers. Following the recent revision of the F-Gas Regulation, Cool-Therm's Midlands office has reported a surge in interest in natural and low GWP chillers, with Martin Sharman (pictured right with md Ken Strong) securing orders for new generation HFO-based chillers and hydrocarbon-based systems.

● Call 0303 030 0004 or email enquiries@cooltherm.co.uk



Compact Ideal Commercial Boilers save New Forest Council more than £30,000

Two Evomax 80kW wall-hung boilers from Ideal Commercial Boilers have been specified and installed at Appletree Court, the head office for New Forest District Council, in Lyndhurst.

Heating in the east wing of the building was formerly provided via system boilers and an outside fan heater, which fed low temperature wall heaters. This would often fail when outside temperatures dropped below -1°C, so the objective was to both improve efficiency and ensure the system would be operational throughout the year.

● Email commercial@idealboilers.com, call 01482 492251 or visit www.idealcommercialboilers.com



Keeping it cool at Foxhills, Surrey

Foxhills Country Club and Resort in Surrey is set in 400 acres of countryside and offers guests access to world-class golf courses, a health spa and three restaurants. The estate prides itself on quality, and has upgraded its kitchens with help from refrigeration and air conditioning specialist Cold Control to improve energy efficiency. Nationwide air conditioning and refrigeration specialist Cold Control has replaced a bank of four walk-in cold rooms to maximise efficiencies: a general-purpose chiller, meat chiller, vegetable chiller, and walk-in freezer.

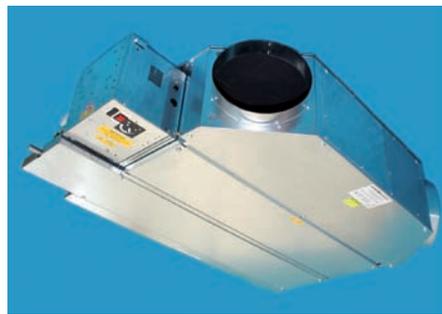
● Call 0844 967 0573
or visit www.coldcontrol.co.uk

Dunham-Bush develops BIM objects

Dunham-Bush, a designer and manufacturer of temperature control solutions, has engineered an in-house solution to provide end users and specifiers with BIM (building information modelling) objects and families not only for standard but also for specially designed heating and cooling products.

The BIM data from Dunham-Bush makes design easier for customers and specifiers; it enables designers to incorporate the physical, and eventually the performance, attributes of the company's products into the overall building design.

● Call 02392 477 700
or visit www.dunham-bush.co.uk



GEZE UK puts road safety in the driving seat

With commercial vehicle drivers experiencing 50% more accidents than other road users, GEZE UK is gearing up to put road safety at the top of its agenda. GEZE, a manufacturer of door and window control systems, is working with Zurich to undertake a company-wide assessment of the risks its drivers face whilst making work-related journeys. The results will then be analysed by Zurich.

This will give GEZE a thorough understanding of the actual risks faced by its workforce, allowing it to direct resources to where they are needed most.

● Call 01543 443000 or visit www.geze.co.uk



Thermoblock offers right formula for autosport test facility

The construction of an advanced testing facility for motor sport engines in Wales features the use of Marmox Thermoblocks at ground floor level, specified to help comply with the latest edition of Part L of the Building Regulations. The Sports Engine Testing Facility at the University of South Wales Porthkerry is being built by Willmott Dixon Construction. While the 1,000m², two-storey structure utilises a steel frame, the exterior walls are being raised in cavity blockwork with the Marmox Thermoblocks.

● Call 01634 835290, fax 01634 835299,
email sales@marmox.co.uk
or visit www.marmox.co.uk



Jet Cox shines on Lady Margaret School

Established almost a century ago, the Lady Margaret School in west London continues to serve the community and has recently been expanded, with more than two dozen rooflights from the Jet Cox range bringing natural daylight to the teaching spaces. Rooflight manufacturer Jet Cox supplied 28 Cox Glasslights to Anglian Architectural – the specialist sub-contractor carrying out the installation on behalf of Osborne – 10 of which feature rain or temperature sensors. These raise the unit if the space becomes too hot, and close them during rain.

● Call 0121 530 4230, fax 0121 530 4231,
email mrevie@jet-cox.co.uk
or visit www.jet-cox.co.uk

Smoke Venting Specification Explained

Fire Design Solutions has launched a new technical guide to provide concise information on the specification of its range of smoke ventilation systems.

Set within the context of important legislative requirements, such as British Standards and Building Regulations, the easy-to-navigate guide provides architects, designers and specifiers with an overview of the smoke ventilation systems available – from natural to mechanical, pressurisation and car park smoke ventilation – and explores how each system operates, describing the fire safety benefits that can be brought to a project.

● Email info@firedesignsolutions.com or visit www.firedesignsolutions.com





Harvey Group wins contract for £30m Waterfront Conference Facility

Harvey Group has been awarded the contract for mechanical and electrical services at the new £30 m conference facility at Belfast Waterfront Hall. Brian Harvey, managing director, said: 'Having played a major role in the original Waterfront Hall complex back in 1996, we

are delighted to have been chosen to provide the mechanical and electrical services for the new conference facilities. The Belfast Waterfront Hall is an iconic project, instantly recognisable as a landmark of our city.'

● Visit www.youtube.com/watch?v=jcA-z6VUtOg to view a 3D tour

Fläkt Woods receives Carbon Trust accreditation

In recognition of Fläkt Woods' strong track record in designing and delivering high quality HVAC products, the company has been accredited as a Carbon Trust Supplier. The scheme is renowned for selecting high quality, energy efficient and renewable technology suppliers, while also providing independent validation and recognition of skills and services. Vice president for Fläkt Woods UK and Ireland, Yan Evans, said: 'We have worked incredibly hard to bring the most energy-efficient products to the market. However, we are always looking at ways to differentiate ourselves, and this is a great accolade.'

● Visit: www.flaktwoods.co.uk



Manchester restaurant installs CO technology for charcoal grill

Solita, one of Manchester's city centre's most popular bar and grill restaurants, has installed state of the art carbon monoxide monitoring equipment in its new Didsbury branch. S&S Northern's Merlin 1750 Solid Fuel Safety system was installed in the restaurant to ensure that any CO given off by the charcoal grill in the restaurant is monitored to keep staff and customers safe and ensure that, if levels become harmful, the system will alert chefs.

● Call 01257 470983,
email info@snsnorthern.com
or visit www.snsnorthern.com



Hewitech expands into plastic media for cooling towers

Hewitech UK has appointed Neil Watson as projects manager for its cooling tower business where the company offers a range of specialist plastic media. Neil Watson brings with him a wealth of experience in the industry, 24 years in total, most recently with PSSP and GEA. Neil is NEBOSH qualified for health and safety in the industry and is qualified in Legionnaires awareness. His expertise is not confined to advice on the best products to use in a cooling tower application but also extends to first-hand experience of project installation.

● Call 01242 821678,
email sales@hewitech.co.uk
or visit www.hewitech.co.uk

Merriott Radiators turn up the heat with full range on BIMStore

Merriott Radiators are the first radiator manufacturer to have their entire range available on BIMStore. Launching its line of 3D BIM models and data, specifiers will now have access to all models to create a complete installation plan before an order is placed. This allows specifiers to compile cost estimates for its heating products, resulting in a more efficient decision-making process. To view the full range of 3D models and data offered, please visit:

www.bimstore.co.uk/manufacturer/merriott-radiators

● Call 01633 657222,
email info@merriott-radiators.com
or visit www.merriott-radiators.com



Vent-Axia celebrates lucky number three with CIBSE awards nomination

British ventilation manufacturer Vent-Axia is delighted to be shortlisted in the prestigious CIBSE Building Performance Awards 2015, run by the Chartered Institution of Building Services Engineers. The company's Lo-Carbon EKF Kitchen Box Fan has been selected as a finalist in the Energy Saving Product category. This announcement marks the third industry award the Kitchen Box Fan has been shortlisted for during the last six weeks with the fan already a finalist in the Energy Awards and the HVR Awards.

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



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Zip pioneers radical new design

Zip has been leading the way in the filtered boiling and chilled water market since it launched its iconic HydroTap filtered boiling model in 2000. Now Zip has launched the most advanced drinking water appliance on the market to date, the HydroTap G4. Designed to deliver even greater performance, the latest evolution of the instant boiling and chilled filtered water system has been repackaged into the smallest footprint on the market to make it the perfect choice for commercial and residential applications.

● Visit www.zipheaters.co.uk



Runways takes off with Mikrofill

Opened in November 2011, the Runways End outdoor adventure centre in Aldershot is one of the biggest of its kind in the UK. Set across nine acres of woodland, the centre was designed to be as environmentally friendly as possible. With this in mind, the Mikrofill 'direct type' unit was the greenest option when deciding which pressurisation equipment to use on the LPHW system. The fluid category 4 Mikrofill unit consumes just 10 watts of electricity on standby and 30 watts per hour fully operational.

● Call 03452 606020
or visit www.mikrofill.com

Highest seasonal efficiency and lowest refrigerant charge VRF

As the only manufacturer with a two-pipe heat pump and three-pipe heat recovery VRF from a single unit, Hitachi has gone one step further introducing Set Free FSXN1E to its expanding range. FSXN1E is available from 8HP to 54HP and is fully compatible with the full range of System Free indoors – including the new 0.6HP units – allowing a greater number of connectable indoor units than ever before, achieving complete design and installation flexibility.

● Call 01628 585 394,
email aircon.enquiries@hitachi-eu.com
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Technical Director - Mechanical | Berkshire | £NEG! | ref: 6572-SW
Eclectic project portfolio consisting of Pharmaceutical and Airport frameworks.

M&E Design Engineers | London | to £45LTD | ref: 6683-SH
Leading Consultancy heavily involved with Crossrail. Long term contracts!

Design Manager - Electrical | West London | to £400LTD/day | ref: 6700-RM
Substation and lighting design for a major tunnel refurbishment. 12 months+

Principal Mechanical Engineer | N. London | to £65K | ref: 6171-SW
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Resident Engineer - Electrical | West London | to £350LTD/day | ref: 6690-RM
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BIM Manager

£45k - £50k+ Benefits, Berkshire

We are working with a well-established, privately owned award winning consultancy in Berkshire in their search for a REVIT/BIM manager. Successful applicants will be responsible for developing 3D BIM using REVIT MEP. The role will be integral for development of 3d BIM usage in a growing market. The successful candidate will also be responsible for leading a dedicated BIM and CAD team. BAR2271/JA

Senior Mechanical Design Engineer

£38 - £40 per hour, London

Exciting opportunity for a Senior Mechanical Design Engineer to join a very well established consultancy. This consultancy has offices all over the world and has a steady stream of innovative projects including commercial, high end residential and healthcare projects in Belarus and Kazakhstan. BAR2299/KB

Electrical Design Engineer (Building Services)

£30k - £38k + Benefits, London

Brilliant opportunity for an intermediate electrical engineer to join an international consultancy established for over 40 years with 14 offices spread across the globe. The London office work on a variety of projects including mission critical, residential, hotels, and leisure schemes. The company are very focused on training and development and hold annual awards for their staff to promote excellence. BAR2244/JA

Head of Mechanical Engineering

65000 AED per month, Doha

Our client is an award winning MEP consulting engineering practice with 10 offices across the UK and Middle East. The FIFA 2022 World Cup has provided an enormous boost to the region and our client is well placed to take advantage of the increase in planned infrastructure projects. This a hands on position for a client facing, degree qualified Director level engineer. BAR1548/PA

Mechanical Associate Director

£65 - £75K + Benefits, London

Established for 15 years my client have a customer base that extends across all sectors in the construction industry, offering expert services from project inception to building operations. As Associate Director for London you will be responsible for strategic development of the Mechanical division as well as managing projects and procurement of new business. This is a great opportunity for an established leader to take the reins in a forward thinking company. BAR2193/CB

Electrical Design Engineer

Berkshire, £37 per hour

A multi-disciplinary consultancy that has been established for 30 years are experiencing an increasing demand from their clients and as such have a vacancy for an Electrical Design Engineer. The successful candidate should enjoy providing a quality service working across a range of commercial sectors and be in a position to commit to a 1 year contract. BAR2302/MA

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Associate Mechanical Engineer / Project Design Leader
Central London
£60,000 Plus Benefits and Bonus

A large award winning international based building services consultancy are looking for an Associate Mechanical Engineer. This role is to work as a project design leader, working on some of the most iconic schemes in London and the Middle-East. This is a fantastic role, offering an opportunity to head up entire projects, co-ordinate services, control financial aspects and liaise with the client. Excellent career progression due to the expansion of the office

Principal Electrical Engineer
London Bridge
£60,000 Plus Package

A small but internationally recognised building services consultancy near London Bridge is currently looking for a Principal Electrical Engineer to assist in the leadership of the design office and lead projects. Although this consultancy is small, they are renowned for working with top architectural practices on prestigious projects in excess of £150m. Excellent opportunity if you are looking for an autonomous role, where you will work on iconic projects.

Senior Mechanical Design Engineer – 18 Month Contract
Central London
£40.00 per hour Ltd

A world renowned architecturally led building services consultancy is looking to add the next up-and-coming mechanical design engineer to their team. Boasting projects from across the globe, they are currently working on one of the most prestigious international hotel projects seen to date.

Associate Electrical Design Engineer
Glasgow
£55,000 Plus Benefits

A well –rounded electrical design engineer at Associate level is required by our client to head up both national and international projects. Being an expert in gaining new business, you will have the chance to work directly with key clients to identify solutions to their many needs in the built environment. Working within a range of sectors, you will also play a key role in mentoring younger, less experienced consultants to meet extensive project requirements.

Principal Mechanical Design Engineer
Northampton
£50,000 Plus Benefits

An experienced mechanical design engineer is now required for a leading player in the building services industry based in Northampton. Due to substantial growth, our client is seeking a principal mechanical design engineer to manage a small multi-disciplined team. Being “hands-on” you will act as the lead design engineer for a range of team projects, covering sectors such as health, education, commercial and industrial. If career progression is your main motive then please apply immediately to be considered.

Building Services Manager
Hertfordshire
£50,000 Plus Benefits

A renowned international residential and commercial developer is currently looking for a Building Services Manager to work out of their head office near Hemel Hempstead. Within this role you will be given full autonomy of the MEP Services design for a number of residential and commercial sites in and around Hertfordshire. Good communication skills are essential, as you will be in charge of managing both internal design engineers and external consultancies.

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NATURAL CAPITAL

Partnering with the right professionals within your organisation can unlock additional funding. **Sandra Rapacioli**, from the Chartered Institute of Management Accountants, explains the advantages of dialogue



Management accounting combines accounting, finance and management with the techniques needed to drive successful businesses. Practitioners do more than just look at financial data – they also assess non-financial information, such as environmental impact, and advise companies about the long-term commercial implications of their actions. So they have a key role in driving sustainable practices.

By partnering with professionals such as engineers, the Chartered Institute of Management Accountants' (CIMA) Sandra Rapacioli says management accountants can identify material sustainability risks – for example, issues that affect long-term business success – and their findings can impact the organisation's objectives, strategy and business model.

CIMA is the world's largest professional body of management accountants, with more than 218,000 members and students, in 177 countries. They work at the heart of business – in industry, commerce, and non-profit organisations.

With what issues is CIMA currently concerned?

We work with our members on a range of topics. Whether it's driving accounting for natural capital and climate change, valuing sustainability strategies, or reporting sustainability performance to investors, we help our members understand how they can 'future-proof' businesses.

Accountants, traditionally, might not be associated with sustainability, but management accountants are ideally placed to provide data –

Buildings are 'manufactured capital', so companies need to make sure that these assets are working well now, and will continue to serve the company in the long term

and insights – about the impact of environmental and social issues on business performance, strategies and business models.

How can CIBSE members help management accountants to address these issues?

The increasing complexity of sustainability challenges means that a range of expertise and perspectives is now needed.

Engineers have considerable expertise in sustainability, so management accountants can learn a lot from them about the particular issues affecting the built environment. Together, they can prioritise risks, identify opportunities, and develop commercially viable solutions that will stand the test of time. Management accountants can help make the business case for these investments by providing rigorous data and insights that connect sustainability issues to commercial outcomes, strategy and corporate reputation.

What is the best way to convince businesses to invest in their buildings for the long term?

Buildings are 'manufactured capital', so companies need to make sure that these assets are working well now and will continue to serve the company in the long term. A wide range of factors should be accounted for; financial benefits such as energy savings are important, but non-financial benefits must also be considered, and, if possible, quantified – such as improved employee productivity from working in a nicer space.

Management accountants can ensure that relevant and reliable data is included in investment decisions, and do it with the same rigour that's applied to financial accounting.

It's becoming more important for businesses to consider environmental and social issues, as sustainable value creation increasingly depends on these non-financial factors. A management accountant, by partnering with engineers, can identify the sustainability issues that will impact on the company's ability to create value over time. They can also explain the impact of these issues in robust business terms, including how and when they could affect the business

With ESOS on the way, how can management accountants help CIBSE to unlock funding for 'green' projects?

Esos will get companies thinking about their energy use – and the old adage that 'what gets measured gets managed' still holds true. However, to encourage investment in energy efficiency and green projects, managers need more forward-looking information – such as forecasts on energy supply and price – and to understand how these trends will impact on the company's costs and operations. They also need to know the costs – financial, environmental and reputational – of doing nothing. CIMA members can advise CIBSE members on these connections.

SANDRA RAPACIOLI is head of sustainability research & policy at CIMA

Events & training

NATIONAL EVENTS AND CONFERENCES

TM56 Valuing our resources
4 December, London
The launch of the new TM56 publication, produced in collaboration with WRAP.
www.cibse.org

CIBSE Building Performance Awards
10 February, London
The prestigious awards event returns to recognise the companies, teams and products that demonstrate engineering excellence. Book your table now, to see who will win.
www.cibse.org/bpa

Technical Symposium
16-17 April, London
Book now for the 2015 Technical Symposium.
www.cibse.org/symposium

CIBSE GROUPS, REGIONS AND SOCIETIES

For more information, visit www.cibse.org/events

East Midlands Region: Society of Light & Lighting Event
2 December, Kegworth
An occasion arranged in conjunction with the Society of Light and Lighting (SLL).

SoPHE: Heat Interface Units and Demand Diversity
2 December, London
A SoPHE meeting.
www.cibse.org/sophe

WiBSE: London Role Models Series
2 December, London
The role models series continues with Vanessa Brady, president and founder of the Society of British Interior Design.

East Anglia Region: Smoke Control Ventilation Webinar
3 December, Webinar session
The East Anglia Region, in association with Flakt Woods, is pleased to present a lunchtime, smoke control ventilation webinar.

Emerging Technologies & The Future of Smart Homes
3 December, Bristol
A YEN event with Dr Nicola Combe, product manager at British Gas Connected Homes.

CIBSE Membership Briefing
4 December, Manchester
This briefing will focus on applications for the Associate and Member grades, and registration with the Engineering Council at Incorporated Engineer and Chartered Engineer levels.
www.cibse.org/briefings

Housing Standards Debate
4 December, London
Group event.

HCNW Region: Building Regulations – A Practical Guide to the Changes
4 December, London
Ant Wilson, of Aecom, delivers an introduction to the 2013 changes to Part L, also covering the *Non-Domestic Building Services Compliance Guide*.

West Midlands Region: Annual Dinner
5 December, Birmingham

YEN Hong Kong Chapter: Cycling Tour to Nam Sang Wai
7 December, Hong Kong
www.cibse.org.hk

North East Region: Affordable Zero Carbon Living
9 December, Newcastle upon Tyne
An evening seminar presented by Nigel Banks, of Keepmoat.

Ireland Region: SDAR Journal 2014 Launch
11 December, Dublin

Merseyside & North Wales Region: The Fracking Facts
11 December, Merseyside and North Wales
Ernie Rutter, professor of structural geology at the University of Manchester, presents the facts.

Saturated colour: Why the Blues?
11 December, Manchester
A talk on whether we have submerged our night-time environment in blue – and, if so, why?

NE Technical meeting: BIM Academy
13 January, Newcastle upon Tyne
Presentation by Sam Collard, of the BIM Academy.

West Midlands – Natural Ventilation
14 January, Birmingham
With speakers Neil Oliver and Andy Harrington, from Ruskin.

Building Drainage Conference
15 January, London
A Society of Public Health Event.
www.cibse.org/sophe

Chartered Engineer Workshop
15 January, Manchester
Three recently chartered engineers share their varied experiences of gaining professional accreditation.

East Midlands Region: Fan Power Regulations
20 January, Northampton
A regional seminar.

24:00 – Arup Lighting Exhibition, Private View
21 January, London
As part of the International Year of Light and Light-based Technologies 2015, SLL is holding a private viewing of the Arup Lighting Exhibition, 24:00.
www.cibse.org/sll

CPD TRAINING
For more information, visit www.cibse.org/mcc or call 020 8772 3640

Energy monitoring and targeting
3 December, Manchester

Intro to commercial building services
3 December, London

Design to gas safety regulations
3 December, London

Variable-flow water system design
4 December, London

Energy building regulations: Part L
4 December, Leeds

Low carbon buildings for local authorities
5 December, London

Energy systems: ISO50001 (Esos compliant)
5 December, Exeter

Inspection & testing of electrical installations
5 December, London

Construction project management
5 December, London

Overview of fire legislation and guidance
9 December, London

Mechanical services explained
9-11 December, London

Standby diesel generator
12 December, London

Energy strategy reports
13 January, London

Practical HVAC controls
14 January, London

Electrical services explained
19-21 January, London

Energy regulations Part L
20 January, London

Fire detection & alarm systems
27 January, London

Mechanical services explained
27-29 January, Birmingham

Practical project management
28 January, London

Low and zero carbon technologies
29 January, London

ENERGY ASSESSOR TRAINING

For more information visit www.cibse.org/events or call 020 8772 3616

EPC Training
2-3 December, Manchester

Esos Training
15 December, London

Esos Training
17 December, Birmingham

Esos training
19 January, London
The Esos training dates are filling up fast. More dates announced soon.

EPC Training
27-28 January, Leeds

Light Graffiti with Michael Bosanko

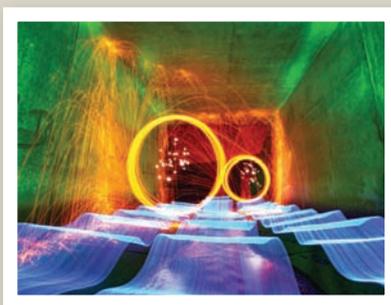
The Society of Light and Lighting (SLL) is delighted to introduce an evening of Light Graffiti, with acclaimed light artist Michael Bosanko.

The event is supported by lighting manufacturer acdc, and will begin at its north London studio, before heading to the atmospheric St John's Church, in Hoxton.

Under Bosanko's expert guidance, attendees will create their own light graffiti, which can then be photographed, using a slow exposure.

This is a wonderful opportunity to meet Michael Bosanko, and to explore your creativity. The event is free, and spaces are limited, so we recommend that you book your place early.

For more information and to book, visit www.cibse.org/sll



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

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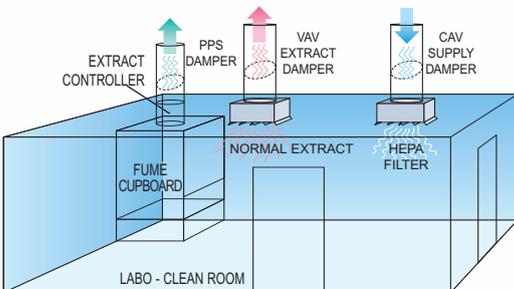


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