CIBSE JOURNAL

The official magazine of the Chartered Institution of Building Services Engineers

March 2013

GOLDEN WONDER

CIBSE celebrates Max Fordham's services strategy at The Hive

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OPINION

The environmental engineer's strategy from the outset has been to minimise the base loads to meet The Hive's emission's target
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- Including more details on all the winners of the 2013 Building Performance Awards

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LEARNING

CLASSIFIED

PEOPLE AND JOBS

Energy efficiency targets getting you into hot water? It's about time...

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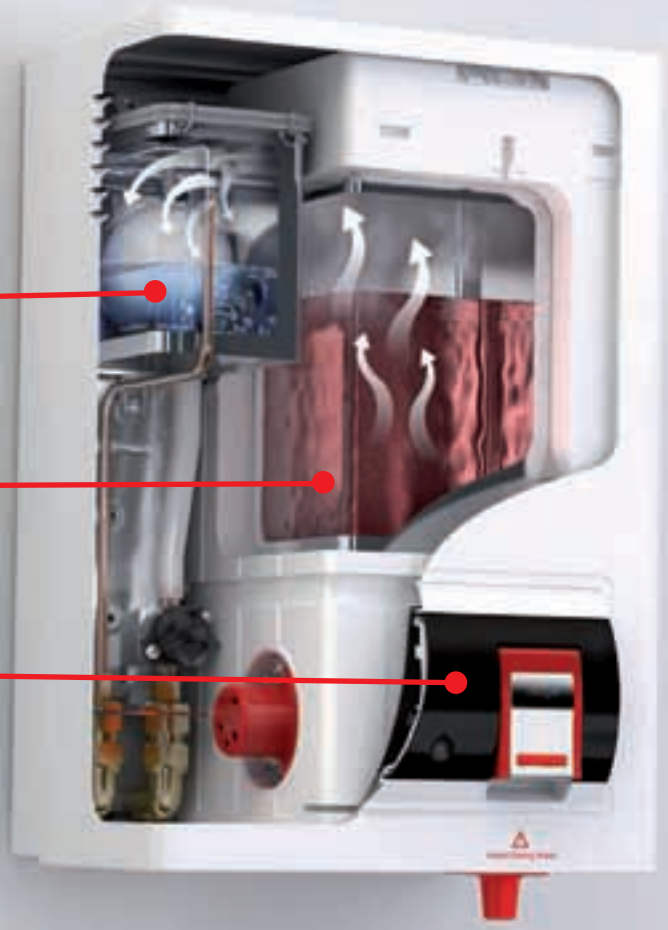

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Carbon champs

Congratulations to all the winners at this year's CIBSE Building Performance Awards, which took place at the Grosvenor House hotel last month. It was another triumph for British Land which followed up last year's success at the awards by being named overall Carbon Champion of the Year, as well as winning the Client Energy Management Award category.

At a time when the government seems to be veering away from the mandatory measurement of actual energy use via Display Energy Certificates (DECs), it's encouraging to hear Justin Snoxall say that British Land's commitment to energy management is adding value to assets long term. It's also of huge benefit to occupiers, with energy savings topping £1.6m from 2009-12.

Fellow property giant Hammerson has the same view and is looking to ensure buildings' energy use is accurately measured. Reaction to its proposal to introduce energy performance contracts for consultants that link energy performance certificates and DECs has created a storm of interest on CIBSE's LinkedIn group (page 17). Head of sustainability Paul Edwards will reveal more of Hammerson's plans next month.

> Hammerson's plan to introduce energy performance contracts for consultants has created a storm of interest on LinkedIn

While some of the large property firms already 'get' building performance, it is important that smaller building owners also have the means to record actual energy use. After presenting at last month's Edge debate (page 10) Bill Bordass told me there was a danger that smaller landlords without a cost-effecitve DEC tool could be squeezed competitively by bigger players, creating more efficient buildings that cost less to occupy. He's now looking at readdressing this situation with the help of CIBSE and other organisations.

For now, let us bask in the afterglow of last month's awards. Something that you can do literally at the Hive, with its shimmering scales of copper cladding. The winner of the award for New Build Project of the Year (above £5m) uses natural ventilation and light to minimise energy use. The building services engineer Max Fordham used water from the nearby River Severn to control summer temperatures, while a biomass boiler is used for primary heating powered by local wood chip (page 26).

We'll be looking at more award winners through the year, but in the meantime you can read a summary of all the building performance champions on the website at **www.cibsejournal.com**

Alex Smith, Editor
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NEWS

All the latest news from around the building industry

MAKING THE NEWS

An independent study has found that energy-efficiency measures have significantly helped to reduce the energy consumption of the *New York Times* building.

The post occupancy survey of the Renzo Piano 51-storey building in New York City shows that five years after opening, the building has an annual electricity consumption 24% lower than a building constructed to the energy efficiency codes of the time – ASHRAE 90.1-2001. Heating energy use is 51% lower, and peak electric demand is down 25%.

Bradford eco-homes hit by heat pump failure

CIBSE's Davies questions commissioning process

Sky high electricity bills undermining one of England's most high profile eco-home developments may be the result of poorly commissioned air source heat pumps.

The 45 houses in the £5.6m Pavilion Gardens development in Bradford are reported to be consuming as much as 7,264 kWh per year, which is more than double typical household levels of 3,300k Wh. Residents have been faced with bills of up to £1,600 in just six months.

Twelve of the homes were designed to Level 6 of the Code for Sustainable Homes, which means annual energy bills should be around £500. The rest were designed to Level 4.

They are highly insulated and use PV tiles, mechanical ventilation with heat recovery, and solar thermal systems, as well as the air-to-water and exhaust air heat pumps.

Bradford Council and the housing association Yorkshire Housing have been working with manufacturer NIBE to address the problem.

'This is an example of what can go wrong when Building Regulation 44 on commissioning is not complied with,' said CIBSE technical director Hywel Davies. 'This should not have happened if the local authority had been given a notice confirming that the fixed building services had been commissioned "in accordance with a procedure approved by the Secretary of State", as the regulations require,' added Davies.

Yorkshire Housing issued a statement saying the 'boilers at Pavilion Gardens are not performing as efficiently as they should and the manufacturer has visited properties on a number of occasions in order to rectify the problems'.

NIBE said the high bills were not solely related to the heat pumps, although it added that 'some of our heat pump units were not performing to their full potential and despite not being responsible for these issues – we have swiftly ensured remedial work has taken place.'

The company added that it was apparent the problems arose from 'incorrect installation or commissioning' and that 'end user operation also played a part'.

NIBE has also installed energy meters at each of the properties to monitor ongoing consumption, but added that it was having trouble getting the results back from the housing association.

'This sort of high profile incident will further ratchet up the pressure on the industry to deliver on its promises and ensure systems are properly integrated,' said B&ES head of sustainability David Frise.

'We are gaining more and more experience of low carbon technologies, but commissioning continues to be a huge training issue.

'We also have a job to do with end users. Enough time has to be built into the project because the days of "fit and forget" are over.

'Consumers are not familiar with these systems and manufacturers cannot oversee every single installation.'

In brief

GOVERNMENT AGREES DEMAND MANAGEMENT DEAL

The UK government has turned to demand management to cut energy use at peak times in public buildings, hospitals, universities and military facilities. It has signed a four-year agreement, through its Government Procurement Service, to help departments and agencies meet financial and sustainability targets and reduce the pressure on the National Grid.

Energy firms, including KiwiPower and Flexitricity, will provide demand response services to central government and public sector estates.

SCOTLAND HAS £5BN WORTH OF SHALE GAS

Scotland has up to £5bn worth of natural gas reserves, according to new research. The country is in a prime position to 'capitalise on shale gas' because of its existing and long-established oil and gas exploration expertise, according to a report by accountancy firm PricewaterhouseCoopers (PwC).

The lifting of the moratorium on fracking by the government has stimulated interest from investors who are looking at reserves in Fife, Stirling and Aberdeenshire. The *Shale Oil – the Next Energy Revolution* report said fracking could spark a new 'dash for gas' and boost the UK's GDP by between £30bn and £50bn by 2035.

In brief

RHI APPROVALS SOAR BY 80%

The last quarter of 2012 showed a significant growth in the number of projects approved for funding under the Renewable Heat Incentive (RHI).

Scheme administrator Ofgem reported 426 new applications between 1 October and 31 December, of which 409 were approved. This represents an 80% increase on the number of installations accredited in the previous quarter (227).

It also equates to 72 megawatts (MW) of additional capacity delivered via the RHI, which is a 47% increase on the 49.04 MW accredited in the previous quarter.

Biomass continues to account for a huge majority of the installations with 90% of the installed capacity, but there has been modest growth in solar thermal and ground source heat pump accreditations in recent months. In total, £1.3m was paid out by the scheme – a 53% increase on the £849,406 paid in the three-month period before.

Ofgem also said its enquiries line is busy. It is averaging more than 2,000 calls a month, with an increase in recent months and a peak of around 3,500 calls in November 2012.

DALLAS ATTRACTS RECORD NUMBERS

The ASHRAE Winter Meeting and AHR Expo held together in Dallas, Texas, set new records for an event in the South West of the US, with 2,840 delegates attending the meeting and 51,337 visiting the Expo.

See page 34 for full report

CIBSE frustrated by regulations delay

DIEZ ARTWORK / SHUTTERSTOCK

Government made a U-turn on 'consequential improvements'

Concern grows about the future role of Part L

The coalition government has made very little progress in developing and enforcing legislation designed to cut energy consumption in buildings, according to CIBSE technical director Hywel Davies.There is also too much focus on individual measures in the existing regulations and not enough on improving the performance of complete building systems.

He told a recent meeting of the CIBSE Patrons group that the Institution was 'frustrated' by the lack of commitment shown to various measures by politicians. He added that there was even growing concern about the future role of Part L of the Building Regulations.

'The government says it is still committed to zero carbon new homes by 2016, but that the deadline is getting very tight,' said Davies. 'The whole thing is looking flaky, especially since the Department for Communities and Local Government (DCLG) launched a complete review of the Building Regulations.

'This government has a real appetite for deregulation, which it sees as removing a burden on industry,' said Davies. He added that it was DCLG Minister Eric Pickles who had performed a U-turn on consequential improvements 'despite reports of overwhelming support for them in his own consultation'.

The government now operates a 'one-in-two-out' policy on regulations to ensure any new measures do not add to existing obligations for industry. 'That's what we are having to work with,' said Davies.

Surge in low carbon work predicted

Contractors have been urged to prepare now for an expected upturn in low carbon construction work by the head of the industry's leading skills agency.

Mark Farrar, chief executive of CITB-ConstructionSkills, said a decision to bring forward the date for setting decarbonisation targets within the revised Energy Bill would stimulate investment in green construction projects.

Tim Yeo, chairman of the House of Commons Energy and Climate Change Select Committee, has proposed the change as an amendment to the Bill.

However, Farrar warned that the industry needed to have 'the expertise and capacity to respond and deliver when this low carbon construction work comes online'.

'Those who have the right skills and qualifications will be in a strong position to make the most of the opportunities that will be generated – those without the right training will miss out,' he said.

The Construction Skills Network report in January showed a 9% fall in construction output in 2012, with significant improvement unlikely in 2013.

PASSAGE TO INDIA

Ahead of David Cameron's recent trade mission to India, engineers gathered to hear of the latest opportunities and technologies in the country's building services sector. The Indian Society of Heating Refrigeration and Air Conditioning Engineers (ISHRAE) conference co-sponsored by ASHRAE featured 100 presentations covering a theme of 'integration'. Seminars ranged from biomimcry in a 5-star hotel chain to ensuring the safety of tall buildings in emerging economic zones.

CIBSE Journal technical editor Tim Dwyer said the issues raised revealed there were 'significant opportunities for CIBSE members to be involved in developments across the booming Indian market'.

Humidity control 'secrets' revealed

Warning about risks of overchilling buildings

Oversized cooling systems are behind many humidity problems in buildings, the CIBSE ASHRAE Group heard last month.

The secret to controlling humidity is to build an airtight building; don't ever let it get too cold inside; and always dry the ventilation and makeup air, distinguished ASHRAE lecturer Lew Harriman told the group via a webinar link direct from the US.

'Massive cooling capacity usually cools a building so quickly that the system does not run long enough to remove humidity,' said Harriman, who is director of research at Mason-Grant Consulting in New Hampshire. 'You also need to remove the source of the humidity by drying the ventilation and makeup air.

'Often we overchill the building thinking that more air conditioning will automatically combat mould growth, but that is catastrophically the wrong thing to do. Excess cooling often creates the cold surfaces that absorb moisture and support mould growth,' he added.

'Sooner or later, every HVAC designer and every architect runs into a problem with humidity control or its consequences; dampness, mould growth, dripping pipes or complaints from occupants. The solutions are simple in concept: tight buildings, tight duct connections and adequate dehumidification. But in execution these demand understanding, cooperation and action that cross the outdated and counterproductive divide between engineering, construction and architecture.'

He urged system designers and building operators to focus on dew point and the relative humidity (RH) adjacent to cool building surfaces – not the RH in the air.

Harriman cautioned that buildings simultaneously operating natural ventilation and mechanical cooling were 'teetering on the edge of disaster... it can be done, but must be managed carefully. You have to separate mechanically-cooled areas from naturally-ventilated areas.'

In brief

CAMERON URGED TO FIGHT FOR LOW VAT

The Prime Minister has promised to address the threat to Britain's favourable VAT rate on energy saving measures.

Responding to a question from the Builders Merchants' Federation (BMF) on the question of retaining the 5% VAT rate, which has been declared illegal by the European Commission, Cameron said: 'I hear what you say and we will look at it' during the launch of the government's Energy Efficiency Mission at the Royal Society.

The BMF said it wanted Cameron to stand up to Brussels over its threat to take the UK to the European Court of Justice unless its ends the reduced rate on the purchase and installation of some energy saving equipment and measures.

BUSINESSES READY TO INVEST IN RENEWABLES

UK businesses are increasingly interested in generating their own renewable energy, according to a new survey.

More than one third of firms surveyed by Opus Energy expect to install PV panels, wind turbines, hydro power or anaerobic digestion on their own premises, with almost half of these (48%) expecting to be generating their own renewable energy in two years. This is a significant uplift since 2011 when just 26% were looking to introduce renewable energy within five years.

Firms see the benefits as being self-sufficient in energy (28%); generating additional income (23%); and 'doing our bit' to tackle climate change (17%).

In brief

ATKINS EX-CHIEF HITS OUT

Professional institutions were accused of being riven by class during a debate on the future of professionalism in the 21st century.

Keith Clarke, former chief executive of Atkins, said many institutions were still class based, 'which has no place in the modern world'. He also accused industry of being negligent in not asking government what they wanted, and said that institutions did nothing to 'bridge the gap.'

This was refuted by chairman of the Edge debate, architect Rab Bennetts, and others who said institutions sat on technical committees and helped inform government policy.

The debate concluded that the institutions provided a bulwark to unethical behaviour from commercial interests. But Clarke strongly contested Bennetts' assertion that architects were more likely to turn down unethical work opportunities than contractors.

The Edge debate also saw presentations from Bill Bordass and others who had contributed to an issue of *Building Reserach & Information* on professionalism.

B&ES CALLS FOR GREATER INTEGRATION

Senior figures at the Building & Engineering Services Association (B&ES) have called for greater integration across the industry.

Chief executive Blane Judd told the association's annual press lunch that history was littered with examples of industries and trade bodies that had 'fallen by the wayside' after failing to adapt and embrace change. Innovations like off-site prefabrication and methods to radically improve indoor air quality and occupant comfort must be developed by working in strategic partnerships with other like-minded bodies.

Deputy chief executive Roderick Pettigrew added that B&ES was now focused on a wider range of client sectors needing help with their energy efficiency strategies.

B&ES is producing an *Integrators' Guide*, which will be the subject of detailed debate at the CIBSE Technical Symposium in Liverpool this April.'

www.b-es.org

Consumers in dark about existence of Green Deal

YouGov survey finds low awareness of energy efficiency scheme

Two thirds of people are not aware of the Green Deal, according to a poll taken shortly after the government's flagship energy efficiency scheme was launched.

The majority of consumers believe energy suppliers should reduce their prices rather than householders having to carry out energy efficiency improvements.

The survey of over 1,960 adults by YouGov found that just 39% of people had heard of the scheme, with awareness highest among men and those aged over 60. However, the Department of Energy and Climate Change (DECC) said the result was pleasing.

'Thirty-nine per cent awareness barely two weeks after launch is very encouraging – and suggests that the government's communication campaign is having an impact,' a statement said.

'Consumers don't believe improvements will make a dent in their payments'

DECC said just 20% of people were aware of the scheme prior to the launch so this result was hopeful for the future of the initiative set up to pay for energy efficiency improvements in homes and businesses.

However, the survey also showed that many people think it will only make a 'small difference' in helping people improve their home's energy efficiency. Just 8% said it would make a 'big difference'.

It appears that most consumers blame energy suppliers for high fuel bills and don't believe Green Deal financed improvements will make enough of a dent in their payments. A third of those surveyed were worried about the cost of energy – double the number concerned about their rental payments.

About two thirds of the sample said 'energy companies need to stop making excessive profits from their customers', while only 30% agreed that people should install 'measures such as insulation to make their homes more efficient and bring their energy bills down'.

Sustainable properties commanding higher rents

Buildings with sustainable credentials are attracting more investors and their landlords can now charge higher rents, according to a study of the European real estate market.

Emerging Trends in the European Real Estate, published by the Urban Land Institute and PriceWaterhouseCoopers, revealed that landlords are now more likely to refurbish properties to give them 'green' features as these are now regarded as good long-term investment opportunities.

Potential occupants are also far more likely to insist on sustainable credentials before taking on a property, according to the report. Some landlords interviewed said it was 'the only thing' tenants wanted to know about.

'Investors and lenders, as they keep one eye on refinancing risk, want to know whether an asset will stand the test of time,' the report said. 'The need for flexibility and "future-proofing" buildings will see the green agenda take a significant step forward in 2013.'

Developers also expect to have little choice in the matter in the future, as regulation and taxes will force them to make their properties more sustainable, the report added.

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CIBSE NEWS

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Diversity Panel launch

The CIBSE Diversity Panel will be holding an event to celebrate its launch on 18 April at The Building Centre in London.

The event will be chaired by CIBSE past-president Andy Ford, with guests including Chi Onwurah MP, Shadow Minister for Innovation and Science, and Lorraine Martins, director of diversity and inclusion at Network Rail, previously responsible for equality and diversity at the Olympic Delivery Authority.

Please email Angela Ringguth at **aringguth@cibse.org** to be included on the guest list.

Training for mixed-use projects on offer

There is a growing business in mixed-use developments that require more detailed engagement from building services engineers.

Satisfying the demand for high-quality housing alongside high-quality, non-domestic or commercial spaces requires an understanding of complex design and performance standards.

A new one-day conference from CIBSE is designed to give attendees the information to work confidently in this area, whether for refurbishments or for new developments. The course runs on 14 March 2013, in London. For further information, visit **www.cibsetraining.co.uk**

International Lighting Conference

The International Lighting Conference, organised by the Society of Light and Lighting and CIBSE Ireland, will be held at Croke Park, Dublin on 12 April.

For more information and to book your place visit **www.cibseireland.org/cibse-annual-conference**

Patrons welcome new chairman

Fitzpatrick hopes to bring together wide-ranging experience of CIBSE Patrons

The CIBSE Patrons are pleased to welcome David Fitzpatrick, sales director at Ruskin Air Management, as their new chairman.

On taking up the position, Fitzpatrick said: 'It is with considerable pride that I begin life as the latest chairman of CIBSE Patrons. I am acutely aware of the excellent people who have held this post in the past, and would first of all like to thank my predecessor, Nick Mead, for his unstinting efforts in the role for the last five years.'

Fitzpatrick added that he was looking forward to bringing different ideas and thoughts to the role, and was struck by the depth and breadth of experience amongst the group, making his first priority to ensure that this is put to the best possible use by CIBSE.

He said: 'Patrons' membership reflects the full building services engineering supply chain and, therefore, we have the ability to address the important issues of the day from all angles. In particular, our experience of training and in technical, commercial and site-based knowledge can be of great practical benefit to the Institution.'

As well as plans to develop the Patrons into a forum, where knowledge and experience can be shared, there is also work underway on CE Marking, which is set to be a big issue in 2013.

The Patrons' relationship with the CIBSE Young Engineers Network is also developing and Fitzpatrick expressed his hope that the group can move this forward further to support the sector's efforts to recruit and retain talented young engineers.

Fitzpatrick will be working with Graduate of the Year 2011 winner, Angela Malynn, to develop work placements for young building services engineers with the Patrons.

For more information about the Patrons scheme, and for a list of members, please visit www.cibse.org/patrons

New members, fellows and associates

FELLOWS

Beaven, Michael Edward
London, UK

Bradford, Benjamin Charles
Gillingham, UK

Cattini, Caroline Louise
Surrey, UK

Fox, Jacquelyn
Stansted, UK

Fu, Po-wa, Calvin
New Territories, Hong Kong

Heath, Piers
Fetcham, UK

Hughes, Raymond Joseph
Merseyside, UK

Jordon, Mark Francis
Castlebar, Republic of Ireland

Judd, Blane
London, UK

Mok, Chung Keung
Queensway, Hong Kong

Phillips, Graham Martin
Dorking, UK

Robinson, Michael
South Shields, UK

MEMBERS

Akritas, Pavlina
London, UK

Alnaimy, Mohanad
Maidenhead, UK

Ansar Azam, Mohammed
Doha, Qatar

Apostolakis, Konstantinos
London, UK

Arnel, Paul
Bristol, UK

Bartholomew, Blaire
London, UK

Bate, Keith John
Kendal, UK

Blyth, Luke
Birmingham, UK

Bootun, Harrydev
Doha, Qatar

Cader, Dariusz
Hertford, UK

Callaghan, Michael John Charles
Leeds, UK

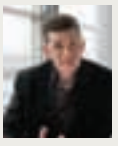
Campbell, Steven Frank
Cambridge, UK

FELLOWS

Ir Calvin Fu

Ir Calvin Fu is an associate director of Ove Arup & Partners HK, and manages a team of more than 40 engineers. He has extensive experience in MEP design, project management and planning for large-scale commercial development, high-rise building and infrastructure projects. His experience is multi-national, including many major cities in East Asia. He is also the East Asia business leader for Arup, responsible for leading healthcare business development opportunities in the region.

Piers Heath



Piers Heath is a senior partner at Foster + Partners, where he leads the environmental engineering team. Prior to this he worked with a number of leading firms including Arup, and Battle McCarthy, and founded award-winning practice PHA Consult in 2005.

He has developed solutions for a wide range of projects, from carbon-neutral designs at Masdar City in Abu Dhabi to the world's first commercial spaceport in New Mexico.

Benevolent fund focus

Continuing our focus on the Benevolent Fund in its 80th year

We introduce the Merseyside and North Wales region, and its almoner, who is responsible for representing the fund to the Regional Committee and its membership.

The Liverpool and District Branch (now known as the Merseyside and North Wales region, and the first of its kind) was formed in 1933. The fund gradually became reliant on the duly appointed regional almoner to identify, assist and monitor deserving cases.

The present almoner, Colin Howlett, was appointed in May 2004 and became a fund trustee in 2008, continuing in both roles to the present day. The region currently has a membership of 525, covering Merseyside, Cheshire, Clywd, Gwynedd and Powys.

A wide range of applications are considered for assistance by the Fund Management Committee each year, whether for members or dependants. The following are examples of cases handled by the regional almoner over the past two decades:

- A widow finding herself struggling to meet her outgoings was awarded a grant to help close the 'gap'. This was regularly paid until such a time as, with the continued assistance of her son, she was able to cope
- A member having suffered a stroke, and to this day, fully cared for by his wife, was granted a membership subscription waiver
- A past committee member was diagnosed with spastic paraparesis and became wheelchair dependent. The fund made a contribution for the purchase of a multi-functional mobility chair

For more information about the Benevolent Fund Trust, visit **www.cibse.org/benfund**. For more information about the Merseyside and North Wales region, visit **www.cibse-mnw.org**

Obituary

Deryck Lloyd Thornley C.Eng, FCIBSE

By DS Gillingham

Deryck L Thornley, a career-long CIBSE member, died peacefully after a long illness on 29 December, aged 88

Having served an apprenticeship with a small London heating and ventilation contractor, Deryck joined consulting engineers J Roger Preston & Partners in his early twenties.

During his professional life, he served on many different institution committees, as well as being an almoner for the CIBSE Benevolent Fund in 1988, and a trustee from 2003 to 2011.

Deryck was awarded bronze medals for technical papers in 1965 and 1971. An elected member of Council for many years, he became CIBSE president in 1988, and was made Honorary Fellow in 1998 in recognition of his distinguished service.

During his life-long career with Roger Preston, he was intimately involved in the strategic design of many well-known landmark buildings worldwide, among them the Royal Palace of Baghdad and the new HKSB headquarters in Hong Kong. Deryck became a member of the practice's senior partners' management group in the late 1980s.

Aside from work, he had wide interests in theatre, opera and choral work, to which he gave generous support, extending to producing and directing local thespian groups.

Deryck was a very widely talented and generous man, who did everything quietly and effectively, always without seemingly ever becoming ruffled, much less irascible.

Deryck will be greatly missed by Gwen, his wife of 61 years, his family and wide circle of friends.

Carracher, Graham
Prestonpans, UK

Chan, Sin Pang
Tsuen Wan, Hong Kong

Chan, Hok Tung
Shatin, Hong Kong

Chan, Wai Ming Raymond
Tseung Kwang O, Hong Kong

Chaney, David
Leeds, UK

Cheng, Ping Keung
Kowloon, Hong Kong

Chetta, David Oliver
Sutton Coldfield, UK

Cheung, Ka Ho Ray
Tai Po, Hong Kong

Chong, Chiew Shan Anthony
Ibstock, UK

Chui, Kam Wa Leslie
Mongkok, Hong Kong

Chung, Wing Tung
Tseung Kwan O, Hong Kong

Colombo, Ina
London, UK

Coppock, Jonathan George
Nr Dollar, UK

Cowlin, Stephen
Redhill, UK

Crudden, Mark Stephen
Sydney, Australia

Davidson, Paul Edgar
Southampton, UK

Davies, David Andrew James
London, UK

Denham, Nigel Bradley
Weston-Super-Mare, UK

Dillon, Sarah
Croydon, UK

Dinis, Rui Alexandre Carapinha
Wallington, UK

Dobson, Owain
Cardiff, UK

Doyle, Thomas Gerard
Kenilworth, UK

Eagle, Paul Lesley
Liverpool, UK

Elliott, Robert Keith
Ballymena, UK

Evoy, Jonathan
Twickenham, UK

Farrington, Daniel
Cambridge, UK

Ferguson, Fergus William
Cambridge, UK

Fifield, Adam
Middlesex, UK

Fok, Kam Fai
Tsuen Wan, Hong Kong

Freeman, Andrew Robert
London, UK

Fung, Po Yee, Polly
Yeun Long, Hong Kong

Gooden, Paul
London, UK

Goodman, Kenneth Richard
Brussels, Belgium

Grabowski, Tomasz
Manchester, UK

Gray, Robert
Bromley, UK

Gwilliams, Lee
Birmingham, UK

Halicka, Malgorzata Joanna
London, UK

Hamada, Kenichi
London, UK

Harris, Daniel
Basildon, UK

Hart, Thomas Peter
Solihull, UK

Hartland, Jack
Whyteleafe, UK

Helmore, Benjamin John William
Bristol, UK

FELLOWS

Ray Hughes

Ray has been in the industry for 40 years progressing from draughtsperson to his current position as managing director of PSD Consulting Engineers on The Wirral. Ray has worked in both contracting and consultancy and set up PSD in 1995. Ray is passionate about the sector and hopes to do more to encourage new recruits with his new-found Fellowship status. Ray specialises in healthcare and leisure projects. He is a keen Evertonian and is retained by Liverpool FC, which is always a good talking point.

Graham Phillips

After a first degree in geology, Graham switched careers and joined the construction industry with W&C French, studying construction at the Regent Street Polytechnic School of Architecture and Building. Moving to the academic side, first in Chelmsford and then at Nescot, he became a senior lecturer in environmental science specialising in Lighting and Acoustics. At Nescot he taught on the BSc in Building Services, the IOA Diploma and the MSc in Acoustics and Noise Control.

He is joint author of *Environmental Science* with B.J.Smith and M. Sweeney (published by Longmans, 1983).

New members, fellows and associates

Heppleston, James Rorie
London, UK

Hillman, Paul Robert
Sidcup, UK

Hosseinitabrizi, Mirrashid
Sittingbourne, UK

Howarth, Timothy John
London, UK

IpKwok Cheong
Kowloon, Hong Kong

Isaac, Damian Lee
Newport, UK

James, Gary
Sale, UK

Jaroszynski-Dziuba, Piotr Marcin
London, UK

Johnson, James
Hatch End, UK

Johnston, William Louis
Glasgow, UK

Johnston, Andrew Brian
Cambridge, UK

Jones, Ewan Edward Newman
Leeds, UK

Kamber, Ninos
Abu Dhabi, United Arab Emirates

Kaminsky, Craig Robert
Newcastle Upon Tyne, UK

Kelley, Andrew
Stoke On Trent, UK

Kennedy, Stuart Gordon
Edinburgh, UK

Khan, Mohammed Saghir
Lahore, Pakistan

Kilaire, Aneel
Birmingham, UK

KoWai Sze, Tsim Sha Tsui
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Kyrimlis, Evangelos
London, UK

Lam, Wai Fung
Shantin, Hong Kong

Latham, Dominic
Cheddar, UK

Lawrence, Nicholas
Oxford, UK

Leach, Robert James
Gloucester, UK

Lee, Heung Wing
New Territories, Hong Kong

Leung, Ka Chi David
Cheung Sha Wan, Hong Kong

Leung, Ka Pui
Fanling, Hong Kong

Li, Shang
Epsom, UK

Lim, Danielle
Weybridge, UK

Lok, Ka Wai, Gary
Hong Kong, Hong Kong

Lucas, Edward
Birmingham, UK

Lukojko, Marek
Liverpool, UK

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South Croydon, UK

Man, Yuen Ling Ellen
Kowloon, Hong Kong

Manning, Richard Andrew
Leeds, UK

Marginean, Vasile
Cluj-Napoca, Romania

McAuley, David Michael
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Mierzejewski, Adam
Cardiff, UK

Mitchell, Alasdair Simon
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Mitropoulos, Constantin-Efstratios
Athens, Greece

Mohammed, Abdul-Azeem
London, UK

Montgomery, Peter
Potters Bar, UK

Moore, Noel
London, UK

Morris, James
London, UK

Mulraney, Anthony James
Maidenhead, UK

Naz, Farah
London, UK

Nenadovic, Aleksandar James
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NgYan Kit, Shatin
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Stone, UK

Olatunde, Hakeem Ademola
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O'Sullivan, Richard John
Bondi, Australia

Outram, James
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Rowlands, Gareth
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Sookun, Roodrasingh
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Tam, Wai Ki Frankie
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Tang, Wing Hong
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Yip, Kwok Wai
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Yip, Chak Kwan, Kwai Chung,
N.T., Hong Kong

Zhang, Yi
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Cheadle, UK

McGowan, Alan
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Epsom, UK

Stewart, Dylan
Musselburgh, UK

Wight, Jonathan Paul
Windsor, UK

LICENTIATE

Bradstock, Matthew
Leatherhead, UK

Cappell, Gordon Neil McRae
Solihull, UK

Carson, Grant
Middlesex, UK

Eckett, Joshua Charles
Weston-Super-Mare, UK

Edwards, Lewis
Uxbridge, UK

Fawcett, Gavin
London, UK

Hunt, Christopher
Bath, UK

Perkins, Gregory Howard
Birmingham, UK

Phillips, Robin David
Canberra, Australia

Shorter, Steven James
Exeter, UK

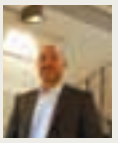
Watson, Jamie Ian
London, UK

Wicks, Andrew
Billericay, UK

Williams, Daniel
Birmingham, UK

FELLOWS

Ben Bradford

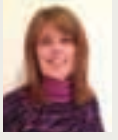


Founder and managing director of BB7 Fire Risk + Resilience, Ben is an active member of the fire safety profession. Chairman of the Fire Industry Association's (FIA) Professional Standards Working Group and a member of the Fire Risk Assessment Council, Ben sits on the Royal Institution of Chartered Surveyors (Building Control) Professional Group Board and is the principle author of PAS 7: Fire Risk Management System Specification for the British Standards Institution. He is a Fellow of the Royal Institution of Chartered Surveyors, and of the Institution of Fire Engineers.

Caroline Cattini

Caroline Cattini has been a senior building services engineer and energy manager for English Heritage, the government's advisor for the historic environment for the past nine years and has more than 20 years' building services experience. Part of her role is advising on work carried out to buildings grant-aided by English Heritage, and advising on the capital projects on their own estate. She was responsible for writing English Heritage's guidance on 'renewable energy in the historic environment' and regularly gives talks on the subject. She is an active member of CIBSE and a co-opted member of the CIBSE Heritage Group.

Dr Jacquelyn Fox



Dr Jacquelyn Fox is head of sustainability for CIBSE and has 20 years' experience in energy efficiency and sustainability within the commercial and domestic sectors of the construction industry. Jacquelyn has a degree in engineering, and a PhD in energy efficiency. She was previously head of group sustainability for one of the UK's largest developers, has worked on air conditioning projects in the Middle East and published several academic papers. She also developed a key BS EN 13141/1-6- Test methodology for residential ventilation systems, which contributed towards the changes proposed for the Building Regulations Approved Document Parts L and F- 2006 revisions.

Blane Judd

Blane Judd has been chief executive of the Building & Engineering Services Association since July 2011. A graduate in integrated engineering from Nottingham Trent University and a fellow of both the Institution of Engineering and Technology and the City and Guilds of London Institute, he previously served as chief executive of the Chartered Institute of Plumbing and Heating Engineering.

Blane spent a decade with the Electricity Association, where he rose to the position of director of education standards and training, and subsequently worked as operations director of SummitSkills, the sector skills council for building services engineering.

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Your letters

DMITRIY KARELIN / SHUTTERSTOCK

This month: Rare backing for Eric Pickles, contrasting views on February's biomass opinion piece and more on chimney design

Pickles has a point

I note that on page nine of February's *Journal*, the Association for the Conservation of Energy (ACE) is calling for a Judicial Review against the Communities Secretary, Eric Pickles, in relation to his decision to remove consequential improvements from the new Part L of the Building Regulations. I also note the comments that ACE director, Andrew Warren, has made in regard to the facts derived from a consultation and what he describes as the failure of a government minister to accept the weight of evidence before him.

As engineers we might all believe the technical considerations are the only ones that politicians should take into account when making these decisions. However, Mr Pickles is not an engineer. We elect politicians to make political decisions and I am sure that is the basis for his ruling.

The fact is that, contrary to Andrew Warren's assertion, only a small percentage of the two million homeowners for whom the cost of extending their home would be increased by 10% will be able to gain means of offsetting any part of that cost by the Green Deal, and that is politically unacceptable.

As an elected councillor for a local authority I often have cause to question Eric Pickles in his role but, much as it goes against my engineering instinct, this time he is right.

Ray Gooding
I.Eng ACIBSE, Essex County Council Member for Stansted

> Much as it goes against my engineering instinct, this time Pickles is right

Wood for good

With reference to 'The heat is on' opinion piece on page 24 of February's *Journal*, one of the main arguments in the editorial is completely flawed.

The authors argue that the notion that fuel is low carbon depends on the re-uptake of CO_2 through subsequent biomass growth. However, this is not true.

Biomass is produced from trees which have absorbed carbon dioxide during growth, and then that carbon is released from the biomass through the combustion process. The carbon cycle is completed from growth through to combustion, and therefore does not rely on future growth as implied in the article.

The local carbon cycle associated with biomass recycles the carbon dioxide from the atmosphere and only releases back what has been taken. In short rotation coppice, this recycling can be as short as three years. In contrast, burning fossil fuels will add to the atmospheric carbon dioxide by releasing carbon which has been locked away for millions of years.

The UK is currently in a state of reforestation and the argument that wood is best left alone will remove some of the economic drivers for the growth of forest plantations. Wood is always best used where it is most valuable. The first consideration should always be for constructional timber to have the priority use. On lumber plantations, only unusable wood and offcuts should be considered for fuel use.

Fuel crops should only be grown on land that is not considered suitable for food crops, and there is an abundance of wasteland and set-aside which could be used for fuel without making an impact on food production. All that is needed is the economic drivers to make this happen.

I do agree that we should be looking at the efficiency of the whole building design, and building regulations stipulate minimum levels of insulation and other energy efficiency measures. Using a sustainable form of biomass, such as one approved by the HETAS quality assured fuel scheme, will ensure users can be confident

they are utilising a carbon neutral fuel.
Robert Burke, technical director, HETAS

Fuelling debate

In February's *Journal* I read with interest about the gathering pace of criticism in the use of biomass as a heat source . At last, the myth of using such a fuel in the pursuit of low carbon solutions has been identified.

Last year, I wrote to the *Journal* extolling the merits of considering entropy as a possible analytical tool (exergetic analysis), in securing a more rounded view of a sustainable solution, rather than solely reducing the inherent content of carbon dioxide.

The latter, of course, is readily endorsed by government and professions alike. If such an analysis had been introduced some 10 years ago (common practice in Scandinavian countries), the market penetration of these biomass boilers would have been challenged more rigorously.

Sadly, on page 10 of the same edition of the *Journal*, I read that such a growth in sales of this equipment continues unabated.
Dr Brian Atkins

Chimney manuals unearthed

Your reader in January's *Journal* (page 13) lamented the loss of chimney-designing knowledge, but all is not lost. While I can't comment on the interest that generations X, Y, and Z may have in that niche of the engineering profession, I'm happy to say that we have not one, but three copies of the much-treasured *Chimney Design Manual* in the BSRIA library.

The retro green covers of the Brightside editions (1965 and 1970) are particularly delightful. As a sign of the times, enthusiasts can also now be found sharing design tips on YouTube, and *Chimney Design and Theory* (1902) has been digitised and is back in print.
Clare Sinclair, BSRIA Ltd

From the forums

Green Deal and DECs

Two discussions have dominated the CIBSE LinkedIn group forum. One seeded by Janet Beckett asked whether the Green Deal was just another bonus for bankers. From her point of view the Green Deal seemed to be the perfect arena for double-glazing salesmen not engineers. The general feeling from more than 200 posts was summed up by John Carden who said the Green Deal for non-dwellings was 'pretending to be what it could not be – informed advice from properly accredited persons'.

CIBSE Journal asked the group what it thought of Hammerson's proposal to introduce energy performance contracts for consultants to ensure actual energy use matched design intent.

Reaction was broadly positive, but with caveats. Many said it could work with Soft Landings and a robust energy model, but some were wary of contractual wrangling. Everyone agreed that the carrot of a performance-related bonus was preferable to penalties for missed targets.

Clarification

'Daikin takes IES route to simulation' on page 68 of the January 2013 issue of the *Journal* should only have referred to the creation of more accurate Energy Performance Certificates, and not Display Energy Certificates, as stated.

THE WORK GOES ON...

This will be my last column in this prestigious magazine – at least for now – as we look for other ways to engage people in the debate on how we reduce and manage energy use in our built environment

If you have caught any of these musings over the past 18 months, I hope they have at least given you food for thought.

We have covered the importance of collaboration to tackle the challenges of climate change, the promise of both new and existing technology, the changing face of legislation and incentives plus a host of other subjects relevant to energy use in buildings.

If one thing has shone through all of these, I hope it is our clear belief that our industry has the skills and knowledge to cope with an increase in demand for renewables.

> Our industry has the skills and knowledge to cope with an increase in demand for renewables

As a manufacturer, we know there is equipment available straight off the shelf that can help improve the efficiency of almost any building.

We also know from the companies we deal with on a day-to-day basis that there is an army of consultants and installers out there, ready to answer the need for the highest levels of specification, installation and commissioning, whether that is in individual homes, throughout our commercial building stock, or in grander community heating schemes.

And we firmly believe that heat pumps are a major part of the solution.

We know that they can never be the only answer, but we know that they are the quickest and most straightforward solution in many cases. That is why we have invested our faith in them.

It is also why we are working with other manufacturers and sectors to find ways of introducing the benefits of heat pumps in new ways.

Over the coming year you will see heat pumps appearing in new sectors, where they will offer a serious, low carbon alternative to 'traditional' methods of heating our buildings.

Air handling units, for example, are also starting to benefit from the introduction of heat pump technology.

Does this mean the end of gas and oil? Well, no. Not yet, because prices remain relatively 'cheap'. But as the world realises more and more the effect mankind has on our planet, we will see increasingly tough legislation that will make gas and oil even less attractive.

So, although we are signing off for now, the work goes on.

Should I bump into any of you in the course of our day jobs, please let me know if you found these columns of interest? You are also welcome to join our debate in our special Linkedin Group or sign up to the Twitter feeds to keep up to date with the latest news.

Farewell for now though!

Martin Fahey is Sustainable Solutions Manager at Mitsubishi Electric.
*Join the debate by visiting the Green Gateway LinkedIn group, or following Martin's Twitter account (**@green_gateway**) which offers followers a chance to receive up-to-the-minute news and views from those within and outside the industry, including key opinion leaders.*

BUILDING REGULATIONS ADOPT 'NEARLY ZERO'

Changes to Building Regulations require that all buildings be 'nearly zero-carbon' from 31 December 2020, but nobody yet knows what this means. **Hywel Davies** explains

Just before Christmas the government published 'The Building Regulations &c. (Amendment) Regulations 2012'[1]. These implement elements of the recast Energy Performance of Buildings Directive (EPBD), as well as other changes to the Building Regulations.

The 2012 consultation on proposed changes to the Building Regulations not only covered proposed changes to Part L, but also a number of other deregulatory changes, including those relating to Approved Inspectors and Part P, Electrical Safety.

Most elements, bar a few exceptions, either came into force on 9 January 2013, or will do on 6 April.

Most of the EPBD is transposed by the 2012 EPB Regulations[2], but provisions relating to the construction or renovation of buildings are transposed by amendments to the 2010 Building Regulations[3], so the two sets of regulations should be read together.

The EPBD recast also introduces a requirement for all new buildings to be 'nearly zero-energy' from 2019 for public buildings, and from 2020 for all buildings. The amendment gives 'nearly zero-energy requirements for new buildings', stating: 'Where a building is erected, it must be a nearly zero-energy building.' This comes into force on 1 January 2019 for public buildings, and 31 December 2020 for all others. What it actually means is anyone's guess, but it implements an article of the EPBD, and we have plenty of time to discover what compliance might require. Meanwhile, we have the other changes to get to grips with: we still await the announcement of any changes to Part L for 2013.

EPBD Article 7 covers 'major renovation' of existing buildings, which is governed by regulation 23 (2010). A new regulation 15 amends regulation 23 to introduce the energy performance requirements of Article 7 for major refurbishment, renovation or replacement of more than 50% of a thermal element, where technically, functionally and economically feasible.

Amendments to the 2010 Regulations cover:

- Rationalisation of Parts K, M and N, to streamline existing guidance and to withdraw Approved Document N and regulation 28 and revoke Part N of Schedule 1. The provisions of Part N are subsumed into a new Approved Document K[4] (Protection from falling, collision and impact)
- Changes to Part P on electrical safety in the home. These extend the range of work that is non-notifiable to include alteration work outdoors, in kitchens and in lower-risk parts of a room containing a bath or shower, while maintaining the requirement to notify higher-risk electrical installation work. There is a new edition of Part P from 6 April 2013[5]
- Changes to statutory notification and completion certificate provisions for local authority building control, to remove the statutory inspection stages and adopt a risk-based approach, and to provide building owners with evidence of compliance needed when buildings are sold
- Changes to Regulation 7 on material and workmanship to address the new Construction Products Regulations. These changes and the new AD7[6] come into force on 1 July 2013
- Requirements for certificates produced by competent person schemes to contain Green Deal information to enable subsequent purchasers of the property to be aware of the Green Deal plan in place
- Requirements for local authorities to store certificates in a retrievable form
- Authorisation of new types of work and extensions of types of work for which competent person schemes are approved
- Requirements that compliance certificates state their legal status as evidence of compliance

> What it means is anyone's guess, but we have plenty of time to discover what compliance might require

The Approved Inspector Regulations cover:

- Changes to provisions on notices of approval and declarations of insurance and related changes to the wording of notices and certificates
- Changes to the grounds for rejecting an approved inspector's notice or certificate
- The requirement that final certificates must state the evidential status

Cost benefits

The government says rationalisation of Parts K, M and N will save approximately £4.4m.

The changes to Part P will deliver annual net savings to business of £9.4m, and benefit DIY workers by approximately £5.3m per year.

The Impact Assessment for Part P also promises further changes to introduce third-party certification of electrical work later in 2013.

References

1. The Building Regulations &c. (Amendment) Regulations 2012, No. 3119; **www.legislation.gov.uk/uksi/2012/3119/made**
2. See *CIBSE Journal* February 2013 Legal column, page 20
3. The Approved Inspector Regulations are also amended so that the changes apply when the building control function is undertaken by an approved inspector.
4. The new edition of AD K, for use from 6 April 2013, can be downloaded from **www.planningportal.gov.uk/uploads/br/BR_PDF_AD_K_2013.pdf**
5. Approved Document P, Electrical Safety, Dwellings **http://www.planningportal.gov.uk/uploads/br/BR_PDF_AD_P_2013.pdf**
6. Approved Document 7, Material and Workmanship **www.planningportal.gov.uk/uploads/br/BR_PDF_AD_R7_2013.pdf**

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

GREEK TAX ADDS FUEL TO FIRE

A new tax has made domestic fuel prohibitively expensive for many Greeks. The consequences are smog-filled skies as occupiers turn off central heating systems and burn firewood to keep warm. **Costas Balaras** says the situation makes energy conservation more necessary than ever

You can smell it – feel it everywhere, especially at night and on cold days. The haze of smog hangs over Athens.

The pollution is linked to an increase in tax on heating oil, which has seen a notable shift towards the use of cheaper fuels, such as firewood in open fireplaces and wood stoves. There are reports of people cutting down trees from Greece's few forested areas, even around Athens. People are burning anything they can get hold of.

Greek cities are breaking every record on air pollution, with particulate matter PM10 (particles smaller than 10 micrometers) reaching atmospheric concentrations of three to four times normal levels, leading to serious concerns over the implications for people's health.

At the beginning of the heating season for 2012-13, the subsidy available for heating oil was removed. As well as raising tax revenue, the harmonisation was aimed at stopping heating oil being used as cheap diesel on the black market – the only difference between the two being the colour additive in heating oil.

To soften the impact of the removal of the subsidy, the government introduced a tax return for the very poor but, even so, the vast majority of low-income households simply cannot afford the cost of heating. As a result, people have turned to other means of heating their homes – especially wood (mostly in open fireplaces) and electricity, where electrical heat pumps that were historically used for cooling in summer are now being used as electric radiators. The move to new energy sources has been dramatic – the use of heating oil is reported to have dropped by 70% since the introduction of the tax.

As of January 2013 there was also an electricity price increase and a new tariff calculation rate based on consumption – further increases are expected later this year. The first adjusted electricity bills were issued last month, adding more strain to household budgets. Natural gas prices have gone up, too, as they are linked to the price of oil.

> Greek cities are breaking every record on air pollution

High levels of particulate matter in the atmosphere are leading to concerns over people's health

BRYAN BUSOVICKI/SHUTTERSTOCK.COM

Even before the latest rises, a combination of higher fuel bills and government austerity measures has seen a sharp fall in energy consumption in Greece. Annual consumption fell by 7.3% in 2010 to 19.0 Mtoe (million tonnes of oil equivalent)[1] – the first decrease in more than two decades.

Residential buildings consume more than half of the electricity and more than 90% of the thermal energy required by the Greek building sector[2]. In 2010, the energy consumption of residential buildings fell to 4.6 Mtoe, or 24.2% of the total [European Commission, EU Energy in Figures – Statistical Pocketbook 2012, Luxembourg, (2012)]. This is the fifth year of continuous reduction in energy consumption, which is now at 2001 levels.

Because of rising energy costs many households are experiencing poor indoor thermal comfort conditions as they reduce the operating hours of central heating systems to the bare minimum and set their thermostats to very low levels.

Fuel poverty is a tragic reality. Thankfully, Greece has been experiencing a relatively mild winter, which has helped alleviate some of the pain.

The current situation and public focus on heating energy costs underlines and strengthens even more the practical importance of energy conservation in buildings, and potentially the exploitation of renewable energy sources in Greece in the near future.

References

1 European Commission, *EU Energy in Figures – Statistical Pocketbook 2012*, Luxembourg, (2012)

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SEASONAL DISORDER

Despite the benefits of seasonal commissioning, it often falls by the wayside. The solution, says Max Fordham's **Tamsin Tweddell**, is more detailed briefs and ring-fenced funding

As winter's icy grip begins to loosen and the sun starts to shine, the impact of seasonal commissioning on improved building performance can truly be demonstrated.

Seasonal commissioning (SC) involves re-commissioning building systems affected by seasonal changes, such as heating systems in winter and mechanical cooling in summer. It ensures the system's energy efficiency is maximised throughout the year. SC is recognised by BREEAM and awards credits for its adoption.

But how often have you specified seasonal commissioning, only to see it overlooked once the building is handed over? It is a common occurrence in the construction industry, and one that hinders the delivery of comfortable, energy-efficient buildings.

This has been a subject of debate within the BSRIA Soft Landings User Group, and it's something of a tug of war. The engineering consultants' view is that contractors often look for ways to get out of doing seasonal commissioning, citing that consultants don't specify what is required in enough detail for it to be priced consistently.

One of the challenges for seasonal commissioning is that, after practical completion, the attention of most parties shifts onto the next project, and any specified post-occupancy activities risk being overlooked. One project engineer noted: 'I kick up a fuss about things like this and it's like talking to a brick wall.' Another bemoaned: 'The contractor is avoiding discussing the topic. I am pretty sure that the client is unaware of the requirement for seasonal commissioning.' It can be hard to get the relevant parties back to the building, and it may even be seen as inconvenient by the client.

Many engineers believe contractors exclude the seasonal commissioning from their tender price as it makes them look more competitive. On some projects, I find it is excluded by the project manager or client as part of a value engineering exercise – it is seen as a non-essential luxury. They are subsequently surprised when the building doesn't operate smoothly.

Seasonal commissioning took place at Brockholes Visitor Centre, which won a CIBSE Building Performance Award in 2012

> As a problem with a variety of contributing factors, there is unlikely to be a single, simple solution

We all know that contractors are under intense pressure to keep costs down to win work. We shouldn't be surprised if they underprice elements such as seasonal commissioning, which they expect to be overlooked.

So, what should we as an industry be doing about this? As a problem with a variety of contributing factors, including cost, timing and specification, there is unlikely to be a single, simple solution.

As designers, we need to ensure we are specifying seasonal commissioning in enough detail for it to be priced consistently and carried out adequately. The BREEAM 2011 seasonal commissioning credit (Man 01 Requirement 22), which many include in their specifications, sets the objectives but not how they should be achieved. Some guidance is provided in BSRIA's new *Seasonal Commissioning Guide BG 44/2013*.

Secondly, seasonal commissioning must be adequately budgeted for and ring-fenced, which could be achieved by asking for the figure to be separately itemised in the tender summary, along with any other specified post-occupancy work, such as fine tuning. This sum would be held back until 12 months after practical completion (PC), and only be paid out if the work is satisfactory.

Lastly, I recommend that dates for seasonal commissioning visits are agreed with all parties, including all sub-contractors involved, before granting PC. These dates should be attached to the PC certificate. The agreed dates need to take into account the building's operating regime. For example, for a school, seasonal commissioning may need to take place during the holidays. The client needs to buy into this and make appropriate staff available.

This is where soft landings can make a difference. By keeping the contractors and designers engaged for a period of aftercare, there is a framework for post-occupancy activities to take place.

It's worth working in collaboration to get this right. Effective seasonal commissioning improves building performance, reduces running costs and creates more comfortable interior environments. Industry needs to tackle this as part of its mission to deliver effectively performing buildings.

See page 8 of the *CIBSE Engineering Excellence* awards supplement. This will be available on www.cibsejournal.com

BEST of the BEST

Industry celebrated the leading energy performers at this year's CIBSE Building Performance Awards 2013. **Carina Bailey** reports

> Our commitment to energy management is stronger than ever and we believe that green buildings do add value
> – *Justin Snoxall*

British Land was crowned low carbon champion of champions at last month's Building Performance Awards 2013, scooping two gongs for its efforts in cutting carbon and energy consumption throughout its property portfolio.

It won the Client Energy Management Award category and was named overall Carbon Champion of the Year after the property giant saved its occupiers £1.6m over the last three years through energy cost savings. Half of this achievement was made through more rigorous management, which was made possible by an extensive sub-metering system that was first trialled at its head office. As a result of the pilot's success, sub-metering and optimisation processes were rolled out across its portfolio of properties.

British Land's credentials as a carbon cutter were first recognised by the awards in 2012, when British Land first won the Client Energy Management Award. Since that time it has almost doubled its energy reductions across its entire like-for-like portfolio.

On receiving the prestigious award, Justin Snoxall, head of the business group at British Land, said: 'We are delighted to be Carbon Champion of the Year and for a second year running be awarded the Client Energy Management award in recognition of our work. Our commitment to energy management is stronger than ever and we believe that green buildings do add value and reduce the obsolescence of our assets in the longer term.'

This year there were 13 categories, ranging from Client of the Year and Building Operation, to Building Services Consultancy and Energy-Using Product of the Year.

The judging panel praised the overall standard of entries. Hywel Davies, CIBSE technical director, said: 'The judges were impressed with the overall very high standard of entries received this year, and were pleased with the number of entries that provided

Winners with their awards, including (clockwise): Atkins, greentomatoenergy and British Land

PIC CREDITS: Carmen Valino

evidence of real life performance data.'

Notable achievements include Whitbread Hotels and Restaurants, which was awarded Client of the Year after it reduced carbon emissions by 20% – relative to sales – at a time of rapid expansion, while greentomatoenergy, which took the Refurbishment Project Award, was praised by the judges for being the 'standout entry in this category' and carrying out such a deep retrofit using sustainable techniques. (See right for full list of winners.)

The event, which was again staged at the Grosvenor House Hotel in London, was hosted by Gyles Brandreth, of *The One Show* fame. During the ceremony, Brandreth expressed his admiration for the awards, and all those shortlisted, because they demonstrate real, tangible results.

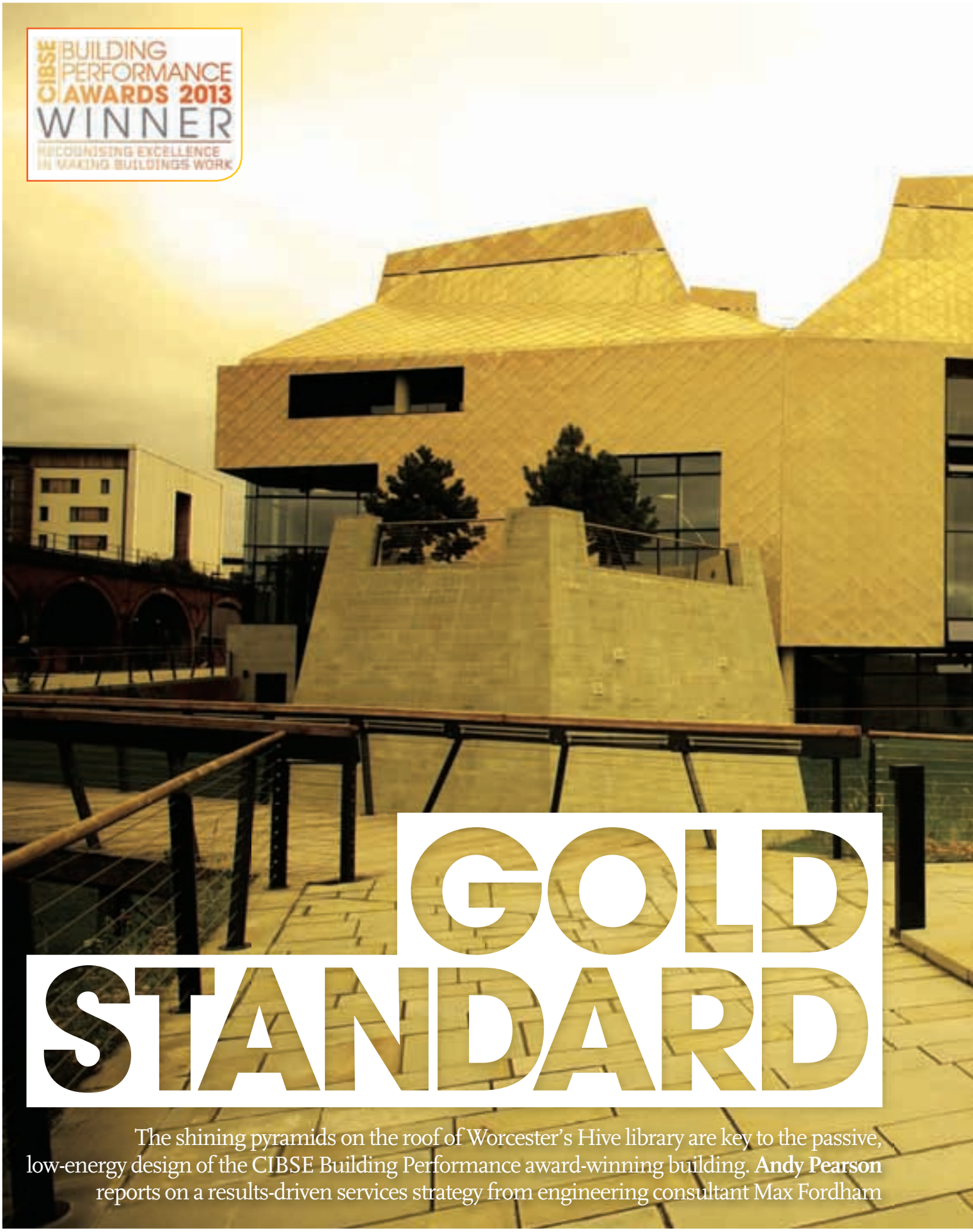
Speaking on the night of the awards, CIBSE president David Fisk said: 'Since our buildings use nearly half our energy, this should be a matter of national priority. The projects and products showcased tonight show us what can be achieved and raise the bar of best practice for all of us in the built environment.' **CJ**

For full details, visit **www.cibseawards.org**

> The judges were impressed with the overall very high standard of entries received this year, and were pleased with the number of entries that provided evidence of real life performance
> – *Hywel Davies*

Winners at a glance

- **Mott MacDonald for 2 St Paul's Place, Sheffield, England** – Building Operation Award
- **Whitbread Hotels and Restaurants** – Client of the Year.
  Highly Commended: Marks & Spencer, nominated by Troup Bywaters & Anders
- **Atkins and London 2012 Olympic and Paralympic Games** – Collaborative Working Award
- **Norland Managed Services** – Contractor of the Year
- **Redwood Systems for its Lighting Platform** – Energy-Using Product Award
- **Max Fordham for The Hive, Worcester, England** – New Build Project of the Year (value above £5m)
- **Architype Ltd and E3 Consulting Engineers LLP for Bushbury Hill Primary School, Wolverhampton** – New Build of the Year (value up to £5m)
- **Buro Happold and Brunel University in collaboration with Fraser Brown Mackenna Architects, Nuaire, Xtralitre and Permarock Products** – Passive Energy Related Product of the Year
- **Greentomatoenergy for Number 20 Lena Gardens, London, England** – Refurbishment Project.
  Highly commended: Fraser Brown MacKenna Architects for Wolvercote Road, Thamesmead Estate, London, England
- **Land Securities for its *Low Carbon Fit Out Guide for Retail* 2012** – Training For Building Performance
- **British Land** – Client Energy Management Award.
  Highly commended: Ofgem for 9 Milbank
- **Hoare Lea** – Building Services Consultancy of the Year
- **British Land** – Carbon Champion



GOLD STANDARD

The shining pyramids on the roof of Worcester's Hive library are key to the passive, low-energy design of the CIBSE Building Performance award-winning building. **Andy Pearson** reports on a results-driven services strategy from engineering consultant Max Fordham

The roof's golden cones help to let daylight into the building, as well as aid the natural ventilation strategy

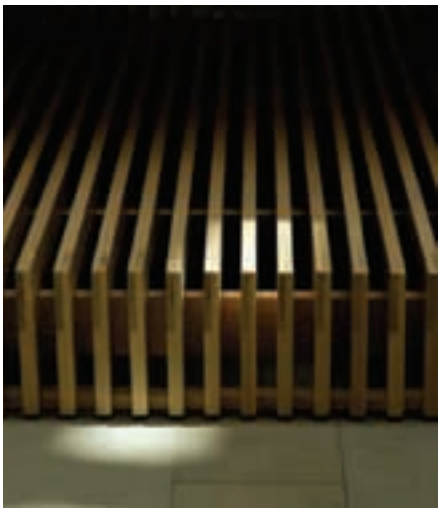
It is official: 72% of the public are impressed by The Hive. This ringing endorsement is for the UK's first, fully integrated public and university library. The statistics were compiled from an exit survey of visitors to the newly opened facility, which is situated in the heart of historic Worcester.

The public are not the only ones to have been wowed by this innovative new building. The judges at the CIBSE Building Performance Awards were won over by The Hive's impressive low-carbon, energy-efficient credentials. It was awarded the accolade of Best New Build Project of the Year (above £5m). The judges described it as: 'an excellent example of good practice engineering delivering BREEAM Outstanding energy performance'.

It was 2004 when the concept for a low energy, integrated public and university library was put forward as a pragmatic solution to meeting the needs of both Worcester County Council and the University of Worcester. The council's existing library was no longer fit for purpose and the university was seeking to improve its learning resources in the city. They formed a partnership and the idea for The Hive was born.

This pioneering concept needed an innovative new home, so in 2007 a PFI competition was launched. The partners put together a challenging brief for the project, which included the requirement that the new building should achieve a 50%

> Wind tunnel tests at the University of Cardiff showed that the addition of baffles would ensure the cones were able to exhaust air, regardless of the prevailing wind direction



> The engineers calculated that the river cooling solution should cost less than a third of that of conventional chillers to run, and would take up less space in the building

reduction in carbon emissions (based on Part L of the Building Regulations 2006), and that 50% of the building's energy would come from renewable sources.

That was not all: the brief also called for the building to have a minimum environmental rating of BREEAM 'Excellent', and it was to be, as far as practical, naturally ventilated. In addition, the scheme had to be sufficiently robust to be able to maintain comfort conditions under the impact of climate change in 2020, and the building had to be capable of being adapted to cope with the more extreme environmental conditions expected in 2050.

The competition was won by contractor Galliford Try, working with engineer Max Fordham and architect Feilden Clegg Bradley Studios. Their design was based on a four-storey, open plan, irregular pentagonal-shaped building. Construction of the 13,253m^2 building was completed early last year, and the scheme opened its doors to the public in July 2012.

Visitors enter the building on the ground floor where the council's customer service centre and the children's library are located. The spaces get progressively quieter as visitors make their way up through the bright, daylit interior of the building. Slotted beneath the entrance floor is the basement. This is home to the council's archive, a social space and café.

In contrast to the restrained colours of the library's interior, the exterior shouts 'look at me!'. The Hive's distinctive pentagonal shape is given further prominence by a covering of shiny golden scales, giving it the appearance of part Cheshire footballer's home, part Sikh temple. The scales are actually copper alloy shingles selected to enable the same material to be used to clad both the building's walls and roof. The scheme's idiosyncratic appearance is crowned, literally, by a roof formed of seven gold pyramidal cones, which Guy Nevill, senior partner at the scheme's M&E engineers Max Fordham, shamelessly describes as 'emblematic of the distant Malvern Hills'.

Emblematic or not, these seven golden cones are the key to the building's passive, low-energy environmental design. The environmental engineer's strategy from the outset has been to minimise base loads in order to meet the project's emissions target. 'A big design driver was daylight because we needed to get as much light into the building as possible to minimise the electrical lighting load,' Nevill explains. As a result, the golden cones enclose large glazed rooflights, which introduce daylight deep into the heart of the building through the central atrium and a series of voids strategically positioned in the building's various floor plates.

The distinctive design and fabric of the building all helps to create a comfortable internal environment

Light from overhead is supplemented by daylight introduced through vertical glazing set into the building's golden façade. These large areas of glazing ensure an average daylight factor of 3% is achieved across the main library floor. Shading devices and solar control glass help limit solar gains.

The natural light is complemented by a low-energy electric lighting scheme. This is based on high-frequency fluorescent fittings integrated within the building's finishes to provide background light. Light levels in the spaces are enhanced by manual task lights in the reading areas and through supplementary lighting fixed to bookshelves under daylight and PIR control. Daylight and PIR lighting controls also control lighting in the separate administration and office areas.

In addition to allowing daylight to enter, the other main purpose of the roof's distinctive golden cones is to allow exhaust air out under the building's natural ventilation strategy. In summer, a combination of large openable windows and smaller, linear openings at floor levels allow fresh air to pass through the façade and into the concrete-framed interior. Driven by the stack effect, the warmed air rises up through the floor voids to exit through a row of clerestory actuator-controlled openings in the roof cones' angled side walls.

Additional fresh air is delivered to the heart of the building through a concrete builders work duct that runs from an intake west of the building, beneath the basement social space to deliver fresh air to the base of the central atrium. 'We set out to maximise the natural ventilation,' Nevill explains.

Baffles, visible externally, form ventilation troughs to ensure negative pressure is always present in the cones. The engineer justified the need for the additional cost of the baffles after wind tunnel tests on a scale model at the University of Cardiff showed that their addition would ensure the cones were able to exhaust air regardless of the prevailing wind direction. A night-time natural ventilation

Project team	
Project partner, client	Worcestershire County Council
Project partner, client	University of Worcester
PFI consortium lead	Galliford Try Investments Ltd
Architectural design	Feilden Clegg Bradley Studios
Landscape architects	Grant Associates
M&E sustainable engineers	Max Fordham
Structural engineers	Hyder Consulting
M&E subcontractor	Briggs and Forester
Main contractor	Galliford Try Construction
Facilities management	SGP

> The designers also had to satisfy British Waterways that removal and replacement of the water would not affect the river traffic

strategy pre-cools the expanse of exposed concrete soffits that provide the majority of the building's thermal mass.

In very hot weather, when the natural ventilation can no longer maintain comfort conditions, the River Severn provides an additional source of cooling for the building. 'Our strategy is to use the River Severn as a heat sink for the cooling system,' explains Nevill. Cooling is needed to maintain comfort conditions at peak summer temperatures and to ensure the building remains comfortable under the UKCIP climate projections for warmer temperatures in 2020 and 2050.

Water is drawn from the Severn and passes through a heat exchanger before being returned back to the river. For much of the year, when the Severn's temperature is below 14°C, direct heat exchange with the chilled water circuit provides sufficient cooling for the building. The cooled water is pumped through pipework embedded in the underside of the pre-stressed concrete floor plates, helping to cool the structure while at the same time increasing the radiant cooling output. The designers were fortunate in that the large expanse of concrete soffits meant that the cooling water need only be slightly cooler than ambient temperatures to have a significant impact. 'The huge surface area of the soffits meant that the water only needed to be 2-3°C cooler than room temperature,' Nevill explains. On the top floor where there are no concrete soffits, passive chilled beams fed from the cool water circuit provide additional cooling.

The River Severn also provides cooling for the chillers, in what Nevill terms 'a high grade cooling system'. The water-cooled chillers deliver water at a flow temperature of 6°C. This system is primarily used to cool IT and meeting rooms as well as the archive. In summer, when the river temperature rises, cooling from the high grade circuit is 'blended' with the river circuit to lower its temperature to ensure it can still cool the floor plates.

River abstraction was not without its challenges. In addition to ensuring the system could cope with water levels in both flood and drought conditions, the system also had to be designed to ensure that return water was never more than 3°C above ambient to comply with the Environment Agency's Freshwater Fish Directive. The designers also had to satisfy British Waterways that removal and replacement of the water would not affect the river traffic. On the plus side, however, the engineers calculated that the river cooling solution should cost less than a third of that of conventional chillers to run, and would take up much less space in the building.

Cooling is not needed in winter. Instead, heat is provided by a 550kW biomass boiler, situated in the building's basement. This is powered by local woodchip. Biomass made sense because Worcester Council already has several biomass installations. 'The council has a well-developed local supply chain and an established source of supply from local woodlands,' says Nevill.

The biomass boiler provides the primary source of the heat for the naturally ventilated building. Heat loads are minimised by the building's airtight construction; the building has an air leakage rate measured at 4.3m^3/m^2 façade at 50Pa. Nevertheless, the biomass boiler is supported by three 250kW gas boilers to meet peak heating load and to provide backup.

Heat from the boiler is circulated through the embedded pipework in the concrete soffits and the chilled beams. The heating circuit also includes perimeter trench heaters beneath the glazing and concealed at the edge of the floor slabs. The units serve two functions: they prevent cold downdrafts from the glazed areas and secondly they warm the incoming fresh air that enters the building through the floor-level linear openings. 'The trench heaters preheat the incoming fresh air,' says Nevill.

While the large areas of exposed concrete soffit are helpful in maintaining a stable, thermal environment within the library, they are less helpful at controlling the spread of noise. As a result, acoustic absorption has been

Performance

- **Gross floor area:** 13,253 m²
- **Building Emissions Rate:** 17.4/kg CO_2/m²/yr
- **Predicted electricity consumption:** 105 kWh/m²/yr (includes small power and IT which are not included in Part L figures, but is based on longer opening hours than Part L). Part L estimate of electricity consumption is 32 kWh/m²/yr
- **Predicted fossil fuel consumption:** 5 kWh/m²/yr, not including biomass fuel, assumes gas usage for peak loads and backup only
- **Predicted renewable energy generation:** 38 kWh/m²/yr biomass generated heat
- **Predicted water use:** 2.5 m³/occupant/year. 1.5m³ potable water per occupant per year. 1m³ harvested rainwater per occupant per year
- **% Predicted water use to be provided by rainwater or greywater:** 40% as above
- **Basic building cost:** 1842 £/m²
- **Services costs:** 804 £/m²
- **External works:** 424 £/m²
- **Total area of site:** 1.3442 ha

added to the numerous balustrades and to the underside of the roof.

The basement archive, which houses more than 26,000 records, is the one area of the building serviced independently from the rest of the library. This thermally massive concrete box comprises 300mm-thick waterproof concrete walls surrounded by 200mm of insulation. The archive is designed to meet the strict requirements of BS5454 to obtain national archive certification. As a result, its roof-mounted air handling plant has been designed for strict environmental control of plus or minus 1°C temperature and plus or minus 5% relative humidity. The plant includes a full back-up system.

In addition to its low energy credentials, the scheme also includes a rainwater harvesting tank for water collected from the building's golden roof. Rainwater is used by the low-flush WCs and by the archaeology department for washing archaeological finds. Local area shut-off valves and mains supply leak detection help reduce risk from damaged pipes.

The building opened to the public in July 2012. Initial feedback has been positive with the users valuing the feeling of freshness in the air and appreciating the quantity of daylight. The PFI contract includes a commitment for the scheme to meet thermal comfort and energy targets. 'Feedback so far has been qualitative rather than quantitative,' says Nevill. The public can, however, monitor the building's performance using the display screen in the entrance foyer. Max Fordham has, however, been appointed to carry out additional post-occupancy monitoring and to work with facilities contractor SGP to improve the building performance. Nevill says this work is 'due to begin shortly'.

The innovative design for The Hive exceeded the BREEAM Excellent requirement in the brief by securing a BREEAM Outstanding rating with a score of 86.40% at the final post construction review. According to Nevill, 'it is the highest ever score for a public library'. The scheme also exceeds the 50% carbon reduction target, with renewables contributing almost 35% to the reduction. To cap it all, it also achieved an Energy Performance Certificate A rating. No wonder the CIBSE judges were impressed. **CJ**

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ASHRAE CONFERENCE: DESTINATION DALLAS

> The open format allowed views and opinions to be aired in an arena where action can be taken
> *Lee Tabis*

The ASHRAE winter conference attracted almost 3,000 delegates to more than 200 presentations. **Tim Dwyer** picks his highlights from the five-day engineering extravaganza

The ASHRAE winter conference in Dallas offered a dazzling array of events for the 2,840 delegates. A choice of up to eight concurrent sessions over four days meant there was in excess of 200 presentations, covering a breadth of material unrivalled by any other event of its type.

In conjunction with the conference there was a huge exposition that attracted around 34,000 visitors who navigated around 1,951 exhibitors covering an area of nearly 10 acres.

ASHRAE chief executive Jeff Littleton opened the event, reporting that the organisation currently has 53,486 members from 130 different countries. He also announced that the *Advanced Energy Design Guide* – available free from **www.ashrae.org** – series had almost 500,000 copies in circulation, and that the IAQ Ventilation Standard 62.1 is hitting its 40th anniversary this year and remains a strong influence in the USA and beyond.

A focus on ethics and engineering in the opening Technical Plenary proved so popular that an enlarged meeting room was required to accommodate the 300-plus attendees.

Ethical engineering

ASHRAE members are specifically expected to follow the ethical codes of their professional or trade bodies and follow the ethical culture of the particular nation in which a project is active. Representing the outlook from three continents, Richard Rooley (UK), Michael Bilderbeck (US) and Farooq Mehboob (Pakistan) provided examples of different approaches to ethics in the heating, ventilation, air conditioning and refrigeration (HVAC&R) industries.

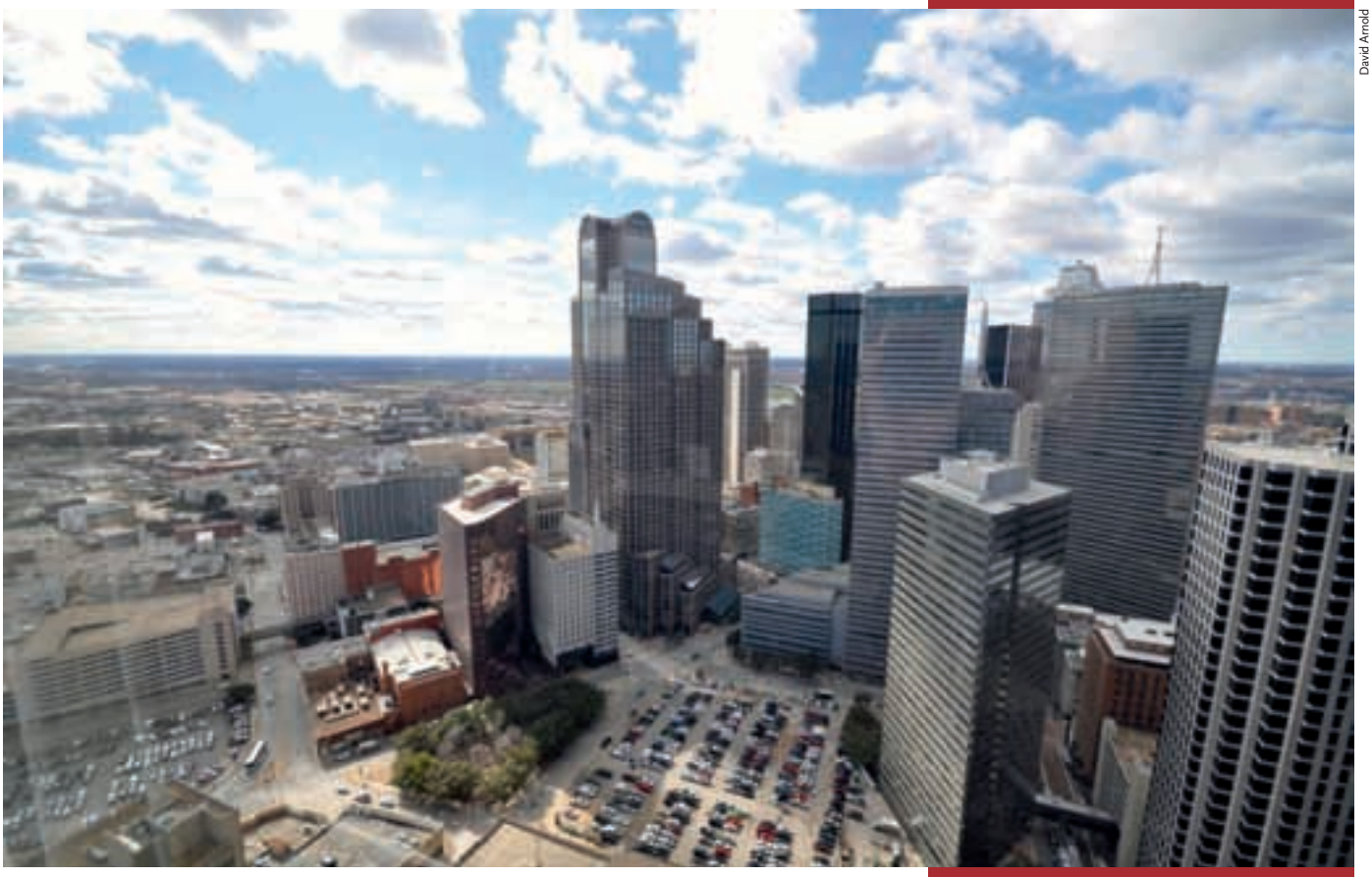
It is clear that, with the increasing internationalisation in building, the relevance and understanding of global practices has more than academic interest.

Notably the most popular sessions covered many areas that have historically evolved a strong body of knowledge and practice in the UK/Europe, including: seminars on the operational aspects/facilities management (FM) of systems; innovative building energy efficiency strategies; and the launch of the new ASHRAE/REHVA chilled beam design guide – REHVA being the Federation of European Heating, Ventilation and Air Conditioning Associations.

The FM perspective

The seminar, entitled 'The FM Perspective: reducing energy consumption and the true cost of maintenance', included a presentation by US speaker Matthew Mullen (from a FM service company) who considered 'The cost of doing nothing: the true cost of ignoring your energy systems'. When asking building owners about the lack of regular maintenance he reported common responses, including: 'we don't need maintenance'; 'just fix it when someone complains'; and 'we save money'.

Through a number of qualitative and



David Arnold

quantitative measures he provided compelling justifications for a managed maintenance regime – including high energy costs, increased service calls, increased equipment failure, reduced worker productivity and additional absenteeism.

He illustrated the point using an annual minimum notional 'cost' of $0.78 per square foot (£5 per m²), arising from the failure to implement a maintenance scheme in an air conditioned building – and that did not include potential litigation costs.

Alongside the perennial favourite, *Standard* 90.1-2010 *User's Manual* – Standard 90.1 is the ASHRAE energy standard that is included in many local codes, as well as LEED – the list of top-selling publications at the conference included *Performance Measurement Protocols: Best Practices Guide*, which serves as the how-to guide for continuously evaluating and improving the performance of commercial buildings throughout their service life. This echoed the interest in the FM sessions.

Rooley honoured

The F Paul Anderson Award – ASHRAE's highest honour – was presented to UK engineer, CIBSE fellow and past ASHRAE president, Richard Rooley. His relationship with the society reaches back more than 35 years, when he organised the first joint conference between CIBSE (then known as the Institution of Heating and Ventilating Engineers) and ASHRAE in Boston in 1976.

This was followed with ASHRAE joining CIBSE in London, in 1981, and hosting regular joint conferences thereafter.

Rooley was recognised for his efforts in encouraging interdisciplinary working and relationships among the societies, and founded the Teambuild competition in the 1990s.

Following the trend of operations, there were two seminars addressing the risk, consequences and ways of addressing the problem of Legionnaires' disease. It is thought up to 18,000 Americans are affected annually, with a mortality rate of 15%. Exposure has led to multi-million dollar litigation with eight hotel guests recently suing for $337m (£220m). The presenters provided a reality check for the international audience, making it clear that substantial damages and civil action taken against the owner, designer and operator were by no means restricted to the USA.

A popular debate was held on the motion 'Sustainability is sustainable'. The spirited debate indicated that engineers are well able to present strong and passionate arguments on both sides of a problem.

Tick box vs professional design

During the debate, a difference was emphasised between 'tick box' design to

Richard Rooley has contributed to ASHRAE for more than 35 years

CIBSE president David Fisk presents Tom Watson with his certificate confirming his membership to CIBSE

Lee Tabis (centre) meets with CIBSE president David Fisk (left) and ASHRAE's Tom Watson

Lee Tabis – in my view

The conference was an amazing experience, especially for younger engineers, as it really helped to give an insight into how the wider international community work.

People were extremely passionate about improving both engineering technologies and themselves as engineers. There was a wealth of technical knowledge on hand, allowing attendees to structure their experience around their interests. The open format allowed views and opinions to be aired in an arena where action can be taken.

It is great to see the relationship between CIBSE and ASHRAE blossoming so strongly, and I look forward to helping strengthen this bridge across the Atlantic, so we can benefit from a more cohesive engineering community.

- *Lee Tabis is the 2012 CIBSE Graduate of the Year and an electrical design engineer at NG Bailey*

meet published methods of measuring sustainability and the powerful need for designers and users of buildings to provide excellent and efficient working conditions for the occupants.

The engineer-dominated forum reflected the strong opinion that, although the tools are available in the publications of ASHRAE, it was the professionalism of high quality engineers that was required to create good buildings.

Much of the activity at the ASHRAE meetings takes place at one of the 100-plus technical committees (TCs) that meet throughout the year. The TCs work to develop research proposals, generate content for the ASHRAE handbooks and develop programmes for the conferences, as well as act as a focal point for their particular area of expertise.

A seminar session that was arranged by TC 9.9 – Mission Critical Facilities, Technology Spaces and Electronic Equipment – was held on 'The Mission Critical Data Centre: Resetting the Definition and the Human Element', where Herb Villa (US) considered performance metrics, regulatory requirements and the development of new products and services to improve efficiencies in data centres.

Robert Tozer (UK) provided a complementary view, showing that – alongside sound engineering – by addressing organisational procedures and individuals' training, the total cost of ownership for data centres may be reduced.

ASHRAE has relationships with many societies around the world and took the opportunity to sign a new Memorandum of Understanding (MOU) with the Society of Heating, Air-Conditioning and Sanitary Engineers of Japan (SHASE) during the conference, as well as a renewed and expanded Mutual Recognition Agreement (MRA) with CIBSE, which enables a wider range of members from both institutions to have accelerated routes to membership.

These, and additional sessions from the Technical Programme, are part of ASHRAE's Virtual Conference, which provides access to more than 250 presentations. Register or access the presentations at **www.ashrae.org/dallasvirtual** **CJ**

- *With special thanks to Amanda Dean, Sophia Flucker and Richard Rooley for their contributions to this report*

MATERIAL CHANGE

Proposed changes to LEED are being opposed by US lobby groups who object to the inclusion of EU-based standards on the composition of building materials. **Michael Cross** reports on the threat to LEED's continuing worldwide growth

The requirement to benchmark the sustainable design and construction of new buildings is now commonplace in the UK, Europe and North America. Globally, the increasing demand for more sustainable construction has seen numerous other countries following suit.

As part of this, the assessment methods used in Europe and America are increasingly being adopted around the world (see box, 'LEEDing the way').

The rapid spread of LEED (Leadership in Energy and Environmental Design) across other parts of the world is, in part, due to US companies and the US federal government adopting it as a preferred benchmarking standard for their global real-estate portfolio, effectively planting the 'LEED seed' as they go.

The home support for LEED is key to its success on both US soil and on the wider global stage. However, cracks are beginning to form in LEED's consensus-based approach. Numerous stakeholders associated with the US construction industry are becoming increasingly opposed to LEED and its current trajectory, threatening its authority as a global voice on sustainable buildings.

The opposition, and in some cases outrage, concerns the release of LEED v4 projected for June 2013, and the inclusion of standards that didn't originate from LEED's home market.

The US Green Building Council (USGBC) upgrades LEED on a three-year cycle, with each new version enhancing the required performance needed to secure a given score.

In theory, this should reflect the progress the industry makes in

green building practices, innovation and technology. By staying ahead of standard practices, LEED drives market transformation – a key function of benchmarking systems. The USGBC invests great effort in its public consultation processes when updating LEED.

This dialogue always includes some resistance, but the objections surrounding LEED v4 have been much stronger than those received for previous versions. The USGBC is currently reviewing the outcome of its fifth round of public comment – a record in itself.

Proposals relating to the materials section of LEED have elicited the greatest response. Under current proposals, LEED will maintain FSC (Forestry Stewardship Council) certification as its only referenced standard for procuring certified new wood. This has met with opposition from the US timber industry, which says a (less onerous) US-based standard should be eligible for credits in LEED (see box, 'Wood wars').

Unfortunately for the USGBC, it is not just wood that is proving to be a sticking point. The proposed changes in v4 mean that LEED will adopt certain parts of the EU's REACH directive (Registration, Evaluation, Authorisation and restriction of CHemicals). This approach is a bone of contention, as the American Chemistry Council (ACC) opposes the use of non-US based standards in an assessment tool that was originally designed for the US market – they are not alone in their thinking.

In a letter, the ACC and a number of trade associations representing manufacturers of building materials urged the US General Services Administration, a government agency that procures real estate for other government agencies, to abandon LEED certification based on the current proposals.

The ACC believes the requirements LEED v4 places on the composition of building materials are inappropriate. It has stated that the limits placed on certain chemical compounds are arbitrary and will result in many commonly used energy efficient building products to be perceived as 'bad' (including PVC windows and insulation). This will subsequently have a negative impact on building energy performance and jeopardise jobs.

The USGBC believes that more can be done to improve the internal environment of buildings, which will in turn improve occupant health by reducing chronic exposure to pollutants.

More than 50 members of Congress seconded the letter's proposals to drop LEED. Their reservations about the application of REACH may be understandable, as it is one of the most complex and influential pieces of legislation to come out of the EU to date, and its implementation is still in its infancy.

It's not just the supply chain that is unhappy with the proposals. Designers and architects have been voicing their concerns in the American press, stating that the changes are happening too quickly without regard for how they will be

> The USGBC believes that more can be done to improve the internal environment of buildings

LEEDing the way

The new Perot Museum in Dallas hopes to attain LEED Gold

The UK's BREEAM (Building Research Establishment Environmental Assessment Method) and the USA's LEED (Leadership in Energy and Environmental Design) systems are emerging as international standards in verifying building performance.

BREEAM was released in 1990, so has an eight-year head start on LEED, which was established in 1998. As a result, the total number of certified BREEAM projects significantly outstrips those certified via LEED[5].

While BREEAM wins the battle of the numbers, LEED is geographically much more prevalent. Its project directory boasts certified buildings in just over 140 countries, while BREEAM's shows only 34.

LEED's success in the US is primarily due to it being a requirement for many new federal and state government buildings. The same has become true for BREEAM in the UK, which – in turn – filters into local planning requirements, increasingly making BREEAM an expected part of a planning application for both public and private building projects.

LEED's rapid spread across other parts of the world is in part due to US companies and the US federal government adopting it as a preferred benchmarking standard for their global real-estate portfolio, effectively planting the 'LEED seed' as they go.

> The opposition and, in some cases, outrage concerns the inclusion of standards that didn't originate from LEED's home market in the US

implemented on the ground with systems and tools that currently don't exist.

The industry's concerns with the practicality of the proposals coupled with the fact that the US government is being strongly lobbied to avoid LEED should be of great concern to the USGBC. The government is the single largest user of LEED with 27% of the total number of LEED-certified buildings owned by the federal, state and local governments[1]. If the federal government moved away from LEED completely, it could bring a significant reduction in certifications, but more importantly, it could result in a knock-on effect where state and local governments could also feel the need to reconsider the role of LEED.

The USGBC has used LEED as a powerful tool to influence policy and practice on many levels in America and drive the green building agenda with considerable effect. Its position as a voice of authority at the local and national scale, and to some extent on the international stage, would be severely curtailed if the US government were seen not to be backing it.

There are signs that this scenario could become reality. In early 2012, the US Congress passed the Defense Authorisation Bill, which prohibits certain military spending on green buildings. The military has been at the forefront of innovative design and it maintains that it will continue to pursue certification under LEED despite the bill. Whether there will be the same number of Gold and Platinum projects remains to be seen.

The USGBC has good reason to try and instill greater rigour regarding transparency about the chemicals used in the production of building materials. The links between poor health and the quality of indoor environments have long been known. Nearly 30 years ago, the US Environmental Protection Agency (EPA) identified indoor air quality as one of the greatest sources of environmental risks to human health[2]. More recent data from the EPA have shown that indoor levels of pollutants are two to five times (and sometimes up to 100 times) higher than outdoor levels and, with the average American spending 90% or more of their time indoors, the USGBC's concerns seem justified[3].

If the USGBC rides out this storm and manages to get its proposals agreed, there remains a danger that the industry will still deem the new requirements too onerous and choose to avoid the corresponding credits. Data published at the 2011 CIBSE Technical Symposium indicated that this was the approach most design teams had taken when faced with the Responsible Sourcing credits within

Wood wars

Members of US Congress and representatives of the timber industry sent an open letter (now known as the 'Timber Letter') to the USGBC, urging that the US-based standards, SFI (Sustainable Forestry Initiative) and ATFS (American Tree Farm System) be accepted within LEED v4. Currently, only FSC-certified timber is recognised in LEED.

Their concern is that the current proposals disadvantage US timber products and drive the industry toward foreign imports. Approximately three quarters of domestic timber in the US is certified under these other (less stringent) schemes, and under the new LEED system, this timber will remain 'non-LEED compliant'. The letter goes on to state that the USGBC are placing 'irresponsible barriers [on] products... derived from responsibly managed forests in the US' and included 79 Members of Congress as signatories.

The USGBC has so far refused to amend the FSC requirement. The SFI believes that the refusal to recognise its standards within LEED is hurting the US economy as 90% of FSC forests are outside the US, while 100% of SFI forests are in North America. In retort, the FSC has stated that there is more than enough FSC-certified wood in the US for all the green building projects across country.

The so-called 'wood wars' prompted the Governor of Maine, one of the supporters of the timber letter, to make it illegal for state buildings to pursue LEED at any level. So far, Maine is the only state to do this.

FSC has been part of LEED for some time now, and as newer versions tend to enhance requirements rather than relax them, it seems highly unlikely that the USGBC will bow to pressure from the timber industry.

the BREEAM system[4]. If this happens with LEED, the USGBC's efforts will be in vain as there will be no engagement to progress the issue. Even with this in mind, it is clear that future LEED projects will look much more closely at material sourcing and content, rewarding only the most rigorous of approaches.

From the outside looking in at these developments, there are obvious implications for UK projects that wish to pursue LEED. But these changes will not come into force until 2015, so there is time to consider your options.

In the meantime, the EU is pressing on with the phased introduction of the REACH Directive, bringing with it a major step change to all manufacturing industries, not just construction. As such, we are likely to see a much more rigorous scientific approach to transparency within the manufacturing industries, creating greater accountability and requiring much more detailed information about product composition.

The USGBC's problems should be seen as an early warning of what lies ahead for other green building rating systems. Assuming we meet the UK government's goal of zero carbon commercial buildings by 2019, what will the likes of BREEAM focus on after this?

It is true that LEED and BREEAM are very different in their approach, but they have the same fundamental objectives with both placing the most emphasis on issues that tackle energy efficiency and human health. It seems likely that we will be having similar discussions to the Americans in the future. **CJ**

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5 According to the BREEAM website, up to 200,000 projects have been certified, while the Green Building Certification Institute lists approximately 30,000 completed projects.

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POWER TO THE PEOPLE

Islington Council believes a district heating network will help cut fuel poverty for thousands of residents. **Robert Langlands** looks at the first phase of the project, which includes the newly commissioned Bunhill Energy Centre

A pioneering CHP district heating (DH) system in Islington is on course to achieve CO_2 savings of more than 2,000 tonnes per annum and provide cheaper, greener heat for 700 residents and local leisure centres.

The 2 MWe Bunhill Energy Centre is the first in a planned deployment of combined heat and power (CHP) district energy clusters within the Borough and is part of Islington Council's Decentralised Energy Programme. In the medium term the aim is to link district energy schemes within Islington, and then explore further opportunities with neighbouring Hackney and Camden councils and the City. The Decentralised Energy Programme was developed as part of a strategy to cut carbon emissions and fuel bills, reduce fuel poverty and drive infrastructure development.

Decentralised energy networks were among the options explored by the London Borough of Islington (LBI) in its bid to significantly reduce its carbon footprint, and comply with the emissions reduction targets of the UK Climate Change Act 2008, which

Thermal store in-situ before timber cladding INSET: The thermal storage tank is craned into position

requires a 35% cut in CO_2 by 2020.

LBI energy services manager Lucy Padfield worked with client engineer Parsons Brinckerhoff to complete the feasibility, detailed design and specification in 2010 for the Energy Centre in Central Street EC1.

Using 2007/2008 heat maps, LBI identified at least four heat clusters with potential as CHP/district energy locations including King's Cross, Archway and Bunhill. At Bunhill visual impact studies, noise surveys and dispersion modelling of emissions were carried out before the project was granted planning in 2011. Commercial aspects, including project funding, were a key issue and the energy centre and heat network were grant funded by the London Development Agency and the Homes and Community Agency.

Vital Energi took the project from detailed to full design and commenced construction on the turnkey project in April 2012. Major challenges included the Olympic embargo on heavy lorry movements as well as the laying of 2.4 km of DH pipework ranging from DN65 up to DN250 in a highly urban and restrictive environment. LBI decentralised energy manager Charlotte Large was the project manager responsible for the project.

A 2MWe MTU V20 96 litre gas spark ignition converted diesel engine forms the heart of the Bunhill Energy Centre. The 50-tonne acoustically treated container was prefabricated off-site in order to reduce disruption to residents. This plug-and-play method of construction means that the energy centre can, for example, be relocated in the Borough as LBI develops and extends its wider heat networks.

The centre was opened on 29 November 2012 by Islington Council leader and chair of the Transport and Environmental Committee of London Councils, Catherine West.

The DH network is linked to five existing plant rooms thereby providing hot water to

> With 25% of tenants living in fuel poverty, there are significant social benefits for Islington council, and the opportunity to decouple the link between energy companies and fuel and electricity costs

The timber-clad energy centre

New guidance

A new edition of the CIBSE Applications Manual, *AM12 Combined Heat and Power for Buildings*, is now available.

This revised and updated edition has been produced in order to recognise the role that combined heat and power (CHP) can play in delivering low-carbon buildings.

The comprehensive guide features new chapters on district heating (DH) applications, information for assessing environmental benefits and more detail on tri-generation (combined cooling, heating and power – CCHP) and thermal storage.

It will help industry professionals meet the highest standards recognised internationally for these engineering solutions. To order the new manual, visit **www.cibseknowledgeportal.co.uk**

Meanwhile, the mayor of London, Boris Johnson, has published a set of guidelines to support the delivery of decentralised energy schemes in the capital.

The *District Heating Manual for London* provides guidance for developers, network designers and planners with the aim of creating a consistent framework for delivering efficient, interconnecting, district heating networks. It also aims to guide local planning authorities.

The document, developed in collaboration with Arup, supports a range of initiatives provided by City Hall to promote the Mayor's target to achieve 25% of London's energy supply from decentralised energy sources by 2025.

The manual, the first of its kind in the UK, is designed to be a 'live' document that will be updated, and feedback is encouraged in time for the next revision to be published this summer. To download a copy, visit **www.londonheatmap.org.uk/Content/Manual.aspx**

The energy centre's engine
INSET: the network of pipes

> Monitoring and targeting is used to track gas input, electricity generated and hours of operation and to help determine efficiency

more than 700 local homes on the Stafford Cripps, Redbrick and St Luke's estates, as well as the newly re-furbished Ironmonger Row Baths, and Finsbury Leisure Centre. With the economies of scale and flexible bulk purchasing of gas for the CHP engine and the revenue from export of electricity to the grid, LBI is able to reduce heat supply agreement costs, providing cheaper, greener energy.

The 115 m^3 thermal storage tank – wooden clad to blend in with the local environment – enables electricity generation to be maximised at peak times and so increase savings.

The £3.5m centre is owned and operated by LBI to maximise the operational control and the financial benefits. This ensures that residents are charged affordable energy prices. LBI ownership also enables opportunities to expand the network in line with the Islington Decentralisation Programme.

With 25% of Islington Council tenants living in fuel poverty, there are significant social benefits for LBI, and the opportunity to decouple the link between energy companies and fuel and electricity costs, bringing significant community benefit.

This is an important issue for Catherine West. In her opening remarks she welcomed the strong sense of direction given by Islington on decentralised energy and its role in tackling fuel poverty. Monitoring and targeting is used to track gas input, electricity generated and hours of operation and to help determine efficiency. This will ensure financial and environmental benefits are achieved long term as monitoring of system performance will optimise power and heat generation efficiency.

A 10-year performance-based maintenance contract has been negotiated with Vital Energi, together with an extended warranty for the DH pipework. This will ensure optimised power generation to maximise electricity revenue and provide lowest possible heat to the estate residents and the leisure centres.

With the commitment by the Mayor of London to deliver 25% of London energy by decentralised energy by 2025, there is a renewed interest in CHP and DH. As well as Bunhill, 2012 also saw the installation of the two Olympic Park CHP-based energy centres.

Other local authorities such as Camden and Brent are exploring the benefits of DH, and the aim of the Mayor of London is to facilitate over £95m of mainly CHP DH schemes by summer 2014 through the decentralised energy for London programme.

More details and updates are available at **www.islington.gov.uk/heatnetwork** CJ

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EASING THE PRESSURE

The installation of liquid pressure amplification on two chillers has cut electrical consumption by 38% on a pilot data centre project for Lloyds Bank. Gareth Holden reports

Data centre server room

Data centres offer a unique challenge to energy management; a constant year round heat load means that cooling represents a significant energy cost. The critical nature of the building means that a very conservative approach to design and modification is adopted.

Excalibur Energy was approached to investigate the potential to reduce the energy consumption of chillers at a Lloyds Bank data centre. Its study showed that there was potential to reduce electrical consumption by nearly 40%.

Excalibur proposed the installation of liquid pressure amplification (LPA) along with the chiller manufacturer's recommendation of replacing existing condenser fans with more efficient Electronically Commutated (EC) fans.

Data centre technical staff had to be persuaded that modification of their chillers would not effect the resilience of their building. A presentation demonstrated that no single point of failure would be introduced as a result of the modifications.

Further confidence was gained by undertaking condition monitoring of each refrigeration circuit using the Climacheck analyser to ensure the chillers were in good working order prior to works commencing.

Improved refrigeration efficiency is achieved by reducing compressor discharge pressure; this is commonly referred to as 'floating head pressure'. Reducing discharge pressure positively affects efficiency in two ways: absorbed power is reduced while cooling capacity is increased.

LPA allows the minimum discharge pressure to be reduced well below what would normally be achievable, with improvements in efficiency of 25% to 35% achievable.

Patented in the US, LPA allows a chiller to be recommissioned for efficient floating head

pressure operation. An LPA pump is located in a fabricated manifold in the drain from the condenser; this pumps liquid refrigerant to the expansion valve, maintaining a flow of good-quality liquid refrigerant at the expansion valve during low head pressure operation.

With the condenser fans adjusted for low head pressure operation, it is important that accurate fan control is maintained whether by inverter control of existing fans or, as in this case, by replacing the existing alternating current (AC) fans with EC fans, which can be speed controlled.

Typical head pressure control is achieved by cycling condenser fans on and off to maintain the desired pressure. This is not accurate enough for low head pressure operation. Inverter or EC fan control allows all condenser fans to be operated and their speed modulated to provide precise control of pressure; the correct control allows discharge pressure to be continually optimised against ambient temperature and cooling demand.

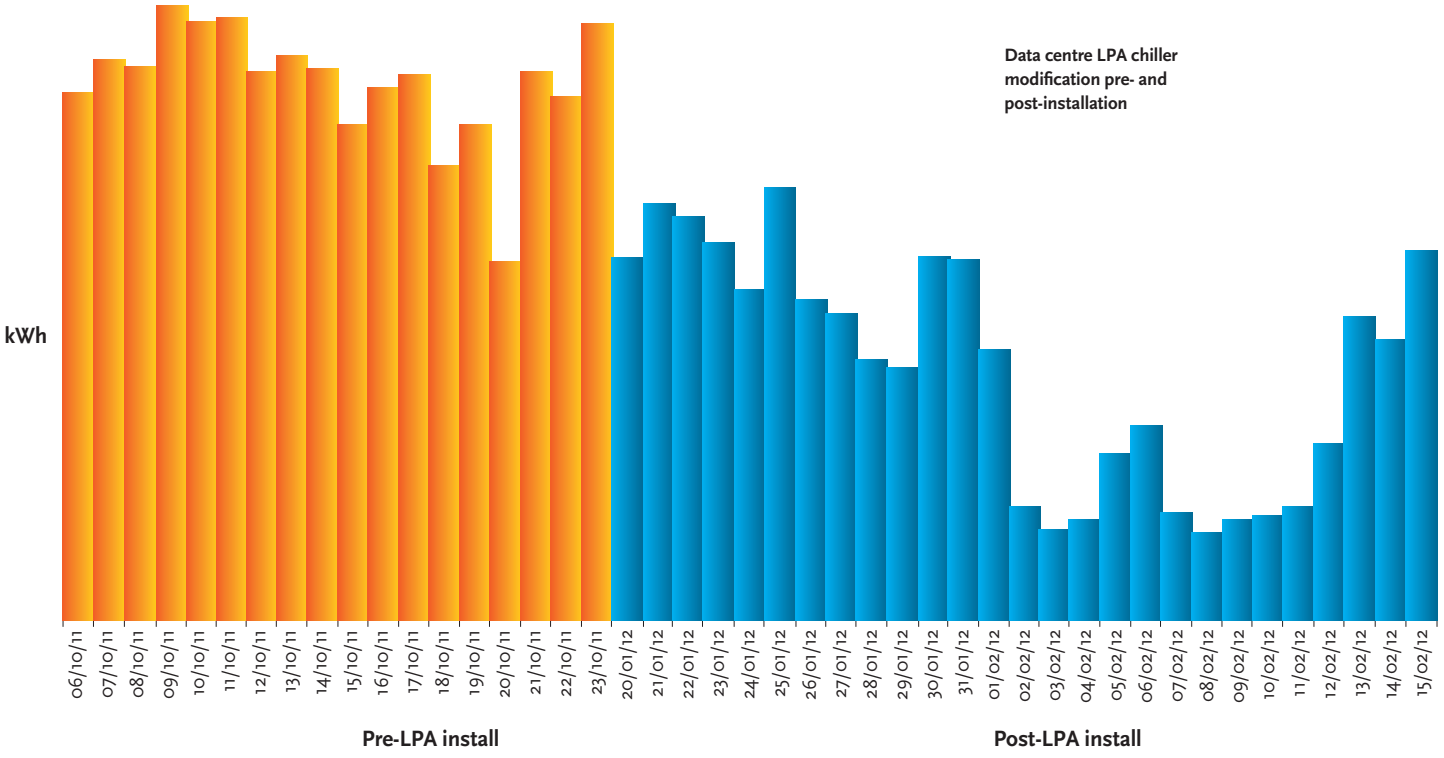
If these operating parameters were maintained without the installation of LPA, a condition commonly referred to as 'over condensing' is experienced. This is where discharge pressure has been reduced to a level where liquid refrigerant starts to evaporate before it reaches the expansion valve, leading to reduced capacity and efficiency.

Installation of LPA requires the recovery of refrigerant and the fabrication of a manifold on the discharge side of the condenser. Bypass pipework ensures that in the event of a pump fault (generally as a result of a loss of refrigerant), the chiller will continue to operate. This fault signal will increase head pressure to ensure that over condensing does not occur.

The LPA control will generate a fault condition when 5% to 10% of refrigerant has been lost, and so provides an early warning that the chiller should be tested for leaks.

Data centre chillers

> The LPA control will generate a fault condition when 5% to 10% of refrigerant has been lost, and provides an early warning that the chiller should be tested for leaks



Data centre LPA chiller modification pre- and post-installation

LPA installation at a BT satellite station

Two 700kw, two-circuit chillers operating on R407c were selected for a pilot installation at the Lloyds site in Copley. These chillers incorporate free cooling coils, which would also show an increase in capacity as a result of floating head pressure operation.

The energy consumption and cooling capacity of these chillers was monitored for a period prior to installation works being undertaken to provide a baseline for efficiency.

Following the installation of LPA and EC condenser fans, the chillers were commissioned for floating head pressure operation and the monitoring repeated.

The results over the period of monitoring showed a reduction in absorbed power of 38% (see graph, p47), which represents an annual reduction in electrical consumption of 325,000 kwh and 177 tonnes of CO_2 for a single chiller.

The monitoring also demonstrated the effect that the increased airflow generated by the EC fans was having. Prior to modification, the chillers were able to entirely satisfy demand in free cooling mode when external air temperatures fell below 10C; following the modifications, cooling demand could be satisfied when air temperatures fell below 40C, thus ensuring a further reduction in chiller energy consumption. **CJ**

● *More details at www.excaliburenergy.co.uk*

● **GARETH HOLDEN** is managing director at Excalibur Energy

essential APPS

Technical editor **Tim Dwyer** reviews the latest industry apps

DANFOSS KOOLAPP

Software determines the characteristics of 60 common refrigerants, without the need for an old-fashioned plastic slider

A myriad of apps are now on the market offering slick access to data conventionally found in guides and technical catalogues, replacing the need for conversion functions developed on a programmable calculator or computer spreadsheet.

The convenience of a fast-access app running on a tablet or smartphone, together with a custom interface that allows some novel manipulation, is very appealing.

This type of app tends to meet a single, or limited, need and the array of free apps, mainly provided by manufacturers, may not provide the breadth, or even depth, of some of those developed independently. And, of course, there will be some inevitable link to, or promotion of, the suppliers' online sales information.

As part of the Danfoss 'KoolApp' suite, the Refrigerant Slider has transformed the physical plastic refrigerant slider into a free, single purpose app, for both iOS and Android, to determine the pressure/temperature dew/bubble point characteristics of 60 common refrigerants.

Aimed at the site user, this digital implementation benefits from being able to instantly – and clearly – provide output in any one of many SI/IP formats – particularly useful in an industry that regularly bridges the metric and imperial worlds.

For each of the refrigerants, basic data is also shown (including global warming potential, ozone depletion potential and critical temperature). The interface has been designed as a 'virtual slider', complete with the ability to optionally slide the cursor (by wiping a finger across the screen) or to type in the pressure or temperature and determine the corresponding refrigerant condition.

There is also opportunity on the tablet version for developers to use some of that blank screen space to supply additional information, such as comparative co-efficient of performances at selectable condensing/evaporating conditions, and possibly also some relative volumetric data.

As a single purpose app, this is both fast and appropriately intuitive, providing instant (offline) access to useful basic refrigerant information at no cost and is practically manufacturer agnostic.

There are other refrigerant apps available from other suppliers, including Honeywell and DuPont.

> The Refrigerant Slider has transformed the physical plastic refrigerant slider into a free, single purpose app

CIENPIES DESIGN / SHUTTERSTOCK

A CHANGE OF SEASON

Tightening of European energy efficiency legislation for air conditioning now requires products under 12 kW to be rated according to seasonal efficiency. It could enable building services engineers to help clients make large energy savings, says **Graham Wright**, legislation specialist at Daikin UK

The European Union's response to the Kyoto Protocol was to set the ambitious environmental 20-20-20 targets to achieve: a 20% cut in greenhouse gas emissions compared with 1990 levels; a 20% increase in the share of renewables in the energy mix; and a 20% reduction in energy consumption by 2020. This resulted in a raft of new legislation to help member countries meet their targets.

One of the most significant pieces of legislation to affect the air conditioning sector is the Energy Related Products Directive (ErP). Unlike the voluntary Eco-label programme, this legal framework – which has already transformed the residential lighting sector and is now having the same effect within consumer electronics – sets new minimum energy efficiency requirements for air conditioning systems below 12 kW (those typically used for light commercial applications).

The new EcoDesign requirements has meant that, from 1 January 2013, all products with capacities up to 12 kW have had to be labelled according to their seasonal efficiency over the entire year. Non-compliant products can no longer be sold by manufacturers, although those already held in stock by a distributor or awaiting installation are deemed to be 'placed on the market' and can still be sold on through the supply chain.

> Previously, the nominal ratings reflected how products performed at temperatures of 35°C and 7°C, which is not applicable to the typical climates experienced in the UK and northern Europe

SHUTTERSTOCK / JOINGATE

> In typical northern European climates, air conditioning equipment will actually run at partial capacity for about 70% of the time, rather than being on full power throughout the year

This is not just tinkering with energy labels, it represents a fundamental shift in the way energy efficiency is assessed and gives a more accurate picture of real-life conditions. Building engineers need to be aware of what the new ErP regime means, because it now affects which systems they can specify. Understanding the new energy labelling is also crucial, so that energy performance of products can be assessed accurately.

At the heart of the new legislation are changes to how energy efficiency is measured. The existing nominal ratings, energy efficiency ratio (EER) for cooling and coefficient of performance (COP) for heating, have been replaced with two new measures: the seasonal energy efficiency ratio (SEER) and the seasonal coefficient of performance (SCOP).

Designed to better reflect real operating conditions and true energy consumption, the main measures it considers are: energy performance in different climates; different load requirements through the seasons; and energy consumption in auxiliary modes.

Previously, the nominal ratings reflected how products performed at temperatures of 35°C and 7°C, which is not applicable to the typical climates of the UK and northern Europe. So, from January, products have had to be rated according to the zone in which they are being used. Europe has been split into three climatic zones, each with its own realistic temperature range, which is used in the efficiency calculation. Although this throws up a number of anomalies, it is a significant improvement on the previous system.

In the past, air conditioning systems were designed typically to reflect the best performance at nominal temperatures and were therefore most efficient when operating at full load, not at partial load.

However, in typical northern European climates, air conditioning equipment will actually run at partial capacity for about 70% of the time, rather than being on full power throughout the year. To reflect this, both the SEER and SCOP calculations consider the energy efficiency at partial load capacities.

This is good news for inverter-controlled products, which run most efficiently at partial loads and so are optimised to perform at their best in real-life conditions. The SEER reflects the inverter's lower energy consumption as it needs only the power necessary to match the load. This results in reduced annual energy consumption and operation costs.

The new measures also consider the energy consumption of products in auxiliary modes, such as standby, or when the thermostat is off. While these factors reduce the apparent energy efficiency of the product, as a result the SEER and SCOP ratings are a more accurate reflection of real-life energy performance.

Requirements for air conditioning units are changing

The SEER and SCOP ratings will be displayed on a product's Energy Label, which have been redesigned to take account of the new ratings. Previous labels only had to show cooling EER and energy consumption, while the new labels need to show SEER, SCOP and energy consumption in both heating and cooling modes, as well as solar power.

It is worth noting the EER and COP ratings do not relate to the SEER and SCOP ratings, and so are not comparable. As a result, manufacturers have had to recalculate their products' energy efficiency ratings according to the new measures.

It is the manufacturer's responsibility to ensure that all these ratings and relevant design conditions are available free online, and that the energy label is supplied with each unit.

While the new legislation only affects smaller or light commercial systems under 12 kW, consultation is already under way about setting new minimum energy efficiency requirements for more powerful systems. And with energy efficiency thresholds tightening further in 2014, even more products are likely to be affected in the future.

There is no doubt that achieving the EU's carbon and energy reduction targets will be an enormous challenge for government and industry, but legislation such as the ErP will help. It has certainly been a major wake-up call to manufacturers to ensure their air conditioning equipment meets minimum energy efficiency standards and that older, less efficient products are phased out. **CJ**

SEASONAL EFFICIENCY KEY POINTS

- From 1 January 2013, air conditioning systems below 12 kW have to meet new European energy efficiency standards
- New seasonal energy efficiency ratings, SEER and SCOP, will replace existing nominal ratings – the new and old ratings are not comparable
- The new ratings account for seasonal variations and efficiencies at partial load capacities and consider energy consumption in auxiliary modes
- Products will be rated according to where, in one of three European climatic zones, they are being used
- Energy labels have been redesigned to show SEER, SCOP and energy consumption in both heating and cooling modes
- New legislation will mean significant redesign of some air conditioning products
- Consultation is already under way about setting new minimum energy efficiency requirements for systems over 12 kW
- Acceptable energy efficiency thresholds are tightening in 2014, with a gradual stepping up of minimum energy efficiency standards

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* restrictions apply

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This module looks at continuous flow water heating systems and how they can offer reduced energy consumption compared to traditional systems

In the 35 years since direct hot water systems entered the UK commercial market, applications have encompassed ever more energy efficient solutions, including condensing technology and, increasingly, fast response 'instant', or continuous flow water heating. This CPD will consider the reasons that, properly applied, such systems can provide reduced energy consumption compared to traditional systems, so reducing the potential lifetime carbon impact and making a positive contribution to meet regulatory requirements such as the UK Building Regulations.

Instantaneous water heaters are well established and popular in many parts of the world (typically as 'point of use' or 'multi-point' heaters). Due to advances in materials, manufacturing methods and control techniques, in recent years instantaneous heaters have also evolved into 'continuous flow' water heaters. The principal factors that differentiate continuous flow water heaters from the former instantaneous water heaters are the close control systems that are used to maintain accurate control of the hot water temperature at high efficiencies, during both continuous and intermittent operation. This is achieved through application of microprocessor controllers together with fast response sensors, combined with fully modulating control of the combustion process.

When combustion takes place in a gas-fired water heater, it produces heat in the form of: radiation from the flame and the gas jet/burner assembly; convection due to the increased temperature of the gases post combustion; and latent heat in water vapour produced in the chemical process (that will not be available as useful heat until the water vapour condenses).

Methane is the principal constituent of natural gas (about 95%). A simplified combustion equation for the most effective combustion of methane (given in *moles*) is:

methane + air => water + carbon dioxide + nitrogen

$$CH_4 + 2\,(O_2 + 3.76N_2) \Rightarrow 2H_2O + CO_2 + 7.52N_2$$

However, typically in a gas boiler, 20% excess air (that is, a lambda of 1.2) will be used to ensure full combustion of the methane giving:

$$CH_4 + 2.4\,(O_2 + 3.76N_2) \Rightarrow 2H_2O + CO_2 + 0.4O_2 + 9.02N_2$$

where the excess air would be evidenced by oxygen being present in the discharged flue gases. The excess air will also reduce the temperature of the gases leaving the combustion process, and reduce the transfer of heat to the water passing through the heat exchanger. The operating effectiveness of the water heater will improve with closer control of lambda to ensure that just enough excess air is supplied. Approximately every 1% extra oxygen supplied in the excess air results in 0.5% efficiency loss.[1] (For an explanation of stoichiometric ratios and lambda, see the August 2012 *CIBSE Journal* CPD.)

In a modern continuous flow water heater, such as that shown in Figure 1, the controller alters the combustion air and gas rates to ensure a near stoichiometric air to gas volume ratio, to maintain the most effective combustion at all points of operation. Water is heated only while it is flowing – a water flow sensor measures the water flow and sends a signal to the controller. The controller monitors the temperature of the water passing through the system and determines how much combustion air and gas is required to achieve the required increase in water temperature. Typically, an outlet water low thermal inertia thermistor (that is, one with a fast response time) measures the temperature of the water being produced and maintains the desired water outlet temperature.

Should the water flow rate exceed the capacity of the water heater, a water flow control valve will reduce the flow of water to maintain the set temperature. A variable speed fan, complete with a fan rotation

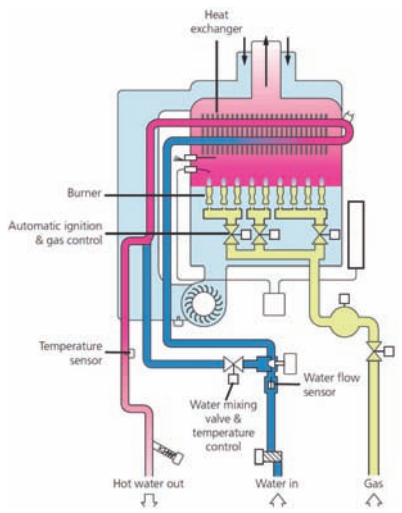

Figure 1: A continuous flow condensing hot water heater

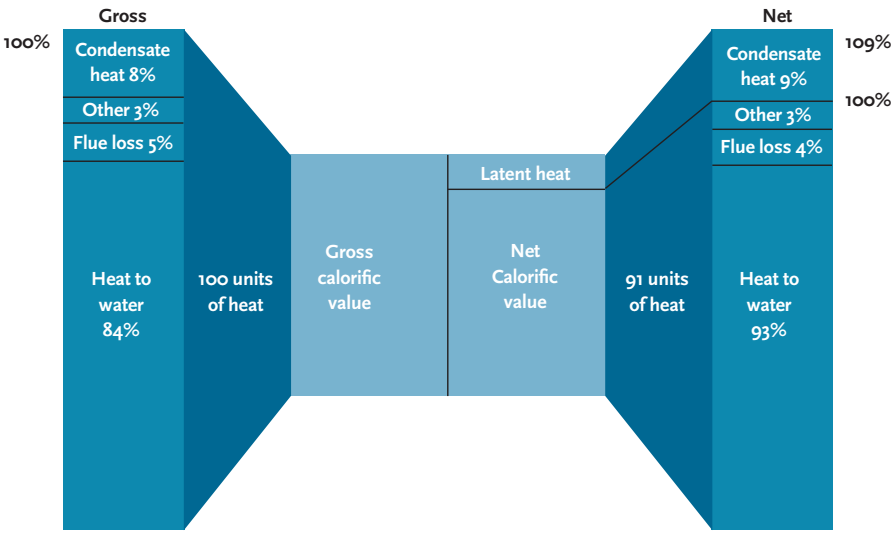

Figure 3: Gross and net calorific values for natural gas

sensor, is used in conjunction with the modulating gas valve to supply the correct amount of gas. Feedback information provides virtually instant error signals to the gas and water controller so that it is able to provide rapid responses to a change in demand for hot water or a change in temperature requirements. The system maximises system efficiency and, by tightly controlling the combustion process, also minimises the emissions of NO_x that will increase as excess oxygen rises and reacts with N_2 in the high temperature area of the flame.

Safety is assured by the controller continuously monitoring the system components, including both a flame sensor checking for correct ignition and exhaust flow sensing.

The output from such a heater can be very stable – an example heater (tested as per EN13203[2]) provides the outlet hot water temperatures shown in Figure 2, where the hot water draw-off rate starts at 12.73 L/minute, then instantaneously reduces to 7 L/minute and then reverts to 12.73 L/minute. The temperature of the hot water remains stable within a few degrees of a set point (in this case, 55°C).

Water heater operating efficiencies

Efficiencies are variously quoted both in terms of 'net' and 'gross' efficiency. Gross efficiency calculations will include all the energy available from the fuel, including the energy due to the latent heat (water vapour) in the flue gas (an additional potential heat source of 3.6 MJ per m³ refined natural gas out of the available total of 38 MJ/m³).[3] Hence, net efficiencies are higher than gross, as illustrated in the comparison in Figure 3. In theory, the latent heat can be fully recovered if, somewhere in the water heater, before the flue gases are expelled they are cooled to less than 20°C. Condensation will start at 57°C, and at a gas temperature of 30°C, approximately 70-80% of latent heat will be recovered.[1] Historically, the UK has used gross calorific values, but since EU standards apply net values, this has now become the more frequently applied standard.[4]

The true 'thermal efficiency' of a domestic water hot water system is the useful energy delivered (through hot water at the point of use) divided by the energy consumed (for example, in the form of gas, oil and electricity). However, to calculate this in practice will be difficult, since it is dependent on the incoming mains water temperatures and the pattern of usage (and associated distribution losses).

Direct and indirect water heating are not easy to compare, but at full load well-installed systems are unlikely to show great differences in primary energy conversion (for example, burning of gas). However, it is the transfer of the heat to the water, both at full load and part load, where a direct-fired water system is likely to benefit.

The overall efficiency of a conventional condensing boiler linked in with a secondary hot water storage vessel (as shown in Figure 4) will be limited, due to the losses in the primary heating circuit and hot water cylinder but, more importantly, due to the lack of potential for condensing operation during times of low domestic hot water consumption.

Stored hot water needs to be maintained at 60°C (to prevent problems of *Legionella* as required by HSE L8[5]) for at least one hour per day. The store will lose heat to the surrounding environment – for example, the *Non-Domestic Heating, Cooling and Ventilation Compliance Guide*[6] (the supporting document to the UK Building Regulations) indicates a (recommended maximum) heat loss of 4.7 kWh per day for a 1,000 litre domestic hot water cylinder. The same loss will be evident with any storage water heating system, including direct-fired systems.

During periods when there is little or no hot water draw-off, if the stored water is to be maintained at 60°C, the primary top up heating feed in the storage vessel will have water returning to the boiler at a temperature

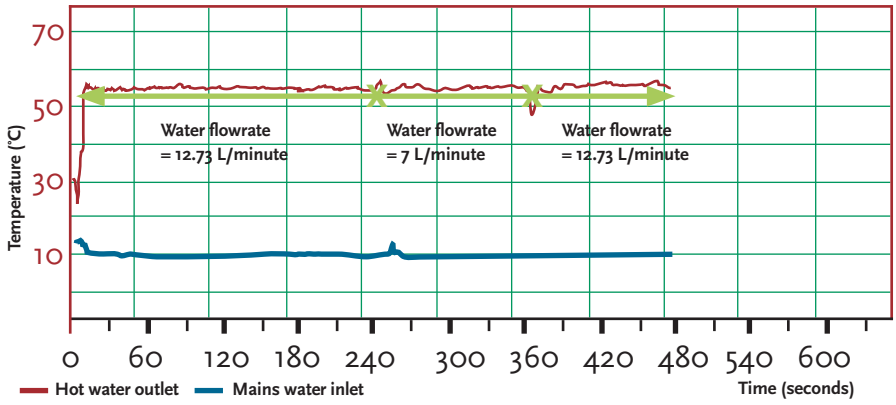

Figure 2: Hot water temperatures at varying flowrates, from an example condensing continuous flow water heater with a design maximum load of 54kW

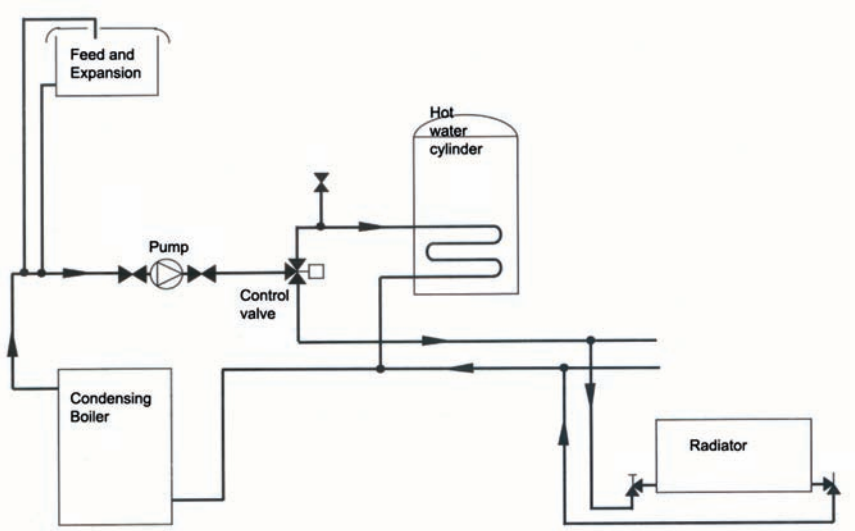

Figure 4: Example heating and domestic hot water schematic

greater than 60°C. Since condensing boilers require return water temperatures of below 57°C to operate in condensing mode, it can be challenging at times of low hot water load to operate at its expected condensing efficiency. It should, however, be noted that with careful design the cold water feed into the cylinder can be arranged to maximise the opportunity of keeping the primary return at a lowest possible temperature when used in association with indirect condensing boilers.

A condensing continuous flow water heater system (as shown in Figure 1) is constantly fed with water from the mains supply (at approximately 10°C), and this provides the opportunity for it to operate in fully condensing mode at all times.

The range of commercially available continuous hot water heaters can supply from around 100 L/hour to more than 1,000 L/hour. However, where there is a requirement for storage – for instance, if there are huge spikes in demand – they can be used as single or multiple units to serve a storage vessel, as in Figure 5. This will allow a turndown to just a few percent of peak while maintaining high combustion efficiencies. Similar arrangements, but using a common thermal store, allow instantaneous hot water heaters to work in conjunction with LZC sources – such as air and ground source heat pumps – to efficiently lift the temperature of the pre-heated water. For direct gas-fired water heaters to successfully operate in condensing mode will depend on the storage tank design and how the feed water is introduced.

Meeting the thermal regs

The Building Regulations Part L2 and, more particularly, the *Non-Domestic Heating, Cooling and Ventilation Compliance Guide,* explicitly recognise that the gross efficiency of the primary heater in a direct-fired water heater is allowed to be lower than that of a boiler used by an indirect hot water heating system. The *Compliance Guide* requires a minimum gross efficiency for direct natural gas-fired water heaters of 73%, compared to the minimum (seasonal) efficiency of a boiler being used to indirectly generate hot water of 80%. The indirect boiler requirement is quoted as 'seasonal' to take account of the variability in performance, as primary return temperatures, and boiler losses, vary in use. In a direct-fired water heater system, there will be fewer opportunities for energy loss (no primary pipework, and the fuel consumed will be directly linked to the water heated) so although the required efficiency of the heat source is lower, it is likely that the overall installed 'true' efficiency will be higher. When comparing solutions for the combined provision of space heating and hot water with that of a direct water heating system, it is important to consider the 'seasonal efficiency' rather than simply peak loads. (Detailed guidance is available in BS EN 15316-3-3:2007 *Heating systems in buildings. Method for calculation of system energy requirements and system efficiencies. Domestic hot water systems, generation.*)

The National Calculation Method (NCM), often using the Simplified Building Energy Model (SBEM) is used to assess compliance with the UK Building Regulations. This procedure, used for buildings other than dwellings, compares the proposed design with the benchmark energy use of a comparable 'notional' building. The Compliance Guide and the Building Regulations recognise that the appropriate control mechanism is so important that extra 'heating efficiency credits' of 1.5% (in the comparison of the actual installed system with the notional system) is given for fully automated ignition and integrated combustion controls. As with all water heating systems, the importance of proper selection and design procedures is recognised by an allowance of an extra 2% being added to the calculated installed efficiency for the purposes of the NCM.

Despite the UK market offering high efficiency hot water heaters for more than a third of a century, with condensing and continuous flow providing proven solutions, only something less than 2%[1] of UK installations use the technology. Where there is an appropriate hot water load to afford the installation of a split space and hot water heating, continuous flow hot water heaters can provide a flexible and efficient option.

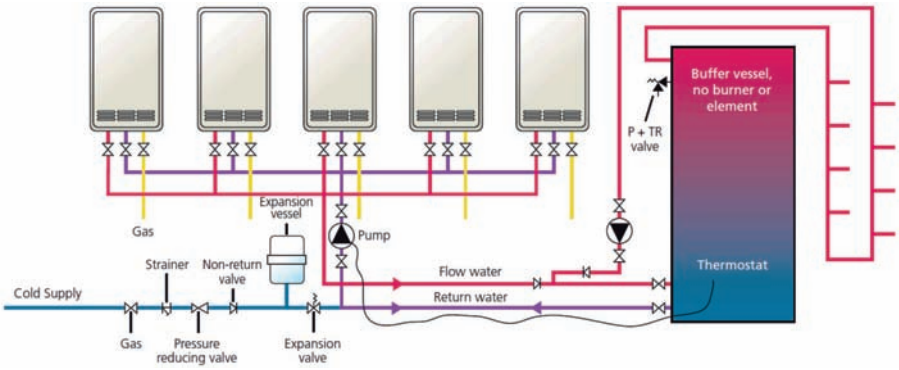

Figure 5: Multiple condensing continuous flow water heaters linked to provide high volume domestic hot water store

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1 Kemna, R. et al, *Preparatory Study on Eco-design of Water Heaters, Task 4 Report*, VHK/EU Commission, 2007.

2 BS EN 13203-2:2006 Gas-fired domestic appliances producing hot water. Appliances not exceeding 70 kW heat input and 300 l water storage capacity. Assessment of energy consumption.

3 **http://chp.decc.gov.uk/cms/calorific-values/** accessed 4 February 2013.

4 *CIBSE Knowledge Series: KS14, Energy efficient heating: an overview*, CIBSE, 2009.

5 *Legionnaires' Disease. The control of legionella bacteria in water systems. Approved Code of Practice and Guidance L8*, HSE, 2000.

6 *Non-Domestic Heating, Cooling and Ventilation Compliance Guide*, DCLG, 2010.

Module 50

March 2013

Rinnai
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1. For each 1% extra in excess air, what is the approximate efficiency loss in a gas heating process?

- ☐ A 0.01%
- ☐ B 0.05%
- ☐ C 0.10%
- ☐ D 0.50%
- ☐ E 1.00%

2. Which of these is the least likely reason for close control of the air/gas mixture and combustion process in a continuous gas water heater?

- ☐ A To maintain a high efficiency in the combustion process
- ☐ B To maintain the outgoing water temperature
- ☐ C To provide a continuous safety check on the state of the boiler
- ☐ D To reduce the noise by reducing the volume flow of air
- ☐ E To reduce the potential to generate emissions of NOx

3. In Figure 2, what is the approximate average outlet water temperature of the tested boiler?

- ☐ A 35°C
- ☐ B 45°C
- ☐ C 50°C
- ☐ D 55°C
- ☐ E 60°C

4. If the flue gases in a gas heater are reduced to 30°C, what is the approximate maximum latent heat that could be recovered?

- ☐ A 10-20%
- ☐ B 30-40%
- ☐ C 50-60%
- ☐ D 70-80%
- ☐ E 90-100%

5. What is the minimum gross efficiency of a direct-fired water heater required to comply with the current requirements in the *Non-Domestic Heating, Cooling and Ventilation Compliance Guide*?

- ☐ A 93%
- ☐ B 83%
- ☐ C 73%
- ☐ D 63%
- ☐ E 53%

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Titan Products launch TPZ-Net Zigbee wireless range

The TPZ-Net is a new range of wireless environmental products from Titan Products. Incorporating Zigbee wireless technology, the range creates extremely stable, self-healing mesh networking capabilities. The TPZ-Net range is designed to monitor temperature wirelessly, CO_2, humidity, light and occupancy levels and transfer this information back to the Titan Products coordinator, where the information can be transferred onto a BACnet network or to other Titan product controllers, or I/O (input/output) devices.

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

Tyco Fire Protection Products launches TechXchange academy

Tyco Fire Protection Products has opened a new TechXchange Training Academy in Manchester, which will provide training services to fire and mechanical installers, contractors, specifiers and engineers who design and install fire protection and mechanical solutions throughout the EMEA (Europe, Middle East and Africa) region. The academy, which will be used by Tyco's regional sales teams and technical trainers from around the EMEA, will provide support to customers throughout the region. This will be achieved through hands-on practical and theoretical sessions.

● **Email info-UK@tyco-bspd.com or call 0161 875 0400**

Vent-Axia's Sabre Sickle fans: next-generation aerodynamic design

Vent-Axia has launched its latest range of Plate and Case Sabre Sickle fans, which incorporate the revolutionary FE2 Owlet impeller. Boasting up to a 7dB(A) sound reduction and up to 15% efficiency improvement, the new Sabre Sickle fans provide a significant upgrade for commercial ventilation customers. The fans feature an advanced blade design, matched to a purpose-designed external rotor motor to offer unrivalled reliability and controllability, as well as meeting ERP 2013 compliance.

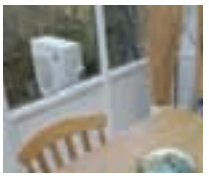
● **Visit www.vent-axia.com or call 0844 856 0590**

Bosch extends range

Buderus, part of the commercial and industrial division of Bosch Thermotechnology, has launched its SB745, a gas-fired condensing boiler with a host of flexible and cost-effective features. As part of the Bosch Group's range of floor-standing condensing boilers, the SB745 has been introduced with simple installation in mind. The compact boiler requires 30% less floor space and is 20% lighter than its predecessor, the SB735.

● **Visit www.buderus.co.uk or call 0844 892 3004**

'Quiet' Ecodan recognised again by Noise Abatement Society



Mitsubishi Electric's domestic range of Ecodan air source heat pumps has again received the official backing of the Noise Abatement Society (NAS) in the annual awarding of its official 'Quiet Mark' of approval. The renewable heating product is currently the only air source heat pump on the Quiet Mark listing and will be exhibited as part of the NAS's special 'Quiet House' at the Ideal Home Exhibition (15 March – 1 April at London's Earls Court). Stand 1H84 will showcase household items that have been officially recognised.

● **Visit www.dashboard.mitsubishielectric.co.uk, www.quietmark.com or call 01707 282880**

Danlers launches 'intelligent' batten mount PIR occupancy switch range

Danlers has launched two Batten-mounted PIR occupancy switches capable of significant energy savings at low cost, ideal for switching lights off when not required. With energy savings of up to 50%, the payback period is kept to a minimum. These UK-manufactured IP 53 rated controls can switch lighting loads of up to 10 amps and can be mounted onto the end of lighting battens.

● **Email sales@danlers.co.uk or call 01249 443377**

Aquatech Pressmain launches convenient 'SB' pressurisation units

The smallest footprint for this 'Spill Back' series is just 500 x 1,140 mm plus a fully enclosed controls case, incorporating twin pressurisation pumps. It is clean, convenient and simple to install. By using the spill and fill principle, a low working pressure can be maintained in a heating or chilled water system. Should pressure fall below the cold fill level, the unit will automatically restore the correct pressure. The two pumps alternate after every start to ensure even wear, and pulse periodically to prevent seizure.

● **Visit www.aquatechpressmain.co.uk**

Telephone: 020 7880 7614 **Email:** Patrick.Lynn@redactive.co.uk

Panasonic renews range of VRF three-way solutions

Panasonic has expanded its range of low carbon VRF three-way heating and cooling solutions. The new range has been redesigned, offering the highest coefficient of performance (COP) of 4.77 at full load. Panasonic's new VRF three-way range is extensive and covers the full ECOi series. The company's VRF range of commercial systems is leading the industry in the development of efficient and flexible systems, and is the natural choice for commercial projects, especially those where power restrictions apply.

● **Visit www.panasonic.net or call 01344 853390**

New guide from Lewden Palazzoli

Lewden Palazzoli, a designer and supplier of electro mechanical products, has launched a new comprehensive guide and listing of circuit protection and control equipment for domestic, industrial and commercial applications. Containing the latest technological advances and design improvements for maximum convenience and reliability, Lewden's full range of consumer units, MCBs, RCDs, isolators, surge protection devices, control gear and much more is clearly listed under easy to locate sections. The catalogue also features technical data.

● **Email sales@lewden.co.uk, visit www.lewden.com or call 020 8539 0237**

An Ecobuild first for Harmer Drainage

This year's Ecobuild represents a milestone for Alumasc's Harmer Drainage range. For the first time, Harmer will have a dedicated stand, providing an important technical resource for engineers, specifiers and contractors visiting the show. 'Blue is the new green' – Harmer will be launching its new innovative Blue Roof range which is expected to attract a large degree of interest this year. Blue Roofs are a new solution that use specially adapted Harmer roof outlets to regulate drainage of water to the sewerage system. Alumasc has been at the fore of research and development, designing the UK's first Blue Roof at Zenith House in London. Harmer SML lightweight, cast iron soil and waste system will also be showcased, and version 2.0 of Alumasc's Drainage Calculator software will be available at the show, with live demonstrations and free copies available on USB sticks. Visit Harmer Drainage on Stand S1710.

● **Visit www.harmerdrainage.com**

Lewden Palazzoli reveals expanded range of enclosures in new catologue

Lewden Palazzoli has expanded its range of enclosures in different materials and designs within its large range of electrical products and power distribution solutions. The new products, described with full specification data in the company's new *Circuit Protection* catalogue, feature cost effective and practical features and benefits in a choice of stainless steel, steel, GRP, plastic and aluminium.

● **Email sales@lewden.co.uk, visit www.lewden.com or call 020 8539 0237**

Havells-Sylvania helps achieve BREEAM excellent rating

Energy efficiency was one of the key criteria when it came to specifying products for One London Square. The 55,000 ft sq office space in Guildford, Surrey, has undergone a complete refurbishment and features a wide selection of Concord and Lumiance luminaires. The four-storey, glass-roofed office building cost £5m to renovate and was designed and project managed by Triglyph Property Consultants, with the works carried out by contractor Overbury. It has now received a BREEAM excellent rating.

● **Visit www.havells-sylvania.com or www.concord-lighting.com**

Havells launches plug-and-play energy meters

Havells, a specialist in low-voltage switchgear, has launched QuikWire – a new range of energy meters that incorporate plug-and-play technology to eliminate wiring errors and reduce installation time. The new QuikWire plug-in metering solution for Havells PowerSafe MCCB panelboards is designed to utilise side extension boxes to facilitate mounting of meters for both outgoing and incoming circuits. The new plug-in meters, current transformers and harnesses have been specifically engineered to complement the panelboard to ensure the meter installation is quick and easy.

● **Visit www.havells.co.uk**

Telephone: 020 7880 7614 **Email:** Patrick.Lynn@redactive.co.uk

New range from Crane

Valve manufacturer Crane Fluid Systems has launched a range of modern and compact differential pressure control valves (DPCVs) with unique features that give cost-saving benefits, reduced energy consumption and a simplified installation process, while maintaining their quality and reliability. Belonging to the FlowMaster range of commissioning valves, the DPCVs (F400 and R400) are quick and easy to install, have a long life expectancy and require little or no maintenance. Available in sizes DN15 to DN50, they are PN16 rated and have an adjustable differential pressure range of 20 – 100 kPa.

● **Visit www.cranefs.com or www.cranebsu.com**

Sentinel Commercial makes a stand for cost savings

Demonstrating its commitment to reducing costs in commercial heating systems, leading water treatment specialist Sentinel Commercial will be giving away System Check water analysis products (worth £50 each) to commercial installers, FM service providers and consultants at this year's Ecobuild exhibition. As part of a daily prize draw, three lucky visitors will also be awarded a cash-back guarantee of up to £1,000 on their order of a commercial boiler treatment package. To qualify, visitors must hand in their business card at the Sentinel stand (N2350).

● **Visit www.sentinel-commercial.co.uk or call 01928 588330**

Evinox appointed main UK distributor for Fontecal Corolla

Evinox has been appointed official UK distributor for Fontecal Corolla's commercial boilers. The Corolla range has been available in the UK since 2004 and the arrangement with Evinox assures continuing availability of both boilers and spare parts for existing and new customers. The Evinox Corolla series of wall hung, condensing, pre-mix boilers consists of four models – 381, 382, 501 and 502. These boilers feature either one or two heat exchanger modules within a single casing.

● **Visit www.evinox.co.uk or call 01372 722277**

Significant reduction in energy use for Alfa Laval

Results from a year-long study monitoring the performance of upgraded air conditioning units at the UK headquarters of a leading global industrial solutions provider, Alfa Laval, show a 44% drop in overall energy use. Having replaced ageing R22 air conditioning units with five new City Multi YHM-R2 Replace technology systems, the company now benefits from energy efficient, market-leading technology. The new systems from Mitsubishi Electric were monitored using its M2M technology and show an improvement in Seasonal Coefficient of Performance (SCOP) from 3.32 to 4.86.

● **Email heating@meeuk.mee.com**

Mitsubishi Electric shows what renewables can achieve today at Ecobuild

Mitsubishi Electric is using its presence at Ecobuild (ExCel, London, 5–7 March) to highlight real-world building projects that are using existing renewable technologies to improve energy performance and lower both carbon emissions and, in many cases, energy bills. 'Ecobuild is undoubtedly the cutting edge of the renewables industry and we are likely to see several groundbreaking products, not least on our own stand,' explains Martin Fahey, sustainable solutions manager for the manufacturer of heating, cooling and ventilation equipment.

● **Email heating@meeuk.mee.com**

Pet foods facility achieves two-year payback with LED lighting

California-based Diamond Pet Foods new 28,000 m² manufacturing facility posed several lighting challenges. First, the company needed an ultra energy-efficient system to reduce consumption and leverage the benefits of its solar system. High vibration and dusty conditions were an issue, as were ambient heat and humidity. Finally, the company required a payback period on the project of less than two years. Dialight provided the solution, fitting the facility with 500+ high-efficiency Dialight LED fixtures.

● **Visit www.dialight.com**

Industry backing for Air Conditioning and Refrigeration Show

The air conditioning and refrigeration industry's leading trade bodies gave their official backing to the recent ACR Show, which took place 11-13 February at the NEC in Birmingham. The event is the only national exhibition for the UK's cooling, air conditioning and heat pump industry. Scott Gleed, chairman of the Refrigeration, Air Conditioning and Heat Pump Group of the B&ES (Building and Engineering Services Association) said he was 'excited to be involved with the ACR Show once again'.

● **Email jan.thorpe@fav-house.com, visit www.acrshow.co.uk or call 01342 332 020**

Baxi creates space and time at Ecobuild

The Baxi Commercial Division stand has been designed to give visitors more space and time to meet technical teams to discuss unique, one-stop-shop, commercial heating solutions. Products exhibited by market leaders Andrews Water Heaters, Baxi-SenerTec UK and Potterton Commercial exemplify energy-efficient heating. At the forefront is an exciting new biomass boiler, with the environmentally aware application of condensing technology, combined heat and power, heat pumps and solar thermal integration well represented.

● **Email jeff.house@baxicommercialdivision.com or call 0845 070 1055**

Solutions on show at Ecobuild

Kingspan Environmental, a global leader in the design and manufacture of sustainable solutions for high performance buildings, will be out in force at Ecobuild 2013, showcasing its state-of-the-art technologies and highlighting their ease of installation through the hugely popular live demonstrations in the Practical Installer area. The company will be showcasing its industry-leading environmental and renewable product portfolio within an innovative water management hub, renewable technologies hub and an intelligence design and specification hub on its stand (N2120).

● **Visit www.kingspanenv.com or call 0845 260 0258**

First UK prefabricated wiring system software from Hager

Hager has developed the UK's first design software package for a prefabricated wiring system to ensure that its Klik.system meets the requirements of BS 8488 and the wiring regulations. The software database contains all of a project's information, including customer, client, design team and delivery details. Any amendments are automatically stored with previous versions all kept for reference, and design parameters, such as ceiling height, are simply added. Any revisions are automatically stored.

● **Email info@hager.co.uk or call 01952 675612**

Aereco launches demand-controlled domestic system

The latest innovation from ventilation expert Aereco is the fully demand-controlled (DC) MVHR system, the DXR. It is said to be the first ever fully DC domestic MVHR system, both on supply and exhaust to be developed. Aereco says its new DXR system can achieve 92% energy savings compared with a mechanical exhaust ventilation system at constant airflow, while providing the same indoor air quality. Aereco DXR is engineered to automatically adjust ventilation according to the specific needs of each room.

● **Visit www.aereco.co.uk**

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

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

● **Call 01293 871751 or visit www.castlinesystems.com**

Jaga launches extra slim all-in-one heating, cooling, ventilating radiator

Jaga has announced the launch of its all-new Briza climate unit, which provides powerful heating, cooling and refreshing ventilation all from a stylish slim-line radiator. Powered by Low-H2O dynamic technology, the Briza is suitable for use with boilers in LPHW systems or with heat pumps in low-temperature, renewable heating systems. It is also designed to operate in both 2-pipe and 4-pipe set-ups and can be integrated with home automation and building management systems.

● **Email jaga@jaga.co.uk or call 01531 631533**

The Royal London one year on

It is just over a year since the completion of phase one of a £650m redevelopment of The Royal London hospital, which saw it transformed into a state-of-the-art medical centre delivering world-class facilities. With energy efficiency an important aspect of the project, Grundfos Pumps worked closely with Skanska to ensure that the complex pump solution would meet the very highest standards. The final solution provided pumps for all the heating, chilling, HWS and chilled water, as well as the pressurisation units and packaged booster sets.

● **Email uk-sales@grundfos.com or call 01525 850000**

Dieselec invests in HQ expansion

Standby power specialist, Dieselec Thistle, is forging ahead with the expansion of its Glasgow head office site, more than doubling its operating space to 65,000 sq ft in a seven-figure investment. The improvements are in response to a 69% growth in turnover over the past four years. The company is forecast to reach a turnover of £25m in the year to June 2013 – an increase of £18m since 2010, the year that Dieselec acquired Thistle Generators and kick-started a coordinated growth plan.

● **Visit www.dieselecthistle.co.uk, email brian.muirie@dieselecthistle.co.uk or call 0141 956 7764**

Telephone: 020 7880 7614 **Email:** Patrick.Lynn@redactive.co.uk

Spurs score with KNX lighting

Tottenham Hotspur Football Club has ensured that its new 67-acre training facility will not disturb local neighbours or wildlife, thanks to a state-of-the-art KNX lighting control system from the Wandsworth Group. Constructed on a greenfield site, the two-storey training centre boasts 11 outdoor pitches, including one artificial surface and 10 natural grass pitches. The development has been designed with ecological sensitivity in mind, and it was for this reason that the Jung KNX lighting control system from the Wandsworth Group was specified.

● **Visit www.wandsworthgroup.com**

Discover the benefits of KNX UK membership

The KNX UK Association's new brochure, *Discover the Benefits of KNX*, details all the advantages of joining the thriving KNX UK Association. Many KNX systems integrators, manufacturers, wholesalers and other parties are already represented by KNX UK and the association is looking to further increase its membership over the coming months. The association acts as a conduit for building services consultants, specifiers, installers, end users and other professionals to contact its members to discuss KNX technology, applications, training and any other aspect of KNX.

● **Visit www.knxuk.org or call 0845 869 5908**

Toshiba launches industry-first with seven-year warranty

Toshiba Air Conditioning has introduced the industry's first seven-year warranty offering total peace of mind. Toshiba Air Conditioning, the first to introduce a five-year warranty a few years ago, believes it creates a new industry benchmark and provides unrivalled protection and reassurance for both installers and end users. David Dunn, commercial director, said: 'Toshiba has been at the forefront of warranty protection in the air conditioning industry for some years, and this latest move confirms our lead in this critical area for installers and customers.'

● **Email general.enquiries@toshiba-ac.com or call 0870 843 0333**

Ecobuild proves perfect timing for new fan efficiency focus

Exhibiting on stand N3430 at Ecobuild 2013, Elta Fans will be focusing on a number of developments, including the new Energy related Products (ErP) directive, introduced on 1 January 2013 – a piece of legislation that is having a profound effect on the building services sector. A number of fans will be on show from the Elta Select range, supported by a brand new catalogue, which identifies the products from Elta that are compliant with the legislation. By providing a visual reference point for visitors to understand what constitutes compliant and non-compliant products, the stand graphics will illustrate the reasons why fans meet the new energy efficiency regulations.

● **Visit www.eltafans.com or call 01384 275800**

New website for Marlow Hydronics

Marflow Hydronics, the specialist solution providers for the balancing, controlling and metering of water distribution systems in the HVAC industry, announces the launch of its brand new website. The website was designed to provide customers with detailed information on the things that they will want to know about in an easy-to-use format. It highlights the full range of products and solutions from Marflow Hydronics alongside a knowledge base to help customers gain a greater understanding of the industry and the products they work with.

● **Visit www.marflowhydronics.co.uk**

SE Controls helps provide the perfect environment at Audi Leicester

Sytner Group's state-of-the-art Audi dealership in Leicester is using advanced natural ventilation technology from SE Controls to ensure that a comfortable environment is maintained for its customers and staff. Constructed to Audi's 'Terminal Concept' dealership template, originally designed by Allmann, Sattler, Wappner Architekten, the extensive new showroom and workshop complex replaces Sytner's previous facility, which it had occupied since 2007. As part of the energy efficient design, the dealership uses natural ventilation to ensure that carbon dioxide levels and temperature are managed effectively within the entire building, to create a comfortable environment for staff and customers within the large, open plan showroom, as well as for its technicians in the pristine workshops. SE Controls supplied, installed and commissioned the complete natural ventilation system, which involved the supply of two SCCO Schuco 500 mm stroke chain actuators and a precision OS2 controller to provide automatic operation of the sloping vents in the showroom atrium.

● **Visit www.secontrols.com or call 01543 443060**

Telephone: 020 7880 7614 **Email:** Patrick.Lynn@redactive.co.uk

Distech Controls wins Lonmark's Certified Device of the Year

Distech Controls' RCL-PFC LONWORKS configurable controller series has been awarded Lonmark's Certified Device of the Year. LonMark International honours products, companies, projects and individuals that have demonstrated superior levels of expertise with open control networking technology, based upon the ISO/IEC 14908 suite of standards. Distech Controls' RCL-PFC Series is a cost-effective solution for controlling HVAC terminal units, such as fan coil units, chilled beams and chilled ceilings. The product has a compact design and a terminal cover option.

Visit www.distech-controls.com

Dimplex renewables set the standard

Dimplex's research and development facility is leading by example and using state-of-the-art renewable energy solutions for its offices in Dunleer, Ireland. A high-power air source heat pump, linked to the innovative SmartRad radiators, is at the centre of the fully integrated Dimplex low carbon heating system in a series of former factory units that have been converted into new offices within the multi-million pound Glen Dimplex Group's global energy development centre.

Email marketing@dimplex.co.uk or call 0844 879 3587

Rehau on the right track

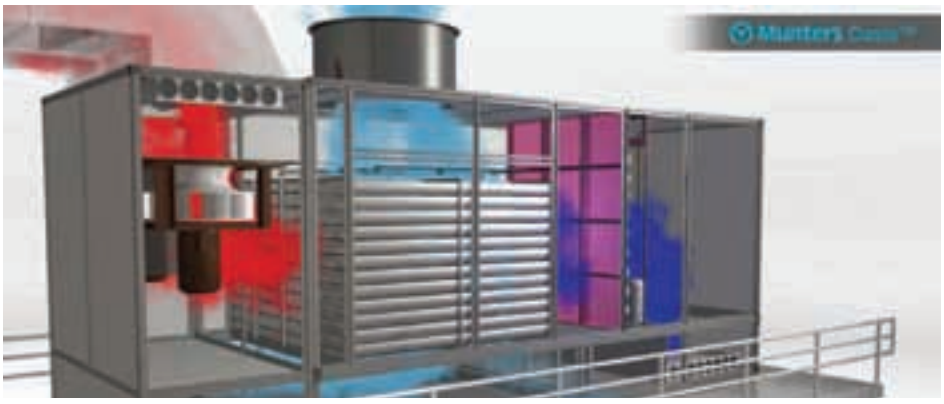
The bends in the track at the new Sir Chris Hoy Velodrome in Glasgow's stunning new £113m Emirates Arena presented the mechanical contractors installing pipework for the hot and cold water supplies with a complex set of challenges. The steel pipe would have required a large number of time-consuming welded joints to be made to accommodate the bends in the walls. Contractors Spie Matthew Hall responded by changing the specification to REHAU's flexible RAUVITHERM pre-insulated PE-Xa pipework.

Email jo.trotman@rehau.com, call 01989 762600 or visit www.rehau.co.uk

Polypipe Terrain products selected for iconic London hospital refurbishment

Innovative above-ground drainage systems from Polypipe Terrain, the UK's leading plastic piping systems manufacturer, have been specified for a major refurbishment of the world-class Royal London Hospital. Working closely with contractor DGR Mechanical, Polypipe Terrain is to manufacture and supply its unique Terrain FUZE high-performance drainage system and compatible PVC Soil and waste products for use within the Alexandra Wing of the landmark hospital in Whitechapel, East London.

Visit www.polypipe.com/terrain



Munters apply specialist experience to Oasis Indirect Evaporative Cooler

As one of the world leaders in innovative energy efficient air treatment, Munters has applied its 50 years' specialist experience of evaporative cooling into the Oasis Indirect Evaporative Cooler (IEC), already installed in more than 75 MW data centres globally. Oasis IEC offers full separation of air flows, partial PUE in London of 1.03, same or lower capital investment costs compared to common free cooling solutions, and total energy consumption 65% lower.

Visit www.munters.com/datacentres or call 01480 410223

ebm-papst to highlight huge energy savings potential at NEMEX

Europe's leading manufacturer of high-efficiency EC fans and motors, ebm-papst, will be highlighting its energy saving credentials at this year's National Energy Management Exhibition (NEMEX). ebm-papst will be announcing news on its fan deck assembly offering, as well as giving away free site surveys to all stand attendees to see how its EC fans can help them save on their building's energy consumption. Helen McHugh, head of sustainability at ebm-papst UK, said: 'ebm-papst case studies reveal that energy savings of up to 78% can be achieved through direct HVAC upgrade.'

● **Visit www.ebmpapst.co.uk or call 01245 468555**

Fan convector replacements made easy with Biddle's sectional Forceflow

Climate control and separation specialist Biddle has launched a sectional version of its Forceflow fan convector. Designed to easily replace any manufacturer's 'back access' fan convector unit, the flexible design ensures compatibility no matter what the size or configuration of the previous product. There are nine combinations in total, providing five heights ranging from 1,800 mm to 2,400 mm and five widths ranging from 750 mm to 1,750 mm. Biddle is a producer and supplier of innovative, high-quality climate control and climate separation equipment.

● **Visit www.biddle-air.co.uk or call 0247 638 4233**

Trend makes sure size matters with its new IQ422 controller

Trend Control Systems, the international building energy management system (BEMS) manufacturer and supplier, has announced the latest in its industry leading IQ4 range of controllers – the IQ422. Designed for use in a wide variety of applications, it offers the smallest footprint for a 12-point universal controller and boasts multi-browser support. The IQ422 is the second variant in Trends' family of IQ4 main plant controllers, and builds on the success of the recently launched IQ41x series.

● **Email marketing@trendcontrols.com or call 01403 211888**

Polypipe Ventilation expands its range at Ecobuild

Following the successful launch of the Silavent Green Line HRX mechanical ventilation heat recovery (MVHR) appliance, Polypipe Ventilation will be adding to the range with a highly efficient and larger unit at this year's Ecobuild. The new HRX2 features market-leading heat exchange efficiency and extremely low specific fan power (SFP) for optimal energy usage, while still retaining full airflow performance, thereby helping to recover a home's waste heat and deliver a higher SAP rating. Suitable for larger properties, the high performance levels of the HRX2 make it ideal for installation in self-build and premium private developments.

● **Visit www.polypipe.com**

Short-term heating solution at Barts Hospital powered by Atlantic Boilers

The Barts Health new hospitals project is replacing many ageing buildings at St Bartholomew's (Barts) in Central London. The first phase, a state-of-the-art cancer centre, opened in March 2010. Construction has started on the second phase, a cardiac centre of excellence, which is due for completion in 2014. Part of the work required the short-term installation of high-efficiency boiler plant. Skanska selected two Atlantic Multi-Elec 210 kW electric boilers. These boilers have a compact footprint, fitting into limited space and are without flue problems.

● **Email nabella@atlanticboilers.com or call 0161 621 5960**

GEZE UK's individual approach to door servicing is launched

A new tailor-made service has been developed by the UK's leading manufacturer of door and window control systems, providing the most cost-effective and efficient maintenance package to date. GEZE UK uses in-depth data analysis to identify the most appropriate service level for each and every automatic door across an estate. For FM companies with contracts for large estates, a system like this can ensure that doors are prioritised according to their need for regular servicing, rather than adopting a 'one size fits all' approach.

● **Email info.uk@geze.com, call 01543 443000 or visit www.geze.co.uk**

PRODUCTS & SERVICES

Telephone: 020 7880 7614 **Email:** Patrick.Lynn@redactive.co.uk

New warehouse air curtain

JS Air Curtains is launching a powerful new air curtain for warehouse and factory doorways. The Max is capable of sealing large entrances with an invisible barrier of air that prevents cold air from entering while the doorway is open and in use. This helps maintain a comfortable temperature within a warehouse, thus increasing safety and efficiency, as well as reducing heating costs. The Max can deliver a massive 6,764 m³ of air per metre of air curtain.

● **Email sales@jsaircurtains.com or call 01903 858656**

MHS Boilers a force to be reckoned with

Staff, swimmers and fitness fanatics at Newton Abbot Leisure Centre, Devon, are benefitting from highly efficient heating and hot water, thanks to three 200 kW ADI-NOx CD boilers, two 300-litre Gemini calorifiers and a Minifill Pressurisation Manager – all supplied by MHS Boilers. The upgrade of the building's boiler plant will reduce carbon emissions by 102.3 tonnes per annum and provide significant energy savings – ensuring a payback within seven years. The new boilers have replaced 12 ageing units.

● **Visit www.mhsboilers.com**

Sill throws light on digital age

Some 330 Sill 021 Mini Power Projectors with 140 w Cosmopolis lamps were the core technology to provide the amenity lighting to Media City, Manchester, and are used in numerous ways, demonstrating the flexibility of Sill and creativity of lighting designers, Pinniger. Triple-head units fixed to a special extended control gear profile were either wall mounted to the multi-storey car park, or column-mounted for direct light. Pairs were column-mounted for indirect light via secondary reflectors.

● **Visit www.sill-uk.com or call 01844 260006**

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Your guide to building services suppliers

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LST Radiators

Energy Efficiency

Pump Packages

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Competitive salary and benefits

Hutchison Whampoa Property is a leading international property company with a reputation for high quality residential/mixed-use developments.

The company's current major developments in London are Lots Road Power Station and the 42 acre site of Convoys Wharf. Despite the current economic conditions, we continue to look for opportunities for future expansion in the UK and Europe. As a result, we are seeking experienced Project Managers to join our London office.

Mechanical & Electrical Project Managers who have M&E expertise in design, planning and construction from inception to completion should apply.

You should be a Chartered Mechanical & Electrical Engineer, ambitious, self motivated, confident and should have extensive experience on large complex projects.

Please email your CV indicating your current remuneration to:
Vanessa Edmunds, HR Coordinator,
Hutchison Whampoa Properties (Europe) Ltd
Email: vanessa.edmunds@hwleurope.com

Hutchison Whampoa Property

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Central London | £28-38k | Ref: 13220
One of the UK's top 50 M&E Consultancies is looking to expand on its Electrical Design team in London with the addition of two Intermediate Electrical Design Engineers. They will be expected to hit the ground running and work without supervision, but continued support and career development opportunities are provided.
Contact: max.encke@bsvrecruitment.co.uk

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Contact: paul.bartlett@bsvrecruitment.co.uk

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Contact: darren.warmington@bsvrecruitment.co.uk

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A small but successful building services consultancy based in central London is seeking a new addition to their management team. This practice is award winning and are always at the forefront of cutting edge design and technology.

Current projects consist of a mixture of UK based and overseas concept design work and this role would take over the management of a mixed team of Mechanical and Electrical Engineers.

This role would suit either an experienced associate director or a senior level engineer looking to step up into a management role.
Ref: 158633

For further discussion, please contact Ben Styles at ben.styles@hays.com or call 020 7259 8760

SENIOR MECHANICAL DESIGN ENGINEER
DEMONSTRATE TECHNICAL EXPERIENCE

Hampshire, up to £45,000

An exciting opportunity has arisen in a small to medium mechanical and electrical services design consultancy who specialise in sustainable engineering design.

You will work with a wide client base and undertake projects within a varied sector range including local authority, education, healthcare, commercial, industrial and domestic.

You must have a minimum 8 years' experience in mechanical design within a consultancy situation. The role offers the opportunity to progress rapidly to management with future equity sharing.
Ref: 1819482

For further discussion, please contact Phillip Terrell at phillip.terrell@hays.com or call on 02380 639 036

These are just a selection of the opportunities we have to offer, please contact your local office for expert advice and confidential discussion 0800 716 026 or to find your local office, visit hays.co.uk/buildingservices

hays.co.uk/buildingservices

Events & training

NATIONAL EVENTS AND CONFERENCES

AM12 launch event
4 March, London
Launch event for the new CIBSE publication *AM12*, chaired by Phil Jones, chairman of CIBSE CHP and District Heating Group.
www.cibse.org/events

Ecobuild 2013
5-7 March, London
Sustainable design, construction and the built environment.
www.ecobuild.co.uk

Ready, Steady, Light
19 March, Sidcup
The annual team lighting competition organised by the Society of Light and Lighting.
www.sll.org.uk

Lighting Masterclass
21 March, Edinburgh
The Society of Light and Lighting Masterclass season continues its tour.
www.sll.org.uk

CIBSE Technical Symposium
11-12 April, Liverpool
Two-day symposium with a focus on practices that ensure buildings realise their energy and environmental promise.
groups@cibse.org

International Lighting Conference
12 April, Dublin
A panel of world-renowned lighting experts and researchers will present on the day. CIBSE Ireland and SLL event.
www.cibseireland.org/cibse-annual-conference

ThinkFM 2013
10 June, London
Facilities management event. This year's focus is 'the leadership challenge'.
www.thinkfm.com

CIBSE GROUPS AND SOCIETIES

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

Management seminar
6 March, Birmingham
Dennis Beard seminar on professional management, run by the West Midlands region.
nigel.marriott@gmtreble.co.uk

The role of engineers in dispute avoidance
6 March, Maidenhead
A Chartered Institute of Arbitrators Seminar organised by the Home Counties North West region.
www.cibse.org/events

Meet the power experts
7 March, London
A facilities management group event organised with the AMPS association.
www.cibse.org/fm

Sustainability and smoke control
13 March, London
An ASHRAE event with speaker John Klote from the National Institute of Standards and Technology. The event will also be transmitted by webinar.
www.cibse.org/events

Lighting breakfast seminar and debate
14 March, Bury St Edmunds
A breakfast event organised by East Anglia region.
Jonathan.page@mlm.uk.com

The Green Deal: Dead or Alive?
14 March, London
A Home Counties North West region event.
www.cibse.org/events

Review of the general design and installation principles associated with rainwater recovery systems
14 March, Bristol
South West Region event.
millham.orchard@tiscali.co.uk

Heat pumps/renewables update
19 March, Northampton
East Midlands region event.
www.cibse.org/events

Flexible plumbing solutions in DWSs
20 March, Manchester
A Society of Public Health Engineers event, with speakers Tony Bolton and David Park from Uponor
www.cibse.org/sophe

Part L 2013 update
20 March, Birmingham
A West Midland region event.
nigel.marriott@gmtreble.co.uk

BMS clinic
26 March, London
A Home Counties North East region event organised with Building Controls Industry Association.
James.bourne@atkinsglobal.com

CPD TRAINING

For more information visit **www.cibsetraining.co.uk** or call the events team on 020 8772 3660

Introduction to electrical services in buildings
5 March, London

Energy strategy reports
5 March, London

Heating services explained (two days)
6 March, London

Building Regulations Section 6 (energy)
7 March, Edinburgh

Unvented and other types of efficient hot water system
8 March, London

Applying for the RHI: What you need to know
11 March, Birmingham

Metering requirements – RHI
12 March, Birmingham

iSBEM training
12 March, London

Mechanical services explained (three days)
12 March, London

Emergency lighting to comply with fire safety requirements
13 March, London

Building electrics basics four
13 March, London

HSE guidance on Legionella control
14 March, London

Part L Building Regulations
14 March, Manchester

Introduction to Energy Efficiency
14 March, Birmingham

Delivering buildings that are truly fit for purpose

11-12 April, Liverpool

CIBSE president David Fisk addresses last year's Symposium

The best practice and research topics being used in the building services industry today will be revealed at this year's CIBSE Technical Symposium.

Benchmarking, energy consumption monitoring and how to integrate renewable energy systems into the built environment are just a selection of the topics to be discussed at John Moores University in Liverpool in April.

This symposium, sponsored by Rinnai, is intended to bring to the fore the latest practice and research, and to provide a glimpse of future developments from across the world.

It will encourage researchers and industry practitioners to share experiences and develop networks, and will encompass both experienced professionals and those at the developmental stage of their careers.

Papers on the following topics have been commissioned:

- Benchmarking systems that can intelligently inform building engineering system design and operation
- Building systems, monitoring and feedback methods to enable improved operation and feedback
- Integrating renewable energy systems in the built environment
- Metering, intelligent monitoring and control techniques to predict and manage energy use
- Innovations in building services systems to improve effectiveness of the built environment
- Environmental assessment and certification for continual monitoring and improvement
- Influencing clients to properly understand total life cycle energy use of their buildings

All papers will be peer reviewed and published electronically through CIBSE.

To book and for further information, visit **www.cibse.org/symposium2013**

Running projects effectively
19 March, London

Low carbon buildings for local authorities
19 March, London

Design of ductwork systems
20 March, London

Fire detection and alarm systems for dwellings BS5839
20 March, London

Electrical distribution design
21 March, London

Electricity at Work Regulations explained
21 March, Manchester

Electrical services explained (three days)
26 March, Newcastle

How to specify lighting: office lighting
27 March, London

Earthing and bonding systems
27 March, London

DEC training (two days)
10 April, Birmingham

WADE

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Wade is an international brand denoting quality and U.K. manufacture.

We are planning to increase our representation across the U.K. with full-time, home-based individuals who service specifiers, merchants, contractors and users.

The role is to impart product information, not to raise quotations, do deals or collect debts, suiting someone with knowledge of building construction, who is comfortable meeting a wide range of people, from experts to beginners and who is a self-starter who can plan his own workload.

Training and guidance will be provided to enhance skills. Home location will be a determinant.

If this position is of interest to you, please send a brief message to s.leeds@wade.eu

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For more details and/or to apply online please access www.nottingham.ac.uk/Jobs/CurrentVacancies/ref/SJ07060Ex2 If you are unable to apply online please contact the Human Resources Department, tel: 0115 951 5206. Please quote ref SJ07060Ex2.

Closing date: 2 April 2013.

http://jobs.nottingham.ac.uk

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

CIBSE
Engineering a sustainable built environment

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www.cibsejournal.com/jobs

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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.

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DPM PRESSURE SENSOR

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

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

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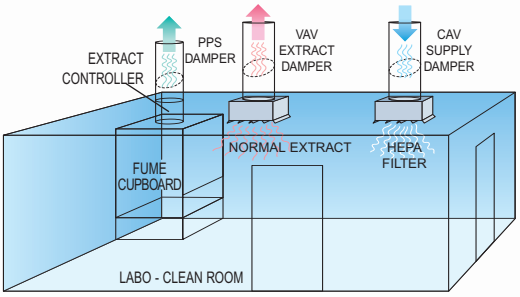
AIR MANAGEMENT SYSTEM

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.



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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

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