CIBSE JOURNAL

The official magazine of the Chartered Institution of Building Services Engineers

September 2010

HERE COMES PART L
Are you ready for next month's changes?

LIGHTING DEBATE
Radical measures for cutting carbon

HOUSING CASE STUDY
Lessons from a post occupancy survey

Drain gain

Expert analysis of public health engineering in our PHE Special Report

www.cibsejournal.com

remeha
creating energy solutions

New shape, new features
the new Remeha Quinta Pro Range

HIGH EFFICIENCY 110% NCV AT 40/30°C

FULLY MODULATING BOILER CONTROL

PREMIX BURNER CLEAN COMBUSTION

ULTRA LOW NOx BREEAM EXCELLENT

100% RECYCLEABLE

INTERNAL LED LIGHT SOURCE MAKES MAINTENANCE & INSTALLATION EASIER

QP30: 8.0 - 31.4 kW | QP45: 8.0 - 43.0 kW | QP65: 12.0 - 65.0 kW | QP90: 14.1 - 89.5 kW | QP115: 16.6 - 114.0 kW

For further information visit www.quintapro.co.uk

Contents

September 2010

CIBSE JOURNAL
The official magazine of the Chartered Institution of Building Services Engineers

www.cibsejournal.com

Editorial
Editor: Bob Cervi
Tel: 01223 273520
Email: bcervi@cibsejournal.com
Reporter: Carina Bailey
Tel: 01223 273521
Email: cbailey@cibsejournal.com
Senior designer: David Houghton

Advertisement Sales
Sales manager: Jim Folley
Tel: 020 7324 2786
Email: jim.folley@redactive.co.uk
Sales consultant: Mark Palmer
Tel: 020 7324 2785
Email: mark.palmer@redactive.co.uk
Sales executive: Darren Hale
Tel: 0207 880 6206
Email: darren.hale@redactive.co.uk
Recruitment sales manager:
John Seaman
Tel: 020 7880 8541
Email: john.seaman@redactive.co.uk
Advertising production: Jane Easterman
Tel: 020 7880 6248
Email: jane.easterman@redactive.co.uk

For CIBSE
Publishing co-ordinator: Nicola Hurley
Tel: 020 8772 3697
Email: nhurley@cibse.org

CIBSE Journal is written and produced by Cambridge Publishers Ltd. Tel: 01223 477411. www.cpl.biz
275 Newmarket Road, Cambridge CB5 8JE.

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

CIBSE, 222 Balham High Road, London SW12 9BS
Tel: 020 8675 5211. www.cibse.org

Subscription Enquiries
If you are not a CIBSE member but would like to receive *CIBSE Journal*, subscribe now! Costs are £80 (UK) and £100 (international). For subscription enquiries, and any change of address information, please contact: Nicola Hurley at nhurley@cibse.org or telephone 020 8772 3697.Individual copies are also available at a cost of £7 per copy plus postage.

Cover: Photo courtesy of British Land

ABC audited circulation: 19,728
January to December 2009

From the editor

Autumn's winds of change

The alarm bells which sounded last month over the latest changes to the Building Regulations have, thankfully, been quietly laid to rest. Fears of the demise of the 1st October implementation date for Part L 2010 were somewhat exaggerated, it seems (with apologies to Mark Twain).

More good news has arrived this month in the form of a reprieve for all 152 building and refurbishment projects whose future was uncertain after the coalition government announced the immediate scrapping of the Building Schools for the Future programme (see our news pages). And fears over future further government funding for the Zero Carbon Hub, the advisory body that is doing important work on meeting low carbon targets, have been allayed with the announcement of a fresh cash injection.

> It remains to be seen whether consultation is a guise for slashing 'red tape' in the regulations

Autumn hasn't arrived yet but it seems as if ministers are desperate to be handing out early Christmas presents. However, the unveiling of the Comprehensive Spending Review next month will no doubt dash any hopes of a reprieve on deep cuts to public spending – leaving industry to face the very real prospect of a 'double-dip' recession.

But with the 'arrival' of Part L 2010 next month, building services professionals will have plenty to take their minds off the economic gloom. Throughout this issue of the *Journal* you will find plenty to guide you on the impact of the latest changes to the regulations, including, for example, revisions to Part F. As well as our news pages, see also our roundtable debate on lighting and the following article on the impact of Part L 2010 on that industry (page 27 onwards). Our article on ventilation and mechnical services (page 67) also offers food for thought.

When it comes to further changes to the regulations, the bad news – or the good news, depending on how you look at it – is that we could well see the next tranche of revisions to the Building Regulations occurring in just two years' time, instead of the expected three (see page 8). Whether this bringing forward of the changes is an attempt to speed up progress on meeting the national carbon-reduction targets is unclear. And how the move sits with the Conservatives' pre-election pledge to 'streamline' the Building Regulations also needs clarifying.

What we are clearly seeing, though, is the welcome fulfilment of another Tory pre-election promise to consult with the industry on a wide range of issues around the regulations. It remains to be seen, however, whether the industry's views will be properly considered, or whether the ultimate immovable aim of ministers is to slash regulatory 'red tape' under the guise of an open invitation for building professionals to state what they believe should be done to improve the regulations.

Whatever the government's motivation – and the industry must fully respond to the exercise – it does seem that the face of the Building Regulations could end up looking very different by the time of the next general election.

Bob Cervi, Editor
bcervi@cibsejournal.com

“I HAVE ENOUGH ON MY PLATE WITHOUT HAVING TO CONSIDER WHETHER WE’VE CHOSEN THE RIGHT SUBCONTRACTORS”

Duncan Pierce,
Director, Page Associates

ECA electrical contractors are periodically assessed to ensure their technical competence

ONE LESS THING TO WORRY ABOUT.

Consequential improvements 'could have saved millions'

Introducing 'consequential improvements' to Part L 2010 of the Building Regulations could have resulted in £705m of savings, according to a campaign group.

Consequential improvements, which would have seen homeowners forced to make energy efficient improvements to their homes when carrying out large renovations, was expected to be consulted on in June last year, but did not appear in the consultation document.

The Labour government suggested it did not want to burden households with these extra costs in an economic recession.

The Association for the Conservation of Energy (ACE), which represents building services companies, says information it has received under a Freedom of Information request shows that introducing consequential improvements into existing domestic buildings in 2010 would have resulted in:

- £201m in savings to households (energy savings minus the costs of renovation works);
- £142m in reduced carbon emissions; and
- £363m from avoiding investment in renewables.

Shutterstock

Increasing energy efficiency 'should be compulsory in major home renovations'

The ACE says the financial savings and carbon benefits of enforcing consequential improvements were removed from the economic impact assessment that was released with the June 2009 consultation.

Consequential improvements were seen as giving the greatest proportional saving to each household, with energy savings 2.3 times greater than any costs, according to the ACE.

Andrew Warren, its director, said: 'The scandal behind this perversity has finally come to light over a year on, but only thanks to the refusal by the Freedom of Information Commissioner to put up with a litany of obfuscation.'

A government spokesman refused to be drawn on the matter, but did say that the communities and energy departments are now working together to develop the Green Deal which will allow householders to invest in home energy efficiency improvements at no upfront cost. The money spent carrying out the works will be recouped through savings on energy bills.

The spokesman added: 'The Green Deal will be consumer-led, with householders choosing the right solutions for them, based on advice on the available options. It is in this context that the case for additional measures, like consequential improvements, will be considered.'

www.ukace.org

Building regs may be reviewed every two years

Part L of the Building Regulations could be reviewed every two years under proposals set out by the UK government.

Building Regulations Minister Andrew Stunell is looking into the move, which may affect the next round of revisions expected in 2013, bringing them forward by a year to 2012. The announcement was made at an evening reception for the Energy Efficiency Partnership for Homes. Stunell has also written to industry asking for its opinion on a wide range of issues affecting all Building Regulations.

CIBSE and BSRIA, the research body, were among the recipients, who were asked to air their views on how the regulations can be 'improved, added to or slimmed down, and suggestions as to how we can deliver even better levels of compliance in the future'.

The closing date for input was the end of August.

■ Fears that the 2010 changes could face a six-month delay have now been allayed after the government confirmed that the changes to Parts F, J and L of the Building Regulations are scheduled to come into operation on 1 October as previously announced. The regulations had to pass through the Reducing Regulation Cabinet sub-Committee, which was tasked with reviewing all legislation introduced from 1 January 2010. It has now approved the changes.

Minister pledges to adopt renewable heat incentive ...

The UK government has committed itself to implementing some form of Renewable Heat Incentive (RHI) as part of its long-term energy strategy.

The commitment forms part of the government's first Annual Energy Statement, set out to parliament by Energy and Climate Change Secretary Chris Huhne.

Listed as action number 13 of 32 in the document, the pledge states: 'We will set out detailed proposals for taking forward the government's commitment to renewable heat through the spending review [in October].'

The government says the move is designed to accelerate the transformation of the energy network to a low carbon system.

Ministers have also decided to keep the Carbon Reduction Commitment Energy Efficiency Scheme (CRC), but will look to simplify it.

Other pledges include publishing proposals for the Green Investment Bank; increasing the scope and target for producing energy via renewables; and increasing energy from waste projects.

Shutterstock

The government's first annual energy statement has confirmed plans for the RHI

Alongside the energy statement, the government also published its 2050 Pathways Analysis report, which considers some of the choices and trade-offs that the country will have to make over the next 40 years to achieve an 80% reduction in greenhouse gases.

Peregrine Fraser, director at carbon reduction company, Sustain, welcomed the report, adding: 'The feed-in tariff has been a good stimulus, encouraging industry to adopt renewable energy, but we would argue that RHI is more important as an instrument for change.'

■ The government has also proposed phased support for developers of offshore wind farms.

The Department for Energy and Climate Change suggested that, for large projects, developers should be allowed to register groups of turbines over a period of up to five years, to take account of the long construction periods involved.

www.communities.gov.uk

... as industry warns over delay

The government's refusal to release detailed information on its planned commitment to renewable heat before October risks the microgeneration industry falling apart, a sector council fears.

The Micropower Council states in its latest report that jobs are disappearing, investors face a confidence crisis and that 'the government runs the very real risk that a recently built industry will simply fall apart, and be impossible to rebuild quickly enough to meet the country's climate change and renewable energy targets'.

Dave Sowden, chief executive of the Micropower Council, said: 'The valiant attempts of Chris Huhne and Greg Barker at the Department for Energy and Climate Change to make progress on microgeneration policy are constantly being thwarted by the Treasury and by the machine taking over from ministers in policy making at DEFRA and CLG. This is distorting the market, costing jobs, spooking entrepreneurs, and causing investors to flee.'

www.micropower.co.uk

News in Brief

New housing benchmark

The London Development Agency (LDA) has published a new benchmark for housing design. All housing built on LDA land is expected to meet these standards, and will be applied to schemes qualifying for funding from the London Homes and Communities Agency from April 2011. **www.lda.gov.uk**

£5.7bn of BSF contracts lost

A survey of 26 councils by Reuters has revealed that builders have lost out on £5.7bn-worth of construction work because the £55bn Building Schools for the Future programme has been scrapped. **www.uk.reuters.com**

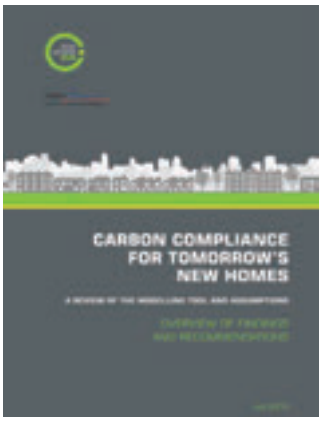
High street giants advice

Marks & Spencer, Tesco and HSBC have all been asked to advise government on how to save energy money across all its departments. They will sit on a cross-government committee looking at how Whitehall's energy use can be reduced by 10% in a year.

Jobs in sector rise

The construction sector saw the biggest rise in jobs in July, according to the Recruitment and Employment Confederation and KPMG. Overall demand for staff rose at a slower pace, with the rate of expansion easing to an eight-month low. KPMG described the result as an indication of a sustained recovery. **www.rec.uk.com**

SAP tool 'needs more investment to deliver'



An advisory body on zero carbon homes has recommended that SAP be used as the compliance tool for zero carbon homes – if a simplified overheating test can be developed immediately.

The Zero Carbon Hub has produced 27 recommendations in a study of current compliance tools, assumptions and related regulations in an attempt to create a definitive guide to building zero carbon homes, which will become compulsory from 2016.

However, for SAP to work effectively, more investment is required to develop it, the report says.

Achieving zero carbon homes 'requires the wider house building industry to change at a pace and scale never previously undertaken', it says.

'Provided work progresses at a pace on all of the recommendations, delivery appears possible but very tight.'

To this end, the report recommends three steps: firstly, the government should announce its intent to take the issue of zero carbon homes forward – within three months provided overheating issues are addressed immediately; secondly, to integrate the requirements into the 2013 Building Regulations; and thirdly, to fully implement the changes in the 2016 regulations. The report added that a version of the compliance tool needs to be available by the summer of 2011.

The developments required within SAP include:

- A better way of reflecting the energy used for water heating and integrating new technologies;
- An urgent assessment of overheating issues to produce a simplified overheating test;
- A means of reflecting the progressive decarbonisation of the electricity grid; and
- Scrapping a building's performance relative to a notional building; a building's target emissions should be dependent on its absolute carbon performance.

The hub also recommended action to close the gap between design and actual performance of what is built on site.

Carbon Compliance for Tomorrow's New Homes can be downloaded at: **www.zerocarbonhub.org**

CIBSE was part of the taskforce that prepared the report.

Some of the Zero Carbon Hub's 27 recommendations:

- An improved SAP to continue to be used as the carbon compliance tool for new homes;
- An absolute limit set for predicted carbon emissions per square metre of floor space in new dwellings;
- Emission factors should include upstream emissions and carbon equivalents for other greenhouse gases;
- Whole house post-construction fabric and services audit tests should be developed and implemented on a sample basis as part of accreditation;
- As a matter of some urgency, research should be undertaken to compare the carbon and energy performance of a national sample of newly completed dwellings with their design performance. The findings should be widely published and mechanisms put in place to gather performance data on a continuing routing basis;
- The compliance tool should model, more closely than SAP currently does, the factors affecting hot water demand, including system losses;
- The carbon compliance tool should incorporate appropriate tests for air quality and daylighting; and
- Need for a structured continuing programme of monitoring, starting immediately, to test and refine the compliance tool.

New 'energy fund' to help achieve carbon target

Councils and developers are to be given more flexibility to help homes meet the zero carbon standard by 2016, according to UK ministers.

Housing Minister Grant Shapps is looking to establish a 'community energy fund' to allow developers to make payments to councils to support local energy projects, such as district heating schemes and wind farms. This would help developers build new homes that emit fewer emissions.

It should also help them to meet the allowable solutions part of the zero carbon definition. New homes will be required to be built to zero carbon standards from 2016.

If developers are allowed to take part in a community energy fund, it would mean they no longer have to install expensive renewable technologies on site, as they do currently to meet low-energy standards, or set up their own off-site low-energy/renewables schemes.

Councils and developers are to be given 'more flexibility' on local energy projects

Shapps said he also intends to set minimum standards for energy efficiency measures in future revisions of Part L of the Building Regulations to make homes warmer and more air tight. These standards would improve the fabric of buildings, such as wall and loft insulation and high-specification windows. The standard would be based on amendments outlined in a recent consultation on the Code for Sustainable Homes.

'I will need to be realistic and take account of costs,' said Shapps. 'The government recognises the challenges posed by the 70% level previously proposed and the case for this needs to be re-examined.

'Therefore, I am commissioning more work from the Zero-Carbon Hub to test what would be an appropriate level. I have asked the hub to report back on this as early as they can.'

Ministers also quashed rumours that the Hub would have its grant cut by announcing £600,000 of funding for the body to continue its work this year. Government is working on what the full definition of zero carbon will be with the hub.

www.communities.gov.uk

fixed problems.

problems fixed.

reddot design award
winner 2010

switch OFF the problems, turn ON to Mainline.

The smart, simple and flexible way to access mains power.

Traditional fixed power outlets simply can't meet the demands of today's digital, electronic world. They are inflexible, inadequate and more often than not, in the wrong place! Mainline is a unique track-based system that's adaptable and scalable. It's the smart, simple and flexible way to deliver mains power right where people need it, at any point, at any time. Once the Mainline track is installed, anyone can simply and safely add, remove and reposition 240v power outlets as and when required.

With Mainline you now have a more flexible, more cost-effective and future-proof solution to delivering mains power anywhere in any environment.

For more reasons to Mainline your next project visit www.**mainlinepower**.co.uk
Available through all good electrical contractors and wholesalers.

MainLine®

Power beyond limits.

News in brief

English contractors win big

Companies in the construction industry in England have been awarded the lion's share of contracts for the London 2012 Olympic Games, a parliamentary question has revealed. England won £5bn worth of contracts, but only £22m worth were awarded to Scottish companies, while Northern Ireland won £17m and Wales just £573,000. Companies outside the UK were awarded £12m.
www.london-2012.co.uk/ODA

Wales sets CO2 target

Wales is using its devolved powers to introduce its own Building Regulations to cut carbon emissions from buildings by 55% compared with 2006 levels. The Assembly Government expects to consult on detailed proposals during 2012 for implementation in 2013.
www.wales.gov.uk

Retrofit for Welsh homes

Six terraced homes in Wales could see their carbon emissions and heating bills halved as part of a new retrofitting project. The Wales Eco Terrace Project has installed triple-glazing, insulation, roof-mounted solar thermal collectors and A-rated condensing boilers to achieve BREEAM EcoHomes Excellent standard. When occupied, the homes' performance will be monitored.

NHS procurement scheme

Six companies have been chosen to carry out construction and refurbishment works at NHS hospitals, under the new Procure 21+ framework. The six are: Balfour Beatty Group; Healthcare Partnership Solutions; Integrated Health Projects; Interserve Project Services; Willmott Dixon Holdings; and Kier Regional.

Product recall by Mitsubishi

Mitsubishi Electric UK has issued a product safety recall after a power receiver component in one W85 (medium-sized) unit failed under pressure, seriously damaging the outdoor unit.
www.mitsubishielectric.co.uk/response-team

BREEAM urged to publish building performance data

UKGBC members would welcome the sharing of performance data from BREEAM

BREEAM should publish the performance data it gathers to help the sector meet its emissions reduction targets, according to a new report.

The UK Green Building Council (UKGBC), the independent advisory body, consulted its members about how the UK environmental assessment method could be improved, in light of the planned updating of BREEAM next year.

According to the UKGBC, it was generally felt that the 2011 update was necessary. But members, covering a range of businesses and organisations, stressed that the sharing of performance data from BREEAM-rated buildings would be hugely beneficial for the industry.

This, alongside integrating operational performance into building certification, would help deal with discrepancies between design-stage energy use calculations and actual energy use in occupation.

It was also felt that BRE Global should review the BREEAM guidance to consider new areas for incorporation and the setting of minimum standards.

One area that demands more attention, said the UKGBC, is the responsible sourcing of materials and their embodied carbon. Greater transparency of the data and lifecycle models behind the Green Guide and the Environmental Profiles Methodology would be hugely beneficial in this area, it said.

BREEAM should also clearly set out future strategies and direction so that industry is prepared for future changes, including how these will relate to government policies and regulations.

The report also recommends that a specific retrofitting scheme should be introduced.

Martin Townsend, director of BREEAM at BRE, said: 'The UKGBC workshop [that gave rise to the report] was an important opportunity for me and the team to hear first-hand the changes we need to make on a wide range of issues and importantly the pace stakeholders want to see these happen.'

BRE Global said it would respond to the report's findings in due course. **www.ukgbc.org**

Homes in London 'kick-started'

Sixteen housing schemes in London that were at risk because of a lack of funding are to share more than £50m.

The Homes and Communities Agency (HCA) has provided the cash to the 16 housing and regeneration schemes to build more than 500 new homes.

Seven of the projects were former 'Kick-start' schemes and nine are local authority new builds.

In total, £51.7m is being provided to support these projects from the London region budget.

The funding follows a lengthy review of the projects to cut costs, which resulted in more than £3.6m being saved from the HCA's London budget for the local authority new-build projects. A number of other former London Kick-start schemes remain subject to further consideration.

To view the full list of resurrected schemes, visit **www.homesandcommunities.co.uk**

Cuts risk UK missing carbon targets

The UK risks missing its own legally binding carbon targets if funding for low carbon technologies is not protected, an advisory body to government has warned.

The Committee on Climate Change's (CCC) latest report, *Building a low-carbon economy – the UK's innovation challenge*, concludes that if there is any reduction in the £550m per year low carbon technologies currently receive, it would increase the risk of missing carbon budgets. The budgets were set to ensure the UK ultimately meets its 80% carbon reduction by 2050. It also fears that the UK would lose out on critical opportunities to build a green economy.

And, once financial pressures have eased, the CCC recommends that funding should be increased in specific areas, such as marine technologies and low carbon innovation more generally, over the next decade.

If government fails to do this, the CCC warns that a range of essential low carbon technologies are likely to get stuck in a so-called 'valley of death' where development is curtailed, and they fail to make it to market. **www.theccc.org.uk**

Bodies seek reassurance over planning reforms

Fears that planning reforms could create barriers to house building have led to nearly 30 organisations requesting a meeting with government.

Since the coalition came to power in May it has announced a string of policy changes, including a clampdown on building in back gardens and abolishing Regional Spatial Strategies (RSSs).

Now 29 organisations have written to Eric Pickles, Communities and Local Government Secretary, through the Royal Town Planning Institute (RTPI), requesting an urgent meeting to discuss the reforms at regional level. Among the bodies supporting the move is the Royal Institute of British Architects, the UK Green Building Council and the Institution of Structural Engineers.

The letter highlights fears that barriers to 'much-needed' housing could be created by the plans. The bodies would also like to have some input into the draft Decentralisation and Localism Bill.

Ann Skippers: ministers must not fail to see the 'bigger picture' on planning

Ann Skippers, president of the RTPI, said: 'Ministers need to be very careful not to miss the bigger picture as the localism agenda gathers pace.'

Reports suggest that local authorities are already scaling down plans to build thousands of homes in the wake of the abolition of RSSs, with Ashford Borough Council announcing it intends to scrap between 10% and 20% of its original 31,000 homes planned by 2031.

■ A CBI report looking at Britain's energy future stresses that government needs to instil business with confidence in the revised planning system. It says that, within the next six months the Decentralisation and Localism Bill must deliver a coherent structure for major energy infrastructure planning.

It has found significant uncertainty still over the investment frameworks for a number of fuels and renewables. **www.cbi.org.uk**

Councils get cash pledge for homes

Councils that build more homes will receive a cash bonus from government to increase house building.

The New Homes Bonus, to be introduced as part of the Comprehensive Spending Review in October, will mean more homes will be built where they are needed, said Housing Minister Grant Shapps. The building of new homes is at the lowest peacetime level for 80 years.

Local authorities are being encouraged to give planning consent now to receive the bonus, which can be used on any priorities they choose.

Shapps said: 'We will not tell communities how or where they should grow. But the new Homes Bonus will ensure that those communities that go for growth reap the benefits of development, not just the costs.'

A consultation paper on the final scheme will be published following the spending review.

News in brief

Atkins buys US company

Engineering group Atkins has acquired the PBSJ Corporation in a $280m (£178m) deal. PBSJ is an American provider of engineering, planning, architecture, construction, environmental and programme management services. PBSJ is an employee-owned firm headquartered in Florida that employs about 3,500 people. Atkins expects the acquisition to give the multi-disciplinary consultancy even more international presence and improve its technical skills.
www.atkinsglobal.com

Sector output grows but demand for property dips

Figures released by the Office for National Statistics showed that construction output grew by 6.6% in the second quarter of 2010. In a year-on-year comparison, output was up 5.8% on the same period of 2009. However, the RICS UK Commercial Market Survey for the second quarter of 2010 showed that demand for commercial property has dropped for the first time in 12 months. Demand slipped after a positive first quarter – particularly in London – and in the latest findings from online estate agent, Rightmove, house prices fell for the first time this year, down by 0.6% (£1,435). **www.rics.org; www.rightmove.co.uk**

PFI projects need scrutiny, says spending watchdog

Projects backed by the Private Finance Initiative (PFI) could find it tougher to get funding after a spending watchdog called for more scrutiny of schemes. A report by National Audit Office (NAO) found that, while the costs for projects in 2009 represented value for money, they committed the public purse to between £500m to £1bn in extra costs over the next 30 years. The NAO recommends a thorough project-by-project review of future PFI schemes 'to apply more exacting and narrower criteria than applied to projects at the height of the crisis'.
www.nao.org.uk

1920s home recreated for efficiency research

A replica 1920s traditional-style terrace property is being constructed at Salford University to test the energy efficiency of old housing stock.

The Energy House will be constructed within a sealed three-storey testing chamber using a host of reclaimed building materials and more than 20,000 bricks from recently demolished terraced homes to make it as authentic as possible.

A laboratory is being built next to the house to control and monitor the effects of a range of external climatic conditions within the testing chamber, including rain, snow, winds and up to 80% humidity. Researchers says they will be able to accurately monitor heat loss, domestic energy usage and carbon emissions.

To accurately recreate the effect of an adjoining terrace property, main contractor ISG is building one and a half houses within the sealed chamber.

The university hopes that working closely with research body BRE and other partners will help it establish an official standard for sustainable retrofitting.

Jim Parker, regional managing director of ISG, said: 'The Energy House represents a landmark development in the ongoing pursuit to minimise energy consumption and reduce the environmental impact of properties within the UK.'

Salford University hopes to reveal more about heat loss in old terraced properties

Britain's least efficient properties are predominantly those constructed prior to 1920, according to the university. These make up 15% of homes in England but account for 23% of total notional CO_2 emissions.

Moreover, it says, about 70% of the UK's existing residential property will still be inhabited in 2050, including around two million two-up, two-down dwellings similar to that being constructed at Salford.

The house should be fully operational by the end of January 2011, when the first tranche of data will be presented at a retrofitting and sustainability conference at the university.

'Very Good' verdict for new schools

A £100m cluster of new schools in Sunderland, UK, has opened. The three projects – Washington School, Castle View Enterprise Academy and St Roberts Academy (pictured) – all achieved BREEAM Very Good ratings. Washington was also awarded a Green Apple Award for Environmental Best Practice, reflecting its sustainability features, including solar power, biomass heating, and what is believed to be the largest green roof on an English school. AECOM and Balfour Beatty Construction worked on the projects.

AECOM's US arm acquires rival firm Davis Langdon

The American arm of consulting engineer AECOM has acquired rival firm Davis Langdon in a deal valued at $324m (£206m).

Davis Langdon will continue to operate under its own name for some time, but it will eventually officially become a global buisness within the AECOM structure. At the time of buying, Davis Langdon had 2,800 employees. The transaction is expected to close in October.

The move will see Langdon's Asia counterpart, Davis Langdon & Seah, remain independent, but it will continue to work with AECOM's Davis Langdon operations under an existing collaboration agreement.
www.aecom.com

Green light for 152 school projects that were in doubt

All 152 projects whose future was in doubt after the closure of the Building Schools for the Future (BSF) programme have been given a lifeline.

Last month the projects were left in limbo after the government cancelled 735 BSF projects and said another 151 (now revised to 152) would need to be reviewed before their future could be decided. Ministers have now announced that all 152 will go ahead.

Of the 152 projects, 119 are academies – all-ability, state-funded schools established and managed by sponsors to raise attainment for the most disadvantaged, according to the government's definition.

Forty-four of the 119 academies are at the most advanced stage of planning and will receive their capital now. Education Secretary Michael Gove said capital allocations for the remaining 75 academies will be decided in the government's Comprehensive Spending Review to be announced in October.

A further 33 schools among the reprieved 152 projects are 'pilot' BSF projects where wider building programmes were never actually started.

Gove added: 'We will work with councils, sponsors and the construction industry to ensure we bear down on costs and bureaucracy so every new school is built in as cost-effective and efficient a way as possible.'

A spokesperson for the Department of Education said that, in the run-up to the spending review 'we will be working with these schools to ensure they can proceed most cost-effectively and quickly in the future'. Government is working with companies in the construction industry to reduce costs.

David Barbons/BDP

The Leigh Academy in Dartford, Kent. More new schools will be built, say ministers

Reports of English Heritage/CABE merger 'inaccurate'

The government is 'unlikely' to merge English Heritage with the Commission for Architecture and the Built Environment (CABE), although it is examining CABE's future role.

The Department for Culture Media and Sport (DCMS) told the *Journal* that it was currently reviewing the roles of 50 'arm's length bodies' in an effort to reduce costs as part of the government's austerity drive, and has been looking at the possibility of merging both organisations.

But the department said it is 'unlikely' to bring the two quangos under one roof.

A spokesman said that reports suggesting the merger was likely were 'inaccurate', adding: 'We want to take more time over the summer to look not just across DCMS but across government to see where any of CABE's functions are mirrored and duplicated and how organisations could be streamlined and refocused to deliver better value for money.'

Lockzone Base – for vortex air distribution and a comfortable indoor climate

Lockzone Base is the ideal supply air diffuser for floor installations.

It manages airflows substantially below room temperature and provides a high induction. The diffuser face has guide-vane perforations arranged in a circular pattern for vortex air distribution.

We spend 85% of our time indoors. Swegon is one of the leading suppliers of clean air and healthy indoor environments. We specialise in intelligent and energy efficient ventilation with climate products and solutions for all needs.

Swegon Ltd
Phone: 01992 450400
Fax: 01992 450500
info@swegon.co.uk
www.swegon.com

energy is in the air

Swegon

CIBSE news

Tel: 020 8675 5211 Fax: 020 8675 5449 **Email:** secretary@cibse.org
President: Rob Manning BSc (Hons) ENg FCIBSE **Chief executive and secretary:** Stephen Matthews

The CIBSE Building Performance Awards 2011 – enter now!

Winners of the 2010 awards show off their plaques

The CIBSE Low Carbon Performance awards have been reviewed, revised and repositioned, and in 2011, CIBSE will be hosting the Building Performance Awards.

Once again, the awards will reward excellence in the development and management of low carbon buildings, but they will also take into consideration a variety of other factors that have an impact on the performance of a building.

The awards will recognise the buildings that are operating at the highest standard – rewarding actual performance and not just potential – and will demonstrate the value building services engineers, consultancies and other professionals have on the development and operations on buildings.

The 14 awards categories have been designed to incorporate each stage in the development of a building and recognise those who play a part at each stage, from the initial training and skills of the people involved, to the products, the commissioning, and, finally, those operating the building.

The categories are:

- Training for Building Performance Award;
- Building Services Consultancy of the Year Award;
- Energy-using Product Award;
- Passive (energy related) Product Award;
- Contractor of the Year Award;
- Commissioning Project of the Year Award;
- Low Carbon Consultant of the Year Award;
- New Build Project Award;
- Refurbishment Project Award;
- Building Operation Award;
- Client of the Year Award – Large;
- Client of the Year Award – Medium/Small;
- Integrated Project Team Award; and
- Carbon Champion of the Year.

The winners will be announced on 9 February 2011, at London's Grosvenor House Hotel, with an evening celebrating the advancements and achievements of the industry.

For more information on entry forms and criteria, visit: **www.cibseawards.org**. The closing date for entries to be received is 8 October 2010.

Coalition seeks industry views

Almost a dozen government consultations are currently underway – and the technical team at CIBSE HQ will be co-ordinating responses to them all.

The building-related consultations range from microgeneration through to OFGEM, smart meters, skills for sustainable growth and Building Regulations.

The technical team will be seeking input from the relevant special interest groups and committees. Some of these exercises are running to very tight timescales. For example, the letter from the Department of Communities and Local Government seeking input and evidence on compliance with Building Regulations was issued on 3 August, but requested responses by 31 August.

The consultation on microgeneration is running to a slightly longer timetable, although some initial scoping workshops have already been held. This consultation is looking at quality, training, certification, skills and availability of advice and information. CIBSE is already involved in the initial studies, and will be seeking contributions from groups with an interest in this topic.

To enable us to manage the CIBSE response to these various consultations, we have revised the consultations area of the CIBSE website. We now have a dedicated page for each consultation, which gives a brief summary of the scope, and links to the relevant documents. It will also have a link to the draft CIBSE response as that develops, with a mechanism for members to comment on the draft.

To see the latest information, go to www.cibse.org/consultations

We are keen to involve CIBSE members in the development of our responses to these consultations. We will be seeking input from the various groups, societies and committees, but there will be many others who can contribute views and evidence to support our case.

2010 Annual Lecture

The 2010 CIBSE Annual Lecture will take place on 23 November with a presentation by Professor Mike Hume. Prof Hume is Professor of Climate Change at the University of East Anglia and his work explores the idea of climate change using historical, cultural and scientific analyses, and ways in which it is deployed in public and political discourse.

The free lecture will take place at the Wellcome Collection Conference Centre, 183 Euston Road, London NW1 2BE. Booking is essential. To book, contact Veron Williams on vwilliams@cibse.org or call 020 8772 3612.

Key titles updated

Look out for the following updated publications due out in September:

- **Commissioning Code W:** Water distribution systems – revised to ensure the most recent knowledge and experience for practicing engineers; and
- **Guide D:** Transportation systems in buildings – for fully updated guidance on lifts, escalators and moving walkways.

Visit **www.cibse.org/bookshop** for more information and to order.

Seeking your views

For the second year running, we will be emailing a short survey to all our members.

We want to hear your views on CIBSE: what you are happy with, and not so happy with; what's working well, or not so well.

The survey will be sent to you in early September so look out for it – and tell us what you think.

The results will help feed into the development of CIBSE membership in the future. If you don't have an email address, but would like to complete the survey, contact Nadia Gatter on **020 8772 3680**.

A summary of the results will appear in the November edition of *CIBSE Journal*.

CIBSE Certification satisfaction survey

For the second year running CIBSE has conducted a certification satisfaction survey, directed at CIBSE Low Carbon Energy Assessors (LCEAs), Low Carbon Consultants (LCCS) and those undertaking air conditioning certificates. Once again, more than 200 people completed the survey, and, as before, results were very positive.

The credibility of CIBSE certification behind the brand was rated most highly by LCEA, LCC and AC inspectors – 113 respondents rated this to be of highest value. Not far behind was the fact that you are members of a high quality scheme, with 98 respondents believing this to be of the highest value.

When asked what CIBSE certification does well, 22% believed that CIBSE provides the highest quality brand and 20% were most satisfied with the training and CPD opportunities that are offered.

When it comes to value for money, 43% of LCEAs told us that the CIBSE scheme is competitive when compared with others in the industry. On air conditioning inspection, this figure rose to 59%.


Shutterstock

Improve your knowledge online

CIBSE will soon be launching an online interface for all its publications and guides. This new service, called the CIBSE Knowledge Portal, promises to provide quick and easy access to all CIBSE, and other relevant, information.

There will be advanced search facilities , with search results showing relevant CIBSE guides and publications, and links to the relevant British Standard and to commercial resources, such as a product directory – providing all the information in one place to help you with your day-to-day job.

All users of the Knowledge Portal will be able to buy electronic publications instantly through a pay-as-you go system, but CIBSE members and companies will also be offered the opportunity to subscribe to full access.

Subscribing to the system will give access to the full content of the portal, and therefore the ability to view and search across all CIBSE content, online. Subscription users will benefit from innovative, time saving features such as page-to-page linking with the same publication, as well as across more than 90 others, and will be given access to all new CIBSE material as soon as it is published.

This new online resource is an essential step for CIBSE to allow frequent updates to technical information and guidance to be accessed with greater ease.

If you are interested in participating and can spare the time, contact Anastasia Mylona at **amylona@cibse.org**

Training and development

Submissions

Good news! Trainees no longer need to submit their interim annual reports to CIBSE, but can do so on a voluntary basis, if guidance from the T&D Panel is required. Trainees will still need to submit their annual reports to their supervisors for review on an annual basis.

If the company scheme is new, trainees will need to submit their year 1 reports to CIBSE for review by the T&D Panel. All trainees need to submit their T&D Plan Registration forms to CIBSE to register their training.

Any queries, including employers' enquiries and applications for approved company training schemes, should be addressed to Olwen Williams, training and development administrator, on **020 8772 3605** or at **owilliams@cibse.org**

CPD Directory update

To be added to the Directory of CPD Course Providers, contact Rosemary Perks on **020 8772 3639** or at **rperks@cibse.org.**

We also accept applications for online courses and we will welcome more e-learning applications. A concessionary rate is available for entries of the following categories:

- Academic institutions;
- Not-for-profit organisations offering free or non-profit courses;
- Sole traders who are members of CIBSE and offering free or non-profit training courses; and
- Sole traders who are members of CIBSE and whose training business is less than 5% of their turnover.

For more information on training and development, visit the IPD CPD section of the CIBSE website at **www.cibse.org**

North West region awards

Preston-based consultancy Pettit Singleton Associates was named North West Consultant of the Year at the recent CIBSE North West region's annual dinner and awards.

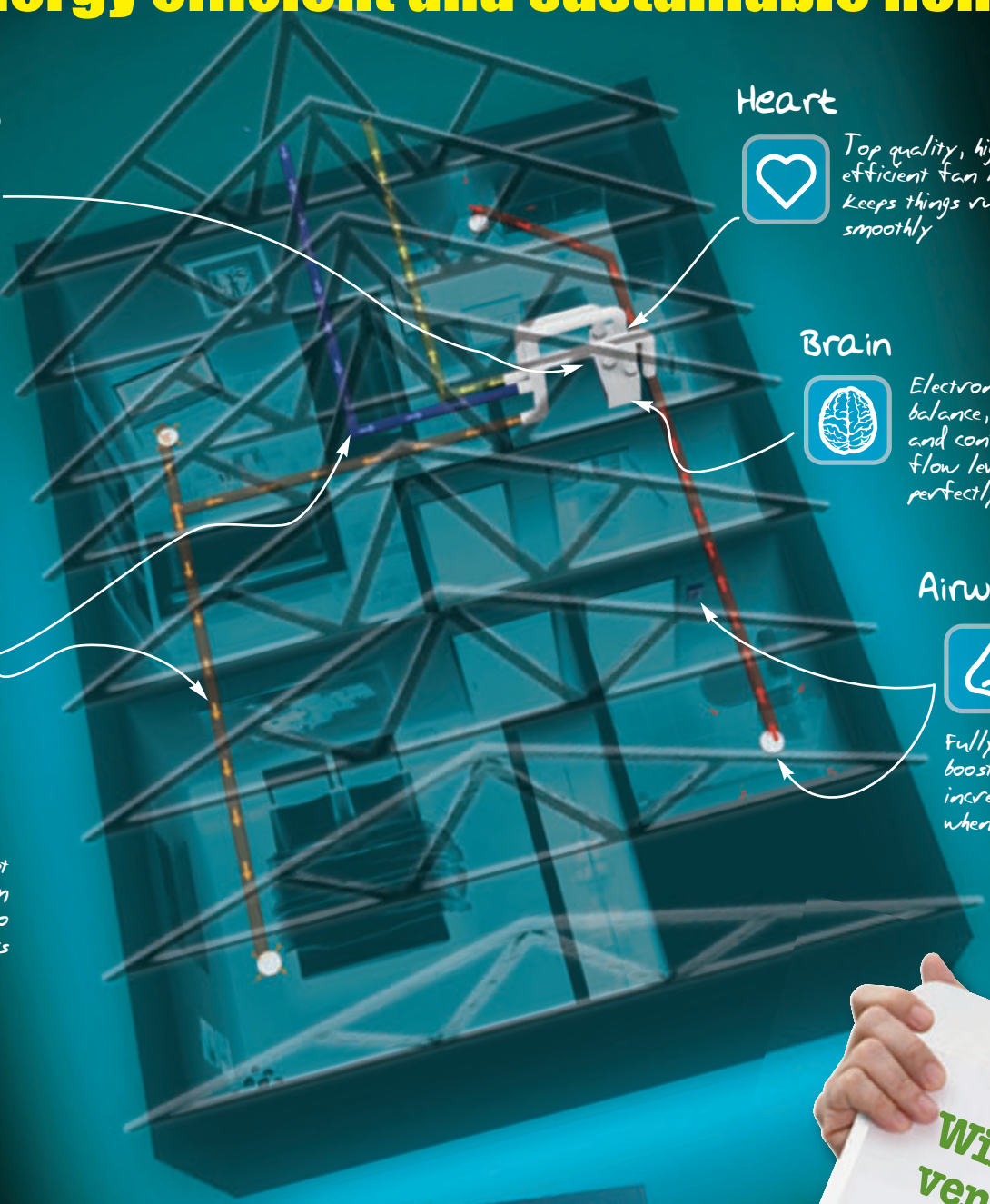
The company, which specialises in providing building services design, has worked on new football stands, health centres and colleges.

Other winners on the night were:

Contractor of the Year 2009 – EIC
Student of the Year (Stockport College) 2009 – Nicholas Thomas
Student of the Year (Manchester University) 2009 – Daniel Coles
Student of the Year (University of Central Lancashire) 2009 – Greg Osborne.

LIFE SUPPORT

for energy efficient and sustainable homes



Lungs

Highly efficient heat exchanger – up to 91%

Easy to maintain filters

Heart

Top quality, highly efficient fan motor keeps things running smoothly

Brain

Electronics balance, monitor and control air flow levels perfectly

Arteries

Full range of matched ducting for optimum performance

Ports accept 100 or 125 mm ducting with no adaptors

Airways

Fully adjustable boost settings increase capacity when required

Titon's HRV Q Plus whole house units

Tel: 01206 713800

www.titon.co.uk/hrv

Letters

CHP-fired district heating is not necessarily the solution

I refer to your August issue article (page 38) on CHP and heat pumps, in which the author shows by use of a Sankey diagram that (provided you ignore district heating pumping and heat losses) a combined heat and power (CHP) system with district heating and heat pumps can be almost as efficient as a conventional power station and heat pumps.

It is refreshing to see some analysis that compares CHP on a 'same-fuel' basis. However, I would come to a different conclusion to the author. If the CHP-fired district heating system only manages to equal the efficiency of a conventional centralised power system, then what is the incentive to incur the cost (and disruption) of installing the district heating, coupled with the increase in pollutants from the decentralised power station located in a dense urban environment?

Proponents of district heating need to design their systems to be ultra-low carbon if we are going to meet the UK target of an 80% carbon reduction by 2050. District heating based on fossil fuel-powered CHP is clearly not the solution.

James Thonger PhD BSc CEng MIMechE

Young engineers do need hands-on experiences of M&E

John Rose's comment in the July issue of the *Journal* (Letters, page 22) that young engineers need real experience on site during the construction and operational stages of a project is spot on – particularly for young engineers who want to pursue their career as mechanical and electrical (M&E) designers.

In the last few years I have been associating with facilities maintenance management services in Oman, and have observed that some plants appear as if the concept of maintenance has not been considered during design stage. We find it very difficult to maintain these plants. This suggests to me the limited knowledge of the designers and project managers who were involved in these projects. I strongly support the statement that, before starting work on M&E facilities, design engineers should have a minimum level of hands-on experience in this area during their academic or initial training periods. It would also help if professional bodies globally required M&E design engineers to undertake continuous professional development.

Dr M Ramaswamy CEng MCIBSE
Muscat, Oman

A single engineering voice? Not in the current climate

Andrew Ramsay's valedictory remarks as outgoing chief executive of the Engineering Council (Letters, page 18, August 2010) seem a remarkable acceptance of blame. He unequivocally cites his own Engineering Council (EC), the Royal Academy and the leadership of the institutions for the lack of a coherent single voice for engineering.

So where do we stand on this core issue? Was a single voice for engineering just Monty Finneston's 'big idea' or is there a realisable benefit for EC registrants?

Running a complex, high-level bureaucracy like the EC to provide a single voice for the profession only makes sense when it delivers results. But when the impossibility of the task is endorsed by the retiring EC chief executive with 35 years' experience, then it must surely be time to accept that a single voice for engineering will not happen now.

I strongly believe that the way forward for the profession is through a perestroika-style decentralization of the 36 professional engineering institutions currently administered by the Engineering Council, together with licensing reform and the statutory regulation and recognition of engineers.

Eur Ing Ian Brown MSc CEng CDir

Time to manage your waste

In these days of austerity measures and concerns about a 'double dip' recession, environmental responsibility seems to have dropped off the political agenda somewhat and out of our collective consciousness. Site Waste Management Plans Regulations have been put in force to help address the issue of the amount of wasted site materials being sent to landfill, and yet the problem continues.

Instead of over-ordering on a just-in-case or guesstimate basis, contractors should be looking to their suppliers to help them order only the amount of materials needed. Suppliers can help with this not only by offering technical support to help with specification and quantities but also by ensuring that their supply chain can provide a fast turnaround on orders, removing the need for anxiety about under-ordering. Managing waste effectively saves time, underpins a quality approach and reduces costs so, in reality, it's not a fad that we can ill afford but a fundamental that we cannot afford to overlook.

Tim Brown
National sales manager, Cablofil UK

CIBSE Journal welcomes article proposals from any reader, wherever you are – whether it be letters, longer opinion pieces, news stories, people or events listings, humorous items, or any ideas for possible articles.

Please send all letters and any other items for possible publication to: bcervi@cibsejournal.com, or write to Bob Cervi, Editor, *CIBSE Journal*, Cambridge Publishers Ltd, 275 Newmarket Road, Cambridge, CB5 8JE, UK. We reserve the right to edit all letters. Please indicate how you wish your letter to be attributed, and whether you wish to have your contact details included.

WITH OUR THREE COMBINED POWERS - HEATING, COOLING AND VENTILATION, TERMODECK PROVIDES HIGH OCCUPANT COMFORT, LOW ENERGY CONSUMPTION, LOW MAINTENANCE AND RUNNING COSTS, FRESH AIR AND INCREASED ENERGY EFFICIENCY. NOW, MANY OF THE UK'S SCHOOLS, UNIVERSITIES AND OFFICES RELY ON TERMODECK TO KEEP THEIR WORLD IN ORDER. UNDER THE WATCHFUL EYE OF THE TERMODECK DESIGN ENGINEERS.

HELP TERMODECK SAVE THE WORLD FROM OVERHEATING NOW!!!

VISIT WWW.SAVEDBYTERMODECK.CO.UK

Tarmac
BUILDING PRODUCTS

Opinion

Pre-tender partnership

Many of the problems arising between building services engineers and building services quantity surveyors could be resolved through greater collaboration, argue **Joe McCaffrey** (left) and **Trevor Schwer**

The design and procurement of services are unquestionably two of the most important aspects in the construction process. As building engineering becomes more complex, building services engineers will need to rely more on specialist sub-contractors and suppliers to provide solutions.

It is often the case that the BS engineers will meet with a specialist sub-contractor pre-contract, to develop the client brief into a design. The BS engineer then takes this specialist design input, includes it in the design, and this then forms part of the overall tender document.

The issue for the QS is that s/he is now procuring a design that possibly only one specialist subcontractor/supplier can provide – and this is generally reflected in a higher price. The QS's role is to try to introduce competition to achieve a fair and reasonable market price, and this is hampered by getting specialists to design pre-contract – which can give the specialist sub-contractor/supplier an advantage during tendering. If the BS engineer and the QS work more closely together, perimeters for the specialist design input could be agreed upon, and a fair market rate could be ensured.

The issues surrounding services design development have never really been tackled by the construction industry, but the opportunity exists between the engineering and the surveying professions to make improvements in the future by working collaboratively and sharing knowledge.

From our viewpoint as QSs, the services in an existing building are often a 'black art' in terms of designing and cost planning, as often very little is known about the condition of the existing services. QSs tend to price out the risk and BS engineers try to put the responsibility on the contractor in terms of completing the design. In a perfect world, the existing design records would be available, with a full detailed maintenance regime in place detailing any changes since the original installation. However, it is rare indeed to see this happen.

The flow of communication and knowledge transfer depends hugely on the individuals involved in the project. Generally at pre-contract stage there is not enough discussion and interaction between the BS engineer and the QS. Part of the issue is the sequencing of services in relation to the architectural design. However, at cost-planning pre-contract stage, the BS engineer is waiting on the architect, and the QS is at the end of the line waiting on the BS engineer's design.

By the time sufficient detail is shown on the engineer's drawings, there is little time to value-engineer the services because the client wants to go to tender – so value-engineering happens during or after the tender process, which is not ideal. A possible solution is the inclusion of a longer design period, but generally people just then prioritise other projects, resulting in the same issues.

> **For quantity surveyors, the services in an existing building are often a black art**

From our experience, there is a sense of 'don't give the QS too much information as they will only highlight the deficiencies in design'. Building services engineers must realise that the QS is looking at the design from a procurement and cost-management perspective, so that variations/changes are reduced post-tender. Again, more collaborative working and communication pre-tender could seriously reduce the amount of work post-tender for both parties. A watertight tender document and design needs far less management post-tender.

While the QS profession recognises that it has a lot more to do in terms of education, training and improvement of core skills in relation to building services, it is also necessary for the relationship between BSEs and QSs to improve from a knowledge-transfer and communication point of view.

An open relationship between these two professionals could go a long way to improving the cost and design issues often incurred on construction projects, with the result of increased demand for both professionals in a future where sustainability and building services are significantly increasing. ●

Joe McCaffrey MRICS is course director, College of Estate Management, j.mccaffrey@cem.ac.uk **Trevor Schwer** MRICS is commercial director, Update Technology, Gulf, trevor@lunar.ae

Recasting the EPBD

The Energy Performance of Buildings Directive (EPBD) has been revised. **Hywel Davies** looks at what might be in store when the new provisions are implemented in the UK

The EPBD was adopted in 2003, and whilst it has been fully implemented into the various UK regulations, compliance is very patchy. The 'recast' of the directive aims to clarify the original document and extend its scope, whilst reducing the variations in its implementation among EU member states. Its provisions cover energy used for space and hot water heating, cooling, ventilation, and lighting for new and existing residential and non-residential buildings.

The directive sets a target for all new buildings to be 'nearly zero-energy buildings' by the end of 2020, including existing buildings undergoing major renovation (Article 9). The cash-strapped public sector in the UK is expected to lead the way and achieve this by the end of 2018.

> The long-awaited definiton of zero carbon will seek to address the question of interpretation

On the face of it, the UK goals of achieving zero carbon homes by 2016 and zero carbon non-domestic buildings by 2019 will meet this target. However, as no definition of 'nearly zero' is given, there will be national interpretations. It remains to be seen: a) whether existing national rules for very low or zero energy buildings will suffice; and b) how these rules will have to be met alongside the renewable energy requirements, which also have to be achieved by 2020.

The long-awaited definition of 'zero carbon' for England and Wales will seek to answer the first issue; the policy on renewables, including the proposed Renewable Heat Incentive and feed-in tariffs, will aim to address the latter.

There are a number of other developments in the new version of the EPBD, which include:

- Provision of a comparative methodology for calculating cost-optimal levels of energy performance, taking into account life-cycle costing (Article 5);
- Member states will have to calculate minimum energy requirements according to the above mentioned benchmarking methodology (Article 4);
- For existing buildings the minimum energy performance requirements for new buildings also apply when a 'major renovation' is to be carried out, with no threshold floor area (Article 7);
- Member states must list financial incentives for 'nearly zero' energy buildings (Article 10);
- Public buildings over 500 sq m will have to display energy performance certificates (EPCs) from 2012-13, and five years later that drops to 250 sq m. Additionally, EPCs will provide detailed recommendations for improvements (Articles 11 to 13);
- There are some changes to the rules for boiler and air conditioning inspections and reports (Articles 14-16) and to the rules for independent experts and controls over certificates and inspection reports (Articles 17 to 18);
- Member states must undertake a programme of public awareness and communication to tell owners or tenants about certification and inspection and the opportunities to improve energy performance (Article 20); and
- Member states will set rules on penalties applicable for non-compliance (Article 27).

There have already been many questions about when the new requirements in the directive will take effect. Apart from the 'nearly zero' target by 2020, most other requirements must be implemented by member states between July 2012 and January 2013.

One aspect of particular interest to those engaged in energy assessment and building regulations is the requirement in Article 27 relating to penalties. These must be set by member states by January 2013, and 'must be effective, proportionate and dissuasive'. Given the widespread view that it is considered cheaper to risk a fine than pay for an air conditioning system inspection, there is going to be an interesting debate to be had about this particular requirement. ●

Hywel Davies is technical director of CIBSE.

DOWNLOAD

Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings (recast) was published in the Official Journal of the European Union on 18th June 2010. The full text of the Directive can be downloaded from www.cibse.org/epbdrecast CIBSE is preparing a briefing on the recast, in collaboration with the Association for the Conservation of Energy. This will also be available on the link above from early September.

Why Vaillant?

Because our heating and renewable systems make commercial sense.

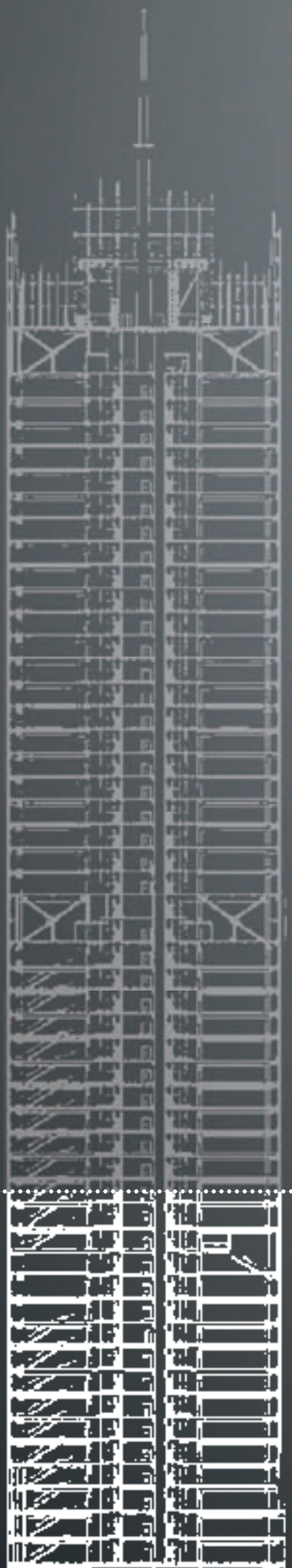
Commercial boilers, solar technology, heat pumps and intelligent controls from Vaillant.

For over 135 years Vaillant has set the benchmark for quality and reliability. Today our commercial heating solutions offer wall hung and floor standing boilers which integrate seamlessly with our innovative solar thermal technology. By combining these with our class-leading controls, which offer weather compensation and multi-zone functionality, we deliver flexible, highly efficient commercial heating and hot water solutions across new build and refurbishment projects.

To find out more about our comprehensive range of commercial products and services, visit www.vaillant.co.uk or call us on 01773 596013

- Heating Systems
- Hot Water
- Renewables

Because Vaillant thinks ahead.



LUTRON FORUM SERIES

Bright ideas

All images: Simon Weir www.simonweir.com

Lighting is a major contributor to the carbon footprint of all types of building. Making lighting more efficient is therefore key to achieving carbon-reduction targets. *CIBSE Journal*, together with sponsor Lutron, brought together a range of leading experts from across the industry to discuss the question: *How can key supply chain players in the building engineering industry promote lighting efficiency and provide the tools and technologies to radically reduce lighting's substantial carbon footprint?* **Bob Cervi** chaired the event

Topic one

Is lighting efficiency a neglected part of the built environment, particularly in the regulations?

Lighting is often the biggest user of energy in a building – particularly in larger offices and retail outlets. So why is it apparently given such a low priority compared with other contributors to a development's carbon footprint, such as the mechanical and electrical services?

One overarching problem is a lack of tight regulation on lighting efficiency. Revisions to the Building Regulations, in particular the recent Part L 2010, were a missed opportunity to put more emphasis on lighting efficiency, the roundtable participants agreed.

'We need the legislation that will drive those developers who are not looking at lighting efficiency,' said Simon Robinson of WSP UK. According to Dominic Meyrick of Hoare Lea: 'The problem rests with CIBSE and the writing of [lighting] codes.'

AECOM's Lee Barker-Field agreed: 'Increasingly, outside of the industry people are buying energy-saving lighting equipment. But in the industry, the problem is the design process and some of the tools that are involved in that process, such as the codes.'

Clearly, regulations are key, and Part L 2010's minimum requirement of 55 luminaire lumens per circuit watt for interior office lighting (raised from 45) has not gone far enough, many of the group argued (*see* >

Roundtable participants

Lee Barker-Field is principal, lighting design, at AECOM

Bob Cervi is editor of *CIBSE Journal*

Marc Draper is project director, UK and Middle East, for Scott Wilson

Dominic Meyrick is lighting principal – partner, Hoare Lea

Mark Ridler is lighting director at BDP

Simon Robinson is associate director, WSP UK

Julian Sutherland is design director for sustainable development at Atkins

Iain Trent is project engineer at Land Securities

Alan Tulla is president of the Society of Light and Lighting, a CIBSE society

Simon Wootton is principal technical manager at NG Bailey

> "Downlighters could have been scrapped but there was an uproar from manufacturers"

> *the guide to lighting terms on the facing page*). Some felt the minimum level should have been raised to 65.

'I have an issue that manufacturing in this country has too much influence on [the lighting] codes and legislation,' said Meyrick. 'Downlighters could have been scrapped [in Part L 2010] but there was an uproar in manufacturing in certain places, and it was seen as being a step too far.'

'I've had manufacturers come up to me and say, you can't go much above 55 [luminaire lumens per circuit watt] because it's too hard to achieve,' said Alan Tulla, president of the Society of Light and Lighting, which publishes the Lighting Code. Meyrick added: 'Part L is a one-size-fits-all, unfortunately. The reason I have an issue about the 55 [minimum requirement] is that there is an enormous refurb market, and that 55 allows a core quality replacement to go in and it will stay there for 10 years. If they put in a product that's 65 lumens per watt, that would really save energy .' 'But there's an opportunity for the Code to say: "the minimum standard should be achieved, and we can add to that," said Mark Ridler of BDP.

Many in the group felt that building design should begin with an emphasis on using natural daylight. 'But there is a tension between daylight design and solar gains and ventilation system design – for example, I'm getting lots of good daylight but also huge solar gains and am putting in a big cooling system to deal with that,' added Julian Sutherland of Atkins. 'When you look at the land between architecture and building services engineering, that tension sits in here and we're not quite sure who's responsible [for resolving it].'

Marc Draper of Scott Wilson said: 'If you're looking at overall energy consumption of a building, and are

going for BREEAM Excellent or Outstanding, you've got to put lighting into the equation in a much bigger way.' 'But BREEAM credits are too easy to get for lighting,' added Simon Wootton of NG Bailey.

One key problem with inefficient lighting is the level of light required by building tenants and users. Iain Trent of Land Securities suggested that, if offices are designed with a level of lighting at the lower end of the range of 300 to 500 lux, the ceilings will have to be stripped out to put in extra lighting. He suggested it was better to 'design for 500 lux and then bring this down to 300' when the building is occupied.

The discussion on regulations and codes highlighted some of their limitations when it comes to trying to legislate for bringing about a reduction in energy use in larger commercial and domestic properties. In particular, the role of natural light is not as strong it could be in the Part L, with its focus on thermal performance.

While most of the group felt that the rules could set tougher requirements for energy efficient lighting, in reality it is building occupiers and users who will determine just how much energy is saved or wasted. However, it was felt that Part L's requirement for a 25% reduction in carbon emissions from buildings would be a key driver of change over time.

Guide to lighting terms

Lumens per circuit watt: This is a measure of a lighting system's 'luminous efficacy' – ie, efficiency.
Luminaire: This is the lighting fixture and lamp combined.
Part L 2010: Building Regulations Part L 2010 sets tougher minimum requirements for lighting efficiency levels in different types of environment. Efficiencies must be at least 55 lumens/circuit watt for general lighting in non-domestic buildings. Part L 2010 also sets tougher targets for buildings' 'notional' carbon emissions, which are to be 25% lower.
Lux: This is a measure of 'illuminence' – how much light falls onto a surface.
The Lighting Code: This is published by the Society of Light and Lighting (SLL). **www.sll.org.uk**
Sources: CIBSE Journal, SLL

Topic two

Are 'ultra-efficient' lighting technologies the answer, or are they oversold?

There is a role for more highly efficient lamps, particularly when it comes to refurbished properties, which generally can't depend on adding more daylight to reduce energy use, argued Tulla. But he agreed with the group that there is genuine concern about possible misselling of new products.

Wootton said: 'Manufacturers are convincing us that LEDs are *the* energy efficient source.' But the danger from overselling new lamps, said Ridler, is that clients won't do other stuff such as daylighting.

He added: 'I do think that manufacturers are overselling LED lighting,' said Robinson. 'This convinces clients that LEDs are the most efficient lighting source, and that's not right.'

'There's a whole world of hurt coming from people badly specifying and installing LEDs,' warned Trent, adding: 'But when we get LEDs right, they're a very efficient light source.'

When it comes to office lighting, said Tulla, 'a T5 lamp and a properly designed luminaire with proper control gear is pretty efficient'.

Tulla pointed out that the lighting industry had recently produced a three-page guide on how to specify LED lighting, which was freely available, and is also working on a definition of 'ultra-efficient' lighting.

Barker-Field argued that a system powered by electricity, with all the wasted energy that occurs along the supply chain, was 'inherently inefficient'. If we are >

> "There's a whole world of hurt coming from people badly specifying LEDs"

> "If you want to drive down energy for lighting in the next decade or two it's got to come from your existing buildings"

looking to radically reduce lighting's carbon footprint, we'd have to look to natural light as the solution, alongside more energy efficient lamps and renewables, he added.

'We're not going to make any fundamental changes unless we say that natural light is the way,' he said.

Topic three

Are the benefits of lighting controls being under-recognised?

Fitting controls can be key to ensuring that lighting is used more efficiently, but achieving user satisfaction is the most difficult aspect of controls, said Ridler: 'If you get a control system that does not deliver for users, they simply turn it off!'

Controls technology is written by software developers and driven by the technology, and this presents problems when it comes to usability for building occupants, said Trent: 'That's why we've got very expensive systems in buildings that are lit up like Christmas trees at night.' Addressing the question 'what are controls for?', Trent said simply: 'To deliver the right amount of light at the right time.'

Users want to be able to influence their local area, said Sutherland: 'We saw ventilation controls as something that controlled everything for everybody some years ago, but we then realised that, actually, we had taken too much control away from people, who didn't feel comfortable anymore because they did not have enough control of their environment.'

He added: 'We need both building-wide energy management and local control – a light switch for every workstation.' However, he said, relying on controls can mean designers feeling that 'it's solved'. It's much more important to get both lighting and natural daylight right.

For a radical change in lighting's carbon footprint, we need to think about how we 'plan buildings from the ground up', said Barker-Field, who stressed the role of better daylight: 'Controls are a response to better daylit buildings.'

Despite the payback on investment that controls can provide through lower energy usage, they are often pushed out of specifications to cut costs, it was felt. Moreover, both the developer and the tenant/user have historically viewed them an 'evil' because they haven't worked or been at all user-friendly. 'We therefore need simple systems that are manageable by all. We have oversold [controls] and we need to start again,' said Draper. Trent argued that providing simple automated messages to a building's users, such as 'your lights were left on last night', is one of the simple but effective uses that controls can be put to. One problem, he added, was that no one is doing 'really good research' on lighting controls. Meyrick asked: 'How can we get those exemplar projects for all sectors out there, so that people can see, that whatever amount of money you want to spend, it's worth it?'

Topic four

So how do we radically reduce lighting's carbon footprint?

'Design may save you but technology won't,' said Barker-Field. 'The broad-ranging discussion we've had shows that it's a complicated area we're dealing with – behavioural psychology, architecture, building services – how you link all those things together. How do you get better [lighting] design into that process? Getting the right people doing the design is the biggest opportunity [for low carbon lighting].'

'If you want to drive down energy for lighting in the next decade or two, it's got to come from your existing buildings,' Tulla said. 'And you'll do that with a technology refurb,' responded Sutherland, 'but then you have to turn the lighting off.' 'You need to drive daylight as being the primary lighting source,' said Ridler. Meyrick added: 'In my view, any daylight is better than no daylight at all, and that's what the great architects of the past absolutely knew.'

Overall, the group felt that a combination of improved legislation, lower lighter levels, more efficient technology and effective and usable controls provided some of the answers. But they agreed that the root of the problem also lay in the lack of a 'holisitic' approach to the designing and specifying of lighting for new builds and refurbishments. ●

The edited video of this discussion can be found with the September issue online at www.cibsejournal.com

In the spotlight

Changes to Part L, due to come into effect next month, will have key implications for the lighting industry, writes **Richard Forster**

The changes to Part L 2010 of the Building Regulations set out tougher Target Emission Rates (TERs) for dwellings and non-domestic buildings. The Non-Domestic Compliance Guide tabulates minimum standards for metering of general and display lighting by kWh meters on dedicated lighting circuits, or metering coupled to lighting or building managements systems, or a lighting management system that can calculate and report consumed energy. This will improve information for the building user.

Because the aim is to assess the overall energy consumption of a building, it is possible for an individual product to be compliant in one building but not in another, thus compliance only relates to individual buildings and not products. However, 'each building service should be at least as efficient as the worst acceptable value for a particular type of appliance as set out in the Compliance Guide'.

Section 6 of Approved Document (AD) L2B for existing non-dwellings includes the requirement for consequential improvements. Among the practical and economical measures suggested in table 6 is 'upgrading general lighting systems with an average lamp efficacy of less than 40 lamp lumens per circuit-watt... by new luminaires or improved controls'.

Later in Section 6 para 11(c) there is a supplementary requirement when the installed capacity per unit area of a cooling system is increased: 'Any general lighting system within the same area with an average lamp efficacy of less than 45 lamp lumens per circuit-watt should be upgraded with new luminaires and/or controls ...' This is to reduce the lighting load and hence the space cooling demand.

For dwellings, the changes largely relate to withdrawal of tungsten filament lamps:

- For internal lighting, three out of four fittings are to use low-energy lamps (previously only one out of four);
- Low energy lamps to have an efficacy of not less than 45 lamp lumens per circuit-watt (previously 40);
- The fittings to have a total of more than 400 lamp lumens;

>

> • Fittings of less than five circuit-watts are excluded from the total number of light fittings. These latter two requirements are 2010 additions, although products of less than 5 watts and an output exceeding 400 lumens seem likely in the near future.

The previous exclusion of compact lamps with bayonet or Edison screw caps has been withdrawn as there is less risk of subsequent substitution by GLS tungsten lamps.

- For external lighting (attached to the building) there is a choice of not greater than 100 lamp watts per fitting, together with automatic switching controls when there is sufficient daylight and when the location is unoccupied (previously the limit was 150 lamp watts);
- Alternatively, the use of low energy lamps greater than 45 lamp lumens per circuit-watt with automatic daylight control plus manual switching.

For non-domestic buildings, some key terms are defined in the Compliance Guide, but for display lighting, emergency escape lighting and special process lighting, it is necessary to refer to Section 3 in the AD. As before, the recommended minimum lighting efficacies for new and existing buildings are defined by type and situation:

- For general lighting in office, industrial and storage areas, the average initial efficacy to be not less than 55 luminaire lumens per circuit-watt (previously 45). For existing buildings, this value can be modified by a lighting control factor in table 45 where automatic lighting controls are employed. For new buildings, no correction should be applied as it is incorporated in the calculation method;
- For general lighting of other areas the average initial efficacy to be not less than 55 lamp lumens per circuit-watt (previously 50); and
- For display lighting the average initial efficacy to be not less than 22 lamp lumens per circuit-watt (previously 15).

What is often overlooked is average luminous efficacy of the area, and so it will vary for each building according to the combination of products used.

Places of worship are excluded, but not ancillary areas such as offices, kitchens and meeting halls. There is special consideration for listed and historic buildings largely as before, and the guidance issued by English Heritage should be taken into account.

The area subject to the largest change is display lighting, with average lamp lumens per circuit watt increased by nearly 50%. Replacements for reflector tungsten filament lamps in this sector are overdue so compliance should not prove difficult.

Finally, compliance with Part L does not indicate good lighting practice or even suitability for purpose. It only examines whether the building's energy performance – including the permanent lighting – is equal to or better than the worst acceptable efficacy as given in the compliance documents. ●

Shutterstock

"Compliance with Part L does not indicate good lighting practice or even suitability for purpose"

Various Building Regulations documents of relevance to the lighting industry

The Building and Approved Inspectors (Amendment) Regulations 2010			
Approved Document L1A: New Dwellings	Approved Document L1B: Existing Dwellings	Approved Document L2A: New Buildings other than Dwellings	Approved Document L2B: Existing Buildings other than Dwellings
Domestic Building Services Compliance Guide		Non-Domestic Building Services Compliance Guide	
Dwelling Emission Rate (DER) SAP 2009		Building Emission Rate (BER) SBEM*	
Reference Documents – Standards, guides and legislation			
Energy Performance Certificate and evidence of commissioning and building log book			

**Simplified Building Energy Model 2010 version or other approved software*

The format of the regulations is multi-tiered and the number of documents has increased with each edition. The table above shows the structure of the documentation. The legal aspect of the regulations requires reasonable provision for the conservation of fuel and power. Specific detail is provided in either the Approved Documents (ADs) or the Compliance Guides. One major change is that the detail now appears in the two Compliance Guides whereas previously it was part of the ADs. ADs are not intended to be prescriptive; there is no obligation to adopt any particular solution in the AD if some other way is preferred and can be shown to be equally effective.To view the ADs, visit: **www.planningportal.gov.uk/england/professionals/buildingregs/technicalguidance/bcconsfppartl/bcconsfppartlappdoc**

Richard Forster IEng, MCIBSE, MSLL, MILE is a lighting engineer. A version of this article is also published in the latest edition of the *SLL Newsletter*.

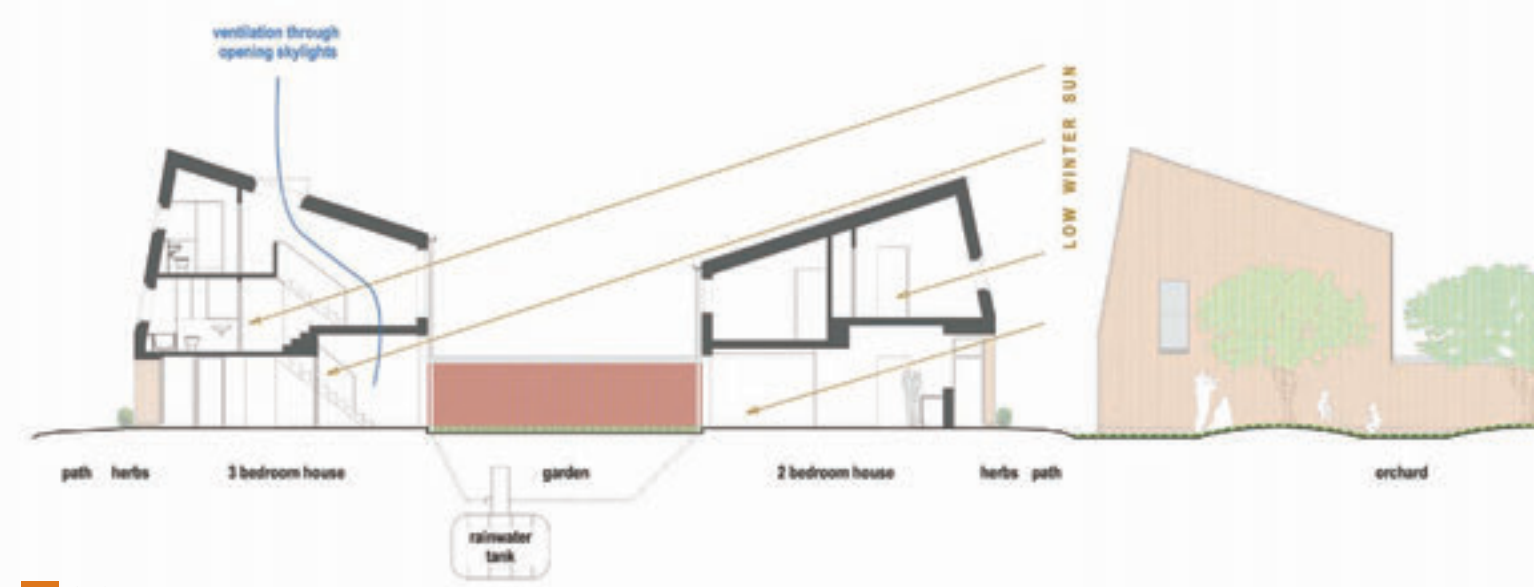
Social success

An affordable-housing development is performing well against design targets, according to engineers, but an evaluation of the project reveals huge variations in occupants' behaviour. **Mark Jansen** reports

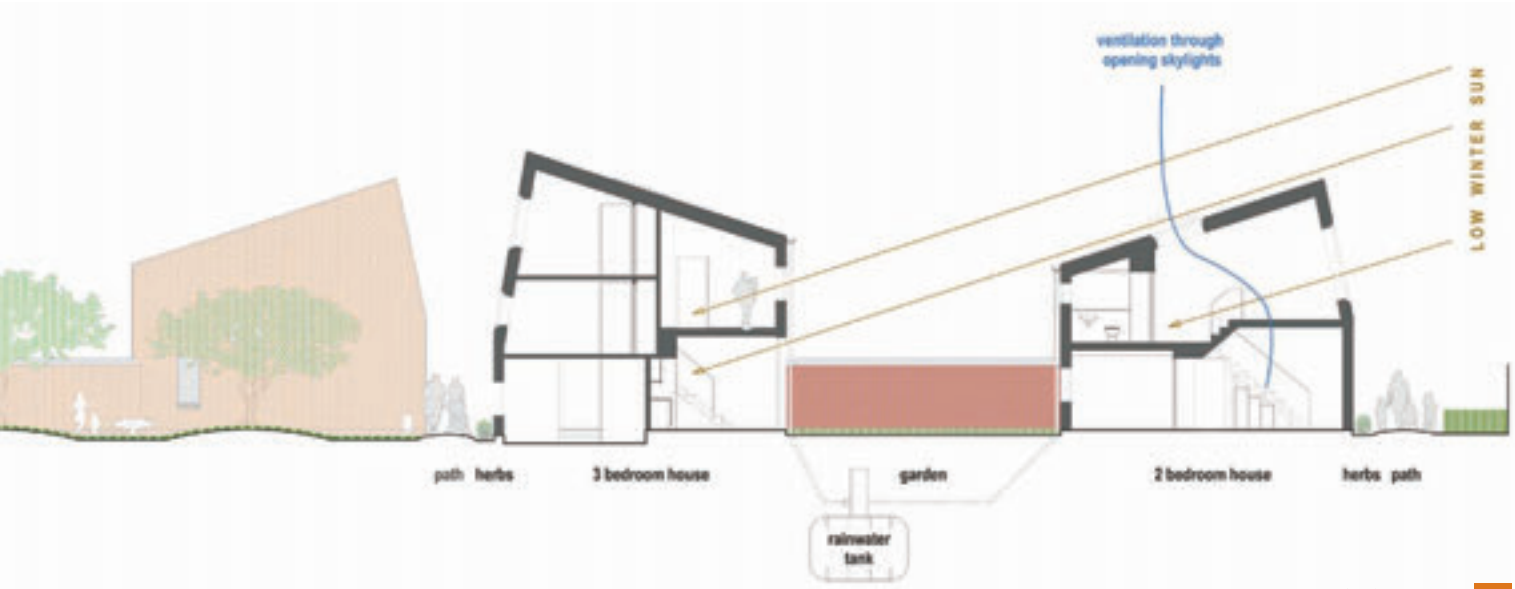
Clay Fields comprises 26 social housing units designed to the BRE Eco-homes Excellent standard

Post-occupation evaluations (POEs) of green buildings are comparatively rare, according to Zack Gill, research engineer at Buro Happold. He believes the problem is partly a lack of funding and partly a fear that the results may reveal issues that the design and construction teams would rather not have to grapple with. However, a recent POE of the award-winning Clay Fields estate in Elmswell, Suffolk, has shown a good energy reduction in both space heating and 'regulated' energy consumption. It also highlights the huge differences that occupant behaviour can have on energy use.

The Clay Fields estate comprises 26 social housing units designed to the BRE Eco-homes Excellent standard and was completed in September 2008. The project was first featured in *CIBSE Journal* in September 2009 (page 36). Sustainability adviser Buro Happold has spent 18 months examining how the homes have been performing. Studies of the space heating and hot water consumption revealed the average amount of energy used is 51% less than >



All images courtesy of Buro Happold



Clay Fields' biomass store and boiler room

Clay Fields specification

Location: Elmswell, Suffolk Scheme: 13 x 2-bedroom and 9 x 3-bedroom houses, plus 4 one-bedroom flats, each built to BRE EcoHomes Excellent standard, completed September 2008

Client: Orwell Housing Association

Sustainability consultant: Buro Happold

Architect: Riches Hawley Mikhail

Features

Biomass district heating network. Whole-house mechanical ventilation with heat recovery. High airtightness: at 3.47m3/sq m at 50Pa, is 65% improvement on regulatory minimum

Massing: homes grouped in threes to reduce area of exposed facade, two and three-storey buildings are positioned to maximise winter solar gain

Rainwater harvesting: each dwelling fitted with a 50 to 60 litre tank that supplies filtered, unmetered grey water for toilet flushing and garden irrigation

Optimised solar orientation: main portions of glazing face south to enable useful solar gain in winter

Improved insulation: walls are 0.25W/sq m.K, glazing 1.9W/sq m.K, roof 0.12W/sq m.K and ground 0.25W/sq m.K. Low-energy lighting and low-flow fixtures throughout the homes

> the national average and 23% lower than the design target (see details in the box on page 40). Gill says there is no single explanation for why the design target was exceeded by such a large margin. The walls were made using hempcrete, a mixture of hemp and lime chosen for its excellent thermal properties. This was sprayed onto timber frames, and Gill believes this method enabled the team to achieve a good seal.

In addition, he points out that energy modelling tools, including SAP that was used for Clay Fields, can lack accuracy: 'There have been calls for better modelling tools and there can be big variations between one type and another. I think this shows that they need to be informed by actual performance data, so this is an argument for greater use of POEs.'

However, one thing the Clay Fields POE does show is the huge differences in energy use depending on occupier behaviour, something that, in Gill's view, policymakers will have to consider when deciding the final form of levels 5 and 6 of the Code for Sustainable Homes.

The lowest energy user in Clay Fields, in terms of heating and hot water, consumed just 46 kWh/yr per sq m, while the highest consumed 144.9 kWh/yr per sq m – both are substantially better than the national average of 191.5 kWh/year. The homes are grouped in threes to minimise heat loss through the exterior walls and there is a 20% to 5% difference in heat demand between mid-terrace and end-of-terrace properties, Gill says. However, the study has shown that the highest energy users are not necessarily those living in the end-of-terrace properties, as might be expected.

Gill insists energy use could be reduced further through greater engagement with the occupiers, stressing that the highest users often appear very interested in reducing their consumption. One of the biggest consumers had never lived in a centrally heated home before and only had experience of storage heaters. Initially, this occupier set this thermostat at 27C, although this was later reduced.

But many occupiers complained that the thermostat controls, which allow seven-day programming with days broken into five different time segments, were too complicated. 'They said the heating controls were confusing and on some occasions would stop people from making the changes they wanted,' explains Gill. Other researchers within Buro Happold are now studying the most effective forms of thermostat design.

In addition, Gill notes that most occupiers at Clay Fields keep their homes fairly warm – the average internal temperature being 21.9C, with thermostats set at 21C to 22C. 'This tells us that the houses are controllable, but they are demanding a fair bit of heat in there, to be honest,' Gill admits.

The Clay Fields estate is linked to a district heating system that runs on a mixture of gas and biomass that is controlled by the landlord, Orwell Housing Association. However, the study shows a relatively disappointing proportion of biomass being used – just 42% over the monitoring period, although Gill says the >

> "The wildly varying electrical consumption on site is very much down to occupant behaviour"

use of biomass is now rising rapidly and should reach 70% after some technical and supply problems were resolved. 'Things are moving in the right direction,' he notes.

The wildly varying electrical consumption on site is also very much down to occupant behaviour. The highest users at Clay Fields consume 64.7 kWh/year per sq m, substantially above the national average of 47.7 kWh/year per sq metre, while the lowest users consume just 17.6 kWh/year per sq m. These figures include electricity consumption that is beyond the control of the building team, such as televisions and white goods like tumble driers.

'Thirty-seven to 45% of total carbon emissions are out of the designer's hands,' asserts Gill.

Buro Happold also discovered the use of 'regulated' electricity at Clay Fields – lighting, pumps (for central heating) and the mechanical ventilation and heat recovery system (MVHR) – varies widely. But the variation is not as wide as for 'unregulated' use – that is, of various appliances such as in cooking. So involving and motivating users in reducing energy use in this area will be important for further reductions in future.

Water consumption also varies widely, with the biggest users measured at 196 litres per person per day, far exceeding the national average of 148 litres. However, average water consumption at Clay Fields was well below the national figure, at 91 litres, while the most sparing occupiers consumed just 28 litres per person per day. The rainwater harvesting system, which supplies grey water for toilet flushing and garden irrigation, is believed to be providing 24 litres per person per day. Gill suggests that water consumption may fall further if there were some way of showing occupiers how much stored rainwater is in their tanks on any given day; for example, if the tank is empty, they may think twice about watering the garden. However, Gill notes: 'The occupiers aren't too worried about water consumption because it is relatively cheap and they don't feel they are wasting it.' ●

Electrical consumption on the site is logged

The POE results

Post-occupation evaluation of Clay Fields development in Elmswell, Suffolk, by Buro Happold. Data collected between September 2008 and November 2009.

Space heating and hot water, kWh/yr

Great Britain average per sq m:	**191.5**
Mid-Suffolk average per sq m:	**172**
Clay Fields design target per sq m:	**121**
Clay Fields average actual performance per sq m:	**92.9**
Clay Fields highest per sq m:	**144.9**
Clay Fields lowest per sq m:	**46**
Estimated average energy requirement for space heating per sq m at Clay Field:	**73**
Estimated average energy requirement for hot water per sq m at Clay Field:	**20**

Electricity in kWh/yr

Great Britain average per sq :	**47.7*** **
Mid-Suffolk average per sq m:	**61.9*** **
Clay Fields design target per sq m:	**13.9***
Clay Fields average actual performance, per sq m:	**40.9****
Clay Fields highest per sq m:	**64.7****
Clay Fields lowest per sq m:	**17.6****

* 'Regulated' electricity only, ie MVHR, lighting, pumps
** Includes unregulated electricity, ie other appliances
*** Is both regulated + unregulated electricity combined

Average MVHR electricity use at Clay Fields, per sq m:	**6.7**
Electricity used for lighting at Clay Fields, per sq m:	**4.8 to 9.8** (estimated)
Other electricity use at Clay Fields, per sq m:	**24.6 to 29.6** (estimated)

Water litres/person/day

Great Britain average: **148**	Clay Fields average: **91**
Clay Field highest: **196**	Clay Fields lowest: **28**

FRESH AIR AND A GOOD INDOOR CLIMATE ARE IMPORTANT FOR OUR:

- HEALTH
- PRODUCTIVITY
- LEARNING

International studies show that productivity and learning can be increased by 10-15% when the right air quality and temperature are present. Natural Ventilation is the economically attractive and sustainable solution for a good indoor climate. Analysis has shown a CO_2 saving of up to 40% compared to traditional mechanical ventilation systems.

WindowMaster offers three different ventilation solutions, depending on the requirements of your project:

NV Advance™

The advanced indoor climate solution for larger buildings with many individually controlled climate zones, based on both purely natural ventilation as well as hybrid ventilation - with advanced user interface software and logging of climatic data. The system can be fully integrated with other building management solutions.

NV Comfort™ NEW!

The cost effective indoor climate solution for smaller projects, such as offices or schools, with a limited number of individually controlled climate zones, based on both purely natural ventilation as well as hybrid ventilation - with easy adjustment via touch-screen panel.

NV Solo™

The simple solution for ventilation of projects with a single climate controlled zone - based on pure Natural Ventilation.

WindowMaster has been involved in over 1,000 projects with Natural and Hybrid Ventilation, and has built a strong competence and experience in the field.

For further information please contact us on:
Tel. 01536 510990
info@ WindowMaster.co.uk
www.WindowMaster.com

Special report

Public Health Engineering

Contents

Introduction

As the sustainability agenda in the built environment grows, so does the remit for public health engineers

In this special report on public health engineering, we look at the torrent of policy, regulations and environmental standards that has gushed from government in recent years as it strives to meet the challenges that a warming world will bring.

Within the next dozen pages we aim to show how these changing requirements in standards and regulations, such as the environmental assessment methodology BREEAM, the Code for Sustainable Homes and Part G of the Building Regulations, are all pushing the boundaries of design in public engineering.

In other articles we show how blue roofs may become the new 'green roof' when dealing with the attenuation of storm water; and another explores the question of who wins when European, Australian and US codes on drainage are sold to all parts of the globe.

We hope you find these articles both useful and enjoyable, and look forward to your comments on these and related issues.

Carina Bailey, special report editor
cbailey@cibsejournal.com

Blue-roof thinking

The custom has been to remove storm water from a building as quickly as possible, but there is a different way of managing rainwater, says **Carl Harrop**

The strict attenuation of storm water from developments is now commonplace, with the flow control normally taking place close to the outfall from the site.

More recently, the idea of reducing the volume of water through using a 'green roof', which also provides a habitat for wildlife, has been used. But a third, and commonly overlooked, way is gaining credence with engineers – the blue roof.

'Blue roof' is a term used to describe a system which allows rainwater to temporarily build up where it lands on the building roof, reducing or potentially eliminating the need for other downstream attenuation methods, such as tanks or oversized drains, and is particularly suited to new-build flat-roof developments. A blue roof normally has zero degrees fall, maximising the volume available for attenuating the rainfall in a relatively thin film across the maximum possible surface area. It can also be cheaper than more established methods.

So what is wrong with the current approach? All too often, barriers to a holistic surface water disposal plan are created through the number of different parties involved in the design for taking the rainwater from the roof, through the building and to its point of discharge. The timing of appointments reinforces the difficulty for any particular discipline to propose an approach that may cross several contractual boundaries.

Using traditional methods creates a concentration of flows that inevitably leads to large-bore rainwater pipework connected to the underground drainage, which is also sized to take the peak flows resulting from short, high-intensity storms. However, does removing the water based on a two-minute storm duration really provide the best value?

A typical flat roof office building will have been designed to withstand the weight of snowfall, which is usually at least 0.6 kN/sq m. Also, to help convey the rainwater to the various outlets as efficiently as possible, the roof will normally be laid to falls, often with screed weighing in at between 1.2 kN/sq m and 4.8 kN/sq m.

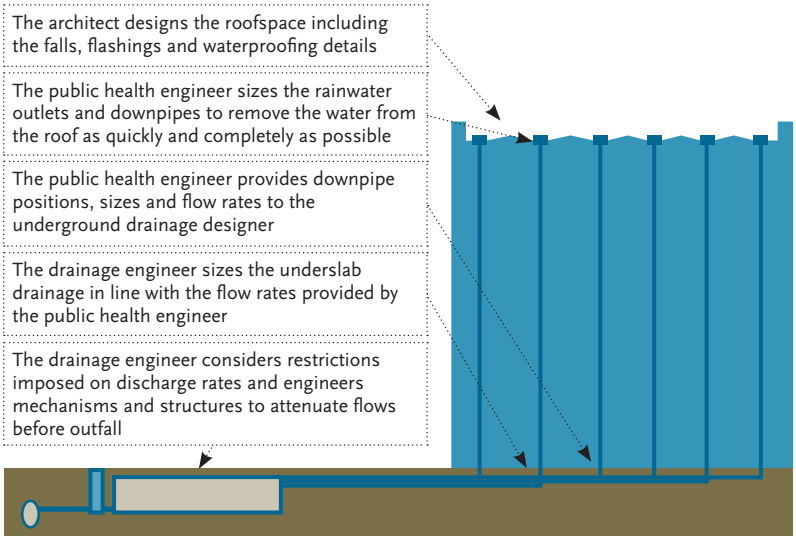
This means that if we remove the screed, there is already the structural capacity to allow more than 180mm of water to build up on the roof. So, what if we use this inherent strength to contain the peak flows from a storm, as opposed to sizing the entire system to convey it to a remote attenuation point?

The key to designing a blue roof or similar system is to understand not just the peak flow rates generated by a particular storm, but also the volumes of water delivered by the downpour.

Every building will have different requirements, and this approach would only be suitable for flat-roof buildings. But as the costed example in the box on the third page shows, if a building is well suited to the approach, there is the opportunity to actually reduce the cost of a building by adding storm attenuation.

A blue roof system needs a means to control the flow rate from the roof. Currently, however, there are very few components on the market designed to accurately restrict flows. But there are several ways of approaching this. One is to control the flow at the outlet. Although this can be difficult to calculate and control effectively due to the very small head of

The traditional approach to rainwater disposal



An example of a roof that is well suited to rooftop attenuation. Even with BS compliant falls, some ponding is common due to building tolerances and workmanship

water, Polypipe, for example, has developed and tested versions of its siphonic outlets that can give accurate reduced discharges for a range of flow rates.

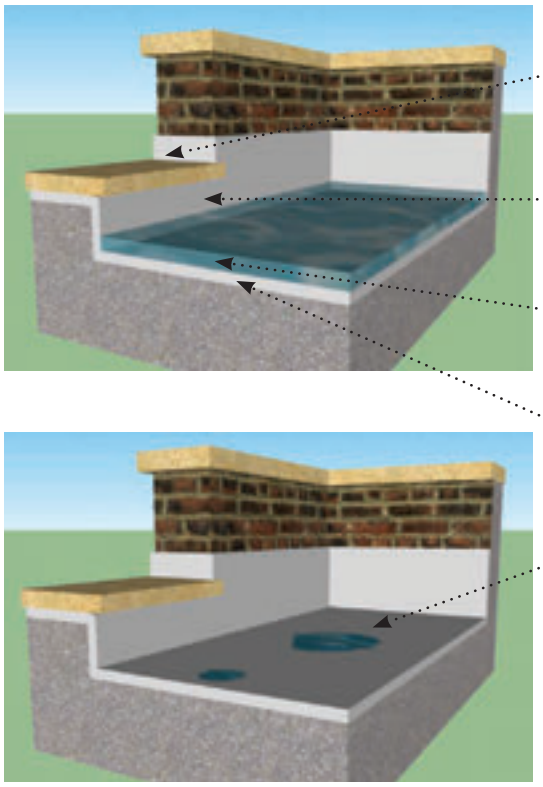
Another option is to run small-bore pipework down the building with a standing head of water in them and install an in-line flow control device located in a plant-room or somewhere similar on a lower floor, where maintenance can be undertaken safely.

The performance of any control device must be demonstrable to the sewerage undertaker, Environment Agency or other authority that has set the outflow restriction.

As with all rainwater disposal designs, the most important factor is to correctly assess and design out the risk of ingress into the building. Overspill points from the roofs to protect against blockage of the outlets or a storm in excess of the design parameters are critical. In theory, if these are provided and the flashings and tanking details are robust, there should be no additional risk of water ingress using a blue roof as opposed to more traditional approaches.

The rainwater designer must also check that all penetrations through the roof have been adequately detailed so that the reservoir is not breached at any point. An explanation of how the roof is designed to perform should also be included in the building log >

Blue roofs: some key design elements



Adequate overspill points or overflows must be provided to ensure water ingress to the building is prevented in the event of blockage or rainfall above the design parameters

Waterproofing upstands to be increased to cater for potential additional water depth

The design depth of water will depend upon the outflow restrictions, the chosen return period for the storm and the available storage area

The roof membrane performance and application must be discussed with the manufacturer at the time of design

There will be some residual water retained in slab undulations potentially requiring designated walkways for safe access

Most of these details will ultimately be the responsibility of the architect to detail but will require guidance and co-ordination from the rainwater disposal designer

The Society of Public Health Engineers

The CIBSE Society of Public Health Engineers (SoPHE) was set up to provide a higher profile and focus for public health engineering, and a route to gaining professional status.

Public health engineers contribute greatly to social welfare, with particular regard to facilities such as water, drainage, gas and fire engineering systems in a large range of applications. This important input is long established and essential to provide clean drinking water supplies and adequate sanitation and drainage facilities. Over the last few years, water conservation has also grown in importance, forming an important part of the drive for sustainability in homes and offices.

SoPHE aims to promote the art, science and practice of public health engineering, along with raising the awareness of the contribution engineers make to this sector. Through organised technical talks, evening events and newsletters, members are kept informed of specific developments and relevant updates on legislation, as well as having the opportunity to network with colleagues. It also organises the annual SoPHE Young Engineers Award, encouraging young engineers of the future.

The society has also created an Industrial Associates forum for leading manufacturers working within the public health industry. Through the society members are able to input into CIBSE publications and government consultations. To find out more about joining, visit **www.cibse.org/sophe**

Blue roof vs traditional method

Traditional roof

Roof type: flat roof office building, 5,000 sq m

Outflow: 15 litres per second for a one in 100 year storm

Scenario one: Category two storm intensity for a two minute storm = 0.062 litres per second per sq m (BS 12056 Part 3)
Total flow rate = 310 l/s

Conclusion: Using a traditional approach, the entire system, from the outlets through to the underground drainage, would need to be sized to remove this peak flow (although time of concentration allowances can be made on larger systems).

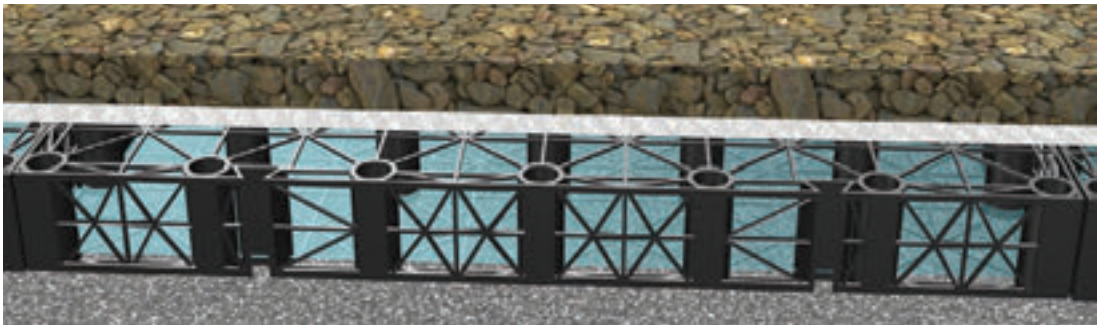
Blue roof

Scenario two: If we look at the same location and storm, but choose to install a truly flat roof with outlets (or other means) restricting the flow rate from the roof to the required 15 l/s:

Temporary available 'pond' space: 3,750 sq m (assuming 25% volume of the roofscape is taken up by plant bases or other structures)

Conclusion: Looking at a range of storm durations from one minute to several hours and an outflow rate of 15 l/s, the maximum depth of water on the roof would only reach 40mm! (Most rainwater outlet manufacturers assume 35mm head of water over their outlets to achieve the stated flow rates.)

As the storm intensity decreases and the outlet capacities begin to exceed the rainfall rate, the roof will slowly clear of water. In this example, after 3.5 hours the water will have cleared, with the exception of some minor ponding retained in any depressions in the flat slab caused by building tolerances.



A void can be used to both attenuate and store water for harvesting

book as it will be important that the calculated volume on the roof is not reduced during the installation of tenant plant on the roof, for example.

The roof waterproofing must, of course, be carefully designed, and the suppliers/contractors happy to provide the necessary guarantees, which should be little different from those required for a green roof.

So, what could the next step be? In the example described in the panel on the left, we use only 40mm of the potential 180mm structural capacity for water storage. Could the next step be to install a shallow crate or paving pedestal system, across the flat roof to provide a storage zone beneath a pedestrian accessible area and re-use the collected rainwater?

Currently, a typical rainwater harvesting system may consist of the following elements:

- Conveyance of the water from the roof as quickly as possible in large pipework;
- Routing roof water to an underground tank in its own system of underground drainage;
- Pumping water back up to a ground-level plant room; and
- Pumping water again to distribute it through the building.

In this example, if we were to construct the rainwater outlets as standpipes, creating a storage zone of 40mm beneath it as rainwater harvesting, it would yield a storage volume in excess of 120,000 litres. The rainwater harvesting could then consist of:

- Storage at source with small bore pipework delivering water by gravity to the treatment plant;
- Pumped distribution to fittings; and
- No associated underground drainage or tanks

To use water stored in this manner for rainwater harvesting may require some additional treatment because of the higher storage temperatures and potentially less effective silt removal. However, when the energy, carbon and cost of such a simplified system are taken into account, this becomes insignificant. (Roughly speaking, the use of the pumps will be reduced by 50%, so energy consumption may be reduced by about 40%. Embodied energy/carbon would be reduced in line with the reduced materials as given in the box, top right.)

Every building is different, but the public health engineer is well placed to become the person to advise the design team on what solution, or combination of solutions, best delivers the environmental aspirations and value for the client. If we can reconsider the need to drain flat roofs quickly, with no residual water, then it will give us, as designers, significant scope for innovation, cost reduction and real sustainability benefits.

Just as the building services engineer is now an essential member of the conceptual design team, advising on building form in relation to energy and ventilation, perhaps it is time for the public health engineer to forge a role in the early design stages to add value and shape the way in which a development manages its impact on the water environment. ●

Attenuation for free?

Using a 5,000 sq m, six-storey building, the traditional approach to rainwater disposal may consist of:

Roof membrane	£225,000
Screed laid to falls	£90,000
45 rainwater outlets	£6,000
550m of 100-150mm diameter rainwater pipe	£16,000
470m of 150-450mm dia underground drainage	£35,000
Total traditional system without attenuation	**£372,000**

During the planning process a requirement for 218 cu m of attenuation is identified.

underground attenuation tank	£50,000
Total cost	**£422,000**

Blue roof approach:

Total traditional system without attenuation	**£372,000**
Add: enhanced roof membrane	+£60,000
Add: higher waterproofing detailing	+£17,000
Add: above ground flow attenuators	+£3,000
Omit: screed laid to falls	-£90,000
Omit: 39 rainwater outlets	-£5,000
Omit: reduction in rainwater pipework	-£14,000
Omit: reduced underground drainage	-£28,000
Total blue roof attenuated system	**£315,000**

Carl Harrop IEng FCIPHE MCIWEM MSoPHE is an associate director with multi-disciplinary consultancy, WSP

Reduce False Alarms

every second counts

In healthcare properties, particularly hospitals and care homes, false or unwanted alarms can cause huge disruption. Vulnerable patients are particularly at risk and could be placed in a potentially life-threatening situation in the event of an evacuation procedure.

ADT Fire & Security has developed a whitepaper on 'How to reduce false and unwanted fire alarms in the healthcare environment'. The paper takes a comprehensive look at the critical steps we believe you should take to prevent the pain and disruption that a false alarm can cause.

Our Whitepaper includes advice on:

- The importance of integrating a false alarm strategy into your fire risk assessment
- Ensuring your system design and technology suits your environment
- Why you need to ensure your appointed person is up to date with best practice
- How carrying out effective training of everyday users can reduce potential for human error

Visit www.adt.co.uk/falsealarms or call 0808 161 6999 quoting reference falsealarms02

A Tyco International Company

ADT *Always There*®

Sealed solution

Collaboration between a UK university and a manufacturer has led to the development of an innovative building drainage technique, write **John Swaffield** and **Steve White**

Partnerships and collaborations between industry and academia are commonplace in high-tech industries such as aerospace. Needless to say, they are rather more rare in the public health engineering sector. However, a 15-year partnership between Heriot Watt University (HWU) and Studor, a manufacturer of air admittance valves (AAVs), has delivered both innovative product and design methodologies, as well as a non-invasive methodology for the assessment of trap seal integrity.

HWU has worked with Studor since the mid-1990s, when together they started to develop models to characterise the action of AAV in the control and suppression of negative air pressure transients, generated by sudden increases in water discharge to vertical stack networks.

In 1999 Studor was introduced to HWU's invention of a variable volume containment device to control and suppress positive air pressure transients generated by the cessation of the entrained airflow path through the drainage network, and particularly down the system vertical stacks due to surcharge at stack base or at stack offsets. The device – now called a Positive Air Pressure Attenuator (PAPA™) – was used to much acclaim to remedy positive air pressure transients within the Pak Tin housing complex in Hong Kong, where bathrooms on the first five floors were unusable due to the water seals being ejected by the severe transients following surcharge – the surcharge being due to both poor stack base design and indeterminate occupation levels (pictured above).

Studor

The multiple positive air pressure attenuator installation at the Pak Tin estate in Hong Kong cured the stack surcharge transient propagation

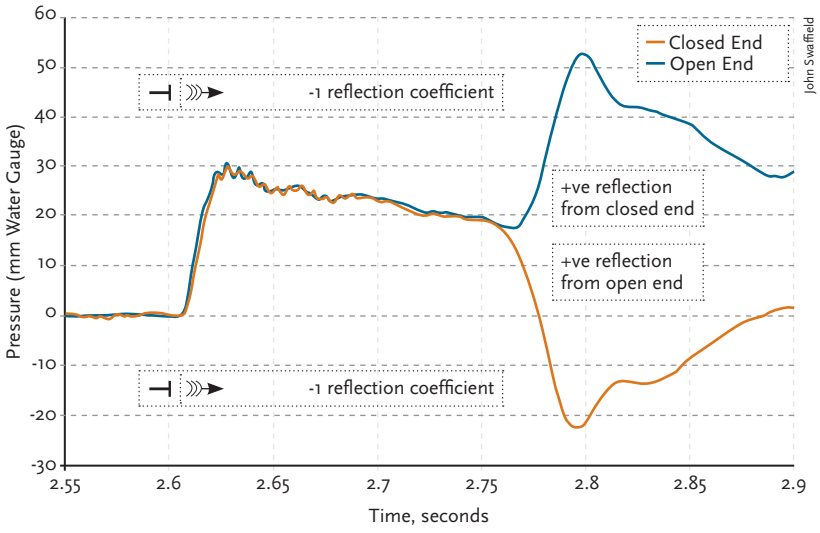
PAPA™ is essentially an inflatable bag normally evacuated by the negative pressure regime within the stack. It provides a diversionary route for an entrained airflow brought to rest suddenly by a surcharge – an application of the control and suppression approaches followed in mainstream pressure surge analysis, the most important being to ensure that the rate of change of the flow is reduced, thereby cutting the transient pressure generated. PAPA™ should also be positioned between the source of the transient and the device to be protected.

Following the development of the PAPA™ and the earlier work on modelling AAV characteristics, HWU proposed the Active Control approach to the venting design of building drainage systems, where a traditional roof penetration was impossible. The technique relies on the AAV installation to limit negative pressure transient propagation while the PAPA™ units control the positive transients. The HWU's development of a simulation package, AIRNET, allowed the feasibility of such a methodology to be evaluated, and the approach has been incorporated into the drainage network installation in the O2 dome in London, (see Figure 1).

Thanks to collaboration with Studor, this methodology is promoted worldwide and has now been used elsewhere on buildings utilising Studor products.

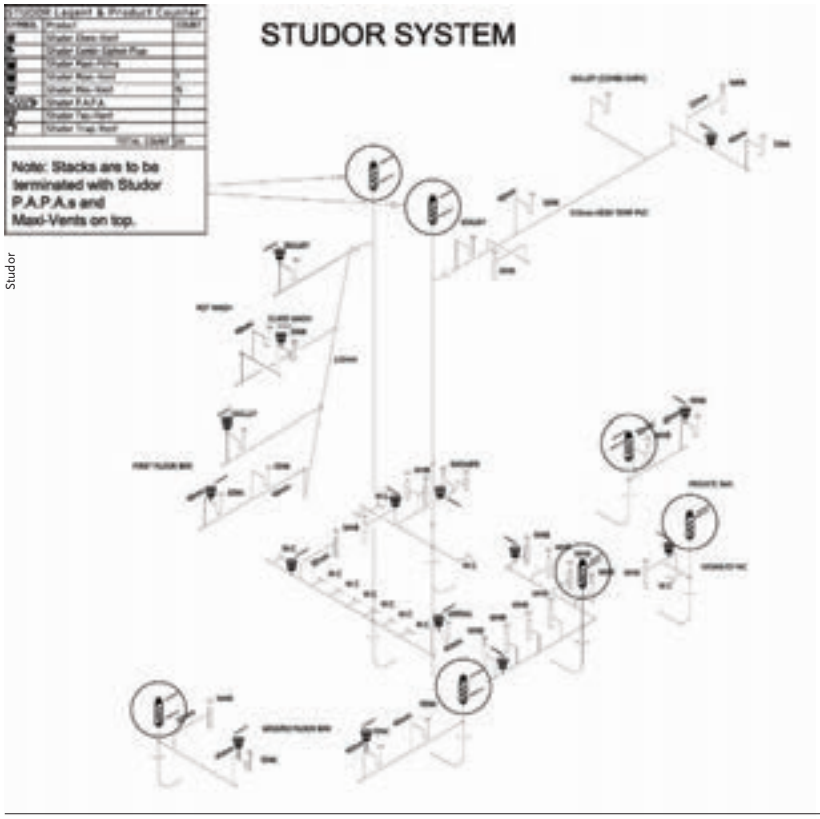
In 2003, poor drainage design was found to be a factor in the spread of the SARS virus within the Amoy Gardens housing complex in Hong Kong. A World Health Organisation investigation, and HWU's own modelling, confirmed that the spread of SARS was >

Figure 2: Demonstration of the +1/-1 reflection coefficients encountered at a closed and open end termination of a single pipe subject to a positive pressure pulse



John Swaffield

Figure 1: Details of the Active Control building drainage system installed at the O2 Dome



Studor

exacerbated by dry traps in many bathrooms, failures due to a combination of poor maintenance and bathroom extraction fan usage.

In 2005, HWU proposed a non-invasive remote and non-destructive methodology to identify depleted trap seals by drawing upon pressure surge theory, and in particular, the result that an open or closed branch termination will generate differing responses to an incoming transient. (See Figure 2).

With UK Engineering and Physical Sciences Research Council (EPSRC) funding, and with additional funding and project team membership from Studor, IAPMO SNIPEF, Buro Happold, RBS and the UK Department of Health, a practical system was developed and tested in large buildings in Dundee, Edinburgh and Glasgow, including an RBS building in Glasgow and the Edinburgh Royal Infirmary building. The research team could not control the activity within the building, so it was a very good test of the system.

The equipment consisted of a sinusoidal pressure wave generator and diversion valves fitted to the upper dry levels of a system stack and pressure sensors (see Figure 3).

The comparison of a no-fault system response to a 10 Hz sinusoidal pressure excitation, with a duration of less than two seconds and a response where one or more traps are depleted, indicates the location of any depleted trap as the pressure signal travels at the acoustic velocity in air.

Further development beyond the EPSRC research

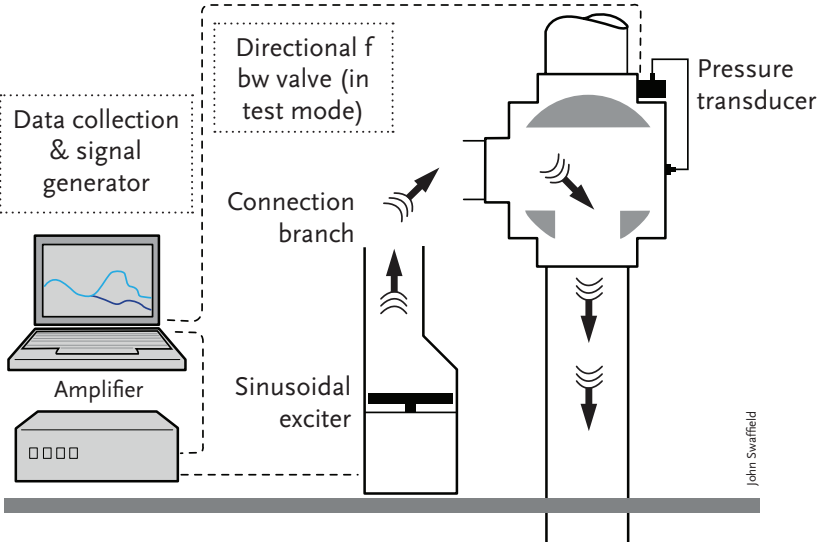
project by the HWU/Studor partnership has resulted in a marketable product and methodology soon to be available to facilities engineers and building operators. The methodology is both non-invasive (as the equipment is mounted in the upper dry stack); non-destructive (as a 10 Hz signal of 30mm water gauge is insufficient to generate more than a 1mm deflection in a fully charged trap seal); and remote, as the operation may be controlled from afar (the Glasgow tests were run by computer link to HWU in Edinburgh to prove this capability).

It is essential that academia works closely with its industrial partners in the broadest sense of that term. HWU and Studor have demonstrated the benefits of such partnerships by the development of new product and new design technologies and the introduction of a public health-enhancing remote sensing system to assess trap seal integrity.

HWU has also worked with major industry players, such as CaromaDorf in Australia (on low-flush WC design and drainline carry) and Hepworth (now Wavin) on the waterless sheath trap development. It is hoped that these projects will encourage further industry-academia interactions, as both parties have much to learn and much to benefit from each other. ●

Further details of the partnership outcomes and HWU's other research can be found in *Transient airflow in building drainage networks* by John Swaffield, published by Spon, April 2010.

Figure 3: Developed test equipment used to provide a remote and non-invasive transient-based technique to identify empty water trap seals



John Swaffield is emeritus professor at Heriot Watt University. **Steve White** is technical manager at Studor, a manufacturer of air admittance valves.

Opinion

International rescue?

The selling of building drainage codes globally is causing more harm than good in the public health arena, but an answer may be at hand, says **Peter White**

When working on international projects, one of the first things you are likely to notice is the plethora of local and international codes according to which we are required to design the drainage. This is due to the codes of Europe, the US and Australia being sold internationally. It isn't unreasonable to expect some variations to reflect local custom and practice, and this wouldn't be so difficult if they more or less all said the same thing, but they don't – far from it, especially where venting and building height are concerned.

In his latest book, *Transient Airflow in Building Drainage Systems*, John Swaffield, emeritus professor and former head of the School of the Built Environment at Heriot-Watt University, compares the five major codes used internationally to design the drainage for a 20-storey residential block. These are: BS EN 12056-2:2000; AZ/NZS 3500.2:2003; ASPE DATA book; Uniform Plumbing Code; and the International Plumbing Code. What Professor Swaffield found was that the documents all recommend different solutions, particularly in terms of vent stack requirement and size, the requirements for which range from none to 125mm.

This rather suggests that some of the guidance may be a little wide of the mark, but the question is whether or not it is recommending under- or over-design. The latter is, of course undesirable, but the former risks expensive post-construction problems.

These various codes have all arrived at different design solutions for two reasons; the first is because codes have evolved on the basis of translating what is observed to work at the time into sets of rules – rules that become more and more detailed in response to the increasing complexity of systems. The second is because codes are written by committees, and the nature of committees leaves them prey to the influences of special and local interests.

'Okay,' I hear you say, 'so if the codes are all based on what works, then where (or what) is the issue?' Well, if you are using the local code in its home country and designing something similar to the schemes that provided the experience on which the code is based, you are not going to go far wrong. But if you use BSEN 12056 to design a 100-storey tower in the Middle East, you have to ask yourself how much experience of similar 'working' buildings informed the code. I would argue that the 'well, they all work' approach is risky if it isn't tempered with some consideration of the 'home' zone from which a particular code has evolved and the type of buildings on which the code is based. Perhaps an even greater risk is when you are presented with several different international codes. Do you choose the one that you feel is most relevant, the one that is least onerous, or cherry pick the bits that suit you best from each?

> The 'well, they all work' approach is risky if it isn't tempered with some consideration of the 'home' zone from which a particular code has evolved

Obviously only one code should be applied. However, the temptation to use more than one is enticing, because some of what is written in the codes is nonsense. For example, the maximum 10-storey implied restriction on the use of air admittance valves (AAV) in BS EN 12056 is arbitrary. It was based on the fact that the largest hydraulic rig available for BBA testing was – you guessed it – 10-storeys!

Of course, if future codes were to be based on set design parameters and analysis as opposed to what is observed to work, codes would become interchangeable, because the laws of physics don't change from country to country. The good news is that this may not be too far off. Heriot-Watt University has developed a computer simulation called AIRNET to model individual system behaviour, which could be used to inform the basis of a future code. AIRNET has already been used to develop the positive air pressure attenuator (PAPA™) device. This, in conjunction with AAVs, can be used instead of traditional venting.

PAPAs™ are currently being retrofitted to various international projects that are experiencing problems with drainage ventilation. I would speculate this is due in part to the inappropriate application of existing codes – hopefully something that will no longer be an issue with the next generation of codes. ●

Peter White is public health principal at consulting engineers, Hoare Lea.

BLÜCHER® EuroPipe

FACT No1
THE BEST FIRE RATING IN ITS FIELD

FIRE

BLÜCHER® EuroPipe is manufactured from stainless steel and is classed as having A1 fire rating.

- It will not combust, so won't add fuel to the fire
- It has no coatings, so does not emit smoke
- It doesn't require fire collars

Time to make BLÜCHER® EuroPipe your 1st choice for drainage?

For your copy of the full **FACTS** mail: **FACTS@BLUCHER.CO.UK**

A

C

T

S

BLÜCHER® EuroPipe is a push fit stainless steel pipework system for soil, waste, rainwater and process applications with a wide range of fittings and pipe diameters from 50 - 250mm. It is suitable for installation both above and below ground.

BLÜCHER DRAINAGE SYSTEMS

KEEPING UP THE FLOW

BLÜCHER UK LTD - Station Road - Tadcaster - LS24 9SG - Tel: 01937 838 000 - www.blucher.co.uk

istock/Sandsun

After the deluge?

A torrent of policy, regulations and standards for sustainability have poured down on the sector, but how have these impacted upon best practice in water efficiency? A team of specialists at **Hilson Moran** give their view

Engineers are striving to reduce flow rates all the time, while ensuring sanitary and drainage systems function effectively, in a bid to meet the challenges posed by BREEAM, the Code for Sustainable Homes (CSH) and the updated Part G of the Building Regulations.

But despite engineers conducting extensive assessments of predicted water use and gaining post-occupancy water meter readings, it's still difficult to know precisely what the population of a building will actually be and, therefore, exactly how much water is required.

Water demand in a commercial office building used to be 40 litres per day per person, but this has reduced dramatically over the last 10 years and is now thought to be closer to 25 litres per person.

Credits are awarded under BREEAM, for example, for water conservation by encouraging reductions in water use, the use of low water use fittings, and through the detection of leaks.

But to make systems work at much lower flow rates, it takes not just the right specification of materials, but also the right communication with clients and end users. It's also important at the design stage to ensure that the low flow rates being sought are reflected in the architect's specifications, to ensure the sanitary ware selected is compatible with the system's design. If incompatible fittings are used, it can cause issues with water delivery.

For example, the WC pan and cistern need to be designed and tested as a single unit to ensure the effective evacuation of the bowl and to minimise the need for the user having to carry out a second flush.

The CSH is endeavouring to reduce the consumption of water in the home from a previous average consumption of 135-150 litres per person per day to an aspiration of just 80 litres per person per day, in order to achieve Code levels five and six. However, reducing the flow rates too stringently in showers, for example, could easily mean that people require a longer one to rinse off lather, so the anticipated water savings become rather self-defeating. Get it wrong in either environment and the occupants will soon be changing the fittings, post occupancy.

Designers can't afford to ignore what's lurking below ground either. They need to look at the entire installation, right down to the drainage level, to ensure that new sanitary ware won't cause future problems. For instance, there is no distinction in BREEAM between old and new buildings in terms of water consumption requirements.

However, retrofitting modern low-flow fittings to work with an old drainage system could cause serious issues. For example, older drainage systems that were designed to convey nine litres per WC flush can now be using just 4.5 litres today, causing solids to settle and increasing the risk of blockages, as well as changing the ratio of sludge to liquid in the effluent that arrives at the water treatment works.

To achieve the full three credits rating in BREEAM Offices, engineers are obliged to incorporate rainwater harvesting and/or grey water recycling solutions into their design. However, this can be quite a challenge, especially in commercial buildings, which, generally speaking, have quite small roof areas relative to a building's population. In reality, rainwater harvesting and grey water recycling can only deliver a small percentage of the water required by a multi-storey office building.

For a high density commercial building (such as a compact, high rise, city centre development), the rainwater harvesting system would achieve only 10% to 15% of the overall WC flushing demand of the building dependent upon the storage provision. In comparison, for a low density commercial building of the same population (but low rise, with a larger roof area), the rainwater harvesting system could achieve between 40% and 50%.

Given such percentages, any rainwater harvesting system would actually need to be supplemented with fresh water, and pipework systems will, in part, need to be duplicated. A further irony is that, due to the increasing trend for green roofs, there is also less run-off water available for rainwater harvesting. Studies have also shown that the run-off from green roofs can be too high in biological residues to be suitable for water flushing.

Grey water systems are technically more complex than rain water systems utilising either mechanical filtration or settling tanks and UV treatment. These require maintenance and supervision to ensure that the water is of suitable quality for distribution around the building. These systems also consume energy, which can be similar to the energy consumed per cubic metre by a large scale water treatment plant. It could well be that the energy required to clean it is greater than the amount of water it provides, so it might be a better investment in time and resources to reduce leaks in the mains water distribution network instead.

All of this needs to be considered very closely by engineers, before assuming that rainwater or grey water harvesting automatically offers energy saving advantages.

In domestic situations, rainwater harvesting is much simpler. A water butt provides a rough and ready solution for watering the garden. However, CSH applies equally to an individual house as it does to a block of flats. This can create anomalies in the credits assigned for particular practices. For example, in terms of rainwater recycling, it is obviously sensible to only recycle rain water at the lower levels within multiple dwelling developments to achieve a balance between the volume collected and distribution efficiency.

In this situation, to obtain the required CSH credit for a dwelling not served by the rainwater harvesting system, it will be necessary to install low-flow water appliances, as the benefit of the rainwater harvesting system cannot be averaged across the block.

Other anomalies can be found within both the CSH and BREEAM Commercial. For example, Part L-compliant software, such as TAS, estimates hot water consumption based on metre square of floor area of a particular room type. Therefore a hotel room hot water consumption varies depending on the room size and not the number of occupants or the type of fittings. Solar thermal and CHP systems must be configured based on the predicted water consumption requirements and therefore the Part L results are not particularly suitable for sizing these systems. However, with energy performance certificates and energy strategies being based on Part L calculations, there is temptation to use this approach at the conceptual stage of the project. All of these can deliver very good theoretical results according to the rating system applied, but very poor results in real-life performance.

In situations like this, solutions may become driven by their credit-worthiness rather than best engineering or construction practice, or user needs – and sticking to the letter of the CSH, or of BREEAM could instead lead to duplication of systems and increased capital costs.

Of course, the latest changes to Part G of the Building Regulations will introduce water efficiency on a mandatory basis. With the exception of publicly funded properties and the requirements of some planning authorities, until now the need to comply with CSH has been voluntary. But very soon, compulsory water efficiency measures could have a massive impact on the design and construction of new homes.

It remains to be seen whether this impact will create a long-term shift. After all, once you have completed construction and achieved Part G, there is no way of enforcing continued compliance. ●

Contributing authors, all from Hilson Moran:

Chris Springett, senior associate public health design engineer; **Andrew Russell**, associate public health design engineer; **Steve Johnson**, associate sustainability consultant; and **Emma Flower**, sustainability consultant.

"Get it wrong in either environment, and the occupants will soon be changing the fittings, post occupancy"

Lurking faults

Electrical engineers are facing increasing challenges to lower the risk of faults as more complex systems and services are installed in buildings. **Tony Sung** offers a guide to checking for faults

> "When it comes to operational risk management, protection against electrical faults is a top priority"

Modern built environments are becoming more complex as a wider range of services systems are being integrated under one roof – from lighting and power distribution to intelligent control and data networks. This complexity is placing increasing challenges on electrical designers and installers to provide clients with a carbon friendly, energy efficient, safe and robust electrical building services system.

Any system downtime arising from electrical maintenance or clearance of faults needs to be minimised using a well-designed protection scheme: the impact of the downtime on the day-to-day activities within the building – including potential loss of revenues – has to be reduced to a minimum. Clearly, when it comes to operational risk management, protection against electrical faults is a top priority.

The duty of care that a professional engineer owes to the client cannot be delegated, which makes the engineer responsible for producing a safe and robust design. On pages 58 to 59 we provide a simple 15-step 'fault MVA (megavolt-ampere) calculation method' aimed at helping designers and installers to check the level of fault currents that could be lurking in an electrical system.

Electrical standards

There are relevant national electrical rules such as BS7671 and NEC, and international standards from the IEEE, IEC and BSI that designers and installers can use to ensure electrical equipment and cables are adequately protected against dangerous fault currents. Protection of electrical installations against fault currents in the built environment can range from simple dwellings to a highly complex type of building such as an airport or hospital. For simple domestic dwellings that receive a single phase AC supply from the supply utility company, the fault current protection design can be implemented using rules of thumb; advice is also available in guidance materials published by trade bodies and professional learned societies.

As for more-sophisticated buildings that contain HV/LV transformers and complex distribution equipment on site, electrical building services engineers are required to devise a bespoke overcurrents protection scheme to provide correct discrimination to disconnect and isolate overcurrents and earth faults without

BS7671: 2008 – 17th edition IEE Wiring Regulations states that:

Regulation 132.13 Documentation for the electrical installation

Every electrical installation shall be provided with appropriate documentation, including that required by Regulation 514.9, Part 6 and where applicable Part 7.

Regulation 434.1 Determination of Prospective fault current

The prospective fault current shall be determined at every relevant point of the installation. This shall be done by calculation, measurement or enquiry.

(The authors acknowledge the permission granted by the IET to reproduce the above regulations from BS7671:2008)

causing unnecessary interruption to fault-unrelated services. While it is possible to use primary and secondary injection tests to check and commission the settings of an overcurrents protection scheme, no one has ever put the system online and slammed on it a bolted three-phase fault to prove it's designed to withstand kA capacity. For a complex HV/LV electrical installation, a complete Fault Current Calculations Study is considered to be one of the most important electrical building services engineering activities that designers and installers must get right in order to meet the life and property safety design requirements of an electrical installation.

Faults

In an HV/LV electrical installation, there are five types of electrical fault that can give rise to dangerously high energy fault currents:

- A three-phase symmetrical fault;
- A three-phase to neutral and/or earth symmetrical fault;
- A double-phase asymmetrical fault;
- A double-phase to neutral and/or earth asymmetrical fault; and
- A single-phase to neutral and/or earth asymmetrical fault.

Normally[1] the three-phase symmetrical fault can provide the maximum prospective fault current for equipment fault rating selection purposes. It is a legal requirement[2] that an electrical installation should be designed for safety under normal and abnormal (fault) conditions. To obtain the maximum and minimum >

Case study Fault MVA (megavolt-ampere) calculation: checking tool

Figure 1 shows an electrical system deriving a 415V three-phase 50Hz a.c. supply from a 350MVA (fault MVA) 66kV grid supply. U_{suffix} denotes the impedance voltage of the transformer and sub-transient reactance of the standby generator in percentage. The voltage values shown are line voltage and the ratings shown against the transformers and standby generators are the full load rating of the equipment.

The steps for applying the Fault MVA calculation method for the system shown in Figure 1 are as follows:

Step 1: Fault MVA at location $F_A = 350MVA$

Step 2: Fault MVA of transformer T1 $= \frac{MVA_{TX}}{U_{k-Tx}} = \frac{25}{0.05} = 500MVA$

Step 3: Fault MVA of 0.1Ω 11kV distribution cable $= \frac{(V_{LL})^2}{Z_{Cable}} = \frac{11000^2}{0.1} = 1210MVA$

Step 4: Fault MVA of transformer T2 $= \frac{MVA_{TX}}{U_{k-Tx}} = \frac{0.7}{0.045} = 15.556MVA$

Step 5: Fault MVA of 0.01Ω 415V LV incoming cable $= \frac{(V_{LL})^2}{Z_{Cable}} = \frac{415^2}{0.01} = 17.223MVA$

Step 6: Fault MVA of generator G $= \frac{MVA_G}{U_{k-G}} = \frac{0.7}{0.15} = 4.667MVA$

Step 7: The single line diagram is then converted into an equivalent Fault MVA single line diagram (see Figure 2)

Step 8: At location F_A, the fault MVA = 350MVA, fault kA $= \frac{MVA_{Fault}}{\sqrt{3} \times V_{LL}} = \frac{350 \times 10^6}{\sqrt{3} \times 66 \times 10^3} = 3.062kA$

Step 9: At location F_B the fault MVA $= \left(\sum \frac{1}{MVA}\right)^{-1} = \left(\frac{1}{350} + \frac{1}{500} + \frac{1}{1210}\right)^{-1} = 175.945MVA$

fault kA $= \frac{MVA_{Fault}}{\sqrt{3} \times V_{LL}} = \frac{175.945 \times 10^6}{\sqrt{3} \times 11 \times 10^3} = 9.235kA$

Step 10: When the mains is healthy,

at location F_C the fault MVA $= \left(\frac{1}{175.945} + \frac{1}{15.556} + \frac{1}{17.223}\right)^{-1} = 7.81MVA$

at location F_C fault kA $= \frac{MVA_{Fault}}{\sqrt{3} \times V_{LL}} = \frac{7.81 \times 10^6}{\sqrt{3} \times 0.415 \times 10^3} = 10.867kA$

Step 11: When the mains is down and the supply at location F_C is derived only from the standby generator, the fault MVA = 4.667*MVA* – the result is from Step 6.

Hence, at location F_C, the generator fault kA $= \frac{MVA_{Fault}}{\sqrt{3} \times V_{LL}} = \frac{4.667 \times 10^6}{\sqrt{3} \times 0.415 \times 10^3} = 6.493kA$

Step 12: Since when the mains supply is restored, the mains and the standby generator will be running in parallel for a short period before the standby generator is taken offline, the distribution equipment should be designed to cope with the sum of the maximum fault currents supplied by both energy sources. Therefore, maximum designed fault kA for the switchboard and circuit breakers at location *Fc* should have a fault capacity not less than (10.867kA + 6.493kA)=17.36kA. Maximum fault MVA is therefore 12.48MVA.

Step 13: When the mains supply is restored, because of the short-time paralleling arrangement, fault contributions from the standby generating set need to be added to location F_B.

The fault MVA due to standby generator $= \left(\frac{1}{4.667} + \frac{1}{15.556} + \frac{1}{17.223}\right)^{-1} = 2.971MVA$

therefore, at location F_B fault kA $= \frac{MVA_{Fault}}{\sqrt{3} \times V_{LL}} = \frac{2.971 \times 10^6}{\sqrt{3} \times 11 \times 10^3} = 0.156kA$

Step 14: Therefore location F_B should have a fault capacity not less than (9.235kA + 0.156kA)=9.391kA due to fault current contributions from the standby generator. Maximum fault MVA is therefore 178.92MVA.

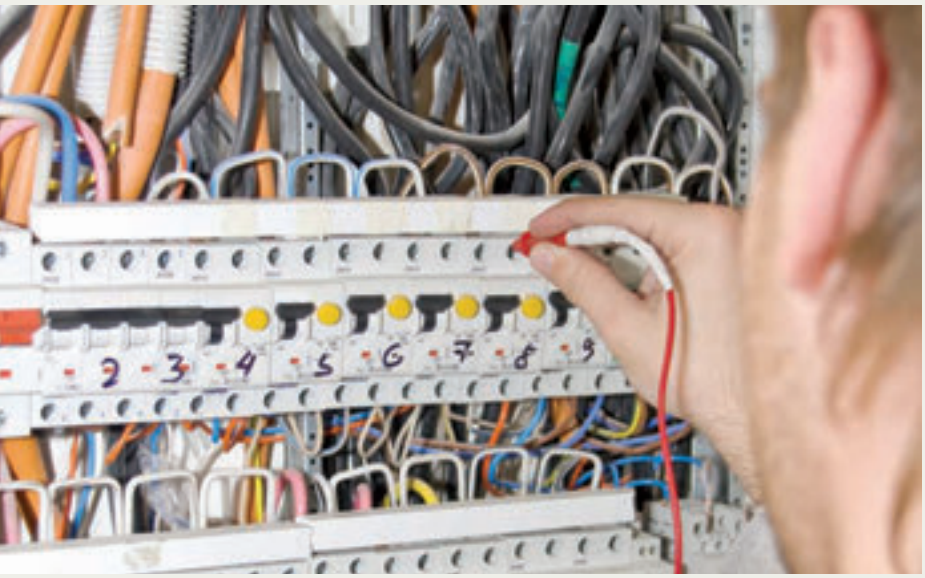
Step 15: At location F_A the fault current contributions from the standby generator is attenuated to 25.8A. The fault withstand capacities should not be less than 3.088kA and 353MVA.

The design check results are summarised thus:

Fault location	F_A	F_B	F_C
Line Voltage	66kV	11kV	415V
3-phase fault kA	3.088kA	9.391kA	17.36kA
3-phase fault MVA	353MVA	178.92MVA	12.48MVA

Fault MVA Calculation results for the electrical system shown in Figure 1

to help reduce electrical services technical risks



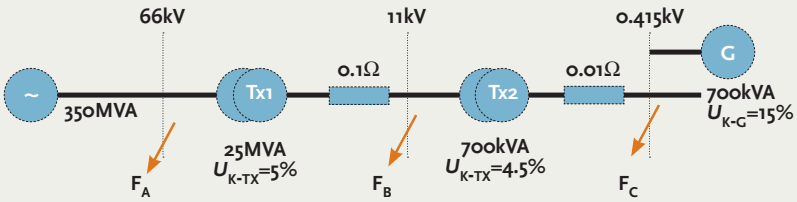


Figure 1 – Single-line diagram of a Fault MVA calculation case study

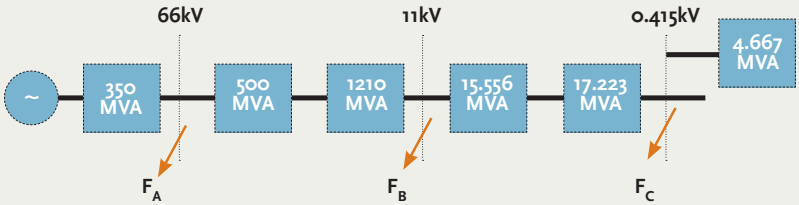


Figure 2 – MVA equivalent single-line diagram

When the same set of base data was used, often the results of the Fault MVA calculation method were found to be accurate within a few percent of computer calculations using industry standard electrical design software. Since most standard quality assurance procedures in engineering require designers and installers to use a different method to verify the calculated results from the one originally used, the use of Fault MVA calculation method would be a useful aid for verifying e.g. BS7671, BS EN 60909-0 or IEEE calculation results derived from proprietary software.

The reader should note that the Fault MVA calculation method shown in here does not give precise fault kA values when compared with the classical fault calculation method (ie the per unit method[1]). It is suggested that the Fault MVA calculation method should be used by engineers and installers as a quick checking tool only.

References

(1) The Fault MVA calculation method uses a lumped impedance approach, which is only an approximation. The classical per unit method using symmetrical component analysis technique can take the advantage of splitting the impedance into resistive and reactive components, hence BS EN 60909-0:2001 is more accurate.

"It is a legal requirement that an electrical installation should be designed for safety under normal and abnormal [fault] conditions"

> fault currents at relevant distribution points, designers and installers are strongly recommended to apply BS EN 60909-0 to perform detailed calculations of acceptable accuracy to select the settings for correct coordination of protective devices.

Although there are many useful guidance materials on BS7671 from various authors available to assist designers and installers to calculate the prospective fault currents of an electrical installation, they are generally more applicable for smaller installations. ●

References

(1) In an electrical system such as a power station, with a near-to-source fault, if the system's zero sequence impedance is small when compared with the positive and negative sequence impedances, the single-phase to neutral/earth fault can produce a fault current higher than the three-phase prospective fault current.

(2) The UK's Electricity at Work Regulations 1989 – Regulation 11, says: 'Efficient means, suitably located, shall be provided for protecting from excess of current every part of a system as may be necessary to prevent danger.'

CIBSE Electrical Services Group quiz

What is the p.u. value of the equipment shown in Figure 1 (in the main article) if the base MVA is chosen to be 100MVA:

1. Grid supply – (**a**) 3.5, (**b**) 0.286 or (**c**) 1.0?
2. Transformer T1 – (**a**) 0.01, (**b**) 0.125, or (**c**) 0.2?
3. 0.1Ω 11kV cable – (**a**) 12.1, (**b**) 0.0827 or (**c**) 6.05?
4. Transformer T2 – (**a**) 6.428, (**b**) 12.85 or (**c**) 0.1556?
5. 0.01Ω 415V cable – (**a**) 0.581, (**b**) 58.1 or (**c**) 5.81?
6. Standby Generator – (**a**) 0.047, (**b**) 21.43 or (**c**) 7.14?

It is left for the reader to show that the p.u. analysis outcomes are similar to the one derived by the Fault MVA calclation method.

The answer will be posted on the CIBSE Electrical Services Group website:
www.cibse-electricalservicesgroup.co.uk

Tony Sung is chairman of CIBSE Electrical Services Group; Patrick YP Du is associate professor, Department of Building Services Engineering, Hong Kong Polytechnic University; Kevin O'Connell is head of the Department of Electrical Services Engineering, Dublin Institute of Technology

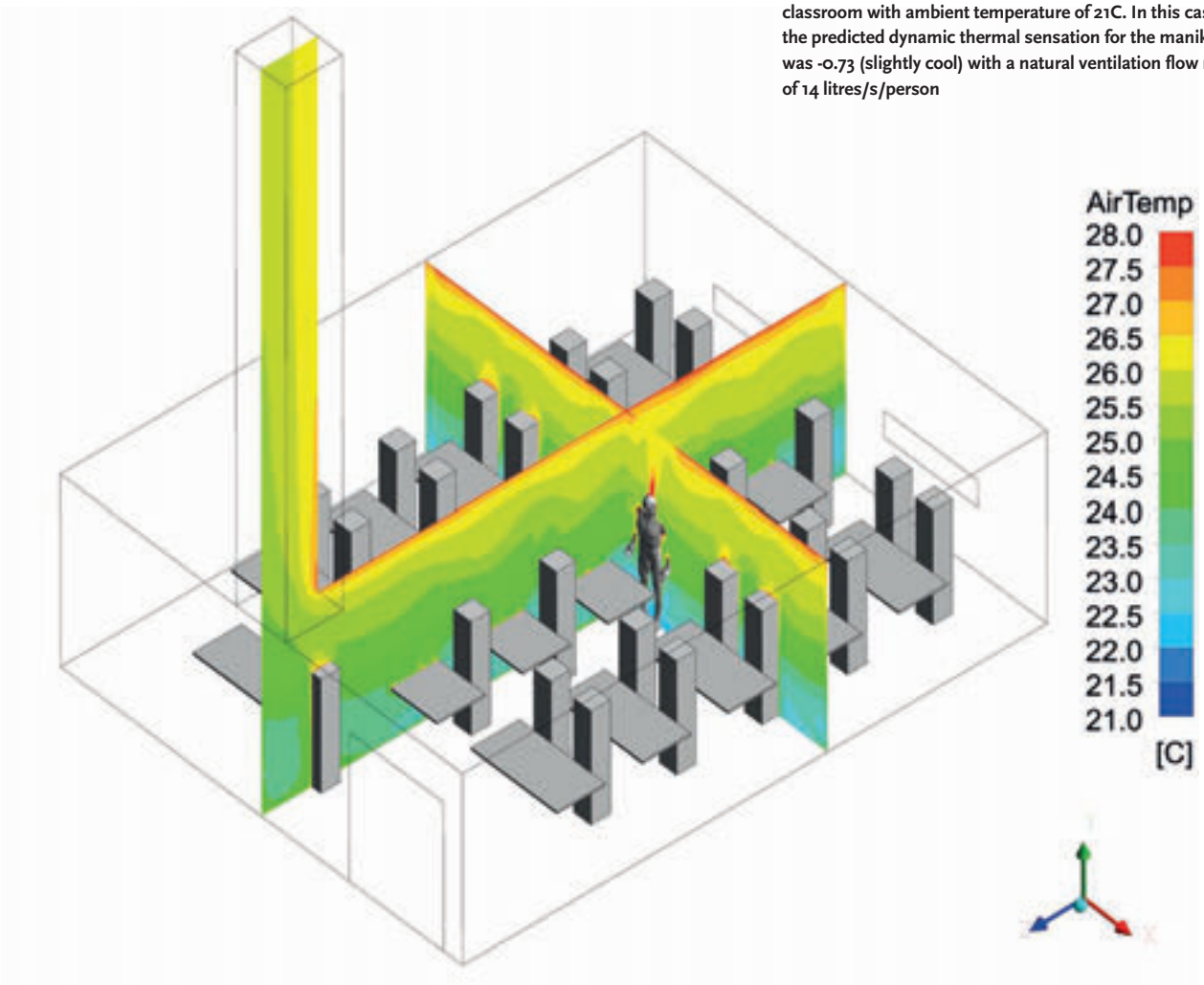
Comfort zone?

How easy is it to predict levels of human comfort when designing a naturally ventilated environment? Recent studies show that computer models used for such predictions are more accurate if they take human physiology into account, write **Malcolm Cook**, **Paul Cropper** and **Tong Yang**

Natural ventilation is now frequently used in modern buildings either as the sole means of ventilation or as part of a mixed-mode strategy. Examples cover a wide range of building sizes and categories, and include performing arts spaces, healthcare facilities and schools. Natural ventilation not only offers potential energy savings, but can also lead to greater occupant satisfaction resulting from higher indoor air quality and increased adaptive control. Occupants in such buildings often remark on the 'airiness' or 'freshness' of their environment. But what design tools do we have at our disposal for predicting comfort parameters in such spaces?

Predicting the likely performance of buildings using computer simulation, both in terms of energy use and comfort, is now widespread practice in design consultancies around the world. This is particularly true when developing innovative strategies such as those that incorporate natural ventilation.

In such cases, computational fluid dynamics (CFD) is often used to determine the likely performance of a design and to refine important parameters such as ventilation opening sizes and positions. In these simulations, the detail with which occupants are represented varies considerably, both in terms of geometrical form and conditions imposed at the surface of the occupant. Some cases use simple shaped blocks >



Air temperature predictions in a naturally ventilated classroom with ambient temperature of 21C. In this case, the predicted dynamic thermal sensation for the manikin was -0.73 (slightly cool) with a natural ventilation flow rate of 14 litres/s/person

> of constant temperature, others specify a constant heat flux based on an assumption of the surrounding air conditions.

Some models pay little or no attention to the radiation exchange with the environment or make assumptions that lead to over-sizing of heating systems or show up natural ventilation to be far less feasible than it otherwise might be. In some cases, CFD models are used to derive empirically-based thermal comfort parameters such as predicted mean vote (PMV) and predicted percentage dissatisfied (PPD) of occupants.

Taking human physiology into account can help when modelling for natural ventilation. PIctured is the Lee Valley indoor athletics stadium, east London

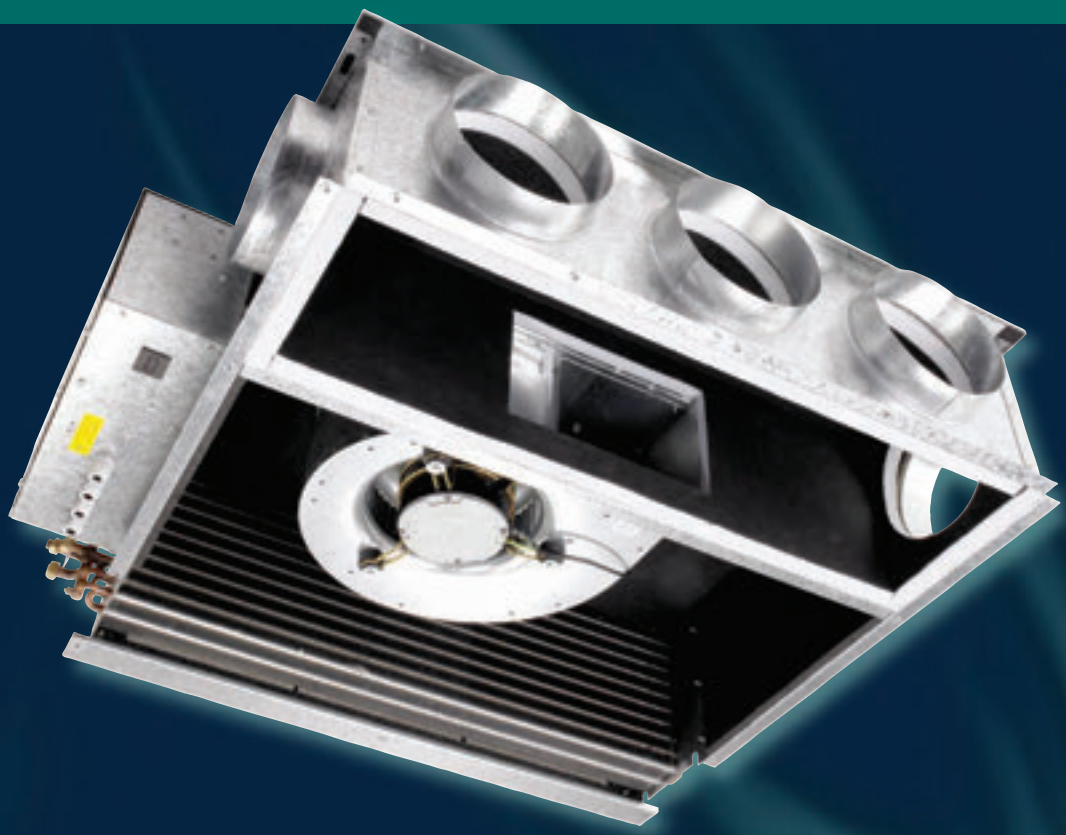
In contrast, the work reported here uses a computational manikin of human thermoregulation and thermal comfort embedded within the solution cycle of a CFD program to provide a fully coupled model capable of predicting the influence of temperature and velocity fields on human thermal comfort and the effect of human metabolism and sweat excretion on the surroundings. This provides the opportunity to model more realistic human geometries (and the boundary layer flows and heat transfer associated with this) as well as the convection, radiation and moisture transfer between the body and the surrounding environment.

The work uses the IESD-Fiala model (Fiala, 1998), which represents human thermal comfort using two interacting systems: the controlling active system; and the controlled passive system. The active system is a cybernetic model predicting the thermoregulatory defence reactions of the central nervous system such as shivering, skin blood flow and sweating.

The passive system simulates the dynamic heat transfer phenomena that occur inside the body and at its surface. The model also incorporates a physiologically based thermal comfort model that predicts human thermal sensation responses in steady state and transient conditions.

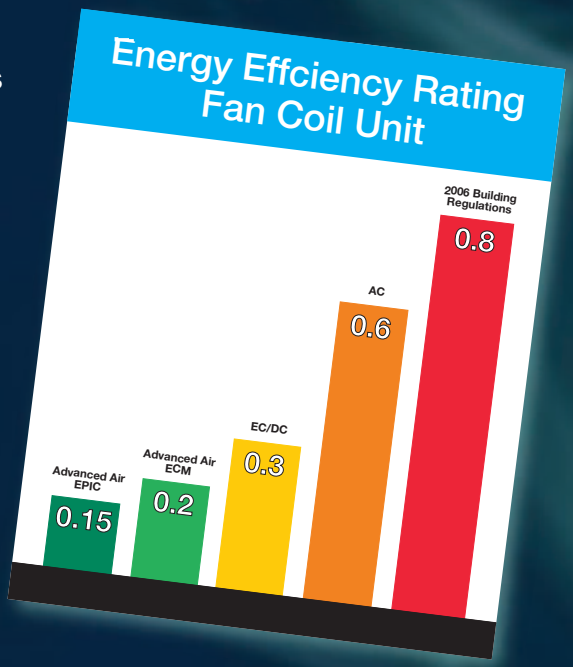
A wide range of commercial CFD codes are currently available, most of which provide facilities for the user to modify and extend the functionality of the CFD solver. In this project, model coupling between the ANSYS >

The **EPIC Fan Coil Unit** with the unique single fan deck



The EPIC Fan Coil Unit with specific fan power as low as 0.15 w/l/s has many benefits over other terminal air conditioning systems:

- Very low carbon emissions – comparable to chilled beams
- Unique fan deck arrangement with large 250 watts horizontally mounted ECM driven fan
- Constant or variable air volume
- Slow speed fan giving low noise levels – NR20 can be achieved
- ECM technology means no commissioning on site



Get the full story...

Advanced Air

T: +44 (0) 1842 855586
E: sales@advancedair.co.uk
www.advancedair.co.uk

Temperature distributions around the IESD-Fiala model compared with simplified shapes for occupants showing differences in surface temperature and buoyant plume structures

CIBSE publications

KS6 – Comfort

KS16 – How to manage overheating in buildings

Both are introductions and are available from the CIBSE bookshop at www.cibse.org/bookshop, £21 for members, and £42 for non-members.

> CFX solver and the IESD-Fiala model is achieved using CFX Command Language (CCL), CFX Expression Language (CEL) and Junction Box routines. CCL is used to define numerical parameters for controlling the coupled simulation, while CEL functions are used to dynamically assign boundary conditions at the body surface based on data from the IESD-Fiala model. Junction Box routines, linked to specific events in the CFD solution cycle, are used to extract information from the CFD solver and to exchange data with the thermal comfort model.

The coupled system begins by setting an initial guess for the flow field in the CFD model. In response to this, surface temperatures and perspiration rates are calculated for each of the 59 body parts by the IESD-Fiala model and are passed to the CFD model to be used as boundary conditions. Once the CFD solution has achieved a sufficient degree of stability, or convergence, information about the local environment close to the body surface is extracted by a Junction Box routine and passed to the IESD-Fiala model, which determines the body's response to these new conditions. Updated surface temperatures and perspiration rates are then returned to the CFD model and the CFD solution process resumed.

This data exchange is repeated until the coupled system achieves a sufficient degree of overall convergence; that is, when changes to the body surface temperatures between consecutive data exchanges and the CFD residual values (equation errors) are sufficiently small.

This two-way data transfer is thought to be particularly important when modelling naturally ventilated spaces where air velocities are low, because the effect that a human body has on the local environment is potentially more significant than in other environments where velocities are often higher.

The two illustrations (see left and page 63) show the coupled system in use to simulate natural ventilation in a school classroom. The model comprises open windows with cross ventilation to a stack driven purely by buoyancy forces generated by the room occupants. The detailed image is taken from a simulation that was used to investigate the differences exhibited by the new coupled system alongside a more traditional, simplified shape model of a human with a constant heat flux.

Although still in progress, the work demonstrates how a coupled model approach can lead to a more accurate prediction of the convective-radiative split at the human body surface to generate a more buoyant plume and ultimately a greater ventilation rate in buoyancy-driven natural ventilation. And if this is not enough to whet the appetite of CFD modellers, the coupled system also predicts dynamic thermal sensation using one of the world's most respected and widely validated cybernetic models of human heat transfer and thermoregulation.

The work continues and is now being enhanced to include the effects of breathing to provide a more accurate means of investigating indoor air quality and pollutant dispersion. ●

Dr Malcolm Cook and **Dr Tong Yang** are based at the Department of Civil and Building Engineering, Loughborough University, UK. **Dr Paul Cropper** is with the Institute of Energy and Sustainable Development at De Montfort University, UK. **www.lboro.ac.uk/departments/cv**

Reference:

Fiala D. Dynamic Simulation of Human Heat Transfer and Thermal Comfort. PhD Thesis, De Montfort University, 1998.

Acknowledgements

The authors wish to acknowledge the Engineering and Physical Sciences Research Council (EPSRC) for supporting this research through grant ref. EP/C517520/2. The authors also wish to acknowledge the technical support provided by Dr Yehuda Sinai (formerly of CFX Technical Services, ANSYS Europe Ltd), Mr Chris Staples (CFX Technical Services, ANSYS Europe Ltd) and Dr Dusan Fiala (ErgonSim – Comfort Energy Efficiency, Stuttgart, Germany).

... trust TROX

It is only by embracing challenge and pushing personal boundaries that we fulfil our true potential.

At TROX we are committed to an ethos of continuous development and refinement to ensure we meet customer expectations and maintain our highly valued global position at the forefront of product innovation in optimised air system solutions. And with the demands of ever more innovative and environmentally-friendly architectural specification, we relish - and are inspired by - the design challenges created for our industry.

Discover for yourself the reality that is TROX today ... and why you can confidently put your trust in us.

TROX® TECHNIK

The art of handling air

TROX UK Ltd
Caxton Way
Thetford, Norfolk
IP24 3SQ

Tel: +44 (0) 1842 754545
Fax: +44 (0) 1842 763051
Email: trox@troxuk.co.uk
www.troxuk.co.uk

Quest for airtight solutions hots up

The latest changes to the Building Regulations will have key implications for the application of ventilation systems in homes, writes **Lee Nurse** of manufacturer Vent-Axia

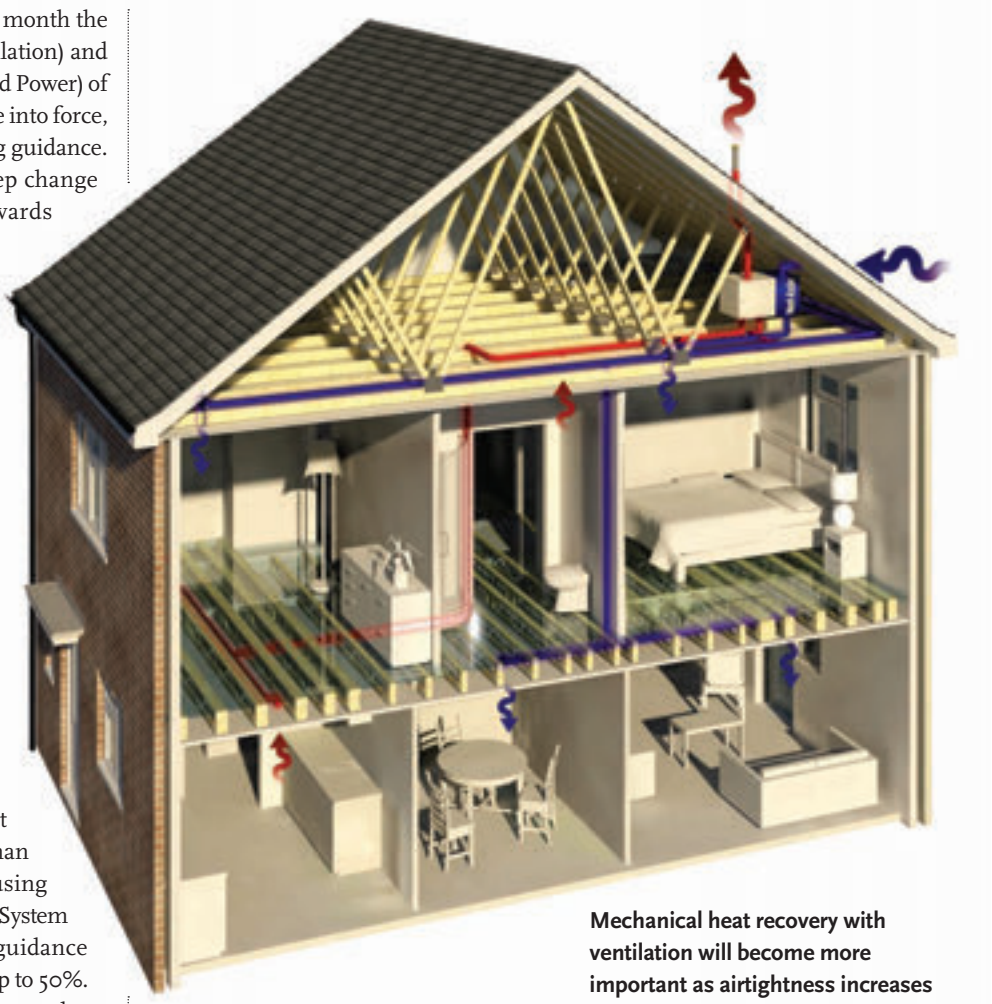
Change is on the horizon. Next month the revised Part F (Means of Ventilation) and Part L (Conservation of Fuel and Power) of the Building Regulations come into force, along with five approved documents giving guidance. These look set to provide an essential step change in energy efficiency and a key stage towards reaching zero carbon homes in 2016.

Part L and Part F are intrinsically linked; both documents feature a number of major revisions that include minimum energy efficiency levels for all ventilation systems. The new *Domestic Building Services Compliance Guide,* which accompanies Part L, highlights ventilation performance levels. Here, for the first time, a specific fan power requirement of less than 0.5 watt/sec is included for intermittent fans used in both refurbishments and new-build developments – a key factor when specifying fans.

To lower dwelling emission levels further, homes need to be increasingly airtight, but not at the cost of good air quality. Changes to Part F therefore include ventilation rate guidelines for airtight properties with infiltration rates tighter than 5 cu m h/sq m at 50pa. For ventilation using either Intermittent System 1 or Passive Stack System 2 approaches, in airtight dwellings the guidance increases background ventilation rates by up to 50%.

This looks set to cause some developers to re-evaluate their designs and, in our view, is likely to move any new planning applications away from intermittent fans, since the previous provisions in Approved Document F 2006 have already been difficult to achieve when using trickle ventilators in windows.

Currently about 10% of new-build developments would require these increased airflow rates, and they are generally designed appropriately. Our belief is that the new regulations will clarify any grey areas to ensure that as buildings become more airtight, ventilation levels are maintained.



Mechanical heat recovery with ventilation will become more important as airtightness increases in new homes, says Vent-Axia

As intermittent fans fall out of favour, changes to Part F and Part L look set to increase the uptake of continuous ventilation since it performs better in SAP, is easier to specify and easier to standardise, as trickle vents are not required. For Continuous Mechanical Extract (System 3) approaches, the guidance removes the need for background ventilation in dwellings designed with infiltration rates above 5 cu m h/sq m.

It is likely that these factors, along with the Dwelling Emission Rate (DER) benefits of using SAP Appendix >

Shutterstock

The drive towards zero carbon homes will have an impact on ventilation technologies, according to manufacturers

> Q, will combine to boost the adoption of whole-house mechanical extract ventilation systems (MEV and dMEV) and mechanical extract ventilation systems with heat recovery (MVHR).

This changing trend from intermittent fans to continuous mechanical ventilation poses a potential noise issue in dwellings. However, this has already been addressed by some manufacturers and has led to the development of new, quieter fans that can run continually without disturbing householders. To ensure this, Part F stipulates that the noise from continuous mechanical ventilation systems should be below 35dBA on trickle speed.

Meanwhile, for the first time Part F will require post-completion testing of ventilation equipment. The new *Domestic Ventilation Installation and Commissioning Compliance Guide* has been introduced to ensure ventilation not only delivers the required airflow, but also does it efficiently and quietly. The guide includes checklists for declaration of the equipment, its performance, its commissioning, sign-off procedures and paperwork completion to ensure performance and efficiency are met.

This completed information must be sent to Building Control. With the post-completion testing, if ventilation is designed to 5 cu m h/sq m and achieves down to three, then the ventilation will be adequate.

Post-installation performance policing is critical to ensure air quality in increasingly airtight homes. This is especially important with the increased adoption of

Approved Documents

Approved Documents (ADs) are government guidance on how to meet the legal requirements set out in the Building Regulations. ADs are intended to provide guidance for some of the more common building situations. However, there may well be alternative ways of achieving compliance with the requirements. Thus there is no obligation to adopt any particular solution contained in an AD if you prefer to meet the relevant legal requirement in some other way. (*Source: CIBSE*)

highly efficient ventilation systems like MVHR, which require trained competent installers.

Heat recovery systems are more complex to install than single fan solutions and need to be fitted correctly to ensure performance, which is key when it comes to lowering carbon emissions. Currently there is a shortage of skilled installers trained to fit MVHR, and without contractors undergoing training now, we look set for a skills gap.

To help with this, Vent-Axia offers the BEAMA CPD seminar to try to support the rapid rise in demand for MVHR systems, and is also working to develop a competency framework with the industry to help deliver a longer-term, better-integrated training solution.

To ensure the installed performance of MVHR units meets the requirements of Part F, contractors must be rigorous about key areas of each and every installation – the product, ductwork, the electrical fixing, system balancing, control and maintenance. Here, best practice is important to ensure not only that MVHR systems are installed correctly, but that they are also maintained correctly. In countries where MVHR is an established technology, contractors are heavily involved in after-sales maintenance, which can potentially offer companies a new and successful revenue stream.

With the Code for Sustainable Homes and the Building Regulations mapping out the coalition government's hopes for future carbon reductions, we need to prepare now for the journey to zero carbon homes in 2016. As homes become inevitably more airtight to meet changes to the regulations, it will be essential to use energy efficient ventilation, such as MVHR. But meeting the challenge of zero carbon homes is about more than just making a product selection; we also need to work together to consider correct specification, commissioning and installed performance of products, ongoing maintenance and system design, which are all necessary to meet our shared goal of achieving good low carbon ventilation. ●

Lee Nurse is the chairman of The Electric Heating and Ventilation Association (TEHVA) ventilation committee and marketing director at Vent-Axia.

www.vent-axia.com

"Changes to Part F and Part L look set to increase the uptake of continuous ventilation since it performs better in SAP"

Towel rails from MHS Radiators

MHS Radiators has supplied 544 electric-only Space towel rails to Strata SE1, London's tallest residential tower, in Southwark. Nicknamed 'the Razor', the 148-metre-high, 43-storey Strata SE1 has three built-in wind turbines integrated into its façade. The 19kW wind turbines are expected to generate up to 50MWh of electricity annually. The development has focused on sustainability, incorporating whole house ventilation systems with heat recovery, a district heating system, low energy lighting and high performance glazing.

● **For more information visit www.mhsradiators.com**

JS Air Curtains at Hope University

JS Air Curtains has supplied a Rotowind air curtain for a revolving door at Hope University in Liverpool. It was installed by M&E contractor, HE Simm, and is helping to maintain internal temperatures at the new Registry Building. Although revolving doors offer some protection from the outside elements, they also act like a slow-moving fan, dragging in cold air with every rotation. An air curtain prevents this cold air from entering the building.

● **For more information email mverney@jsaircurtains.com or call +44 (0)1903 858656**

Alpha packages help HA properties achieve CSH Level 3

Alpha Heating Innovation's FlowSmart and SolarSmart packages have been installed in housing association properties in the city of Rochester. The products went a long way to helping them achieve Code for Sustainable Homes Level 3 without needing to go 'over the top' in terms of the building fabric specification. This led to cost savings, and will also help keep ongoing gas bills to a minimum.

● **For more information call +44 (0)1732 783001 or visit www.alpha-innovation.co.uk**

Major Line comfort units from CIAT Ozonair

Sleek, modern design combined with technology makes CIAT Ozonair's new Major Line range a revolution in comfort units.

A product of CIAT's sustainable development philosophy, Major Line consumes 20% less electricity than its predecessors and is extremely quiet in operation. It also filters indoor air to protect the well-being of occupants. The range offers a broad range of cooling capacities up to 10kW, and includes an array of innovations.

● **For more information call +44 (0)1883 621015**

Renewable energies heat National Welsh Heritage Centre

Award-winning building controls specialist, BG Controls, has installed the controls to enable an eco-friendly new heating system at the picturesque Welsh Language and Heritage Centre in Pwllheli. Based in a former granite-quarrying village on the northern coast of Llyn Peninsula, the heritage centre specialises in intensive Welsh language courses. As well as residential Welsh language classes, there's also conference facilities, a heritage centre and visitor shop all on site.

● **For more information call +44 (0)1909 517460 or visit www.bgcontrols.co.uk**

Danlers lighting controls help reduce Clarks' footprint

Danlers UK-manufactured passive infra-red (PIR) occupancy switches have been installed at Clarks' headquarters in Street, Somerset, to promote energy efficiency in their offices.

Project contractors KDR Electrical Services said: 'We have always found Danlers products reliable and never have problems with them. Their after-sales service has been excellent, and when we have had technical questions, the help has been good. We would have no hesitation in recommending Danlers products and will continue to use them for the foreseeable future.'

The products were supplied to KDR Electrical Services by Edmundson Electrical of Bridgewater. Danlers PIRs help to reduce energy bills and carbon emissions by turning the lights on and off automatically through movement detection. This prevents lights being left on unnecessarily when an area is vacant. Every Danlers PIR also has a photocell that prevents the load coming on when there is already sufficient light in the area.

● **For more call +44 (0)1249 443377, visit www.danlers.co.uk or email sales@danlers.co.uk**

Products & Services

Telephone: 020 7880 6206 **Email:** darren.hale@redactive.co.uk

UK's first online task management system

Mechanical and electrical companies across the UK can now benefit from TaskAdviser – the UK's first online task management system. Owned by MMB Software Ltd, TaskAdviser enables M&E companies to automate the production of job sheets and invoicing. Maintaining such control over the business is vital for the success of any enterprising M&E firm.

● **For more information visit www.taskadviser.com or email Kevin.shipp@taskadviser.com**

TITAN Products expands energy efficient BACnet range

TITAN Products announces the release of two new BACnet enabled control products operating to ANSI/ASHRAE Standard 135.

The CCI-2X485 is a Modbus to BACnet gateway, with a 128 Modbus object mapping capability, and is designed to interface third party Modbus control products onto a BACnet system.

The CCI-2242 BACnet controller is a multi-purpose product with inputs and outputs that can be used to monitor and control building services plant or configured to customer specific applications.

● **For more information visit www.titanproducts.com or call +44 (0)161 406 6480**

Ultramax WM from MHS Boilers

The competitively priced and popular Ultramax WM high efficiency condensing boiler from MHS Boilers now comes with a two-year full parts and labour guarantee, as well as its first annual service, included as standard.

The inclusion of the first year service on the Ultramax WM has been widely welcomed. Additionally, the full guarantee and annual service can be extended with one of MHS Boilers' maintenance and service packages.

● **For more information visit www.mhsboilers.com**

Bio-fuel Boilers from Atlantic

Atlantic's R Series, dual-fuel, year-round maximum condensing boiler, can burn rapeseed oil, natural gas, vegetable and waste oils, LPG or kerosene in a clean manner and within EU NOx emission standards. For all these fuels, efficiencies exceed 92% GCV and can rise up to 99.5% GCV. The boiler will condense to its maximum efficiency, even at 82°C flow and 71C return. For combustion air at inlet temperatures below 30C, efficiencies always exceed 92%.

● **For more information email info@atlanticboilers.com or visit www.atlanticboilers.com**

Green heating from leftover timber

Green and Easy is a distributor of green products for the home and garden and so naturally took to the idea of using their wood waste usefully to heat its small warehouse. The heat comes from a Fabbri wood burning heater, distributed in the UK and Ireland by Euroheat, suitable for burning all types of dry wood and secondary waste wood, like broken pallets. Efficiency is high – around 83% – and heating starts 15 minutes after lighting.

● **For more info visit www.euroheat.co.uk or call +44 (0)1885 491100**

Energy efficient Dimplex air curtains can help hit CRC targets

Large organisations across the public and private sectors are actively looking for ways to reduce their energy consumption, and Dimplex air curtains can help by creating a stream of fast-moving air that stops treated air from escaping through open doorways.

Specifying air curtains, or upgrading them to more efficient units, can offer a fast and easy way to reduce the energy required to maintain a comfortable indoor environment.

● **For more information call +44 (0)1489 773336, email marketing@dimplex.co.uk or visit www.dimplex.co.uk**

Aggreko opens new national rental centre

Aggreko, the global leader in temporary power and temperature control solutions, has opened its new National Rental Centre in Cannock, Staffordshire. The move brings together the 24/7 operations centre and head office for Northern Europe and signals the company's long-term commitment to the UK and European markets, despite the tough economic conditions facing many industry sectors.

● **For more information call +44 (0)8458 247365, email hire@aggreko.co.uk or visit www.aggreko.co.uk**

Products & Services

Telephone: 020 7880 6206 **Email:** darren.hale@redactive.co.uk

High efficiency RDM controls for new Aviva Stadium

Dublin's new Aviva Stadium is equipped with 64 cold rooms, all controlled by an RDM Data Manager. The installation required 8km of ethernet cabling to connect the refrigeration systems and controls. It supports the stadium's vast catering facility, which serves 50,000 capacity crowds. Martin Kerr, of installer Montgomery Refrigeration, said: 'The RDM controls ensure it operates at peak performance, minimising energy costs and pinpointing any potential issues.

● **For more information call +44 (0)141 810 2828**

ICS (Eastern) provides critical controls at Frimley Park Hospital

Building controls expert, ICS (Eastern), has installed a new building management system in six operating theatres for Frimley Park Hospital in Surrey. This included the automation of several of the theatres' special 'air curtains' around operating tables to help keep infection at bay. These are connected to the system and can be easily accessed by the surgeon. The display screen allows the surgeon to view the temperature in the operating theatre and adjust accordingly.

●**For more information call +44 (0)1603 879510 or visit www.ics-eastern.co.uk**

Planor SR revamped with LEDs

Thorn's Planor SR now employs LED technology to guarantee lighting quality.

The lay-in 600mm sq luminaire uses a dimmable Cree 58W LED module with active colour management and a micro prismatic lighting technique that regulates the light. This ensures colour temperature stability of 3500K through life, a colour rendering index (CRI) of 92 and reduced glare. It solves one of those eternal problems – how to give even yet 'soft' lighting over an entire desk surface.

● **For more information visit www.thornlighting.co.uk**

Dimplex pumps to create mega heat at college

A new college campus being constructed in Luton has used Dimplex ground source heat pumps to help meet its twin objectives of energy efficiency and sustainability in a large-scale 1.5MW installation.

As part of the Building Schools for the Future initiative, the £56m development will see a new Luton Sixth Form College built. The design consists of 28 ground source heat pumps ranging in size from 11kW to 75kW.

● **For more information call +44 (0)1489 773336, email marketing@dimplex.co.uk or visit www.dimplex.co.uk**

Classroom ventilation units

Aircraft Air Handling's 260mm-high classroom ventilation units: silenced to nr25; plate recuperator 60% efficient; air volume 0-500 litres. Heating: LPHW/ELECTRIC. Cooling: CW/DX. Larger air volumes and bespoke units are available.

● **For more info visit www.aircraftairhandling.com**

Armstrong integrated heating solution speeds London apartment block refurb

When property management company PCP took over an old building that had been a hostel for nurses at the Royal Free Hospital, it had an ambitious scheme in mind.

The 1907 building, Ornan Court, is in the desirable Belsize Park area of London. Armstrong's award-winning MBS integrated heating solution was specified, and was a great success.

● **For more information call +44 (0)161 223 2223, email salesuk@armlink.com or visit www.armstrongintegrated.com**

Fläkt Woods introduces industry first scrappage scheme

Fläkt Woods has introduced an industry first: a scrappage scheme for fans, offering a 10% discount to any customers replacing their old fan with the new 'Twist Wing' fan, and the company also guarantees to completely recycle the removed fan.

To assist the increased need for low energy options, Fläkt Woods has developed a unique design for a mounting configuration named Twist Wing, which can accommodate foot mounted IE2 category motors and maintain high fan efficiencies.

● **For more information call +44 (0)1206 222549 or email info.uk@flaktwoods.com**

Products & Services

Telephone: 020 7880 6206 **Email:** darren.hale@redactive.co.uk

New Grundfos web portal

Enter the Grundfos' web portal and see how this link can help to simplify pump selection:

- Product information on specific Grundfos pump families and their areas of application;
- Quick pump selection – in just a few clicks allows you to select pumps that will meet the needs of your particular application;
- Downloads – quickly find and download all the information you need when you need it; and
- Lexicon – a quick reference guide to both familiar and less familiar industry terms.

● **Visit www.grundfos.com/commercialbuilding or call +44 (0)1525 850000**

Hospital heating update

A major overhaul of the heating system at St Ann's Hospital, Tottenham was completed in December. Working in conjunction with Broag-Remeha, Kirkfields Heating Services of Enfield specified a mix of both commercial and domestic boilers from the Remeha product range. Replacing outdated systems, a total of 14 Remeha boilers from across the Quinta range and one Gas Eco 610 now serve a variety of areas throughout the hospital complex.

● **For more information visit www.remeha.co.uk.**

KNX technology provides complete control

A complete home automation system at a private house in Leicestershire has been completed by KNX UK member and building automation specialist Design Innovation. The company was contracted to undertake a complete turnkey solution, including electrical installation. KNX technology has been used extensively in the property to control lighting, blinds, curtains, heating and hot water. The scheme incorporates halogen and LED light sources.

● **For more information call +44 (0)845 869 5908, email admin@knxuk.org or visit www.knxuk.org**

Your guide to building services suppliers Directory

Telephone: 020 7880 6206 **Email:** cibsedirectory@redactive.co.uk

Air Conditioning

Air Handling

CAD Services

Fluid Flow

Energy Efficiency

LST Radiators

Pump Packages

When it comes to replacing old R22 systems, you can now tempt your customers out of hiding with our new R410A VRF Replace Multi systems

Mitsubishi Electric's new range of **R410A VRF Replace Multi systems** provide the perfect solution for the replacement of ageing R22 systems. These highly efficient heat pump and heat recovery units enable the reuse of existing old R22 / R407c pipework plus the control and mains wiring. With the ability to use existing pipework connected to other non-Mitsubishi Electric systems the new R410A VRF Replace Multi systems dramatically reduce installation costs.

Our comprehensive range of replace models offer anyone with an existing R22 system the simplest and most cost effective way of upgrading to a more energy efficient system which will dramatically reduce running costs and CO_2 emissions.

for more information call: **01707 282880** email: **air.conditioning@meuk.mee.com**

MITSUBISHI ELECTRIC
AIR CONDITIONING SYSTEMS

REPLACE MULTI

TIME R22 REPLACE

www.mitsubishielectric.co.uk/aircon

CPD Programme

The *CIBSE Journal* CPD Programme

Members of the Chartered Institution of Building Services Engineers (CIBSE) and other professional bodies are required to maintain their professional competence throughout their careers. Continuing professional development (CPD) means the systematic maintenance, improvement and broadening of your knowledge and skills, and is therefore a long-term commitment to enhancing your competence. CPD is a requirement of both CIBSE and the Register of the Engineering Council (UK).

CIBSE Journal is pleased to offer this module in its CPD programme. The programme is free and can be used by any reader. It is organised jointly by *CIBSE Journal* and London South Bank University, and will help you to meet CIBSE's requirement for CPD. It will equally assist members of other institutions, who should record CPD activities in accordance with their institution's guidance.

Simply study the module and complete the questionnaire on the final page, following the instructions for its submission. Modules will remain available online at **www.cibsejournal.com/cpd** while the information they contain remains current. You can also undertake the questionnaire online, and receive your results by return email.

Renewable and efficient heating

Since heat pumps are now officially recognised by the UK government and European Union as renewable energy, they qualify for the latest incentive initiative that will come into effect from April 2011. Called the Renewable Heat Incentive (RHI), it gives a fixed payment for the renewable heat generated in building. This CPD article will look at the implications of the RHI and compare some renewable heat producing options for a particular commercial building, in the light of the latest information available. Renewable heat provision includes air/ground source heat pumps, solar thermal, biomass boilers, renewable CHP and use of biogas/bioliquids.

The Renewable Heat Incentive is a fixed payment for the renewable heat generated and is similar to the Feed-in Tariffs (FiTs), a comparable scheme for electricity which went live in April 2010. It has done more than anything else to accelerate the installation of renewable energy capacity in Europe.

While the Renewable Heat Incentive (RHI) is very similar to FiTs, there are some important differences due to the fact that nearly every building in the UK generates its own heat from a gas or oil boiler. In other words, there is no national grid for heat, and so importing and exporting heat is irrelevant.

To date the details of the scheme have not been finalised by the UK government, so there is some doubt as to the precise content of the scheme.

Under current proposals – subject to any changes implemented by this autumn's government spending review – the key elements of the RHI include the following:

- The scheme will support a range of renewable technologies including air- and ground-source heat pumps, solar thermal, biomass boilers, renewable CHP and use of biogas/bioliquids;
- RHI payments will be claimed by and paid to the owner of the equipment;
- In small and possibly medium-sized installations, installers and equipment will have to be certified under the Microgeneration Certification Scheme or equivalent standard;
- The proposal is that payments are made annually for a number of years, for equipment below 45kW and quarterly for larger systems. Payments will be subject to conditions such as continued operation and maintenance of the equipment;
- Payments will be made on the amount of predicted heat output generated in kWh when installed; and
- RHI will remain open to new projects until 2020 and eligible installations completed after 15 July 2009 will benefit from the scheme.

Figure 1 indicates the proposed tariff levels within the RHI consultation document. >

> However, these are not final and may be moved up or down.

Heat pumps have already proved their worth as energy efficient cooling and heating systems for today's buildings. With the latest development of 'heating-only' heat pumps designed to take the place of the heating-only gas boiler, or the biomass/biogas system, there is now an alternative renewable technology to be considered. For the forseeable future it seems likely that all the renewable technologies will have specific applications that benefit most from the particular technology.

For example, biomass may be best for projects that require large amounts of hot water, such as hospitals. In the size range 50 to 200kW heating capacity, heating-only heat pumps offer ease of design and installation, ease of operation and maintenance, and flexibility in heat source (ground or air). In a comparison between heat pumps and gas-fired boilers, the most efficient gas boiler provides 93 units of heat for 100 units of gas input, while a heat pump operating at a COP (see below) of 3.5 can produce the same 93 units of heat from 53 units of gas input.

The principles of operation of a heat pump have been well documented in previous CPD articles, the most recent being the February 2010 issue, 'Design of air-source heat pumps for heating and hot Water'. The performance of a heat pump is defined by its COP (coefficient of performance), which is the ratio between useful heat output and the total energy input (normally electrical energy) to drive the system. A typical seasonal value of COP for an air-source heat pump providing hot water at 40C in an ambient of 0C would be 3.5 to 4.0. A typical value for a ground source heat pump would be 4.5 to 5.0. This means that, for every kW of electrical energy to drive the heat pump, 3.5 to 5.0kW of heat is generated (ie, an overall 'point of use' efficiency of 350% to 500%).

In order to maximise COP it is necessary to minimise the temperature difference between the heat source and the heating requirement. CIBSE Guide F: *Energy Efficiency in Buildings*, states that for every 1C increase in this temperature difference the heat pump requires 3% more energy to drive it. Design and specification for a heat pump system is therefore vital, as is commissioning and maintenance of the installed system.

In his book, *Sustainable Energy – Without the Hot Air*, Professor David MacKay maintains that heat pumps are superior in efficiency to condensing boilers, even if the heat pumps are powered by electricity from a power station burning natural gas. In the *CIBSE Journal* August 2010, Huw Blackwell of Hoare Lea compares the performance of heat pumps with combined heat and power, and drawing out some of the practical points about heat pumps that can adversely affect their efficiency, such as the need for defrosting the outside heat source coil when the ambient drops below about 5C. A further article in the same Journal issue, 'Gaining Ground, Heat Pumps 2 Specification', acknowledges the growth that has taken place in the heat pump market and again emphasises the need for good design at the building stage before selecting the appropriate heating technologies.

Comparing renewable technologies

If we take a fairly typical office building of about 2,800 sq m and a design heat load 200kW, to meet the heating demand, the following systems can be considered:

- Air-to-water heat pump comprising an outdoor unit and two water heating units;
- A biomass, wood pellet-burning boiler; and
- A condensing gas boiler.

The heat pump system is shown in Figure 2 and the biomass cycle in Figure 3. Biomass is a biological material such as wood, waste or biogas and is a renewable energy source. A biomass boiler is regarded as a zero carbon technology and the cycle between production and absorption of CO_2 is short in comparison with other fuels.

In this example, the costs for the biomass system are based on the Biomass Heating Guide CTG012 produced by the Carbon Trust. The tariffs and emissions factors in Figure 4 are based on information in the SAP 2009 version 9.90(March 2010) document. Figures 5 to 8 speak for themselves with regard to comparative costs, efficiency and emissions.

Note that the water flow temperatures achievable for the three options are:

- Heat pump 55C
- Biomass boiler 90C
- Gas boiler 85C

There are several issues that need to be addressed when using biomass boilers. In urban and inner city areas delivery and storage of the fuel is a problem, even prohibiting its application in some cases. There can also be a problem in rural areas where delivery involves long transport distances for the fuel, resulting in an overall increase in CO_2 emissions for the application.

Maintenance and testing of a biomass boiler and associated equipment is generally greater in time and cost than heat pumps or gas boilers. Should biomass installations increase significantly in the future, there may come a point where the UK cannot meet the fuel demand and the fuel has to be imported. This again would increase the CO_2 emissions.

A fairly typical office building may be able to make use of an air-to-water heat pump

Technology	Scale	Tariffs (pence/kWh)	Tariff lifetime (years)
Small installations			
Solid biomass	Up to 45kW	9	15
Biodiesel (restricted use)	Up to 45kW	6.5	15
Biogas on-site combustion	Up to 45kW	5.5	10
Ground-source heat pumps	Up to 45kW	7	23
Air-source heat pumps	Up to 45kW	7.5	18
Solar thermal	Up to 20kW	18	20
Medium installations			
Solid biomass	45kW–500kW	6.5	15
Biogas on-site combustion	45kW–200kW	5.5	10
Ground-source heat pumps	45kW–350kW	5.5	20
Air-source heat pumps	45kW–350kW	2	20
Solar thermal	20kW–100kW	17	20
Large installations			
Solid biomass	500kW and above	1.6 - 2.5	15
Ground-source heat pumps	350kW and above	1.5	20
Biomethane injection	All scales	4	15

Figure 1: Proposed tariff levels for the Renewable Heat Incentive *Source: RHI consultation document*

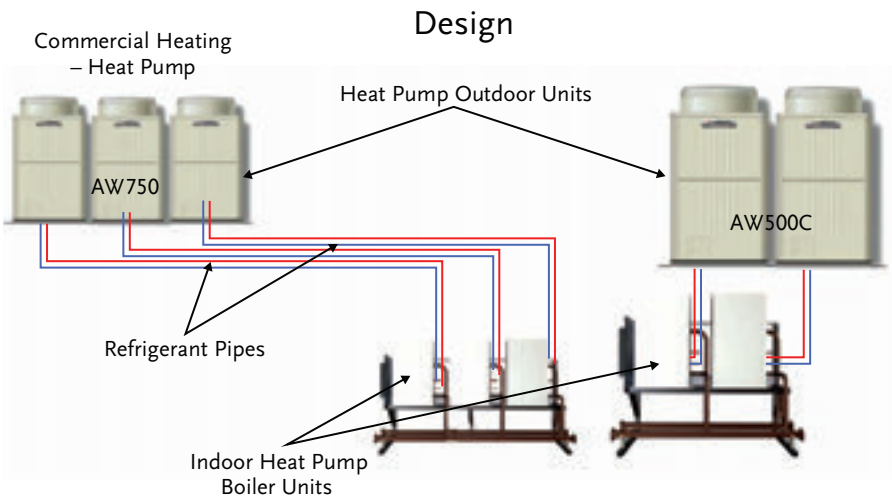


Figure 2: Heat pump water system

From the example used, while the heat pump solution has many points in its favour, it is important to emphasise the need to consider all options for each building application. It would seem that the future will include heating solutions that make use of each of the renewable technologies. The following points should be considered:

- Capital and installation costs are similar for heat pump and biomass boiler, but the gas boiler has significantly lower costs;
- The heat pump system costs the least to run on an annual basis, though very similar to the gas boiler. Biomass has higher running and maintenance costs;
- A biomass boiler has the lowest CO_2 emissions by far, though fuel transport is not included;
- Heat pumps have the highest efficiency by far, but this can easily be reduced with poor design/application/commissioning and maintenance; and
- Gas boilers occupy the least space, though the entire heating system is comparable to heat pumps, while biomass boilers and ancilliary equipment occupy the most space.

	Electricity	Wood Pellets	Gas
Tariff (p/kWh)	13	4	5
CO_2 Emission Factor (kg/kWh)	0.544	0.026	0.184

Figure 4: Assumed fuel tariffs

References:

CIBSE Journal August 2010, CIBSE News editorial
Sustainable Energy – without the hot air, David MacKay, **www.withouthotair.com**
CIBSE Journal August 2010, *Sustainability without the hot water*, Huw Blackwell
CIBSE Journal August 2010, *Gaining ground, Heat pumps 2* article
Mitsubishi CPD 30, Information Guide, *Commercial heating*, 2009
Mitsubishi presentation, *Commercial heating analysis*, 2010
Renewable Heat Incentive, **www.rhincentive.co.uk**

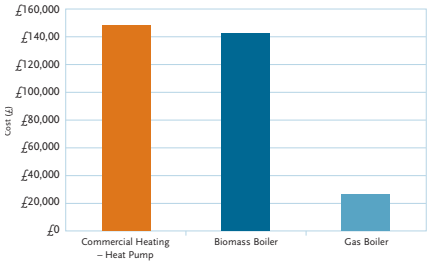


Figure 5: Capital and installation costs

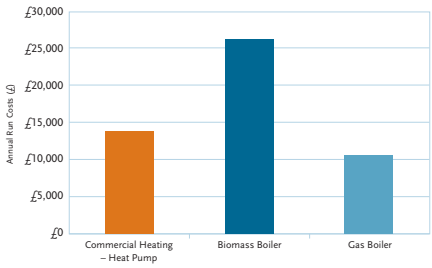


Figure 6: Annual running costs

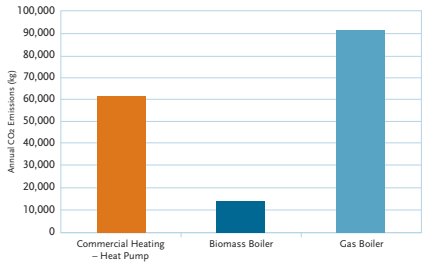


Figure 7: Annual CO_2 emissions

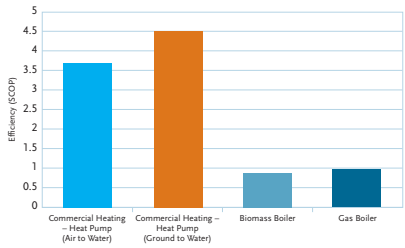


Figure 8: Seasonal efficiency

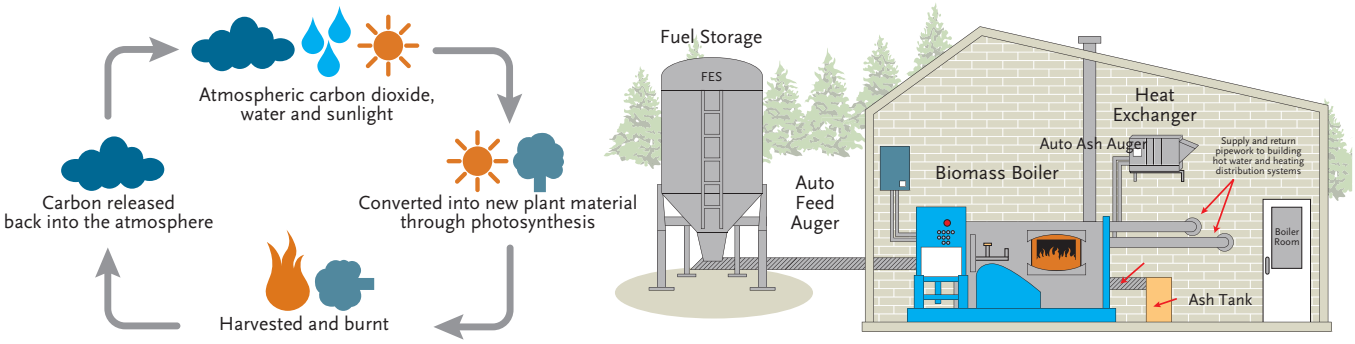


Figure 3 The biomass cycle and system

Module 20

September 2010

1) Which of the following is not a key element of the Renewable Heat Incentive scheme?

- ☐ A The scheme is the same as the Feed-in Tariff scheme
- ☐ B The scheme will support a range of renewable technologies
- ☐ C RHI payments will be claimed and paid to the owner of the equipment
- ☐ D Payments will be made on the amount of heat output generated in kWh when installed
- ☐ E In small installations, installers and equipment will have to be certified under the Microgeneration Certification Scheme or equivalent standard

2) What is the proposed RHI tariff for a 40kW air source to water heat pump?

- ☐ A 5.5p/kWh
- ☐ B 6.5p/kWh
- ☐ C 7.5p/kWh
- ☐ D 7.0p/kWh
- ☐ E 2.0p/kWh

3) What is the maximum flow water temperature from a biomass boiler?

- ☐ A 80C
- ☐ B 70C
- ☐ C 55C
- ☐ D 90C
- ☐ E 85C

4) In the case study of this article, what is the seasonal efficiency of a ground source to water heat pump?

- ☐ A 3.5
- ☐ B 5.0
- ☐ C 2.0
- ☐ D 0.9
- ☐ E 6.0

5) Which of the following statements is not true?

- ☐ A Capital costs are similar for both heat pumps and biomass boilers
- ☐ B Gas boilers occupy the least space, though the entire heating system is comparable to heat pumps
- ☐ C The biomass boiler has the highest CO_2 emissions
- ☐ D The heat pump system costs the least to run on an annual basis
- ☐ E Heat pumps have the highest efficiency compared with biomass or gas boilers

Name (please print) .....

Job title .....

Organisation .....

Address .....

.....

.....

Postcode .....

Email .....

Are you a member of:

☐ CIBSE

If so, please state your membership number

(if available) .....

☐ Other institution

(please state) .....

To help us develop future CPD modules, please indicate your primary job activity:

- ☐ Building services engineer
- ☐ Mechanical engineer
- ☐ Electrical engineer
- ☐ Commissioning engineer
- ☐ Energy manager
- ☐ Facilities manager
- ☐ Other (please give details) .....

If you do NOT wish to receive information about Mitsubishi Electric, the sponsors of this CPD module, please tick here: ☐

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

Please go to **www.cibsejournal.com/cpd** to complete this questionnaire online. You will receive notification by email of successful completion, which can then be used to validate your CPD records in accordance with your institution's guidance.

Alternatively, you can fill in this page and post to:
N Hurley, CIBSE, 222 Balham High Road, London, SW12 9BS

Events & Training

NATIONAL EVENTS AND CONFERENCES

● **18 Sep 2010 The YEN Autumn Ball** Cambridge
Young Engineers Network event. www.cibse.org/yen

● **22-24 Sep 2010 National Housing Federation Annual Conference** Birmingham
Affordable housing event. www.housing.org.uk

● **01 Oct 2010 CIBSE Intelligent Buildings Seminar** London
Saving costs and delivering sustainability. www.cibse.org/ibg

● **01-02 Oct 2010 AECB Anniversary Conference** Powys
Talks, workshops, demonstrations and more. www.aecb.net

● **05 Oct 2010 Solids Handling and Processing Association (SHAPA) Knowledge Conference** Loughborough
One day conference. www.shapa.co.uk

● **07 Oct 2010 CIBSE/ASHRAE Graduate Award** London
Five finalists will give presentations before the winner is announced. www.cibseashrae.org

● **08 Oct 2010 President's Awards Dinner** London
Includes the presentation of the CIBSE Undergraduate Award. vwilliams@cibse.org

● **12 Oct 2010 Hinton Lecture and Dinner** London
Speaker Dr Lyn Evans. Helen.berrington@raeng.org.uk

● **12-14 Oct 2010 Energy in Transition** London
Meeting future energy demands. events@energyinst.org

● **15 Oct 2010 Part G – Reading between the lines** London
Provision of domestic hot and cold water services. vwilliams@cibse.org

● **17-18 Oct 2010 ACE GCG 2010 Conference** Abu Dhabi
Risk management and more. nbari@acenet.co.uk

● **19 Oct 2010 What's New About Part L 2010?** London
Updates for the building services sector. www.cibsetraining.co.uk

SOCIETY OF LIGHT AND LIGHTING

Visit the SLL pages via www.cibse.org

● **07 Oct 2010 SLL Masterclass – The Low Carbon Challenge** Birmingham
Julie Kane, sll@cibse.org

● **19 Oct 2010 Energy in Lighting** London
Carbon Reduction Commitment and design. sll@cibse.org

● **28 Oct 2010 SLL Masterclass – The Low Carbon Challenge** Leeds
Julie Kane, sll@cibse.org

CIBSE REGIONS

● **15 Sep 2010 The benefits of stainless steel in above- and below-ground drainage applications** Manchester
Speakers: Frank Netherwood and Simon Vautrey (Blucher UK). doug@dpconsultants.co.uk

● **16 Sep 2010 Update on changes to Building Regulations Part L 2010** Chichester
An overview of the likely changes. Malcolm Atherton 0161 872 4811

● **17 Sep 2010 Southern Region Golf Challenge** Chichester
A fun golfing day out. doug@dpconsultants.co.uk

● **21 Sep 2010 UPS and IT Data Centres** Northampton
Further details to be advised. denseldavy@ntlworld.com

● **17 Nov 2010 Energy Efficiency Opportunities from Zip Heaters** Manchester
Speaker: Adrian Hippert. Malcolm Atherton 0161 872 4811 or m.atherton@dssr.co.uk

CIBSE/OTHER TRAINING

● **07 Sep 2010 Air conditioning inspection training** London
How to undertake inspections and become accredited by CIBSE. www.cibsetraining.co.uk

● **21-22 Sep 2010 LCC/EPC training course** Birmingham
Becoming Low Carbon Consultants and Low Carbon Energy Assessors. www.cibsetraining.co.uk

CPD TRAINING

Visit www.cibsetraining.co.uk, call 020 7675 5211 or email eventbookings@cibse.org.

BUILDING REGULATIONS

● **14 Sep 2010 Part L Building Regulations** Manchester

● **28 Sep 2010 Part L Building Regulations** Birmingham

● **07 Oct 2010 Part L Building Regulations** Liverpool

● **18 Oct 2010 Part L Building Regulations** London

● **20 Sep 2010 Part L Building Regulations** Bristol

ENERGY EFFICIENCY

● **21 Sep 2010 Introduction to Energy Efficiency** London

● **22 Sep 2010 The Carbon Reduction Commitment (CRC)** London

● **23 Sep 2010 Energy Strategy Reports** London

MECHANICAL SERVICES

● **15-17 Sep 2010 Mechanical Services Explained** Birmingham

● **15 Sep 2010 Design of Heating and Chilled Water Pipe Systems** London

● **16 Sep 2010 Design of Ductwork Systems** London

● **12 Oct 2010 Introduction to Building Services** London

● **13 Oct 2010 How To Specify A Ground Source Energy System** London

● **18 Oct 2010 Air conditioning basics 1: comfort, climate and heat gains** London

FIRE SAFETY

● **23 Sep 2010 Control of Door Release Arrangements (1/2 Day)** London

● **05 Oct 2010 Part B (Fire Safety) of the Building Regulations** London

ELECTRICAL SERVICES

● **28-30 Sep 2010 Electrical Services Explained (Three days)** Birmingham

● **14 Oct 2010 Introduction to BS 7671:2008 Requirements for Electrical Installations** London

PERSONAL DEVELOPMENT

● **16 Sep 2010 Presentation Skills for Engineers** London

● **6 Oct 2010 Practical Project Management** London

Send your event details to **cbailey@cibsejournal.com**

Conference: what's new about Part L?

Paul DeCort will address delegates at CIBSE's conference on Part L in October

To help prepare for the updated Part L of the Building Regulations, CIBSE is holding a one-day conference on 19 October in London.

The changes will prove to be the toughest yet, as part of the government's plan for lower carbon buildings. Attendees will gain an understanding of the differences between the new regulations and the current ones.

Industry professionals will highlight the impact these changes will have on the industry, along with other critical issues, such as the financial and practical implications that come with these revisions. Speakers include: Paul DeCort (above), from the Department of Communities and Local Government, who will give an overview of the changes to the regulations, standards and guidance; and Paul Davidson, of BRE, who will be speaking on modelling and the impact on EPCs.

The conference will also highlight case studies showing how the 2010 version will affect designs. Terry Wyatt, consultant to Hoare Lea, will chair the event.

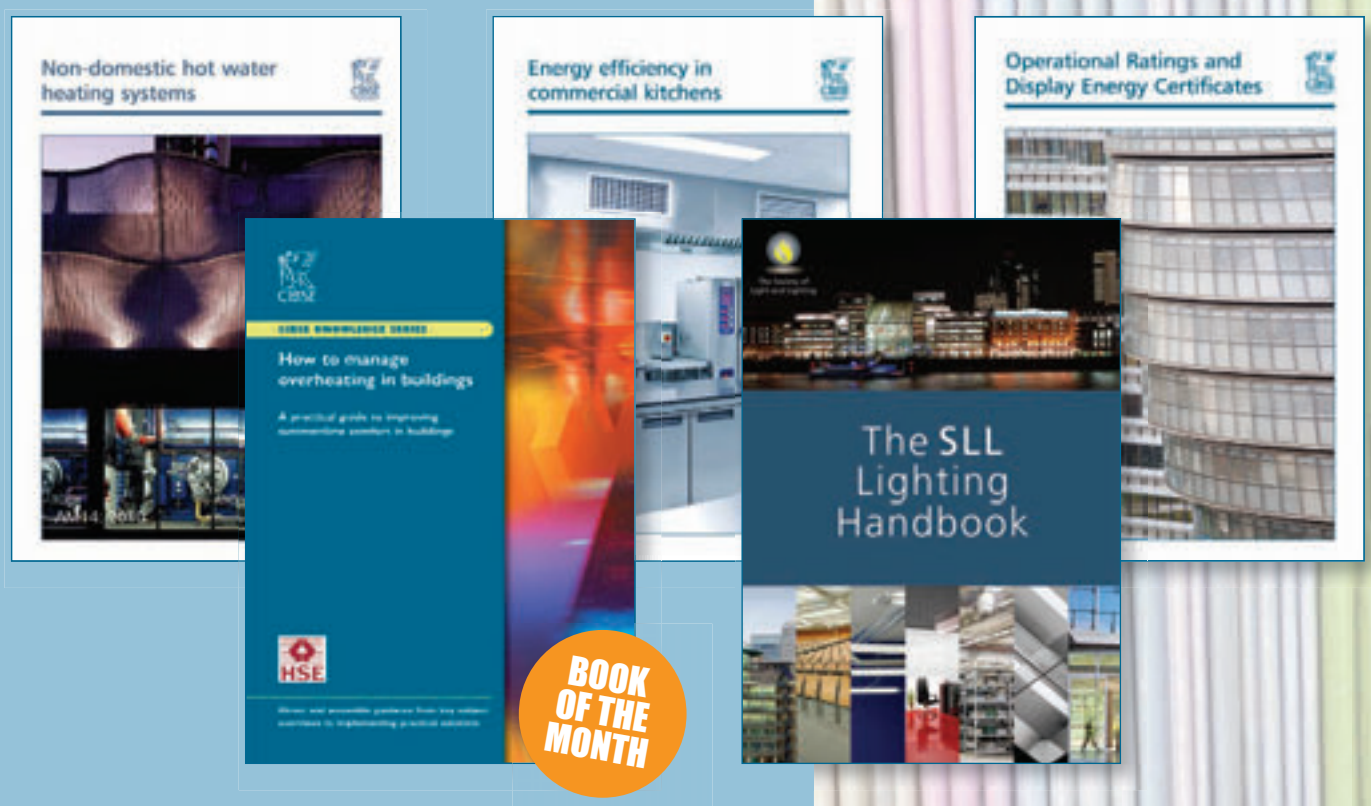
The conference will take place at the RSA in London (WC2N). **www.cibsetraining.co.uk**

CIBSE
Engineering a sustainable built environment

BOOKSHOP 2010

- CIBSE publications provide practical information and best practice guidance on a range of building services and energy topics.
- Publications range from the very technical to the hands on and cover a wide variety of subjects. They will be of benefit to those working throughout building services and the built environment, including: designers, facilities managers, contractors, lighting specialists and architects.

To view the full range of publications visit **www.cibse.org/bookshop**
to order call **020 8772 3618**
or email **pubsales@cibse.org**



UNIVERSITY OF OXFORD

www.ox.ac.uk/jobs

Refrigeration and Air Conditioning Engineer

£25,751 - £30,747 p.a.

Department of Physics

Joining the Building Services Team, you will work across two sites and four buildings within the Science Area, carrying out service, maintenance and repair on a range of air-conditioning, ventilation and refrigeration plant within the department

This is a new role and will require the development of a range of management systems as well as planning and managing a maintenance schedule. You will provide advice to the Building Services Manager on all aspects of the existing provision for such plant and make recommendations for modifications and new systems.

With a building services qualification, mechanical N.V.Q. or indentures in Refrigeration and Air Conditioning Engineering, you will ideally have experience of working in a building services environment. You will be suitably qualified in Air Conditioning and Refrigeration and Refrigerant Gas Handling and recharging (City & Guilds or CITB 2078, 2079, JO1 or JO11). You should have excellent communication and interpersonal skills and be computer literate.

You will be required to maintain a profile of continual professional development and seek to obtain the latest industry standards.

For further details of the post, please see **http://www.physics.ox.ac.uk/jobs/** Informal enquiries should be directed to Warwick Clifton (Building Services Manager) w.clifton1@physics.ox.ac.uk

Applications including a CV, covering letter and details of two referees should be sent to: personnel@physics.ox.ac.uk or to HR Officer, Department of Physics, Clarendon Laboratory, Parks Road, Oxford OX1 3PU by Friday 1 October 2010. Interviews will be held on Wednesday 20 October 2010. Please ensure you quote DT10-006 in all correspondence and applications.

Committed to equality and valuing diversity

CAPITA SYMONDS

Building Services & Low Energy Division

- Business Development Managers
- Sustainability Consultants/BREEAM Assessors

Capita Symonds is one of the largest multidisciplinary design consultancies in the country employing over 4500 staff throughout the UK and overseas, operating in all market sectors. We are looking to appoint high calibre individuals from within the building services industry for the following positions:

Business Development Managers - London, Southampton, Cambridge

The position(s) would ideally suit a senior status engineer within a current engineering consultancy who has a client focus approach to business development, but is now ready to make the next step in becoming a key member of a management team.

Sustainability Consultants / BREEAM Assessors - Redditch, Manchester, Glasgow

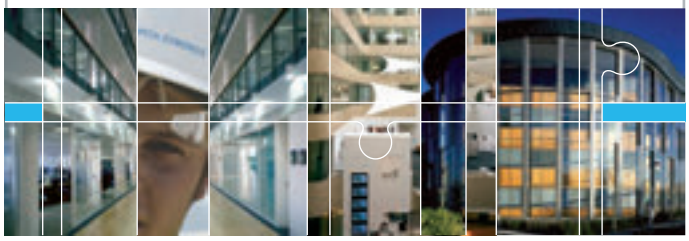
Sustainability Team Leader - Based in our Redditch office, the candidate will be experienced in the field of low energy/sustainability, possess good communication skills with the ability to contribute to continued growth and success of the team.

We also have vacancies for appropriately qualified senior and intermediate grades of sustainability specialists.

Packages will be commensurate with a FTSE100 company.

Please apply in writing with CV to Terry Ashmore, Capita Symonds, Salter House, 263-265 High Street, Berkhamsted HP4 1AB or email terry.ashmore@capita.co.uk

www.capitasymonds.co.uk/buildingservices



Principal Engineer

To £55k + benefits, Surrey

Our client is a medium sized Building Services consultancy with a national network of offices providing a wide range of services, assisting its clients in all aspects of Building Engineering Services. You should possess a wide breadth of experience and knowledge in the consultancy field, with a particular emphasis on detailed design and project management skills. You will be required to lead projects and should be able to demonstrate previous experience at this level.

Ref: BAR492/CB

Principal Electrical Design Engineer

£45k + benefits, Greenwich

The Principal Electrical Engineer will be taking a lead role in the design of electrical systems for a £300 million CrossRail station; this is an ideal opportunity for a Senior Engineer looking to progress into management and lead a team of MEP Engineers. Responsibilities include: working to develop employees' technical skills, producing fee proposals in response to enquiries, networking with internal and external clients. Applicants must be chartered and/or degree qualified.

Ref: BAR477/PA

Mechanical Design Engineer

To £30k + benefits, Yorkshire

Our client based in Yorkshire require a mechanical design engineer to assist them on range of education and health care projects including Building Schools for the future schemes. The consultancy are looking for a mechanical design engineer with experience of hevacomp calculation software for the mechanical design of building services such as pipe work, heating, ventilation and air conditioning systems. The ideal candidate will have a relevant HNC in engineering.

Ref: BAR499/JA

b-a-r beeby anderson recruitment

Thinking of your future

For further information and to apply, please call us on **0845 519 4455** or email **cv@b-a-r.com**

Building Services Vacancies

Not just any recruitment.

Wind Project Director
REF: 11310 **Brighton - Circa £60,000 + Benefits**
Our client is one of the world's largest employee-owned companies and they use their experience and resources to help deliver projects on any scale and implement development policies and programmes as well as advance sustainability. They are looking for a Project Director to take responsibility for technical due diligence and feasibility studies for onshore and offshore wind projects around the world. You should be and experienced wind energy professional with thorough understanding of technical advisory work for large on and offshore wind projects.

Construction Manager
REF: 11294 **Saudi Arabia - £110,000 + Expenses/Accommodation/Travel**
Our client is developing an Independent Power Project (IPP) in the Kingdom of Saudi Arabia. The project provides for the design, engineering, procurement and construction of a power generation plant and associated facilities to be located approximately 125 km to the west of Riyadh, Kingdom of Saudi Arabia. The power generation plant and associated facilities will be implemented under a lump sum turnkey EPC contract which is in place between our client and the EPC Contractor. You should be an experienced construction manager on CCGT power plant projects. Mechanical or civil discipline required

Renewable Energy Engineer - Wind Due Diligence
REF:11304 **Glasgow £ Negotiable**
Our client is looking to build their renewables team to provide advisory services for a range of international clients (private developers, utilities, government bodies) involved in the development, procurement, construction and operation of renewable energy projects and wind farms in particular. They are looking for a graduate engineer (mechanical or aeronautical) with relevant experience in the renewable energy industry - preferably offshore wind farms. This position will require travelling.
Contact Alex Hill on 01483 768 600 for additional information on the above and other Energy opportunities

Associate Mechanical Director
REF: 11098 **Central London £40,000 - £55,000**
A Multi-Disciplinary Consultancy are currently expanding their successful Building Services Department to the London area. Established and expanding their wide portfolio of exciting and challenging projects will attract a motivated self starter to lead an engineering team. The successful candidate will preferably be Chartered, commercially minded and have experience in the London market.
Contact Darren Warmington on 01483 768 600 for additional information on this and other Building Services opportunities

Call **01483 768600** or email **contact@bsvconsultants.co.uk** to enquire about these and other vacancies.

BSV Consultants
www.bsvconsultants.co.uk

The sound of music

Active musician **Paul Driscoll** explains why he left teaching for the melodious world of engineering acoustics

For Paul Driscoll, a musician by heart, becoming head of London acoustics at multi-disciplinary consultancy, BDP, was the perfect job – but it wasn't his chosen career by any means.

A graduate in music technology, Driscoll started his vocation as a part-time music teacher when he was just 16. His career in teaching lasted a few years, but it was an inspirational lecturer in university and a chance Google search many years later that led him into the acoustics sector.

Driscoll explains: 'I sat in a very dour electronics department lecture about logarithms and sound pressure calculations. The lecturer, David Howard, was incredibly enthusiastic. He started talking about how there were people out there whose job it was to design buildings for how they sound rather than just how they look.

'I had been interested in architecture since I was young but had never seen how that could tie in with my main passion – music. Then I suddenly saw that designing buildings for their acoustic properties would match up the artistic/creative side of architecture with the science of music and it would be a beautiful match!'

Now, as well as being an active musician playing in his 'human jukebox' band, the The Dukes Box, Driscoll manages a team of acoustic consultants providing advice to architects, building services engineers, interior designers and contractors – and he's still only 29 years old.

'One of the good (and often challenging) things about acoustics is that you will typically be working on many different projects simultaneously,' enthuses Driscoll. 'In any one day I will typically advise on six or seven different projects, dealing with queries from contractors, doing design workshops with architects,

> "There's a few more extract fan noise assessments than I had hoped, but there's still enough creativity and art to keep me interested"

marking up architectural plans to show acoustic requirements, or producing acoustic models of buildings.'

He leads a team of seven people, ranging from senior acoustic consultants to assistants, but also works alongside many other people in different professions as part of the overall design team – one of the joys of the job. Recent projects include two recording studio facilities, a television studio complex and a rehearsal hall for an opera company, as well as the usual schools and shopping centres.

Driscoll, who has been in the industry for just five years, admits that the job involves 'a few more extract fan noise assessments and motorway noise barriers than I had hoped', but says the fundamental principle is the same, and that 'there's still enough creativity and art to keep me interested'.

Email people appointments/ role profiles to **cbailey@cibsejournal.com**

Movers & Shakers

Design, engineering and project management consultancy Morgan Sindall Professional Services has appointed **Dominic O'Hara** as associate engineer. O'Hara is a member of CIBSE and a chartered engineer, based in the practice's London office.

Ian Watmore, former chief executive of the Football Association, is to become chief operating officer of the government's Efficiency and Reform Group. As CEO, Watmore will work closely with ministers to make sure there is a co-ordinated approach to tackling waste and improving accountability across all government departments.

Steve Bratt will replace David Pollock as group chief executive of the Electrical Contractors' Association, after Pollock announced that he would retire at the end of September. Following his retirement, Pollock will continue as an adviser to the association as well as representing the ECA's interests in Europe.

Multi-disciplinary consultancy Atkins has appointed **Phil Malem**, former head of Sellafield Limited's Capenhurst decommissioning facility, to lead the development of its nuclear strategy and positioning in new markets. He is Atkins' second senior energy management-level recruit this year, following the appointment of Tony Price.

Architectural and engineering practice Pick Everard has announced the appointment of two new associates, **Jose Hernandez** and **Matthew Sweeting**, and **Doug Soutar** as assistant director. Hernandez is a sustainability consultant, while Soutar joined Pick Everard in 2006 and has been key to the expansion of building services consultancy.

Mott MacDonald's director **Alan Powderham** has been awarded the 2010 Royal Academy of Engineering (RAEng) Sustained Achievement Award. This is one of the ultimate accolade for a British engineer and recognises Powderham's influence on civil engineering over the last four decades.

The government has announced that **Lord Heseltine** will chair the Independent Approval Panel for the £1bn Regional Growth Fund, which will allocate funds for schemes – including capital projects – to areas hit hardest by public spending cuts. The government is now seeking views on how the fund should be designed to best meet the needs of communities across England.

Business secretary Vince Cable has appointed **Roger Cashmore** as chair of the United Kingdom Atomic Energy Authority. Cashmore is the principal of Brasenose College, Oxford, and the current chairman of the Nuclear Research Advisory Council of the Ministry of Defence. He has previously worked for CERN, the European Laboratory for High Energy Physics.

Patrick D'Cruz has joined independent engineering and environmental consultancy Gifford as technical director. Based in Oxford, he will take a leading role in directing the mechanical and electrical engineering team.

Martin Burton is the new president of the Heating and Ventilating Contractors' Association for 2010/11. Burton is also an associate member of the Institute of Domestic Heating and Environmental Engineers. He has been a member of the association's council since 2005 and chairman of its commercial and contractual committee since 2007.

CIBSE BUILDING PERFORMANCE AWARDS 2011

CALL FOR ENTRIES

Engineering for a low carbon built environment

Wednesday 9 February
Grosvenor House
London

www.cibseawards.org

CMR

in complete control

CMR Controls manufactures low air pressure and air volume measurement sensors and control systems for standard air conditioning, clean rooms, sterile laboratories, containment facilities, and fume cupboard extract systems.

DPC CONTROLLER

Fast and accurate controls to drive high speed dampers or invertors. Full PID stand alone controls with BMS interface.

DPM PRESSURE SENSOR

Panel Mount Pressure or Velocity Transducers with remote alarms, analogue and digital interfaces. Traceable calibration certificates supplied as standard.

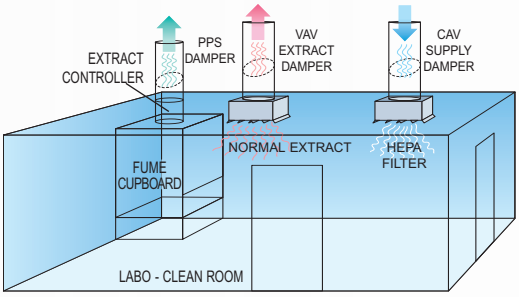
CAV AND VAV DAMPERS

Accurate air flow measurement with the unique CMR Venturi built into the airtight shut-off damper to control room pressure or constant volume.

Metal Damper

AIR MANAGEMENT SYSTEM

A complete turn-key system to control room pressure to +/-1Pa. Fume cupboard face velocity to 0.5m/s at high speed and provide constant air changes into the labo - clean room.



PPS EXTRACT DAMPER

Poly-propelene control and shut off valve incorporating the CMR Venturi Nozzle. This is essential when dealing with corrosive extract air especially from fume cupboard systems.

PPS Damper

PRECISION COMPONENTS FOR VENTILATION AND PROCESS CONTROL

CMR CONTROLS

A Division of C. M. RICHTER (EUROPE) LTD

22 Repton Court, Repton Close,
Basildon, Essex SS13 1LN. GB
Website: http://www.cmr.co.uk

Tel: +44 (0)1268 287222
Fax: +44 (0)1268 287099
E-mail: sales@cmr.co.uk

CMR®