

CIBSE

JOURNAL



The official magazine of the Chartered Institution of Building Services Engineers

December 2011

ARTFUL DESIGN

HEPWORTH
GALLERY
GOES FOR
MINIMALISM

LIGHTING SPECIAL
THE NEW SLL CODE

POWER RELATION
HOW TO APPLY CHP

TAKING CONTROL
MAKING SYSTEMS WORK

> 120 YEARS EXPERIENCE

INSIDE EVERY TOSHIBA BULB

In 1890, inspired by a meeting with Thomas Edison, one of Toshiba's founders – Inshisuke Fujioka – developed and mass-produced Japan's first electric bulb.

Ever since, Toshiba has used its knowledge and expertise combined with high investments in the latest cutting edge technology, to bring you the very best quality lighting solutions.

Over the years lighting has seen many developments, from frosted bulbs to fluorescent lights and low-energy bulbs – today Toshiba is introducing its range of innovative, low energy and long life LED bulbs and fixtures in the UK.



1890

Toshiba manufactures Japan's first electric light bulb

1921

Toshiba invents the "double coil electric bulb," one of the six great inventions in bulb technology

1941

Fluorescent lamps go on sale. Toshiba introduces technology to Japan

1980

Toshiba NeoBall, the world's first light-bulb shaped compact fluorescent lamp

2010

Toshiba introduces its E-Core LED lighting to UK market

VIEW THE RANGE AT: WWW.TOSHIBA.CO.UK/LIGHTING



REFLECTOR LAMPS



GLS LAMPS



DECORATIVE LAMPS



LED LIGHT ENGINES



INDOOR LIGHTING



OUTDOOR LIGHTING

Contents

NEWS

6 News

Opposition grows to planned cuts in FITs; school emissions rising despite drop in heating; lawyers warn of Green Deal flaws; dismay over cut in RHI tariff for big biomass; help for firms to be more energy efficient; councils need support on design plans – review.



13 CIBSE News

Eastern odyssey for president; and a sense of wonder at annual lecture.

OPINION

17 Spotting the bug in the BMS

Just how much of a threat are computer viruses to a building's control systems?

18 Letters

Shades go up on quick wins; engineering economics; and Olympic expectations.

20 Regulations

The Energy Act may have enshrined the Green Deal in law, but key questions remain unanswered, writes Hywel Davies.

21 Manufacturer's viewpoint

Why we should all adopt the 'ECR' approach to building services.

LEARNING

51 CPD

Fans for ducted ventilation systems.

42



LIGHTING SPECIAL

38 Artful illumination

A look at the sensitive lighting approach taken at the Hepworth gallery.

42 Head to head

Two very different perspectives on a lighting specification and the price of value engineering.

46 In a new light

How will the radical changes in the new Code for Lighting be interpreted?

Features

22 Taking control

How to make electronic building management systems work to your advantage.



28 Power relation

Comparing the efficiencies of combined heat and power and district heating systems.

34 Fitter application

CIBSE has published an updated guide on combined heat and power.

'The speed of the FITs changes will leave many companies with stranded assets and a plethora of contractual disputes. It's a real mess'
Page 6

CLASSIFIED

57 Products

Your guide to the latest products and services.

PEOPLE AND JOBS

62 Appointments

Find your next job here and online at jobs.cibsejournal.com

66 Looking ahead

Intelligent Cities, and future events and training seminars.

Why Vaillant Commercial Systems?

Because commercial heating solutions have never been so advanced.



High efficiency commercial products.

For over 135 years Vaillant has set the benchmark for quality and reliability. Today our commercial heating solutions offer wall hung and floor standing boilers, such as the ecoCRAFT, which come in a range of sizes from 80kW to 280kW and integrate seamlessly with our innovative solar thermal and ground source heat pump technology.

By combining these with our class-leading controls, which offer weather compensation and multi-zone functionality, we deliver flexible, highly efficient commercial heating and hot water solutions for your every requirement.

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

■ Heating ■ Hot Water ■ Renewables

Because  **Vaillant** thinks ahead.



www.cibsejournal.com

Editorial

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

Advertisement sales

Sales manager: Jim Folley
 Tel: 020 7324 2786, jim.folley@redactive.co.uk
Sales consultant: Mark Palmer
 Tel: 020 7324 2785, mark.palmer@redactive.co.uk
Sales executive: Darren Hale
 Tel: 020 7880 6206, darren.hale@redactive.co.uk
Recruitment sales: Stephen Fontana
 Tel: 020 7324 2787
 stephen.fontana@redactive.co.uk
Advertising production: Jane Easterman
 Tel: 020 7880 6248
 jane.easterman@redactive.co.uk

For CIBSE

Publishing co-ordinator: Edward Palmer
 Tel: 020 8772 3697, epalmer@cibse.org

Editorial advisory panel

- George Adams, engineering director, Spie Matthew Hall
- Laurence Aston, director, Buro Happold
- Annabel Clasby, mechanical building services engineer, Atkins
- Patrick Conaghan, partner, Hoare Lea Consulting Engineers
- Rowan Crowley, director, inside track
- David Hughes, consultant
- Philip King, director, Hilson Moran
- Chani Leahong, senior associate, Fulcrum Consulting
- Nick Mead, group technical director, Imtech Technical Services
- Christopher Pountney, graduate engineer, AECOM
- James Rene, engineer/acoustician, Max Fordham
- Alan Tulla, independent lighting consultant
- Ged Tyrrell, managing director, Tyrrell Systems
- Ant Wilson, director, AECOM
- Terry Wyatt, consultant to Hoare Lea

CIBSE Journal is written and produced by CPL (Cambridge Publishers Ltd) Tel: +44 (0) 1223 477411. www.cpl.co.uk 275 Newmarket Road, Cambridge CB5 8JE.

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

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

CIBSE, 222 Balham High Road, London SW12 9BS
 Tel: +44 (0) 20 8675 5211. www.cibse.org

©CIBSE Services Ltd. ISSN 1759-846X

Subscription enquiries

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

The 2011 US annual subscription price is £100. Airfreight and mailing in the US by Air Business, C/O Worldnet Shipping NY Inc, C/O Air Business Ltd / 155-11 146th Street, Jamaica, New York, NY 11434. Periodical postage pending at Jamaica NY 11431. US Postmaster: Send address changes to CIBSE Journal, C/O Air Business Ltd / 155-11 146th Street, Jamaica, New York, NY 11434.

Cover Photo: Iwan Baan



FiT of rage may not be justified

Just another cost-cutting exercise to reduce the national debt, or a genuine attempt to improve a policy that has gone awry? There's no doubt that virtually everyone involved in the renewables industry will be up in arms over the government's decision to cut by half the feed-in tariff (FiT) for solar photovoltaic (PV) installations (see News, page 6).

What earthly justification is there, they will ask, for deliberately stymying a sector that is taking off? And why deter households with a new lower tariff that will mean it will take them around 18 years to break even on the costs of installation, instead of the current 10, according to estimates?

The minister charged with 'selling' the cut, Greg Barker, argued that he wanted to avoid a 'boom and bust' in solar PV, the costs of which have fallen – which means that the government must seek 'more value for money' from the FiTs budget. This does indeed

sound like penny-pinching. On the other hand, Barker is right to point to Germany as an example where PV was heavily subsidised and grew rapidly – sometimes at the expense of a more rational engineering-led approach that would assess whether it was the most appropriate application in the circumstances.

Putting this argument in a broader context, it is now conventional wisdom that the best approach to increasing energy efficiency in buildings is the 'fabric first' one. So, before we pile on the PV panels, let's ensure we have made the structure as energy efficient as possible.

This is not to say that the solar panel industry is wrong to challenge the cuts – that is their prerogative. And they are right to point to apparently contradictory ministerial comments, which suggest that: a) the cuts will go ahead regardless, and b) a public consultation on the cuts will give the sector every opportunity to make its concerns known. With barely a fortnight between the consultation closing and the cuts beginning to take effect, one can't help wondering whether such an exercise can be deemed fair and legal.

But, cuts or no cuts, we must not forget that a self-interested rush to grow a business sector as fast as we can should not blind us to the need to step back and assess whether such growth is truly the best way, long term, to cut energy use and carbon emissions.

Before we pile on the PV panels, let's make the structure as energy efficient as possible

Bob Cervi, Editor
 bcervi@cibsejournal.com



In Brief

CRC LEAGUE TABLE UNVEILED

The first league table, ranking larger companies by their cuts in carbon emissions, has been published. The list is based on metering data provided by companies that come under the Carbon Reduction Commitment Energy Efficiency Scheme – those that consume at least 6,000 megawatt hours of energy a year. <http://publications.environment-agency.gov.uk>

CASH FOR STALLED SCHEMES

Developers whose projects have been stalled by snags such as contaminated land and road-access problems can apply for a share of a £500m of government cash. The Growing Places Fund 'will put local businesses and organisations in the driving seat', according to the Communities Department. www.communities.gov.uk

FUTURE OF PFI TO BE REVIEWED

The Public Finance Initiative (PFI), which has been used as the bases for funding many building developments, is undergo a 'fundamental reassessment', George Osborne, the Chancellor, has said. It could lead to a new model for public-private schemes, the Treasury said.

SCOTTISH RENEWABLES LIFTED

The Treasury has also announced an extra £100m of funding for renewable marine energy projects in Scotland.

GREEN DEAL REPORT

The Green Deal for non-domestic buildings alone could create an £800m energy efficiency market, according to a report by analysts Ernst & Young, which adds that the government must also ensure the policy is 'business-centric'. www.ey.com/uk

Opposition grows to planned cut in FiTs

● Policy could face judicial review but minister calls for 'holistic' approach

The government's controversial decision to slash feed-in tariffs (FiTs) for PV solar panels faced the threat of a possible judicial review as the *Journal* went to press. Environmental pressure group Friends of the Earth (FoE) said it would seek a judicial review of the decision unless ministers backed down on the cut.

The new lower tariff for PV systems – dropping from 43.3p per kWh to 21p – will apply to installations completed on or after 12 December 2011, and will take effect from 1 April 2012.

However, while announcing these deadlines, the government also set up an apparently fast-track consultation on the changes, with a closing date for comments of 23 December.

'The government is breaking the law with its plans to fast-track a solar industry kill-off,' said Craig Bennett, FoE policy campaigns director.

Several solar power firms, housing associations and politicians also joined forces to call on the Prime Minister, David Cameron, to intervene over the proposals.

Energy Minister Greg Barker suggested that one reason for cutting the tariff for PV installations was to promote a 'holistic' and 'whole-house' approach that 'prioritises energy efficiency'. He said that 'all



new domestic PV sites from April 2012 must meet the minimum energy efficiency standards'.

The consultation on PV tariffs includes a proposal that 'a property would need to reach a certain level of energy efficiency' to be eligible to receive the tariff.

The 'certain level' could include achieving an Energy Performance Certificate rating of at least C, or 'taking up all the measures potentially eligible for Green Deal finance'.

Dave Sowden, chief executive of the Micropower Council, said: 'The speed of the changes will also leave many companies with stranded assets, a plethora of contractual disputes in the industry, and another race to beat the six week deadline. This is a real mess.'

For more information visit: www.decc.gov.uk/en/content/cms/consultations/fits_comp_rev1/fits_comp_rev1.aspx

Lawyers warn of Green Deal 'flaws'

Legal experts have expressed doubts about the viability of the government's flagship policy for cutting energy use.

The Green Deal, which is due to start next autumn, will provide upfront funding for energy efficiency improvements in homes and small businesses.

But delegates at last month's CIBSE Funding Mechanisms for Sustainable Buildings conference heard that the model was potentially flawed.

Charles Woollam, a chartered surveyor, and Chris Edwards,

solicitor at sustainability and commercial property legal practice Siam LLP, argued that landlords might block many of the projects.

They also cast doubt on the reliability of the data used to ensure projects did deliver the promised energy savings to end-users.

'We are in danger of constructing a regime that will suffer from obstruction and inertia, created by landlords worried about how the benefits are to be delivered,' said Edwards.

'With leases getting shorter due to the current climate, landlords

are worried about being left with a financial obligation, which they will have to try to pass on to prospective new tenants.'

The energy saving measures paid for must satisfy the Golden Rule, which means that the charge does not exceed the predicted savings. However, this is another source of potential concern, according to Woollam. 'It is highly probable that many measures will fall foul of the Golden Rule. There is a problem with the quality of energy performance certificates. Lots of people don't believe what they say.'



BREEAM RECORD FOR STUDENT FLATS

This Bradford University student accommodation block, built in the Bradford Learning Quarter in the city centre, has achieved the world's highest BREEAM Design Stage score to date, reaching 95.05%, according to the scheme's M&E contractor, Balfour Beatty Engineering. The 1,026-bedroom site, known the Green, has, among its features, prefabricated open panel timber wall frames, bathroom pods built off site, a combined heat and power system, and rainwater harvesting. The buildings will also be used to help students learn about environmental sustainability.

School emissions rising despite drop in heating

● Research shows rise in electricity use as heating demand drops

The carbon dioxide emissions of schools in England are still rising, despite reductions to their heating demands, according to new research.

Researchers from the University of Cambridge and Shinawatra University in Thailand used data from 25,000 Display Energy Certificates (DECs) produced in 2008-09. This allowed them to study almost 40% of the primary and secondary schools in England. They found that improvements to buildings' thermal performance and heating systems had, as expected, resulted in reduced heating consumption.

But electricity consumption was still found to have risen, resulting in an increase in emissions. The researchers suggest that DEC benchmarks used for energy consumption in schools had in general underestimated the amount of electrical energy that schools consume.

But they point out that that there could be a range of reasons for the rise in schools' electricity consumption, including the increase in IT facilities and other

technology to support teaching and learning in recent years.

This may also go some way to explaining why academy schools had significantly higher energy consumption profiles than normal secondary schools.

Typical CO₂ emissions per pupil were found to be 116% higher in academies than in primary schools – more than double the figure for secondary schools, which were 47% higher compared with primaries.

Professor Koen Steemers, head of the department of architecture at Cambridge University, said: 'This research shows that design strategies to reduce heat loss have been moderately effective, but have been offset by increasing electricity demands, for mechanical ventilation, lighting or equipment.' He added: 'In the context of national and international targets to reduce emissions, the paper establishes the need for continued monitoring and research into the relative roles of building design, systems and occupant behaviour to ensure that the emissions trend is downwards.'

'The paper establishes the need for continued monitoring of buildings'

The findings are published in *Building Research & Information*. www.tandf.co.uk/journals/rbri

BUILDING CERTIFICATES COULD FACE REVIEW

The new Green Construction Board is likely to consider the use of energy certificates as part of its plans to review progress on policies to promote green construction.

The board, made up of ministerial and industry representatives, will look to take forward the government's Low Carbon Construction Action Plan.

Co-chair of the board, Dan Labbad, suggested that its work would need to include the measurement of energy use in buildings. The news follows the government's decision not to extend the mandatory use of Display Energy Certificates to commercial buildings, as part of the new Energy Act.

Paul King, chief executive of the UK Green Building Council, said that the property sector needed to see a roll-out of DECs 'showing actual energy use for landlords and tenants, so we can see who is doing a good job of managing their carbon emissions, and who is not doing their bit'.

See Regulations column, page 20

SMEs 'missing out on energy savings'

Small businesses in Britain are losing £7.7bn a year by not installing simple efficiency measures, according to energy supplier E.ON.

Only a fifth of the 1,167 SMEs the company surveyed had energy efficient equipment installed, so each firm is missing out on possible savings of up to £2,000 per year.

While 15% had smart meters installed, almost 90% did not have lighting timers or motion sensors. Some 80% did not have an energy monitor installed, and 13% admitted to leaving windows open when the air conditioning or heating was running.

Report identifies £8bn public service savings

The public sector can raise the productivity of its workforce by £8bn a year by using buildings more efficiently.

That is the recommendation of a new report launched by Communities Secretary Eric Pickles after an eight-month parliamentary enquiry carried out by the Westminster Sustainable Business Forum.

The report suggests that, if the public sector rationalises its property portfolio, works in partnerships and improves workplace conditions by championing practices such as flexible working, it can improve environmental efficiency while improving productivity by between 5% and 15%. A 5% cent increase alone would equate to £8bn worth of staff time.

The report also suggests that a well-run property energy efficiency programme can deliver energy savings of 15%, in return for an investment typically paid back in two years, as well as cutting emissions.

www.policyconnect.org.uk



A biofuel plant. Larger biomass projects face a tariff cut

nostalgic/shutterstock.com

Dismay over cut in RHI tariff for big biomass

● Members 'hugely frustrated' by decision, says Renewable Energy Association

The renewable energy industry has reacted with dismay to the government's announcement of a 60% cut in the Renewable Heat Incentive (RHI) tariff for larger biomass projects.

There was some relief that the scheme was going ahead at all – after the last-minute delay announced in September – when the European Commission expressed concern that the tariff level for large biomass projects had been set too high.

The Department for Energy and Climate Change last month confirmed that RHI scheme would now be going ahead. But it also confirmed the cut in payments for biomass installations above 1MW, prompting industry bodies to warn that this would lead to many projects being cancelled.

'Most of the projects at that scale (above 1MW) will not now go ahead,' said Paul Thompson, head of policy at the Renewable Energy Association (REA).

'We understand that policy does sometimes have to change, but all we ask is that the industry is given

a reasonable notice period so people can get projects completed.

'This is so drastic and so sudden that many of our members have been left hugely frustrated as they were already committed to projects based on the original tariff agreed by Parliament.'

There was considerable criticism of the Department of Energy and Climate Change (DECC) for its failure to gauge what level of subsidy the European Commission would accept. Investor confidence is being eroded with

every change of direction on renewables funding, Thompson said.

Separately the Energy Secretary, Chris Huhne, has claimed that the UK will become the largest market in Europe for offshore wind. He pointed to actions totalling nearly £1.7bn of investment over the last year.

'We are not going to save our economy by turning our back on renewable energy. I can assure you this government has resolved that we will be the largest market in Europe for offshore wind,' he told the annual UK renewables conference in Manchester.

'Most of the projects above 1MW will now not go ahead'

For more information visit:
www.decc.gov.uk

Help for firms to be more energy efficient

The Carbon Trust has launched a free advisory service to help companies reduce their energy costs.

It claims the scheme offers objective evaluations of firms' energy needs and the most effective way to meet them.

A survey by the trust has found that 76% of companies are more concerned than they were six months ago about rising energy costs and the impact of this on their businesses.

More than half of those surveyed are expecting the cost of energy to

rise at least 11% over the next three years.

The survey also found that companies want to improve their energy efficiency, but are held back by three barriers: insufficient time or resources; inability to quantify the expected returns; and energy efficiency being a lower priority than other business considerations.

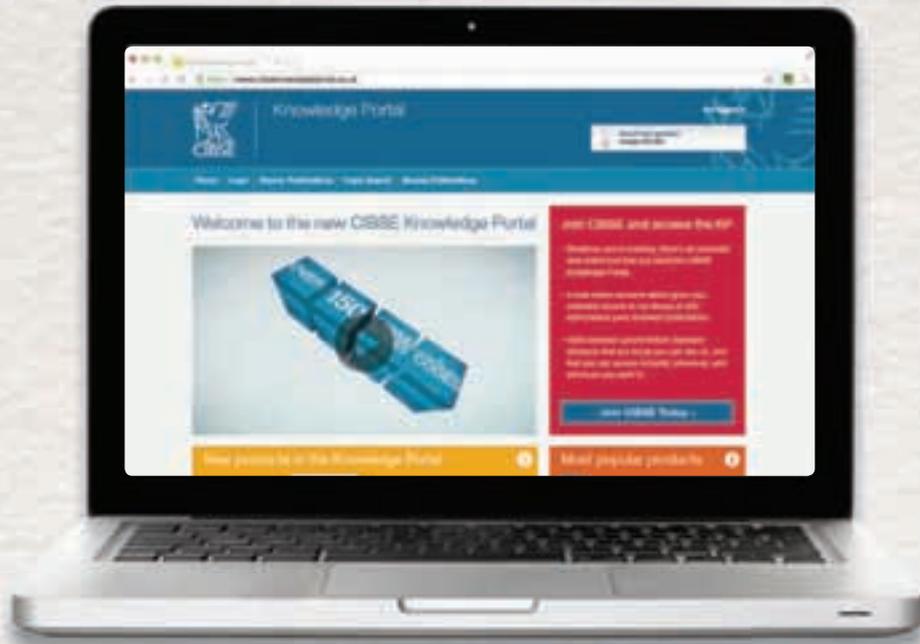
The new service, Carbon Trust Implementation, will also help customers to run competitive tenders for their projects, says the trust.

Its chief executive, Tom Delay, said: 'The new business will help unlock £9bn of investment into energy efficient equipment.'

'We are confident that our new business will catalyse organisations to take action, and in turn to benefit from implementing cost effective energy efficiency and renewable energy projects, as well as helping the UK capitalise on green growth.'

For more information visit:
www.carbontrust.co.uk

Whatever you're building the CIBSE Knowledge Portal is the essential online tool.



Whatever your role in the built environment, the work you do is underpinned by experience and expertise. The CIBSE Knowledge Portal is a new online resource that puts the world of building services knowledge at your fingertips.

When you renew your 2012 membership subscription you will receive online access to the Knowledge Portal. This exciting new tool allows you unlimited access to search and download the full range of CIBSE published guidance, including Guides, Commissioning Codes, Applications Manuals, Technical Memoranda, Lighting Guides and more. The Portal also provides information on other publications and links to around 3,200 current British Standards, carefully selected for their direct relevance to the work of building services engineers.

Renew your 2012 CIBSE membership today and get access to our new online library worth over £5,000

Find out more at

www.cibseknowledgeportal.co.uk



In Brief

REGENERATION PLAN ATTACKED

The government has 'no adequate strategy' for regeneration in England, according to the Commons Community and Local Government Committee. The MPs found that the decision to end funding and development under the Pathfinder housing renewal scheme had left people 'desperate', with residents being 'trapped' in half-finished developments - adding that the current government strategy provides 'little confidence' for the future.

CONSTRUCTION GROWTH

October saw the UK construction sector grow at its fastest pace for five months. The Markit/CIPS construction purchasing managers' index (PMI) jumped to 53.9 in October from 50.1 in September, after industry observers had predicted a slump to 50, which indicates no growth. An increase was reported in new commercial business, but activity in the housing construction sector continued to fall.

www.markiteconomics.com

ANOTHER YEAR FOR MORRELL

The government's chief construction adviser, Paul Morrell, has been reappointed for another year by the Business Minister Mark Prisk. Morrell, who was first appointed to the position for two years in late 2009, will oversee reforms set out in the government's construction strategy.



Shutterstock.com

Councils need support on design plans, says review

● Bishop report says current centralised system is no longer appropriate

Design needs to be 'championed' in the built environment, with more support provided to local authorities faced with a shake-up in the planning system, according to a new report.

The Bishop Review, carried out for the Design Council, says the current centralised system that was administered by the Council for Architecture and the Built Environment (Cabe) is no longer appropriate for local councils, communities and developers.

'Good design is about more than just the physical appearance of development,' said review author Peter Bishop, a visiting professor of architecture.

'It needs to embrace social functionality and environmental performance, and to be capable of being delivered in a tough economic climate.'

'If we are to leave a lasting legacy for future generations, then all the major bodies and institutions

need to come together to build a national infrastructure where good design can flourish at all levels.'

He said the newly merged body, Design Council Cabe, had to become a facilitator and principal adviser to government and should empower others to deliver good design through a network of local partners.

There should be new models of engagement with local communities offering clear advice and a simple point of access to available support, he said.

Bishop added that poor quality housing was a major issue that should be addressed by creating working partnerships, and that local planning authorities were pivotal but needed support to deliver reform.

Liz Peace, chief executive of the British Property Federation, said: 'The government's proposed changes to planning policy place design firmly at the centre of the new planning system.'

'It is vital that we have a way of ensuring that local authorities can access independent and imaginative design advice needed to make sound planning decisions.'

'It is vital that councils can access independent, imaginative design advice'

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



VELOGRID

Velocity Averaging Sensor



P-Sensor

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

CMR CONTROLS Ltd

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

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



Renewable heating solutions for commercial buildings

**The Renewable Solutions Provider
Making a World of Difference**

Mitsubishi Electric's Ecodan heat pumps are specifically designed for use in commercial buildings where there is a need for space or water heating.

Using proven heat pump technology to deliver effective, low carbon heating, our Ecodan systems provide a simple, renewable solution that rivals traditional heating systems.

- Helps achieve renewable energy targets
- Capable of reducing running costs and CO₂ emissions
- Easy to design, install and maintain
- Fully scalable and can work independently or in conjunction with other systems
- Optimised systems from 5kW to 688kW
- MCS accredited

ecodan[®]
Renewable Heating Technology



Certificate Number:
MCS HP0002
Product Reference:
CAHV-P500YA-HPB
PUHZ-W50VHA-(BS)
PUHZ-W85VHA2-(BS)
PUHZ-HW140VHA2/YHA2-(BS)

For more information please call: **01707 282880**
or email: **commercialheating@meuk.mee.com**

 **MITSUBISHI
ELECTRIC**
LIVING ENVIRONMENTAL SYSTEMS

Air Conditioning | Commercial Heating
Domestic Heating | Photovoltaics

www.commercialheating.mitsubishielectric.co.uk



ES-LCDM.
Simple touchscreen navigation and control.

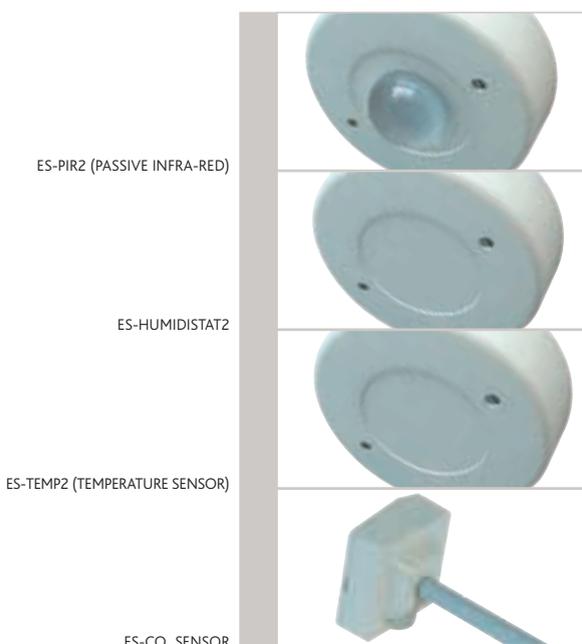
“The new Ecosmart intelligent control panel from Nuaire. Who said nobody’s lifting a finger to save energy these days?”

With its new intelligent control panel, Ecosmart from Nuaire represents the most flexible energy-saving ventilation control system on the market today.

There’s no wasted energy because air volume can be precisely set through the integrated speed control. As part of a constant pressure system, you get ventilation on demand, only when a room is occupied, to achieve the maximum possible savings. There’s also a trickle function as standard enabling you to set a background ventilation rate to keep rooms fresh when unoccupied too while still conserving energy. While integrated BMS features enable any central system to control and monitor the fan or air-handling unit. But that’s not all.

Because Ecosmart doesn’t just save energy. With its new state-of-the-art, easy to use touch screen control panel, it saves your client’s energy too. In fact, saving so much energy has never taken so little effort. Ecosmart from Nuaire. It doesn’t cost you the earth.

Nuaire. For the complete ventilation solution.



Call **02920 858 200** to arrange a demo of the **NEW** Ecosmart ICP System.
Quote reference code **CIBSE1211**

Eastern odyssey for president

● Institution's president goes on tour

In October, CIBSE president Andy Ford visited Qatar, Singapore and China to meet the Institution's country representatives and to attend seminars and conferences. In Doha, he met Michael Daly, country representative for Qatar, as well as Esam Elsarrag, Yousef Al Horr and Murad Ali Munawar Khan, before attending a seminar on low carbon lighting hosted by the Gulf Organisation for Research and Development (GORD). As a result, CIBSE and GORD signed a memorandum of understanding to work together on academic research.

During his visit, Ford met Hsieh-Min Loy, CIBSE country representative for Singapore, and local members before proceeding to Chongqing, China, where he attended the SuDBE International



Dr Yousef Al Horr and CIBSE president Andy Ford

Conference on Sustainable Development in Building and Environment.

This visit reflects CIBSE's global membership, with about 5,000 members based outside the UK across almost 100 nations, including 91 members in Singapore and 49 in Qatar.

Call for building services design group

The role of a building services design manager is fast becoming a stand-alone discipline in its own right and there is a strong view that there should be a Specialist Interest Group within CIBSE to support this post. It would provide a forum for like-minded individuals to communicate, host events and review existing publications and guidance to determine whether any gaps

need to be filled. CIBSE would welcome the views and input of those interested in supporting the formation of such a group.

The design of building services systems requires particular technical skills and needs to be coordinated with the needs of the other design and construction team professionals.

Building services design management differs from

project management in several ways; project management concentrates on a wider range of administrative skills, but is not normally sympathetic to the peculiarities of delivering a fully coordinated functioning design.

Those who support the formation of a new group are asked to contact Nyree Hughes, CIBSE technical networks manager at groups@cibse.org

Access the Knowledge Portal now!

The Knowledge Portal, which provides online access to all CIBSE publications, as well as links to a wide range of carefully selected resources and publications from other publishers, can now be accessed at www.cibseknowledgeportal.co.uk

Members can download CIBSE publications via the Knowledge Portal as soon as their 2012 subscription renewal has been paid.

In addition to the Knowledge Portal, CIBSE membership provides a range of other benefits: access to the *CIBSE Journal*; professional recognition; networking opportunities through the regional

and special interest groups; knowledge sharing; and substantial discounts on CIBSE hard copy publications and training.

Renewals notices and information on how to pay have been sent to all members. For those who haven't already done so, please remember to renew your membership subscription for 2012, which is due on 1 January 2012. There are several payment methods: direct debit (which includes a 5% discount); online at www.cibse.org/members; by phone with a credit or debit card by calling +44(0)20 8772 3655, or by sending a cheque.

North-east showcase at YEN ball

This year the CIBSE Young Engineers Network (YEN) Autumn Ball took place in Newcastle. Hosted and organised by the YEN North East Centre, the ball included a drinks reception and a three-course meal for around 100 engineers.

Entertainment on the night was provided by a stage hypnotist, live band and DJ. The event was kindly sponsored by Baxi Commercial Division, Fläkt Woods, Mitsubishi Electric and Herz Valves UK.

CIBSE president Andy Ford endorsed the importance of the CIBSE YEN in his address to guests.

Colin Lehane, vice-chair and co-founder of the North East Centre, said he 'looks forward to seeing YEN growing in popularity while commending the spirit of young professionals in the industry'.

A charity raffle at the ball, which took place on Saturday 15 October, raised £566 with proceeds going to Project Zambia.

● For more information on upcoming CIBSE YEN events or to join the network, visit www.cibse.org/yen

Journal success

Many thanks to the 640 readers who completed our October survey.

Your feedback was overwhelmingly positive, with 87% rating the *Journal* as 'excellent' or 'good', and a further 11% describing it as 'fairly good'.

The technical coverage in the magazine was rated as 'excellent' or 'good' by 79% of respondents. Three-quarters of readers spend over half an hour reading each issue.

We will take on board feedback on areas where we can develop the *Journal's* coverage, such as including greater input from energy managers and architects.

New workshops for Green Deal

CIBSE Training has put together a one-day workshop to provide insight into the Green Deal scheme and allow you to recognise the opportunities. These events will run in various locations around the UK. For more information visit www.cibsetraining.co.uk/green-deal

BSO12 abstracts deadline

The first national conference on building simulation and optimisation is to be held at Loughborough University on 10-11 September 2012. Abstracts are welcome from building design professionals, as well as academia. For further details and to submit your abstract, visit www.bso12.org

Young Lighter of the Year 2012

Submit your entry by 31 December 2011 to earn your place in the Society of Light and Lighting's prestigious Young Lighter of the Year competition.

Designed to help promote the younger element in the lighting profession, the competition provides a unique platform for young lighters – whether society members or not – to hold forth on a lighting subject of their choice. It will also be a chance for them to hone their presentation skills, and to win the considerable kudos of being chosen as the 'SLL Young Lighter of the Year'.

Following the submission of the written synopsis, a preliminary shortlist of entrants will be invited to submit a short piece to camera to further explain the premise of their paper. Entries may be based on previously prepared work and must be capable of being presented in 15 minutes during the final.

In addition to free SLL membership for one year, each finalist receives a cash prize, a certificate and a free lighting publication.

For an application form call **020 8772 3685** or e-mail sll@cibse.org

Sense of wonder at annual lecture

Chris Wise captures the imagination

In attempting to answer the rhetorical question: 'I wonder what it would feel like if we did that?', Chris Wise explored the role of the vital trace elements of imagination, empathy and physicality in engineering.

The theme of emotion in engineering was examined using examples from his career, from the Millennium Bridge to the 2012 London Velodrome.

Chris Wise, co-founder of Expedition engineering, is widely regarded as one of the most gifted structural designers of his generation. He has a reputation for hands-on engineering projects and also for his close working collaboration with some of the world's leading architects, including Richard Rogers, Norman Foster, Michael Hopkins, Ken Shuttleworth and Renzo Piano.

The lecture was sponsored by the CIBSE Patrons, a scheme set-up in 1979 as a way of developing closer links and working between the Institution



Chris Wise presents at CIBSE's Annual Lecture

and a broad range of organisations involved in the building services engineering industry.

For those who could not attend the lecture, it was broadcast online as a webinar, with online users able to listen to the lecture, view the slides and post questions. The audio file and presentation slides are available for download from www.cibse.org/annuallecture2011 For more information about becoming a CIBSE Patron member, contact cbrown@cibse.org

Professional conduct of a member

The CIBSE Board has recently considered a disciplinary case against a member. The case concerned the level of hospitality provided to a major client, and whether evidence pertinent to that hospitality had been destroyed.

The Board concluded there had been a breach of two CIBSE Codes of Conduct, dealt with by two separate clauses:

- The first clause – At all times members shall order their conduct to uphold the dignity and reputation of their

profession, and to safeguard the public interest in matters relevant to the art, science and practice of building services engineering; and

- The second clause – Members shall not improperly offer or accept, either directly or indirectly, payment or inducement to secure work or employment.

Although there had been a serious breach of the code, the Board decided that the member had demonstrated sufficient regret for his actions, and it was

agreed that he should receive a reprimand. Also, any similar transgression of the two clauses within two years could lead to the member's suspension or expulsion from the Institution.

As part of the reprimand he will be required to adhere to his company's new hospitality policy.

The disciplinary case was investigated before the Bribery Act 2010 came into force on 1 July 2011. Members are advised to carefully note the new legislation. Further guidance is expected to be issued in the next few months.

Green Deal update and other future consultations

While the public comment on PAS 2030, the Green Deal installer standard, has now closed, the next stage of public consultation on the details of the Green Deal is imminent. It is reported that a 460-page package is due for release very shortly. This may not be a full 12-week consultation, due to the proximity of the scheme start date on 1 October 2012. And with the publication of the consultation around Christmas, there could

be very limited time to address some very significant issues for services engineers, installers and manufacturers.

The package is expected to cover detailed regulations for Green Deal advisers, installers and providers, who will finance work carried out under the Green Deal. It is also expected to contain the detailed requirements and guidance for advice, installation and funding arrangements. CIBSE will be

co-ordinating responses, and will make the material available by email and on the CIBSE website.

Meanwhile, the formal consultation on the 2013 changes to Part L is due in December, as well as a consultation on the implementation of the recast Energy Performance of Buildings Directive. Those with limited reading material this Christmas will have plenty to compensate over the festive period.

Obituary

Lynn Bellenger

● Engineer with a passion for design dies

Lynn Bellenger, immediate past president of the American Society of Heating, Refrigeration and Air Conditioning Engineers, and the first woman to hold the office, died on 19 October 2011 in Rochester, New York.

Lynn Gardner Bellenger grew up in Webster, Massachusetts. Her professional career began after she graduated from Principia College with a Bachelor's Degree in mathematics, and a Master's Degree in environmental science from Rutgers University.

She joined Xerox, working on energy conservation. While there she began studying to become a Professional Engineer, (the US equivalent of Chartered Engineer) and was licensed in several states. In 1977 she left Xerox with Donald McGeddy, who had started the energy program at Xerox, to form a consultancy providing energy studies

and analysis to firms nationwide. They worked together until 1991, when Mrs Bellenger joined the Sear-Brown Group.

In 1998 Mrs Bellenger was one of four founding partners of Pathfinder Engineers & Architects LLP, set up to provide energy engineering and modelling services across the US.

She was a leader in developing energy modelling software, techniques and standards that are common industry practice today, and was one of the first to achieve ASHRAE Certification as a building energy modelling professional and a high-performance building design professional.

She was active in several organisations, most significantly ASHRAE, receiving two ASHRAE Technology Awards and the Exceptional Service Award. In June 2010 she was installed as the first female president in ASHRAE's 116-year history, fulfilling a long-held goal.



Lynn Bellenger

In October 2010 she attended the CIBSE ASHRAE Graduate of the Year Award in London, serving on the judging panel and then delivering her ASHRAE presidential address, 'Modelling a Sustainable World', which highlighted the role of engineers as leaders in sustainable design in the 21st century. It also addressed the importance of controlling plug loads, that part of energy use in buildings not covered by the regulations, noting that 'as the envelope, lighting and heating, ventilation and air conditioning loads diminish, the remaining loads take on increased significance' – a theme that both ASHRAE and CIBSE members recognise well.

Lynn Bellenger was a lifelong Christian Scientist. She is survived by her husband, Neil, and two sisters.

'In June 2010 she was installed as the first female president in ASHRAE's 116 year history'

Election time for members of the Board and Council

The Board is the governing body of CIBSE. It is made up of the seven officers of the Institution (president, president-elect, three vice-presidents, honorary treasurer and immediate past president) and five elected members. Vacancies arise at each annual general meeting (AGM), and the Board is required under Regulation 36 to nominate candidates for all the forthcoming vacancies.

The Board has also agreed that elections should be held for membership of the Council of the Institution, a much larger consultative body that exists to advise the Board on Institution policy, which is composed mainly of representatives of the regions, societies, groups and standing committees. The Board itself has not chosen to make further nominations for Council membership on this occasion, but members may nominate candidates if they wish.

The nominations to fill arising vacancies at the next AGM in May 2012 are listed in the box (right).

Short biographical notes for candidates can be found on the Members section of www.cibse.org

Members of the Institution are entitled to nominate additional candidates for election,

according to the rules set out below:

- Fellows, members, associates and licentiates may submit nominations for the offices of president-elect, vice-president and honorary treasurer, and for members of the Board. Only duly qualified individuals who have been supported by 10 nominations from fellows, members, associates and licentiates will be added to the lists;
- Fellows, members, associates and licentiates may also nominate individuals from those grades for membership of Council. Graduates, companions and affiliates (including students) may

nominate individuals from those grades for membership of Council. Only duly qualified individuals who have five nominations from members in the appropriate grades will be added to the lists; and

- Any such nominations must be made in writing to the chief executive/secretary, and must be received at CIBSE headquarters by 3 February 2012. These nominations must be accompanied by the written consent of the nominee to accept office if elected. The names of those making nominations will follow the name of the candidate on the ballot paper.

The qualifications for each position are as follows: **President-elect:** Fellows of the institution who hold, or have held, the office of vice-president. **Vice president:** Fellows, members, associates or licentiates of the Institution who are, or have been, members of Council. **Honorary treasurer:** Fellows, members, associates or licentiates of the Institution who are, or have been, members of Council. **Members of the Board:** Members of all grades may be nominated (at least three of those elected must be, or have been, members of Council, and at least three must hold membership in the grades of fellow, member, associate or licentiate). **Members of Council:** Must hold the appropriate membership grade for the category in which nominated, that is fellow/member/associate/licentiate or graduate/companion/affiliate (including students). **President-elect:** George Adams. **Vice presidents:** John Field, Peter Kinsella, Peter Wong. **Honorary treasurer:** Nick Mead. **Members of the Board:** Geraldine O'Farrell, Tadj Oreszczyń and Cathie Simpson.

High-Performance Green Buildings

Find out
What's new in
Hevacomp

sustainability design architecture geometry components design sustainability design architecture geometry



Image courtesy Hamilton Associates



Image courtesy HKR Architects



Image courtesy Foster+Partners

Software for Building Energy Design, Analysis and Simulation

Successfully creating high-performance buildings demands the accurate prediction of energy consumption, CO₂ emissions, operating costs, and occupant comfort.

Bentley's comprehensive suite of industry-leading energy design, simulation and analysis applications, including **Bentley Hevacomp** and **Bentley Tas**, provides today's professionals with these capabilities and more, facilitating the productive delivery of sustainable 'green' buildings.

These applications are used by leading firms worldwide to effectively simulate and analyze building energy performance – optimizing the balance of function, comfort, and energy and carbon impact and helping building teams sustain our environment.

www.bentley.com/CIBSE

© 2011 Bentley Systems, Incorporated. Bentley, and the "B" Bentley logo are either registered or unregistered trademarks or service marks of Bentley Systems, Incorporated or one of its direct or indirect wholly owned subsidiaries. Tas copyright EDSSL. Used with Permission. Other brands and product names are trademarks of their respective owners.

**Already a Hevacomp user?
Improve your productivity
with Training:**

www.bentley.com/UK-Green-Training



For more information:

**0808 101 9247 (UK only)
+353 1 436 4600 (Europe)**

Press 1 for energy modelling and building services software

1-800-BENTLEY (US)



SPOTTING THE BUG IN THE BMS

A building's control systems are crucial to its safe and secure operations. But, asks **David Fisk**, do we worry enough about computer viruses that could potentially put these systems at risk?

 A chance remark from Chris Hankin, who runs Imperial College London's Institute for Security Science, set my head spinning. Just how well could our systems perform if they were subject to a cyber attack? The answer might be: not at all.

The story begins with a now infamous computer virus, stuxnet. Most computer viruses steal passwords and personal data. But could one be written to infect the software of process controllers? It would not be easy: stuxnet has 15,000 lines of code, and there seems to be no criminal advantage that would justify the effort. But stuxnet stopped the Iranian nuclear enrichment programme for a while. The word is out that infecting process controllers could be done, and cyber-terrorists might want to do it.

Not every facilities manager is running a building that is under a high security threat. But, where they are, owners have often spent large sums of money on finding safe locations, installed blast-proof glass, provided security access, bought four days' worth of fuel for standby power, and so on. The same attention is not always lavished on the humble building services system that heats, cools and lights all this investment.

Yet, 'upstream', people are taking the cyber threat to the smart grid seriously. The US will be spending several billion dollars a year on protecting it from cyber attack, and ASHRAE is looking at standards.

But hold on. Isn't the smart grid supposed to be linked to the smart meter, and the smart meter to the building management system (BMS)? And, if you are ambitious, the BMS is linked to the enterprise's platform, and that probably to the 'Cloud'? Has not



The threat from cyberspace for building services is in danger of being neglected

 The real services engineering question is: what would happen if the system protection was breached?

the testing group KEMA just criticised the all-singing, all-dancing UK smart meter specification for not addressing security threats?

We have had some clues to this threat. To name just one, in 2003 a bug in communications software led to a single unexceptional line fault resulting in the whole north-east of the US being blacked out for four days.

The first BMSs were hard-wired monitoring systems, giving oversight of a largely manual process. Digital data communication then opened up vast possibilities, but initially in a system safely quarantined from the enterprise itself. But the attractions of upgradeable control software and access to BMS data within the enterprise network are clear and no one wants to lose those advantages if they can, for a threat that might never happen. So the risk level has been creeping up while IT security people have been worrying about other things.

Agreed, you can now insert firewalls and the like in these systems

(see www3.imperial.ac.uk/lorsystemscentre/workingpapers), but IT is a compliance culture and the protection will not be included unless it is asked for. Indeed, it is just as unwise to presume that IT systems will always be protected as it is for a householder to suppose that a determined burglar can be kept out.

System providers will do their very best – stuxnet can be patched, for example – but the real services engineering question is: what would happen if the system protection was breached and the digital control was compromised?

What is needed is some 'fall-back' engineering, a simple principle; everyone takes the lift in a 20-storey building but they are glad the back stairs are there when they can't.

So the simple question is: can the building's services be run 'hands on' if the BMS has for some reason or other decided to take on a life of its own? Those neat, naturally-ventilated, naturally-lit, B-rated buildings look the least at risk, while the energy-guzzling, G-rated ones appear to be most at risk.

Normal practice would be to program a device to go to 'fail safe' and shut down if it detected that something was awry. That is no great help if the system is a server farm or a hospital theatre. Sometimes, at the cost of a few pounds, a simple extra manual valve would be enough to do the job of getting something back on stream – worth checking out if you are (justifiably) paranoid in a world where the Foreign Office is convinced that cyber warfare is here to stay.

 **PROFESSOR DAVID FISK** is director of the Laing O'Rourke Centre for Systems Engineering and Innovation at Imperial College London

Your letters

This month:

Automated window shading can provide significant savings

Shades go up on quick wins

As a new CIBSE member, I read with interest my first copy of the *Journal*. The cover feature on 'Quick Wins for Energy Efficiency' (November, page 40), included presence detectors for lighting but made no mention of window shading or automated shade controls (although the cover illustration does show what appear to be shaded windows).

By using solar shades with a solar screen fabric, up to 50% of heat can be stopped from entering the building. If automated real-time window controls are also used alongside a lighting management system, the same IT backbone and server systems can be used, cutting costs further and providing integrated window and lighting control management and reduced energy costs.

For example, in the US the Lawrence Berkeley National Laboratory (LBNL) monitored the New York Times building for a year after it was occupied in 2007. The LBNL found that a huge amount of energy was saved by using



shades operated by an automated real-time window management system, where radiometers monitor sky radiation.

The monitoring showed that, for 91% of the time, the shades operated according to the programme. Of the other 9% of the time, nearly half of the control movements sent the shades upwards more. This was the opposite of what most people had predicted.

I look forward to further articles where, at long last, shades and shade controls are taken seriously by the MEP and the engineering and specification community, as a contribution to sustainability in the built environment.

Maggi Clayden

Vice-president, MechoSystems UK

Engineering economics

The cover story on the London Olympics energy plants says little about the engineering economics of these projects, which is essential to understanding how they work (*August Journal*, page 16). It is certain that Cofely required, and got, long-term guarantees of payment for the capital and operating costs of those services before proceeding to spend £113m. The article should have shown who provided those guarantees, their basis, and duration. Almost certainly, the prices for those services must also cover the many risks that exist. For example: who pays Cofely, and how much, if the expected occupancy after the Olympics does not materialise? What happens to prices of these services if the cost of fuel changes dramatically? Who will be saddled with these costs? This information is required to make any project proceed and should be published.

Larry Spielvogel

Bala Cynwyd, Pennsylvania, USA

Olympian expectations

Reading Roger Courtney's article on urban heat supply, I wonder whether he looked at the article on the London Olympics energy centre in the same issue (*August Journal*, pages 16 and 34). In this article he would have noted that the average heat loss in the district heating network is (a very low) 1C per km (assumed to be measured at full flow rate, but which will mean higher losses at reduced flow rate).

This sounds excellent, until you calculate that this means that the

Who pays Cofely, and how much, if the expected occupancy after the Olympics does not materialise?

1hr in-house CPD seminars available

JS Air Curtains

The widest range of air curtains in the UK with expert advice and technical support.

- Bespoke:**
- Colours
 - Fascias
 - Mounting options



T: +44 (0)1903 858656
E: sales@jsaircurtains.com
W: www.jsaircurtains.com

system will be at least 8C, assuming an average 'round trip' of 8 km out of its 16 km network. Given that the operating temperatures are 95C flow/55C return, this means that (ignoring the pumping losses) at least 20% of the heat is wasted to the ground (and probably considerably more than this at low flow). Since the heat network is more than 85% fed by conventional, natural gas-fired boilers, one wonders on what basis the operators claim this to be a 'low carbon' heating network.

I would suggest that the significant heat loss from the district heating pipework is a good reason why heat networks are unlikely to be the future for us, as Prof Courtney suggests (particularly if the heat sources are more than 50km away). The answer to future (zero carbon) urban heat supply is heat pump technology (using air-source, ground-source or even waste-water source), with biogas as the fuel of choice for the rare situation where insufficient heat sources are available.
James Thonger

Counting carbon does count

David Fisk might be right to question the justification for seeking a single grid carbon emission factor (Letter, October *Journal*, page 19), but in the hard-pressed marketplace where equipment manufacturers are jostling for every advantage, variations in grid emissions certainly do count.

Because the regulators have chosen to provide fiscal support in the form of feed-in tariffs for more-expensive but less-effective technologies, combined heat and power (CHP) has to depend on its superior carbon and energy saving credentials to stay in pole position.

Every increase in grid emission factors deliver more carbon savings from CHP – and that matters, not least because it gives the designer the option of reducing the CHP size, so improving overall performance and delivering better payback.

If there is a chance that the current range of grid emission factors in general use is skewing results, clarification is certainly needed.

Every increase in the grid emission factor delivers more carbon savings from CHP – and that matters

Prof Fisk's suggestion that it could be 0.5 to 0.6 is a bit cavalier, but if it were to be 0.6 the CHP industry would be delighted!

David Shaw
Baxi-SenerTec UK

Trusting heat pump accreditation

One year on from the Energy Saving Trust's (EST) report, air-water heat pumps can live up to the claims of energy efficiency ('Hot prospect?', October *Journal*, page 50). It is widely recognised that most of the heat pumps in the EST field trial were installed prior to the introduction of the Microgeneration Certification Scheme (MCS). The next logical step is for the industry to continue to work with the government and industry associations such as the EST to support initiatives which improve knowledge and understanding within the UK heat pump market such as the development of skills and 'best practice' for heat pump installations.

Andrew Crown
Daikin UK

Ventilation Solutions by Fläkt Woods Limited

Fläkt Woods is a global company providing solutions for ventilation and air treatment for buildings as well as fan solutions for Industry and Infrastructure applications.

As one of the World's leading manufacturers of axial and centrifugal fans, Fläkt Woods can provide the air movement solution to meet your needs.

Supplying over 40 million air management products that are providing the finest and safest environment in buildings around the world, means you too can rely on Fläkt Woods to bring 'better' air to life.

www.flaktwoods.co.uk

Tel: 01206 222 555










Fläkt Woods Limited
Axial Way, Colchester, Essex, CO4 5ZD
Tel: 01206 222 555 Fax: 01206 222 777
email: marketing.uk@flaktwoods.com website: www.flaktwoods.co.uk





DEAL OR NO DEAL?



The Energy Act has ushered in the Green Deal, but many questions about its implementation and the impact on landlords remain to be answered, writes **Hywel Davies**

The Energy Act is the legal basis for introducing the coalition government's flagship energy and environment policy, the Green Deal. The Green Deal proposes a new finance framework to enable permanent improvements to the energy efficiency of a property to be funded by a charge on the electricity bill.

The key condition for any Green Deal finance package, whether for domestic or non-domestic property, is that the energy savings will reduce the energy bill by more than the annual repayments on the Plan, which is referred to as the Golden Rule. The Green Deal avoids the need for the property owner or tenant to pay for the improvement up front.

The Act also creates a new Energy Company Obligation (ECO) that replaces the existing Carbon Emissions Reduction Target (CERT) and Community Energy Saving Programme (CESP), which expire at the end of 2012. The ECO will supplement Green Deal finance for appropriate measures for vulnerable and low-income households likely to need additional support and in 'hard-to-treat' housing.

As well as the framework for the Green Deal, the Act establishes a



Not all tenants will appreciate the onset of improvement works

legal mechanism for introducing energy efficiency regulations for privately rented homes and for non-domestic properties, with separate provisions for Scotland. In both cases the regulations will apply where the required provisions can be funded via the Green Deal (and so must meet the Golden Rule). The key difference between the two jurisdictions is that, in England and Wales these regulations must be introduced by 1 April 2018, whereas in Scotland they may be introduced, but not before April 2015.

These regulations, which are yet to be drafted or consulted on, and are not expected to feature in the initial implementation phase of the Green Deal, may compel a landlord to

achieve and maintain a specified level of energy efficiency for a property as defined by the energy performance certificate. If the level of energy efficiency falls below the specified level, the landlord will not be allowed to let the property until such energy efficiency improvements as can be funded under the Green Deal are carried out.

Failure to do so may result in a fine of up to £5,000 for domestic properties, or possibly more for non-domestic, subject to the provisions adopted in the regulations. Enforcement will be the responsibility of local weights and measures authorities, who have already had several years' experience enforcing the Energy Performance of Buildings regulations.

There is an added requirement for landlords of private domestic rented properties: these landlords will be required to meet reasonable requests by tenants to take out a Green Deal Plan or obtain ECO funding for work to improve the energy efficiency of the property from 2016.

This may prompt questions about how this legislation squares with the government's 'one in, one out' commitment. This requires any new regulation to be cost-neutral, or else

Landlords now need to start thinking about the energy efficiency of their buildings



Makes humidifier servicing easy with its scale collector tank

JS Humidifiers

Condair Mk5 Resistive Steam Humidifier

Features:

- No replaceable boiling cylinders
- Low operating costs
- Very close control $\pm 1\%$ RH



E: sales@jshumidifiers.com
T: +44 (0)1903 850200
W: www.jshumidifiers.com



MANUFACTURER'S VIEWPOINT

If we're serious about cutting carbon, we should all adopt the 'ECR' approach to building services, writes **Martin Fahey** of Mitsubishi Electric, sponsor of this column

it can only be introduced if legislation of equal or greater burden is repealed. But if improvements meet the Green Deal's Golden Rule, then they must be cost beneficial, and so not be a burden. That may satisfy coalition ministers, but may not convince landlords facing additional costs under the new regulations.

Several potential questions about how the Green Deal will work in practice won't be answered until the regulations are made. For example, what types of commercial properties will be affected, what level of energy performance will be specified, and how long will landlords have to comply? Landlords might also be wondering what will transpire in cases where the energy efficiency works to be carried out interfere with the existing legal rights of other tenants to enjoy the beneficial use of their tenancy. For example, installing insulation in a multi-tenanted office building could well upset some tenants whose businesses could be adversely affected as a result of the disruption.

Indeed, landlords need to start thinking about the energy efficiency of their buildings now, in order to stay ahead of the game. Otherwise they risk not being able to let the property, or of the potential rental being reduced, or of having to carry out potentially costly work to a tight timescale.

Clauses 74 and 75 contain one further interesting provision. The current rules for disclosure of EPCs in the Energy Performance of Buildings Regulations may be amended, making EPCs far more widely accessible. Again, new regulations will be required, but the intent appears clear, to make EPCs far more widely available than hitherto. We live in interesting times.

WEB LINKS

The full legal text of the Energy Act 2011 is at www.legislation.gov.uk/ukpga/2011/16/pdfs/ukpga_20110016_en.pdf. The Act applies to the United Kingdom as a whole, although some aspects of the Act are only applicable to parts of the UK.

The Department of Energy and Climate Change has an extensive page giving further information and links to policy documents: www.decc.gov.uk/en/content/cms/legislation/energy_act2011/energy_act2011.aspx

Why we should all adopt an ECR approach to building services?

Buildings need heating, ventilation, power and sometimes cooling. Without these, we cannot create the habitable, operational and profitable spaces we all require to live, work and play in. At the same time however, we want our buildings to be energy efficient, less carbon intensive, and to use more renewable technologies.

As the industry responsible for producing, specifying and maintaining the technology that can answer these needs, everyone in the building services sector needs to find ways of delivering what a building wants while addressing the challenges of what it needs to achieve.

At Mitsubishi Electric, we're aware that reconciling these needs and wants has changed the way equipment purchases have to be made. That is why we have developed what we call the 'ECR' approach – which should be adopted once every possible measure has been taken to reduce the overall energy demand.

Firstly, the heating, cooling, power and ventilation requirements should be delivered in ways that are as *efficient* as possible. Next, they should help the building emit lower amounts of *carbon* and finally, wherever possible, they should incorporate *renewable* energy.

EFFICIENT: Maximum efficiency is paramount: The cheapest and cleanest kilowatt of energy is the one you do not use. Achieving this means more than just sealing a building's envelope – it also requires the selection and correct specification and installation, maintenance, monitoring and operation of the most energy efficient technologies available. Short-term decisions need to give way to those that take a whole lifetime view.

As their costs increase and availability decreases, the use of fossil fuels on site

become a less and less attractive option – especially as the technologies that burn them are already at the peak of their efficiency. Greater economies can be realised by switching to alternatives, indeed, a future with electricity as the only point-of-use energy is now both possible and desirable due to the lower direct emissions this will generate moving forward.

CARBON: Buildings in all their forms account for 44% of the UK's CO₂ emissions. Reducing this burden and specifically those emissions

generated by heating – and by cooling and ventilation in some commercial properties – is key.

This can be achieved through innovating more efficient products, removing the direct use of fossil fuels from buildings, recovering waste heat to use elsewhere and replacing equipment in a timely manner.

RENEWABLES: The UK building stock is able to accommodate renewable technologies relatively

easily. We are also fortunate that our climate is often ideal for supplying renewable energy via currently available technology.

Renewable solutions for use in buildings are varied and span both heating and power generation. Their inclusion gives buildings a level of energy independence, and the skills exist to incorporate them. The task ahead of us is so large that we rapidly need to find those mass-market solutions that can deliver the energy savings we require as soon as possible.

We firmly believe that the ECR approach places efficiency, carbon reduction and increased use of renewable energy at the centre of every decision-making process in respect of fulfilling a building's heating, cooling, ventilation and power requirements. If you would like to join the debate, visit www.greengateway.mitsubishielectric.co.uk.

SPONSORED BY



Adding various electronic management systems to buildings is meant to increase their energy efficiency, but the result is often far from satisfactory. **Graham P Smith** offers a guide to making the most of these processes

TAKING CONTROL

One of the most common causes of poorly performing buildings is inadequate or deficient control systems. About 90% of controls for heating, ventilating and air conditioning (HVAC) systems are inadequate in some way, costing industry and commerce more than £500m a year in additional energy costs, according to the Carbon Trust (see *Building Controls Technology Overview – CVT032, 2007*). Controllability – or the lack of it – is a key issue when it comes to saving energy and cutting carbon emissions from buildings.

There are a number of definitions of controllability. For the purposes of this article, the term is used to mean the ability for the system to be controlled within acceptable limits for both occupancy comfort and energy efficiency/carbon emissions. Despite advances in control technology, poor control outcomes are still common. Controls can be inadequate or deficient for a number of reasons, but the most common are:

- Inadequately specified control systems/building management systems (BMS);
- Deficient commissioning and maintenance of control systems/BMS;
- Poorly understood, or ineffectual use of, control systems/BMS; and
- Poor controllability and uncontrollable HVAC services.

All these factors are important, but the most misunderstood and difficult-to-resolve

Giuseppe_F / Shutterstock.com

“The most misunderstood and difficult-to-resolve cause of poor control is the controllability of the HVAC services

No matter how good a management system is, not being able to control it properly can seriously undermine it

cause of poor control is the controllability of the HVAC services: no matter how good the control system or BMS is, lack of controllability means lack of effectiveness for all load conditions. A very simple example of an uncontrollable system is an oversized DX Cassette Unit with on/off control. This will never achieve a stable room temperature, and can result in cold draughts, dissatisfied occupants and poor efficiency of operation.

Changes to system design or plant selection may be required to achieve acceptable controllability – but such changes can be expensive and disruptive, and are avoidable by designing controllable systems. Alternative control strategies can sometimes be used, although not normally without some compromise of efficiency or operation.

Heating

Many controllability issues are associated with multiple boiler and chiller systems, which are normally less noticeable to the building user but are of increasing importance to reduce energy consumption and carbon emissions (and can be expensive and disruptive to rectify). CVT032 states that inadequate or incorrect application of boiler control can easily add 15% to 30% to fuel consumption, compared with a well-controlled system. Here are some of the most common heating-system controllability issues.

Poor header design (see Figure 1): Headers should be designed with flows at one end and returns at the other. If one circuit returns prior to the take-off for another circuit, the second circuit flow temperature will be affected – in this case the hot water supply (HWS) primary, which could affect HWS temperature. This should be obvious, but I’ve seen it on a major project within the last couple of years.

Split headers (see Figure 2): Individual flow and return headers will cause interaction between primary and secondary pumps, varying flows and potentially affecting stability of boiler control. It can be relatively easy to resolve by making the split header into a common header. A combined header/de-aerator/dirt separator can be very useful for this purpose.

Individual boiler pumps (see Figure 3): Individual boiler pumps and a common header are desirable to eliminate dilution of flow through off-line boilers, but can be the source of controllability issues. The most common issue is that boiler sequence cannot be controlled from return

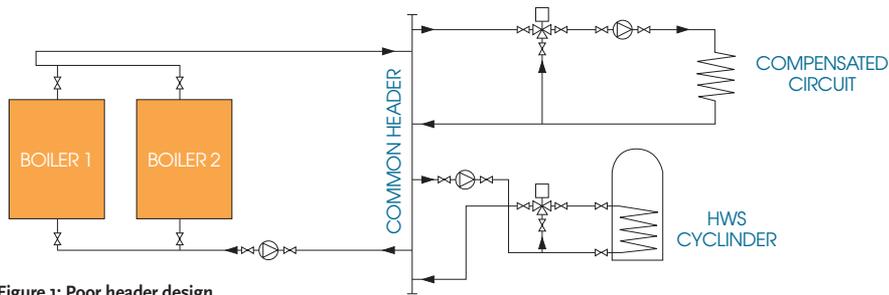


Figure 1: Poor header design

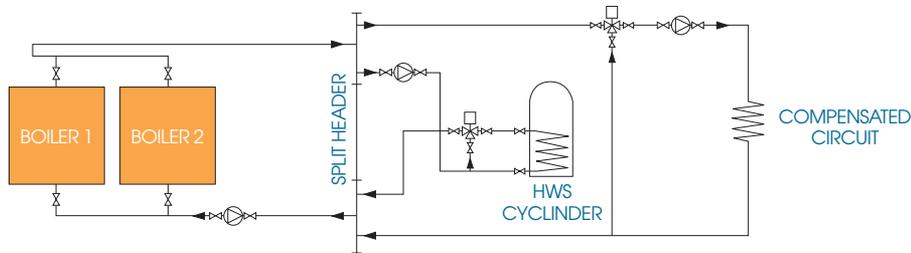


Figure 2: Individual flow and return headers

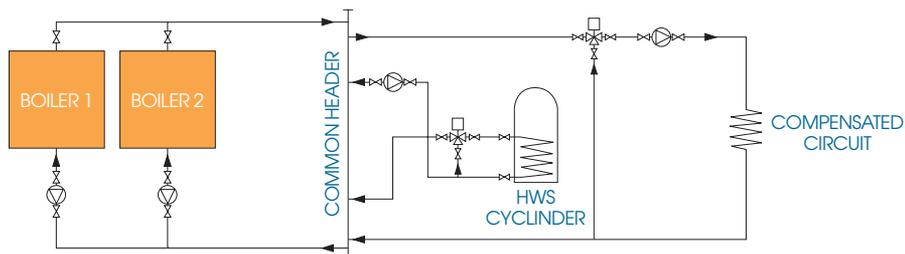


Figure 3: Individual boiler pumps and a common header

➤ temperature as the temperature will not be representative of the system load, due to the change in flow rate. Flow temperature control can be used, but is only normally stable where it is correctly integrated to control boilers with modulating burners. Flow temperature control of boilers with on/off or high/low burners can be unstable and can interact with the boiler thermostats, unless particular care is taken with operating temperatures, which must conform with Health and Safety Executive guidance note PM5 (www.hse.gov.uk). Boilers with individual pumps can be very effectively controlled with heat load control, which also allows the boilers to be controlled for their most efficient range of operation.

Condensing boilers: Many condensing boiler installations rarely work in condensing mode as, apart from start-up, the return water temperature is often above 54C, due to the system design. Direct compensation of boilers can achieve significantly increased condensing operation, but can only be used where a quick response to increase temperature is possible for HWS demand, where required.

System differential temperatures: Modern boilers are normally designed for higher

differential temperatures, and consequently have lower flow rates. Whilst substitution of modern boilers with packaged pumps is normally successful at a domestic level, the effect on hydraulics must be considered for larger retrofit installations; reverse flows in common headers causing dilution of secondary flow temperatures is the most common problem.

Boilers with variable flow pumps: Pumps that vary boiler flow in unison with burner firing to maintain constant differential temperatures can cause significant hydraulic and controllability issues in multiple boiler applications, particularly where system differential temperatures have also not been carefully considered.

HWS segregation: Many systems combine heating and HWS heat sources to reduce capital costs. Segregation of HWS can often reduce standing losses in summer, and can permit far greater flexibility for boiler control, enabling more effective condensing operation.

● **Two-stage burners:** These are very rarely correctly commissioned; only a few months ago I saw new boilers with both high and low burner stages set to the same temperature, working as single stage burners. Where controlled by the individual boiler thermostat, the second stage must be set to a lower temperature than the first stage; consequently, significant flow temperature variations will occur. Control can be integrated with sequence controls on multiple boilers to work effectively, but care must be taken to ensure compliance with HSE guidance note PM5.

There is little to justify two stage burners as the theoretical gains over single stage burners are very rarely achieved. Modulating burners should always be used for good control and energy efficient operation.

Biomass boilers: These are increasingly used as a low carbon solution, but require a number of additional factors to be considered for successful operation. Purely adding a biomass boiler to an existing system without considering overall system integration – hydraulics and control – can be a recipe for problems. There are too many factors to consider here, but controllability is a major factor in successful biomass boiler system design.

Component pressure loss: Modern boilers can have significant pressure losses, which should be considered in their selection, as this will add to overall energy consumption. System components should also be

KX6 VRF... applied



Curve Theatre, Leicester

Two auditoria with 1,200 seats, studios, rehearsal suites, dressing rooms and dining facilities all climate controlled simply, effectively, efficiently.

Ford Showroom, Swindon

600m² showroom, offices, meeting rooms and a 900m² service centre and canteen in need of cooling, but little plant space. Solution; KX6 micro single fan outdoor units.



Icon Hotel, Luton

43 guest bedrooms, reception, bars, restaurants and fitness suite zones simultaneously receive heating or cooling as required, with simplified guest controls for ultimate comfort.



ecolution

amp air conditioning limited

Tel: 01707 378670 Fax: 01707 378699, sales@ampair.co.uk, www.ampair.co.uk

HRP Limited

Tel: 01359 270888 Fax: 01359 271132, headoffice@hrpltd.co.uk, www.hrponline.co.uk

3D Air Sales

Tel: 01753 495720 Fax: 01753 495721, sales@3dair.co.uk, www.3dair.co.uk

Scotland Tel: 0141 777 5007, Ireland Tel: 00 353 (0) 1463 8604





Simple solutions to adjusting controls are preferable but not always available

carefully selected, and individual items with significantly higher pressure losses avoided, as these can dictate the maximum pump operating head. I have encountered systems where the majority of the loads had losses of 15 to 30 kPa, but a couple of loads were around 100 kPa.

To minimise energy use on variable flow systems, additional differential pressure sensors can be installed to control the individual parts of the circuits, to meet the required differential pressure only when these items of plant are operating. However, care needs to be taken to ensure stable operation of all items of plant when the system differential pressure changes. Selecting components with similar (low) pressure losses on each circuit is by far the most effective method for energy efficient controllable operation.

Chillers

One problem with chilled water (CHW) systems that I have identified on a couple of sites recently is parallel connection of a pair of chillers with a common pump-set (see Figure 4). In both cases the chillers were modern, large energy efficient chillers, but had flow temperature sequence control

observed at low load, with one on-line chiller having an evaporator discharge temperature of 4.5C, mixing with the flow through the off-line chiller to achieve a mixed flow temperature of 6C.

An evaporator flow temperature of 4.5C will only satisfy a 25% load, assuming a constant flow system and 6C to 12C system temperatures. 3C would be necessary for 50% load with only one chiller operating to provide a mixed temperature of 6C, although chillers are typically set for a minimum control temperature of 4C to avoid the possibility of freeze-up. Running a chiller at lower CHW temperatures will typically have a reduction in coefficient of performance (CoP) of around 3% to 6% at 4.5C instead of 6C, and 6% to 12% at 3C. The overall reduction in seasonal efficiency could be significantly greater, dependent upon the selected chillers and load profiles, plus there will be additional pumping losses compared with individually pumped chillers. I understand in both cases the chiller manufacturers had recommended the hydraulic layout and control system!

It is normally more efficient to run modern multiple chillers together down to loads of around 20% to 25%, dependent upon chiller selection. However, individual chiller turndown is limited and stability of operation has to be considered at low loads. Significant energy savings and stable, reliable operation can normally be achieved with a controllable system design incorporating individual chiller primary pumps, a common header or buffer vessel, heat load control and variable flow secondary circuits. Reset of evaporator flow temperature at low loads can also save further energy in many applications.

Conclusion

The above is a selection of common controllability issues, most of which are easily avoided with suitable input to system design, resulting in controllable, energy-efficient operation. Robust control strategies are necessary to achieve optimum energy efficient, low carbon operation. Simple solutions are preferable, wherever possible, although modern plant with direct communication via BACnet, for example, offers further opportunities for more efficient operation. CJ

GRAHAM P SMITH is director of Birling Consulting. He was a technical adviser for and a principal author of CIBSE Guide F: Energy Efficiency in Buildings -1998. www.birlingconsulting.co.uk www.cibse.org/bookshop

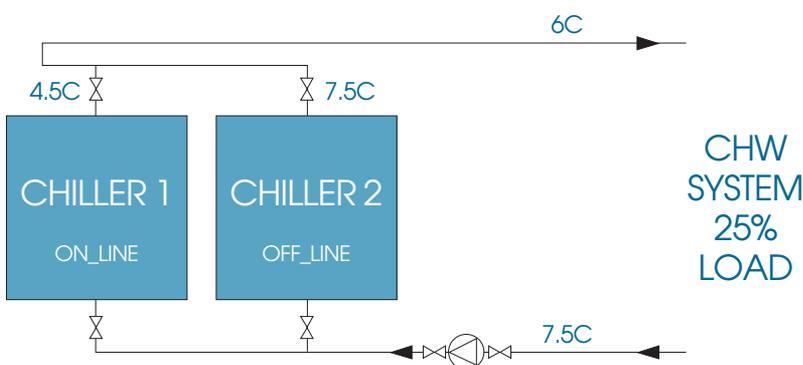
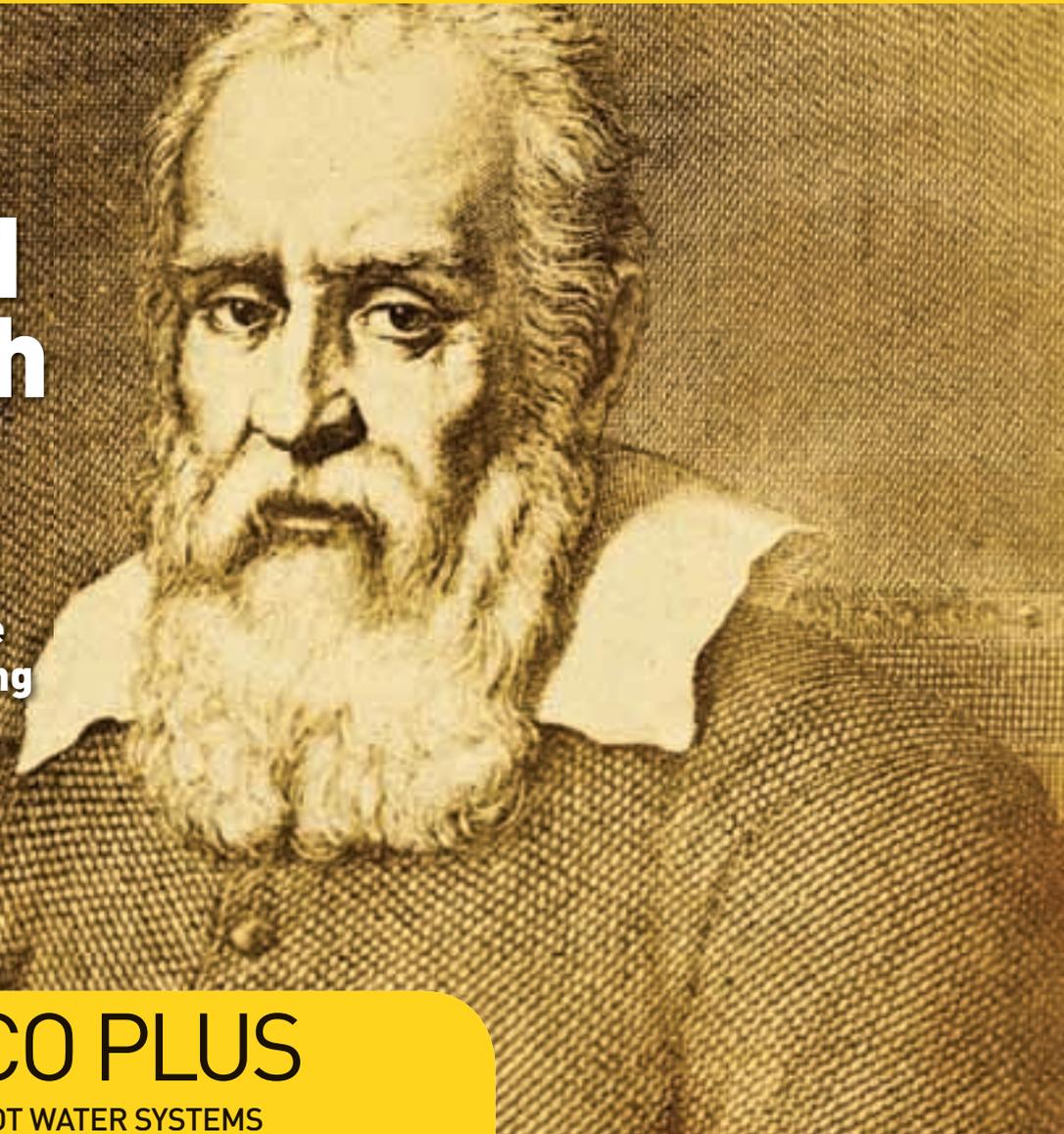


Figure 4: A pair of chillers connected to a common pump set

Revolutionary ideas

**Galileo
believed
the earth
orbited
the sun**
even when everyone
thought he was wrong



QUINTA ECO PLUS

COMMERCIAL HEATING & HOT WATER SYSTEMS

revolutionary thinking from Remeha

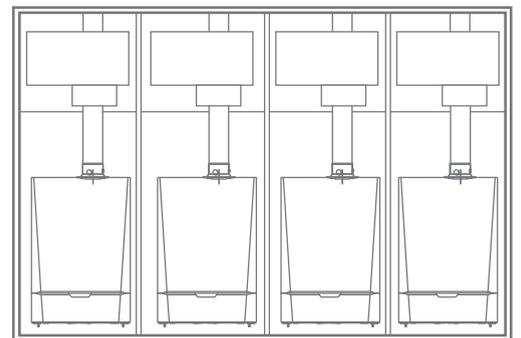
Low Carbon Best Practice from the Pioneers of Condensing Boiler Technology

Introducing the Quinta Eco Plus, the revolutionary new heating and hot water system from Remeha. The Quinta Eco Plus can achieve up to 48% lower carbon emissions and fuel savings than typical 'best practice' systems, delivering an overall system efficiency of 97% GCV at 82/71°C.

By incorporating Passive Flue Gas Heat Recovery technology, the Quinta Eco Plus heating system recovers normally wasted energy equivalent to around 15% of the gross input energy. This can be used for driving additional radiators, underfloor heating or preheating DHWS. This maximum efficiency can only normally be achieved by condensing boilers with constant running of the total system at low temperatures, 50/30°C or less.

The Quinta Eco Plus gives you maximum 'full time condensing' efficiencies, irrespective of primary circuit temperatures, making it the perfect solution for a wide range of commercial heating requirements where 100% low temperature circuits are not possible.

*The efficiency improvements are when the Quinta Eco Plus is compared to the industry best condensing boiler published efficiencies



**CHALLENGE
CONVENTIONAL
THINKING**



JOIN THE DEBATE



HIGH EFFICIENCY
110% NCV AT 40/30°C



FULLY MODULATING
BOILER CONTROL



PREMIX BURNER
CLEAN COMBUSTION



ULTRA LOW NOx
BREAM EXCELLENT



RECYCLABLE
MATERIALS

www.remeha.co.uk

T. 0118 978 3434

F. 0118 978 6977

E. boilers@remeha.co.uk





POWER RELATION

How can specifiers decide when and how to apply combined heat and power, and what are the key considerations for using district heating systems? **Paul Woods** looks at ways of comparing efficiencies in these applications

One of the energy centres serving the Olympic Park and Stratford, as part of a district heating scheme that is near completion (see *CIBSE Journal*, August 2011, page 16)



The growing need to improve energy security and reduce greenhouse gas emissions is often focused on cutting energy demand and using renewable energy sources.

Other important approaches include using combined heat and power (CHP) systems or heat pumps to provide heating or cooling – but both of these approaches need to be rigorously assessed to determine their ‘equivalent heat efficiency’ – that is, equivalent to boiler efficiency. This analysis also needs to take account of the carbon intensity – or ‘carbon factor’ – of different fuels used by CHP and heat pump systems. The carbon factor of electricity supplied by the grid is crucial here.

When CHP or heat pumps are used with district heating (DH) systems, there are three other factors that also need to be considered: the heat losses from the DH network; the pumping energy required; and the additional use of boilers to meet peak demand. These factors can dilute the benefits obtained from the higher efficiency of larger-scale CHP.

Comparing efficiencies

The ‘equivalent heat efficiency’ concept can be used to compare CHP and heat pumps. The calculations are shown in the panel on page 32.

All of the CHP-equivalent heat efficiencies are higher than for boilers, which are typically 80% to 90% efficient.

Figure 1 can also be used to compare CHP with heat pumps. For a grid efficiency of 40%, a heat pump with a coefficient of performance (CoP) of 3 has an equivalent heat efficiency of 120% (3 x 40%); and a CHP with an electrical efficiency of 20% would have the same equivalent heat efficiency.

When CHP or heat pumps are used with district heating systems, there are factors that need to be considered

However, for a grid efficiency of 50%, a heat pump with a CoP of 4 would have an equivalent heat efficiency of 200% (4 x 50%), and a CHP would need to have an electrical efficiency of 40% to be as efficient.

The current grid efficiency is about 39%, as calculated from DUKES (*Digest of UK Energy Statistics*, Chapter 5, Table 5.6, 2010. www.decc.gov.uk).

This excludes transmission and distribution electrical losses, so the average efficiency for delivered energy is around 36%.

Typical efficiencies calculated from the equations shown left are:

Current technology and a grid efficiency of 40%:

Individual Gas Boiler	85%
Air source heat pump CoP 2.5	100%
Gas-engine CHP 35% elec/45% thermal	360%

Future technology and 50% grid efficiency:

Individual Gas Boiler	85%
Air source heat pump CoP 2.5	125%
CHP 35% elec/45% thermal	150%
Heat pump CoP 4, 50% grid efficiency	200%
CHP 40% elec/40% thermal, 50% grid efficiency	200%

The above shows that, as the grid efficiency improves, CHP efficiency will also need to improve if the efficiency benefits are to be maintained, especially when compared with heat pumps that benefit from the improved grid efficiency.

CHP efficiencies are quoted as being at 80%, referring to the total efficiency, and then compared with the grid efficiency of 40%, thus indicating a doubling of energy efficiency. As the analysis above shows, this is a false comparison: for low CHP electrical efficiency >



A computer image showing an example of a combined heat and power system with a ground source heat pump, which together supply underfloor heating and hot water. The 'equivalent heat efficiency' concept, described in this article, can be used to compare CHP and heat pumps

of, say, 15%, an 80% CHP total efficiency may be only slightly better than a boiler.

Similarly, it is sometimes claimed that heat pumps have an efficiency of more than 100% (which is true, provided the CoP x grid efficiency is >100%), and that this must therefore always be better than a CHP, which has a practical maximum total efficiency of 80% (see 'Sustainable Energy Without the Hot Air', David MacKay, 2009, page 151. www.withouthotair.com). Again, this is an erroneous conclusion. As shown above, the CHP-equivalent heat efficiency can be significantly higher than a heat pump, depending on the seasonal CoP of the heat pump, the CHP electrical efficiency and the grid efficiency.

Emissions factors

Although the above approach provides some useful insights to help mitigate climate change, it does not take account of the variation in CO2 emissions that result from using different fuel types. An alternative method for comparison is to calculate the CO2 content of a unit of heat produced by the different technologies.

- For a boiler, the CO2 content of heat is given by: fuel emission factor / efficiency
- For a heat pump it is given by: electricity emission factor / CoP
- For a CHP plant it is: (CHP fuel x fuel emission factor - CHP electricity generated x electricity emission factor) / CHP heat generated

This can be expressed in terms of the CHP thermal efficiency and CHP electrical efficiency as:

$$\text{CO}_2 \text{ content of CHP heat} = (F_{chp} \times e_f - E_{chp} \times e_e) / H_{chp} = e_f / \eta_h - e_e \times (\eta_e / \eta_h) = (e_f - e_e \times \eta_e) / \eta_h H_{chp}$$

where e_f = fuel emission factor, e_e = electricity emission factor, η_e and η_h are the CHP electrical and thermal efficiencies, E_{chp} , H_{chp} and F_{chp} are the CHP energy flows for electricity generated, heat and fuel.

Another type of CHP plant is where heat is extracted in the form of low-pressure steam from a power station built primarily for electricity generation, whether fossil fuel, energy from waste, biomass or nuclear. When steam is extracted from the steam turbine at a useful temperature, there will be a reduction in the electricity generated as the steam flow through the low-pressure turbine is reduced. In this case the CO2 content of heat relates to the emissions from power stations on the system that would have to operate to replace this 'lost' electricity. The ratio of heat extracted to electricity reduction is termed the z-factor and is typically in the range of 6 to 8. Hence:

$$\text{CO}_2 \text{ content of heat extraction} = ee/z$$

The above equations have been plotted on Figure 2 for comparison, with the main variable being the electricity emission factor for the grid supply. It is assumed that gas is the fuel used for CHP and boiler with an emission factor of 198g/kWh.

Figure 2 demonstrates that the key issue in the comparison is the emissions factor assumed for the grid electricity. As the electricity supply is composed of a mix of power stations with wide variation in emissions factor (from hydro-electricity and wind energy with near-zero emissions to coal-fired power stations with around 900g/kWh), it is not obvious which emissions factor to use.

An average emissions factor is the approach taken within Part L of the Building Regulations 2010, where 529g/kWh is to be used in assessing the benefits from displacing grid electricity.

Looking at Figure 2, we can conclude:

- The CO2 content of heat from CHP varies significantly with CHP electrical efficiency and electricity emissions factor.
- The actual CO2 saving arising from CHP can be found by using marginal electricity emission factors (say 690g/kWh), reflecting partly the energy efficiency of CHP and partly fuel switching from coal to gas. This approach shows that gas-engine CHP will result in more CO2 savings than heat pumps.
- However, if the question is 'how does gas-engine CHP compare with the best alternative use of gas as a fuel?' then a much lower electricity emission factor should be used (say 394g/kWh), and for this case a mid-range CHP

Equivalent heat efficiency for CHP and heat pumps

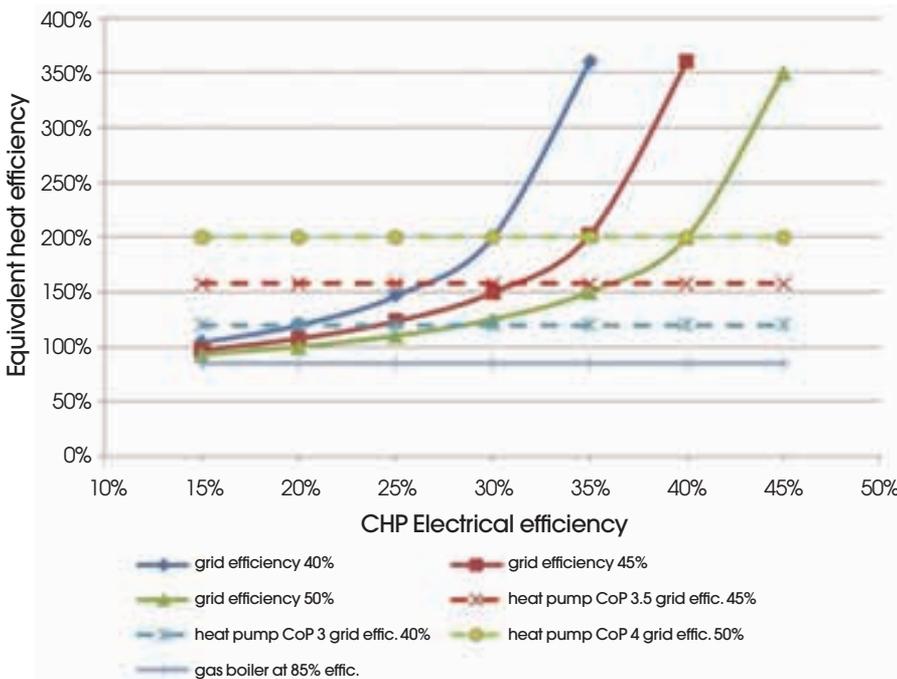


Figure 1: Equivalent heat efficiencies for CHP (CHP total efficiency = 80%)



Are you ready for the Renewable Heat Incentive?



Built in Britain

*Burn Wood!
Save Carbon!
Earn Money!*



Install a STU Biomass Boiler

Save money and carbon together

Play your part in a sustainable energy future
For every boiler we install we plant a dozen¹ trees

With our expertise it's easy to be green...as well as in the black!

Please contact us to find out more



Hoval Limited
Northgate Newark Nottinghamshire NG24 1JN
Tel: (01636) 672711 Fax: (01636) 673532
Email: boilersales@hoval.co.uk Web: www.hoval.co.uk

Hoval

¹The number of trees planted per boiler sold will vary. A minimum of 45,000 trees will be planted in total.

Responsibility for energy and environment

Variation of heat emissions factor for various heat sources

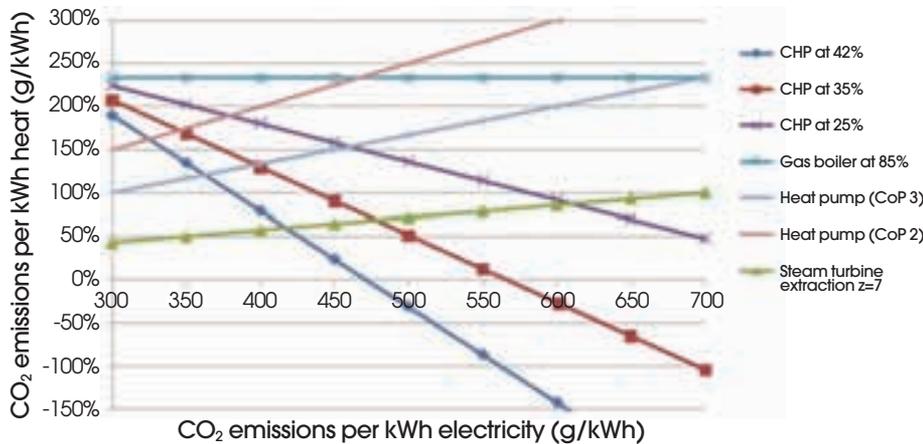


Figure 2: CO₂ emissions for heat from various sources against electricity emissions factor. CHP efficiencies in the key relate to electrical efficiency; total CHP efficiency (thermal plus electrical) is kept constant at 80%. All efficiencies are on GCV basis

- is equivalent to a heat pump with a CoP of 3.
- Below an electricity emission factor of about 420g/kWh, the lowest CO₂ content is obtained by extraction of heat from an established steam turbine power station, which is equivalent to a heat pump with a CoP of 7.

What about district heating?

The greatest benefit of CHP will come through the use of district heating, which will enable larger-scale CHP to be used, including using CHP to extract heat from power stations. DH also has energy inputs to counteract heat losses

from the network. In these circumstances, CHP can supply 80% of annual heat consumption, with the remainder coming from boilers. The growing use of larger-scale CHP as part of DH systems has implications for the siting of power stations in the longer term – they will need to be nearer major cities. Larger heating networks will also need to be provided to take advantage of heat from such power stations.

This will mean, in effect, that all new coal or gas power stations and biomass/waste plants will need to be ‘CHP ready’ to be able to supply heat in the longer term. DH will also be able to use a range of other heat sources, including large-scale heat pumps, solar, deep geothermal, electrode boilers and offer important demand-side management benefits, enabling more wind energy generation and reducing the need for electricity storage.

In conclusion, it has been shown that, as the electricity grid decarbonises in the future, gas-fired CHP systems will save less CO₂. CHP and DH schemes will need to evolve to maintain an environmental and economic benefit over other low carbon solutions, including taking heat from major low carbon thermal power stations and the use of large-scale heat pumps and thermal storage. **CJ**

● **PAUL WOODS** is technical director of AECOM. www.aecom.com This article is extracted from a paper presented to the CIBSE Technical Symposium 2011.

Calculating the energy efficiency of CHP and heat pumps

The energy efficiency of heat supply can be calculated using the ‘equivalent heat efficiency’ concept and used to compare heating options.

For a boiler, equivalent heat efficiency = heat output / fuel used (equation 1)

For a heat pump, equivalent heat efficiency = heat output/primary energy input

= heat output / (electricity used / grid efficiency)

= CoP x $\eta_{e,grid}$ (2)

Where:

CoP = useful heat output / electricity consumption over the year

$\eta_{e,grid}$ = grid efficiency = delivered electricity / primary fuel input (F_{ps}) (3)

For a CHP system the performance requires the definition of two efficiencies**:

The thermal efficiency = η_h =

useful heat output (H_{chp}) / fuel input (F_{chp}) (4)

The electrical efficiency = η_e = electricity generated (E_{chp}) / fuel input (F_{chp}) (5)

The equivalent heat efficiency for CHP = heat output (H_{chp}) / net fuel used where: net fuel used

= CHP fuel (F_{chp}) less power station fuel (F_{ps}) displaced by CHP electricity generated (E_{chp})

So equivalent heat efficiency, $\eta_{h,eq}$ = $H_{chp} / (F_{chp} - F_{ps})$ (6)

From (3) above = $H_{chp} / (F_{chp} - (E_{chp} / \eta_{e,grid}))$

From (5) above = $H_{chp} / (F_{chp} - ((F_{chp} \times \eta_e) / \eta_{e,grid}))$

Dividing through by F_{chp} leads to the following equation:

CHP equivalent heat efficiency $\eta_{h,eq} = (H_{chp} / F_{chp}) / (1 - (\eta_e / \eta_{e,grid}))$

From (4) $\eta_{h,eq} = \eta_h / (1 - (\eta_e / \eta_{e,grid}))$ (7)

Or, in words:

CHP equivalent heat efficiency = CHP thermal efficiency / (1 - (CHP electrical efficiency / grid efficiency)) (7)

Equation 7 is fundamental to CHP performance. One implication of the second law of thermodynamics is that the highest electrical efficiency will be achieved when discharging heat at the lowest possible cold sink temperature (the ambient temperature).

For heat to be useful, it will always need to be above ambient, and so the CHP electrical efficiency will always be lower than the best grid efficiency**.

In equation 7, as the CHP electrical efficiency tends to the grid efficiency, then the equivalent heat efficiency tends towards infinity – that is, the heat would eventually

be rejected close to ambient temperature and could be classed as ‘waste heat’.

At the other extreme, if the CHP electrical efficiency tends to zero, then the CHP equivalent heat efficiency tends towards the CHP thermal efficiency; in other words, the CHP is tending to become the same as a boiler. Therefore the most efficient CHP is one where the electrical efficiency is as high as possible.

**The CHP performance can also be defined using: total efficiency = (heat plus electricity) divided by fuel input, or heat to power ratio plus one of the two efficiencies defined here, but two parameters are always needed to define CHP performance.

**Electricity grid losses also need to be considered where power stations are remote from, and CHP plant is close to, the point of consumption.

CIBSE BUILDING PERFORMANCE AWARDS 2012

RECOGNISING EXCELLENCE
IN MAKING BUILDINGS WORK

Wednesday 8 February



»» JOIN THE CELEBRATION

- » NETWORK WITH CLIENTS
- » CELEBRATE WITH COLLEAGUES
- » BE ALONGSIDE THE BEST



BOOK YOUR TICKETS NOW

FOR THE CIBSE AWARDS 2012
GROSVENOR HOUSE, LONDON

Book online at www.cibseawards.org
or contact juliette.bond@redactive.co.uk / 020 7324 277

HEADLINE SPONSOR:



SPONSORED BY:



FITTER APPLICATION

A CIBSE manual on CHP has been overhauled to take into account latest trends and application needs. **Tim Dwyer** explains

Amid concerns over fuel security, energy costs and rising worldwide demand, there is increasing pressure on specifiers to look for alternative means of providing power, heat and cooling for buildings. As a result, combined heat and power (CHP) has increased in popularity, and there are now more than 1,500 non-domestic CHP installations across the UK.

A long-established CIBSE guide on applying CHP has been substantially updated to reflect the latest trends in energy supply and demand. The structure of the document, *AM12: Combined Heat and Power for Buildings*, has not altered greatly from the 1999 version, but there has been a complete overhaul and replacement of much of the material.

The UK government has an expectation that there can be a 34% reduction in CO₂ emissions by 2035, with decarbonisation of the electricity supply playing a significant part in this. The authors of the updated AM12 are confident that properly-applied CHP is a technology that can reduce emissions as well as being cost-effective to implement in many applications.

Comparing gas-fired central power stations with localised CHP (employing current technologies) the revised guide advises that there is a potential to save up to 22% of CO₂ emissions, if the electricity and, crucially, the heat can be fully utilised. But it is only through this appropriate application of CHP that significant savings on fuel and environmental emissions may be made. Buildings with a high year-round

demand for heat are ideal; without a heat load, the CHP will switch off and no savings will be made.

The guide includes the methodologies required to assess the viability of CHP, its procurement, installation, commissioning, operation and maintenance. A set of practical applications and 'lessons learned' provide insight taken from real-world experiences in the application of CHP.

Small-scale and micro-CHP

Since the 1999 edition, there has been significant commercial development of smaller-sized CHP aimed at commercial and residential applications. These systems have been designed specifically to provide longer running hours between servicing and employ more sophisticated control systems.

At the larger end of this scale, high-speed micro-turbines have the benefit of longer maintenance intervals than reciprocating engines, so availability is higher and maintenance costs lower. The guide explains that this benefit is at a cost of an electrical efficiency that is generally lower than the equivalent sized spark-ignition gas engine.

Smaller, domestic applications (typically less than 5 kWe) that avoid the need for the cost of some form of district heating are available. These are seen as potential replacements for the domestic gas boiler, but the heat demands need to be carefully assessed to ensure the units run for significant parts of the year.

AM12 notes that these applications are



Dimplex

based predominantly around the Stirling engine (a heat-driven engine) which, while having lower efficiency than a spark-ignition engine, is well suited to the small outputs of an individual-dwelling CHP system with around 1 kW_e output.

The fuel cell-driven CHP system is promoted as having the potential for a higher electrical efficiency than other types of CHP, and hence better CO₂ and cost savings; but AM12 notes that there are continuing challenges to their deployment, including initial costs, the short life of the fuel cell stack, and the sheer physical size of the system.

Renewables and thermal storage

Reflecting a shift in the marketplace since the 1999 edition, AM12 now has a separate section on 'Renewable Fuels and CHP'. Although relatively brief, it covers solid and

liquid biofuels and their application as an energy source for CHP. This also includes a succinct review of the opportunity for integration of other renewable technologies (solar thermal, photovoltaics, wind) with CHP systems.

This edition also includes an enhanced section on thermal storage being applied as a means of increasing the utilisation of CHP systems. The guide explains that stored heat can reduce the use of associated boiler systems, while increasing the useful and efficient peak load CHP running hours.

The extra heat resource can be used both at times of low demand (when it would not be efficient to operate the CHP engine) and during periods when the load is beyond the maximum CHP capacity. Some guidance is given on the sizing, design and installation of a complementary thermal store. ➤

Smaller, domestic CHP applications that avoid the need for the cost of some form of district heating are available



The revised CIBSE guide includes the methodologies required to assess the viability of CHP, its procurement, installation, commissioning, operation and maintenance

The authors of the updated AM12 are confident that properly applied CHP is a technology that can reduce emissions as well as being cost-effective in many applications

► Environmental and regulatory requirements

The regulatory requirements have seen a significant overhaul since the previous edition. Although much of the technological guidance in AM12 is applicable worldwide, the regulatory commentary is specifically orientated towards the legislation that affects much of the UK (for example Part L of the Building Regulations and the London Plan). That is not to say that this legislative guidance is not being echoed across Europe and beyond, and so the mechanisms explored in this guide to assess compliance (or simply performance) should be usefully adaptable to other global applications.

As a result, AM12 now has new, separate sections entitled 'Environmental Impact of CHP' and 'Legislation and Regulations that affect CHP'. Methods for the calculation of CO₂ and NO_x emissions, together with mitigation techniques, are included (as well as for other environmental impacts, such as noise and vibration).

The authors were very aware of the debates published in *CIBSE Journal* over the past year on the need for responsible calculation techniques, so they endeavour to illustrate robust methods showing that the potential variations in savings will depend on the assumptions of which power stations are displaced by the CHP operation.

In addition to an overview of the related legislative and planning needs, the treatment of CHP by BREEAM and the Code for Sustainable Homes is also now

included. AM12 also provides a snapshot of the current position of other influencing instruments, such as the Quality Assurance for Combined Heat and Power (CHPQA) scheme, the Climate Change Levy exemptions and the Climate Change Agreements.

Assessment and appraisal

One of the key areas in the guide – and its longest section – is on 'Feasibility Studies'. Although much of the technology in commercial CHP systems is considered mature and well tested, the variability of heat demands and the electricity supply network can make comparative feasibility studies demanding and problematic.

This updated section provides a route through the methodical assessment of the technology to provide engineers with the information to produce a feasibility report that contains both technical specification and life-cycle justification. It also provides guidance on the structure of the resulting feasibility report.

Topics covered include:

- Data gathering requirements (loads and temperatures);
- Initial technical evaluation;
- CHP performance and heat recovery options;
- Optimum sizing of CHP (including software and models);
- Integration with other technologies;
- Economic appraisal including sensitivity of results; and
- Financing options.

AM12 recognises the need for the designer to have a reasonable understanding of the installation, operation and maintenance needs of CHP systems. And so the later sections provide some detail of typical maintenance regimes that are clearly underpinned by systematic processes of monitoring and recording.

The guide is undoubtedly unique in that it bridges the technological and operational needs of applying successful CHP in commercial and residential applications. However, its key strength is that it provides an accessible and usable toolkit for the designer when attempting to establish the true benefit of CHP. **CJ**

● **PROFESSOR TIM DWYER** is a teaching fellow at University College London. The new AM12 has been written by Paul Woods of AECOM. Phil Jones of the CIBSE CHP and Energy Performance Groups chaired the AM12 steering group. The guide is expected to be published soon. To obtain a copy, visit www.cibse.org/bookshop

LET'S FOCUS OUR
EFFORTS ON EARTH'S
MOST VALUABLE
RESOURCE.
LET'S SOLVE
WATER.

From ITT comes Xylem.

Xylem is a world leader in the design, manufacturing and application of highly engineered technologies for the water industry. We are 12,000 people unified in a common purpose: creating innovative solutions to global water challenges. We know this is only achieved when partnering closely with our customers. We are committed to continuing the product innovation and forward thinking you've come to expect from the collection of market-leading brands in the Xylem portfolio. For more information on what this transformative shift can mean to your business, go to xylem.com.

Artful ILLUMINATION

The design for the new Hepworth gallery aims to provide optimum light to show off the eponymous British sculptor's works, as well as serving the needs of other, light-sensitive works. **Florence Lam** of Arup Lighting outlines the approach taken

With buildings often housing priceless artwork and exhibits, conservation, security and protection are clearly paramount in the design of galleries and museums. Perhaps for many of these exhibits the best way to preserve them would be in a darkened room, but of course that would somewhat defeat the object of a gallery and it's important that they are shown to their best advantage for the benefit of the visitor.

With a long track record working with museums and galleries, design consultancy Arup Lighting has been involved with projects ranging from the Victoria and Albert's Medieval and Renaissance Galleries, through to the Malaga Picasso Museum, the New Acropolis Museum in Athens and the Brandhorst Museum in Germany.

The Hepworth Wakefield is one of the most recent that Arup has completed in the UK, opening to the public in May 2011. With an inspirational design by David Chipperfield Architects, it is one of the UK's largest purpose-built art galleries outside of London. It displays the work of sculptor Barbara Hepworth, as well as the City of Wakefield's art collection and exhibitions by contemporary artists, throughout a cluster of discrete trapezoidal rooms on the upper level.

Arup delivered the natural and



architectural lighting design with two goals: to conserve the gallery's temporary exhibitions and to present Barbara Hepworth's 44 original plaster sculptures literally in an optimum light. The lighting design principle strikes a careful balance between the long-term conservation of light-sensitive works and the visitors' visual needs. Arup aimed to ensure that each space was designed within the established international standards for limiting illumination, but this was determined in terms of the following cumulative light exposure (a measure which actually determines the rate of deterioration of artwork):

- **Works on paper:** 50 to 80 lux, or 150-240 klux.hr
- **Oil paintings:** 200 to 250 lux, or 600-750 klux.hr



- **Sculpture – painted (depending on type of paint):** 80 to 250 lux, or 240-750 klux.hr
- **Sculpture – natural finish:** up to 800 lux, or up to 2,400 klux.hr

The brief required the design to bring the outdoors in, so daylight can be experienced in the galleries. The lighting concept was to use windows for the views, and skylights to animate the space. The intention was to develop skylight and window designs producing varied daylight distribution across each space, allowing works on paper to be displayed in darker areas, for example, and sculpture to be displayed nearer daylight areas expressing a coherent, curatorial story.

In other words, the space is asymmetric in lighting terms, allowing the curator the freedom to put relevant sensitive and non-sensitive artwork together, rather than

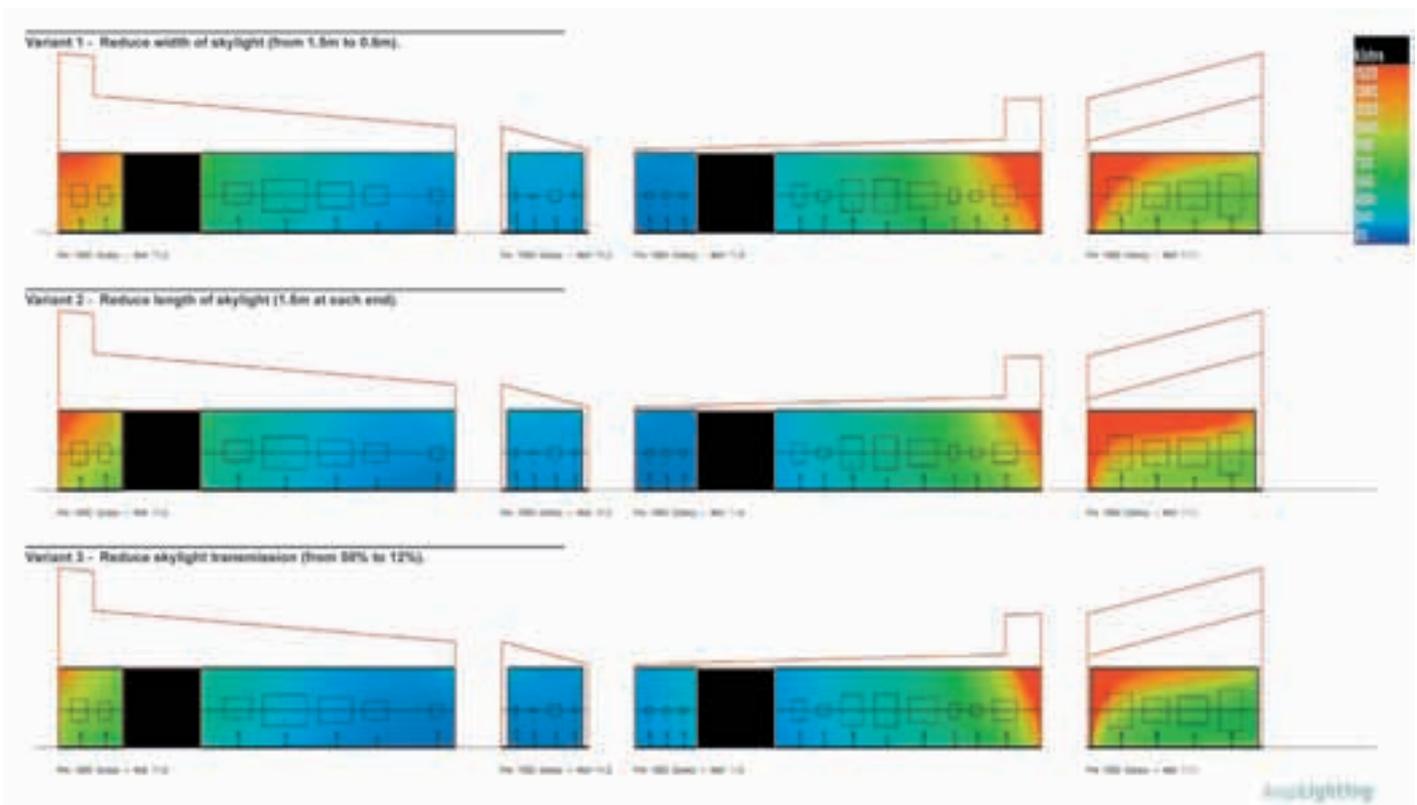
the selection being partially dictated by conservation constraints.

The process was begun by applying regional historical weather data to the geometry of each room over the course of a year to estimate the extent of daylight exposure. Arup developed a methodology to assess how a particular geometry/ fenestration arrangement responded to daylight. Where the exposure exceeds the allowable levels, shading systems are used to optimise the light for particular scenarios.

To help the curators determine suitable locations for artwork with various light sensitivities, the team developed a daylight mapbook, which gives a three-dimensional representation of the annual exposure prediction for each gallery.

The strategically placed windows within ➤

“ The team developed a daylight mapbook, which gives a three-dimensional representation of the annual exposure prediction for each gallery



Daylight maps for the pre-1900 gallery under various skylight configurations



HEPWORTH GALLERY TEAM

PROJECT: The £35 million Hepworth Wakefield art gallery houses 44 Barbara Hepworth sculptures and the work of other local artists. The building is sited on the headland of the River Calder at the southern gateway to the city, and comprises a cluster of 10 trapezoidal blocks of different sizes, which form the display spaces. All the galleries are on the upper level and have natural lighting.

LIGHTING DESIGN (DAYLIGHT AND ELECTRIC): Arup Lighting

ARCHITECT: David Chipperfield Architects

LIGHTING SUPPLIERS: Zumtobel (Arcos spots with customised lenses); Viabizzuno (094 system customised to provide integrated lighting and ventilation solution on ground floor)

the galleries create visual connections for gallery visitors to the river and surrounding landscape, while allowing people outside to get glimpses of activity inside and of collections on display. The windows use transparent glazing with a clear UV interlayer to protect sensitive works. Open-weaved diffusing blinds of 20% lighting transmittance are deployed on sunny days, still maintaining the view outside. When the exhibition is closed, blackout blinds cut out unnecessary light exposure.

The visitor experience is further enhanced by the play of light in the galleries. At the taller end of each gallery, discreet skylights create a daylit backdrop, providing a 'stage' for the exhibition. The skylights use laminated glass with a diffusing interlayer that doubles as a UV filter. Adjustable louvres control daylight filtering through the skylights, creating a glow at the top of the wall to draw the eye of visitors entering the room. These are adjusted seasonally, modulating higher light levels between March and November, while maintaining the experience of external lighting variation throughout the day.

Electric lighting in the galleries comprises two lighting elements: concealed cove lighting and track lighting. As daylight fades at dusk, each skylight is subtly illuminated with concealed T5 HO fluorescent luminaires, fitted with asymmetric reflectors to provide ambient lighting after dark. In addition, track

lighting is provided to accommodate any art location or wall configuration, allowing for flexibility in illuminating artwork displays.

The sloped ceiling posed a challenge as it was problematic to design a recessed track layout that could ensure uniform wallwashing and optimum incident lighting angles on wall-hung artwork. Zumtobel's Arcos IRC tungsten halogen wallwashers with a special sculptural lens were specified to overcome this. A light-reduction lens was added to reduce light output, while keeping the colour at the correct temperature to harmonise the cool daylight temperatures at one end with the warm (3,000K) tungsten halogen.

Arup adopted a minimalist approach to the ground-floor lighting with Viabizzuno's 094 system, customised to provide an integrated lighting and ventilation solution. Cool white T5 HO lamps create crisp runs of parallel light lines across the ceiling for the entrance reception lobby, bookshop and café.

The completed building, winner of a British Design Award 2011, has had an enthusiastic response from public and critics alike. In particular, *The Independent* newspaper has described the galleries as 'sublime spaces' and The Hepworth Wakefield as 'one of the finest contemporary art museums in Europe'. **CJ**

FLORENCE LAM is global practice leader for lighting design at Arup. www.arup.com/lighting

FIREGUARD
LED7 

WARRANTY
10 YEAR

The **NEW 7W LED**
downlight from JCC



where **fire** safety
& **energy** saving meet

For more information please visit:

fireguard-led.co.uk

JCC™

Tel: 01243 838999 • Email: sales@jcc-lighting.co.uk

50W
HALOGEN
EQUIVALENT

IN LIGHT OF THE COST FACTOR, I SAY...

The project manager and the lighting designer can have very different perspectives on a lighting specification. **Steve Edouin** and **Dominic Meyrick** give their respective views on the price of value engineering



THE PROJECT MANAGER
STEVE EDOUIN

In commercial lighting, the front-of-house areas require an experienced independent lighting designer to provide the best options to complement the overall concept design.

However, this requires a clear brief, and an understanding of how the concept design will work with the final finishings. In my experience, this does not often happen because the time constraints involved in agreeing the overall build take priority.

Once the design team starts working through the detailed design, the structure and envelope are first on the priority list to ensure the project can be progressed. Within a typical three-year, start-to-finish programme, the first-pass designs for the front-of-house areas are usually available after the first six months.

Building a set of mock-ups is very important, and well worth the time and cost involved to ensure the client is clear what to expect of the finished article. The mock-up is also used to flush out coordination and buildability issues.

When the lighting designer is providing his scope and specification, it should



be based on the performance required, rather than a particular manufacturer. Although a picture giving a typical example is also important, so that there can be no confusion, when bidding it is important that manufacturers do not believe they are solely being specified for the project.

On a few occasions, when two or three manufacturers have provided conflicting or confusing information about their products, I have set up a competition using either a separate – or the original – large mock-up. Then, with a judging panel made up of designers and managers, we have evaluated the products to ensure the best choice is made. To me, the idea that there should only be one bespoke manufacturer for a particular design implies a flawed design process.

The electrical contractor is often on board before the final lighting designs for the front-of-house areas are available. To ensure the value of provisional items is kept to a minimum, it helps to provide a basic design, plus an indication of the number of points and the method of control, enabling the engineering designer to set out the wiring installation. This price can then be firmed up at tender stage, with only the actual luminaires being a provisional item.

To keep a project on budget throughout



THE LIGHTING DESIGNER
DOMINIC MEYRICK

You design what you believe will be a triumph of lighting design and then issue the specification. But then the rumours begin and the phrase 'VE exercise' starts to appear on email trails.

VE exercises are usually carried out at the end of a project, just before final orders are placed, and normally respond to a budget crisis across a number of disciplines. By this time the exercise can only be harmful to the final visual impression of the space and, though it might save money, the hard work and fees spent on designer input are likely to be compromised.

Semantics are always important, and it is worth considering the words that make up the phrase. Value is, according to *Oxford Dictionary*, 'the regard that something is held to deserve the importance, worth, or usefulness of something'. However, add 'engineering' and it becomes: 'The modification of designs and systems according to value analysis.'

In the 11 years I have worked as an independent lighting designer, I can only remember two projects where specified luminaires were changed. In both instances this was to do with the supply chain and, in both cases, the final lit impression suffered as a consequence.

As independent lighting designers we have a distinct advantage – the very fact that we have been hired and that our input is deemed worthy of a fee shows that the lighting design is important, so why should it be ignored? This is a cornerstone conversation for the lighting design industry, as it is hired to ensure that the lit environment 'looks good'. Switching product effectively means that we get paid for lighting design input on a project, but then are absolved of responsibility if the end scheme looks rubbish because: 'You changed our spec. What can we do?'

In my view, there are five basic values that apply and it is my job to determine which of these is most important to my client. These are: money, time, visual impression, user satisfaction and quality. This last value can be split into two subsections – quality of light and quality of product. Now, when we hear the term VE, we almost immediately assume it is the cost of the specified products that is under

the whole design, procurement and installation processes require constant evaluation. This often means progression from concept to the actual design, and the selection of equipment requires some hard decisions. But when we talk about hard decisions this should not be confused with 'panic cuts', or value engineering (VE), which can occur when projects run out of money. This type of VE will affect the overall scheme, and the outcome can only be down to poor financial planning at the concept stage.

For correct decisions to be made, the whole design team must be well organised and set out clearly what is needed to provide the final visual experience of working within and visiting the building. This process may well produce 'must have' and 'would like to have' lists, which can then be finally agreed with the project management team and end user.

In conclusion, lighting is a very small part of the overall building services package, but it has a large interface with the end-user and is a key factor in the overall effect of the building. Unfortunately, this is not always appreciated.

● **STEVE EDUIN** is project manager with Canary Wharf Contractors

Gordon Ramsay's Bread Street Kitchen at One New Change, London. Hoare Lea Lighting viewed the bespoke LED products as necessary to meet the requirement for energy efficient downlights, saying it would not have been possible to use halogen technology due to energy restrictions

‘Panic’ VE can occur when projects run out of money, and can only be down to poor financial planning at the concept stage
– Steve Edouin



The result of a contractor changing this upright specification was fittings filled with water (right). The supplier also provided different colour temperature lamps

VE is part of the construction business and we need to engage with it and really understand the client and the project drivers – *Dominic Meyrick*

➤ scrutiny but, in my experience, it is often a combination of some, or all, of the above.

VE as it applies to cost (money) value is the most common, as budgets are always tight. Time value can come from specified products being delayed in the factory and contractors wanting to find alternatives. VE with regard to visual impression might be summed up by the client wanting to know if those ‘feature’ light fittings are really necessary. Attention to user satisfaction value usually increases – rather than decreases – the light specification, with items such as dimming control.

Finally, quality is often driven by a number of design team members, with the visual appearance of the product itself usually paramount to the 3D designers, and the light quality most important to the lighting designers and end user. So VE may mean questioning one or all of these criteria – not just the capital cost of the specified lighting products.

The next question is how to defend against VE. In my experience, lighting is always under review and therefore knowing the client and the project drivers from the start is critical.

It is also essential to clarify what is non-negotiable in design terms – that is, agree what can go well before the final design stages – and it is important to remember that VE exercises happen after the final specification has been issued. It should be emphasised that design payment equals design responsibility, and the lighting

designer is being paid to take design responsibility for the products he or she has specified, not fittings that other design team members have selected.

Finally, the quality factors of light and product must be considered by the whole design team to ensure the lighting design approach is appropriate, and therefore hopefully avoiding questions such as: ‘Why would you not light that 3D element, bearing in mind the client is spending that much on it?’

This may all seem obvious, but I am amazed how many projects I see under VE pressure in their final stages because these fundamental questions were not asked at the beginning of the project.

We may be absolved of responsibility, but a VE exercise at the end of a project that affects the lighting does not leave a good taste in the mouth – as designers we want the space to look as we intended it.

VE is part of the construction business and we need to engage with it. By making sure we really understand the client and the project drivers – by asking pertinent questions and explaining the lighting design principles we apply – we have the best possible chance of maintaining the scheme’s integrity. This is, after all, likely to be the best outcome for everyone, including the client, the design team and the end-user. **CJ**

● **DOMINIC MEYRICK** is lighting principal-partner at Hoare Lea Lighting

Want to reduce the energy consumption of your lighting?

Can't afford the expensive LED systems?

Voltage optimisation could be the answer...

Up to 35% savings on lighting loads – at a significantly lower cost than a complete replacement LED system

- **Instant savings** – easily installed in a few hours, energy savings start immediately, either simply enjoy them or use them to save for a future LED system
- **Astroclock** – automatically switches external lights according to GPS coordinates of the site and global sunrise/sunset times
- **Remotely control your savings** – securely login via your internet browser to view performance and change unit settings remotely from anywhere in the world
- **Units for whole site optimisation available** – up to 18% average savings on all the equipment at your site
- **Superior product** – compact wall mounted design with automatic bypass as standard to ensure supply continuity
- **Tried and tested** – thousands installed worldwide
- **Other benefits**
 - ▶ Reduce heat output from lighting; ease A/C requirements
 - ▶ Improve lifespan of lighting; reduce maintenance and replacement lamp costs like LED systems



For more details
call Thomas Ridgley
on **01257 239504**
or visit **www.apolloenviro.co.uk**



We offer a range of environmental consultancy services and energy efficiency products to support energy efficient building practices.



IN A NEW

LIGHT

The new edition of the *Code for Lighting* has radical changes but how will they be interpreted this time? **Jill Entwistle** talks to its author, Peter Raynham

Now on his fifth version, Peter Raynham is something of a veteran when it comes to updating the *Code for Lighting*, an exercise that has to be undertaken rather more often nowadays, to keep pace with fast-moving developments in everything from technology to energy legislation. It used to be revised every seven or eight years but since 2002, his first one as author/editor, it has been every two or three.

'There are so many moving targets out there,' he says. 'For example, Part L of the Building Regulations is going to change in 2013, having last been revised in 2010. So 2014 will need a new Code for that reason alone. Others are in the pipeline – the road lighting standard is currently being reviewed; there's a European daylighting standard on the way.'

Produced by the Society of Light and Lighting's (SLL) technical and publications

committee, and also involving Peter Boyce and John Fitzpatrick on this edition, the Code is essentially a digest of all the standards relevant to lighting practice in the UK.

But as a publication it is not as reactive as that implies. 'There is a hard core of material there which is digested from about five or six key standards – we've got to reference all the standards because somebody could chase people up for that. But then it's got all the underpinning of what all those things actually mean.'

'While we might give a value – for example, you need 50 lux on the wall and 30 lux on the ceiling – we're saying that would be a reasonable number but really you should be doing better. There are little bits of text peppered through in a commentary to the standard. The aim is to push forward the quality of our lit environment.'



SLL CODE: KEY CHANGES

LIGHTING REQUIREMENTS

- Each task now has its own uniformity requirement
- There is now a requirement for a background illuminance
- There is a requirement for illuminance on the walls and ceiling, although the levels are below that recommended by the SLL
- There is a requirement to provide a certain amount of semi-cylindrical illuminance in all spaces to make it possible for people to see each other's faces

CONTENT AND APPEARANCE

The new revised edition of the *SLL Code for Lighting* is significantly different to previous editions, both in content and in format. The Code in book form will now have a similar format to the *SLL Lighting Handbook*, which now covers some material traditionally covered by the Code – all the old material relating to lighting equipment and lighting design, for example – so that the two together will become the definitive lighting reference.

As Raynham points out, not only is the intention to promote good practice over and above the standard, but also the SLL is very involved in pushing for the standards in the first place.

The latest edition, however, is not just an update of the 2009 version, according to Raynham. 'This time it's a real rethink. Basically we took what we had, tore it up and started again.' Because it reflects the changes to BS EN 12464-1, it now introduces mean cylindrical illuminance values and shifts the emphasis to lighting for the specific task (see the *Journal*, September 2011, page 34).

'The most radical change is the requirement for cylindrical illuminance in offices and buildings in general,' says Raynham.

'Classically we would talk purely about lighting visual tasks and now we've realised that we have to look at people in offices. We

have what I guess is probably a finger in the wind value and we will know in five years' time whether it's a good value to use or not. At least introducing it is a start.

'The place where it's most important, and where it will have its biggest impact, is probably schools, where you have to have good communications between the teachers and the pupils. Secondly, meeting rooms and offices and those sorts of spaces.'

There are two drivers for rethinking the working space: lighting quality (lighting for people) and energy efficiency. While the phrase 'working plane' has not been mentioned in a Code since 1994, the preoccupation with throwing a blanket of 500 lux over a space persists, despite the fact that it is wasteful and pointless. Raynham hopes the new direction will finally, if slowly, put paid to it.

'The other thing that we've emphasised, ➤



James Newton

Above: Atrium, City of Westminster Academy (lighting by Happold Lighting): according to Raynham learning environments, where good communications between teachers and pupils are essential, are where the new Code will have most impact.

Right: Grimshaw's The St Botolph Building (lighting by Speirs and Major): 'Everyone knows that you have to go that extra mile with a bit of flair and creativity to make a really nicely lit space,' says Raynham.

which has always been in the Code but never stated explicitly, is that you shouldn't light a working plane. The phrase is only used in this new edition to say that this Code doesn't recognise the working plane. It is gone, don't use it.

'My guess is that it's going to be a culture shift for the industry but the payback is that it halves your energy use. If you're not lighting every square inch of an office to 500 lux, think what that does to the energy consumption. Obviously you've got to light desks and the area round them to a reasonable level, but three quarters of the entire space needs only be to 150 or 200 lux – the energy saving is massive.'

As with BS EN 12464-1, there will perhaps be detractors who think the Code, and standards generally, don't go far enough. Or that lighting specialists don't need them and we should do away with them altogether.

The point, argues Raynham, is that they are aimed not at the lighting professional but at the non-specialist in the hope of avoiding the worst excesses of the inexpert, and 'to make sure the clients have some vague ideas of what they might be letting themselves in for'.

He adds: 'When we think of what the role of the Code is, it's actually to stop bad lighting rather than to promote good lighting. If you just follow the Code you won't do anything terrible, but it might

just end up mediocre. Everyone knows that you have to go that extra mile with a bit of flair and creativity to make a really nicely lit space. Lighting design by numbers alone will only produce an inferior result.'

Raynham acknowledges, however, the inherent paradox of aiming at the non-specialist who, by definition, might get the wrong end of the stick. There is apparently no accounting for the perversity of people and the bits they latch on to.

'What always worries me when I'm writing a Code is that somebody is going to extract selectively from it some weird and wonderful bits and pieces, and just

use that for box ticking. You will always get a strange bit of any SLL document like this picked up. When we wrote LG3 we said how important it is to get all the wall surfaces bright and, by the way, if you have this sort of screen, it's sensible to limit your luminaire luminance at certain angles. What emerged was the awful Cat 2 system.

'Why one particular paragraph may hit the mood or not of the lighting users I don't know. I've tried in writing it to make sure that they get an overall rounded view and know that they are only supposed to light these particular tasks, but how people will choose to abuse it I can't say.' CJ

This time it's a real rethink. Basically we took what we had, tore it up and started again

Peter Raynham says he is concerned that people extract selectively from the Code



● The new *SLL Code for Lighting* will be launched in early 2012. 'Follow the Code' is on 13 December at the RSA www.sll.org.uk



OUR NEW 350lm ES50 LED

The true 50W Halogen replacement is here



NEW

We asked our designers, how could we possibly top the invention of one of the most iconic lamps in history?

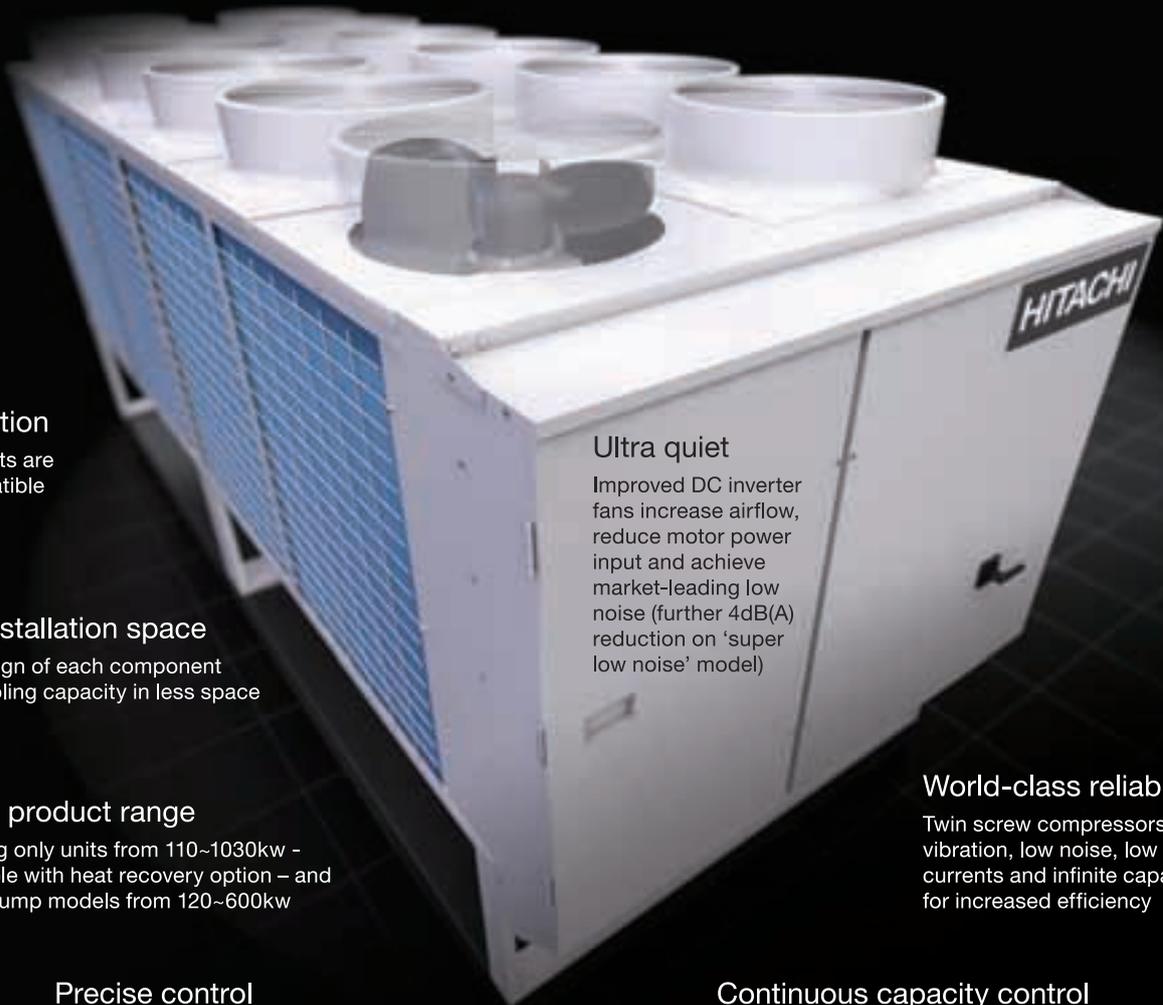
The answer was clear, we do it again....

Sylvania is proud to launch the first genuine LED retrofit with the power to replace a 50W halogen GU10.

The **NEW HI-SPOT RefLED ES50 GU10 350lm** delivers all the cost saving benefits associated with LED technology, but now in a compact size making it the perfect fit for all GU10 and GZ10 type luminaires.

- 7.5W (50W Halogen equivalent)
- IEC standard dimensions, 55mm x 50mm
- Available in Homelight, Cool White and Warm White
- Beam angles of 25° and 40°
- High power factor of 0.8

Powerful yet quiet in its delivery. Meet our newest Samurai.



Hydrokit option

Single cycle units are Hydrokit compatible

Compact installation space

Meticulous design of each component means high cooling capacity in less space

Wide product range

Cooling only units from 110~1030kw - available with heat recovery option - and Heat Pump models from 120~600kw

Precise control

Control outlet water temperature to $\pm 0.5^{\circ}\text{C}$ independent of cooling load (depending on site conditions)

Ultra quiet

Improved DC inverter fans increase airflow, reduce motor power input and achieve market-leading low noise (further 4dB(A) reduction on 'super low noise' model)

World-class reliability

Twin screw compressors, low vibration, low noise, low starting currents and infinite capacity control for increased efficiency

Continuous capacity control

Infinitely variable slide valve for 15-20% energy saving over step control systems and excellent partial load performance

Introducing Hitachi's newest Samurai AG2 chiller unit. With two blade propellers instead of four, it's able to reduce noise and power output as well as increase airflow. It's also smaller than previous units and boasts a number of key improvements for easier servicing and maintenance. Not to mention compatibility with Hydrokit for single cycle units. In short, it's highly effective, powerful, yet surprisingly quiet – meet our newest Samurai.



Professional development

The CIBSE Journal CPD Programme

Members of the Chartered Institution of Building Services Engineers (CIBSE) and other professional bodies are required to maintain their professional competence throughout their careers.

Continuing professional development (CPD) means the systematic maintenance, improvement and broadening of your knowledge and skills, and is therefore a long-term commitment to enhancing your competence. CPD is a requirement of both CIBSE and the Register of the Engineering Council (UK).

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

Simply study the module and complete the questionnaire on the final page, following the instructions for its submission. Modules will be available online at www.cibsejournal.com/cpd while the information they contain remains current.

You can also complete the questionnaire online, and receive your results by return email.

Fans for ducted ventilation systems

This module looks at centrifugal and axial fans used for ducted ventilation systems and considers selected aspects, including their characteristics and operational attributes

The two common fan types used in building services for ducted systems are generically referred to as centrifugal and axial fans – the name deriving from the defining direction of air flow through the fan. These two types are themselves split into a number of subtypes that have been developed to provide particular volume flow/pressure characteristics, as well as other operational attributes (including size, noise, vibration, cleanability, maintainability and robustness). This CPD unit will consider selected aspects of these fans, and to complement the article there is much good-quality detailed material freely available (see list at the end of this article). This article will attempt to include areas that may not typically be in many of the other general sources.

Some of the more frequently encountered types of fan used in HVAC are listed in Table 1, together with indicative peak efficiencies that have been collected¹ from data published by a range of US and European manufacturers. In addition to these, the 'plug' fan (that is actually a variant of the centrifugal fan) has seen rising popularity in recent years.

Characteristic fan curves are shown in Figure 1. These are exaggerated, idealised curves, and real fans may well differ from these; however, they are likely to exhibit similar attributes. This includes the areas

Fan type		Peak total efficiency %
Centrifugal	Aerofoil	88
	Backward curved	84
	Backward inclined	80
	Forward curved	70
Axial	Vane axial	86
	Tube axial	75
Mixed flow		75

Table 1: US and European published peak fan efficiency data for fans >600mm in diameter

of instability that are due to hunting, where the fan can flip between two possible flowrates at the same pressure or as a consequence of the fan stalling (see *Stalling of air flow* box). Manufacturers should also identify preferred 'safe' working ranges in their literature.

Centrifugal fans

With centrifugal fans, the air enters the impeller along its axis, then it is discharged radially from the impeller with the centrifugal motion. These fans are capable of generating both high pressures and high volume flowrates. The majority of traditional centrifugal fans are enclosed in a scroll type housing (as in Figure 2)

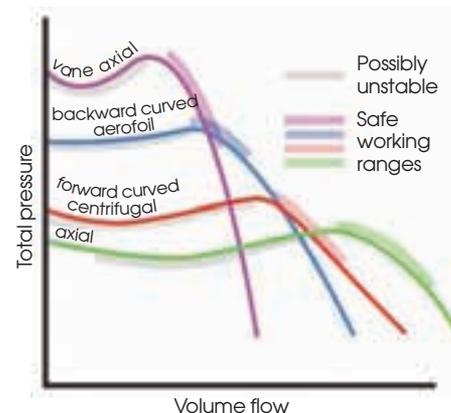


Figure 1: Generic fan curves. Real fans can differ widely from these simplified curves

that acts to direct the moving air and efficiently convert the kinetic energy to static pressure. To move more air, the fan can be designed with a 'double width double inlet' impeller, allowing air to enter on both sides of the casing.

There are a number of shapes of blades that can make up the impeller, with the main types being forward curved and backward curved – the shape of the blade will determine its performance, potential efficiency and the shape of the characteristic fan curve. The other factors that will affect the fan's efficiency are the width of the impeller wheel, the clearance space between the inlet cone and the rotating impeller, and the area used the discharge the air

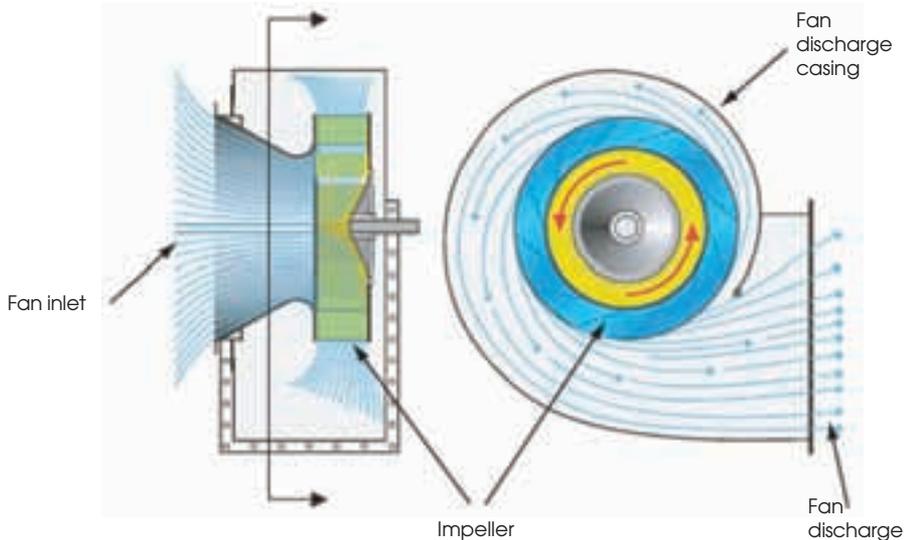


Figure 2: Centrifugal fan in scroll casing, with a backward inclined impeller (Source: CIBSE TM42:2006)

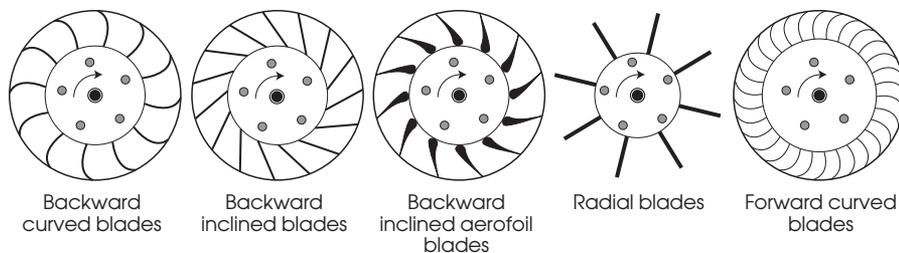


Figure 3: Illustration of centrifugal fan impellers

from the fan (the so-called 'blast area').

This type of fan has been traditionally driven by a motor with a belt and pulley arrangement. However, with the improvement in electronic speed controls and the increased availability of electronically commutated ('EC' or brushless) motors, direct drives are becoming more frequently used. This not only removes the inefficiencies inherent in a belt drive (that may be anything from 2% to more than 10%, depending on maintenance²) but is also likely to lessen vibration, reduce maintenance (fewer bearings and cleaning requirements) and make the assembly more compact.

Backward curved centrifugal fans

Backward curved (or 'inclined') fans are characterised by blades that tilt away from the direction of rotation. They can reach efficiencies of towards 90% when using aerofoil blades, as shown in Figure 3, or with plain blades shaped in three dimensions, and slightly less when using plain curved blades, and less again when using simple flat plate backward inclined blades. The air leaves the tips of the impeller at relatively low velocity, so the friction losses within the casing are low and air-generated noise is also low. They may stall at the extremes of the operating curve. Relatively wider impellers will provide greatest efficiencies,

and can readily employ the more substantial aerofoil profiled blades. Slim impellers will show little benefit from using aerofoils so tend to use flat plate blades. Backward curved fans are particularly noted for their capacity to produce high pressures combined with low noise, and have a non-overloading power characteristic – this means that as the resistance reduces in a system and the flowrate increases the power drawn by the electrical motor will reduce. The construction of backward curved fans is likely to be more robust and rather heavier than the less efficient forward curved fan. The relatively slow air velocity of the air across the blades can allow the accumulation of contaminants (such as dust and grease).



Figure 4: Forward curved centrifugal fan with integral motor (Source: EBMpapst)

Forward curved centrifugal fans

Forward curved fans are characterised by a large number of forward curved blades. As they typically produce lower pressures, they are smaller, lighter and cheaper than the equivalent powered backward curved fan. As shown in Figure 3 and Figure 4, this type of fan impeller will include 20-plus blades that can be as simple as being formed from a single metal sheet. Improved efficiencies are obtained in larger sizes with individual formed blades. The air leaves the blade tips with a high tangential velocity, and this kinetic energy must be converted to static pressure in the casing – this detracts from the efficiency. They are typically used for low to medium air volumes at low pressure (normally <1.5kPa), and have a relatively low efficiency of below 70%. The scroll casing is particularly important to achieve the best efficiency, as the air leaves the tip of the blades at high velocity and is used to effectively convert the kinetic energy into static pressure. They run at low rotational speeds and, hence, mechanical generated noise levels tend to be less than higher-speed backward curved fans. The fan has an overloading power characteristic when operating against low system resistances.

These fans are not suitable where, for example, the air is heavily contaminated with dust or carries entrained grease droplets.

Radial bladed centrifugal fans

The radial bladed centrifugal fan has the benefit of being able to move contaminated air particles and at high pressures (in the order of 10kPa) but, running at high speeds, it is very noisy and inefficient (<60%) and so should not be used for general purpose HVAC. It also suffers from an overloading power characteristic – as the system resistance is reduced (maybe by volume control dampers opening), the motor power will rise and, depending on the motor size, may possibly 'overload'.

Plug fans

Instead of being mounted in a scroll casing, these purpose-designed centrifugal impellers can be used directly in the casing of the air-handling unit (or, indeed, in any duct or plenum), and their initial cost is likely to be lower than housed centrifugal fans. Known as 'plenum', 'plug' or simply 'unhoused' centrifugal fans, these can provide some space advantages but at the price of lost operating efficiency (with the best efficiencies being similar to that for housed forward curved centrifugal fans).

The fans will draw air in through the inlet cone (in the same way as a housed fan) but then discharge the air radially around the whole 360° outer circumference of the impeller. They can provide a great flexibility of outlet connections (from the plenum), meaning that there may be less need for adjacent bends or sharp transitions in the ductwork that would themselves add to the system pressure drop (and, hence, additional fan power). Overall system efficiency may be improved by using bell mouth entries to the ducts leaving the plenum. One of the benefits of the plug fan is its improved acoustic performance, largely resulting from the sound absorption within the plenum and the lack of 'direct sight' paths from the impeller into the mouth of the ductwork. The efficiency will be very dependent on the fan's location within the plenum and the relationship of the fan to its outlet – the plenum being used to convert the kinetic energy in the air and so increase the static pressure. Substantially different performance and different stabilities of operation will depend on the impeller type – mixed flow impellers (providing a combination of radial and axial flow) have been used to overcome flow problems resulting from the strong radial air flow pattern created using simple centrifugal impellers³.

For smaller units, their compact design is often complemented through the use of readily controllable EC motors.

Axial fans

In axial flow fans, the air passes through the fan in line with the axis of rotation (as shown in the simple tube axial fan of Figure 6) – the pressurisation being produced by aerodynamic lift (similar to an aircraft wing). These can be comparatively compact, low cost and lightweight, particularly suited to moving air against relatively low pressures, so are frequently used in extract systems where the pressure drops are lower than supply systems – the supply normally including the pressure drop of all the air conditioning components in the air handling unit. When the air leaves a simple axial fan, it will be swirling due to the rotation imparted on the air as it passes through the impeller – the performance of the fan may be improved significantly by downstream guide vanes to recover the swirl, as in the vane axial fan shown in Figure 7. The efficiency of an axial fan is affected by the shape of the blade, the distance between the tip of the blade



Figure 5: Example of direct driven plug fan with backward curved blades (Source: Fläkt Woods)

and the surrounding case, and the swirl recovery. The pitch of the blade can be altered to efficiently vary the fan's output. By reversing the rotation of axial fans, the airflow can also be reversed – although the fan will be designed to work in the principal direction.

The characteristic curve for axial fans has a stall region that can make them unsuitable for systems with a widely varying range of operating conditions, although they have the benefit of a non-overloading power characteristic.

Vane axial fans can be as efficient as backward curved centrifugal fans, and are able to produce high flows at reasonable pressures (typically around 2kPa), although they are likely to create more noise.

The mixed flow fan is a development of the axial fan and, as shown in Figure 8, has a conical shaped impeller where air is drawn radially through the expanding

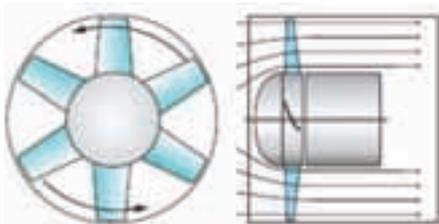


Figure 6: A tube axial flow fan (Source: GPG383)

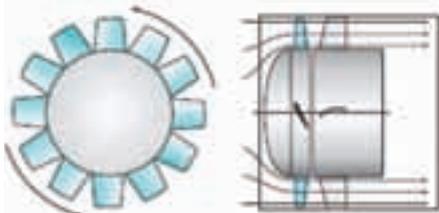


Figure 7: A vane axial flow fan (Source: GPG383)

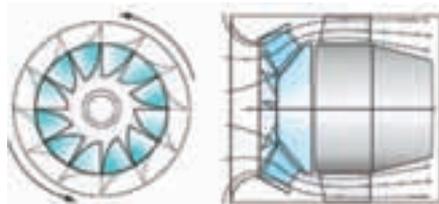


Figure 8: Mixed flow inline fan (Source: GPG383)

channels and then passed axially through the straightening guide vanes. The combined action can produce pressure far higher than is possible with other axial flow fans. Efficiencies and noise levels can be similar to those of a backward curve centrifugal fan.

Stalling the air flow

The stall in a fan can be thought of as a condition where the flow patterns in the impellers are such that air will not be effectively and consistently moved through the fan. At this point, the flow becomes unstable and can manifest itself in a number of ways including vibrating fans and ductwork, rumbling noise in ductwork, and possibly some resonance that makes the ductwork physically pulse. Continued operation in stall can damage bearings and damage the fan itself. Stall conditions can be averted through appropriate matching of fan to system – in many fans this means keeping the fan operating point so that it is to the right (that is, greater volume flow) of the point of peak efficiency. However, the type of stall and the solutions will vary depending on fan type – the Eurovent document 1/11 *Fans and System Stall: Problems and Solutions* provides excellent coverage of this area.

The installation of the fan

The efforts to provide an effective fan solution may be severely undermined by the relationship between the fan and the local ducted pathways for the air – this will be discussed in a future CPD article.

© Tim Dwyer 2011

For further reading in this area see:

- CIBSE *Fan application guide* (CIBSE TM42: 2006) – available for free access for CIBSE members through the CIBSE Knowledge Portal.
- ASHRAE *HVAC Handbook 2008*, Chapter 20.
- GPG383 Good Practice Guide: *Energy savings in fans and fan systems* – freely downloadable from www.carbontrust.co.uk
- For an excellent discussion of 'stall' see EUROVENT 1/11 *Fans and System Stall: Problems and Solutions* – free download www.eurovent-association.eu

References

1. Murphy, J. 'Selecting Efficient Fans', *ASHRAE Journal*, April 2010.
2. Carbon Trust CTV016 'Motor Drive Technology Overview', Carbon Trust 2007.
3. Coward, C. 'Unhoused (Plug/Plenum) Fans: Is Their Performance Predictable?', *ASHRAE Journal*, October 1997.

Module 35

December 2011

1. From the data referred to in the article, which of the following is likely to have the highest peak total efficiency?

- A Aerofoil centrifugal fan
- B Backward curved centrifugal fan
- C Backward inclined centrifugal fan
- D Forward curved centrifugal fan
- E Tube axial centrifugal fan

2. What is the principal purpose of the scroll casing in a centrifugal fan?

- A To act as a safety device
- B To convert the kinetic energy into static pressure
- C To enhance the appearance of the fan
- D To ensure the inlet air is scrolled into the inlet
- E To maximise the air's exit velocity

3. How might the overall efficiency of a backward curved impeller plug fan installation be improved?

- A Increase its speed
- B Make the impeller forward curved
- C Remove the scroll casing
- D Use bell mouth outlets leading into the ducts from the plenum
- E Stop the air leaving the fan impeller radially

4. Which one of these is most likely to be true about axial configuration fans?

- A As the air leaves the fan, the swirling air will automatically straighten due to the fan rotation
- B They are particularly known for high-pressure high flowrate applications
- C They have a particularly stable flow pattern across all flowrates
- D Air is unlikely to flow if the rotation of the fan is reversed
- E The mixed flow fan will produce higher pressures than a plain axial fan

5. Which of these is LEAST likely to be a manifestation of a regularly stalled fan?

- A Vibration from the fan
- B Damaged bearings
- C Stable air flow
- D Pulsing ductwork
- E Rumbling noise

Name (please print)

Job title

Organisation

Address

Postcode

Email

Are you a member of:

CIBSE

If so, please state your membership number

(if available)

Other institution

(please state)

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

Building services engineer

Mechanical engineer

Electrical engineer

Commissioning engineer

Energy manager

Facilities manager

Other (please give details)

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

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

Alternatively, you can fill in this page and post it to:

E Palmer, CIBSE, 222 Balham High Road, London, SW12 9BS



NATURAL VENTILATION

HYBRID VENTILATION

SMOKE VENTILATION

WindowMaster offers many different solutions for the automation of the facades and rooflights, depending on the requirements of your project:

NV Advance™

The advanced indoor climate control solution for natural and hybrid ventilation in larger buildings with many zones.

NV Comfort™ *New!*

The cost effective indoor climate control solution for natural and hybrid ventilation in smaller projects.

MotorLink™

The new standard in communication between BMS systems and electrical window actuators.

For additional information or documentation please visit our website www.WindowMaster.com or telephone us on **+44 1536 510990**

©WindowMaster – Solutions for Natural Ventilation

DIRECTORY

Air Conditioning

CLIVET™

For total solutions in air-conditioning

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

Air Handling

AirCraft
AIR HANDLING LTD

Manufacturer of high quality bespoke AHU's and fan coils.

Specialists in refurbishment and site assembly projects.

Expedient delivery service available.

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

Energy Efficiency

GROENHOLLAND

Ground Source Heat Pump Installations

Meeting Renewables Targets

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

Certificate Number MCS 1201 Heat Pumps



Your all round solution provider for air conditioning and refrigeration

Extensive stock available for collection or timed delivery from branches across the UK including: Aberdeen, Glasgow, Gateshead, Manchester, Birmingham, Heathrow, Crayford and Fareham

kooltech



0141 883 0447

www.kooltech.co.uk

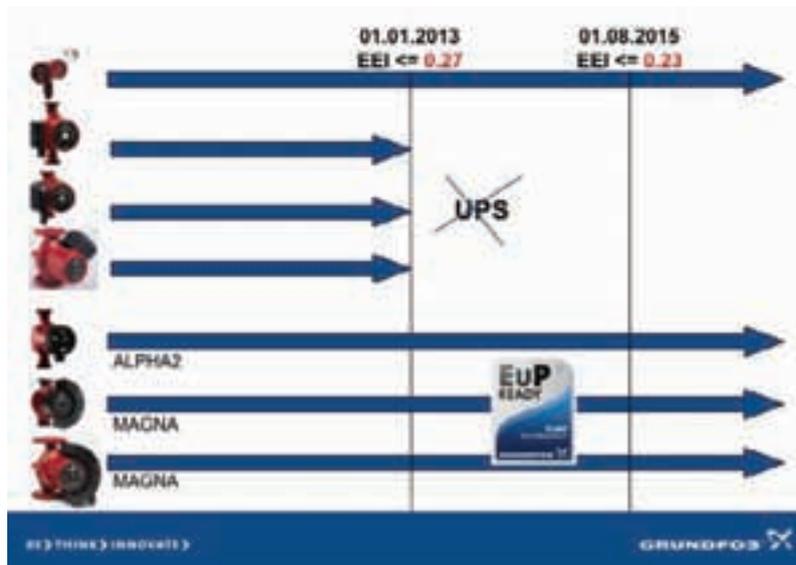


..... PUMP NEWSFLASH PUMP NEWSFLASH PUMP NEWSFLASH

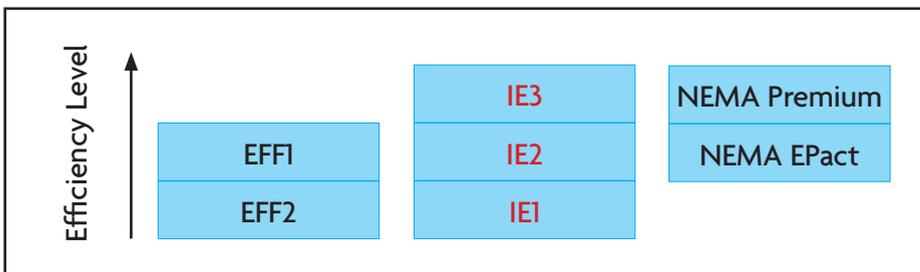
Changes to legislation will affect your **pump** selection options

So what are the **10 things** you need to know?

- There is a new EuP/ErP Directive that affects circulator pumps and motors
- From 1st January 2013 the EU standalone circulator market is changing
- The eco-design requirements for glandless standalone circulators (laid down in Commission Regulation No 641/2009 of 22 July 2009) will now be a part of the Declaration of Conformity (CE)
- As of 1st January 2013: glandless standalone circulators must have an EEI of no more than 0.27
On 1st August 2015 that drops to 0.23. This criteria will be integrated into the CE label
- The **GRUNDFOS**  **MAGNA** family meets all of these criteria – today



- In terms of the European motor market a new IE standard (International Efficiency class) replaces all current national standards, including the European EFF system and the US NEMA system (see below)



- From 16 June 2011, all motors above 0.55kW needed to meet the IE2 standard (minimum)
- From January 1st 2015, all 7.5kW – 375kW motors must meet the IE3 standard, or meet the IE2 standard and be equipped with a variable frequency drive (VFD)

- By 2017, all 0.75 – 375kW motors must meet the IE3 standard or meet the IE2 standard and be equipped with a variable frequency drive (VFD)
- **GRUNDFOS**  pumps and motors already meet these requirements **today**.



Want to know more?

Visit www.grundfos.com/energy or email uk-info@grundfos.com



Elta Fans handles the hard stuff in new whisky bottling plant

Elta Fans, Kingswinford-based Building Services division, has supplied a number of fans for the new bottling plant of one of Scotland's premier manufacturers of single malt whiskies. Six 'Quietflow' twin DCVs were provided for the ventilation project by Elta Fans' distributor, VHS, to subcontractors

NG Bailey, along with a BIFLOW bifurcated axial fan, specially developed for handling hostile air conditions, designed so that the throughput totally by-passes the motor, avoiding any possible detrimental effect. In addition, a Skyflow SSMF and two Revolution SLCs were also supplied.

● For more information visit www.eltafans.com or call 01384 275800



E.ON chooses the Evinox ModuSat heat interface unit

E.ON is one of the UK's largest power and gas companies, generating electricity, and retailing power and gas to millions of customers nationwide. The company is now moving into the supply of energy utilising communal heat networks and has chosen Evinox as its preferred supplier for the heat interface units. From its detailed analysis, E.ON established that the Evinox 'ModuSat' unit is the best solution for its district heating projects, where customer satisfaction over the long term is vital.

● For more information visit www.evinox.co.uk or call 01372 722277



Celebrating two decades of CableCalc level P with a free version of new twin and earth calculations

To celebrate 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 even 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.

● For more information call 01293 871751 or visit www.castlinesystems.com



Sirius Products' canopy containment technology improves kitchen air quality

Filtration and air-management specialists Sirius Products has developed a range of canopies designed to improve the containment-efficiency of the hood by up to 15%. This system delivers a constant stream of high-pressure, low-volume air directly into the canopy itself, creating a negative pressure along the front lower edge. Consequently, the rising convective heat and smoke created by cooking processes is drawn into the hood and towards the high-efficiency grease filters, leaving a pleasant, productive and smoke-free kitchen environment.

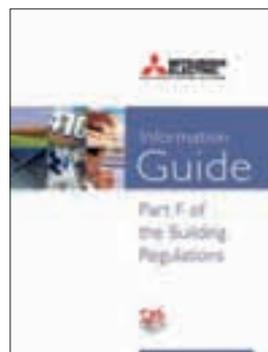
● For more information visit www.siriusproducts.co.uk or call 01707 299339

CPD best practice guide on building ventilation published

Mitsubishi Electric has released a new CPD-Accredited guide to Part F of the UK's Building Regulations. The free guide gives readers

the latest information about regulation changes to building ventilation. The guide looks at the types of ventilation systems available, to help remove moist and stale air from homes and offices. A section of the 2010 Updates to Part F focuses on the long-term sustainability of mechanical ventilation. Overall, the guide looks at the suitability, effectiveness and efficiency of powered ventilation systems.

● For more information visit www.livingenvironmentalsystems.mitsubishielectric.co.uk. For a copy of the guide email heating@meuk.mee.com



Gripple responds to continued growth and product diversification

Sheffield's Gripple, the globally successful and multi award-winning manufacturer of unique wire joiners, maintains its phenomenal growth, offers a 2,000-strong product range, has

created a third specialist division and appointed Matthew Hutchinson as marketing manager. Hutchinson optimises the versatile marketing activities of both time-honoured product managers and support teams, to promote the products and help develop additional innovative products within the established agricultural and industrial divisions. Gripple Seismic is the latest division, which Hutchinson is also tasked with expanding, utilising the matchless resources within the Gripple 'family'.

● For more information visit www.gripple.com or call 0114 275 2255





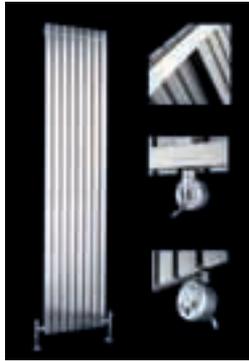
Prysmian – safe racing for Commonwealth Games

More than 50,000 metres of Prysmian FP200 Gold and FP600S have been installed in the Sir Chris Hoy Velodrome, part of the National Indoor Sports Arena and Velodrome (NISA) in Glasgow. The Velodrome will contain a 250m high-banked wooden cycle track and an infield area for the cycling events at the 2014 Commonwealth Games. The contractor used Prysmian's FP200 Gold and FP600S cables to supply essential services within the Velodrome, including the emergency lighting, fire alarms and the PA system.

● For more information visit www.prysmian.co.uk or call 023 8029 5029

Design innovation on Flasteel stainless steel radiators give 17% extra heat

Manufacturer, retailer and distributor of designer radiators and heated towel rails, Geysler Ltd, has developed its Flasteel range of flat panel, stainless steel radiators to give an additional 17% extra BTUs of heat output. It has also created much more flexibility in the range by introducing new Landscape and Electric Models of these radiators, which it never offered before. These two benefits are the result of a unique new collector bar introduced on the rear of the radiator, due to research and development by Geysler.



● For more information visit www.geysler.co.uk or call 01204 695387



A world of arts apart – MHS Boilers at Edinburgh Festival Centre

Staff and visitors to The Hub, Edinburgh's Festival Centre on the Royal Mile, are benefiting from efficient heating, thanks to three ADI-NOx LT 150kW boilers and a Pisces pressurisation unit – all supplied by MHS Boilers. The installation was part of the complete refurbishment of the heating system in the 19th century Grade A-listed building. The installers were Paisley-based Taylor and Fraser Ltd, which has a long established and unrivalled reputation for working in historic buildings. Arup provided the M&E consultant engineers for the project.

● For more information visit www.mhsboilers.com or call 01268 546700



Wandsworth switches UK onto Jung's sleek styling

Specifiers looking for a stylish and subtle approach to lighting switches and dimmers can now select from the Jung 'A Creation' range, available from The Wandsworth Group, Jung's exclusive UK distributor. A range of minimalist, translucent frames designed to complement any interior, the 'A Creation' line combines German quality with contemporary styling to provide a wide range of colour and finish combinations. The range can be used to create a statement look or to blend seamlessly into the interior design of a property.

● For more information visit www.wandsworthgroup.com or call 01483 713400



TROX Air Handling Units help Dublin Airport's energy efficiency ambitions take place

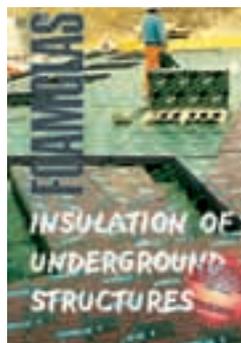
Displacement air terminal units from TROX are helping the new Terminal 2 at Dublin Airport to achieve outstanding levels of energy efficiency. The units are housed in stunning purpose-designed stainless steel grilles that enhance the aesthetic effects created by the architect. In addition, the 75,000 sq m terminal uses approximately two thirds less energy compared to other equivalent buildings. The visually striking new terminal has been created for Dublin Airport Authority (DAA) by a design team, including Arup, Mace and architects Pascall+Watson.

● For more information visit www.troxuk.co.uk or call 01842 754545

Pittsburgh Corning launches insulation guide

Pittsburgh Corning, the manufacturer of FOAMGLAS insulation, has re-released the Underground Structures guide in PDF format due to overwhelming demand. It is designed to provide architects and structural engineers with an easy-to-follow directory of insulation solutions. With clear indexing, case studies and illustrations, it provides a definitive guide to the specification process. The Underground Structures guide explores external and internal insulation to underground walls, insulating floor slabs with trip footings, insulation over floor slabs, insulation under foundation rafts and low-temperature applications.

● For more information visit www.foamglas.co.uk or visit 0118 950 0655



JS Humidifiers achieves bronze investors in people award

JS Humidifiers has recently achieved the bronze standard Investors in People award. This puts JS in the top 7% of organisations that gain Investors In People, as it requires the company to go above and beyond the normal procedures for employee development. Steve Verney, managing director, said: 'An important part of JS Humidifiers' success has always been to support and develop our staff. We are very proud to be one of the few companies to receive the added recognition of achieving the bronze standard.'

● For more information visit www.jshumidifiers.com or call 01903 850200



Integra multi-functional units with simultaneous heating and cooling from Climaveneta

Climaveneta now provides simultaneous heating and cooling, multi-functional outdoor units over 100kW. The Integra range is an intelligent four-pipe system, able to generate both hot and chilled water in the same building. The configuration also enables heat to be redistributed around the building, extracting heat where cooling is required and delivering it to areas in need of heat, thus improving overall energy efficiency. Integra is ideally suited for buildings with variation in solar and internal heat gains through the day, typically offering around a 40% reduction in primary energy consumption.

● For more information visit www.climaveneta.co.uk or visit 0871 663 0664



DuPont improves energy efficiency of the new iCon Innovation Centre

When a new icon of architecture is dedicated in both design and function to the purpose of innovation, it makes perfect sense to specify the most innovative solutions to energy-efficiency. Consarc architects won the competition to design the iCon Innovation Centre in Daventry with an exciting proposal for a building that would embody not only the highest standards of aesthetics and human-friendly design, but also optimum sustainability. DuPont Energain helped to enable these goals by adding lightweight, high-tech thermal mass.

● For more information visit www.energain.co.uk or call 01275 879770



Buderus launches CHP range

Buderus, one of the world's most established heating technology brands, has boosted its UK portfolio of low-carbon commercial heating solutions with the launch of a Combined Heat and Power (CHP) system. CHP systems provide the simultaneous generation of electricity and usable heat from the same plant or appliance, which maximises efficiency and provides a low-cost supply of hot water and electricity. The installation of a gas-fired Buderus CHP system can help make a significant contribution towards meeting sustainability targets and compliance with legislation.

● For more information visit www.buderus.co.uk or call 0844 892 3004

A new name in LV switchgear

Havells is a new name in the UK for low voltage circuit protection and control. The company has launched a range of consumer units, which will be followed by a whole raft of new products, including Type A and Type B distribution boards and MCCB panelboards. Havells Sylvania is well known in the lighting industry for its Sylvania, Concord and Lumiance branded products. In recent years it has supplied an estimated 50 million poles of circuit breakers as OEM products to leading UK electrical companies.

● For more information visit www.havells.co.uk or call 020 7011 9700



Just published – the Green Guidebook from FLIR thermal imaging

Stopping energy loss is so much easier when you can see its source, and that is why FLIR thermal imaging is proving such a powerful ally in driving down carbon emissions. In combination with application specific software, a FLIR thermal imaging camera allows the user to see the thermal effect of building construction faults, insulation failures and moisture ingress. Any problem areas are easily pinpointed in a single sweep of the camera, allowing appropriate remedial action to be taken.

● For more information visit www.flir.com or call 01732 220011



Advanced Air Epic fan coil for NR20 applications

The Advanced Air EPIC Fan Coil Unit incorporates a unique fan deck with a single horizontally-mounted fan and motor. The fan and motor is much larger than those used in conventional fan coils and consequently runs at a much lower speed. With this lower-speed fan comes the benefit of lower noise levels, and on the University of West of Scotland an amazing NR20 was achieved in the studios.

● For more information visit www.advancedair.co.uk or call 01842 753624



Grand design puts house in the shade

Naco, part of the Ruskin Air Management group, has supplied bespoke louvres to a stunning new home that was featured on Channel 4's *Grand Designs* programme in September. State-of-the-art Sylvan Glade is a highly unusual residential home in Kent. Aesthetics and design considerations were key to the specification, so Naco's products had to meet exacting standards of form and shape determined by the architect. Replacing a Georgian Style house, Sylvan Glade was constructed by Innovate Space, on behalf of Modillion homes.

● For more information visit www.naco.co.uk or call 01746 761921



Remembering the Titanic

HygroMatik's HL80 HeaterLine-Comfort steam humidifier has been specified within the pavilion at Southampton's newest visitor attraction, Sea City. The pavilion is part of the visitor attraction that has been established to celebrate the city's historical relationship with the sea, and commemorates the 100th anniversary of the sinking of the Titanic. The HeaterLine-Comfort is a self-generative, compact steam humidifier, ideal for wall mounting, with a corrosion-resistant stainless steel cabinet that is easy to install and maintain.

● For more information visit www.hygomatik.co.uk or call 02380 443127



Classroom ventilation units

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

● For more information visit www.aircraftairhandling.com



Nuair delivers complete ventilation solution via UK-wide road show

Ventilation expert Nuair is celebrating the success of its UK-wide road show where it introduced more than 1,000 consultants to its expanded portfolio, which now includes natural ventilation, providing customers with a complete ventilation solution. The UK market leader in the design, manufacture and distribution of powered ventilation and air movement solutions, hosted a series of 47 seminars in cities all over the UK and Ireland. The road show included technical presentations, which explored the potential for mechanical and natural ventilation to go hand in hand.

● For more information visit www.nuair.co.uk/naturalventilation or call 029 2088 5911

FSW and Panasonic help Red Dragon train engineers of the future

FSW has supplied Panasonic's Ethernia units to specialist training provider Red Dragon Air Conditioning for use in courses to allow engineers to become compliant with the F-Gas Regulations. Red Dragon has selected Panasonic's Ethernia wall-mounted systems at its new, 3,000 sq ft purpose-built training centre in Bridgend, Wales. There are eight individual work stations, each with a Panasonic Ethernia unit installed for engineers to train on. Courses are run by Red Dragon's owner, Steve Fisher, who is a qualified City and Guilds and CITB Trainer and Assessor.

● For more information visit www.panasonic.co.uk/aircon or call 01344 853390



Sanyo crowns year of awards success with two top industry accolades

Sanyo has crowned a year of awards success by winning two of the industry's most coveted awards, for the Air Conditioning Product of the Year and for an outstanding project. On the technology front, Sanyo's pioneering Series 6 VRF system has won the Air Conditioning Product of the Year Award in the Cooling Industry Awards 2011. The judges praised the Series 6 for combining a host of genuine technical innovations in this highly competitive sector.

● For more information visit uk.sanyo.com/aircon or call 0845 612 6364



Safety first, when the heat is on, with MHS Radiators

Patients and staff in the recently refurbished main building at Spire Yale Private Hospital, Wrexham, are benefiting from safe, efficient and hygienic heating, thanks to the installation of 50 Safeguard low surface temperature (LST) radiators – supplied by MHS Radiators. Safeguard LST radiators are available in five heights, with lengths from 661 to 2,911mm as standard. All Safeguard emitters are pressure tested to 7 bar and have a maximum working pressure of 5 bar. And for complete peace of mind, they have a five-year warranty on materials and manufacture.

● For more details visit www.mhsradiators.com or call 01268 546700



Bespoke water systems design and manufacturing service from London Pumps

A bespoke water systems design and manufacturing service from London Pumps ensures every installation is technically ideal, environmentally sound and within budget. London Pumps' experienced staff provide expert technical advice and, if clients require it, the company's highly-trained personnel will provide system design, installation and commissioning. London Pumps' packaged systems include Booster Pump Sets c/w water tanks, pressurisation equipment, plate heat exchanger packages and fire pumpsets to BS9990. Its in-house facilities include full project support, from design stage to final production.

● For more information visit www.londonpumps.co.uk or call 020 8337 7249



Apex wins multi-million pound Bristol hospital wiring contract

A UK market leader, Apex Wiring Solutions, has won a multi-million pound contract to supply a modular wiring system for a new £430m state-of-the-art 800 bed hospital, being built by Carillion for the North Bristol NHS trust at Southmead. Modular wiring has been specified for the new build to cut electrical installation times, reduce on-site waste and provide a prewired factory tested power and lighting system. The Apex system will also be utilised on pre-wired factory tested pluggable distribution boards.

● For more information visit www.apexwiringsolutions.co.uk or call 0191 378 7900.

Water pipe sizing and drainage design software

This software incorporates five applications in one product, covering popular topics: Pipe sizing water supply systems (with integrated LU conversion, head loss, and 'industry standard' tabulation), assessment of 'tail end' water design flow (based on probability), sanitary design flow (including mixed occupancy assessment), eaves gutter sizing, and storage capacities for rainwater harvesting. Priced at £95 + VAT, supplied as a binder enclosing CD and user guide, the product will appeal to mechanical design professionals, PH Engineers, and trainees.

● For more information visit www.phoffice.co.uk/design-software.php or call 0845 459 6029



Stokvis proves catalyst for reduced carbon emissions in sheltered housing

Catalyst Communities Housing Association (CCHA) has opted for solar thermal equipment from Stokvis Energy Systems at a refurbishment of heating plant at O'Grady Court, in Ealing, west London, as it seeks to reduce carbon emissions from its housing stock. CCHA, the largest member of the Catalyst Housing Group, provides more than 11,000 affordable homes in London and the Thames Valley. CCHA is committed to sustainable development and lowering the carbon footprint of all of its housing stock.

● For more information visit www.stokvisboilers.com or call 0208 783 3050

Ideal maximises LPG efficiency

Hot on the success of the Evomax natural gas range, Ideal Commercial is taking wall-hung LPG boilers to new levels of performance. The British-based manufacturer has launched the Evomax LPG, a boiler designed specifically for customers who are not connected to mains gas, but who still demand high-efficiency solutions to heating and hot water. Built to the same high specifications as the existing Evomax – with specialist modifications made to the gas management system – the Evomax LPG boasts exceptional performance.

● For more information visit www.idealheating.com or call 01482 498660



Andrews' solar heating for new Brixham fish market

At Brixham, in Devon, a multi-million pound fish market has been built to replace the existing 30-year-old building, as part of a £120m regeneration of the port area. In line with Torbay Council's sustainable energy policy, domestic hot water is being provided by an Andrews Water Heaters' solar thermal water heating system to minimise fuel usage and reduce its carbon footprint. The Brixham Fish Market is a state-of-the-art establishment with all the latest services available, including internet bidding.

● For more information visit www.andrewwaterheaters.co.uk or call 0845 070 1055

The only energy recovery range that exceeds ErP requirements for 2015

Fläkt Woods has announced the launch of a series of energy recovery units, known as E3co, they promise affordability and quality from a renowned name within the heating, ventilation and air conditioning industry. The E3co Crown is a technological innovation, with high-efficiency EUROVENT-certified counter flow aluminium heat plate exchangers. These are used to help capture the energy contained in conventionally exhausted buildings, utilising it to treat the incoming outdoor ventilation air and providing energy recovery efficiencies in excess of 90%.

● For more information visit www.flaktwoods.com or call 01206 222555



MHI air conditioning competes at Wordskills final in 2011

Apprentices and vocational trainees from all over the world, including the UK's Stuart Millar, demonstrated their skills on the latest air conditioning units from Mitsubishi Heavy Industries (MHI) at the WorldSkills 2011 finals (London ExCel 5-8 October 2011). Stuart scooped a Bronze medal working on a training rig from MHI's new high efficiency SRK series of heat pump single split systems, in the event's Refrigeration and Air Conditioning section. Apprentices from all over the world competed in the event.

● For more information visit www.mitsubishi-aircon.co.uk or call 020 7842 8100

Air Conditioning



For total solutions in air-conditioning

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

Air Handling



Manufacturer of high quality bespoke AHU's and fan coils.

Specialists in refurbishment and site assembly projects.

Expedient delivery service available.

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

CAD Services



CadEURO
 Draughting Services

- Building Services Work Undertaken
- 2D Draughting
- 3D Autocad MEP
- Record Drawings
- Excellent Rates & Turnaround Service
- MEP BIM Services

Contact Stephen:-
 T: 020 7043 7491
 F: 020 7043 7493
 E: cad@cadeuro.co.uk
 W: www.cadeuro.co.uk

LST Radiators



autron
 LST Radiators

Range of Low Surface Temperature radiator models to suit all budgets & applications

- Easy installation – ready assembled
- Attractive functional design
- BSRIA tested outputs and surface temperatures
- SteriTouch® antimicrobial surfaces as standard
- Energy efficient copper aluminium emitters

BSRIA ISO9001
 Call 01787 274135
www.autron.co.uk

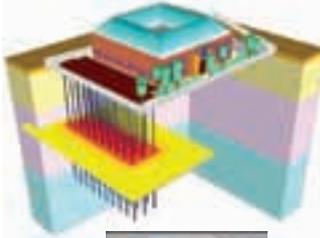
Energy Efficiency



Ground Source Heat Pump Installations

Meeting Renewables Targets

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




Certificate Number MCS 1201 Heat Pumps

Pump Packages



AquaTech Pressmain

LEADERS IN FLUID PUMPING EQUIPMENT AND CONTROLS

- Water Pressure Booster Sets
- Tank Level & Temperature Controls
- Sealed System Pressurisation Units
- Bespoke Design Service
- Water Storage
- Energy Efficient
- Hydraulic Shock Control

Head Office: 01206 215121
 Manchester: 0161 226 4727
www.aquatechpressmain.co.uk

Refurbishment



MOFAUK

Energy Efficient Refurbishment solutions for increasing the performance and reliability of existing Air Handling Units of any manufacture.

- Replacement, Refurb or Retrofit
- Site Survey, Design, Manufacture
- Basic to High Spec Installations
- In-depth Technical Support from survey to final commissioning

For more information, call Steve Peck on 01206 505909 or e-mail tech@imofa.co.uk
www.imofa.co.uk
 AHU Designers & Manufacturers

APPOINTMENTS

● Telephone: 020 7324 2755 Email: cibsejobs@redactive.co.uk

blueprint recruitment

Specialists in Building Services Recruitment

Merry Christmas and Happy New Year to our clients and candidates from the team at Blueprint!

Senior M&E Design Engineers | Hampshire | to £32ltd | ref: 2833
 Our client, a blue-chip M&E contractor, is looking for Senior Mechanical and Electrical Design Engineers. You will be experienced in the detailed design of office fit-outs and base builds and will ideally have previously worked for a contractor. Long term opportunities!

Senior Electrical Design Engineer | London | to £35ltd | ref: 1570
 A multi-national consultancy is looking for a Senior Electrical Design Engineer for a long term contract. Suitable candidates will have significant experience in the design of mission critical facilities and be able to lead their discipline within the team. Excellent opportunity!

Design Manager | West London | £HIGH! | ref: 3846
 We are looking for an experienced MEP Design Manager for a major project at Heathrow. You will have significant airport experience and ideally still hold a current airside pass. Please call Rebecca Moore for more information.

Senior Mechanical Design Engineer | London | £48K++ | ref: 1756
 Our client is looking for a Senior Mechanical Design Engineer who has achieved Chartered status, or is in the process of applying. Ideal candidates will be comfortable leading a small team and have experience within commercial, educational and cultural projects.

Intermediate M&E Design Engineers | London/Surrey | £NEG! | ref: 4797
 We are looking for Intermediate Design Engineers who are looking to take the next step in their career. You will be nearing chartered status and ideally have a varied project background. Opportunities within major consultants and contractors available!

For more information or a confidential discussion please contact Mark Butter
t: 02392 603030
 e: mark.butter@blueprintrecruit.com www.blueprintrecruit.com
 E3 & E5 Heritage Business Park, Heritage Way, Gosport, Hampshire PO12 4BG

www.desco.uk.com



Desco (Design & Consultancy) Ltd is an award-winning building services engineering consultancy with offices in the UK and the Middle East.

The practice has continued to develop an excellent reputation for delivering a professional quality service, much of which can be attributed to the talented people who work in the business.

We are expanding in both our London office (based in Epsom) and our Middle East office (based in Doha, Qatar) and we are seeking to recruit enthusiastic, talented individuals to fill design engineering vacancies in our mechanical and electrical building services teams in both offices. We are seeking the following:

Senior Electrical Engineer (London & Qatar)
Senior Mechanical Engineer (London & Qatar)
Senior Public Health Engineer (Qatar)
Electrical Engineer (Qatar)
Mechanical Engineer (Qatar)
Public Health Engineer (Qatar)

If you are interested in joining our committed, professional team and have the relevant experience and qualifications, then please email your application with a full CV, indicating which vacancy you are applying for, to: jobs@desco.uk.com

Direct applications only please; recruitment agency applications will not be considered.

We are an equal opportunities employer



GREENWICH, A GREAT PLACE TO LIVE, VISIT AND WORK.

HEATING & VENTILATION ENGINEER

£30,987 - £33,510

REF: DRES031JUL11

This role at Greenwich Council will give you plenty of scope to enhance both your Heating and Ventilation Engineering knowledge and career. You'll hone your skills on a wide range of tasks. What's more, you'll help keep offices, libraries and schools across Greenwich running smoothly and safely.

From designing and supervising both minor and major installation works, to drawing up specifications and carrying out site inspections and producing cost estimates, your technical tasks will be wide ranging. You will manage and issue work to the groups assistant heating engineers. Equally important will be the way you communicate with a range of contacts, from contractors to clients making enquiries.

You'll either have a relevant qualification in Heating & Ventilation Engineering (BSc, BTEC, HND or Higher) or an equivalent level of experience and have membership of the CIBSE. You've also have a strong knowledge of relevant Health and Safety legislation, and are familiar with all aspects of Heating & Ventilation installation methods systems and equipment.

ASSISTANT HEATING ENGINEER

£21,375 - £30,390

REF: DRES032JUL11

This role at Greenwich Council will give you plenty of scope to develop both your Heating and Ventilation Engineering knowledge and career. Working with, and learning from, both the Line Manager and other Engineers, you'll hone your skills on a wide range of tasks - and have the opportunity to take on extra responsibilities and get extra rewards. What's more, you'll help keep offices, libraries and schools across Greenwich running smoothly and safely.

From helping design and supervise minor installation works, to doing site inspections and producing cost estimates, your technical tasks will be wide ranging. Equally important will be the way you communicate with a range of contacts, from contractors to members of the public making enquiries.

You'll either have a relevant qualification in Heating & Ventilation Engineering (BSc, BTEC, HND or Higher) or an equivalent level of experience. You've also got a strong knowledge of relevant Health and Safety legislation, and are familiar with all aspects of Heating & Ventilation installation methods systems and equipment.

To apply please visit Greenwich Council's website www.greenwich.gov.uk go to the jobs opportunities page, download an application form and apply online. Guidance on how to apply online is available on the website.

Closing date for both posts : 5 December 2011.



Senior Electrical Engineer

London, £28 - £30p/h

A major international consultancy requires a senior electrical engineer on a contract basis. Successful candidates will have previously led projects from a client liaison and design perspective, with exposure to writing specifications, system selection and development of design criteria. Candidates will have worked on design of electrical services for data centres, hospital, and laboratory projects, with infrastructure, LV, HV and fire alarm experience. Applicants will be degree qualified in electrical engineering or building services, and preferably be a chartered engineer.

Ref: 717/PA

Senior Mechanical Engineer

Surrey, £45k + Benefits

The company work on commercial, mixed use developments and retail projects, the practice was established in 1998 and operates through 4 offices in the UK. The successful candidate will have worked on commercial or retail projects, and be fully conversant with Hevacomp calculation software. Responsibilities will include completing tender packages, preparation of budget reports, initial and detailed design of mechanical building services. The ideal candidate will have completed a degree in mechanical engineering or buildings services, and possess strong client facing skills.

Ref: 714/JA

Senior Mechanical Engineer

Middlesex, £45k + Benefits

Our client is involved in innovative Building Services solutions and is the preferred choice with clients seeking low energy designs within the education, commercial, retail and healthcare industries. All applicants should possess the ability to demonstrate a strong interest in and experience in the execution of sustainable solutions, and will be responsible and accountable for the overall design, technical delivery, quality and management of projects within defined budget and timescales.

Ref: 520/PA

Senior Mechanical Engineer

London, £28 - £30 per hour

A major international consultancy requires a senior mechanical design engineer on a contract basis. Successful candidate will have previously led projects from a client liaison and design perspective, with exposure to writing specifications, system selection and development of design criteria. Candidates will have worked on design of mechanical services including air conditioning, heating and ventilation services. Candidates previously used IES and Hevacomp software. Applicants will be degree qualified in mechanical engineering or building services, and preferably be a chartered engineer.

Ref: 718/PA

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

Discover your future at www.b-a-r.com



Thinking of your future



Our Company

The Ramboll Group now employs over 10,000 staff in 200 offices worldwide. With more than 60 years' experience, we have an engineering culture that sets industry standards.

We are an award-winning employer, recognised for creativity and professional rigour as well as the emphasis we place on supporting individual career paths and helping people to lead and inspire. What unites us is a shared commitment to excellence in design.

Our Culture

Ramboll has won numerous awards for design innovation and excellence. Our genuine passion for engineering informs everything we do.

We take a fully integrated multi-disciplinary approach to our work. Bespoke teams are assembled on a project by project basis ensuring that the right expertise is brought to bear on each project.

Our Projects

Despite the difficult economical climate we, at Ramboll, have witnessed significant growth recently attaining a number of key large scale projects on a national and international platform.

Our Vacancies

We now have a number of vacancies for International Project Managers (SE level), Engineers and Technicians across the UK in the following disciplines:

- Civils/ Public Health
- Structures
- Mechanical
- Electrical
- CAD

We would be especially keen to hear from individuals who have competent/ fluent foreign language skills, in particular Russian (verbally and written) with a good understanding of Russian and knowledge of SNIP's Russian coding.

Your Future

If you are talented, with the drive, determination and commitment to progress your career within one of the cutting edge engineering specialists, apply online today.

www.ramboll.co.uk/careers/vacancies

All vacancies are listed under the appropriate discipline

Ramboll is an Equal Opportunities employer.

Carbon Reduction Manager Property Services, Birmingham £37,908 - £41,697

We are seeking an experienced individual to lead our approach to carbon reduction management, energy efficiency and sustainability issues. You will manage a carbon reduction programme and be the primary contact responsible for managing the CRCEES on behalf of the Force, ensure the Force's utilities are achieving best value, assisting in setting and embedding change and developing a building environment strategy.

You will be expected to have extensive knowledge and experience of energy/utility procurement and management, including managing budgets, working with computerised energy management, BMS, targeting and monitoring systems with an understanding of sustainable construction. An ability to produce mandatory Display Energy Certificates as well as an understanding of the BREEM rating system would be required.

A clear understanding of current and pending energy legislation is essential and knowledge of all the likely carbon and energy issues that the Force faces is also key. You will either possess or work towards accredited energy assessor status.

Ideally, you will have strong project management experience with excellent analytical and communication skills and be able to demonstrate a good track record in the management of utilities and budgets as well as having sound knowledge of wider environmental issues. You should self-motivated and ready to deliver significant change.

For an application pack and role profile, visit:
www.west-midlands.police.uk/recruitment
or call the Shared Service Centre on 0121 626 5100.

Closing date: 12 December 2011



Serving our communities, protecting them from harm

47672



Constructing Relationships
Engineering Careers

Tailored recruitment for the Construction and Engineering industry.

CAD Coordinators

World Wide | £Neg | Ref: 12357

My client provides 2/D and 3D Building Information Modelling (BIM) services to architects, structural engineers, consultants and contractors for the construction industry worldwide. They are looking for a number of CAD Technicians UK & Middle East who must have experience in BIM, AutoCAD MEP, CAD Duct, and most importantly Revit.

Contact alex.hill@bsvrecruitment.co.uk

Technical Services Manager

London | £50-55k + Bens | Ref: 12346

Our Property Management client requires a rounded Chartered engineer to develop a service strategy and business plan for their clients numerous blue chip clients. Responsibilities will include completing M&E Asset Register Verification Surveys and Reports, providing Lifecycle Analysis of M&E Assets, liaising with External M&E Consultants as appropriate. This is an excellent client representative role with prospects.

Contact darren.warmington@bsvconsultants.co.uk

M&E Quantity Surveyors

London | from £55k + | Ref: 12357

Contact darren.warmington@bsvconsultants.co.uk

For more vacancies please visit
www.bsvrecruitment.co.uk or call today.

T +44 (0) 1483 768600

E info@bsvrecruitment.co.uk

www.bsvrecruitment.co.uk



Opportunities in Australia for Buildings Industry engineers

live your ideas.

Image courtesy CHBW, Alison Paine

Are you an experienced building design or project management professional looking for a lifestyle change down under?

Aurecon is a specialist leading, vibrant and global technical services and engineering consultancy that operates in robust expanding markets globally.

Our people are empowered to deliver our vision – fostering human achievement and to enhance communities in partnership with our clients.

Due to significant growth we currently have opportunities for design engineers and managers with experience working in the buildings sector to work on some of Australia's high profile projects.

We have opportunities for:

- Senior/Lead Structural Engineers (Perth and Adelaide)
- Senior/Lead Building Services Engineers – Mechanical and Electrical (Perth and Adelaide)
- Senior Fire Safety Engineers (Perth)
- Senior/Lead Acoustics Engineers (Perth)
- Hydraulics Engineers (Perth)
- Project Managers (Adelaide)

Successful applicants will also be provided with visa sponsorship and relocation assistance.

Applications are sought from direct candidates only.

To register your interest visit careers.aurecongroup.com and apply under job number 781047.

Please contact Vlad Jelinek +61 8 9223 1548 or vlad.jelinek@aurecongroup.com



Leading. Vibrant. Global.

Foster + Partners

We are expanding our in-house engineering team. This builds on our conviction that design should be a completely integrated process.

The team has the opportunity to work on some of the most exciting and challenging projects in the world, developing them from first concepts to completion and into use.

We are seeking candidates who are passionate about engineering design, technically strong and

keen to participate in the development of a new and growing group in a dynamic and collaborative environment.

You will need the ability to think creatively and beyond the conventional and should have a particular interest in sustainable building and systems design. As you will be part of an integrated team, good interpersonal as well as good communication skills (both verbal and visual) and a flexible attitude are essential.

The following positions are available:

Mechanical Engineering Leaders at Senior Levels (Ref: LSME1111CIBSE)

Candidates applying for the Mechanical Engineering Leadership positions need to be Chartered Engineers and have proven ability to inspire, lead, organise and integrate the work of internal and external mechanical engineering and multi-disciplinary teams.

Considerable relevant experience in the design of a broad range of mechanical building services is essential and site-wide infrastructure experience will be beneficial.

Electrical Engineers (Ref: LEE1111CIBSE)

Environmental Water/ Public Health Engineers (Ref:LEWPHE1111CIBSE)

Candidates applying for the Electrical Engineer or Environmental Water Engineer/ Public Health Engineer positions must be a Chartered Engineer or nearing Chartership.

They will need the ability to formulate designs and present them for discussion. A proven track record in a broad range of electrical or water services is essential and site-wide infrastructure experience will be beneficial.

Graduate Mechanical Engineers (Ref:LGME1111CIBSE)

Candidates for the Graduate Mechanical Engineer must be training or intending to train to become Chartered Engineers and have a keen interest in sustainable building and systems design.

The ability to use some of the following: IES, Energy Plus, Energy Pro, Wind Pro, MicroStation and InDesign would be an advantage.

More information about Foster + Partners and the job descriptions can be found at: www.fosterandpartners.com

To apply please send a covering letter and CV stating the reference number to: careers@fosterandpartners.com

Foster + Partners
Riverside, 22 Hester Road, London, SW11 4AN

Foster + Partners
is an equal opportunities employer

Events & Training

NATIONAL EVENTS AND CONFERENCES

Annual Conference of the National Insulation Association 2011 01 December 2011, Harrogate

This event is relevant for all those involved in solid wall insulation, cavity wall insulation, loft insulation and draft proofing.
www.nationalinsulationassociation.org.uk

All Hands on DEC! 08 December 2011, London

How DEC's, monitoring and metering are highlighting good and bad performance in building services.
www.cibsetraining.co.uk

Indoor air quality, air distribution and ventilation: striking a balance between quality and efficiency 25 January 2012, London

Exploring the conflicts involved in ventilation and giving you the tools you need to provide good indoor air quality in your projects.
www.cibseawards.org

CIBSE Building Performance Awards 2012 08 February 2012, London

The CIBSE Building Performance Awards recognise, reward and celebrate the best performance, innovation and practice in buildings.
www.cibseawards.org

The Lift Show 2012 18-19 April 2012, London

A number of industry-leading specialists will be presenting keynote sessions during the exhibition. The general theme will be cost-saving and efficiency.
www.thelifshow.com

The ARC Show 2012 29 February - 1 March 2012, Islington

Lighting show focusing on global architectural, retail or commercial lighting. Plus new sustainability, and healthcare and education feature areas.
www.thearcshow.com

SOCIETY OF LIGHT AND LIGHTING

Mid Career College: lighting basics 1 – light, sight and colour 07 December 2011, London

An introduction for delegates who need an understanding of the physical and psychophysical aspects of lighting.
www.cibsetraining.co.uk

Mid Career College: lighting basics 2 – lamps and luminaires 08 December 2011, London

Light production and its application to produce practical light sources. Plus, the principles of light control and its application to practical luminaires.
www.sll.org.uk

Follow the code? 13 December 2011, London

Exploring the new Code for Lighting, and should designers be allowed to break the rules?
www.sll.org.uk

CIBSE GROUPS AND REGIONS

CIBSE West Midlands Region Annual Dinner 02 December 2011, Birmingham www.cibse.org

DW145 Fire & Smoke Dampers Guide 05 December 2011, Cardiff Details to be confirmed www.cibse.org

CIBSE Peninsular Region – Winter Social 06 December 2011, Plymouth Including a trip to the Planetarium www.cibse.org

Sunlight, health and circadian rhythms – are these design issues? 07 December 2011, London Speakers: Richard Hobday, Becca Hotopf, and John Mardaljevic www.cibse.org

CIBSE Intelligent Building Group seminar on Intelligent Cities

8 December, The Science Museum, London

This event will be a comprehensive one-day programme that will bring together stakeholders to discuss how today's cities can make the transition to sustainable, liveable cities through the large-scale adoption of intelligent systems.

During the day experts from government, academia, and business will explore intelligent cities from strategic, architectural, financial, and social perspectives. You will obtain insights from thought



leaders who are laying the foundations of intelligent cities and building the convergent physical and digital infrastructures that will manage the urban spaces in which we live.

This event will take place

at the inspirational London Science Museum and is free to attend due to the generous sponsorship of Accenture.

Places are limited and prior registration is required. For more information visit www.cibse.org/ibg

CIBSE East Midlands Region – Christmas Celebrity Lunch 07 December 2011, Kegworth

Christmas Celebrity Luncheon with Derek Randall as the guest speaker.
www.cibse.org

CIBSE Intelligent Buildings Group seminar on Intelligent Cities 08 December 2011, London See box above www.cibse.org

Heating and hot water by refrigeration 15 December 2011, Bristol A detailed look at the technology involved within a heat pump. www.cibse.org

Fire Alarm Systems 09 January 2012, Cardiff Details yet to be announced. jno@neiloliver.plus.com

Society of Public Health Engineers – selection and application of cold water booster sets 10 January 2012, London Details to be confirmed. www.cibse.org/sophe

Society of Public Health Engineers – the history of the present day 18 January, 2012 Manchester Details to be confirmed. www.cibse.org/sohpe

Annual East Anglia Region empowering debate 12 January, 2012 Ipswich Details to be confirmed. jonathan.page@mlm.uk.com

CPD TRAINING

Visit www.cibsetraining.co.uk, call 020 8772 3660 or email eventbookings@cibse.org

Building Drainage Explained 13 December 2011, London

Introduction to BS 7671:2008 requirements for electrical installations incorporating amendment 1 – July 2011 13 December 2011, London

Rainwater harvesting and greywater recycling in the sustainable environment 14 December 2011, London

LCEA EPC Training 10-11 January 2012, London

Energy Efficient Façade Design 17 January, Manchester

Air conditioning inspection for buildings 17 January 2012, Birmingham

Building electrics basics 1: choosing electricity supplies 18 January 2012, London

Mechanical Services Explained 18 January 2012, Manchester

Building electrics basics 2: distribution systems and equipment 19 January 2012, London

Lighting basics 3: interior lighting applications 19 January 2012, London

Smoke control: matching the method to the building 24 January 2012, London

Getting Ready for Green Deal 2012 24 January 2012, London

Running Projects Effectively 25 January 2012, London

Energy Surveys 26 January 2012, London

Low and zero carbon energy technologies: undertaking feasibility studies and understanding design considerations 31 January 2012, London

Send your event details to cbailey@cibsejournal.com

So much power. So little space.

Eurocondense three.
Aiming higher.



The high performance, "smaller footprint" condensing boiler from Potterton Commercial.

Established values.
Leading edge technology.

Baxi Commercial Division
0845 070 1055

POTTERTON
COMMERCIAL
www.pottertoncommercial.co.uk

CMR

in complete control

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

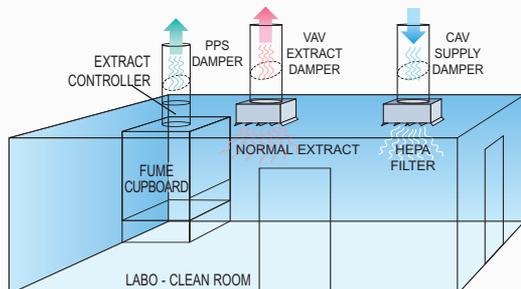


DPM PRESSURE SENSOR

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

AIR MANAGEMENT SYSTEM

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



PRECISION COMPONENTS FOR VENTILATION AND PROCESS CONTROL

CMR CONTROLS

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

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



DPC CONTROLLER

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

CAV AND VAV DAMPERS

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

Metal Damper



PPS EXTRACT DAMPER

Poly-propylene 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

