

# CIBSE

JOURNAL



The official magazine of the Chartered Institution of Building Services Engineers

August 2013

## HEAT RETENTION

Design best practice for district heating

## GROUND WORKS

Oxford University maximises heat pump efficiency

SOUND & VISION™

# Guaranteed SAVINGS

Sainsbury's reveals carbon cutting strategy

CARBON EMISSIONS - UP TO 30% OFF

Available now!

# Why Vaillant?

Because with outputs ranging from 80kW to 120kW and cascades of up to 960kW, the beauty of our new commercial boilers is more than skin deep.



### Models:

- Wall hung boilers
- 80, 100, 120kW
- Stainless steel heat exchanger

### Cascade rigs:

- Wall to wall
- Back to back
- L-shaped
- Full pipework and insulation
- Cascade flues
- Low loss header

### Integrated in the boiler or separate as an accessory:

- Modulating shunt pump
- Isolation valves
- Pressure safety valve
- Gas isolation valve

### Controls:

- Compatible with Vaillant controls
- Compatible with BMS systems
- Boiler management system VRC630
- Boiler and solar integrated management system VRS620

For more information or to contact your local business manager please call **0870 240 7545** or visit [www.vaillantcommercial.co.uk](http://www.vaillantcommercial.co.uk)

- Heating
- Hot Water
- Renewables



Because  **Vaillant** thinks ahead.

# Contents

## NEWS

### 7 News

Engineers tackle overheating; Barker sets domestic RHI tariff; *CIBSE Journal* readership survey now online; industry gets to grips with resource efficiency; DECs need fixing not replacing

### 12 CIBSE News

Institution launches Building Performance Awards 2014; visit to historic Paternoster lift; find out how the benevolent fund is helping members

## OPINION

### 16 Letters

BIM and the building services engineer; zero carbon logic behind the code; the risks of nuclear delay

### 17 Feedback

Industry responds to CIBSE president George Adams' first blog

### 18 Don't blame heat pumps

The real problem is the way buildings are designed and procured in the UK

### 20 Regulations

What the Energy Savings Opportunity Scheme is really all about

**'Because district heating systems are so large, the effects of failing to design an efficient system are magnified'**  
Page 32

22



## Features

### 22 Are you sitting comfortably?

A clear and comprehensive definition of overheating is finally here, explained in full by CIBSE's TM52 guidance

### 26 Beyond the fridge

Supermarket giant Sainsbury's has set itself the challenging target of slashing its carbon emissions by 30% in seven years. But can it cut the mustard?

### 32 Foiling the great escape

It's vital that clients' essential focus moves from cost cutting to long-term performance when installing district heating systems

### 36 All hands to the pump

When an innovative ground-source energy system failed to live up to expectations, the original project team stepped up to the plate

### 42 Making hospitals feel better

ASHRAE's *HVAC Design Manual for Hospitals and clinics* gives new advice on heating and ventilating clinical spaces

### 58 Waste under the knife

Barts Health NHS Trust reveals how it has slashed its energy bill by £105,000 in two hospitals by persuading workers to close doors and turn off lights and equipment

## LEARNING

### 45 CPD

Biomass for commercial building heating systems

## CLASSIFIED

### 50 Products

A round-up of gadgets and services for the industry

### 55 Directory

A guide to suppliers

## JOBS

### 56 Appointments

Jobs at [jobs.cibsejournal.com](http://jobs.cibsejournal.com)

# Ruskin Air Management Limited



## *action*air

Dampers Controls Fancoils

South Street, Whitstable  
Kent, CT5 3DU

Tel: 01227 276100

Fax: 01227 264262

Email: [sales@actionair.co.uk](mailto:sales@actionair.co.uk)

Website: [www.actionair.co.uk](http://www.actionair.co.uk)



## Air Diffusion

Grilles Diffusers Louvres Chilled Beams

Stourbridge Road, Bridgnorth  
Shropshire, WV15 5BB

Tel: 01746 761921

Fax: 01746 760127

Email: [sales@air-diffusion.co.uk](mailto:sales@air-diffusion.co.uk)

[sales@air-diffusion.co.uk](mailto:sales@air-diffusion.co.uk)

Website: [www.air-diffusion.co.uk](http://www.air-diffusion.co.uk)



Louvres Sunscreens Natural Ventilators

Stourbridge Road, Bridgnorth  
Shropshire, WV15 5BB

Tel: 01746 761921

Fax: 01746 766450

Email: [sales@naco.co.uk](mailto:sales@naco.co.uk)

Website: [www.naco.co.uk](http://www.naco.co.uk)

**World Class Company.**

**[www.ruskinuk.co.uk](http://www.ruskinuk.co.uk)**



www.cibsejournal.com

#### Editorial

**Editor:** Alex Smith  
Tel: 01223 273520  
Email: asmith@cibsejournal.com  
**Deputy editor:** Carina Bailey  
Tel: 01223 273521  
Email: cbailey@cibsejournal.com  
**Senior designer:** Dean Farrow  
**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  
**Senior sales executive:** Paul Wade  
Tel: 020 7880 6212, paul.wade@redactive.co.uk  
**Advertising production:** Jane Easterman  
Tel: 020 7880 6248, jane.easterman@redactive.co.uk

#### For CIBSE

**Publishing co-ordinator:** Neil Walsh  
Tel: 020 8772 3696, nwalsh@cibse.org

#### Editorial advisory panel

**George Adams**, engineering director, Spie Matthew Hall  
**Bakar Al-Alawi**, mechanical building services engineer, Atkins  
**Patrick Conaghan**, partner, Hoare Lea Consulting Engineers  
**Rowan Crowley**, director, insidetrack  
**James Fisher**, e3 consultant, FlaktWoods  
**David Hughes**, consultant  
**Philip King**, director, Hilsen Moran  
**Nick Mead**, group technical director, Imtech Technical Services  
**Jonathan Page**, building services consultant engineer, MLM  
**Dave Pitman**, director, Arup  
**Christopher Pountney**, senior engineer, Aecom  
**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

**Printed by:** Warners Midlands PLC

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 Neil Walsh at nwalsh@cibse.org or telephone +44 (0)20 8772 3696. Individual copies are also available at a cost of £7 per copy plus postage.

The 2013 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 46th 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 46th Street, Jamaica, New York, NY 11434.



ABC audited circulation:  
18,558 January to  
December 2012



# Hot and bothered

As I type, Britain is sweltering through its longest heatwave since 2003. External temperatures have soared to 33.5°C and it's not much cooler in homes and offices as, once again, the inability of the UK building stock to deal with a hot summer is exposed.

With climate change predicted to increase temperatures by at least 2°C, extreme weather events will be a regular feature of the British summer. And the 2°C figure is only an average predicted increase – global warming could cause sustained temperatures of that are 10°C warmer than the norm in certain circumstances.

The UK is fortunate in having relatively mild weather – in less temperate zones with a continental climate the impact of global warming is much more extreme. Where air conditioning is standard, the strain on power companies during hot weather is immense. Only last month, power use in New York State reached an all-time record of 33,955 MW, as consumers responded to 100°C temperatures by cranking up the air conditioning. Excessive demand can have critical consequences. In 2003 a baking hot day in Ontario triggered a blackout affecting 45m people in eight US states, and 10m in Canada.

Part of the problem is that many buildings have been built without taking overheating into account. Glazed towers may offer users light (and glare) but they rely on air conditioning to keep people cool, while highly insulated buildings that protect occupants against cold winter days, can be prone to overheating in the summer.

The challenge of adapting our cities to mitigate against rising temperatures was a key theme of George Adams' presidential address. The question of 'peakiness' and urban heat

islands was also addressed at a recent conference organised by CIBSE's Natural Ventilation Group, with participants suggesting a range of solutions, including more planting, use of reflective surfaces and low-energy lighting, and a return to more traditional building principles.

The publication of two CIBSE Technical Memorandums by the Overheating Task Group could not be more timely (page 22). *TM52: The limits of thermal comfort: avoiding overheating in European Buildings* offers a clear definition of overheating, while *TM49 Probabilistic Design Summer Years for London*, helps engineers accurately predict the risk of overheating in the capital. Specialist guides such as these should help ensure future generations are sitting more comfortably than I am at the moment.

**Alex Smith, Editor**

asmith@cibsejournal.com



**COMMITTED TO LOWERING CARBON OUTPUT  
THROUGH EXCELLENCE IN SYSTEM EFFICIENCY**

**CIBSE BUILDING  
PERFORMANCE  
AWARDS 2014**  
— Sponsor —

# Lower Carbon Output by Optimising Hydronic Stability

## Pressurisation Systems

To control system pressures and condition refill water

## Deaeration Equipment

To remove air, inhibit build up of corrosion and other contaminants, reduce energy cost

## Dirt Separators

To remove circulating particulates, provide long term protection and reduce maintenance cost

## System Analysis

To diagnose problem systems and plan how to provide best long term solution

## Chemical Treatment

To clean & add protection to your investment

## Spirotech Total Solutions



The Spirotech Solution is comprehensive and seamlessly integrates all relevant disciplines. We can only ever have the customer's best interest in mind.

Over the life of the system, this provides the most cost effective solution as it removes the strong dependency that the industry places on an expensive Chemical Regime to achieve Hydronic Stability and allows the system to operate at its optimum efficiency.

From designing New Installations through to problem sites, Spirotech Total Solutions are your first point of contact.

Now represented in over 60 Countries

**THE ONLY COMPANY THAT PROVIDE COMPLETE CONTROL  
AND CONDITIONING OF YOUR SYSTEM'S FLUID**

*To find out how we can lower your overall project cost, arrange a meeting with one of our sales engineers today.*



40 years of experience  
and full system knowledge

**SPIROTECH**  
FOR BETTER PERFORMANCE

T: 0208 451 3344 | [www.spirotech.co.uk](http://www.spirotech.co.uk) | F: 0208 451 3366 | [info@spirotech.co.uk](mailto:info@spirotech.co.uk)



## Engineers tackle overheating

### ● CIBSE guides designed to deal with warmer summers caused by climate change

A new CIBSE technical guide is calling for building service engineers to take a more comprehensive approach towards preventing overheating in commercial buildings (see page 22).

*TM52 The Limits of Thermal Comfort: Avoiding Overheating in European Buildings*, aims to provide detailed instructions on how to lower the risk of overheating during hot weather using dynamic modelling and integrated systems management.

Lead author Fergus Nicol said: 'There are a lot of different ways to respond to overheating, but we must try to consider every factor and account for changes in weather patterns.'

'What it requires is a really holistic attitude. We cannot just deal with one issue at a time.'

The *TM52* guide outlines the findings of the CIBSE

Overheating Task Force, which was created in response to concerns that buildings heavily insulated to save energy costs during the winter posed potential health risks at warmer times of the year. This coincided with reports that domestic properties could suffer from severe overheating and poor air quality if they had been insulated as part of the Green Deal.

*TM52* will be followed by another technical memorandum, *TM49 Probabilistic Design Summer Years for London*, which will provide more detailed and up-to-date weather data for London. Due to be published in the next month, *TM49* analyses the variations in climate across London, based on the 'urban heat island', and makes recommendations for building designs.

Dr Anastasia Mylona, environmental data co-ordinator for CIBSE, said: 'As the climate heats up, there will be many more extreme instances of overheating. It should be treated as a health and safety issue.'

[www.cibseknowledgeportal.co.uk](http://www.cibseknowledgeportal.co.uk)

## Barker sets domestic RHI tariffs

Four years after the scheme was announced, Energy and Climate Change Minister Greg Barker has announced the tariffs that will be payable under the domestic version of the Renewable Heat Incentive (RHI).

The scheme is due to start in April, next year, with payments to householders set at: 7.3p/kWh for air source heat pumps; 12.2p/kWh for biomass boilers; 18.8p/

kWh for ground source heat pumps and 19.2 p/kWh for solar thermal water-heating systems.

Industry observers said the RHI could result in paybacks on heat pump installations of about five years and welcomed the higher-than-expected payments for solar thermal.

Anyone who has installed a renewable heat technology since 15 July 2009 will be eligible.

Payments will be made on a quarterly basis for seven years. In most cases, they will be based on estimated heat demand of the property.

'After years of frustrating delays, the government has finally stepped forward and shown its commitment to renewable heat,' said Chris Davis, chairman of the BEAMA Domestic Heat Pump Association.

## MPs call for late payment penalties

A group of MPs has called for legislation to reform the payment record of construction companies.

The cross-party group, chaired by Labour MP and fair payment campaigner Debbie Abrahams, demanded a code of conduct to protect small and medium-sized firms and reform the current system of payment retentions.

Calling for 'urgent action', the MPs described the construction industry as among the worst offenders for late payment and said that small companies were regularly 'bullied' into accepting poor payment terms.

Fair payment should be enshrined in public sector contracts, according to the group, with tier one contractors required to be paid within 14 days; tier two firms within 19 days and tier three contractors within 23 days. Main contractors who fail to adhere to these schedules should be excluded from tenders, with payment history made part of the pre-qualification process.

Retention money should be held in trust to avoid unfair future payment delays, the inquiry concluded. The proposed code of conduct would be regulated by an independent ombudsman with the power to settle disputes.

## CIBSE Journal readership survey now online

The *CIBSE Journal* 2013 readership survey is now online. We are interested in hearing your views on the content of the magazine and understanding more about your readership habits. The survey takes about five minutes to complete and will help shape the future of the *Journal*.

Completing the questionnaire is quick and simple and all readers will be sent an email with the link to the survey, or it can be accessed now at [www.cibsejournal.com](http://www.cibsejournal.com)

Results will be published in a forthcoming issue – keep your eyes peeled.

## In brief

### ANDY FORD JOINS LONDON SOUTH BANK UNIVERSITY

Former CIBSE President Andy Ford has joined London South Bank University (LSBU) as professor of systems engineering in the built environment.

Formerly technical director at Mott MacDonald and a founder of Fulcrum Consulting, Ford said his focus would be on helping the university 'develop courses for future engineers that embrace holistic systems thinking and cross discipline boundaries'.

'We will aim to empower our students to play their part fully in addressing the challenge society faces in a resource constrained world, as we struggle to cope with both an expanding urban population and dangerous climate change,' he added.

### INDUSTRY 'NEEDS MULTI-DISCIPLINARY FOCUS'

Building engineering sector firms must take a 'complete and multi-disciplinary' view to prosper, according to the new president of the Building and Engineering Services Association (B&ES) Bruce Bisset.

He said the 'long and ferocious economic downturn' had created unprecedented change, which was also fuelled by 'technological advances, improved working practices and the emergence of the low-carbon economy'.

B&ES members also chose Andy Sneyd, of Crown House Technologies, as president elect, and Jim Marner of Shepherd Engineering Services, as vice-president. Roderick Pettigrew has also been appointed chief executive of B&ES, succeeding Blane Judd.

### AWARDS GET NEW BACKER

Renewable heating and air conditioning supplier Daikin UK has joined Ruskin Air Management and Lochinvar as a sponsor of this year's CIBSE Young Engineers' Awards.

Taking place on 9 October 2013 at the Institution of Mechanical Engineers in London, the awards scheme combines the CIBSE ASHRAE Graduate of the Year and CIBSE Employer of the Year awards.



Andrew Cooper (left) and Bill Bordass (right) took part in the debate

# DECs need fixing not replacing

## ● CIBSE Energy Performance Group debate backs Display Energy Certificates

Display Energy Certificates (DECs) are far from perfect, but remain the best way currently available for clients to assess the performance of their buildings, a lively CIBSE debate has agreed.

Andy Stanton, of Transport for London, urged other clients to use DECs as widely as possible at CIBSE Energy Performance Group's Great DEC Debate. 'There are lots of claims made about building performance that are not backed up by any data,' he told the debate, which was hosted by the CIBSE Energy Performance Group at the London headquarters of Legal & General.

Ahead of the discussion, the Better Buildings Partnership (BBP), which represents major London developers, reiterated its desire for DECs to be made mandatory on all buildings.

However, commercial property consultant Andrew Cooper said it would not get the result it hoped for because the current system was flawed.

'DECs are good in theory, but the methodology is not

good enough,' he said. 'They are not operated by the government and are not supported by the industry in their current form.'

The fact that they only have to be renewed every 10 years makes them 'worth even less than an EPC [Energy Performance Certificate]', he added.

However, Bill Bordass, of the Usable Buildings Trust, said DECs were broken, but needed 'fixing not replacing'. He urged the government to show more enthusiasm for performance benchmarking as that would demonstrate the value of DECs and improve awareness of energy use in buildings.

Lack of enforcement is undermining the DEC system, according to BSRIA's Rod Bunn, who described DECs as a 'dead end'. 'We need to close the feedback loop between handover and building operation,' he added.

'DECs in their current form will not transform the market,' said Bunn. 'We need something better.'

However, Stanton said more private-sector building owners should 'mandate DECs' as that would deliver the volume of energy data needed to change the government's mind about rolling-out DECs across the whole building stock.

# Better predictions can close gap

The performance gap is often exaggerated because designers don't always carry out the accurate estimates of operational energy use at the design stage, according to a new CIBSE guide.

TM54 suggests that many buildings are not performing as well as hoped because actual energy use is being compared to the Part L calculation, which is not an appropriate tool for predicting energy use.

Dave Cheshire, AECOM regional director and co-author of the Technical Memorandum, said: 'The calculations used to demonstrate compliance with Part L are

not intended as predictions of operational energy use'

*CIBSE TM54 Evaluating Operational Energy Use at the Design Stage* explains the differences between Part L

## Part L is not an appropriate tool to demonstrate energy use

calculations and estimates of energy use, based on realistic assumptions.

It gives examples of how to run scenarios and recommends that the sensitivity of different

options is tested to determine the potential range of performance.

The guidance suggests how to present the results by running different scenarios to reflect the level of uncertainty of the estimates.

Cheshire said: 'The aim of the guidance is to enable designers to make better estimates of operational energy, identify the range of possible outcomes and, therefore, show how designs can be improved to deliver on the predictions'.

An article on TM54 will be in the next *CIBSE Journal* and the guidance will be out later this year.

# Industry gets to grips with resource efficiency

## ● WRAP/CIBSE workshops reveal M&E best practice

A collaboration between CIBSE and the WRAP to reduce resource waste has identified industry initiatives that could lead to changes in the way that building services are designed and delivered

CIBSE is working with WRAP 'to increase awareness of the opportunities and business benefits of resource efficiency'. Aecom was appointed to run seven workshops and to develop technical guidance for the industry.

Initiatives include a tool being developed by Imtech in partnership with Oxford Brookes University, which calculates the embodied energy of building services.

The ventilation workshop included a debate on the potential benefits of lightweight ductwork such



Cardboard ductwork

as pre-insulated ductwork and an innovative new cardboard duct developed by Gatorduct, which has considerably lower embodied energy, as well as reduced transportation costs, compared to conventional galvanised steel.

Meanwhile Philips Lighting said it was developing a 'Pay-Per-Lux' service, developing products that can be maintained and upgraded, rather than disposed of at end of their operating life.

For The Enterprise Centre – a new low carbon exemplar building at the University of East Anglia – BDP and Architype said

that they were working to reduce the embodied energy of both the fabric and services

The findings will be developed into a CIBSE Technical Memorandum on resource efficiency of building services, and CIBSE is keen to hear about further examples via [resourceefficiency@cibse.org](mailto:resourceefficiency@cibse.org)

## Firms need to find £1.9bn energy savings

Large businesses could save almost £2bn through new energy efficiency assessments produced by the Department of Energy and Climate Change (DECC).

The Energy Savings Opportunity Scheme (ESOS), being developed as part of the UK's implementation of the EU Energy Efficiency Directive, can show firms how to make average annual savings of £56,400 per year for an investment

of £15,000, the department claimed.

DECC is running a consultation on the planned scheme until October 3.

Energy Minister Michael Fallon said there would be no legal requirement to implement the energy-saving measures identified, but the assessments could encourage large businesses, charities and other organisations to

consider the benefits of investing in energy-efficiency.

'Net social benefits of £1.9bn could be achieved, even if just 6% of the potential energy savings identified through assessments were implemented,' he added.

The consultation document can be found on CIBSE's website, and responses should be submitted to [www.cibse.org/consultations](http://www.cibse.org/consultations)

Turn to page 20 for more on ESOS

## In brief

### GOVERNMENT CLAIMS £447M PROCUREMENT SAVINGS

The government has announced £447m worth of savings in public sector procurement in the past year by making use of better working practices. As a result, it has published new benchmarks designed to reduce project costs even further and to deliver 20% overall savings by 2015.

### SERVEST BUYS MAXWELL STEWART

Facilities management firm Servest has acquired the mechanical, maintenance and building services business Maxwell Stewart. The combined business will have annual sales of about £225m.

'This acquisition is part of our growth strategy, which we aim to achieve through a mix of organic growth and further purchases,' said Rob Legge, Servest Group chief executive officer UK and Europe.

### EVAPORATIVE COOLING PAPER

HEVAC's Humidity Group has launched a new white paper on evaporative cooling with cold water humidifiers.

It presents evaporative cooling as an alternative or supplement to mechanical means and is available from the Humidity Group's section at [www.feta.co.uk](http://www.feta.co.uk).

The white paper gives an overview of the technique and outlines typical applications.

## OUT WITH THE SOLDER in with the new



**UP TO 3X  
FASTER  
TO INSTALL\***

Introducing **TracPipe®**  
the revolutionary, flexible alternative to rigid copper or steel gas piping.

**Key TracPipe® Benefits...**

- Bend by hand
- Up to 75% time savings\*
- No hot work
- Long lengths & fewer joints
- Lower installed cost



Visit: [www.tracpipe.co.uk](http://www.tracpipe.co.uk)  
call: +44 (0) 1295 67 66 70  
Email: [eurosales@omegaflex.net](mailto:eurosales@omegaflex.net)  
or contact your local merchant.

Manufactured in the UK  
**TracPipe®**  
Flexible Gas Piping by Omega Flex

\* Compared to copper pipe installation.

## New strategy must tackle old problems

The new Industrial Strategy for Construction, launched in July by Business Secretary Vince Cable, will only achieve its aims if it tackles deep-seated structural problems in the industry, says the Specialist Engineering Contractors' (SEC) Group.

The strategy aims to achieve a 33% reduction in capital and whole-life running costs of buildings; a 50% reduction in the time taken from inception to completion for new build and refurbished projects; and a 50% cut in greenhouse gas emissions – all by 2025.

It is also intended to develop a co-ordinated approach to engaging young people; consider a process to identify specific areas where regulatory risk is creating concern to the construction industry; develop a business case for how to remove bureaucracy from the construction procurement process by adopting standard Pre Qualification Questionnaires and applying them through the supply chain; and develop a construction-specific approach to the prompt payment code.

'The strategy is about transforming our levels of performance with high-end skills, innovation and use of digital technologies, but to achieve this it also requires that we ditch decades of outdated and wasteful practices,' said SEC Group chairman Trevor Hursthouse.

## UK and Europe growth subdued

UK and Europe will experience just 2.7% growth in building and infrastructure over the next decade, according to a study by the consultancy EC Harris.

Produced in conjunction with the Centre for Economic and Business Research, the Global Built Asset Wealth Index quantifies the accumulated wealth of 30 countries' built assets as an indicator of economic health and growth potential.

China is set to become the wealthiest built asset nation next year – overtaking the US.

View the full report at [www.echarris.com](http://www.echarris.com)

# Investors promised big returns on energy efficiency projects

## ● £100m fund is backed by government and city firm

A £100m fund has been launched to invest in energy efficiency projects promising healthy returns for private investors within five years.

Backed by City firm Sustainable Development Capital (SDCL) and the Government's Green Investment Bank, the new fund is seeking energy demand and cost-reduction projects in UK non-domestic buildings, industrial facilities and infrastructure.

The backers told a high profile launch at the Royal Institution that energy efficiency offered lucrative returns for private investors, but

that renewables were less attractive because of 'regulatory risks' and uncertainty over subsidies.

The BRE is providing technical support to the fund by carrying out energy assessments to establish the savings possible and post-occupancy evaluations to measure improvements. It will certificate that the running costs of the building have been reduced, which 'will improve the value of the asset'.

'Our job is to provide hard evidence to help minimise the risk involved for the investors in these projects,' said Rufus Logan, chief executive of BRE Scotland.

The partners are particularly interested in building retrofits that include upgrading lighting, heating,

ventilation and air-conditioning equipment and the use of voltage optimisation. They also actively promote combined heat and power (CHP) in larger projects and are looking for opportunities in district heating and heat networks. The fund will offer up to 100% of the cost of projects, typically around £2m.

Jonathan Maxwell, of SDCL, said opportunities to make money from energy efficiency schemes would increase dramatically.

'Ofgem has told us that there will not be enough energy at peak times from 2015 and from 2018 you will not be able to let a building below a certain energy rating, which means every F and G rated building will have to be retrofitted.'



## LATEST LONDON AIRPORT PROPOSAL TAXIS FOR TAKE-OFF

Gensler is behind the latest design for an airport in the Thames estuary. Britannia Airport is among the proposals submitted to the Airport Commission, which is assessing the future of Britain's aviation strategy. Testrad, the backer of the hub airport, said the six runways would be able to handle 172m passengers a year.

## FETA furious at F-Gas 'horse-trading'

The Environment Committee (ENVI) of the European Parliament (EP) has been accused of exploiting a loophole to deny MEPs the chance to influence 'extreme proposals to amend the F Gas Regulation'.

Cedric Sloan, director general of the Federation of Environmental Trade Associations (FETA), said the committee had 'to its great shame side-stepped the normal process' by voting to give its rapporteur a mandate to begin immediate negotiations with the European Council.

FETA believes MEPs should have been allowed an open discussion on the amendments.

'Effectively, this gives the rapporteur carte blanche to horse trade with member states behind closed doors,' said Sloan. 'He will be armed with a range of unpalatable measures, such as banning HFC refrigerants in air conditioning from 2020.'

'This callous act of political expediency should be seen in the context of a desire by Brussels to attend the Montreal Protocol meeting in November with a severe European agreement to phase down HFCs – in the mistaken belief that other nations would follow their ill-advised lead.'

He added that the owners, operators and users of HFC-based refrigeration and air conditioning equipment would be forced to 'pay the price of this political folly'.

The body that represents European contractors said that it was not surprised by the committee's decision.

'We are more disappointed with the attitude of some council members who can't seem to understand that there is a real opportunity to close the loophole that allows uncertified installers to continue installing small split systems,' said Graeme Fox, president of the Air Conditioning and Refrigeration European Association.



# A shining reputation for reliability.

For our customers it's comforting to know that as an engineering company we pride ourselves in technologies that last. Mitsubishi Heavy Industries (MHI) has a global heritage in air conditioning, heat pumps and chillers. With a vast range of dependable HVAC products, and a track record that speaks for itself, people have been warming to us for years.

Mitsubishi Heavy Industries Air Conditioning Europe Ltd (MHIAE) is a new company created by MHI for all HVAC solutions across Europe. MHIAE offers high-efficiency systems for cooling and heating air and water in residential, commercial and industrial applications. As a reputable engineering company with vast expertise and experience, we are fully equipped to meet all your HVAC needs.

[mhiae.com](http://mhiae.com)



**MITSUBISHI HEAVY INDUSTRIES  
AIR CONDITIONING EUROPE, LTD.**



Our Technologies, Your Tomorrow

## Call for entries

The 2013 Building Simulation Group Award for best MSc dissertation is now open to entries. It focuses on projects involving the application and development of advanced simulation techniques and/or software for predicting the performance of natural or mixed-mode (hybrid) ventilation systems. Full details of the entry criteria and prizes for the award, titled 'Simulation of ventilation in buildings', can be found at [www.cibse.org/bsg](http://www.cibse.org/bsg)

## Diversity message strikes a chord

Supporting CIBSE president George Adams' call for greater diversity and collaboration in building services engineering, the Home Counties North West region (HCNW) held a diversity workshop in central London.

Attendees heard talks from a wide range of speakers, defining many aspects of diversity and the benefits that the industry was already gaining. Work groups then explained how they could accelerate shifts in attitudes to bring a more integrated culture in the industry.

HCNW chairman Chris Jones said: 'We were really encouraged by the diverse audience and the unusually high proportion of women.'

HCNW expects to hold another workshop next year. For details about CIBSE regions, visit [www.cibse.org/regions](http://www.cibse.org/regions)

# Institution launches Building Performance Awards 2014



## ● Rewarding outstanding performance

The 2014 CIBSE Building Performance Awards launch took place on Wednesday 3 July, kindly hosted by Carbon Champion 2013, British Land, at its London headquarters.

Speaking to a full crowd, Justin Snoxall, head of the business group at British Land, presented the 2013 Client Energy Management of the Year winning entry, and explained the methods and tools used to transform energy use across British Land's estate, and the ambitions for future savings.

'British Land is delighted to have hosted the launch. We applaud initiatives such as these, as we believe that recognition of the investment made by companies to improve building performance will motivate and stimulate future thinking and innovation in this area,' Snoxall said.

CIBSE technical director and chairman of the judging panel Hywel Davies then outlined the categories for entry and added that post-occupancy evaluations would be desirable as supporting evidence for many of the categories, and encouraged participants to use the CarbonBuzz platform as a way of measuring building performance.

Davies also stressed the unique feature of the CIBSE Building Performance Awards – the fact that they recognise the businesses, teams, products and projects that deliver outstanding performance in the built environment.

CIBSE president George Adams concluded: 'Innovation and ideas are great, but it is their application that really counts. This is why the Building Performance Awards are so valuable – they reward actual, measured performance.'

For more information, and to enter the awards, visit [www.cibseawards.org](http://www.cibseawards.org)

## Find out how the Benevolent Fund is helping members

The Benevolent Fund is now in its 80th year and continues to provide help to CIBSE members, former members and their dependants who are in need, whether through sickness, bereavement or financial hardship. The fund recently published its annual report, the highlights of which are summarised below.

Standard grants are increased – most of the clients supported by the fund will now receive £350 every quarter instead of £300.

A scheme to help unemployed members get back into work has been introduced. This will provide part-funding for members to improve their skills at preparing a more polished CV and presenting themselves at interviews.

The fund's finances are in reasonably good shape, but donations from members in 2012 were down slightly from the previous year. The income from investments increased in 2012,

but is still below the level achieved in 2008.

The fund would like to extend thanks for the CIBSE regions' ongoing support. Regional support has shrunk over the past two years, but it is hoped more regions will give greater priority to the Benevolent Fund in their charity efforts. The fund also extends thanks to all the almoners who look after about 50 clients.

For more information about the Benevolent Fund, visit [www.cibse.org/benfund](http://www.cibse.org/benfund)



## Visit to historic Paternoster lift

### ● Largest ever-made Paternoster is restored

The CIBSE Lifts Group recently visited the Arts Tower at the University of Sheffield to view the historic Paternoster lift and to hear about its refurbishment.

The lift has a series of open compartments that move slowly in a loop up and down the building without stopping, with passengers able to step on and off at any floor.

The Paternoster was first built in 1884 by the engineering firm J & E Hall, of Dartford, and was known as the Cyclic Elevator. The lifts initially proved popular as they could carry more passengers than a standard elevator. They were relaunched in the 1920s, and again in the 1960s, but since then most

have been taken out of service because of safety concerns. Few now survive around the world, with the Paternoster in Sheffield being the largest ever made. With 38, two-person cars, it weighs more than 20 tonnes without passengers.

The building's listed status, plus a need to maintain the people-carrying capacity and expectations from English Heritage for the Paternoster to be returned – as far as practical – to its original state, have ensured the Paternoster remains one of the iconic interior features of the building. The Arts Tower Paternoster has been featured on the BBC One programme, *The One Show*, and can now be viewed on YouTube.

The CIBSE Lifts Group is a special interest group focused on vertical transportation. To find out more, visit [www.cibseliftsgroup.org](http://www.cibseliftsgroup.org)

## Denver welcomes YEN mentor

A rainy day in Denver, Colorado, didn't dampen spirits when CIBSE Young Engineers Network (YEN) mentor Andrew Saville presented Ian Metzger, winner of the ASHRAE New Face of Engineering, with a year's CIBSE Affiliate membership on behalf of the YEN.

Metzger is a member of ASHRAE Young Engineers of America (YEA), which is working closely with its YEN counterparts in the UK.

The two first met following the CIBSE Technical Symposium in Liverpool, Metzger attending as a reward for his award win. Saville had a trip scheduled to the US city and found time to visit Metzger and take a tour of the US Department of Energy's National Renewable Energy Laboratory (NREL) facilities, where Metzger is based.

CIBSE YEN congratulate Metzger on his award and continue to work alongside ASHRAE and the YEA group. [www.cibse.org/yen](http://www.cibse.org/yen)

## Join the debate with George Adams

Change is afoot as George Adams takes over blogging duties for his presidential year. In his first update, now live, he discusses the importance of tackling climate change.

With collaboration and diversity playing such an integral part of Adams' year in office, he invited guest bloggers to the debate. During his

term in office he will introduce some key issues to the blog and each week a guest blogger will give their unique insight and expertise.

In the first of his blog debates, Adams cited the need for an 'energy engineering conscience'. The CIBSE LinkedIn and Twitter profiles saw an influx of thought provoking

posts from bloggers and tweeters – including Susie Diamond, Ant Wilson and the University of Sheffield. You can read the blog each week at [www.cibsepresidentblog.co.uk](http://www.cibsepresidentblog.co.uk) and join the debate through the CIBSE LinkedIn group.

To become a guest blogger, contact [nwalsh@cibse.org](mailto:nwalsh@cibse.org)

## New members, fellows and associates

### FELLOWS

**Cheung, Yuen Fong**  
Tai Po, Hong Kong

**Liddament, Martin William**  
Reading, UK

**Offer, Nicholas Robert George**  
London, UK

**Tam, Wing Shing**  
Hong Kong

**Tonks, Nigel John**  
London, UK

**Wallace, Malcolm William**  
Thornhill, Canada

**West, Philip John**  
Nottingham, UK

### MEMBER

**Abd Elrazek Mota, Amr**  
Doha, Qatar

**Aitchison, William**  
Glasgow, UK

**Alexandru, Andrei Valentin**  
London, UK

**Aristotelous, Aristos**  
Limassol, Cyprus

**Bamford, John Brian Richard**  
London, UK

**Barahona, Maria**  
Cardiff, UK

**Barnes, Matthew**  
Farnham, UK

**Beales, Adam**  
Dartford, UK

**Bell, David Michael**  
Blackburn, UK

**Bennett, Andrew Mark**  
Droitwich, UK

**Bera, Hadrien**  
London, UK

**Beveridge, Stuart Andrew**  
Glenrothes, UK

**Billington, Ben Michael**  
Chester, UK

**Bosomo, Emuesiri**  
Croydon, UK

**Boulton, David Jeffrey**  
Bristol, UK

**Bramhill, Robert Michael**  
Worcester, UK

**Brooker, Christian Keith**  
Poole, UK

**Brownlie, Jocelyn Drysdale**  
Telford, UK

**Burns, Keith Robert**  
Epsom, UK

**Butler, Stephen John**  
Birmingham, UK

**Campbell, Michael Thomas**  
Mid Glamorgan, UK

**Chan, Chun Yue**  
Sheung Wan, Hong Kong

**Cheung, Ki Tat**  
Tsuen Wan, Hong Kong

**Chiu, Chi Keung**  
Quarry Bay, Hong Kong

**Chu, Yiu Cheong**  
N.T., Hong Kong

**Chubb, Geoffrey Lee**  
Farnham, UK

**Collins, Steven**  
Kent, UK

**Cook, Phillip Roy**  
St Albans, UK

**Dalton, Gary**  
Glasgow, UK

**Dent, Matthew**  
Cottingham, UK

**Dewar, Gordon**  
London, UK

**Diab, Jihad Mohamad**  
Abu Dhabi, United Arab Emirates

**Dimbleby, Christian Peter**  
London, UK

**Du Jiangtao**  
Lund, Sweden

**Duan, Min**  
West Malling, UK

**Edwards, Sean Lewis**  
Waterlooville, UK

**Ellis, Anthony James**  
Surrey, UK

**Ene, Aurelian**  
London, UK

**Fernandes, Rochelle Karen**  
Sydney, Australia

**Fernando, Robin**  
London, UK

**Fisher, Mark**  
Basildon, UK

**Flanagan, Ben**  
Glasgow, UK

**Freehill, Cormac**  
Newtownabbey, UK

**Fung, Chi Kit**  
Tuen Mun, Hong Kong

**Fung, Ka Yin**  
Sha Tin, Hong Kong

Continued overleaf



## New members, fellows and associates

Continued from page 13

- Gallen, John**  
London, UK
- Gauntlett, Christopher Simon**  
Nottingham, UK
- Grundy, Richard**  
Bristol, UK
- Halbert, Peter John**  
Dubai, United Arab Emirates
- Halmshaw, Steven**  
Leeds, UK
- Heppenstall, Ian**  
Sheffield, UK
- Hewitt, Dale Roddy**  
Solihull, UK
- Ho Chun Yuen**  
West District, Hong Kong
- Holm, Ashley**  
Toowong, Australia
- Hubbard, Carl Ryan**  
Leicester, UK
- Hughes, Jason John**  
Wirral, UK
- Hung, Oi Tik Eddie**  
Kowloon, Hong Kong
- Ip, Ngai Bong**  
Causeway Bay, Hong Kong
- Johnston, Brian George**  
Gloucester, UK
- Jones, Colin Nigel**  
Ruislip, UK
- Keogh, Andrew**  
Alton, UK
- Khoury, Raji**  
Birmingham, UK
- King, Kevin John**  
Halstead, UK
- Kirk, Peter David**  
London, UK
- Knight, Timothy**  
London, UK
- Laidlaw, Stuart**  
Loughton, UK
- Lam, Chi Wai**  
Tuen Mun, Hong Kong
- Lam, Kai Wa**  
Kowloon, Hong Kong
- Lam, Ngai Kong**  
Shatin, Hong Kong
- Lau, King Fu**  
Tsuen Wan, Hong Kong
- Law, Sze Man**  
Chai Wan, Hong Kong
- Lawale, Adesola Olanrewaju**  
Dubai, United Arab Emirates
- Lawson, Matthew Jon**  
Beverley, UK
- Lear, Stephen**  
Salford, UK

- Leask, Ross Andrew**  
Newbridge, UK
- Lecky, Michael**  
Manchester, UK
- Lee, Ka Cheong**  
Tseung Kwan O, Hong Kong
- Liu, Chun Wai**  
Tsing Yi, Hong Kong
- Lu Lin, Kowloon**  
Hong Kong
- Lue, Siu Ping**  
Tseung Kwan O, Hong Kong
- Lui, Ching Wah**  
Pok Fu Lam, Hong Kong
- Mac A Choiligh, Dominic**  
Sydney, Australia
- Maduekwé, Uzoamaka Njideka**  
London, UK
- Marshall, Sarah**  
Cannock, UK
- Markell, George Edward**  
Ruislip, UK
- Mauerberger, Mark Anthony**  
London, UK
- McGregor, Graham**  
Southampton, UK
- Melandinos, Athanasios**  
Manchester, UK
- Meleady, Stephen**  
Brentford, UK
- Moisisdis, Christos**  
Athens, Greece
- Mok, Wai Tak**  
Yaumatei, Hong Kong
- Mok, Suk Ling**  
Tsuen Wan, Hong Kong
- Monkcom, Jonathan**  
London, UK
- Morris, Andrew Phillip**  
Mitcham, UK
- Morse, Ben Gareth**  
Ferndown, UK
- Mrozowski, Michal**  
London, UK
- Mulla, Faruk**  
Doha, Qatar
- Multra, Hemant Chowbay**  
Reading, UK
- Nowak, Michal**  
Glasgow, UK
- Nunn, James Edward**  
Maidenhead, UK
- Okke, Seyda**  
London, UK
- Ombewa, Dickson Nyalala**  
Nairobi, Kenya
- Paradi, Jonathan**  
Northolt, UK
- Patel, Hershil**  
London, UK

- Patni, Roshni**  
Wembley, UK
- Peacock, Colin Edward**  
Glasgow, UK
- Pearson, Joel Colin Richard**  
Worcester, UK
- Pegg, Ian Michael**  
St Albans, UK
- Perera, Deva**  
London, UK
- Poon, Kim Wan Ricky**  
Ma Wan, Hong Kong
- Pountney, Christopher**  
St Albans, UK
- Railton, Charles Matthew Harry**  
Harpenden, UK
- Ramadan, Islam**  
Doha, Qatar
- Rasmussen, David Rodney**  
Reading, UK
- Ray, Elizabeth Jayne Juelin**  
London, UK
- Reynolds, Neil**  
High Wycombe, UK
- Richardson, Adam**  
London, UK
- Roberts, Thomas Michael**  
London, UK
- Rochelle, Glyn David**  
Dudley, UK
- Sathiyaseelan, Mark**  
Buckhurst Hill, UK
- Shave, Neal Francis**  
Norwich, UK
- Siddique, Rabiul**  
Sunbury-On-Thames, UK
- Sierra, Javier**  
Cardiff, UK
- Simpson, Philip**  
Wirral, UK
- Skidmore, Daniel Charles**  
Fleet, UK
- Slessor, Michael**  
Stourbridge, UK
- Spencer, Ian**  
Wigan, UK
- Stec, Wojciech Jerzy**  
Brezg Dolny, Poland
- Stonell, Mark Richard**  
London, UK
- Sturrock, Andrew Graeme**  
Falkirk, UK
- Szopa, Jaroslaw Wojciech**  
London, UK
- Taylor, Jeremy**  
Bracknell, UK
- Taylor, Christopher John**  
Leeds, UK
- Tudor, Joseph Richard**  
Crawley, UK

- Valente de Sousa Ramos, Bárbara Andreia**  
London, UK
- Vickersmith, Edward John William**  
Birmingham, UK
- Wan, Bui**  
Tuen Mun, Hong Kong
- Watkins, David Mark Tudor**  
London, UK
- Waugh-Bacchus, Christopher Paul**  
Basingstoke, UK
- Weiss, Alexander**  
Brooklyn, USA
- Wilkinson, David Martin**  
Blackburn, UK
- Wodar, Albert George**  
Kirkcaldy, UK
- Wu, Chor Wing Valerie**  
Kowloon, Hong Kong
- Yip, Shing Chi Sam**  
Fanning, Hong Kong
- Young, Paul Stephen**  
Manchester, UK

- Evans, Thomas William James**  
Peterborough, UK.
- Harding, James William**  
Tonbridge, UK
- Jasper, David**  
Bristol, UK
- Lamont, Fergus Liam Alexander**  
Kirkcaldy, UK
- Lawson, Damian**  
Stourbridge, UK
- Lockhead, Kayley**  
Leeds, UK
- Padfield, Richard**  
Ho Chi Minh City, Vietnam
- Pedley, Adrian Francis**  
Oldham, UK
- Sturgeon, Marc Albert**  
Knaresborough, UK
- Sullivan, Ian Richard**  
Lichfield, UK
- Thompson, Andrew**  
Godalming, UK
- Veasey, Sam**  
Sittingbourne, UK

### ASSOCIATES

- Aird, Jonathan**  
Leeds, UK
- Arnold, Ian Charles**  
Birmingham, UK
- Baldwin, Nigel Scott**  
Morden, UK
- Beard, James**  
Harrow, UK
- Cemikovas, Andzejus**  
London, UK
- Cox, Samuel Joseph**  
Orpington, UK
- Eadie, Robert Gordon**  
Falkirk, UK
- Evans, Barry Thomas**  
London, UK

### LICENTIATE

- Coles, Michael**  
Essex, UK
- Edwards, Guy Nathan**  
London, UK
- Newman, Matthew James**  
Solihull, UK
- Pennington, Stephen Francis**  
Upminster, UK
- Tiplady, Matthew**  
Brighton, UK
- Waudby, Richard**  
Beverley, UK
- Willis, Nicholas**  
Bexleyheath, UK

### FELLOWS

#### Phil West



Phil West is managing director of West Energy Saving Technologies (WEST). Previously he ran his own building services consultancy, WPMS, for more than 20 years and it was through troubleshooting for his clients that he developed the ideas for his patented ventilation controls, Ventmiser CMSM. WEST was formed in 2002 to manufacture and market his product and he has been an integral part of the company, securing multiple awards, including the Queens Award for Enterprise (Innovation).



## It's all about USB!

- Complies with the latest charging standard (BS EN 62684:2010 Interoperability specifications of common external power supply (EPS) for use with data-enabled mobile telephones).
- Dual port USB charger capable of charging a wide range of devices including the simultaneous charging of two Apple devices.
- Powered from adjacent power socket so no additional wiring is required.



call us on 01709 385469  
visit us at [www.cmd-ltd.com](http://www.cmd-ltd.com)

Vibration Isolation

Goodwood House, 86 Holmehorpe Avenue,  
Redhill, Surrey, RH12NL

Neoprene Turret Mounts    Inertia Bases  
Neoprene Hangers        Noise & Vibration  
Spring Mounts            Surveys  
Spring Hangers            Ex Stock Delivery  
Flexible Connectors       Selection Service  
Floating Floors            Special Design Service

**Eurovib Acoustics Products Ltd**

Telephone (01737) 779577  
Fax (01737) 779537  
sales@eurovib.co.uk  
www.eurovib.co.uk

## Imperial College London

### Systems Engineering & Innovation MSc Programme

In a world of increasing technical complexity those involved in major M&E engineering will need to master the art of systems engineering.

#### This Master's programme:

- *Explores systems engineering techniques in a wide range of contexts from aerospace to software engineering*
- *Develops systems thinking for successful innovation development*
- *Content has been developed in conjunction with major players in engineering*
- *Is particularly suited to engineers with industrial experience and who have demonstrated outstanding leadership and innovation potential in their field*
- *Is available part-time over two years or full-time over one year*

Full details and entry requirements can be found at:  
[www3.imperial.ac.uk/lorsystemscentre/msc](http://www3.imperial.ac.uk/lorsystemscentre/msc)

For further information please contact:

Email: alexandra.williams@imperial.ac.uk Tel: +44 (0)20 594 5995

**Deadline** for applications 30 July 2013 (overseas applicants)  
or 01 September 2013 (UK/EU applicants).

'Bringing Systems Engineering to the Built Environment'



## Introducing our new high output ground source heat pump... the Vitocal 300-G Pro



Viessmann has extended its range of heat pumps up to 240 kW in the form of the new Vitocal 300-G Pro. It is the only heat pump in its class with an integral energy statement facility.

High output levels can be achieved by linking up to five Vitocal 300-G Pro in a single cascade, achieving up to 1200 kW output.

- Brine/water heat pump - single and two stage
- Heating output 93 to 240 kW
- Maximum output 1200 kW as a cascade
- COP up to 4.88 (brine 0°C/water 35°C)
- Low noise emissions from 58 to 65 dB(A)
- Maximum flow temperature up to 60°C
- Electronic soft starter for lower starting current

Available now, for more information please see our website  
or email us at, [info-uk@viessmann.com](mailto:info-uk@viessmann.com)  
[www.viessmann.co.uk/vitocal300gpro](http://www.viessmann.co.uk/vitocal300gpro)

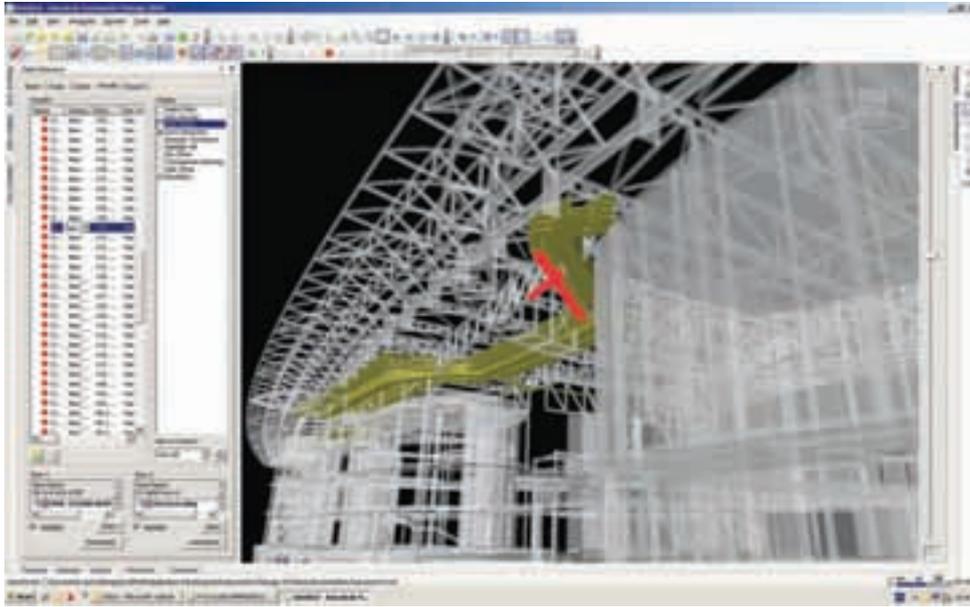


**Effizienz  
Plus**

**VIESSMANN**

climate of innovation

# Your letters



**This month:** BIM and the building services engineer, zero carbon logic behind the Code, and the risks of nuclear delay

**The reality of BIM**

Thanks for a usefully demystifying collection of articles on BIM (*CIBSE Journal*, June 2013). It is vital that less-technical project directors and managers do not see BIM as some kind of magic silver bullet. To complete the exercise, it's worth remembering how and why it all happened and noting the limitations imposed – on all aspects of procurement too – by necessary evils such as tendering procedures.

Firstly, the origins of BIM were a desire for a method of ensuring designs were fully coordinated and for recording what had been included in the design. The big advance came with CAD and BIM really took off when 3D representation became cheap enough to allow its use within the fee structures of ordinary projects.

But, as with layered drawings, the primary function was – and probably is – visualisation of elements in a particular volume in order to avoid clashes and late on-site revisions. Trying to go further than this leads to Thomas Taggart's point that the

data used in BIM 'drawings' will not necessarily be suitable as the calculation input, be it spreadsheet or full program, or for a measured quantities program.

The problem with cost control – of which tendering is only a part – is that the information for items cannot be input as firm data before tender. The more freedom tenderers have to offer – or insist – on alternatives, the less chance there is of a fully-firmed cost-component of a BIM model at that stage.

It follows implicitly that the accuracy of any plant sizing and characteristics before it is tendered is, at best, a good guess, and that trade-offs made by a tenderer – such as offsetting a less-efficient, but much cheaper, fan by increasing the dimensions of certain ducts – become much harder to entertain.

Behind this is the lack of a 'trade-approved' all-singing, all-dancing calculation program that allows, for instance, inputs of fan and pump characteristics at both variable speeds and shifting operating points as

throttling controls act. Most do not really allow input of non-standard ductwork shapes and dimensions. Until we have facilities such as these, the differences between energy consumption figures as calculated and as measured (as discussed elsewhere in the June *Journal*) will not be removed by implementing BIM.

All we can do about this particular problem is to insist that our energy consumption figures apply only to (a) the occupancy and (b) the 'small' power, both as briefed by the client before tender. This alone might, after appropriate adjustments to the arithmetic, reduce the differences to those acceptable as ballpark figures. But, a full program, into which observed occupancy and measured small power can be input at any time to revise the energy consumption, is the only way of achieving better approximation.

*John Moss MCIBSE, consultant, Arup Advanced Technology and Research*

**It is vital that less-technical project directors and managers do not see BIM as some kind of magic silver bullet**

**Logical thinking**

I enjoyed Dr Evins' article on the Code for Sustainable Homes, and the injustice of a more challenging energy target for Code Level 6 for small than for larger homes due to their presumed higher occupancy per unit area. While this may seem unjust to those living in small homes, there is a certain logic to it. It's a reasonable assumption that a family in a big home should not use more than six times as much energy on internal appliances as a small one. The general idea of 'zero carbon homes' is to offset the energy usage of the home, and so the metrics in the code – as presented – seem quite logical.

On a visit to Vienna, I went round a university hall of residence (think rabbit hutch density), which met – not Code Level 6 – but Passivhaus standard – routine for new buildings there. There seem to be



two routes forward – the penalisation of owners of large homes on grounds of social equity, or that we build more energy efficiently and better, like the Viennese. We could do either, or both, but easing up on energy targets when others are achieving them in much more challenging climates would seem perverse.

*Oliver Griffiths, CEng MCIBSE*

### Nuclear deterrents

The news that EDF's Hinkley Point nuclear power station project will take twice as long as anticipated reveals a worrying trend in the energy sector. While energy companies focus on maintaining profitability, and the government treads carefully to avoid agreeing financial deals that will overburden energy users, we are slipping closer and closer towards an energy crisis and losing valuable time to put in place the infrastructure required to address the problem.

The latest concerns follow Centrica's revelation that EDF's £14bn nuclear scheme will take nine to 10 years to deliver, instead of the anticipated four to five years. The story follows Centrica's decision to pull out of its 20% stake in the scheme and seems to be part of a culture of energy companies safeguarding their own interests, rather than working together to address the energy needs of a growing and energy-hungry population. Amid this sits a government that is unwilling, or unable, to take charge of the situation and drive forward a cohesive energy strategy that incorporates a clear way forward on the preferred mix of generation methods and the level of payback for those willing to invest in low carbon infrastructure.

For standby power specialists like us, this is a business development opportunity, as companies across a wider range of sectors than ever before begin to realise how likely power cuts will be over the next few years and the impact these will have on their business. However, standby power ought to be a last resort insurance, not a back-up that companies need to resort to on a regular basis. While having an installation is a sensible precaution, it should neither be considered, nor used, as a substitute for mains power.

Isn't it about time that there was a more co-ordinated approach to answering the low carbon agenda while managing costs and maintaining a serviceable generation infrastructure? Or is it just me that thinks that this all looks more like playground politics than a serious response to a looming energy crisis?

*Paul Moore, managing director, Dieselec Thistle Generators*

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

Please send all letters, and any other items for possible publication in the *CIBSE Journal*, to: [editor@cibsejournal.com](mailto:editor@cibsejournal.com), or write to Alex Smith, editor, *CIBSE Journal*, CPL, 275 Newmarket Road, Cambridge, CB5 8JE, UK. We reserve the right to edit all letters. Please indicate how you wish your letter to be attributed, and whether you wish to have your contact details included.

# @ Online feedback

## READY TO CHANGE?



In George Adams' first presidential blog, he asked whether the challenge of climate change presented opportunities and whether they could be grasped through behavioural change?

### Susie Diamond

Our first tactic must be mitigation to lessen the damage; closing the embarrassing performance gap between what we as a construction industry promise and ultimately deliver has to be a priority. Planning developments – not just to withstand the more challenging future weather scenarios, but still to be pleasant to occupy – will definitely be a challenge. I think there are all sorts of interesting ideas out there. Simple tactics like painting more roofs white to reflect heat and reduce the urban heat island effects, more planting (drought resistant and non-foundation-damaging) to increase evaporative cooling and provide shade, seem sensible.

### Ant Wilson

It is no good saying we want or need more 'stuff', as the world only has limited resources. There is scope in the design of building services to select more efficient equipment, in terms of both the operational energy consumed during their lifetime and the embodied carbon/energy in the system.

### Tony Johnstone

If you want consistent improvement you have to keep up a constant – and credible – message. You also have to keep up a constant – and credible – feedback. I hesitate to say we need a PR consultant but, as a project-based industry, we do tend to keep ourselves isolated (aka uncommunicative).

### Bob Beattie

To carry out engineering efficiency we need compliant and willing clients with

a steady flow of finance, a coherent government energy generating and efficiency policy, a determination to push it through, and a governing body (multiples) that ensures that what is designed is actually delivered on site.

### Eric Asquith

There has to be an agreement reached in all areas from architects, building services and M&E consultants and a truce drawn up that all disciplines will work together from the start of a project and keep each other informed of any changes.

### John Arntsen

I believe there are three stages (I'm oversimplifying) – first the consensus of the general populous (mostly here), second, the political will (now higher on parties agendas and in their manifesto), and the economic will (this underpinned by regulations and standards). The last, the economic will, is the hardest.

### Sophie Parry

The market for energy-efficient products and designs is steadily growing in most developed economies and, as time goes by, designing for energy-efficiency compliance and with corporate sustainability linked to business continuity will become everyday practice – it just takes time for the legislation, technology and mindsets to mature. As I see it, we as an industry are very much in the trial and error stage at this time and still learning our craft.

● Join the debate at CIBSE's LinkedIn group. [www.linkedin.com](http://www.linkedin.com) The presidential blog is at [www.cibsepresidentblog.co.uk](http://www.cibsepresidentblog.co.uk)

# DON'T BLAME HEAT PUMPS



Construction procurement is dysfunctional and prevents clients from reaping the full benefit of new technology such as air source heat pumps, says **Janet Beckett**

There has been a lot of recent negative press about 'air source heat pumps' (ASHPs) with the ventilation heat recovery type being particularly featured in consumer rights programmes such as *The One Show*.

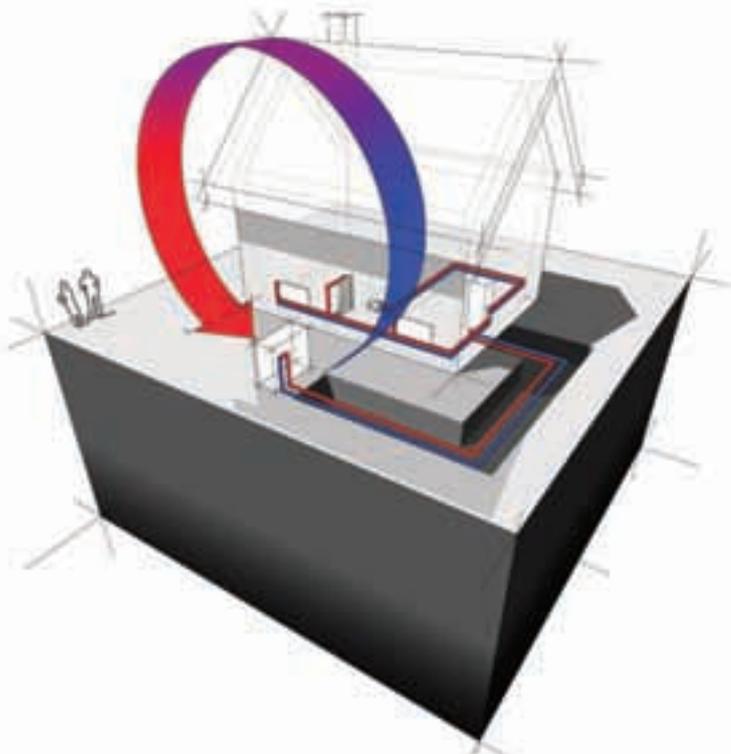
As a CIBSE engineer I often say to people that 'we don't really do houses'. However, as ASHPs have appeared as a 'new' technology I find myself becoming increasingly involved with dwellings – mainly sorting out the enormous mess that someone else has left them in.

There is of course nothing new about ASHPs. I specified my first one around 27 years ago for the Duchess of Devonshire. I am sure she would have been thrilled with its energy saving properties, had she known it was there. I also remember endless lectures about the Carnot cycle and thinking... what, why? It took me a while to see the benefits.

There is nothing wrong with the basic science and technology behind an ASHP. However, if we wish to use these 'new' technologies effectively then there is a real problem with the way in which buildings are currently 'designed' and procured in the UK.

I say 'designed' because of course the heating systems in houses do not

If we wish to use these 'new' technologies effectively then there is a real problem with the way buildings are currently 'designed' and procured in the UK



The principle behind air source heat pumps is sound

usually have any design input, or not as we (CIBSE engineers) would know it.

In one case we looked at, the tenants were cold, had insufficient hot water and their energy bills were huge. The story began where the project manager had issued a performance specification for a design and build appointment

to the big main contractor. The latter shopped around for the cheapest M&E sub-contractor, who, despite having some training on ASHPs, didn't fully understand how that unit worked in the context of the whole house heating, hot water and ventilation.

It was also evident that the ASHP

SLAVO VALIGURSKY / SHUTTERSTOCK.COM

## 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



salesperson did not fully understand what they were selling. On top of that, the larger ASHP first specified was 'value engineered' to the next size down. This saved a few quid, (exactly whose I am not sure).

This exercise was done without benefit of any credible calculation or evidence to back the decision up. As a consequence the unit finally installed had a heat output from the ASHP of a little over 1kW – on a good day – with the remainder topped up by a 3kW immersion heater. A shortfall that my colleague demonstrated beautifully in a client meeting by bringing along her hairdryer as an example of something that could provide more heat output than this ASHP.

In effect then for most of the winter months approximately 80% of the peak space heating was achieved using electricity as an indirect heating source – not exactly energy efficient.

To add further insult, the recommended controls were value engineered out, as was the ducted heat recovery mechanism. Microbore pipework was used throughout even though the specification expressly disallowed it – this did nothing to help the efficacy of the integral circulating pump.

There was no evidence supplied to us of any commissioning of the heating and hot water systems as ought to have done by law. The fact remained that the ASHP was in fact basically undersized for the job in hand.

We presented a clear cut, well documented case and requested an amicable meeting to agree a solution. The procurement was 'design and build' so the problem ought to have been quickly resolved with the main contractor as the single provider.

Despite all this, we then spent the best part of 8-10 months wrangling and arguing, and arranging meetings that the main contractor failed to attend. All the while the main contractor attempted to blame everything and everyone else – the controls, tenants, project manager, ASHP supplier, subcontractor, client and so on.

Since then, with CIBSE's help, the rules have been changed on ASHP specification, which would have gone some way to avoiding problems on that project – but not all of them.

Unfortunately, the problems on this project are all too typical of any construction site.

Before then we wave the magic wand of BIM over the Construction Industry – and building services in particular – we need to address the problems with procurement in our industry. At the moment what we are doing in the real world very often simply isn't working.

*Turn to page 36 to learn how the project team managing an innovative ground-source energy system at Oxford University worked together post construction to iron out the bugs.*

**JANET BECKETT MCIBSE**  
is director at Carbon Saver UK



### Why buildings fail

- Lack of genuine and appropriate design input
- Over reliance on self-regulation and poor supervision of M&E subcontractor by main contractor
- Subcontractor self regulating its own design and installation
- Absence of qualified M&E practitioners at all stages
- General ignorance or disregard of Building Regulations. (These are a legal minimum remember, not a 'nice to have')
- Lack of policing/resourcing by building control bodies to enforce Building Regulations
- Inappropriate value engineering



## CREATE HEALTHY INDOOR AIR WHILST CONSERVING ENERGY.

Elta Fans' Komfovent range of Heat Recovery Units (HRUs) offer thermal efficiency and energy savings up to 88%. With both AC or EC motors, rotary and plate heat exchangers and wall mounted or ceiling suspension options available, we have a wide range of units to suit any installation.

Visit [eltaselect.com](http://eltaselect.com) to see our stocked range of products, which are not only available for NEXT DAY delivery, but also offer Plug & Play with integrated controls for immediate start up and simple operation.

For more information contact Elta Fans on +44 (0) 1384 275800.



See the stocked range of HRUs at  
[WWW.ELTASELECT.COM](http://WWW.ELTASELECT.COM)

# SUMMER OPPORTUNITY



The government published its proposals in July for an Energy Savings Opportunity Scheme for public consultation. Hywel Davies explains what this piece of summer holiday reading is all about

 The Energy Savings Opportunity Scheme (ESOS), proposed as part of the UK's implementation of the EU Energy Efficiency Directive, will enable companies to identify opportunities to save money on energy bills through improved energy efficiency.

Under the scheme, which delivers the energy audit requirements of the Directive, large private sector enterprises will be required to undertake 'ESOS assessments' to identify cost-effective ways to invest in energy efficiency, helping reduce energy bills and increase competitiveness.

Article 8 of the Directive requires all Member States to introduce a regime of regular energy audits for large enterprises to promote the uptake of cost-effective energy efficiency measures. These audits must be undertaken by 5 December 2015, and then every four years thereafter.

The scheme is intended to stimulate uptake of cost-effective ways to save energy. The Department of Energy and Climate Change (DECC) believes that the proposed scheme will drive take up of energy efficiency improvements, and estimates that the additional energy savings could benefit the UK by £1.9bn.

A consultation has now been launched seeking views on the proposed approach to delivering the energy audit requirements through the Energy Savings Opportunity Scheme. The proposals seek to realise the potential benefits of better energy efficiency and energy management as part of 'a proportionate and better regulation approach'.

This seeks to implement the energy audit requirements in a way that fits into the wider landscape of existing energy efficiency and climate change policy, minimise administrative

burdens on business while avoiding competitive disadvantages to UK businesses relative to their EU competitors.

The proposal to align the scheme with existing policies is very welcome and is a response to the work done by CIBSE, in association with other industry bodies to demonstrate the potential to use existing tools to implement energy audits.

As a result, those organisations already collecting data under the Carbon Reduction Commitment (CRC) will be able to use that data under the ESOS. Also, those organisations whose energy use is predominantly in buildings will be able to use information from Green Deal assessments or Display Energy Certificates within the scheme.

*Under the scheme, assessments will be required to:*

- Identify energy efficiency improvement opportunities across the whole organisation being assessed
- Be carried out in an independent manner and satisfy minimum criteria
- Be transferable to any energy service provider (with the consent of the customer organisation)

Assessments may be carried out by a range of individuals, including CIBSE Low Carbon Consultants and Energy Assessors. In-house assessors will be permitted, as long as they are not auditing activities in which they have direct involvement. DECC propose to work with the British Standards Institution (BSI) and industry to develop a Publicly Available Specification (PAS), setting out the minimum competence requirements for assessors.

The consultation closes on 3 October 2013. The government states that it intends to introduce secondary legislation in spring 2014,

 This is an entirely new departure for standards in the UK

which will set out the legal framework for operation of the scheme ahead of the 5 June 2014 deadline for transposition of the Directive. CIBSE will be responding.

For more information please see [www.cibse.org/consultations](http://www.cibse.org/consultations)

To comment on the consultation, please email [technical@cibse.org](mailto:technical@cibse.org) or see the discussion on the CIBSE LinkedIn Group.

● **HYWEL DAVIES** is technical director of CIBSE [www.cibse.org](http://www.cibse.org)

## What does the Directive require?

The consultation sets out the requirements of Article 8 for energy audits, which must:

- (a) be based on up-to-date, measured, traceable operational data on energy consumption and (for electricity) load profiles
- (b) comprise a detailed review of the energy consumption profile of buildings or groups of buildings, industrial operations or installations, including transport
- (c) build, whenever possible, on life-cycle cost analysis (LCCA) instead of Simple Payback Periods (SPP) to take account of long-term investments and discount rates
- (d) be proportionate, and sufficiently representative to permit the drawing of a reliable picture of overall energy performance
- (e) allow detailed and validated calculations for the proposed measures so as to provide clear information on potential savings
- (f) ensure the data used as part of the energy audit is storable for historic analysis and tracking performance

## Who does the Directive affect?

The following organisations, unless they are SMEs, may have to undertake ESOS assessments:

- Companies
- Partnerships
- Community interest companies
- Charitable incorporated organisations
- Corporations sole
- Unincorporated associations
- Certain universities

For copies of EU Energy Efficiency Directive (2012/27/EU), the full consultation document (80 pages) and the impact assessment (91 pages), and for details of CIBSE's plans to respond to the consultation, visit [www.cibse.org/consultations](http://www.cibse.org/consultations)

GE  
Lighting

# LED Innovation

for sustainable offices

Dramatic improvements to the working environment and elimination of the routine maintenance for the next 10 years have been achieved at the iconic Ark building in London through the use of GE's innovative LED lighting solutions.

[www.gelighting.com](http://www.gelighting.com)



GE imagination at work

# ARE YOU SITTING COMFORTABLY?

CIBSE's TM52 guidance finally gives a clear and comprehensive definition of overheating – a vital tool in simulating comfortable, low-energy naturally ventilated indoor environments. Fergus Nicol reports

Overheating has become a key problem for building design. The rising cost of energy, coupled with the need to reduce reliance on fossil fuels, has cut the number of options available for designing comfortable buildings that are resilient to climate change.

Much research effort has been directed towards methods of controlling winter temperatures indoors, but this has often led to lightweight, highly insulated buildings that overheat in the summer.

The CIBSE Overheating Task Force was formed to tackle this problem and soon realised that there was no adequate definition of overheating. This is a particular issue for the design of naturally ventilated (NV) buildings, where control of indoor temperature in summer is often left to occupants. In the past, overheating has been defined as a number of hours over a particular temperature in the given season. Research suggests that the temperature that occupants of NV buildings will find uncomfortable changes with the outdoor conditions in a predictable way.

One way – and probably the best way – to find out whether a building overheats is to ask the people who occupy it. But this is no help when it is not yet built. Even a building that has been occupied for a short time may not have been fully 'tested' by a heatwave, let alone the effects of climate change.

The task force needed a method for predicting the danger of overheating using dynamic building simulation or, if available, building monitoring.

The basis of CIBSE's new guidance, *TM52: The limits of thermal comfort: avoiding overheating in European buildings*, is the European Standard EN 152512. This standard was developed in response to the European Energy Performance of Buildings Directive and contains information about the relationship between the prevailing outdoor temperature and the upper limit of temperatures in NV buildings.

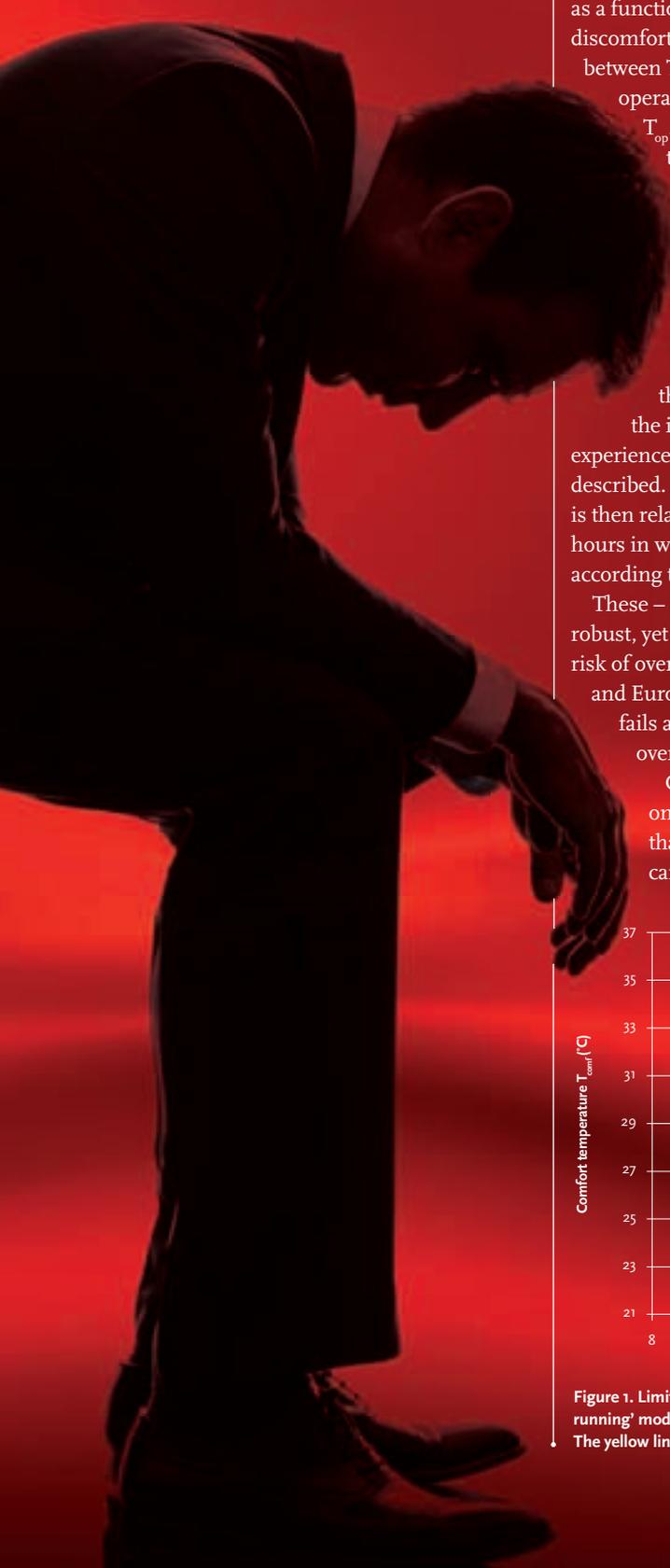
*The standard introduces three categories of building:*

- Category I – buildings whose occupants are sensitive or fragile
- Category II – normal expectation, recommended for new build or renovations
- Category III – moderate expectation, mainly applicable in existing buildings

Note that each defines buildings by reference to the needs of their occupants, rather than any notion of "building quality". Figure 1 shows the upper limits for acceptable temperatures in NV buildings for each of the categories.

The CIBSE task force decided that the guidance should be based on category II – the most applicable to new and existing buildings. The continuous white line shows the upper limit for indoor temperature as a function of the running mean of the outdoor temperature. The running mean is precisely defined in TM52 and is a weighted average of the daily mean outdoor temperature over the previous few days – it should be noted that it is not related to the peak daily temperature.

The category II maximum temperature – the white line in figure 1 – is given by



the formula  $T_{max} = 0.33 * T_{rm} + 21.8$ , where  $T_{rm}$  is the running mean of the outdoor temperature and  $T_{max}$  is the upper limit of the indoor operative temperature as a function of  $T_{rm}$ . The likelihood of discomfort is related to  $fjT$ , the difference between  $T_{max}$  and, which is the actual operative temperature in the space,  $T_{op}$ . The value of  $fjT$  is rounded to the nearest 10°C.

TM52 defines discomfort in NV buildings using the upper temperature limits introduced by EN 15251. The use of the day-to-day changes in the running mean outdoor temperature enables the dynamic relationship between the indoor environment and the experience of the building occupants to be described. An increased risk of overheating is then related to the number of summer hours in which the  $T_{max}$  is exceeded, according to three overheating criteria.

These – taken together – provide a robust, yet balanced, assessment of the risk of overheating of buildings in the UK and Europe. A room or building that fails any two of the three is classed as overheating:

Criterion one sets a limit of 3% on the number of occupied hours that the operative temperature can exceed the threshold comfort

Probably the best way to find out whether a building overheats is to ask the people who occupy it

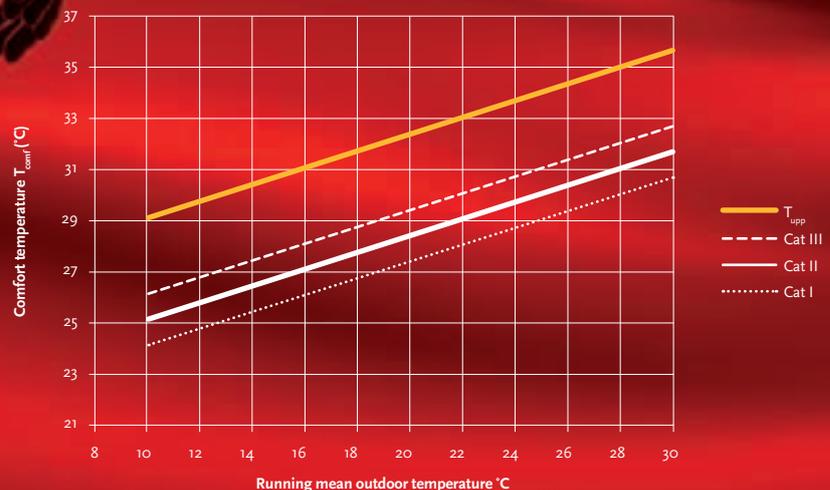


Figure 1. Limiting values ( $T_{max}$ ) of the operative temperature to avoid overheating in buildings operating in the 'free running' mode – that is, without heating or cooling – as a function of the running mean of the external temperature. The yellow line is  $T_{upper}$ , the absolute upper limit of the temperature as defined in criterion three of TM5.

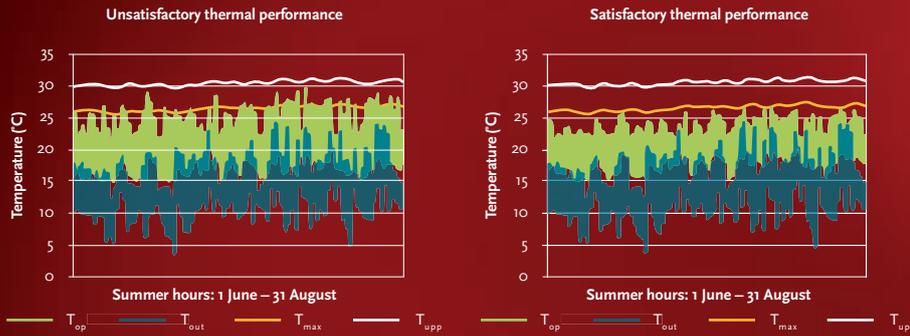


Figure 2. Outdoor air temperatures ( $T_{out}$ ) and indoor operative temperatures ( $T_{op}$ ) for an exemplar building with little thermal mass and no shading (left), and for the same building with exposed thermal mass, night cooling and solar shading (right). Also shown are the day-to-day values of  $T_{max}$  and  $T_{upp}$  (data from Tuohy *et al*, 20093). The effect on the operative temperature, and the likelihood of overheating, is clearly shown.

temperature,  $T_{max}$  (see figure 1), by 1K or more during the occupied hours of a typical non-heating season – 1 May to 30 September.

Criterion two deals with the severity of overheating within any one day, which can be as important as its frequency.

This is a function of both temperature above  $T_{max}$  ( $\Delta T$ ) and its duration. This criterion sets a daily limit for acceptability.



## London's burning

### New TM49 overheating guidance responds to rising temperatures and urban heat island effect

A new CIBSE technical memorandum will help engineers to more accurately predict the risk of overheating in designs for London buildings.

TM49 *Probabilistic Design Summer Years for London* accompanies a range of hourly weather data from three London locations that designers can use to assess the likelihood of overheating when modelling buildings.

The updated guide complements the existing Design Summer Year (DSY), which is a moderately warm summer based on a near-extreme value of April-September average temperature at Heathrow airport in 1989.

Three DSYs are available – all warmer summers than the existing DSY – for three locations, representing a range of weather conditions across London.

Data from Gatwick, Heathrow and the London Weather Centre is featured in the new guide, enabling variations in city-wide temperatures caused by the urban heat island effect to be taken into account.

Designers can use data that is representative of rural areas around London (Gatwick); suburban and urban areas outside central London (Heathrow); or central

London (London Weather Centre).

The new guidance takes account of climate change projections. This will lead to warmer summers than contained in the existing DSY, which the report's authors found were no longer sufficiently extreme to provide a basis for accurate overheating assessments in London.

The analysis indicates that according to the climate change projections the more extreme historical summers would become average summers.

It estimates that the current DSY will have a return period of only 1-3 years by the 2020s time period (2011-2040) – in other words, every one to three years there will be a summer as warm, or hotter, than the DSY.

The return period is based on a new metric of summer warmth called 'weighted cooling degree hours', which is more closely related to the likelihood of thermal discomfort, according to the report's authors.

The three DSYs represent a range of more extreme summers, with appropriate return times of between six and 11 years.

These DSYs can be used for overheating risk assessments, and the guide recommends that more than one is used to investigate the sensitivity of designs to different weather conditions.

If each hour (or part-hour) in which the temperature exceeds  $T_{max}$  by at least 1°K is multiplied by the number of degrees by which it is exceeded ( $\Delta T$ ), then this 'excess' should not be more than six degree-hours (for example, it can exceed  $T_{max}$  by 10°C for six hours or 20°C by three hours, and so on).

Criterion three sets an absolute maximum temperature of  $(T_{max} + 4)^\circ C$  for a room (shown as  $T_{upp}$  in figure 1), beyond which the level of overheating is unacceptable.

Figure 2 illustrates the use of the overheating guidance in a building simulation using a Design Summer Year weather file in TM49 (see box). It shows how the introduction of thermal mass, solar shading and night ventilation can make a building less likely to overheat. Similar analyses are shown in the technical memorandum, where monitored data from an actual building is used to illustrate the guidance. Simulation is also used to illustrate the increased risk of overheating as a result of climate change.

TM52 also includes advice on the risk of overheating in mechanically-cooled buildings. **CJ**

### References

1. Nicol F, Hacker J, Spires B and Davies H, 'Suggestion for new approach to overheating diagnostics', *Building Research and Information*, vol 37 (4) pp348-357 (2009)
2. BS EN 15251:2007 *Indoor environmental input parameters for design and assessment of energy performance of buildings addressing indoor air quality, thermal environment, lighting and acoustics*
3. Tuohy P, Humphreys MA, Nicol F, Rijal H and Clarke J, 'Occupant behaviour in naturally ventilated and hybrid buildings', *ASHRAE Transactions*, 115 (1) pp16-27 (2009)

**FERGUS NICOL** is Professor Emeritus at Oxford Brookes and a professor at London Metropolitan University

### Other CIBSE publications relating to comfort and overheating

- *Keeping Cool in a Heatwave: Top Tips for Facilities Managers and Keeping Cool in a Heatwave: Top Tips for Building Users* (2010).
- *KS16 How to Manage Overheating in Buildings* (2010)
- *Guide A: Environmental Design* (8th edition, 2013)
- *TM49: Probabilistic Design Summer Years for London*

All publications are available at [www.cibseknowledgeportal.co.uk](http://www.cibseknowledgeportal.co.uk)

**SAVE  
TIME & MONEY**  
Delivered fully assembled  
for easy installation

**autron**  
Safety Radiators

**Range of Low Surface Temperature radiator models to suit all budgets and applications**  
Designed for hospitals, mental health units & care homes



**IMPACT  
FRIENDLY  
ROUNDED  
EDGE**

**ANTI  
LIGATURE  
&  
SECURITY  
FEATURES**



**WALL-SAVING  
CORNER &  
CONTINUOUS  
DESIGNS**



**VERTICAL  
DESIGN**



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



SteriTouch®



**Call 01787 274135 [www.autron.co.uk](http://www.autron.co.uk)**

**Teekay**  
the pipe coupling



Say goodbye to flanging, threading,  
pipe grooving and welding with:



**Axilock-S**

Join plain end pipe with Teekay Axilock-S  
Seals and locks the pipes together  
**Two Pipes... Two Screws... Two Minutes**

tel: +44 (0)1494 679500

[www.teekaycouplings.com](http://www.teekaycouplings.com)

**NO CROSS-CONTAMINATION,  
MAKES THESE UNITS IDEAL  
FOR HYGIENE SPECIFIC  
APPLICATIONS.**

The XBOXER run-around coil as part of a system can help reduce peak heating and cooling loads as well as total heating and cooling loads. A systems overall effectiveness can be much higher using heat exchanger systems designed for maximum cost-effective performance.

There is no possibility of cross-contamination with this type of heat recovery. Ideal for hygiene specific applications. How innovative is that?

**nuaire**



Opusxbox



XBC



Thermal Wheel



Boxer Bespoke

OTHER XBOXER RANGES



**NUAIRE. FOR THE COMPLETE VENTILATION SOLUTION.**  
T 02920 858200 E [enquiries@nuaire.co.uk](mailto:enquiries@nuaire.co.uk) W [nuaire.co.uk/commercial](http://nuaire.co.uk/commercial) QUOTE CIBSE0813

**ecosmart**

# BEYOND *the* FRIDGE



Sainsbury's has introduced a range of innovative technologies to reduce the impact of its lighting, heating and energy-intensive refrigeration. But will it be enough to meet its self-imposed target of slashing emissions by 30% in the next seven years?

**Andy Pearson** reports

**S**ainsbury's is a big business. The retailer currently serves 23m people a week from around 600 supermarkets and 600 convenience stores. But it wants to serve more. Its ambitious plans for growth saw 93,000 m<sup>2</sup> of floor space added to its estate in 2012, with another 93,000 m<sup>2</sup> expected this year.

Along with its commitment to growth, Sainsbury's has also made a significant pledge to sustainability with the recent launch of the 20x20 Sustainability Plan, an initiative based on 20 commitments to be achieved by the year 2020. From an environmental perspective, the plan includes some challenging targets, including reducing the amount of own-brand packaging by half, compared with 2005 levels, and cutting the carbon emissions associated with its own-brand products by a similar amount.

From an engineering perspective, however, by far the biggest 20x20 challenge is the commitment to reduce absolute operational carbon emissions from the estate by 30%, again compared with 2005 levels. That equates to a 65% reduction in emissions for every square metre of existing floor space, including distribution centres, stores and offices. And as Mark Hawker, head of engineering for the estate, points out, the 30% figure stays, 'no matter how much Sainsbury's estate grows'. So what innovations is it using to hit its target?

### Enlightened approach

The engineering team is currently focusing its energy-saving efforts on lighting, which makes up 20% of the company's energy use. 'To minimise this, we try to use natural light wherever we can,' says Hawker. As a result, most new stores now feature a form of ➤



### SAVING WATER

Globally, water is becoming a resource issue, and it is also a cost issue for Sainsbury's. The retailer has reduced its operational water consumption across its entire estate by 50% relative to the size of the store – an annual saving equivalent to 393 Olympic-sized swimming pools. All new stores incorporate automatic meter reading linked to a central monitoring station. This ensures any major water leaks can be detected and allows Sainsbury's to compare consumption of one store against another. Stores use waterless urinals and percussion taps, toilets are flushed using harvested rainwater and the carwash recycles water. Sainsbury's has also become one of the first organisations – and the first retailer – to achieve the Carbon Trust Water Standard, showing that it's measuring, managing and reducing water use year on year.

➤ rooflight that Hawker calls 'daylight panels'. A lux meter on top of the product gondolas adjusts the artificial light levels by turning the lights up or down, or even off, in response to fluctuating daylight levels.

For day-lit stores, light levels are set to maintain a constant 650 lux. For stores without daylight, light levels are higher at 800 lux during trading hours. When stores are not trading, levels are reduced to 300 lux. According to Hawker, the only time when the lights are turned off completely is Christmas Day.

In addition to daylight, Sainsbury's is starting to achieve major energy savings from the use of LED lamps. It first started using them back in 2005 as a cost-effective replacement for fluorescent lamps in freezer cabinets. 'Fluorescent light output dims by 75% at -20C so you need four times as much energy to match the lighting level,' says Hawker, whereas LEDs are 'agnostic to temperature', meaning their efficiency does not drop off in the same way. Their imperviousness to cold also allows LEDs to be used in the stores' big back-of-house freezers, in conjunction with motion sensors that turn them on and off.

LED technology has moved on considerably since 2005, with improvements in the lamps' colour, cost and life span. Consequently, by 2010 Sainsbury's was using LEDs in spotlights, in fridges, to illuminate counters and



## Sainsbury's first 100% LED store

When it opened in January, the 3,700 m<sup>2</sup> low-energy store in Leek, Staffordshire, was the first Sainsbury's to be fitted with a full LED lighting scheme on the main sales floor. Not only was it a first for Sainsbury's but it was the world's first commercial application of GE's Lumination EL Series 'blade' LED luminaires. 'The technology is straight out of GE's research and development programme,' says Hawker.

The light fittings incorporate a linear LED unit. The most unusual aspect of the unit's appearance, however, is its microlens light diffuser. This is attached beneath the lamps like a glowing, rectangular blade of light (see image above and next page).

The big advantage of the lamps is that the illuminated blades throw most of their light sideways. 'The lamps illuminate the products on the shelving and not the shop,' says Hawker. At a light level of 650 lux, the units delivered a 65% kWh saving when compared to a

conventional high frequency T5 fluorescent lamp system.

In addition to the shop floor, LEDs are also used in feature lighting, staff areas, refrigeration cabinets, sales counters and the bulk-store area, which is fitted with passive infra-red detectors to sense when the room is occupied. The store is even fitted with LED car park lighting, which incorporates very white LEDs. 'Because the LED light is so white, it means that you can illuminate that space using lower lux levels, which saves us further energy,' says Hawker.

Other carbon-saving measures in the store include daylight panels, CO<sub>2</sub>-based refrigeration plant and a 520kW Uniconfort biomass boiler. The impact of all of these innovations is a 55% reduction in operational carbon performance and a 59% reduction in kWh for the store.



freezers and even to light its car parks. This year, the retailer has opened its first store with a shop floor lit entirely using LEDs (see box left). And it is investigating a number of new LED products, each with a payback of between two and three years compared to fluorescent technologies.

Hawker says the switch to LED technology will require Sainsbury's to change the way it thinks about warranties because the lamps are expected to last for eight to 10 years: 'It means we need to deal with companies that will still be around in eight years or so for the warranty to be valid.'

He thinks the way Sainsbury's buys light fittings will change too: 'If I buy an LED-based luminaire that will last for eight years, will I be able to upgrade the body and reuse the LEDs? And if I do, will the manufacturer reprocess the fittings?'

Hawker's team is contacted on average by three new lighting suppliers each month, all looking to have their products specified by Sainsbury's. If the teams like



a product, it will investigate the robustness of its supply chain and quality-control systems to ensure they meet its exacting requirements. Only when a product has met the retailer's technical, commercial and quality demands will the team consider trialling it – and even then only in a non-trading environment.

Most products for use in stores are tested initially in what Hawker calls 'mock-shops'. Sainsbury's has two of these facilities – one in Coventry and one in north London – where products are put through their paces in a simulated supermarket interior. 'For lighting, we'll use these facilities to assess power consumption, light output, cost to install and cost to operate,' explains Hawker.

Only about 10% of the products tested make it successfully through the mock-shop. Those that do 'might' be trialled in an actual store. If that is successful, the product will be incorporated into the retailer's standard specification for roll-out across future stores.

### The cold front

In a similar way to the advances in LEDs, the use of carbon dioxide (CO<sub>2</sub>) as a refrigerant is another carbon-saving technology that required time and effort to bring to a point where Sainsbury's was comfortable to use it in its new stores. Refrigeration is a vital issue for Sainsbury's as it makes up 40% of its total energy use.

On its larger stores, Sainsbury's uses a refrigerant circuit to remove heat from the rows of chilled cabinets and freezers, via individual heat exchangers. The circuit transfers the heat to a large refrigeration plant, usually tucked out of sight on the store's roof, where the heat is removed and, in most cases, used to provide space heating. On top of the carbon associated with the energy consumed by a store, there is always the risk of F-gas leakage from these large refrigeration systems.

To tackle the problem, Sainsbury's set out to replace conventional refrigerant plant with non-ozone depleting CO<sub>2</sub>-based plant. Initially, Hawker says the technology was up to 40% more expensive than the conventional system. As a result, Sainsbury's worked with three suppliers, who had aligned themselves with European manufacturers producing CO<sub>2</sub>-based plant. Each supplier's refrigeration equipment was trialled in two stores. 'These six stores enabled us to learn about the good and bad of each system to come up with a Sainsbury's standard.'

CO<sub>2</sub> refrigeration technology has now evolved to a point where capital cost and efficiency are the same as those of conventional refrigeration plant. To date, CO<sub>2</sub> refrigeration has been installed in 160 larger stores. 'It has made a big dent in our carbon footprint,' says Hawker.

Heating is another area where the engineering team is starting to make significant carbon savings. Biomass is now the default heating system for shops up to 5,570m<sup>2</sup> and Sainsbury's has 78 local stores that run on it. The fuel comes from a Scottish firm that makes timber thinnings to power a CHP plant, energy from which is used to process the remainder of the thinnings into pellets. Delivery to stores in the north of the UK is by road; for the south, the pellets are sent by boat to Purfleet in the Thames Estuary, before distribution by road to stores.

Where it is cost-effective, some of the retailer's larger stores use a closed-loop ground-source heat pump to provide



### THE WASTE CIRCLE

None of Sainsbury's waste goes to landfill. Comprising a mixture of cardboard, plastic, food, oil and paper, it is all put to positive use. Food fit for human consumption is donated to charities to help tackle food poverty in the UK. Bread waste goes to animal feed with the remaining food waste going to anaerobic digestion to produce gas that is burnt to generate electricity and fertiliser; cardboard is baled and recycled, as is plastic; wood waste is recycled, as is paper. 'You do not throw stuff away, instead you re-use it in a circular economy,' says Hawker.



“The retailer is the 'biggest' user of photovoltaic arrays in Europe, with 750,000 individual panels installed on the roofs of supermarkets and distribution centres

Other carbon-saving measures at Leek has contributed to a 55% saving in operational carbon performance



both heating and cooling. In winter, the main source of heating is the captured heat rejected by the rooftop refrigeration plant. Supplementary heating is provided by the heat pumps, which are connected to a series of boreholes that extend up to 200m below ground. The ground acts like a giant thermal storage battery. In winter, the heat pump draws heat from the ground to top up the space heating. A secondary circuit delivers the heated water from the heat pumps to the various air-handling units and domestic hot-water appliances.

In summer, heat from the store's rooftop refrigeration plant is collected and used to reheat the ground.

The ground's temperature, at about 14°C, has the advantage of creating a significantly lower condensing temperature for the store's refrigerant circuit than ambient air. 'We get about a 30% energy saving on the condenser because of the low ground temperature,' says Hawker. The solution also means the store does not require a gas supply for heating.

The technology is being used in new stores, but Hawker says retrofitting on existing stores has been trialled and is on the agenda. 'If we grow, to meet our targets, we've actually got to reduce the carbon emissions of our existing stores.'

He compares the scale of the task to an iceberg: 'The new energy-efficient stores are the bit above the surface of the water, but the bulk of the existing estate is below,' he says.

Hawker says Sainsbury's is considering generating its own energy using a low-carbon source, such as combined heat and power. Currently it generates a proportion of its electrical energy using PV panels: Hawker says it is the biggest multi-site user of PV arrays in Europe, with about 100,000 panels installed on the roofs of supermarkets and distribution centres.

There is still much more to be done, but the engineering team's strategy appears to be working: since 2005 the estate has grown by 23%, but total energy use has come down by 6%. Which means there's just 24% to go before it hits its 30% reduction target in seven years. **CJ**

● Read about Sainsbury's 20x20 sustainability plan at [www.j-sainsbury.co.uk/responsibility/20x20/](http://www.j-sainsbury.co.uk/responsibility/20x20/)

## POWER FULL

WHEN YOU NEED FULL POWER EVEN IN AN OUTAGE, YOU CAN DEPEND ON THE NATION'S BEST.

With facilities across the country, a UK-wide transport fleet and a rapid-response team, rely on MEMS to keep you at full power.

Register for our **FREE PowerCare 24/7** membership scheme today.

Sign up at [www.mems.com/prepared](http://www.mems.com/prepared)



08452 230 400



## FOR REAL SAVINGS AT HOME, CHOOSE THE AQUAREA HEATING SYSTEM



**5** COP  
HIGH EFFICIENCY



Panasonic's Aquarea range of heat pumps delivers major energy and environmental savings thanks to its incredible efficiency

Aquarea is part of a new generation of heating systems that use a renewable, free energy source (the air) to heat or cool the home and to produce hot water:

- Extremely high efficiency (COP of 5.00 for 3kW unit)
- Line up developed for low consumption homes (starting at 3kW)
- Line up developed for retrofit with dedicated control system
- Easy to control with your smart phone (Using an optional interface)
- Large range of efficient tanks for domestic hot water storage

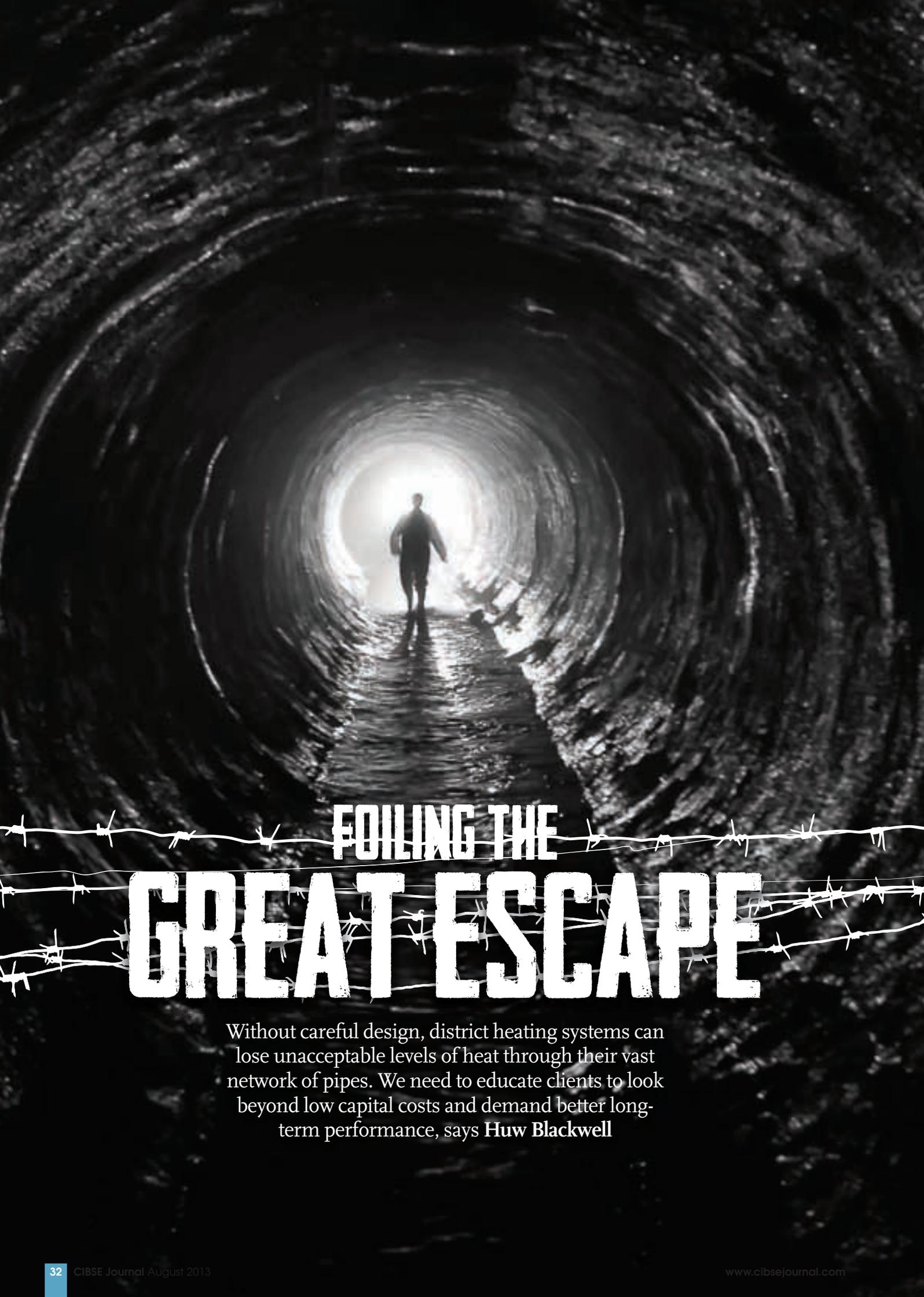


### ENERGY SAVING

High efficiency heating <b>INVERTER+</b>	Environmentally friendly refrigerant R410A	Down to <b>-20 °C</b> in heating mode OUTDOOR TEMPERATURE	Boiler connection RETROFIT	Solar panels connection SOLAR KIT	Domestic hot water DHW
---	---	--	-------------------------------	--------------------------------------	---------------------------

### HIGH CONNECTIVITY





# FOILING THE GREAT ESCAPE

Without careful design, district heating systems can lose unacceptable levels of heat through their vast network of pipes. We need to educate clients to look beyond low capital costs and demand better long-term performance, says **Huw Blackwell**

In the world of large-scale residential development, district heating is at an all-time high. Planners and policy makers seeking a low-carbon future have identified these networks as part of the solution, based on the efficiency of generating low-carbon heat centrally in large plant, such as combined heat and power (CHP) and biomass boilers.

However, sometimes a strength can also be a weakness. Because district heating systems are so large, the effects of failing to design an efficient system are magnified. In a typical system for 100 properties, for example, there maybe 1.5km of flow and return pipework (3km in total) pipes, so even the smallest problem with the pipework design can have wide ramifications. Not least of these is that the operational costs of inefficiency will also be magnified. Where heat is plentiful and cheap, the defects of poor design may be masked, but this is not the case with the systems currently being installed. These costs will have to be paid by the system operator, and ultimately the user.

The irony is that this problem arises because the private-sector clients developing the new wave of networks are – perhaps not unreasonably given the current economic climate – focusing on keeping costs to a minimum. Currently, it is common to procure district heating built to minimal compliance levels under a design-and-build arrangement, where the focus is to deliver a system for a low capital cost. At the same time, to limit liabilities between landlord and tenant or resident, heat interface units (HIUs) are used to provide hydraulic separation at property boundaries.

Both of these approaches can have serious repercussions in terms of long-term operational efficiency and costs. In certain cases, it may even be possible to prove that the inefficiencies result in a ‘high-carbon’ system – the reverse of policy intention. Below are some common scenarios which consulting engineers need to avoid. Many of the issues that lead to operating inefficiencies relate to the system insulation or the design of the distribution system. These include:

### Specifying compliant pipework insulation without considering operational losses

Depending on the system type, compliance with Building Regulations means following either the *Non-domestic or Domestic Building Services Compliance Guide* (2010), which are linked to the British Standard BS 5422:2009. Reference is made in the domestic heating guidance to BS EN 253 for pre-insulated district heating insulating pipework. However, although this quotes a maximum lambda

(conductivity) value for insulation, there are no references to insulation thickness for a given operating temperature. Typically, this may lead to allowable losses of 10-20W/m in distribution pipework. Where the average pipework temperature is higher than the assumed temperature (the standard applies up to 95°C distribution systems), losses are higher still.

### Lack of insulation continuity

If insulation is not consistent from plant through to pipework and HIUs, it can add significant heat losses. Though it is becoming more common to see insulated heat exchangers in HIUs, pipework is often left exposed. Manufacturers can provide a fully insulated system, but often at additional cost.

These two issues alone can lead to constant standing losses in the tens of kilowatts, even for a system serving 100 homes or less. They are further compounded if the distribution system design results in any of the following:

### High, fixed operating temperatures, but low temperature differences

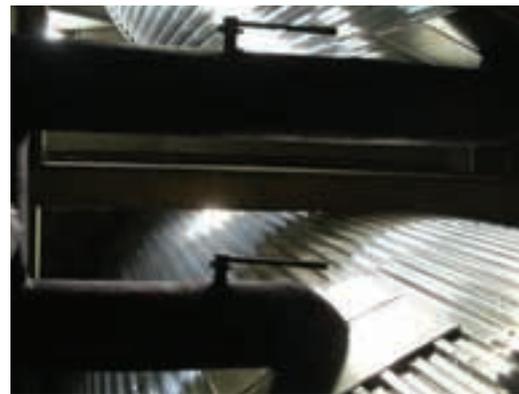
This reduces the capital cost and space requirements of heat exchangers at the expense of reduced primary plant efficiency, potentially increased pipework losses, pump sizes and pumping energy costs.

### Poor pipework layout

If the length of pipework required is increased through poor design, it will compound distribution losses. Added to this, pipework is often ‘oversized’, reducing pumping losses but increasing heat loss from a bigger surface area, as can be seen from the higher heat loss allowances in the compliance guide.

### Poor pumping and flow control

Cheap bypasses mean systems are ‘always on’ at a certain level, regardless of the requirement for heat. These may also have the side-effect of increased return temperatures, further driving up pipework losses. Pressure sensors installed across pumps restrict turndown, increasing electrical use and the circulation of water at high temperatures.



Many of the issues that lead to operating inefficiencies relate to the system insulation or the design of the distribution system



## CALL FOR EVIDENCE

CIBSE is keen to obtain case study examples of measured performance of recently completed residential and mixed-use development district heating projects, in order to gather evidence of scenarios where there are potential performance gaps. The case studies, which can be kept anonymous, can help CIBSE

identify critical issues about the design, application, procurement and operation of community energy systems. Examples of good performing systems would also be welcome.

If you are able to provide examples of measured performance, which will be treated confidentially, please email [DHN@cibse.org](mailto:DHN@cibse.org)



The Renewable Solutions Provider  
Making a World of Difference

# Renewable heating solutions designed to meet the needs of the community

Mitsubishi Electric's Ecodan heat pumps are specifically designed for community heating schemes or any commercial building that requires 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.

- Centralised or Decentralised solutions to help achieve renewable energy targets
- Capable of reducing running costs and CO<sub>2</sub> 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 approved



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**  
email: [heating@meuk.mee.com](mailto:heating@meuk.mee.com) or visit:  
[www.heating.mitsubishielectric.co.uk](http://www.heating.mitsubishielectric.co.uk)



Air Conditioning | Heating  
Ventilation | Controls

**ecodan**<sup>®</sup>  
Renewable Heating Technology

# All HANDS to the PUMP

When an innovative ground-source energy system at the Department of Earth Sciences in Oxford failed to live up to expectations, the original project team were on hand to sort it out. Unless we all adopt this approach, these technologies are bound to fail, says **Keith Horsley** of Hoare Lea



## THE TEAM

- **Client:** Estates Services, University of Oxford; University of Oxford Department of Earth Sciences
- **M&E consulting engineer:** Hoare Lea
- **Ground-source energy system designer and installer:** GI Energy
- **Main contractor:** Laing O'Rourke
- **M&E contractor:** Crown House Technologies
- **Project manager:** RBDML
- **Architect:** Wilkinson Eyre Architects
- **Cost consultant:** EC Harris
- **Civil/structural engineer:** Pell Frischmann

Low-carbon technologies such as ground-source heat pumps have the potential to make a real dent in the UK's carbon reduction targets. However, if these systems are to fulfil that potential, the industry's attitude to their specification, commissioning and operation needs to change.

If carbon-saving technologies are simply 'fitted and forgotten', the chances are they will not perform as expected, and the result

will be more 'turned off and forgotten'. Experience from one prestigious university project in Oxford shows the importance of continued involvement from the design and construction team during the post-occupancy stage – and the significant rewards that can be gained through perseverance.

### A groundbreaking system

The Department of Earth Sciences at the University of Oxford (OUES) is a leading centre for geological research designed by Wilkinson Eyre Architects with Hoare Lea as mechanical and electrical consultant. The development, which had a £29.5m construction cost, comprises a 7,100m<sup>2</sup> building with a five-storey office and teaching wing and a four-storey specialist laboratory wing, linked by an atrium entrance.

In some of the laboratories, environmental control is of critical importance to the experiments conducted. The building also houses a server room, and a number of hub rooms, where 24-hour cooling is required.

Energy efficiency was a key part of the brief and a 20% renewable energy contribution was a planning requirement of Oxford City Council. Early in the design, Hoare Lea carried out a comparison of low and zero carbon (LZC) technologies, and concluded that a ground-source energy system (GSES) was the most appropriate solution. OUES is one of the first laboratory buildings in the UK to use a GSES and the principles of the technology fitted neatly with the climate change and geological research interests of the university department.

The financial payback of the system – at current energy prices – was longer than would normally be considered viable, but became more attractive when fuel cost inflation was factored in. Also, Oxford University was attracted by the predicted carbon savings and instructed the designers to push beyond planning requirements and maximise

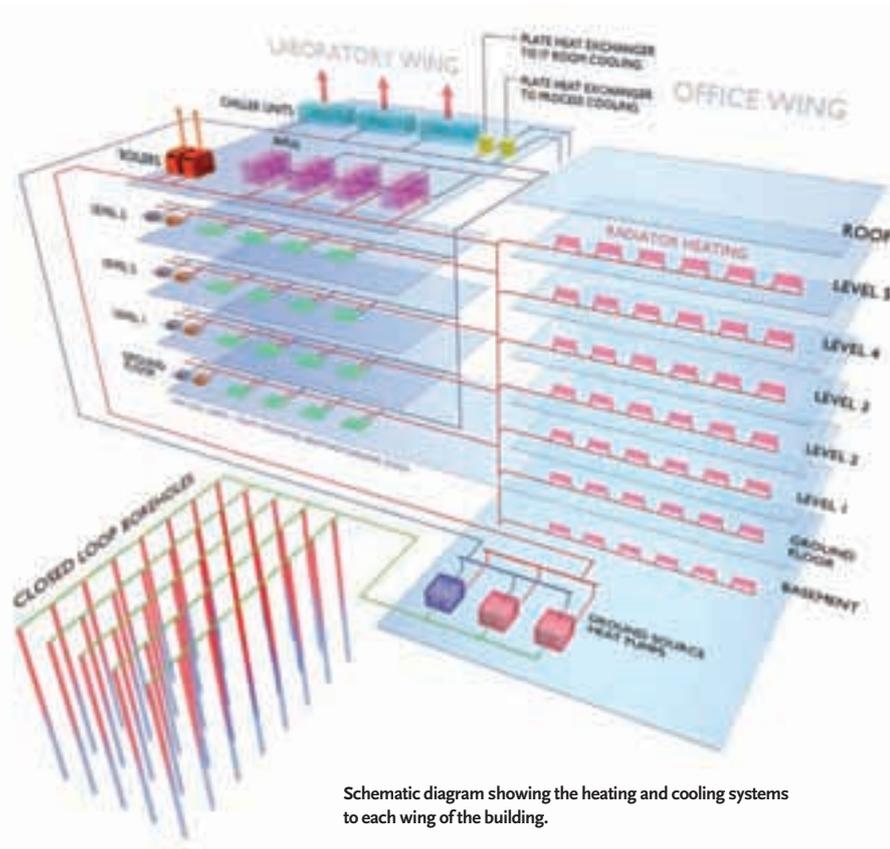


### CONTROLLING TO SAVE CARBON

When installing the ground loop, the designers were limited to the footprint of the building, writes Roger Macklin of GI Energy. This constrained the GSES's total energy exchange capacity and peak output, so conventional heating and cooling systems were installed as part of the original design. This led to the development of a unique control philosophy in which the GSES could choose whether to provide heating or cooling on the basis of optimising carbon savings, rather than to satisfy a specific load.

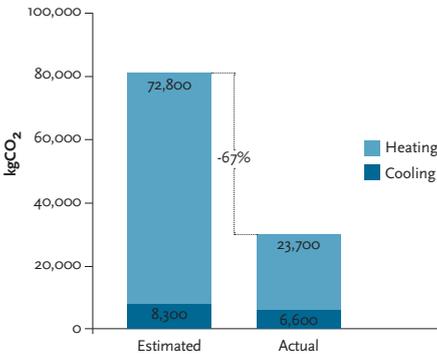
The overall conditioning is, therefore, led by the GSES control system, which selects the technology to use. GI Energy modelled the performance of the selected heat pumps to identify, for a given ground-loop temperature, how carbon savings would be maximised, taking into account the anticipated performance of the conventional systems. Further development of the control system added stability and incorporated detailed hourly performance monitoring, observable from GI Energy's office.



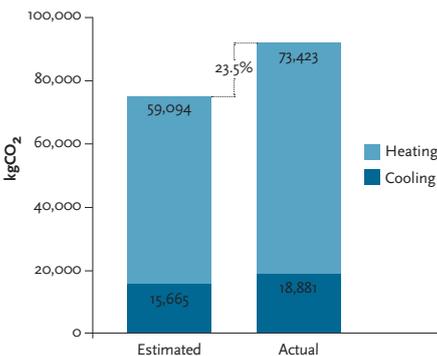


Schematic diagram showing the heating and cooling systems to each wing of the building.

**CO<sub>2</sub> savings generated by the GSES before and after remedial/optimisation works**



Actual CO<sub>2</sub> savings generated by the GSES, compared to predicted, in a six-month period before the remedial/optimisation works were complete



Actual CO<sub>2</sub> savings generated by the GSES, compared to predicted, in the 8½ months after completion of the remedial/optimisation work

the contribution from the area of ground available under the building.

The result is a system that comprises 63 closed-loop boreholes, each about 65m deep, with three reversible heat pump units connected in a ‘sliding header’ arrangement. Hoare Lea worked with ground-source energy specialist GI Energy on the initial design prior to being novated to main contractor Laing O’Rourke. Laing O’Rourke appointed GI Energy to carry out the detailed design and installation of the system.

The control strategy ensures that the GSES provides heating, cooling or both, depending on what is most carbon-efficient at any particular time. The main low temperature hot water (LTHW) system operates at flow and return temperatures of 45°C and 35°C to maximise the efficiency of the heat pumps. A separate LTHW system, with its own boilers, generates higher temperature water for domestic hot water and conventional radiators.

Heat meters measure how the heating load is shared between the heat pumps and the boilers and also how the cooling load is shared between the heat pumps and the chillers. Heat meters on the secondary circuits identify where in the building the heating and cooling is used. The GSES control system measures the electricity

used by the heat pumps and ground-loop circulation pump and uses an algorithm to apportion this load between heating and cooling.

**Oxford, we have a problem...**

In the spring of 2011, just after the building was fully occupied, it became clear that all was not well with the system. A number of reliability issues had led the client to lose confidence in the GSES and it was not operating as efficiently as had been predicted. Although no formal appointment extension was agreed, all parties involved were keen to uncover what had gone wrong and what could be done to improve it. Hoare Lea, GI Energy, mechanical and electrical contractor Crown House Technologies, and its controls specialist Matrix, returned to the table to resolve the problems one by one.

The first issue was that three of the heat pump compressors and three of the actuators on the valves in the sliding header failed. Such early-life equipment failures could just as easily have befallen a conventional system, and the faulty components were replaced free of charge. Yet this did not help the client gain confidence in what was, for them, an unfamiliar system.

While reviewing some of the metering data, Hoare Lea noticed that there was a large mismatch between the heat meters on the primary and secondary circuits. Further investigations revealed that one of the flow meters had seized and there had been inconsistencies in the way the meters had been ‘zeroed’ at the time of handover. There was also a problem with the algorithm that allocated the heat pump electricity use to either heating or cooling.

However, the most serious problems for the department were those connected with the control systems. The GSES control system was designed to identify when the heat pumps were unable to meet the heating or cooling load alone and to send a signal to the main BMS requesting assistance from the building’s boilers or chillers.

This had appeared to work during initial commissioning – but, in practice, there were times when these signals did not appear to be getting through. The result was a disruptive loss of temperature control in the critical labs and IT rooms. It was at this stage that the department took the decision to turn the GSES off and rely on the conventional systems.



## Mid Career College CPD Training Courses

September 2013 – July 2014

### New dates available to book on website now!

Mid Career College runs over 170 courses a year. Our 1–3 day CPD courses cover building regulations, energy efficiency, electrical services, lighting, mechanical services, fire safety and facilities management.

Notable courses featured in the new programme include:

- **Mechanical Services Explained** (3 day course)
- **Electrical Services Explained** (3 day course)
- **Energy Strategy Reports** (1 day course)
- **Practical HVAC Controls** (1 day course)
- **HSE Guidance on Legionella Control** (1 day course)
- **Emergency Lighting to Comply with Fire Safety** (1 day course)

Book 1  
month early  
to receive  
discount!

### Look out for new course brochure in next edition of the CIBSE journal!

As a CIBSE member, as well as being able to book online, you will receive a quick reference guide to the full MCC course programme in the next edition of the CIBSE Journal.

**Training at your offices** - all of our courses can be delivered in house (min 6 staff).

To book and receive early booking discount, visit:  
[www.cibsetraining.co.uk/mcc](http://www.cibsetraining.co.uk/mcc)

For further queries contact Melissa on 0208 772 3640 or email [mfileppi@cibse.org](mailto:mfileppi@cibse.org).



## A CLIENT'S PERSPECTIVE

Our first major GSES has provided us with a series of valuable lessons in managing low-carbon technology, writes Steve Pearson, head of building services at the University of Oxford's Estates Services.

Thermal models are fundamental to GSES design, but it is all too easy to trust the output of a model without understanding the assumptions on which they are built, and how they affect performance.

It is all the more important for a GSES because the performance in any given period is heavily dependent on how the system was used in the preceding period.

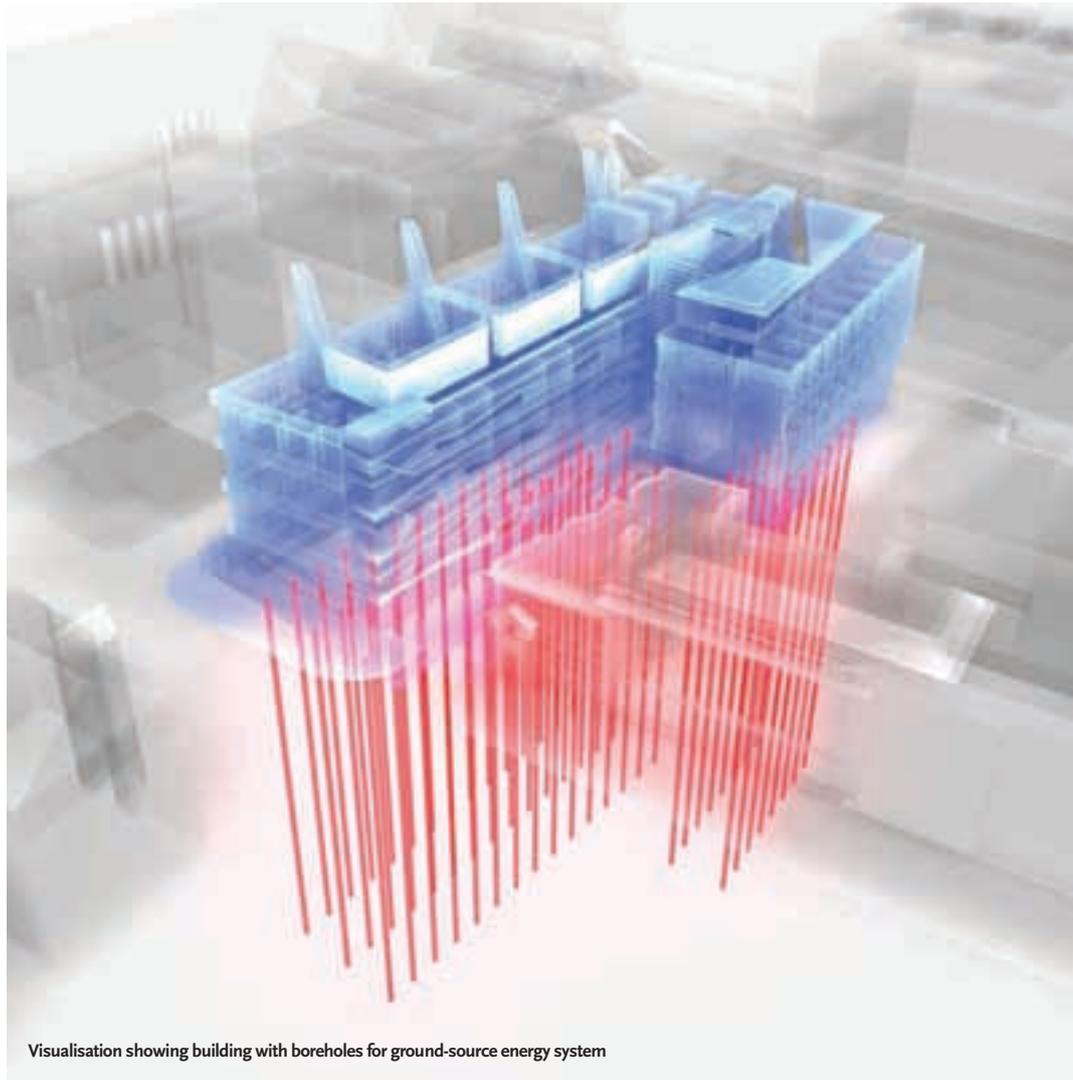
There is a requirement for sensitivity analysis on our next project and a 'sign off' of the model assumptions.

Getting the control systems communicating effectively and the metering system accurate was a struggle.

It would be naive to think that all of this can be perfect before handover as the system cannot be optimised without in-use data.

Much has been talked of 'soft landings' but if ever there was a system that required attention post-PC it is GSES.

We are fortunate that we were able to devote this attention to it and now have a GSES that is performing significantly better than the specification.



Visualisation showing building with boreholes for ground-source energy system

## ▶ Lessons learned

By April 2012, all these issues appeared to be resolved. Some additional tweaks to the control software were also made to improve efficiency, but a further period of close monitoring was needed to ensure the problems had been rectified.

Since this date, the system has operated without any significant fault, and has actually been shown to deliver greater carbon savings than originally predicted. While on the face of it this seems a positive result, in fact part of the reason for this is that the annual heating and cooling loads are significantly higher than predicted. This is, perhaps, unsurprising in a building with variable volume laboratory ventilation systems, the use of which is largely occupant-dependent and almost impossible to predict. It does however raise interesting questions about the specification of GSESs and the difficulty in establishing a criterion at design stage against which performance can be measured.

The key lesson from the project is that

a significant amount of effort is necessary to ensure that the potential savings of LZC technologies are realised. At OUES, it was fortunate that the client and the design and construction team had a long-standing relationship and shared a commitment to proving the system's reliability and performance. It is easy to imagine many buildings with LZC systems installed where there is not the will or the resources to resolve the issues and where, instead, the systems are turned off and forgotten.

The carbon reduction performance of LZC systems is, quite rightly, placed under the microscope. These systems should be made to justify the claims made on their behalf. Equally, it must be accepted that optimum performance is unlikely to be achieved without effort. If we are serious about closing the 'performance gap' we must allocate time and resources to fine-tuning during the early months and years of operation. **CJ**

**KEITH HORSLEY** is an associate at Hoare Lea



## Here's a big reason we set standards.

Etanorm is a classic that keeps on evolving. The world's best-selling standardised water pump is extremely reliable, and runs so well that it meets the ErP Directive requirements on energy efficiency for 2015 already today. Available in numerous variants, Etanorm covers a huge range of applications. And it's so technically refined that our customers can totally depend on the first-class reliability of this globally identical product. For more information, please visit [www.etanorm.com](http://www.etanorm.com)



**KSB Limited** • 2 Cotton Way • Loughborough • Leicestershire • LE11 5TF • 01509 231872

# Making HOSPITALS feel BETTER

ASHRAE's *HVAC Design Manual for Hospitals and Clinics* has been revised to give up-to-the-minute advice on the complex heating and ventilation demands of different clinical spaces in the US. Frank Mills reports

The second edition of the HVAC Design Manual for Hospitals and Clinics, by CIBSE's sister society in the US, ASHRAE, explores in detail issues such as energy efficiency, sustainability and healthy healing environments for patients, staff and visitors. Building on the first HVAC Design Manual, published in 2003, this edition not only updates technical content, but also includes added focus on topics that are crucial for successful HVAC design in a variety of healthcare settings.

The updated manual points out that designers must see the hospital not as one large clean room, but as a complex facility with a range of requirements from 'sterile' to 'clean', 'normal' and 'dirty'. They need to understand the requirements of each space and their respective engineering solutions so that appropriate, effective and energy-efficient HVAC designs are applied and over-expensive specifications avoided. Here are some of the key issues that the manual addresses.

### Infection control

The ASHRAE guide sets out the principles for best practice in infection control.



Ventilation has a significant role in reducing the risk of infections, but the fact that the proportion of infections directly attributed to airborne transmissions is relatively low (10-20%, according to the guide) shows that current practice is working well. Some 80-90 per cent of infections are spread by other means, such as touching contaminated surfaces or instruments – a helpful diagram illustrates the various routes. The manual also explains the underlying issues of infection control so that engineers can understand the role of HVAC systems more clearly.



### RELEVANT TRAINING

8 Nov 2013 - A1050 Practical Controls for HVAC Systems – London

This course covers the principles of control operation and gives practical insight into how to control heating, ventilation and air-conditioning systems, what equipment to use and how it works. It details control components and reviews system specification using Building and Energy Management Systems (BEMs)

More information at [www.cibsetraining.co.uk/mcc](http://www.cibsetraining.co.uk/mcc) or contact [eventbookings@cibse.org](mailto:eventbookings@cibse.org) or 0208 772 3640

## Energy Efficiency Exhibitions

Follow us @EnergyEfficExpo

incorporating Renewables Roadshow

Reserve your FREE tickets  
[www.energyefficiencyexhibitions.co.uk](http://www.energyefficiencyexhibitions.co.uk)

<b>KEYNOTE PARTNERS</b> BES, Energy Saving Alliance, safe	<b>TRADE PARTNERS</b> APHC, CIAT, City&Guilds, BPVA, bre, ECA, GDSA	<b>asset skills</b> HHIC, The National Skills Academy, IDEA, ECA, GDSA	<b>UK GREEN BUILDING COUNCIL</b> UK Green Building Council	<b>ASSOCIATE SPONSORS</b> AIRFLOW, altecnic, BAXI, wilo, tp24, Danfoss, 3CDimplex renewables, VIE MANN, windhager	<b>Honeywell</b> PTS, Stelrad	<b>BITESIZE SPONSORS</b> ANTON, safe, NatWest, Stelrad, PLUMB CENTER, PTT	<b>KNAUF</b> kronitach, 3CDimplex renewables, SolarTrac, windhager	<b>NATIONAL EXHIBITORS</b> clik, ECA, DAIKIN, ELECSA, ADEY, AIRFLOW, BAXI, altecnic, CTC, ANTON, GORGI, Glow-worm, 3CDimplex renewables, BAXI-Servit UK, LAILEY & COATES	<b>safe</b> safe, GE Lighting, GREENDEAL, INTERGAS, Danfoss, kronitach, HEATRAE SADIA	<b>Energy Saving Alliance</b> Energy Saving Alliance
--	--	---	---	--	----------------------------------	--	---	---	--	---

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



### Air-handling and distribution systems

The chapter covering air-handling and distribution systems includes in Table 3-3 a list of hospital and clinic spaces and a list of their US design conditions, including air change rates, which is ASHRAE's preferred method of sizing ventilation systems. These design requirements include:

- Significant recirculation advised in most areas – for example, 80% in operating theatres
- Full fresh-air ventilation only required in certain spaces. These include medical

gas storage spaces, A&E waiting rooms, triage, A&E decontamination, airborne infection isolation (AII) rooms, combination AII/protective environment (PE) rooms, AII anterooms, combination AII/PE anterooms

The option to recirculate air in this way represents significant energy and maintenance benefits, because a significant proportion of the (already) heated/cooled and filtered air can be re-used. Energy costs will be less and high-efficiency particulate air (HEPA) filters will last longer.

In some areas ASHRAE's guidance differs significantly from UK practice, as set out in Department of Health technical memorandum HTM 03A. ASHRAE encourages re-circulation, whereas the UK virtually bans it, while ASHRAE steers away from natural ventilation – it is hardly used in North American hospitals – whereas the UK encourages it wherever possible.

### Natural ventilation

Acknowledging ASHRAE's international membership, the guide introduces natural ventilation as an appropriate solution, directing readers to World Health Organization guidance and UK Department of Health research. CIBSE's AM10 is listed as the source to use when designing naturally ventilated areas in hospitals.

### Room design

Of particular benefit to designers is the updated chapter covering hospital room types. This includes diagrams and examples to help understand the specific requirements of different rooms. The section on imaging rooms, for example, identifies the range of imaging technologies and how each influences the room design. The tables of

equipment heat gain have been updated to reflect the latest medical technology using generic data. Another particularly useful aspect is the way the guide explains the medical terms, which can help to clarify the room's purpose. The 'PET' in the PET scan room, for example, stands for 'positron emission tomography', which is a diagnostic imaging technique based on injecting a patient with radioactive material and picturing the emitted radiation to visualise path.

### Disaster planning and emergency management

A major update now covers a wide range of possible problems, from terrorism threats to natural disasters, and from energy shortages to pandemic outbreaks. The implications for engineering systems are clearly set out, including useful references to more detailed sources.

### Sustainability

The new chapter on sustainability covers all aspects of this important subject in detail and refers designers to ASHRAE's new Hospital Sustainability Standard 189.3. It also refers to the ASHRAE low energy services guide for hospitals, *The 50% Advanced Energy Design Guide for Large Hospitals*, which can be downloaded for free from the ASHRAE website.

The HVAC *Design Manual for Hospitals and Clinics* can be obtained from ASHRAE Publications at [www.ashrae.org](http://www.ashrae.org) and is being presented through the ASHRAE Learning Institute Short Course programme. **CJ**

**FRANK MILLS** FCIBSE, MASHRAE, MIMechE is a member of ASHRAE TC9.6, Healthcare and a member of the Healthcare Design Guide author group. He is also a healthcare professional involved in low-energy hospitals.

THIS AUTUMN, THE AWARD-WINNING EXHIBITIONS FOR BUILDING SERVICES PROFESSIONALS ARE BRINGING THE BEST BRANDS & THE BRIGHTEST IDEAS TO YOUR REGION!



PLUS...  
REGIONAL EXHIBITORS  
COMMERCIAL THEATRE  
ENERGY EFFICIENCY DEMOS  
GREEN DEAL THEATRE  
HANDS-ON HEAT PUMPS  
RHI THEATRE  
RENEWABLES DEMOS  
...AND MUCH MORE!

PLUS...  
ENERGY EFFICIENCY  
& RENEWABLES  
AWARDS



North-West  
26 September

Also with Bitesize Briefings in Northern Ireland,  
North Scotland, South Wales & East Anglia

LEAD  
SPONSOR



# The new BBS

The Biomass Boiler System  
from Potterton Commercial.



Pellet and chip  
variants up to  
2 MW output

Technology for a renewable future.



Scan this QR code for  
details of the Potterton  
Commercial BBS

**POTTERTON**  
COMMERCIAL  
[www.pottertoncommercial.co.uk](http://www.pottertoncommercial.co.uk)

**Baxi Commercial**  
0845 070 1055

# 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](http://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.

## Biomass for commercial building heating systems

### This module explores mid-size biomass boiler solutions and key issues for installations

There is a clear imperative from the UK government<sup>1</sup> for low carbon biomass heat, and with support under the Renewable Heat Incentive (RHI), biomass boilers have the potential to provide a reduction in carbon dioxide (CO<sub>2</sub>) emissions as well as offering a financial benefit. As with all engineering design, and particularly low carbon or 'renewable' technologies, proper consideration is essential to ensure a beneficial – and socially acceptable – solution.

The UK has a binding target under the EU Renewable Energy Directive 2009 to source 15% of its overall energy from renewable sources by 2020. However, it is currently struggling to meet that obligation.<sup>2</sup> The UK bioenergy strategy<sup>3</sup> suggests that bioenergy has the potential to provide approximately 30% of the 2020 target through biofuels, biorefineries and the recovery of energy from the biomass portion of waste (including anaerobic digestion), so as a way of driving the development of appropriate systems to meet the directive, there is strong support for deployment of biomass heat – primarily driven by the RHI.

Not only is there wide variation in biomass boiler design, but there are also ranges of different biomass fuel types. The vast majority of installations in the UK are 'woody' or 'solid biomass' – typically wood pellet or wood chip-fed units. This CPD module deals exclusively with 'mid-size' automatically fed chip and pellet systems for commercial applications.

Equally suited to new build and retrofit

schemes, with correct hydraulic design, commercial biomass boilers can be integrated into existing systems, and are best employed as part of a bivalent system (sharing the maximum load with a gas or oil boiler). In comparison to a fossil-fuelled boiler there are, however, significant technical differences in design, operation and maintenance that must be understood and accommodated in order to achieve a successful outcome.

#### Fuel quality and storage

Perhaps the most important factor to consider when appraising a potential biomass installation is sourcing a fuel supply of an appropriately high standard, and provision for its storage on site. Pellet/chip size, moisture content, calorific value and fuel constituents all have a major bearing on boiler operation.

The sustainability of fuel supply is central to the concept of wide scale deployment of biomass heating. The main source of biomass in the UK is timber from forestry, which falls under the remit of the Forestry Act (1967). The Central Point of Expertise on Timber Procurement ([www.cpet.org.uk](http://www.cpet.org.uk)) gives advice on how public sector buyers and their suppliers can meet the UK government's timber procurement policy requirements and demonstrate that timber supplied is legal and sustainable.

The standards governing the quality of fuel available for wood pellets and wood chips are, respectively, BS EN 14961-2:2011 *Solid biofuels*.

*Fuel specifications and classes. Wood pellets for non-industrial use and BS EN 14961-4:2011 Solid biofuels. Fuel specifications and classes. Wood chips for non-industrial use*, specifying limits on size, chemical and physical properties. Ensuring the supplied fuel is in accordance with relevant quality standards is essential in ensuring effective boiler operation.

Low moisture content is key to effective combustion. Pellet fuel produced in accordance with quality standards typically has lower than 10% moisture content and, depending on the source and type, wood chip may be closer to 30% (when harvested, timber will have a moisture content typically around 50%, and above 55% moisture content, the fuel is unlikely to burn). Typical calorific values are given in Figure 1. Boiler manufacturers will specify a moisture tolerance range. Excessively high moisture content can lead to incomplete combustion, releasing black smoke and tars that can coat internal heat exchanger surfaces and cause damage to fuel delivery systems.

A wide variety of fuel storage options are available, from purpose built rooms to pre-fabricated silos and containerised stores, with automated feed systems typically comprising a mechanical auger or pneumatic arrangement. Physical size, maintenance requirements and access for fuel delivery trucks all require consideration. For these reasons, the installation of biomass plant in dense urban environments can pose logistical challenges.

Handling and storage of fuel can also

Fuel	Net calorific value (CV) by mass GJ/tonne	Net calorific value (CV) by mass kWh/kg	Bulk density kg/m <sup>3</sup>	Energy density by volume MJ/m <sup>3</sup>	Energy density by volume kWh/m <sup>3</sup>
Wood chips (30% MC)	12.5	3.5	250	3,100	870
Wood pellets	17	4.8	650	11,000	3,100
Heating oil (for comparison)	42.5	11.8	845	36,000	10,000

Figure 1: Typical calorific values of 'woody' biomass fuels<sup>4</sup>

present safety issues. For example, wood chips with high moisture content may degrade and decompose in storage, losing calorific value. In certain conditions, there can be mould growth that – in common with wood dust – if inhaled can cause respiratory problems. When wood pellets are blown into a store upon delivery, a proportion of 'break up' can happen, leading to a suspension of dust in the air that can pose an explosion risk. Furthermore, in the case of pellets, it has recently been reported that stored fuel can release carbon monoxide (CO), making a robust safety procedure essential when working on or inspecting enclosed fuel storage areas – including provision for ventilation and supervision. Established guidance is provided by the UK Health and Safety Executive (HSE) ([www.hse.gov.uk/confinedspace/](http://www.hse.gov.uk/confinedspace/)), while the Dangerous Substances and Explosive Atmospheres Regulations 2002<sup>5</sup> (DSEAR) provides further information on control of such risks. (Also, see *Further reading* section below.)

### Combustion process

Figure 2 shows a diagrammatic arrangement of the combustion process of an example mid-scale biomass boiler, incorporating a moving grate fuel bed and cyclone flue-cleaning device.

- 1 Fuel is automatically fed into the combustion chamber of the boiler. The fuel is ignited by a blown hot air ignition system.
- 2 The automated grate movement evenly spreads the fuel at the point of combustion for optimum burning efficiency.
- 3 Relatively small amounts of ash residue (from 0.5% to 2% dry fuel weight) will remain

when the fuel has been fully burnt. The grate movement propels ash to a mechanical screw that removes the ash into the ash box.

- 4 When the unit is first 'fired', hot air is blown in at the fuel entry point. The hot air ignition system turns off when the flame is established.
- 5 The hot gases and particulates are drawn through the boiler through a multi-cyclone collector to remove the majority of the particulates (roughly 2% of the total ash will be carried along with the combustion gases<sup>6</sup>), which are collected in the ash box at the base of the collector. The remaining flue gases are discharged to the atmosphere.

The fuel feed rate will modulate according to the heating system demand. Typically controlled by a 'lambda sensor', the rate of excess air supplied into the combustion process is critical to derive the highest efficiency, together with minimising the production of CO, NO<sub>x</sub> and soot.

The combustion of biomass fuel typically generates a higher level of polluting emissions than that of a gas fired boiler – although not as high as other solid fuels – so compliance with local requirements on clean air and particulate emissions is critical.

The Clean Air Act (1993) regulates particulate emissions from residential and industrial combustion sources, and allows areas to be designated as smoke control areas (SCAs). Under the Environment Act 2005, local authorities throughout the UK have a statutory duty to review and assess air quality in their area against the objectives set for nitrogen

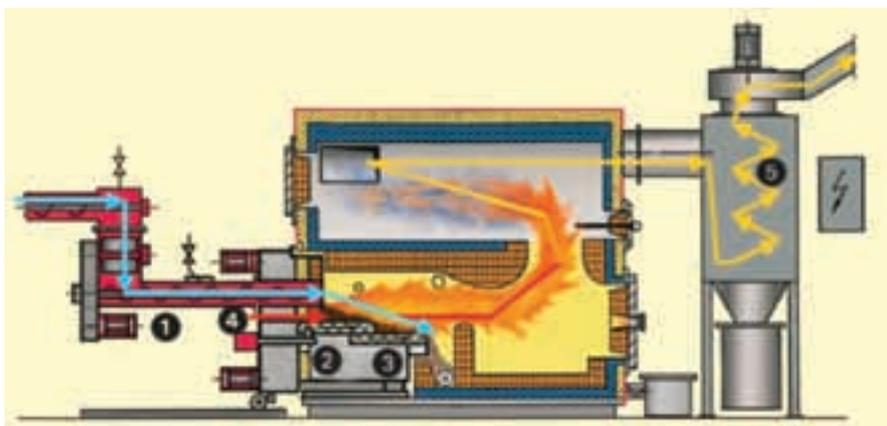


Figure 2: Typical biomass boiler combustion process (Source: Potterton Commercial BBS)

dioxide (NO<sub>2</sub>), particles measuring 10µm or less (PM10), sulphur dioxide (SO<sub>2</sub>) and other gases.

To enable the wider adoption of biomass heat, boilers can be approved for operation in designated SCA and, subject to the maximum concentrations of particulate matters and NO<sub>2</sub> not being exceeded in a given area, approval for a biomass installation should be possible.<sup>7</sup>

### System hydraulics and buffering

Biomass boilers are typically less responsive than modern condensing boilers, with less effective modulation and lower turn-down ratios. For this reason, it is recommended that the biomass boiler is sized to cover the base heat load of the building, with condensing gas boilers meeting peak load requirements. This enables the biomass boiler to run for longer periods without load cycling; this is important, as multiple boiler starts over a short time period can result in incomplete combustion and a rise in pollutant emissions.

A buffer vessel is essential in most installations – firstly, to allow longer run periods and smooth out peaks in system demand, and secondly, because when the boiler stops firing there can be a great deal of residual heat in the fuel bed and refractory lining that must be dissipated, which is typically undertaken by employing a pump overrun control. Sizing of the buffer store will vary by boiler design, fuel type and the system it is serving – manufacturers' advice will be required. Boilers with a lower water content and good modulation may only need 10 litres per kW output, whereas larger chip-fed appliances may require upwards of 50 litres per kW.

Figure 3 shows a typical bivalent system layout with a buffer vessel, peak load boilers and a low-loss header.

With this arrangement, it is typical for the condensing boilers to operate with a return temperature of around 50°C to ensure optimum efficiency. Many biomass boilers will require a return temperature of between 60 and 65°C, dependent upon fuel moisture content, to prevent corrosion of the heat exchange surfaces. Therefore, a back end protection loop – comprising a three-port control valve and shunt pump circuit – is a common arrangement, thereby bypassing the buffer vessel until the boiler loop is up to an acceptable temperature.

### Renewable Heat Incentive for biomass

Payments are based on kilowatt hours (kWh) of metered generation for heat produced by the biomass plant that is used for an eligible purpose (space heating, hot water production and some processes). Tariff levels are split by the installed thermal output (kW<sub>th</sub>) of the biomass plant, as detailed in Figure 4.

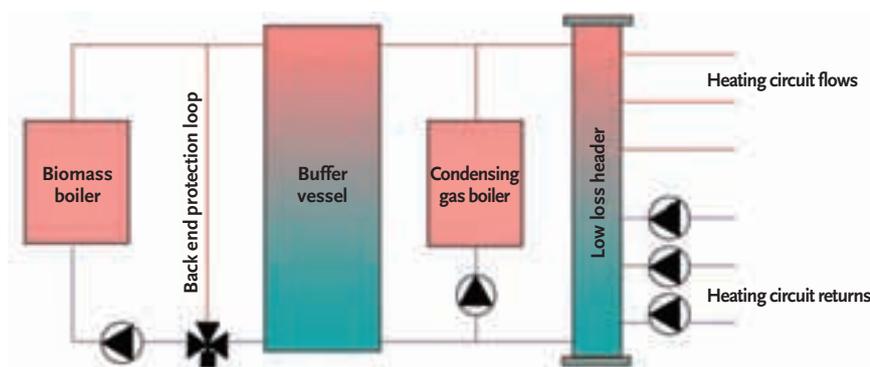


Figure 3: Simplified schematic of a typical bivalent biomass system

Tariff	Eligible sizes	Tariff rate	
		Tier 1	Tier 2
Small biomass	Less than 200 kWth	8.6 p/kWh	2.2 p/kWh
Medium biomass	200 kWth and above; less than 1,000 kWth	5.0 p/kWh	2.1 p/kWh
Large biomass	1,000 kWth and above	1.0 p/kWh	

Figure 4: RHI tariff levels for biomass installations (July 2013)

Affected installations covered by these tariffs will receive, each year, a higher Tier 1 tariff for the initial proportion of heat (an energy equivalent of the total installed load output for 1,314 hours per year) and lower Tier 2 payments for the remainder. (So, under current RHI arrangements, there is the potential for unscrupulous or poor design producing oversized installations that would benefit from a larger proportion of Tier 1 payments.)

Heat meters, compliant with ‘class 2’ requirements of the Metering Instruments Directive (MID Annex MI-004), must be employed to provide heat delivery data for claims. Ofgem publishes guidance on the requirements for the number and placement of such meters, which depends on the number of heat sources and complexity of the system. In the case of system designs including a back end protection loop, it is essential that this is excluded from any metering, as the heat is not deemed ‘useful’; typically, a meter at the inlet of the buffer vessel will suffice.

From the date of a successful application, the tariff is claimable for a period of 20 years for biomass installations – providing the plant remains in operation – with annual adjustments of tariff levels in line with the Retail Price Index (RPI)

Built into the RHI scheme is a ‘degression mechanism’ that will instigate a reduction of the tariff level in the event of a particular technology reaching 150% of the Department of Energy and Climate Change (DECC) predicted expenditure in a budget year. During May 2013, the ‘medium biomass’ category reached its degression trigger point, meaning that new applicants for the scheme since July 2013 face

tariff rates 5% lower than those offered on earlier installations.

### Maintenance

For the operational phase of a project, it is essential to define a robust maintenance regime for biomass boilers. In general terms, to ensure efficient operation, maintain clean flue gas emissions and prevent damage to internal components, the biomass plant will have greater maintenance requirements than a gas boiler. Dependent on the design of the boiler and any ‘self clean’ functionality, it may be necessary to complete weekly tasks such as emptying ash bins or brushing flue ways. Self-cleaning units can reduce this interval and provide a degree of automation to the maintenance regime.

### Packaged plant rooms

A complete biomass solution includes fuel storage, fuel delivery system, buffer vessel, back-up boilers, hydraulic integration and controls, together with requirements for maintenance access and fuel delivery. Incorporating all of this into an internal plant room can prove

challenging in terms of space availability, especially in the case of refurbishment schemes.

To this end, containerised plant rooms (as shown in Figure 5) – including all required system components, flues and external connection points – are becoming available. This approach offers significant benefit in terms of site assembly time and ensures a consistently high quality design and fabrication. Following recommendations in the Egan Report, it is anticipated that offsite prefabrication has the potential to decrease costs by as much as 30%.

The application of biomass technology for providing heating for buildings is, of course, not new. However, new systems that include benefits such as more reliable automatic fuel feeds, and improved burner and emission controls, together with a maturing fuel supply market, greater government assistance and increased market competition, are opening up the potential application of biomass boilers.

© Jeff House and Tim Dwyer, 2013.

### Further reading:

*CIBSE Knowledge Series 10: Biomass Heating* is a good introductory text, and the freely downloadable *Biomass heating: a guide to medium scale wood chip and wood pellet system* from the Biomass Energy Centre provides an excellent reference. For practical health and safety provisions, there is an excellent free guide *Health and safety in biomass systems: Design and operation guide*, published by the Combustion Engineering Association.

### References

- 1 *The Future of Heating: A strategic framework for low carbon heat in the UK*, DECC, 2012.
- 2 *Renewable energy progress and biofuels sustainability*, (ENER/C1/463-2011-Lot2) EC, 2012.
- 3 *UK Bioenergy Strategy*, DECC, 2012.
- 4 *Typical calorific values of fuels*, [www.biomassenergycentre.org.uk/portal/page?\\_pageid=75,20041&\\_dad=portal&\\_schema=PORTAL](http://www.biomassenergycentre.org.uk/portal/page?_pageid=75,20041&_dad=portal&_schema=PORTAL) accessed 28 June 2013.
- 5 *The Dangerous Substances and Explosive Atmospheres Regulations*, HSE 2002, [www.hse.gov.uk/fireandexplosion/dsear.htm](http://www.hse.gov.uk/fireandexplosion/dsear.htm)
- 6 Palmer, D. et al. *Biomass heating: a guide to medium scale wood chip and wood pellet systems*, Biomass Energy Centre ([www.biomassenergycentre.org.uk](http://www.biomassenergycentre.org.uk)), 2011.
- 7 Palmer, D. et al. *Biomass heating: a guide to feasibility studies*, Biomass Energy Centre ([www.biomassenergycentre.org.uk](http://www.biomassenergycentre.org.uk)), 2011.



Figure 5: Example of a prefabricated, packaged plant room

# Module 55

August 2013



## 1. What is UK target for overall energy from renewable sources by 2020?

- A 5%
- B 10%
- C 15%
- D 20%
- E 30%

## 2. What volume of woodchips would have approximately the same energy as 1 m<sup>3</sup> heating oil?

- A 1.1 m<sup>3</sup>
- B 3.1 m<sup>3</sup>
- C 4.5 m<sup>3</sup>
- D 11.6 m<sup>3</sup>
- E 36 m<sup>3</sup>

## 3. What part of the illustrated example of the biomass boiler is used to ignite the fuel?

- A 1
- B 2
- C 3
- D 4
- E 5

## 4. What is the back end protection loop used for?

- A To reduce ash in the flue gas so protecting the back end of the boiler
- B To ensure that there is always a temperature low enough for the condensing boiler to condense
- C To allow the boiler to ignite more quickly so reducing the accumulation of tars
- D To ensure that the return water temperature to the biomass boiler is maintained above a minimum level
- E To reduce the size of the buffer vessel

## 5. How many years is the annually adjusted RHI tariff payable following acceptance on the scheme?

- A 5 years
- B 10 years
- C 15 years
- D 20 years
- E Period dependent on degression triggers

Name (please print) .....

Job title .....

Organisation .....

Address .....

Postcode .....

Email .....

### Are you a member of:

CIBSE

If so, please state your membership number

(if available) .....

Other institution

(please state) .....

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

Building services engineer

Mechanical engineer

Electrical engineer

Commissioning engineer

Energy manager

Facilities manager

Other (please give details) .....

If you do NOT want to receive information about Baxi, the sponsor of this CPD module, please tick here:

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

Please go to [www.cibsejournal.com/cpd](http://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:

**N Walsh, CIBSE, 222 Balham High Road, London, SW12 9BS**

# Healthcare Estates **Exhibition, Conference & Dinner**

8 - 9 October 2013 Manchester Central

Putting Positive Energy into Healthcare

## Why should you attend:

The biggest gathering of facilities, estates, engineering and procurement professionals from the healthcare sector

- Come and see the latest products and solutions in healthcare
- Over 180 companies displaying over 450 products presented by experts in the exhibition
- Healthcare Estates combines the UK's largest event in healthcare with the highly respected IHEEM conference
- Join other high-level decision makers from across the healthcare sector
- See and hear about the practical application of products in the health care environment
- Healthcare Estates exhibition is 'free' to attend and healthcare professionals benefit from complimentary parking on site, complimentary refreshments and a dedicated VIP area in the show



Event Sponsors: **CAPITA** **Cynergin** **e-on**

Register NOW for your Discounted Conference Ticket

Register NOW for your Complimentary Exhibition Visitor Pass



Scan me to register

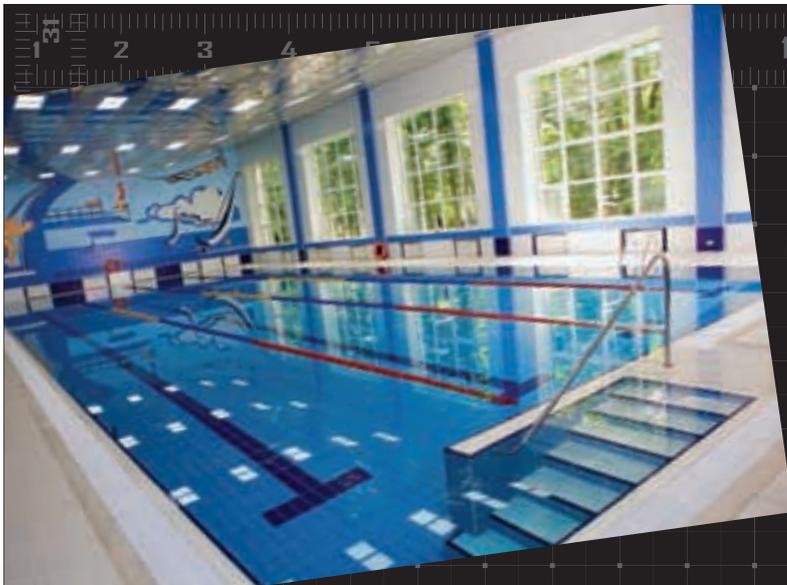
Event Partner:



Event Organised By:



To register please visit [www.healthcare-estates.com](http://www.healthcare-estates.com)



# JOURNAL CIBSE

Look out for CIBSE Journal's  
"Hotel & Leisure Facilities Supplement"  
appearing with our  
October 2013 issue

## ORDER DEADLINE - 2nd September 2013

For more information please contact:

**Editorial:** Alex Smith – [asmith@cibsejournal.com](mailto:asmith@cibsejournal.com)

**Advertising:** Jim Folley – Tel: 020 7324 2786  
or email: [jim.folley@redactive.co.uk](mailto:jim.folley@redactive.co.uk)

Mark Palmer – Tel: 020 7324 2785  
or email: [mark.palmer@redactive.co.uk](mailto:mark.palmer@redactive.co.uk)



## Lochinvar fits out advanced hospital development in Norwich

The Norfolk and Suffolk Foundation (NHS) Trust decided to upgrade dementia treatment facilities for the Norfolk area by building one of the most advanced facilities in the UK at Hammerton Court, part of the Julian Hospital in Norwich. It was built over a 12-month period and comprises single-storey timber frame wards and a two-storey composite steel frame, containing the entrance, shared clinical areas, administration and training rooms. The considerable demand for hot water is satisfied by a large solar thermal system integrated with gas-fired condensing water heaters, all by Lochinvar.

● Visit [www.lochinvar.ltd.uk](http://www.lochinvar.ltd.uk)

## Wieland's Metalynx proves ideal for major refurbishment

Refurbishment of 1A Wimpole Street in Westminster has included the use of Wieland Electric's Metalynx structured wiring system to connect small power and lighting, and to distribute the control cabling for the lighting management system. The Wieland Metalynx system was selected by electrical contractors Raytell Electrical because the company had confidence that Wieland products would meet all of the requirements of the project.

● email [sales.uk@wieland-electric.com](mailto:sales.uk@wieland-electric.com) or visit [www.wieland-electric.com](http://www.wieland-electric.com)



## Titan Products launches TPZ-Net Zigbee wireless range

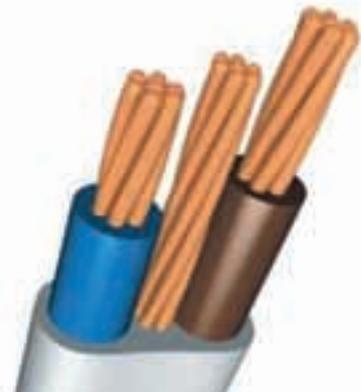
The TPZ-Net is a new range of wireless environmental products from Titan Products. Incorporating Zigbee wireless technology, the range creates extremely stable, self-healing mesh networking capabilities. The TPZ-Net range is designed to monitor temperature, CO<sub>2</sub>, humidity, light and occupancy levels wirelessly, and transfer this information back to the Titan Products coordinator, where the information can be transferred onto a BACnet network or to other Titan product controllers, or I/O (input/output) devices.

● Visit [www.titanproducts.com](http://www.titanproducts.com) or call 0161 406 6480

## New high-speed cleaner achieves heating system efficiency fast

In direct response to market demand for a fast-acting, safe-to-use heating system cleaner, Sentinel Commercial has introduced Senticlene 8500. Ideal for quick, one-day cleaning projects, Senticlene 8500 is perfect in circumstances that require immediate, unplanned cleaning, for example, prior to a new boiler or chiller installation. This cleaning solution has been developed specifically for commercial heating and closed cooling systems, such as those found in office facilities, conference venues, sports centres, hotels, schools and retail outlets.

● Call 01928 588330



## LG uses artistic licence with Artcool gallery wall mounts

LG's Artcool range of indoor split and multi-split units rings the changes over more conventional white wall mounts, combining aesthetics and energy efficiencies for the domestic and light commercial markets. The top of the range Artcool Gallery wall-mounted unit resembles a framed picture and comes with a changeable photo for the front panel. LG also offers a selection of conventional, standard, white wall-mounted units and also the Artcool Mirror unit, with a striking mirror finish.

● Visit [www.lg.com/uk/air-conditioning](http://www.lg.com/uk/air-conditioning)



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

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

● Call 01293 871751 or visit [www.castlinesystems.com](http://www.castlinesystems.com)



## SE Controls provides safe and comfortable environment for students at Staffordshire University's Stoke Campus

A £30m Science and Technology Centre at Staffordshire University's Stoke Campus is relying on a combined smoke and natural ventilation solution from SE Controls to create a comfortable and safe environment for staff and students. Designed by architects Sheppard Robson and built by Miller Construction, the extensive facility is part of a £200m flagship regeneration scheme, which is transforming education in the region with the development of the 'Uni-Q' university quarter. Working closely with façade and access specialist, Norking Aluminium, SE Controls was responsible for the supply, installation and commissioning of the smoke and natural ventilation solution to ensure the fully automated system met design specifications and legislation for air quality, as well as smoke safety in the event of a fire. SE Controls supplied 240 SCCO and TCGO type chain actuators to the project, which were used in conjunction with 40 OS2 controllers, to provide complete control over the vertical vents, louvres and atrium vents.

● Visit [www.secontrols.com](http://www.secontrols.com) or call 01543 443060



## Leading the way in pipe insulation design

Kingspan Tarec has once again raised the bar for pipe insulation design and performance with the launch of its Next Generation Kooltherm Pipe Insulation solution, featuring passivated, impregnated liner technology, with an optional Theatre Black finish due

to arrive shortly. The cutting-edge product is manufactured using Kingspan Tarec's unique continuous online production process, which creates minimal waste (less than 5% for recycling) and cuts labour time when compared to less efficient conventional phenolic pipe insulation manufacturing.

● Email [info@kingspantarec.co.uk](mailto:info@kingspantarec.co.uk), call 01457 890400 or visit [www.kingspantarec.com](http://www.kingspantarec.com)

## BUPA's winter air curtain care

The versatility and aesthetics of the Rund air curtain from JS Air Curtains has cured BUPA's winter draught problems at the reception of its Health and Wellbeing UK offices in Staines. The air curtain has been custom-designed so it can be easily removed during the summer months when it isn't required. The large reception atrium suffered from cold draughts during the winter with more than 11,000 employees entering and leaving the building through its revolving doors. JS Air Curtains' solution was to vertically mount a 2.5m-high, low-temperature, hot water-heated Rund air curtain.

● Call 01903 858656 or email [sales@jsaircurtains.com](mailto:sales@jsaircurtains.com)



## Hitachi Air Conditioning Europe's VRF awarded ECA status

Hitachi's recently launched Hi Efficiency Set Free VRF – FSXNH – has achieved Enhanced Capital Allowance (ECA) scheme status. The ECA Scheme is part of the government's programme of measures to manage climate change, which gives businesses tax relief for investing

in energy-efficient, accredited products – making it possible to claim a 100% first year capital allowance against the taxable profits in the period of investment, rather than claiming on a reducing balance basis.

● Visit [www.hitachiaircon.com](http://www.hitachiaircon.com), email [aircon.enquiries@hitachi-eu.com](mailto:aircon.enquiries@hitachi-eu.com) or call 01628 585 394

## Canary Wharf banks on the future

No 8 Canada Square – better known as The HSBC Tower – has been the global headquarters for the HSBC Group since it was completed in 2002. The 45-floor building was designed by Sir Norman Foster's team and, at 656 ft, is the second tallest building in Canary Wharf.

When the building started to experience problems with its water boosting system, it turned to Grundfos Pumps to recommend a solution. Having ascertained that the original non-Grundfos pumps were not 'fit for purpose', the

Grundfos team of sales and service personnel worked with Vear M&E Services to tailor-make the solution. Needing to replace 40 bar pumps – including the related vessels and control panel – in a very confined plant room (the pumps only had four-inch headroom clearance), while the building remained fully operational, presented a huge engineering challenge to all parties concerned. The solution, which incorporated 5x25 bar Grundfos CR32, needed a lot of careful planning and coordination and, once the solution was in situ, the Grundfos service team remained on site for the first 48 hours to ensure there were no issues.

● Email [grundfosuk@grundfos.com](mailto:grundfosuk@grundfos.com), call 01525 850000 or visit [www.grundfos.co.uk](http://www.grundfos.co.uk)





## Wigan Town Hall gets kitted out with condensing boilers from Baxi

Baxi Commercial Division has supplied five floor-standing condensing boilers for a refurbishment of Wigan Town Hall's heating system, which has shown a 22% energy saving over the year, to May 2012, compared with the previous year's usage. This saving was made despite the heating remaining operational until the end of May 2012; In 2011 it was switched off in early April. Wigan Town Hall is home to the council chamber, the Mayor's Parlour, offices, as well as a number of civic functions and popular events.

● Visit [www.pottertoncommercial.co.uk](http://www.pottertoncommercial.co.uk), call 0845 070 1055 or email [Jeff.house@baxicommercialdivision.com](mailto:Jeff.house@baxicommercialdivision.com)

## CP's EBDSPiR – unobtrusive yet effective

CP Electronics' popular EBDSPiR presence detector is now available in a surface-mounted option. Designed for the automatic control of lighting, heating and ventilation applications, this versatile unit is self-contained and easy to install via a back plate. The EBDSPiR detector monitors the zone and will switch on when occupancy is detected, or off when the area is vacated following a preset time. The time delay is adjustable between 10 seconds and 30 minutes and, if there is sufficient natural light, a built-in photocell will keep the lighting switched off.

● Email enquiry [@cpelectronics.co.uk](mailto:cpelectronics.co.uk), call 0333 900 0671 or visit [www.cpelectronics.co.uk](http://www.cpelectronics.co.uk)



## School gets the maths right with Remeha super condensing heating

An exemplary new, three-storey extension at Taunton Academy has been fitted with the Quinta Eco Plus, Remeha's super condensing heat recovery system, to reduce energy consumption and carbon emissions while offering fast financial payback. Mechanical and electrical consultant Simon Luff, of FP Hurley, specified a Quinta Eco Plus 115 kW system with a Quinta Pro 115 kW as an affordable, 'green' solution for the school, which meets Part L carbon reduction requirements. The Quinta Eco Plus is suitable for new build and retrofit applications, delivering 107% (NCV)  $\geq 82/71^{\circ}\text{C}$  condensing efficiency at all times and recovering otherwise wasted energy for pre-heating DHW and space heating.

● Visit [www.remeha.co.uk](http://www.remeha.co.uk), email [boilers@remeha.co.uk](mailto:boilers@remeha.co.uk), or call 0118 978 3434

## Helvar launches second phase of Tridium driver for its Niagara driver

Helvar is pleased to announce a software update to its Niagara driver, which is available now as a free download. Supporting open technologies such as DALI and EnOcean, the Helvar IP driver integrates lighting control with other BMS components on Tridium's renowned Niagara interface, providing the freedom of choice for integration. The latest software upgrades reduce time on site for programmers, and streamlines the process of opening up lighting control networks to other systems, such as automated blinds and heating.

● Visit [www.helvar.com](http://www.helvar.com) or follow us on Twitter @Helvar\_Systems



## Bitzer and Foster Refrigerator back ACR Show 2014 as team expands

Bitzer and Foster Refrigerator, leading manufacturers in their respective fields, have confirmed their participation in the forthcoming Air Conditioning and Refrigeration Show 2014. German giant Bitzer will have a larger presence than at the previous show, and roll out its latest developments in compressor technology. Foster Refrigerator is taking a major stand to showcase advances in commercial refrigeration for the catering and food service industry.

● Visit [www.acrshow.co.uk](http://www.acrshow.co.uk), call Jan Thorpe on 01622 699113 or email [jthorpe@datateam.co.uk](mailto:jthorpe@datateam.co.uk)



## Hamworthy Heating opens new research and development centre

In June, the president of the Institution of Mechanical Engineers, Patrick Kniveton, officially opened the new research and development centre at Hamworthy Heating in Poole. As part of its commitment to new product development and innovation, Hamworthy invested £500,000 in the 150 sq m facility at its factory in Dorset. Kniveton said: 'It is a real pleasure to take part in the opening of this centre. It is evident that the work Hamworthy Heating is doing here is very impressive.'

● Call 0845 450 2865, email [sales@hamworthy-heating.com](mailto:sales@hamworthy-heating.com) or visit [www.hamworthy-heating.com](http://www.hamworthy-heating.com)

## Fläkt Woods waxes LYRA-cool about latest chilled beam

Fläkt Woods has launched LYRA – a highly efficient cassette chilled beam, which provides extremely quiet cooling from a compact unit. LYRA sits flush in suspended ceilings and is equally effective in exposed soffit installations with casing adaptors and ‘snap-on’ front panels. Available in two sizes – 600 mm and 1,200 mm – and suitable for cooling, heating or mixed use, LYRA utilises multidirectional diffusers and a flow pattern control system to produce a comfortable environment for a wide range of office and commercial applications.

● Visit [www.flaktwoods.co.uk](http://www.flaktwoods.co.uk)



## Free training on PICVs

In September and October 2013, Marflow Hydraulics is running free training courses across the country on Pressure Independent Control Valves. Aimed at consultants, designers, specifiers and key influencers who want to improve their skills and specify, purchase or commission a PICV, the courses are designed to provide delegates with knowledge on how they work, how best to design them and how to make systems more economical. The half-day sessions will look at how things have been done historically, using PICVs today, simplified design and installation, cost implications, commissioning and what's in store for the future.

● Visit [www.marflowhydraulics.co.uk](http://www.marflowhydraulics.co.uk), call 0845 643 9096 or email [training@marflow.co.uk](mailto:training@marflow.co.uk)



## Free specification CD available from REHAU

Specifiers and consultants can now obtain a free CD from REHAU containing all of the technical information they need to specify subsurface heating and cooling systems from the pipework system specialist. The disk contains all of REHAU's specification literature, including product guides, technical and CAD drawings, as well as required specification phrases. Tony Harbour, specifications manager, said: 'The guide is intended to give specifiers the tools they need in a user-friendly format, as well as lots of useful information on pipe sizing, flow rates, system temperatures and installation guidance.'

● Email [jo.trotman@rehau.com](mailto:jo.trotman@rehau.com), visit [www.rehau.co.uk](http://www.rehau.co.uk) or call 01989 762600



## CE seal of approval for Harmer SML range

Alumasc has launched an enhanced range of Harmer SML lightweight cast iron soil and waste systems, which delivers a package of design and installation benefits to contractors and specifiers alike. Engineers and designers have the reassurance that the new Harmer SML range meets the new UK requirement for CE Marking, while installers can also benefit from the introduction of new ductile iron brackets. Wayne Willmott, sales manager for Harmer Drainage, says: 'The CE Mark and new brackets are just two of the customer-focused features that make Harmer SML a market leading system for easier specification, greater choice and simpler installation. Advances in cast iron technology have ensured that Harmer SML products are fully attuned to modern construction needs. The system is durable, recyclable, quick and easy to install and requires low maintenance.'

● Visit [www.harmerdrainage.co.uk](http://www.harmerdrainage.co.uk) or call 0808 100 2008

## Co-operative lowers bills and emissions with heat recovery boiler technology from Mitsubishi Electric

A new VRF (variable refrigerant flow) air conditioning system has been installed at the Co-operative's food store in Dagenham to provide all the hot



water the store needs. The installation has enabled The Co-operative to get rid of the assortment of old oil-fuelled heaters and electrical cooling equipment, which were inefficient and costly to run. The solution involved linking Mitsubishi Electric's PWFY heat pump boiler to a City Multi VRF R2 heat recovery system to provide heating, cooling and hot water.

● Visit [air.conditioning@meuk.mee.com](mailto:air.conditioning@meuk.mee.com) or call 01707 278880



## Acton Town Hall chooses electric boilers for restrictive space

Atlantic Boilers of Oldham has supplied its new Multi-Elec electric boiler for the Acton Town Hall re-generation project. With access and availability of services being a problem on site, the powerful electric boiler – which needs no flues – fits snugly into the basement area. The Multi-Elec boiler is 99% GCV efficient and has a three-step control system controlled in stages or by a building management system. The boiler is available ex-works, from 96 kW to 630 kW and, by special manufacture up to 980 kW. Range of temperature is 40°C to 95°C and working pressure 0.5 bars to 4.0 bars.

● Email [info@atlanticboilers.com](mailto:info@atlanticboilers.com), visit [www.atlanticboilers.com](http://www.atlanticboilers.com) or call 0161 621 5960



## AA's two Rosette-rated restaurant installs gas safety equipment

The Sharrow Bay, a luxury Lake District hotel, has installed a new kitchen with a gas interlock system from S&S Northern. Harmony Business and Technology worked on the installation. Jim Scott, of Harmony, said: 'We recommend S&S Northern gas interlock products to our customers because of the company's professional and responsive service. S&S Northern products are reliable, excellent quality and simple to use and understand.' S&S Northern's Merlin 1650 Gas Interlock with a Merlin CO<sub>2</sub> detector were recommended to The Sharrow Bay to ensure compliance with TB140.

● Visit [www.snsnorthern.com](http://www.snsnorthern.com), email [info@snsnorthern.com](mailto:info@snsnorthern.com) or call 01257 470983

## Donation to help train tomorrow's engineers

The donation of a City Multi air conditioning system to one of the country's leading colleges is helping to ensure that the engineers of tomorrow are up to speed with the latest VRF technology. Eastleigh College is one of the top providers of refrigeration and air conditioning qualifications in the UK and Mitsubishi Electric hand-picked the Ofsted-rated 'Outstanding College' to be the owner of the sophisticated equipment. 'Modern air conditioning systems offer simultaneous heating and cooling to different parts of a building to maximise energy efficiency, and anyone working on them needs to have appropriate training,' said Ben Bartle-Ross, senior pre-sales engineer at Mitsubishi Electric.

● Call 01707 278880 or visit [air.conditioning@meuk.mee.com](mailto:air.conditioning@meuk.mee.com)



## Mikrofill Ethos provides heating package for Kinden Lodge School

North House forms part of Linden Lodge School in the Wimbledon area of south west London. The existing time-served, cast iron sectional boilers in the basement area were providing primary heat to radiators and a large open-vented hot water calorifier. The Ethos condensing boiler package married well with the on-site criteria of awkward access, limited space and a need for the highest efficiency. Mikrofill's products proved a further advantage as they were transported from the UK production line straight to site.

● Call 0845 260 6020

## Energy-efficient drive for HVAC launched by Siemens

The Siemens Building Technologies division has launched a new energy-efficient variable speed drive, allowing users to reduce their heating, ventilation and air conditioning (HVAC) operating costs. Suitable for applications requiring an efficient drive for pumps or fans, the G120P variable speed drive (VSD) is user-friendly and can also be used in harsh environmental conditions due to its protection classes of IP54 and IP55. For example, it can operate in temperatures up to 60°C – an essential feature for controlling the speed of fans and recirculation pumps in heating and cooling systems.

● Visit [www.siemens.co.uk/buildingtechnologies](http://www.siemens.co.uk/buildingtechnologies)



## LG Electronics is aces high with flexible H-Inverter range

LG's high COP range of commercial splits, or 'H-Inverter', offers high efficiency for commercial applications via a wide range of cassette, ducted or ceiling-suspended units. These innovative, split-type air conditioning units feature powerful air throw, allergy reduction filters and responsive step controls. The LG H-Inverter range is available in sizes from 3.5 kW to 14 kW, with three-phase power supply options over 10 kW. System SEER's can be up to 6.11, with an energy labelling of A++.

● Visit [www.lg.com/uk/air-conditioning](http://www.lg.com/uk/air-conditioning)

# PRODUCTS & SERVICES

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



## Modular Wiring Systems opens city office

Modular Wiring Systems, a subsidiary of electrical cable manufacturer Tratos, has opened a new London office in the heart of the city. Conveniently located in Farringdon, Modular Wiring Systems' new office will help to further strengthen existing customer support with local connections, in addition to allowing the company to develop relationships with key contractors working throughout the capital. Modular Wiring Systems provides a complete design, manufacture and supply service for high and low level modular sub-circuit distribution systems prefabricated off-site.

● Visit [www.modularwiring.com](http://www.modularwiring.com), email [info@modwire.com](mailto:info@modwire.com) or call 0845 413 9777



## Power and reliability from Thision L

The Thision L range of light commercial boilers from MHS Boilers (part of ELCO Heating Solutions) can now be supplied in a powerful, and class-leading, cascade system, offering combined outputs up to 1,140 kW. With a turndown ratio of 6:1 and extremely low NOx emissions, Thision L cascade systems are perfect for a wide range of commercial applications such as schools, healthcare facilities and retail outlets. At the heart of the Thision L boiler is a stainless steel heat exchanger.

● Visit [www.mhsboilers.com](http://www.mhsboilers.com)



## Kingspan Environmental launches first essential product catalogue

The Essential Products Guide has been published by Kingspan Environmental. The 100-page catalogue details all of the company's products and services across sustainable water, environmental management and renewable technologies. It includes a huge range of information on product types, sizes and specifications, as well as a source of advice and support for customers. The guide is available in print and as a downloadable ebook ([www.keguide.com](http://www.keguide.com)). All customers and users of Kingspan Environmental products can claim a free copy.

● Email [keguide@kingspan.com](mailto:keguide@kingspan.com) stating name, business and address. Or call 028 3836 4448

# DIRECTORY Your guide to building services suppliers

Telephone: 020 7880 7614 Email: [patrick.lynn@redactive.co.uk](mailto:patrick.lynn@redactive.co.uk)

## Air Conditioning

**CLIVET**  
For total solutions in air-conditioning  
E: [info@clivet-uk.co.uk](mailto:info@clivet-uk.co.uk)  
W: [www.clivet.com](http://www.clivet.com)  
T: 01489 572238  
W: [www.versatemp.co.uk](http://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](mailto:info@aircraftairhandling.com)  
Web: [www.aircraftairhandling.com](http://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](mailto:cad@cadeuro.co.uk)  
W: [www.cadeuro.co.uk](http://www.cadeuro.co.uk)

## Controls/BMS/Controllability

**Birling Consulting Ltd**  
Professional Services:  
• BMS Design & Specification  
• System design for controllable energy efficient operation  
• Integration of Low Carbon Technologies  
• Controllability Reviews  
• PM, Reports, Guides, Advice, etc.  
See: Taking Control - CIBSE Journal Dec 2011  
**Graham P Smith CEng MInstMC MCIBSE**  
T: 01548 830672  
E: [grahambirling@aol.com](mailto:grahambirling@aol.com)  
W: [www.birlingconsulting.co.uk](http://www.birlingconsulting.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](http://www.autron.co.uk)

## Energy Efficiency

**GROENHOLLAND**  
Ground Source Heat Pump Installations  
Meeting Renewables Targets  
Tel: 02392 450889  
Fax: 02392 471319  
[www.groenholland.co.uk](http://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](http://www.aquatechpressmain.co.uk)



## Senior MEP Engineering Appointment in Vietnam

Exciting and diverse opportunity for experienced MEP Engineer to lead and develop the division within Atlas, a leading international supplier of outsourced engineering and architectural services.

Following significant wins and increased demand for multi-disciplinary services, we are seeking senior professionals for the role of MEP Manager.

Salary c£60k pa + benefits.

The successful individual will be based in Ho Chi Minh City, working on major international projects on 2D, 3D and BIM platforms.

Applicants must have excellent leadership skills and a proven track record of delivering major projects within the Buildings sector.

Candidates should ideally be UK or Australian registered engineers.

Interested candidates should send their CV to: london@atlasindustries.com

www.atlasindustries.com



## ASSOCIATE MECHANICAL ENGINEER

### MECHANICAL & ELECTRICAL ENGINEERS

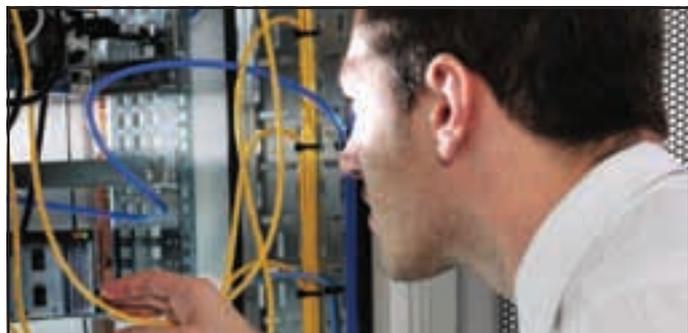
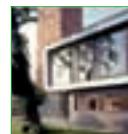
Brinson Staniland Partnership are an award winning firm of consulting engineers founded in 2001. We design M&E systems for a diverse range of buildings including: schools, universities, health, laboratories, residential, offices, leisure and restaurants.

Due to our expanding work load and growth plan we are currently seeking an associate with good leadership and management skills to provide advice and produce creative designs for our loyal client base. The candidate would ideally be a chartered engineer able to take on a variety of projects.

We also have opportunities at other levels for both disciplines at graduate trainee level to senior engineer level where REVIT/BIM training would be offered.

An excellent salary, annual bonus scheme and further opportunity for promotion is on offer. If you would like to apply for a position then please contact James Staniland at js@bspce.com

Brinson Staniland Partnership, Seymour House, South Street, Bromley, Kent, BR1 1RH 020 8466 6131 www.bspce.com



## Technical Engineers and Managers

UK and Ireland

Johnson Controls Global WorkPlace Solutions is a leading global provider of integrated facilities and corporate real estate management. We are currently recruiting a number of Technical Engineer and Manager roles across the UK and Ireland.

If you are interested in the above vacancy please visit our website [www.johnsoncontrols.co.uk/careers](http://www.johnsoncontrols.co.uk/careers) and apply online, or email your CV to [ukcareers@jci.com](mailto:ukcareers@jci.com) quoting the vacancy reference number 103287.



8281a0713



For a confidential chat, Call us **8am to 8pm**

### Contract Mechanical, Electrical and Public Health Design Engineers | London

£30.00 - £35.00 Per Hour

We are currently working on behalf of a renowned medium sized building services consultancy who have recently won numerous hotel and high end residential projects. Candidates should be able to lead their own projects and be responsible for client meetings and on occasion manage junior members of staff whilst working with the CAD Department. Candidates should have at least 5 years' experience and be educated to at least HNC/ HND level and be competent on design software such as Dialux, Hevacomp, Relux and Amtech.

### Senior Mechanical Building Services Engineer | Croydon

£45,000 - £50,000 Plus Package Plus Possible Equity

Our client is a medium sized award winning M&E consultancy based in Croydon with an enviable reputation for delivering high profile projects in the Commercial and high end residential sector. With the company performing particularly well and the recent announcement of further successful bids, this consultancy is looking for a senior level Mechanical Design Engineer to join their team. The ideal candidate will be technically strong, hardworking and offer client facing flexible attitude at all times. This is a fantastic role for a Mechanical Engineer to join a team with the potential to climb the ranks extremely quickly to Associate level due to impending retirement. Candidates should have at least 5 years' experience within a consultancy and be will be ideally working towards chartered status.

### Senior Electrical Design Engineer - Real Estate/ Project Management Services Firm | City of London

£45,000 Plus Benefits Package

One of the largest Real Estate Brokers and Project Management firms in the world is currently looking for a senior level Electrical Building Services Design Engineer to join their engineering design team based in Central London. Appropriate candidates will have a minimum of 5 years post graduate experience and have gained or be working towards Chartered status. They will be confident in client facing roles, will demonstrate strong inter-personal, presentational and reporting skills, and will be able to deal effectively with client representatives, professional team members and contractors at a senior/board level.

Contact: [george@conradconsulting.co.uk](mailto:george@conradconsulting.co.uk) | 0203 159 5387  
Find more jobs online at [www.conradconsulting.co.uk](http://www.conradconsulting.co.uk)

# UNIVERSITY OF Southampton

## Engineering & Maintenance

### Mechanical Engineer (Design)

#### Full-Time

**Location:** Highfield Campus

**Salary:** £35,244 to £44,607

**Full Time Permanent**

**Closing Date:** Friday 30 August 2013

**Interview Date:** To be confirmed

**Reference:** 250913TD

With an ambitious target of reducing carbon emissions by 20% by 2020, the University of Southampton is looking to recruit a dynamic and innovative mechanical engineer to join its Mechanical and Electrical Design Team.

This team is responsible for delivering, directly and with the support of external consultants, an on-going long term maintenance programme as well as responding to the changing needs of colleagues from the academic and other professional services departments.

The estate's mechanical services serve a wide range of building types from high performance laboratories to catering outlets to

Halls of Residence. The installed plant includes large scale district heating and CHP, condensing boilers, absorption and vapour compression chillers, chilled beams, displacement ventilation, VAV, fan coil units and VRV, the vast majority of which is controlled using an extensive Trend BEMS.

The successful applicant will bring extensive technical ability and practical experience in the design and delivery of all types of mechanical building services including BEMS. Experience of public health and/or lift engineering would be an advantage.

In order to agree the specification of projects in a way that does not compromise energy efficiency or health and safety legislation and then to deliver them in occupied buildings excellent interpersonal communication and negotiating skills will be essential.

**Please apply online at [www.jobs.soton.ac.uk](http://www.jobs.soton.ac.uk) quoting reference number 250913TD.**

**At the University of Southampton we promote equality and value diversity.**



THE QUEEN'S  
ANNIVERSARY PRIZES  
FOR HIGHER AND FURTHER EDUCATION  
2011



[www.jobs.soton.ac.uk](http://www.jobs.soton.ac.uk)



#### Security Cleared Candidates | Berkshire | £HIGH! | ref: 3907

We have a number of clients based at AWE who are actively looking for cad technicians, design engineers and project engineers on long term contract or permanent basis. Suitable candidates will currently hold SC clearance. Please call Rebecca Moore for more details and a confidential discussion.

#### Design Manager | London | to £400LTD/day | ref: 3824

Our client is a blue-chip M&E Contractor who has a full order book running into 2014. A track record of managing your own internal design team or external design consultancies is essential as well as a good knowledge of London Underground and/or Network Rail standards.

#### Int/Snr Public Health Engineer | London | £35 - £45K | ref: 3754

A large independent M&E Consultant requires a Public Health Engineer to work on a variety of projects, including residential and leisure. Candidates should hold a minimum qualification of an HNC.

#### Revit MEP Technician | London | to £30LTD or £40K | ref: 3821

Our client is a leading M&E Consultant with major commercial and residential developments at the detailed and early design phases. You will ideally have 12 months+ hands on Revit MEP experience and be able to produce fully coordinated M&E drawings. Long term contract or permanent opportunity!

#### Building Physics Engineer/Snr Consultant | Bristol | to £45K+ | ref: 3871

A multi-disciplined consultant requires experienced engineers to undertake detailed engineering analysis in the fields of dynamic thermal modeling and/or computational fluid dynamics. Experience and regular use of IES is essential.

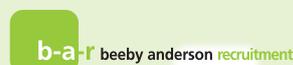
#### Mechanical Design Engineer | London | to £45K+ | ref: 3906

An award winning firm of international consulting engineers is looking for a Chartered mechanical engineer. Ideal candidates will be IES proficient with a exceptional track record in the commercial and residential sectors.

**t: 02392 603030**

**e: [cv@blueprintrecruit.com](mailto:cv@blueprintrecruit.com)**

**[www.blueprintrecruit.com](http://www.blueprintrecruit.com)**



### Rail Engineering Manager

**£70k + benefits/£450 per day, London**

My client is a market leading M&E Contractor that specialises in major infrastructure projects. Due to expansion, they seek an electrically biased Engineering Manager for their rail division. You will be responsible for managing teams of project and design engineers with a focus on delivering the HV Electrical engineering elements of large LUL, Network Rail, and Crossrail projects across London and the UK. BAR1269/CB

### Senior Electrical Design Engineer

**£45k + benefits, Central London**

International multi-disciplinary design consultancy requires an experienced Building Services design engineer with an electrical bias. The client undertakes projects spanning the commercial, residential, and mixed-use development sectors along with large scale urban redevelopments. Successful candidates should be chartered engineers with extensive building services design experience and a proven track record leading teams of engineers to deliver schemes on time and budget. BAR1292/TA

### Senior Mechanical Design Engineer

**Surrey, £45 - £50k + benefits**

Our client is a well-established building services consultancy with exciting plans for growth. The directors seek a senior level mechanical engineer to work alongside the management team in delivering a structured growth plan. The next 12- 18 months will see a significant increase in headcount which in turn will create a great opportunity to progress within the practice for an ambitious, client facing engineer, with exceptional management ability. BAR1264/JA

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

Thinking of your future

[www.b-a-r.com](http://www.b-a-r.com)

# WASTE UNDER THE KNIFE

Barts Health NHS Trust reduced energy bills by £105,000 in two hospitals by persuading workers to close doors and turn off lights.

**Fiona Daly** is quizzed on how a focus on patient care changed behaviour and cut energy use



An energy-saving project being trialled at Barts Health NHS Trust hospitals saved the NHS's largest trust £105,000 last year. The 'Turn off, lights out, close doors' (TLC) scheme took place at Barts and The Royal London and the Trust says the initiative could save up to £800,000 in the next two years across its six hospitals.

The TLC scheme uses the 'nudge' philosophy, encouraging groups to work together and remind each other of the benefits of saving energy for patients use.

## What inspired the project?

The inspiration was two-fold. We wanted to use behavioural change to drive energy efficiency and we wanted to ensure that the project had longevity within the organisation. We had tried a few things before, like poster campaigns that were successful for the period they ran, but they never lasted the distance.

We were keen to focus on how efficiency would improve patient experience, since caring is obviously our core business. We communicated how closing doors made wards less noisy and turning off lights gave patients a better night's sleep.

We realised that with all the people we had to engage – 15,000 staff and about 3,000 contractors – we really needed to get a collaborative approach working.

## What were the challenges to changing behaviour?

On a day-to-day basis getting health professionals to be energy efficient is very difficult because they are focused on patient care. The challenge was to

We were keen to focus on how efficiency would improve patient experience, since caring is obviously our core business

make it relevant and integrate it into regular work. They often see other things – such as energy efficiency – as important if you speak to them on a one-to-one basis; they absolutely get it and they want to help.

It is important to reward people who have done well with gifts, such as tins of biscuits at Christmas.

## Who drove energy efficiency on the wards?

We had about 140 main sustainability champions who were on the ground – in wards – really trying to drive efficiency. We taught them the principles of TLC and gave them training through UNEP (United Nations Events Programme) certification.

They also worked with our facilities providers, which are external companies, to gain a greater awareness of why things happen. For example, people often don't know exactly what a building management system is and how it operates, so working with the facilities providers really helped to expand knowledge.

## How was the message delivered?

Through a variety of methods from face-to-face communication to screensavers, pens and an inflatable energy-saving character called Mr Switch (pictured above).

## Who is funding the initiative?

We entered into a public-private-NGO partnership to achieve all of these objectives. Our funding is split between several sources: half is coming from Barts Trust itself, a quarter from Skanska and a quarter

from General Electric. Payback for the first 12 months was less than a year.

## What are the long-term aims?

For the first year, the focus was on our two largest sites, but now we have funding to introduce the scheme to our other hospitals. We hope to expand this to other NHS Trusts and we will share what we have learned. We want to create a blueprint.

An independent clinical assessment team carried out patient evaluation surveys to determine what behavioural changes initiatives were actually working. There is not much evidence for success through behavioural change.

## How do you repeat the success of the last year?

The first year was focused on getting people on board. We are recruiting more sustainability champions, who will be doing more micro-projects to drive efficiency in specific wards.

As well as that, we are looking to push this out to the community. We want people to be more aware of what the carbon footprint is and why it is important to reduce it.

## What's the next step?

We will be rolling out the programme to the remainder of our sites and exploring how to integrate technology into the project. Along with our partners, energy specialists GE, Skanska and Global Action Plan we will be exploring how we can help the NHS achieve its £35m saving potential.

**FIONA DALY** is the environmental manager at Barts Health NHS Trust



# 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.

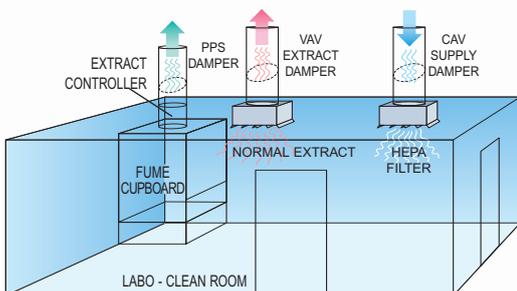


### DPM PRESSURE SENSOR

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.



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



PPS Damper

PRECISION COMPONENTS FOR VENTILATION AND PROCESS CONTROL

# CMR CONTROLS

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](mailto:sales@cmr.co.uk)



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