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JOURNAL



The official magazine of the Chartered Institution of Building Services Engineers

October 2012



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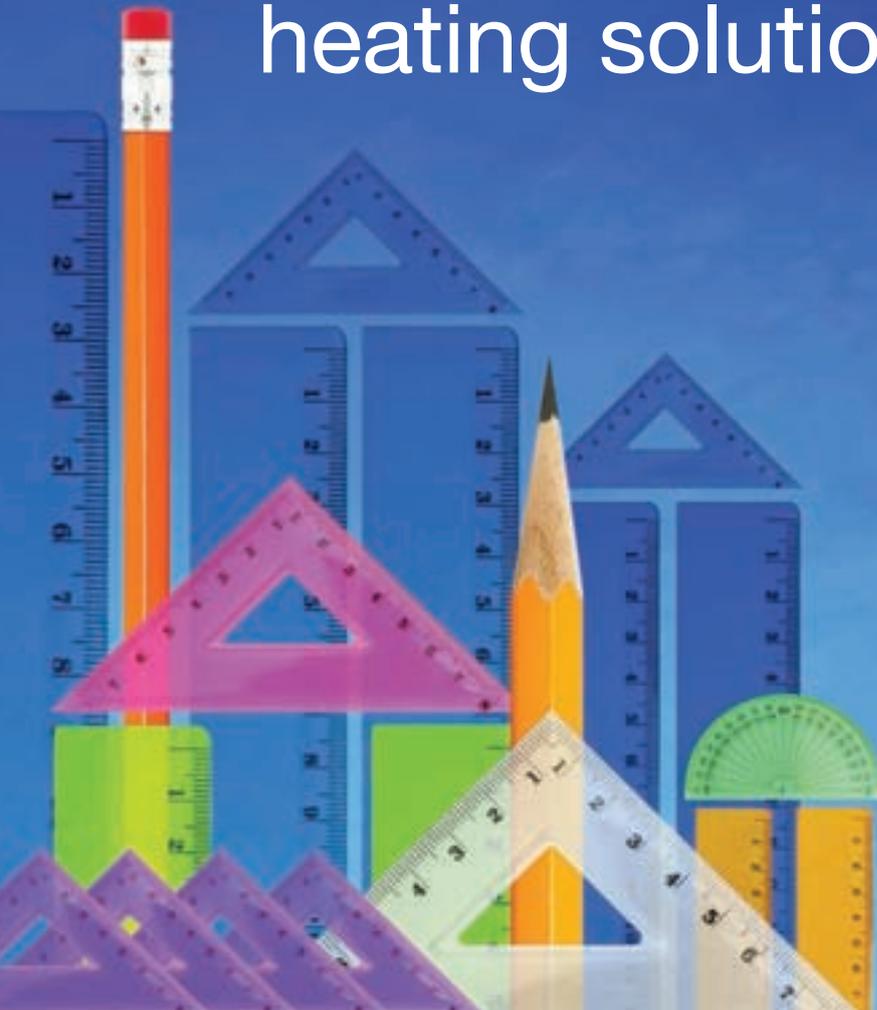
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# Next generation take centre stage

The cover stars on this month's *Journal* are among the seven talented young engineers on the shortlist for this year's CIBSE ASHRAE Graduate of the Year Awards. The winner will be announced on 11 October after a presentation to a panel of dignitaries at the Institute of Mechanical Engineers' grand HQ on Birdcage Walk. Sitting on the judges' panel is last year's winner Angela Malynn. One piece of advice she would offer graduates would be to work at relationships. The technical bit is easy, says Angela; the hard part is meeting other professionals' requirements (page 26).

Relationships and collaboration are recurring themes in this month's *Journal*. Our article on the growing trend for architectural engineering courses highlights the collaborative benefit of building services engineers and architects studying together. CIBSE past-president Andy Ford warns that prejudices about wooden engineers and design-obsessed architects

will prevail (page 28) without mutual understanding.

At least Janet Beckett is noticing a positive change in perception towards building services engineers. For the first time in 27 years she didn't have to explain to delegates at a conference what a building services engineer did (page 22). She puts it down to people starting to understand that successful building depends on the professionals who know how the physics works.

Like thousands of others I missed out on 2012 tickets for the London velodrome, but I did have the chance to watch Team GB's cyclists at a test event. The arena was designed to create the optimal conditions for riders in terms of crowd noise and temperature. It might not always be comfortable for the audience, as my red-faced six-month old can attest, but Sir Chris Hoy and Victoria Pendleton like working at 28°C.

The wonder of the velodrome is how much has been achieved through natural ventilation and daylighting – for a hi-tech building it is low on plant. The full story of building service engineer BDSP's successful collaboration with Hopkins Architects and structural engineer Expedition is revealed on page 30.

Alex Smith, Editor

asmith@cibsejournal.com



## UK to fight Brussels over VAT

The government has confirmed it will fight to keep its reduced VAT rate on energy saving measures.

The UK Treasury charges 5% VAT on insulation, heating controls, solar panels, and heat pumps. However, the European Commission (EC) has ruled this is illegal because, under EU law, taxes can be cut for 'social wellbeing' reasons, but not to support environmental initiatives.

The EC has threatened to take the UK government to the European Court of Justice if it does not abandon the reduced rate this year.

CJ understands that the government's defence will be built around the Green Deal, which will suffer a major setback if VAT is raised to 20% on many of its measures. UK lawyers will argue that the Green Deal and the Energy Company Obligation (ECO) are designed to improve living conditions for socially disadvantaged householders.

The Treasury said it would back efforts to keep the 5% rate, but accepted that it could no longer be applied to buildings used for charitable purposes, which will now have to pay the full rate from 1 August 2013.

## TO RUSSIA WITH LOVE

Buro Happold is set to play a key role in the future sustainable development of Moscow. The design firm is part of an Anglo-American team that won a competition aimed at developing plans for doubling the size of the city. The principles of zero carbon urbanism will be integral to the planning, design and construction, said the company.



## Heating firms angered by delay to energy directive

### ● Cancelled meetings 'unacceptable'

Heating companies say they are dismayed by further delays to the Ecodesign of Energy Related Products directive (ErP).

September was due to be pivotal in the development of the directive, which will establish performance standards for heating products in Europe. However, two key meetings have been disappointing.

The first, on September 6, ended with no final decisions made on the criteria and arrangements for product energy labelling – a key directive aligned with ErP – and became little more than a consultation meeting, according to a number of attendees. The second

meeting, on September 14, was due to vote on the acceptance of draft technical product requirements, but was simply cancelled.

There is now no chance of the industry receiving ratified documents detailing the requirements of the directive until the end of October at the very earliest. However, there is no suggestion from the European Commission that there will be any flexibility in the final deadline of 1 January 2015. Products will have to display energy labels and comply with the first round of ErP efficiency requirements by that date.

'This is a totally unacceptable situation,' said Paul Hardy, managing director of Baxi Commercial Division. 'It means heating product manufacturers

have to base crucial decisions on draft documents rather than agreed criteria. It also reduces the time we have to implement product strategy to ensure compliance with legally binding measures.'

The directive is intended to standardise performance values across the EU and prevent individual countries from setting their own criteria. Free movement of environmental products across national boundaries is seen as being in the best interests of the heating industry and its customers.

Boilers and water heaters (up to 400kW output) are among products targeted by Lots 1 & 2 of the directive. Other related products are covered by other Lots at different stages of implementation.

See more on ErP on page 18.

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



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# Shale gas is not the answer, argues Davey

## ● Government says new methods will not impact hugely on power market

Energy Secretary Ed Davey has dismissed suggestions that there will be a new 'dash for gas' as a result of shale gas exploration being given the green light.

He told the CBI that it would take until the end of this decade before shale gas could make an impact on the UK energy market. He added that price volatility and concerns about carbon impact means the government must continue to back renewables and nuclear power.

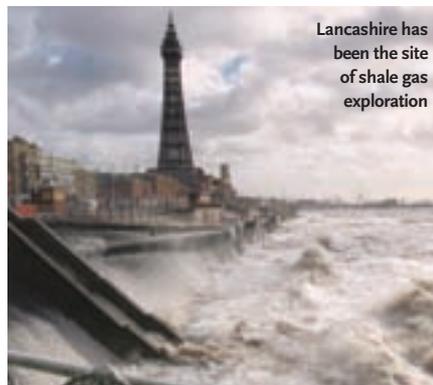
'Unconventional gas can make a difference, although perhaps not as big a difference as some sections of the press would have me believe,' he said.

'The International Energy Agency predicts shale gas will double its share of the market by 2035, but that will still account for barely a third of global demand. Analysts think shale gas extraction in Europe will be more expensive than in the US, and probably won't happen at scale until the end of

this decade.' Growing demand for gas from China and the Middle East will continue to push up prices, he added.

The EU has also released three reports looking at the environmental and climate change impact of new shale gas projects.

These call for increased regulation of shale gas exploration and cast doubt on suggestions that the new sources will reduce pressure on EU gas supplies.



Lancashire has been the site of shale gas exploration

Shutterstock / Peltos

# Solar industry will fight funding cuts

## ● Davey says move will provide more certainty for investors

Solar photovoltaic (PV) providers have reacted angrily to planned 25% cuts to the Renewable Obligation (RO) funding mechanism. However, the Department of Energy and Climate Change (DECC) says the new rates better reflect the falling cost of the technology.

The RO bands for solar and biomass projects below five megawatts (5MW) will be brought into line with the Feed-in Tariff (FiT) scheme under the proposed changes.

Energy secretary Ed Davey said this would provide 'certainty for investors' and lead to more capacity being installed. He added that the new RO bands would 'encourage the most economically sound PV projects and ensure value for money'. DECC also wants to cap support for biomass projects and ensure wood fuel only comes from sustainably managed forests.

However, the Solar Trade Association said this cut was 'too big and too soon' and that it was effectively 'pulling the rug from under the industry'.

Under the new RO, solar PV projects would fall

from two Renewable Obligation Credits (ROCs) to 1.5. However, the Solar Trade Association (STA) said little solar had been built under the RO until this year because it had not been financially viable.

'The solar industry was challenged by DECC to reduce costs to a level where it could expand under 2 ROCs, which makes solar competitive with other key renewables,' a statement said. 'The non-domestic solar industry is now starting to expand at 2 ROCs after it was derailed by cuts to the Feed-in Tariff (FiT) over a year ago. Around 500MW is projected to go in this year under the RO, the majority of which will be sub-5MW.'

The STA said it was now concerned the market for mid-range solar projects would be derailed.

'We have delivered really exceptional cost reductions, yet we once again face having the rug pulled from under us,' said STA chief executive Paul Barwell. 'The proposed 25% cut is too big and too soon. We understand DECC has concerns about how solar will interact with other renewable technologies under the RO, and how it will influence the budget, but under-rewarding solar to curtail the industry is not the solution.'

'This is not fair and it is not in the public interest to constrain a cost-effective technology.'

## Counterfeiting threat to CE Mark

The launch of compulsory CE Marking for all construction products next summer could lead to a surge in illegal counterfeit products into the UK.

CE Marks will be required on all products from 1 July 2013 and will set tight quality standards for all manufacturers. However, there are growing concerns about how the system will be policed.

Speaking at a conference held at the QEII Centre in London, Raimo Pettunen of Flakt Woods said this was a particular concern in the fire and smoke safety market.

'CE Marking is a very positive move as national standards will be harmonised, making it simpler to trade across country boundaries. However, national authorities will have to be vigilant as the CE Mark itself is relatively easy to copy,' said Pettunen.

CE Marking is the biggest thing to happen to the ventilation sector for 20 years, added Ruskin Air Management's David Fitzpatrick: 'It raises the bar in terms of quality, which is welcome, but its success depends on keeping cheap, counterfeit products out.'

## Reshuffle sounds environment alarm

The government has been accused of another U-turn over environmental initiatives following the recent Cabinet reshuffle.

The sacking of Caroline Spelman as environment secretary to be replaced by the 'hawkish' Owen Paterson has been interpreted as a lurch away from the 'green' agenda by many political commentators and industry observers.

Paterson, who has moved over from Northern Ireland secretary, is a big supporter of a third runway at Heathrow Airport. He is a Eurosceptic and a member of the rightwing Cornerstone group, which campaigns for traditional Tory values.

Spelman was caught up in the government's climb down over selling off national forests, but also seems to be carrying the can for the coalition's failure to deliver on its promise to be the 'greenest government ever' – including further delays to the Green Deal.

Former chartered surveyor Mark Prisk, who has replaced Grant Shapps as Housing Minister, did once champion a bill to protect the green belt. This is now under threat from moves to relax local planning rules designed to boost housebuilding.

## In brief

### GOOD NEWS AT LAST

Construction output grew by 2.2% in July and earlier falls were less dramatic than previously thought, according to the Office for National Statistics (ONS). The second quarter figure was also revised upwards from a 3.9% fall to just 3.0%, but year-on-year the industry remains down by just over 10%. The improved July figure has prompted a number of analysts to predict an upswing in the final quarter.

### DEBEN IN CHAIR

Lord Deben is the new chair of the Climate Change Committee, which advises the government on how to meet its carbon reduction targets. Deben said he was determined that the committee would remain 'firmly independent, giving impartial, scientifically well-founded advice to the UK Government and devolved administrations'.

### SMART SPENDING TO ROCKET

The market for 'smart' building technologies will rocket to £686m by the end of this decade, according to Pike Research. Current spending is estimated at around £200m. The report suggests that automated systems will overtake traditional building management systems (BMS) because they offer an easier route to optimising building energy efficiency.

### DAIKIN BUYS US FIRM

Air conditioning giant Daikin has bought US manufacturer Goodman Global for £3.7bn, allowing the extended group to increase its presence in the North American residential and commercial ducted air conditioning market.

### CONSULTATION LAUNCHED

The government is inviting input into its consultation on the inclusion of 'in-use factors' when calculating the carbon reduction scores from insulation measures installed under the Energy Company Obligation (ECO).  
[lottie.jones@decc.gsi.gov.uk](mailto:lottie.jones@decc.gsi.gov.uk)

# New global warming claims 'smear' the industry



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## ● Industry rejects findings of study that suggests HFCs are more damaging to planet than CO<sub>2</sub> emissions

The refrigeration, air conditioning and heat pump industry has strongly rejected claims that political lobbyists are protecting refrigerant gases for commercial reasons and ignoring scientific evidence of their impact on global warming.

Johannes Laube, an atmospheric scientist at the University of East Anglia (UEA), has published a study that suggests hydrofluorocarbons (HFCs) – adopted by the industry to replace ozone depleting CFCs – are far more damaging to the planet than CO<sub>2</sub> emissions.

Along with perfluorocarbons (PFCs), used to manufacture semi-conductors and household appliances, HFCs were blamed in the report for increasing global warming by 20%.

Laube admitted that the concentrations of these gases in the

atmosphere are tiny, but claimed they are extremely powerful and, therefore, have a disproportionate impact. His results were seized on by environmental groups claiming large manufacturers with vested commercial interests were using lobbyists to bully Brussels politicians into blocking legislation that would outlaw these gases.

However, industry figures dismissed the claims as 'scaremongering' and 'smear tactics', saying the science was flawed and that significant progress had been made in safely containing the gases.

'We are not professional lobby groups,' said Graeme Fox, president of AREA (Air Conditioning and Refrigeration European Association). 'Many different parts of the industry have argued the same points for some time now simply because we understand the technical deficiencies of the environmental arguments.'

'Together we understand the big picture and understand that containment [of refrigerant

gases within the equipment] can be significantly improved given assistance by the various national authorities.'

He argued that, on the contrary, it was environmental pressure groups that did most of the lobbying in Brussels and were pushing for an immediate ban on any commercially produced gases without understanding the technical implications.

**'Industry figures dismissed the claims as scaremongering and smear tactics, saying the science was flawed and that significant progress had been made'**

'The industry has made huge advances in safe containment of gases,' said Scott Gleed, chairman of the B&ES Refrigeration, Air Conditioning and Heat Pump group.

'Recent information from the Refcom register showed that properly accredited companies checked were 100% compliant with the European F-Gas Regulation designed to ensure safe handling of all potentially global warming gases.'

'A total ban on HFCs would create havoc and immense cost for building and equipment end users, who would be required to replace large amounts of plant.'

'That is why we have consistently argued that containment is the best approach. Brussels supported that stance by passing the F-Gas laws.'

## European emissions fall

Greenhouse gas emissions fell by 2.5% across the EU last year, according to the European Environment Agency (EEA).

This means that total EU emissions are around 17.5% below 1990 levels, despite higher coal consumption and larger gross domestic product (GDP) across the continent.

The EEA said the milder winter, in most parts of the EU, had played a big part because it had reduced heating demand. It added that renewable energy consumption had also risen.

Households and the service sector saw the biggest drop in emissions, according to the study. The EU Emission Trading System (EU ETS) contributed a 1.8% cut and the transport sector also reduced its emissions for the fourth year in a row, the EEA said.

# Seven stars make Dallas shortlist

## ● Winner of CIBSE ASHRAE Graduate of the Year will be flown to US conference

Seven leading young building services engineers have been shortlisted for the 2012 CIBSE ASHRAE Graduate of the Year Award. The award, which is supported by three international engineering institutions, is now part of the CIBSE Young Engineers' Awards, sponsored by Lochinvar and Ruskin Air Management. It will be presented alongside the CIBSE Employer of the Year Award.

Those on the shortlist, and in with a chance of winning the first prize of a trip to the ASHRAE Winter Conference in Dallas, Texas, are: Baljit Bhogal, a graduate of Coventry University and now working at WSP; Georgina Donnelly from Cambridge University and Arup; Thomas Greenhill, Bristol University and Max Fordham LLP; Chris Marien, Brunel and Calfordseaden; Dinachi Onuzo, Imperial College and AECOM; Imran Shaikh, BITS Pilani (India) and CKR Consulting Engineers, Dubai; and Lee Tabis, Leeds College of Building and NG Bailey. For more on the shortlist, turn to *Class of 2012* on page 24.

All of the finalists will give a short presentation to the judging panel at the Institution of Mechanical Engineers, London, on 11 October.

As well as the trip to the ASHRAE Winter Meeting, there are cash bursaries from the Rurnford Club on offer to two runners-up. The occasion will also see the presentation of the

IMechE Construction and Building Services Division annual award and will be followed by the annual ASHRAE Presidential Lecture given by the Society's president, Tom Watson.

Watson is also a member of the Graduate Award judging panel alongside David Fisk, president of CIBSE; Rurnford Club chairman David Hughes and last year's winner Angela Malynn. The panel, chaired by CIBSE ASHRAE group chairman Professor Tim Dwyer, must decide which finalist shows the best combination of communication skills, sound engineering

knowledge and practical understanding while presenting to a packed auditorium.

The winner is selected for their potential to serve as an ambassador for young engineers at the ASHRAE conference.

Attendance at the awards event, which starts at 5pm and concludes with a hot buffet dinner, is free and open to all, but anyone wishing to attend must book in advance at: [www.cibse.org/yeaeventbooking](http://www.cibse.org/yeaeventbooking)

For more information, visit: [www.cibseashrae.org](http://www.cibseashrae.org)



The 2011 award winner Angela Malynn receives her award from ASHRAE president Ron Jarnagin (right) and CIBSE president Andy Ford.

## View Ecodesign webinar online

The *CIBSE Journal's* first webinar, *Are you ready for Ecodesign EuP/ErP?* is available to watch online.

The session was chaired by the *CIBSE Journal's* technical editor, Tim Dwyer, and director of sales for commercial buildings at Grundfos, Glynn Williams.

It covered a variety of changes set to take place from January 2013, when the EU Directive on energy-related products (ErPs and EuPs) will set strict new requirements for energy efficiency with regard to circulator pumps and motors in general.

Specifically, it covered:

- The scope of Ecodesign legislation;
- The Ecodesign legislation – what is it?
- Ecodesign EuP and ErP;
- Ecodesign and pumps and the timeline;
- Ecodesign and motors and the timeline;
- How you can ensure that you meet the requirements.

The event was held on 20 September, and was sponsored by Grundfos.

The webinar is now available online, at: [www.cibsejournal.com](http://www.cibsejournal.com)

## Evaluate public sector projects, say MPs

Post-occupancy evaluation should be mandatory on public sector projects over £5m, according to MPs.

The All Party Parliamentary Group for Excellence in the Built Environment report, *A better deal for public building*, said that assessing performance against design expectations would help determine good and bad design practice.

CIBSE supports the recommendation and is working with the Technology Strategy Board to deliver a tool for post-occupancy evaluation that will support it called TM22.

CIBSE also provides a series of case studies, known as the Post Occupancy Review of Building Engineering (PROBE) surveys, which are available on the CIBSE website.

For more information on PROBE visit: [www.cibse.org/technicalresources](http://www.cibse.org/technicalresources)

## Integral CEO joins Elementa board after buyout

Integral Group has snapped up UK-based Elementa Consulting to create a global network of engineering design consultants. Elementa said there would be no restructuring of its business under Integral, but Integral CEO Kevin Hyde and COO Conrad Schartau will sit on the Elementa board. Elementa will operate as the UK arm of Integral, but retain its name.

Elementa managing director Doug Kerr said: 'We now have a huge opportunity to grow our business and focus on our vision of becoming the leading green engineering consultancy in the UK. Our skills and local reputation provide Integral Group with a great platform for their expansion.'



## LEARN ABOUT ErP & MAINTAIN YOUR CPD.

Elta Fans are currently holding **CPD presentations** on the topic of legislation and how it affects the HVAC industry. Various presentations are being held around the country over the coming months to educate, inform and answer any questions you may have.

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## Fuel poverty definition set to change in 2013

Energy Minister Edward Davey has announced plans to consult on a new definition of fuel poverty following a review by Professor John Hills.

The final report in his review, *Getting the measure of fuel poverty*, recommended that an alternative definition be found, focused on the description offered in the Warm Homes and Energy Conservation Act 2000 (WHECA). This says that government should be concerned about people in households 'living on a lower income in a home that cannot be kept warm at reasonable cost'.

Davey said: 'I intend to adopt the overall framework that Professor Hills proposed. I believe this is a better measure of the problem than the indicator we are currently using because it will allow us to properly



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understand the problem.'

The current definition of fuel poverty is: 'A person is to be regarded as living "in fuel poverty" if he is a member of a household living on a lower income in a home which cannot be kept warm at reasonable cost.'

The consultation, which will run until 30 November, will also consider the implications of a change to the definition for the fuel poverty target, set out in WHECA.

An updated strategy is expected to be published in the New Year.

## Shading at the flick of a switch on trial

An electronic glazing system that darkens windows at the touch of a button could revolutionise building façade design, according to De Montfort University (DMU).

The windows – manufactured by SAGE Electrochromics and currently being tested at DMU – have a ceramic coating that can vary the tint when a small electric voltage is applied.

Electrochromic glazing has the potential to dramatically alter the

way glass is used in architecture, said DMU, which claimed it could reduce the need for blinds or external shading devices.

DMU has installed the windows in two offices at the university where the system will be studied. Researchers will look at the ability of the windows to control direct sunlight and bright skies to improve the comfort of occupants without compromising energy performance.

## Last chance to enter Performance Awards

October is the last chance to enter the 2013 CIBSE Building Performance Awards.

The Awards seek to reward innovation and best practice in the building services sector.

They focus on actual, measured performance, rather than design intent or performance specifications.

Last year's winners include the Royal Botanic Garden Edinburgh, which is featured on page 38 of this month's issue of *CJ*.

The final deadline for entries is 31 October 2012.

For a full list of all the 2012 winners and full details on how to enter the 2013 awards visit [www.cibseawards.org](http://www.cibseawards.org)

# Green Deal could be a year late

## ● Doubts grow about the future of the scheme

The Green Deal will not be operating properly until at least September 2013 – almost a year behind schedule, according to a number of industry groups.

Doubts about the whole future of the scheme have increased following the revelation that the Prime Minister's own office was behind a decision to block changes to Part L of the Building Regulations that could have supported the Green Deal.

The Prime Minister noticeably avoided the subject of the Green Deal when questioned in Parliament about the government's commitment to its 'green' agenda in the wake of the recent ministerial reshuffle. Instead he focused on the green investment bank; carbon capture and storage; smart meters and renewable heat.

The Treasury was previously blamed for the decision to drop the proposal for 'consequential improvements' in the face of criticism from the *Daily Mail* that dubbed the plan a 'conservatory tax'. This was despite favourable feedback from consumer groups included in a consultation carried out by the Department for Communities and Local

Government (DCLG).

DCLG estimated that 2.2 million homes would have taken up Green Deal funding to pay for the additional energy efficiency measures prompted by consequential improvements, which are triggered when a householder has an extension built.

This would have 'greatly boosted demand for home energy efficiency measures at a time of concerns that low demand for the Green Deal is the biggest risk to its launch, take up and viability', according to a DCLG briefing note.

The Construction4growth campaign, organised by CITB-

Construction Skills, called on the government to focus on the Green Deal to help get the economy moving. Industry estimates suggest that the scheme

could be worth £710m to British firms and cut 130 million tonnes of CO<sub>2</sub> emissions.

It is understood that almost three-quarters of homeowners consulted on the measure said it was 'reasonable' or 'very reasonable', but the results of the consultation have not been published.

Uncertainty about training criteria and the way the scheme is organised have also prompted questions about the government's commitment.

**'The PM noticeably avoided the subject of the Green Deal when questioned in Parliament'**

## GUIDE OFFERS MODEL ADVICE

BSRIA's Design Framework for Building Services has been re-issued, including new material to help project teams agree and allocate design activities related to Building Information Management (BIM) and the production of building information models.

This guide has been produced to give building services guidance to consultants, contractors and clients as BIM becomes more widely understood and used.

With the ongoing developments and discussions around BIM, it is likely that a fourth edition will be required within the next couple of years. The third edition is intended to be an interim edition and is available in digital pdf version only.

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



## Gas-Fired Water Heaters

Are you aware of the proposed changes to the Building Regulations?\*

\* Section 2 part L (Conservation of Fuel and Power)

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## Launch for WIBSE network

CIBSE now has a Women in Building Services Engineering Network. Formed through members on LinkedIn, it will offer a support network for women in the industry, who have historically been underrepresented in the sector.

It will also offer a forum for discussion of issues relevant to women joining, working, staying and progressing in the industry, and provide the opportunity to share knowledge and experience.

The network will feed into the newly established Diversity Panel, and help offer guidance to CIBSE on ways to encourage women into the sector.

It is open to women and men, CIBSE members and non members – anyone interested in joining should visit [www.cibse.org/linkedin](http://www.cibse.org/linkedin)

## Lighting conference – call for papers

Papers are being sought for a lighting conference organised by CIBSE and the Society of Light and Lighting.

The conference, entitled 'Lighting Focus on Energy Standards Quality', will take place on 12 April 2013 at Croke Park, Dublin.

A panel of world-renowned lighting experts is currently being assembled to present on all issues – from legislation to codes of practice, quality, new product developments and LED technology – with energy usage and energy efficiency in lighting being the common theme.

● To book a place at the conference, or to submit a paper (please send an abstract of no more than 200 words, focusing on energy standards and quality) email [kevin.kelly@dlf.ie](mailto:kevin.kelly@dlf.ie) by 31 October.

# How secure is Britain's energy supply?

## ● The UK's fuel challenges

The 2012 CIBSE Annual Lecture will be delivered by Alistair Buchanan CBE, chief executive of the Offices of Gas and Electricity Markets (Ofgem).

In 2009 Ofgem published Project Discovery, with dramatic predictions for the following decade: prices would rise, carbon targets would be hard to achieve and our secure supply of electricity might be at risk. In 2012 Ofgem was invited by government to review both the electricity and gas markets to 2016 and beyond.

This year's lecture, entitled: 'How secure is Britain's electricity and gas supply over the next decade?', will focus on the unique challenges facing Britain and the government's responses so far.

This is a vital issue for building services engineers and those who are responsible for energy



consumption in the built environment, which represents around 40% of the nation's primary energy use.

As Britain's energy mix changes, with an increased reliance on fuel imports, there will be new interest in more sophisticated tariffs as smart grids and smart meter technology are rolled out across networks that now connect to variable renewable supplies and

large power loads like data centres.

CIBSE president David Fisk said: 'The lecture will help to answer the question: what surprises are in store for building services designers, operators and clients?'

The free lecture will be held on 7 November at 7pm in London, and broadcast live as a webinar. Booking is essential.

For more information and to book, visit: [www.cibse.org/annuallecture](http://www.cibse.org/annuallecture)

## Australia and New Zealand celebrate 25 years with the Institution

The Australia and New Zealand (ANZ) region recently celebrated a quarter of a century since its inauguration as CIBSE's third overseas region.

A dinner was held to commemorate the anniversary, which was attended by 125 members and guests.

Video messages of congratulations were sent from

David Fisk, CIBSE president, and Andrew Ramsay, former CIBSE secretary, along with written messages of support from past president Deryck Thornley, who officiated at the inauguration ceremony in 1987, and Paul Gill, a member of the Inaugural Regional Committee.

Inaugural regional chairman John Tyerman also contributed a

short video, highlighting events and important happenings during the past 25 years.

Six members of the Inaugural Region Committee and nine of the 11 past region chairmen attended and were introduced to guests.

The event finished with guest speaker Adam Elliot, who won an Oscar for his animated film, *Harvie Krumpet* in 2004.

## New training courses for RHI

CIBSE is holding two one-day training courses in October to assist those wanting to apply for the Renewable Heat Incentive (RHI) and Heat Metering guidance.

Last March, the government announced details of the RHI policy to revolutionise the way

heat is generated and used, with proposals set out to improve the scheme performance this year.

The course details are:  
● **Day 1** – Applying for the RHI – what you need to know 18 October, London (for potential applicants and installers); and  
● **Day 2** – Metering requirements

for RHI, 19 October, London (for installers and independent meter report providers).

This course will be followed by an assessment for people to be listed as suitably qualified

For more information, visit [www.Londontraining.co.uk/rhi-training](http://www.Londontraining.co.uk/rhi-training)

# Gulf group gaining strength

## ● New board and MoU in Qatar

The CIBSE Qatar group is increasing its influence both at home and abroad, signing a memorandum of understanding with the Gulf Organisation for Research and Development and establishing its own board.

CIBSE Qatar group has existed since 2008; at that time there were just 10 to 15 CIBSE members based in the state. But following a call-out, five engineers met – Michael Daly, the current country representative, Joseph Smith, David Baker, Phil Dywer and John Makaronis. It was during this initial meeting that it was decided to establish a group to allow networking between CIBSE members.

Formal recognition from CIBSE London was obtained, and the group began networking through a series of seminars and site visits. Over the years, the group has continually grown in membership and increased its activities.

There are now more than 50 CIBSE members

in Qatar and the group regularly holds seminars. It has presented seminars from Trox, Nuaire, Caswell and Terrain, and visited construction sites at Katara, Qatar Cool District Cooling chiller plant room and Sidra Hospital.

Now the CIBSE group has signed a memorandum of understanding with the Gulf Organisation for Research and Development, which has prepared the Global Sustainability Assessment Standard (GSAS), to exchange knowledge on green buildings.

A group board has also been established, with Michael Daly as country representative, Ged Smart as assistant country representative and Ekram Syed

as membership officer; Peter Carew and Douglas Hannel are responsible for seminars.

In future, the group intends to increase its activities to raise the profile of CIBSE in Qatar and support the science, art and practices of building services engineering.

For more information, email: [qatar@cibse.org](mailto:qatar@cibse.org)

**'The group intends to support the science, art and practices of building services engineering'**

## CIBSE membership and certification on hand at Exhibition



Members are invited to visit the CIBSE stand during the Building Services Conference and Exhibition to meet the staff.

We are holding a membership clinic for both members and non-members during the conference. Those who want advice on upgrading their membership, which level of membership they should be aiming for, how to complete their application forms, and any other general membership enquiries, can book a

20-minute slot with a membership adviser.

Advisers will be available from 11am to 4pm each day, and you can book a slot through the website, at [www.cibse.org/membershipclinic](http://www.cibse.org/membershipclinic). This is a great opportunity to get individual, face-to-face advice on membership-related queries.

The certification team will also be on the stand, and will be hosting a morning session each day – providing an overview of the

requirements for organisations wishing to become Green Deal Advice Organisations, and an update on how to demonstrate competence to be a Green Deal adviser.

Each session will take place at 10.30am and last about 30 minutes. The sessions are free, but attendees should book at [www.cibse.org/gdsession](http://www.cibse.org/gdsession)

You can find CIBSE at stand D30, so do make sure you stop by to say hello. See you there!

## Diversity Panel

The first meeting of the newly established CIBSE Diversity Panel took place in September. The panel was set up to advise and support the Institution in recognising under-represented groups in the industry.

The panel, chaired by Andy Ford, CIBSE immediate past-president, has the following Terms of Reference:

- To advise and engage with the board on all matters relating to equality and diversity;
- To recommend actions to increase the diversity of the Institution and its membership, and to ensure it meets its commitments to fairness and equal opportunities;
- To be a communication hub between CIBSE and other organisations, working in collaboration to promote and embed diversity in the industry; and
- To keep under review the Institution's policy and practices relating to equality and diversity.

The initial meeting established that the scope of 'diversity' should encompass gender, age, ethnicity, socio-economic status, disability, sexual orientation, and religion/beliefs.

But it also acknowledged that there were at least two other aspects of diversity the panel should also engage with: diversity of professional background (relating to different construction professionals), and diversity of working patterns (in relation to part-time working and career breaks).

The panel agreed that it should seek to learn from other organisations in terms of setting targets and monitoring progress.

The group is keen that its own membership should be as diverse as possible, and is keen to hear from anyone interested in joining.

Members keen to get involved should register at [www.cibse.org/diversity](http://www.cibse.org/diversity)

# QUESTIONS

Some of the industry's biggest names will be speaking at The CIBSE Conference & Exhibition. As a warm up, we ask four of them to take questions from fellow speakers



**Q David Mathieson, director at Turner & Townsend**

What are the three key changes that attendees at this conference should make to help enable more extensive collaboration through the supply chain?

**A Robin Nicholson, senior partner at Edward Cullinan Architects**

Promote the use of 'soft landings' from the start of all serious projects.

Engage as many of the supply chain and the users at the start of projects by using the Design Quality Indicator to review existing or similar buildings.

Given the urgency of changing our behaviour in the context of climate change and the difficulty that Latham and Egan had in instigating a partnering culture, start with measuring the energy performance of every project in a blame-free environment and share the results across the supply chain.

**Q Ashley Bateson, partner at Hoare Lea**

Do you anticipate changes in the way architects and building services engineers work together, at a time when clients and building regulations are pushing for low-carbon buildings?

**A David Fink, architect / BIM manager at Schmidt Hammer Lassen**

Architects and building engineers will need to work even more closely in the future to achieve low-carbon buildings. There needs to be a holistic view of the project that unifies the building's form and systems to make a significant reduction in carbon. Architects will need to conduct more environmental analysis early in their design process to optimise the building form, so the systems that the building engineers design can be minimised and made more effective. Building systems should not need to compensate for building forms that are not responsive to their



environment.

The documentation requirements for green certification systems also need more input from both architects and building engineers to meet the requirements. The planning involved to meet the requirements must start early in the design process. Everyone will need to bring their expertise to the table and work towards a common goal.

**Q Sarah Cary, sustainability executive at British Land**

How do you think your role as a M&E engineer, and scope of services, should change to enable improved management of resource use in office buildings?

**A Ashley Bateson**

This is a very topical question; it will become increasingly important for M&E engineers to be involved in the process of improving resource efficiency in the operation of buildings. There are opportunities to change the M&E engineers approach and role if we improve the link between design and operation.

The traditional engagement of an M&E engineer is largely finished when construction ends, but this is a time when M&E engineers can make a big difference to how well a building performs. Traditional limits of engagement mean that the designer normally doesn't know how well the building performs after handover, and the client no longer has any input from the M&E designer to provide guidance on how to optimise systems.

If the scope of the M&E engineer was expanded to include performance evaluation it would better inform designers on strategies that work well. It would help if there was better interaction with building managers, if known, at the briefing stage, and if targets for resource efficiency could be agreed with clients at the outset.



# PLEASE

**Q David Fink**  
What role can the construction industry play to stimulate local economies during the current economic crisis?

**A Meredith Davey, associate director at Atelier Ten**

While there are ways that design and construction can influence local economies, it is largely governments that are in a position to make significant macro-economic change. Construction can play a role, but at the more granular level where it can shape existing demand rather than generate new stimulus.

As construction is inherently a demanded issue, it is only when there is demand that someone goes out and builds. There are few clients who would risk significant capital expenditure to develop a project in

the hope that it will generate new demand on completion (although there are notable exceptions). That said, when thinking about the design of a building or masterplan, there are measures that can be used to encourage local supply of labour and goods. Once the development is operational, interactions with existing business and other social infrastructure can be encouraged to help the local economy to develop sustainably, both in economic and environmental terms. The key to impacting the local economy is really in thinking through what these project-specific opportunities are in the construction and operation cycles of a building, and maximising their implementation.



The Building Services conference takes place at London Olympia on 10-11 October 2012. To book and see the full conference programme, visit [www.buildingserviceevent.com](http://www.buildingserviceevent.com)

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# Your letters



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## This month: Buildings fight back against planes, mature students' fatter wallets and LCDs vs fluorescent lights

### Planes vs buildings

I enjoyed the letter from Rob Farman (August 2012) on the perceived gap between predicted building energy performance and the operational performance.

I think the comparison to an aircraft flying over the Atlantic reveals a lot about why energy use in buildings is harder to predict at the design stage. At first glance aircraft and buildings have many similarities in that they're both engineering products that accommodate people, but there are key differences. Firstly, aircraft can

run out of fuel, unlike buildings, which means the pilot is very focused on fuel use and how much is left in the tank.

Secondly, passengers don't really have much of an influence over the energy performance of an aircraft. If a passenger is cold, they put on a blanket; the lights get switched off when it gets late; there's no chance that a few passengers will ask to extend the hours of the flight beyond what was predicted; passengers can't plug in additional bits of equipment; and they can't open the windows.

Thirdly, the optimisation of the

**Passengers don't really have much of an influence over the energy performance of an aircraft**

design of the aircraft is essential for it to get off the ground. Fourthly, each building is a prototype, with different equipment, fabric, services, controls and uses, which makes predictions harder and there is still a dearth of performance data to provide reliable data on performance of other similar buildings.

Rob asks whether we're doing the sums wrong. I don't think so. It is more that the sums aren't being done. It is rare for designers to be asked to provide a design-stage prediction of energy performance in operation. A significant proportion of the perceived performance gap comes from people mistaking the calculations required by Building Regulations and planning policies for a prediction of energy use. The Part L calculations are simply a method of demonstrating compliance and they normalise many variables.

The Part L calculations also only include the energy use that can be directly influenced by designers (heating, lighting, cooling, fans and pumps), which means up to 50% of the energy use in non-domestic buildings is not included in the calculations.

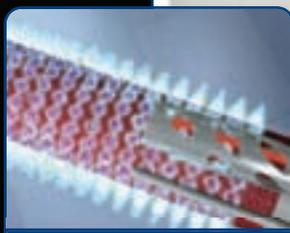
Rob is right that there are many other factors such as the complexity of the system and the quality of construction. I think a start should be made by doing simple calculations of

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the probable energy performance of the building, including all the likely end-uses and assumptions about the way that the building is expected to be operated.

AECOM is working with CIBSE to develop some guidance for engineers on evaluating the operational performance of buildings at the design stage, to be published as a TM next year, which we hope will help to address this issue.

*Dave Cheshire, Sustainability Group, AECOM*

### Mature bank balances

*David Tann writes in response to Shona Williams' letter questioning the average graduate salary of £34,000 (£10 a week to save the world, CIBSE Journal August 2012).*

A total of 490 (or 88%) of South Bank University building services engineering students on various courses are already employed before they enrol at the university. Having an average age of around 30, they study part-time over a longer period of time

than typical full-time students. A lot of these students hold senior positions in their companies, while some others are owners or joint-owners of SMEs who already earn a good salary. Once they graduate with a degree, some do get a pay enhancement. The £34K annual salary that we quoted was thus based on survey results provided by our Building Service Engineering graduates, which differs from the national average figure of graduate starting salary by a large margin.

*David Tann, South Bank University*

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.

fluorescents have had their day and will be phased out. Lighting controls have been over-designed to boost design fee costs. The simple multi-gang light switch has served us for 100 years and is as good as any hi-tech lighting control. Energy saving is easy; turn unwanted lights off! We have LED street lighting in Suffolk, remotely controlled by a base station, saving energy costs.

**John Taylor:** Great comments Bob. Definitely agree with LED over controls for new designs, obviously being dependent on the particular case. I don't think we'll see the end of florescent lights any time soon though. Are we more likely to see the phase out of the popular halogen lights – MR16, GU10, AR111?

● Join the debate at [www.cibse.org/linkedin](http://www.cibse.org/linkedin)

## From the forums

### LEDs vs fluorescent lights CIBSE LinkedIn group

**Jonathan Sparks:** LEDs are not the only answer to energy saving. In some situations they can still be outperformed by fluorescent luminaries, and just swapping out existing fluorescent's for LEDs could ruin a lighting scheme that was not designed with LEDs in mind. There is a lot to consider when designing lighting, other than just the lux level on the desk. Lighting controls are sometimes a much better solution.

**Bob Taylor:** All new lighting design should be based on LED,

## MANUFACTURER'S VIEWPOINT



Ensuring that the green agenda stays on the political radar is one thing, but it's the consultants that can make the real difference, says **Martin Fahey** of Mitsubishi Electric

We are joining an initiative called the Sustainability Hub, to try to help educate our politicians about the direct financial benefits of the green agenda – for both individuals and the country as a whole.

The UK has some very stringent environmental targets to meet and the deadlines are getting closer and closer. Whoever is in charge at the top cannot fudge this without incurring serious penalties from Europe, so something has to be done.

While we don't believe that we, as a manufacturer, have all the answers, we are equally sure that none of us can simply sit back and expect the government (of whatever colour) to provide the solution.

While they can – and should – provide the legislative backdrop, and find ways to encourage and incentivise individuals and businesses to play their part, the answer has to involve everyone – what you might call a 'coalition of the able'.

Every one of us consumes energy in our buildings, and we can each make a difference, whether it's through simple measures, such as better insulation and energy control, or by upgrading out-of-date technology to reduce energy use (and bills) into the future.

While I know that everyone can make a difference, there is one sector that has perhaps the most important role – the consultants.

The way in which a new building or a major refurbishment is planned, specified and implemented will have a major impact on the energy life of that

building for decades to come.

The ongoing energy use of a building is now becoming an important part of the pitch for any new project. That is why we have been working with software specialist EDSL to help designers know the implications of each piece of heating, cooling and ventilation kit that they install in a new building.

The upshot of this is that it should be easier to demonstrate

the required information to achieve appropriate energy labelling for each building, simplifying the calculations and providing consultants with an accurate new tool.

It is also why we have upgraded our own Audit Tool software, so that the clear energy and running cost benefits can be seen from the decision to upgrade older equipment.

As a manufacturer, we know we can play an important role in helping to educate the wider community about the benefits of managing energy in our buildings.

As a consultant, you too have an incredibly important part to play.

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

We are trying to help educate our politicians about the direct financial benefits of the green agenda



# EU SETS SIGHTS ON MORE WASTEFUL PRODUCTS



The Ecodesign Directive has resulted in the banning of inefficient light sources. Hywel Davies looks at other products that might be under threat

 The Ecodesign of Energy Related Products (ErP) Directive sets minimum environmental performance requirements for dozens of product groups. Its main focus is on energy performance in use, whether that is the energy the product uses or the impact the product has on energy use where it is installed. Its full title is Directive 2009/125/EC, *establishing a framework for the setting of eco-design requirements for energy-related products*.

All energy-using products sold in the domestic, commercial and industrial sectors are covered by the directive, apart from means of transport (covered by other legislation). The revised directive, which came into force in November 2009, covers all energy-related products including windows, insulation materials, and water using products such as shower heads or taps. However, it is still not clear whether these products will be addressed through measures under the Ecodesign Directive or under other measures such as the Energy Performance of Buildings Directive or Energy Services Directive.

The directive aims to improve the lifetime environmental performance of products by considering: raw materials used; manufacturing; packaging and distribution processes; installation and maintenance; and use and final disposal at the early stages of product design. It seeks to remove disparate national rules on environmental performance, which create obstacles to trade within the European market. It is intended to benefit businesses and consumers by facilitating free movement of products and by enhancing product quality and environmental protection.

The 'framework' directive sets out overall performance criteria, but does not prescribe specific measures, standards or overall energy saving targets for specific product

groups. Implementing measures setting specific requirements will be introduced for each product group, usually in the form of EU regulations. These take direct effect in all member states, without transposition into national laws.

Conflicting laws are superseded by this regulation, so the new rules come into effect across the EU at the same time. Manufacturers must meet the regulation's requirements to legally place their product on the market. Requirements for product energy labels to give consumers energy and environmental information are also adopted alongside these measures.

The Commission has identified a long list of product groups to be covered by the directive, including many domestic appliances (standby usage amounted to some 10% of domestic energy demand in 2005). Implementing measures are introduced after a process of initial study and discussion of the proposed measure with key stakeholders and national regulators. Manufacturers marketing a product covered by an implementing measure in the EU must ensure it conforms to relevant energy and environmental standards.

The Ecodesign Working Plan for 2009-2011<sup>2</sup> lists product groups considered to be priorities for adoption of implementing measures. The Commission is due to produce a new Working Plan in October 2012 for the period 2012-2014. A study has been initiated to provide background material for the revised Working Plan. In practice, the directive will focus on products with the greatest potential to cut greenhouse gases at the lowest cost by reducing energy demand. Many will be domestic appliances.

A regulation covers electric mains-operated air conditioners with a rated capacity of ≤ 12 kW for cooling, or heating if there is no cooling function,

and comfort fans with a power input ≤ 125W. It is worth noting that air conditioning systems over 12 kW are subject to regular inspections under the EPBD, but these are proving difficult to implement due to a systemic failure of enforcement. Perhaps the commission could propose a regulation for the eco-design of the larger units to deliver energy savings instead? There is also a regulation covering fans over 3kW, and another for water pump.

What do manufacturers need to look out for next? Measures for boilers, hot water heaters, office lighting, room air conditioners, solid fuel burning devices, room heating and warm air central heating, waste water pumps, motors and air conditioning systems are all in the current workplan, with the regulation for boilers and water heaters due to be published soon.

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

 The directive seeks to remove disparate national rules

## REFERENCES

- 1 Directive 2009/125/EC of the European Parliament and of the Council of 21 October 2009, establishing a framework for the setting of eco-design requirements for energy-related products (recast), OJEU, L 285/10, 31 October 2009. For the full text go to <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32009L0125:EN:NOT>
- 2 Ecodesign Working Plan for 2009-2011 published in October 2008 <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2008:0660:FIN:en:PDF>

## FURTHER RESOURCES

EU guidelines accompany the regulations implementing the directive: [http://ec.europa.eu/energy/efficiency/ecodesign/doc/overview\\_legislation\\_eco-design.pdf](http://ec.europa.eu/energy/efficiency/ecodesign/doc/overview_legislation_eco-design.pdf)

For the latest information on the directive go to [http://ec.europa.eu/enterprise/policies/sustainable-business/ecodesign/index\\_en.htm](http://ec.europa.eu/enterprise/policies/sustainable-business/ecodesign/index_en.htm)

For information from DEFRA, go to <http://efficient-products.defra.gov.uk/cms/product-area-updates>

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# THE RESPONSIBLE RETROFIT



The Green Deal threatens the fabric of millions of historic buildings, unless the lessons from a new report are quickly learnt, warns Neil May

Everyone involved in the Green Deal needs to be aware of the huge risks that inappropriate measures pose to our existing building stock.

The Sustainable Traditional Buildings Alliance (STBA), a not-for-profit alliance of historic building groups, environmental specialists and professional building organisations, was commissioned by the Department of Energy and Climate Change (DECC) at the start of 2012 to get to grips with this.

Our brief was to undertake a gap analysis of research and guidance on the energy performance of traditional buildings and the impact of retrofit measures on these buildings, in terms both of energy and other consequences, such as fabric, human health and usability. Clearly this has direct and immediate relevance to the Green Deal, which from next year will encourage a range of significant retrofit measures, including solid wall insulation.

What we found was a huge gap in understanding and practice in regard to traditional, pre-1919 solid wall buildings, and energy saving refurbishment and retrofit in the UK.

The result of our work has just been published in the 'Responsible Retrofit of Traditional Buildings' report, in which we propose a programme of policy, delivery and development work to address some of those gaps. Early next year will also come a guidance tool for dealing with the uncertainty, complexity and sometimes conflicting aims and values of traditional building retrofit. It should be mandatory reading for all Green Deal advisers and installers.

There have long been murmurs around the Green Deal and what it could mean to the UK housing stock. But what made DECC sit up and

Recent research has shown that buildings actually perform better than is predicted by standard U-value calculations



take notice were the serious and well publicised concerns raised by the Society for the Protection of Ancient Buildings, and other historic building groups, about the potential damage to the fabric of our architectural heritage and traditional buildings in the UK from inappropriate insulation, and the complex moisture and breathability issues that would arise.

Traditional buildings have long been vilified for their poor thermal performance by organisations such as the Energy Savings Trust. But recent research has shown that such buildings actually perform better than is predicted by standard U-value calculations under BR443, and certainly much better than RdSAP default values.

The STBA research verifying these findings justified the concern. We also found an alarming lack of research on many issues surrounding the performance of our existing building stock, including ventilation, indoor air quality, overheating or user behaviour. Nobody has really looked at these issues in any depth. More worryingly, even where there is some research, the implicit guidance given by current regulations, certifications and trade literature is contradictory to that research.

So what we have been focusing on this year is the creation of a very effective and formalised process to join up best research, guidance, regulation, standards and practice.

Personally, this is probably the best piece of work I have had the privilege to work on outside my support to clients at National Building Technologies.

DECC has responded immediately and positively to everything we have told them. It knows that, without this work, we are still driving blind. DECC has embraced the challenges of developing the much-needed guidance and has initiated a landmark project, in my view, because it fundamentally changes the old fashioned linear and reductionist approach to solving building problems of this sort.

Instead we now have an approach which can be applied to most areas of building, embracing the multiple interactions in building performance, engaging all parts of the supply chain and building users to work through areas of uncertainty and complexity, and to create a genuine learning process along the way.

● NEIL MAY is CEO of Natural Building Technologies (NBT) and the project lead for the STBA. [www.stbauk.org](http://www.stbauk.org)



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# A RETURN FROM THE WILDERNESS



Building service engineers are used to being sidelined by architects and clients in their quest for form over function, but **Janet Beckett** believes the low carbon agenda has put building physics at the heart of the design process

My presentation at a Leeds built environment conference last month was a design pyramid, a simplified overview of the design engineering process. I admit it was also a thinly disguised promotional effort for building service engineers and their (often unrecognised) contribution to building design.

Amazingly, for the first time in 27 years, I felt that I didn't have to explain to people at the event what I did for a living.

BSE was well represented in the seminars, the fringe events and even the keynote speeches. There seems to be a genuine realisation that we are the profession holding the key to the secret of low carbon building design and operation. This is a step change and we need to rise to the challenge. There are exciting times ahead.

Repeatedly, over the past 27 years, technologies required to make buildings fit for purpose have been pushed out of sight and out of mind.

Instead of meeting the challenges of climate change by adapting architect designs to include natural ventilation and passive cooling, I have seen an increase in the number of buildings with air conditioning to maintain.

So that the building can retain its shiny and highly glazed façades and its sparkling form, the building services engineer has been obliged to respond by adding energy-hungry machinery and services to render the building usable; to 'make it work'.

Just as important for architects was for the installations to be hidden. No wonder nobody knows what we do. Until recently, the words low carbon had barely even entered our vocabulary. The recent and meteoric rise of the 'starchitect' and

There seems to be a genuine realisation that we are the profession holding the key to the secret of low carbon building design and operation



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two decades of boom has nurtured and encouraged the idea that we can have it all. This is not the case.

Clients often seem to expect that their new building will be air conditioned without really understanding why – for many clients it is seen as aspirational. Few of them seem to realise that a 'low carbon, air conditioned building' is an oxymoron, or that it can cost five times as much to run as a non-air conditioned building.

Building Regulations ADL has altered the way in which we approach the design of our buildings. 2010 ADL has already instigated the consideration of an aggregated and collaborative approach to delivering a low carbon building.

There could not be a better time than now in a time of global change to implement a paradigm shift – we cannot continue in the same vein. We need a new kind of architect, who can accept the principles of engineering alongside the building aesthetics. Perhaps also we need a new kind of engineer, one who is better able to communicate about

the realities of how the engineering services impact on the building – not just conceding; shoving them out of sight and out of mind.

More direct and meaningful dialogue must take place between architects and engineers – and sufficiently early in the project – to make effective use of passive design solutions through building physics.

Earlier dialogue in the project means it is easier to build in value, and add innovation and engineer integrated solutions, rather than bolt on problem solving. We need to have the right kind of dialogue with each other at the right time.

We also need a new generation of architects to be inspired by engineering and science, willing to listen to concepts and ideas that can be both beautiful and useful. Step forward architects and embrace the new low carbon engineering architecture. Hug an engineer or, if that doesn't appeal, at least try to communicate with one.

● **JANET BECKETT** is director at Carbon Saver

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# THE CLASS OF 2012

Meet the finalists of the 2012 CIBSE ASHRAE Graduate of the Year Awards

**H**ere are details about the seven finalists of the 17th CIBSE ASHRAE Graduate of the Year Awards. The winner will be announced at a ceremony on 11 October after each has made a presentation on how they will help engineer better communities.

The winner will receive a trip to the ASHRAE winter conference in Dallas, Texas, while two runners-up earn a cash bursary from the Rumford Club. The winner will be selected for his or her potential to serve as an ambassador for young engineers at the ASHRAE conference.

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6 Georgina continues to solve complex technical problems on a range of high profile projects



## Baljit Singh Bhogal - Coventry University and WSP

Baljit has just received a first class honours B.Eng. degree in Building Services Engineering from Coventry University. His dissertation on 'Improving the Efficiency of Ventilation Systems' gave an insight into designing low carbon ventilation systems for compliance with Part L of the Building Regulations.

After leaving school, Baljit studied for a City & Guilds in Mechanical Engineering Services Plumbing & Gas, and later Electrical Installation level 2 & 3, before embarking on an ONC and HNC in Building Services on day release. He achieved a distinction in all of them. He will be starting an MSc in Building Services Engineering at Coventry University later this year.

He has been a CIBSE member since 2007 and was Young Engineers Network representative for South Birmingham College. He is also responsible for arranging various CPD accredited activities.



## Georgina Donnelly - Cambridge University and Arup

Georgina completed her Interdisciplinary Design for the Built Environment Masters at Cambridge University this year. Her dissertation studied how the design of retirement villages in the UK enables older people to maintain their quality of life.

As a senior engineer at Arup, she was central to the delivery of mechanical services for Kuwait International Airport on behalf of Foster and Partners. She has also worked on the Harvard University Arts Museum designed by Renzo Piano, which is expected to achieve LEED Gold rating.

Georgina has led multi-disciplinary teams while continuing to solve complex technical problems on a range of high profile projects. She runs regular presentations for mechanical, electrical and public health engineers, and mentors a number of junior engineers.



## Thomas Greenhill - Bristol University and Max Fordham LLP

Since graduating, Tom has played a key role in a number of projects for Max Fordham.

He is a member of the company's building physics group and created the 'as-built' Part L simulation model for Worcester's HIVE, the highest BREEAM rated public library.

He has been a member of CIBSE since university, is taking part in the Royal Academy of Engineering's (RAEng) Executive Engineers Programme and is working towards chartership. He was also awarded the RAEng Engineering Leadership Award, and in that role regularly attends events and debates at the Houses of Parliament as well as lectures at the Building Centre.

He does voluntary work in developing countries including Kenya, Haiti and Burkina Faso. He is also a STEMNET and IMechE ambassador, taking part in events to promote engineering to young students and engineers.



### Chris Marien – Brunel University and Calfordseaden

Chris has recently completed his MSc in Mechanical Engineering and Sustainability at Brunel University and is about to start a PhD in sustainability at Cambridge University. He joined Kent-based practice Calfordseaden immediately after graduation and has already risen to Intermediate Engineer.

He is a member of the London and Home Counties branch of the Energy Institute and has given seminars on sustainability for RICS in Cambridge and London. He has also conducted a webinar for *The Guardian* online newspaper on sustainability within social housing.

His employer says that his keenness for his building services subject is greatly appreciated by clients, constructors and residents, who all praise his practical and enthusiastic approach.



### Dinachi Onuzo – Imperial College and AECOM

Dinachi graduated from Imperial College with a 1<sup>st</sup> Class Masters degree in Mechanical Engineering last year. She was sponsored by AECOM and spent her summer holidays working in the firm's St Albans office, where she now works as a graduate engineer.

She is a graduate member of the IMechE and has worked in schools as part of the Institution's ambassador programme. She is also a STEMNET ambassador and has helped with AECOM's work experience scheme for 15 to 17-year-old students from local schools.

She is helping to establish AECOM's 'Into Africa' scheme for supporting African projects. She has a passion to help the less well-off in society and to encourage women into engineering.



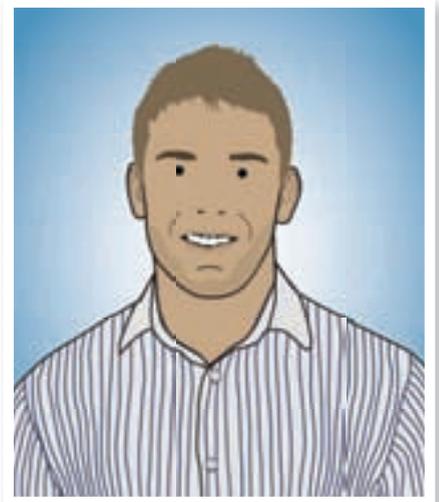
### Imran Shaikh – BITS Pilani (India) and CKR Consulting Engineers (Dubai)

Imran has already secured a Bachelor's Degree with honours in Mechanical Engineering from BITS Pilani, one of India's leading engineering universities. He is currently studying for a Masters of Science in Energy at Heriot Watt University, where he has completed the

first year with distinction.

He works as a mechanical design engineer at CKR Consulting Engineers in Dubai, where he has been closely involved in the design of air conditioning and ventilation services for hotels, showrooms and high rise residential buildings. He is very experienced in the LEED certification process.

Imran is actively involved in the local ASHRAE chapter events and the monthly seminars sponsored by the IMechE to prepare for the chartered engineer professional review. He also created the website: [www.greenlearningandconsulting.com](http://www.greenlearningandconsulting.com) to promote sustainability and raise awareness of green buildings among young engineers.



### Lee Tabis – Leeds College of Building and NG Bailey

Lee spent four years as an apprentice at NG Bailey, during which time he achieved a National Certificate Double Distinction and an HND with 13 distinctions and four merits. He then received the Building Services National Diploma Award from Leeds College of Building in 2010.

He was a finalist in the National Apprenticeship Awards and received the SummitSkills National Technician Engineer of the Year award in 2011.

Lee is now a trainee design engineer in NG Bailey's Birmingham office, where he has taken responsibility for much of the electrical design on a number of major projects. He is a Licentiate member of CIBSE and is aiming to achieve I.Eng next year.

Lee is the mentor for all the building services apprentices in the Birmingham office and has also taken on the role of CPD training co-ordinator for his region.  ➤

There must have been some merit in what I'd said to make my ideas worth sharing



## 'Winning was absolutely overwhelming'

Mechanical engineer **Angela Malynn** won last year's Graduate of the Year Award



### What did it mean to win?

It was absolutely overwhelming. Having not seen the other entrants present meant there was no way of knowing how my ideas on 'How can young engineers lead the profession to ensure we deliver a sustainable future?' ranked, or whether the others had been outstanding presenters. All I can remember is shaking so uncontrollably I couldn't hold my notes, so in some ways I wasn't expecting it. Turns out no one even noticed!

Winning the award, based on the views I expressed for young engineers in the industry, meant going to Chicago with the CIBSE elite was less daunting. After all, there must have been some acceptance or merit in what I had said to make any other ideas I have worth sharing.

### How has your career progressed so far?

I almost fell into Building Engineering when an application form for the Arup Pre-University Scheme miraculously came through the letter box. From the Pre-University Scheme I went on to complete my Masters in Mechanical Engineering with sponsorship from Arup and later joined them as a project manager; this time and experience has, in hindsight, been invaluable. I soon found my way back to engineering when I decided it was essential for me to attain my professional qualification with an engineering institution, rather than project management. As I'd missed some essential early graduate experience, I decided to complete an MSc in Building Services. Studying part-time and continuing to work full-time as Mechanical Engineer on the redevelopment of King's Cross Station proved challenging, but I came out the other side feeling I had really achieved something. I now feel I have enough knowledge and experience to apply for chartered status, which will be a great milestone and achievement for me.

### What would you advise a new graduate?

To work at their relationships – be these with their seniors, their peers, engineers of other disciplines, or any other construction industry professionals. None of us can deliver a building alone, and the technical side of the job often

ends up being the easy part of what we do. Understanding how we all fit together and the process of arriving at solutions that work to meet all the professionals' requirements is the hard bit. This is where having built strong relationships will set a project apart, not only by delivering a better end product, but also in that people will walk away looking back with fond memories of the time spent delivering it. That is why we go back and do it over and over again.

### What's it like being a woman in a male-dominated industry?

In some ways I am angered by the ongoing topic of being a woman in a male-dominated industry. I'm not sure I recall the question being raised so often for men who find themselves in careers where women are predominant. My experience has been such that I have rarely had cause to think about it unless asked. It is a difficult line to tread between addressing reasons why women might choose not to come into an industry, or remain in it, and positively discriminating albeit with good intentions. If I found myself being elevated to a role that was not clearly as a result of my own performance and the fact I was the best candidate, I would feel deeply insulted. As an individual I have much to offer, which is in part a product of my genetics, but largely one of my environment, shaped by experience. Being a woman is a small factor among those variables.

I can think of numerous minorities in the industry that would benefit from targeted thought and effort, to make sure we have a truly diverse mix of people contributing, ensuring an interesting and challenging workplace, with equal opportunity for all. Over the years I think I have felt more conscious of having not gone to the very top universities or come from a particularly privileged background. I was very lucky to have taken the path I have, and this has been one of my primary drivers for promoting engineering within London, where I grew up knowing very little or nothing about engineering as a career.

### Where do you see yourself in five years' time?

In the future I would really like to be leading and delivering large projects, perhaps from the UK or maybe further afield. It would be great to think that there might be an opportunity to get involved at a higher level by advising the government, and educating the country to address the issues of climate change through their day-to-day use of buildings, and expectation of comfort and physical environment. I'd also hope to be helping other young engineers develop and achieve their potential.

### What will you be looking for as a judge in this year's award?

Someone with passion and enthusiasm, who can really inspire other young engineers and young people in general.

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# COLLABORATION ON CAMPUS



Building services and architecture students are more likely to enjoy a pint together at the union bar if they have shared space in the lecture hall. **Carina Bailey** explains

**S**tudent fees may have tripled in the past year and university applicants from within the UK dropped by some 8% compared to 2011\*, but the time may still be ripe for students embarking upon a career in building services and architecture.

An evolution in how building services engineers and architects are being taught has been taking place in pockets of the country for some years now, giving prominence to the philosophy of 'architectural engineering'.

And, although the concept is still not widespread in the UK and far from becoming common practice, this will have to change if the UK is to have any hope of meeting its stringent low carbon and energy targets, says Andy Ford, a past president of CIBSE and director of Mott MacDonald Fulcrum.

'It's about building physics,' he explains. 'Understanding what causes human beings to enjoy a space and enjoy being in a building.'

Architectural engineering courses – of which there are currently only a handful in the UK and predominantly at post-graduate

level – enable building services engineers and architects to be taught together and to design together. This not only engenders respect for both professions, but also breeds an appreciation of how buildings work.

Heat, light and how a building responds to those factors; the orientation and direction of a building; and the role building services have to play are all important parts of the same equation. Take all of these into account, says Ford, and the end result will be 'beautiful' buildings.

'While we need extremely good engineers to design services, we need quality services. The perfect building would perhaps be one that didn't need any services at all, but that's actually impossible,' says Ford.

What we need then, he says, are architects with the knowledge of a building services engineer: 'It's about understanding how the two professions are basically two sides of the same coin, working towards creating buildings that work and that are a pleasure to be in.'

The architectural engineering courses currently available tend to cover structures, building services, civil engineering and some architecture. But the balance between how much of each discipline is taught varies and is a hurdle that the education sector – and industry – has to overcome, through the introduction of a proper curriculum.

'It's not straightforward,' admits Ford, but he is certain it is possible to achieve.

He says CIBSE is well placed to develop it – in agreement with other institutions – and to ensure that the knowledge required is properly regulated and available.



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Ford adds: 'It's about understanding the need for building services and how to design them, and how to design them out.'

'There's never going to be a lack of need for mechanical engineers. But you also have facades, lighting, daylighting groups and so forth. These specialist groups within CIBSE all deal with elements of the whole. It's how you bring that 'whole' together and CIBSE is the logical place for that to happen.'

The way students are taught in both sectors also has profound implications for how the two professions work together in real life.

Prejudices are formed right at the beginning of a students' study; architects are taught to believe that engineers are wooden people with no creativity, while engineers are taught that architects are only interested in the aesthetics of a project. Both beliefs are wrong, says Ford, and this needs to change.

Other issues arise from the way both types of students are taught to behave. Ford explains: 'An architect leads a team, but they aren't in many courses taught to lead the team. They're taught to have their own ideas and to defend them vigorously. We are not and actually we should be. The way to get to a good result is to get both people listening to each other and vigorously putting their points of view.'

Another challenge for engineers identified by Ford is simple: effective communication. 'It's true to say that we are not very good at talking to each other because we are not taught to be good at explaining what we are trying to do.'

Paul Kirby, programme lead for architecture and environmental engineering at the University of the West of England, which has run an architectural engineering course for the past two years, describes building services as 'the unknown profession'.

'Why do people know about quantity surveying? We need to be putting information into the hands of teachers,' states Kirby.

Schools have a duty to provide careers

education, says Kirby, but he questions what the profession is doing to help them fulfil that duty. 'There are very few engineers teaching in schools, so how do teachers know about engineering? We have to help them – universities and industry.'

However, for Kirby, it is not just about making courses more interesting – although he admits that is what architectural engineering does by widening the net to interested people. 'Does it really matter if we in building services have got engineers with some knowledge of architecture, or architects with a better knowledge of engineering? Joint courses benefit the industry whichever way round you look at it.' **CJ**

\*UCAS figures: [www.ucas.com](http://www.ucas.com)

Architects are taught to believe that engineers are wooden people with no creativity, while engineers are taught that architects are only interested in the aesthetics. Both beliefs are wrong  
*Andy Ford*



## What employers want

Paul Kirby, programme lead for architecture and environmental engineering at the University of the West of England, has conducted interviews with some of the top building services employers in the industry to find what they look for in graduates. Key points included:

### General

- Daylighting and lighting in general should be included in building services degrees
- Some Building Regulations knowledge
- A grounding in fundamental physical and mathematical principles
- Resourcefulness and inventiveness to hunt down and process information productively
- Need to integrate their specialist knowledge and skills within the complex environment of buildings and their construction
- Enthusiasm

### Integration/holism

- Appreciate the broader context
- Understanding of how the parts contribute to the whole
- Strategic overview of buildings and systems

### Engineering and drafting software

- Ability to pick up specialist design/analytical/drawing software skills
- Understanding of underlying principles
- Understanding of parameters in modelling
- Manual methods for routine calculations

### Mathematics

- No use of high level mathematics, but some use of mathematics required – a mind trained in mathematics is conditioned to think in terms of 'cause and effect'

### Broader skills

- Ability to think and learn
- Resourcefulness
- Inventiveness
- Flexibility
- Confident communication skills
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- Sketching skills

### Controls

- Stronger knowledge of controls, particularly for specifying engineers

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# BUILT FOR SPEED

Creating the now-iconic velodrome for the London 2012 Games was something of a mean feat, with designers trying to break the laws of physics and create completely still air. **Andy Pearson** looks at how they made it work

**I**f you take everything you do and improve it by 1%, then that will add up to a big increase in performance,' said Dave Brailsford, performance director of British cycling, in a recent television interview. He was explaining the approach adopted by the British Olympic cycling team that helped them win seven out of a possible 10 track cycling gold medals. Team GB's Paralympic team topped the cycling medals table too, winning 15 medals at London 2012. That same philosophy of obsessive attention to detail is also evident in the design of the building where Team GB was so successful.

The Olympic Velodrome is situated at the northern end of the Olympic Park. The building's curving red cedar timber walls and swooping oval roof are a tribute to the design team's panache and engineering ingenuity. However, it is inside this iconic oval building that the real attention to detail starts to become apparent.

At the request of Team GB's cyclists, the

designers set out to create a facility that would enable them to ride fast enough to break world records. Surprisingly, it was not on the design of the track where the designers focused their efforts – instead, it was on the building's environmental design. The cyclists wanted the designer to ensure the air temperature in velodrome was a tropical 28°C, because at this raised temperature, the air is slightly thinner. Thinner air means less aerodynamic drag, so the cyclists can move faster to shave milliseconds off their times. The fact that four world records were broken in the venue during the Games is proof of their success.

#### Refining a concept

Environmental engineer BDSP was part of the integrated design team responsible for the venue. Also onboard was Hopkins Architects, structural engineers Expedition Engineering and Landscape designers Grant Associates. Since the team won

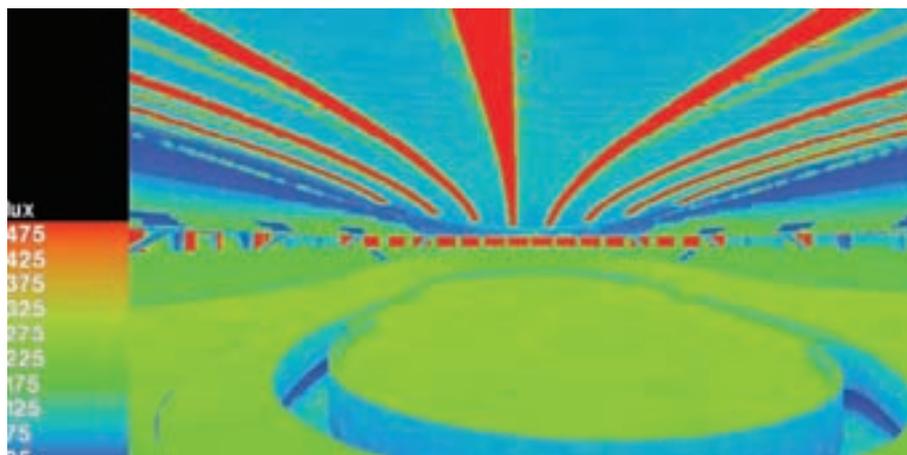
“Thinner air means less aerodynamic drag, so the cyclists can move faster to shave milliseconds off their times”

The roof dips in its centre to shrink-wrap the building around the track, minimising its volume



6 The building's curving red cedar timber walls and swooping oval roof are a tribute to the design team's panache and engineering ingenuity

Simulation of lux levels from the rooflights. Designers were looking to achieve 300 lux of natural light distributed evenly on the track to minimise need for artificial light during legacy use



the competition to design the velodrome in 2007, the designers worked with Team GB's cyclists to refine their concept into the finished product. 'We talked quite a bit with British Cycling at their Manchester HQ about what they needed and what they wanted from the building,' says Gustavo Brunelli, an associate at BDSP.

However, in addition to creating the ultimate cycling venue for the Olympics and Paralympic games, the Olympic Delivery Authority (ODA) wanted the facility to be able to be used by local schools and cycling clubs as part of the Olympic legacy. It was a difficult balancing act for the environmental engineers.

This meant that in addition to coping with 6,000 spectators and TV lighting during the Olympics, the services would also need to be capable of providing suitable legacy conditions for when the velodrome would become the centerpiece of the new cycle park, which will

also include a new road track, a mountain bike course and the modified Olympic BMX track. At such times, as few as 50 people might be using the facility.

In addition to the legacy, the ODA also set demanding sustainability criteria. The building had a target of BREEAM Very Good; it also had to meet the requirement for all permanent venues to have a Target Emission Rate of 15% better than Building Regulations Part L 2006. The design team's approach was to design the building for legacy use, knowing that it would need to be capable of being used in a different way for four weeks of Olympic and Paralympic competition. 'We designed for legacy use and then we said: "How do we need to change the design to accommodate these major events?"' says Brunelli.

### Tracking a curve

The oval, 250m long Siberian pine cycle track is at the scheme's heart. It was designed by Ron Webb, the man responsible for designing most of the world's velodrome tracks; although its banked curves are slightly steeper than most, its geometry is fairly standard. The track is encircled by a lower tier of 3,000 spectator seating. Two additional banks of 1,500 seats form the upper seating tiers; these face the two straight sections of track. The main concourse separates the upper and lower seating tiers. Suspended above the arena is the cable-net roof structure.

The double-curved form of the roof is key to the building's environmental strategy. The roof dips in its centre to shrink-wrap the building

around the track, minimising the building's volume. 'The larger the volume, the more air you have to heat,' explains Brunelli. This will be particularly important during the legacy period, when the temperatures may have to be raised to 28°C for competitions regardless of whether or not the auditorium is full. Under normal, non-competition conditions, a temperature of 18°C will be sufficient. 'The need to accommodate these two extremes shaped the building and the services design.'

An additional challenge from BDSP's perspective was that the temperature of 28°C was required at track level, while at the same time it needed to be cooler in the auditorium where the spectators were seated. 'The conditions demanded a solution that went against the laws of physics,' explains Brunelli.

Radiant heating was not an option; the cyclists wanted the air to be hot. Blasting air downwards with powerful fans was out; the cyclists were insistent that they should not be able to feel air movement. In addition, the lightweight roof construction necessary to provide a column-free environment below, coupled with a fear of water leakage onto the precious track, meant that no plant could be mounted on the roof and no ventilation openings could be punched through it.

Despite their best efforts, BDSP were unable to break the laws of physics. Instead they developed a heating strategy for the velodrome based on three main elements: underfloor heating, under-seat heat and over-track heating using jet nozzles. Underfloor heating warms the in-field area in the centre of the track oval and the concourse. The system has been sized for legacy day-to-day heating to keep the auditorium at a set point of 18°C on a cold winter's day.

For competition events, when the temperature needs to be at its peak, additional heat is provided through grilles beneath the spectator's seating. Adding warm air beneath the seating helps distribute it homogeneously to avoid drafts and pressure fluctuations. 'This displacement system will help create a small amount of air movement, to help spectators feel a little more comfortable, even though the air will be warm,' says Brunelli. In addition to providing extra heat, the grilles also provide fresh air if called for by CO<sub>2</sub> sensors.

### Jet powered

The final element in the heating solution is the jet nozzles. The nozzles are set around the base of the upper tier of seating to supply heated air upwards, at high velocity, over the track. This helps mix the air preventing it from stratifying and making conditions even more

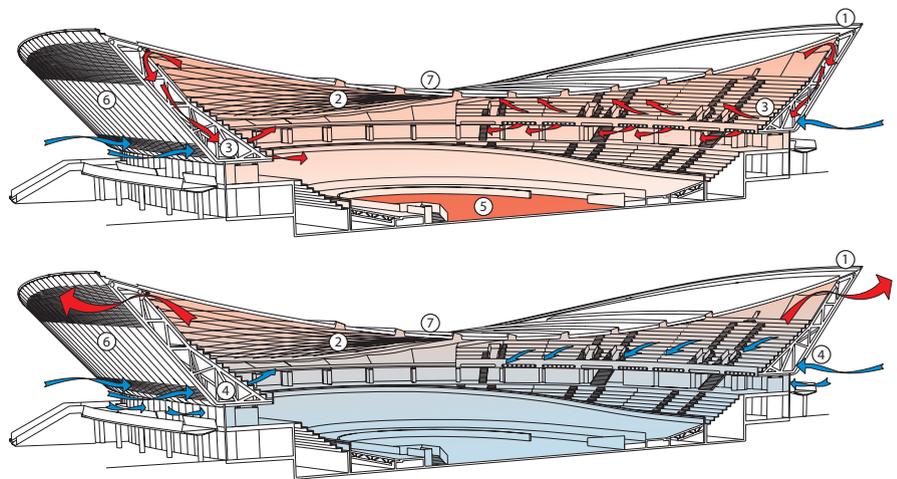
uncomfortable for spectators. The jets will also be used to bring the venue up to temperature quickly between competition sessions. Extensive CFD modelling was used to ensure the jets did not create too much air movement at track level.

But what is too much air movement? The cyclists did not want to feel the air moving, but according to Brunelli, there is no metric to say what the maximum air velocity should be. BDSP turned to other sports for guidance; the most severe requirements were for air

The double-curved form of the roof is key to the building's environmental strategy

Natural ventilation keeps riders cool during summer (below) while air is recirculated and heated in winter (above)

- 1 Rainwater Harvesting - Roof Gutter
- 2 Daylight - Rooflights
- 3 Mechanical Ventilation - Jet Nozzles and Underseat Slots (Winter)
- 4 Natural Ventilation - Plantroom Plenum and Concourse (Summer)
- 5 Underfloor Heating - In-field
- 6 Highly Insulated Envelope - Bowl and Roof
- 7 Compact Volume - Low Profile Roof



### Let there be light

Most velodromes are dark boxes that hide the cyclists from the light of day, but this velodrome is different. It features a large area of glazed rooflights to flood the space with daylight. The rooflights are supplemented by a band of glazing surrounding the concourse.

The areas of glazing reduce the need for artificial light during legacy operation where a uniform light level of 300 lux on the track and in-field areas will be sufficient for general use and the area of rooflights was optimised on that basis.

It was important, however, that the rooflights did not create contrasting light levels on the track and under no circumstances should they permit direct sunlight to land on the track because this would be distracting and could result in an accident. In addition, the architect didn't want too many openings in the roof to compromise its insulation or to create too many perforations, which could be a potential source of water leakage.

BDSP worked with architects to look at different rooflight configurations. The best option was found to be strips of rooflights. This configuration

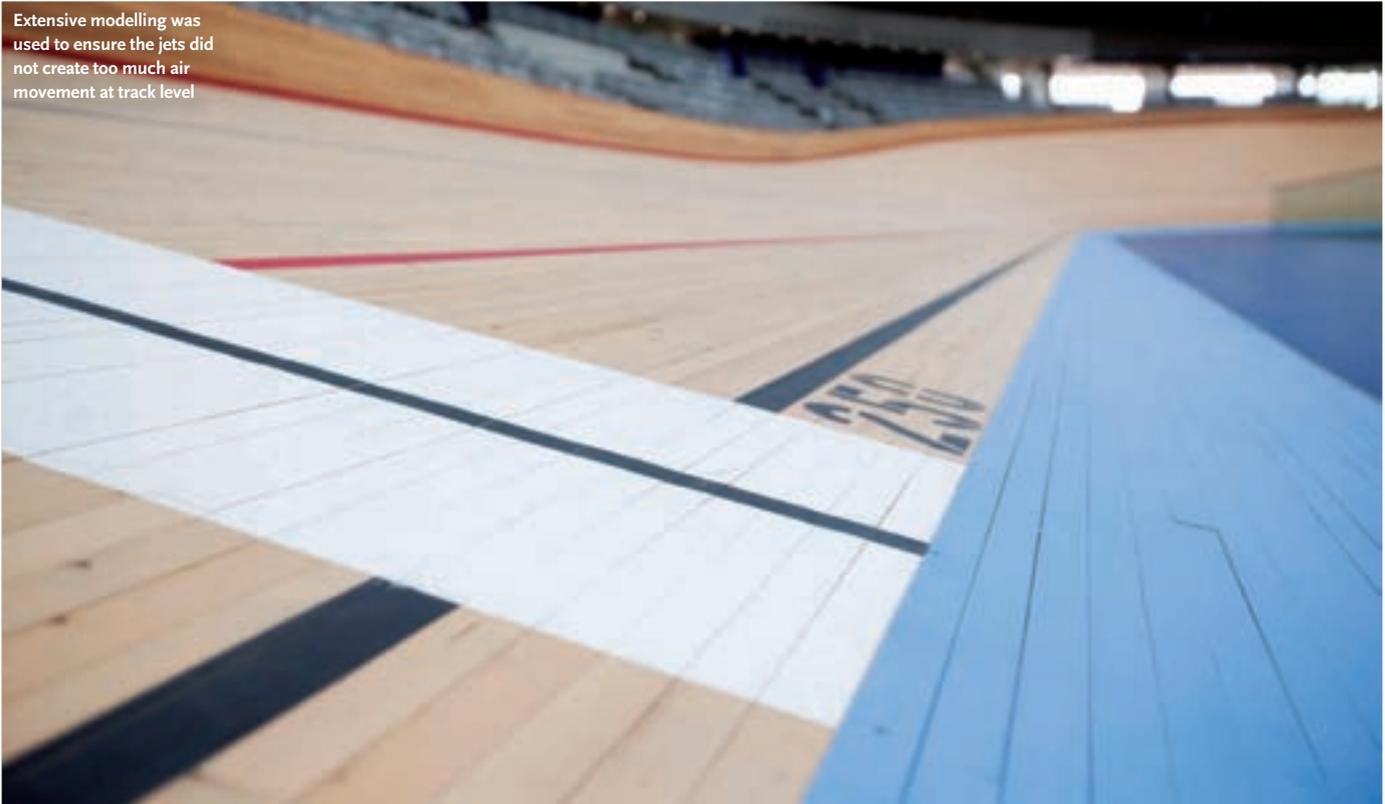
was also easier to integrate into the roof's supporting cable net structure. To prevent sunlight entering, the inside pane of the double glazing has two PVB interlayers, set at 90 degrees to each other, to diffuse the light.

The rooflights are supplemented by 356 artificial lights – Philips 1kW ArenaVision – designed to give a level of 2000 lux for TV, but also to have the capability to give lower light levels of 1400, 700 and 300 lux for the different events.

For most of the year, the artificial lighting will be used in the 300 lux setting. The lights have been configured so that 300 lux can be achieved with four different sets of fittings and the controls are designed to use each configuration in turn to equalise lamp life. 'It was a very complicated aiming exercise,' says Brunelli.

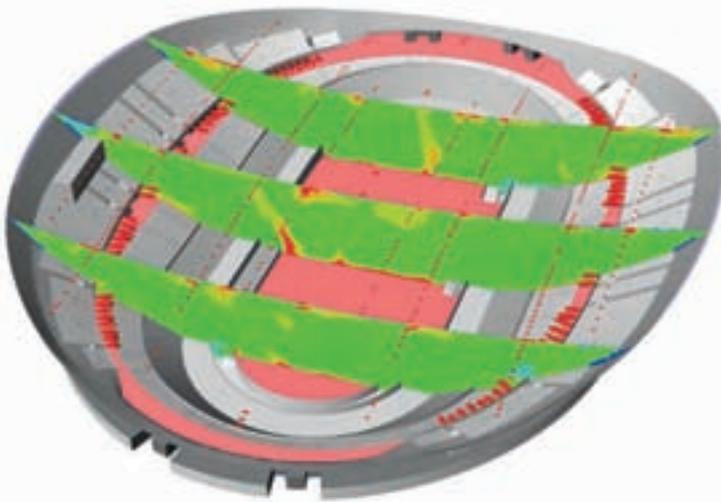
A far higher level of power resilience was needed for the Olympics than would be needed during the velodrome's normal operation, even during legacy events. As a result, the building has been designed to allow a back-up power plant to be trailered in by lorry and hooked up to the electrics.

Extensive modelling was used to ensure the jets did not create too much air movement at track level

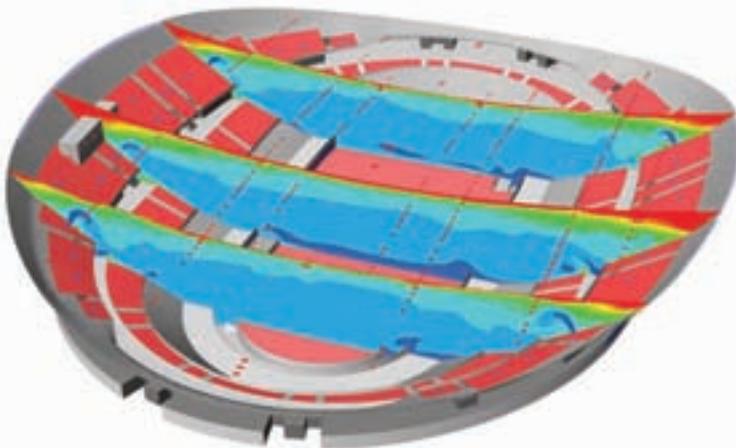
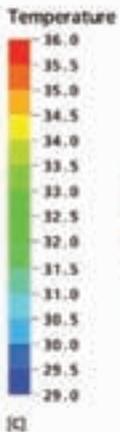


Modelling was used to ensure cyclists and audience were comfortable at all times. The simulations show cross sections through the arena to show distribution in both summer and winter

Winter air flow



Summer air flow



movement above badminton courts. BDSP used the same criteria that enables the flight of a lightweight shuttlecock to remain unaffected to define maximum track level air movement.

Twenty relatively small air handling units (AHUs) supply the auditorium with heated air. The AHUs are hidden in the curving, wedge-shaped plant space beneath the upper banks of seating and the external wall. Fresh air is supplied to the AHUs through wooden louvres set into the façade behind, just above concourse level. The AHUs are sized to deliver fresh air for 6,000 people.

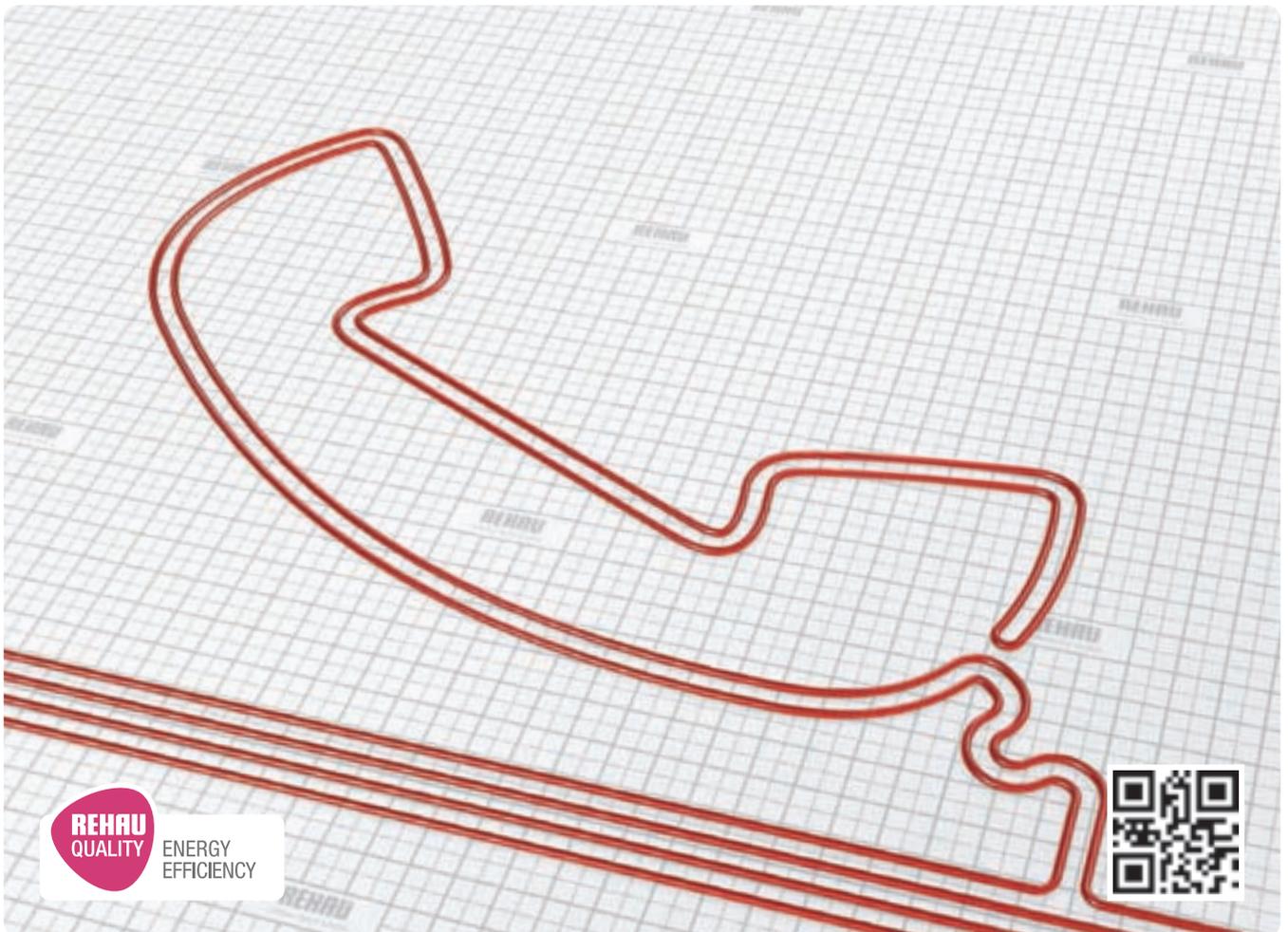
They are arranged alternately so they either supply air to grilles beneath the spectator seating or to the jet nozzles. Rather than have all the AHUs operating all of the time, the system is matched to the heating and fresh air loads by simply switching individual units on and off in much the same way as the modules turn on and off in a modular boiler. To help with the air distribution, the units are generally brought into use as matched pairs either side of the auditorium.

Air is extracted from the auditorium through a slot just beneath the roof, at the high point of the auditorium's wall above the spectators. Depending on demand, it is either heated and returned to the auditorium, or exhausted through louvres integrated into the building's red cedar façade. A thermal wheel removes heat from the waste air and transfers to the incoming air before it is exhausted.

To ensure heat is retained in the building

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Our priority was always the cyclists. It will get pretty warm if you put 6,000 spectators in the space at the peak of summer – as, in fact, it did during the Olympics

in winter, the four main sets of entrance doors leading onto the underfloor heated concourse are lobbied with double doors, synched so that inner and outer doors are never open at the same time. The lobbies have top-up heat provided by air curtains.

#### Breath of fresh air

In summer and midseason, the building will be ventilated using natural ventilation alone – it does not need heating. The natural ventilation system follows a similar pattern to the mechanical ventilation. Insulated dampers will open to allow fresh air to enter through the lower set of louvres set into the façade. From here, it will enter the plenum beneath the seating before finding its way out into the auditorium through the grilles beneath the seats. As the air is warmed, it will rise and pass out of the auditorium through slots beneath the high points of the roof. Finally, it will make its way back outside through the set of louvres at high level in the facade.

Sizing the ventilation openings was critical for the system to work, and interaction between the engineers and architect was essential in securing the right size and number of openings in the façade and beneath the seats to allow sufficient air flow. 'We generated charts for the architect with different combinations of the number and size of the slots so that the architect could decide on the most appropriate combination,' says Brunelli.

BDSP also carried out extensive CFD modelling to check that the natural ventilation would perform under different wind speeds and directions. The design team had set themselves a nominal target that the interior temperature would be no more than 3°C above outside ambient in summer. The modelling showed that on windless summer days

with a full house, for those spectators in the higher seats, this target would be exceeded with temperatures 'at the high end of what is acceptable' says Brunelli. 'Our priority was always the cyclists. It will get pretty warm and a bit uncomfortable if you put 6,000 spectators in the space at the peak of summer – as, in fact, it did during the Olympics.'

The natural ventilation strategy is helped by the exposed concrete in the in-field area and the concourse. The building has no cooling, so the thermal mass contained in these areas helps to moderate temperature fluctuations.

Brunelli says BDSP would have liked to test the NV strategy in the summer, but couldn't 'because the Olympics were taking place.' Instead, they made do with feedback from February's World Cup cycling event at the velodrome. 'We tried different ventilation permutations, but conditions were not ideal because it was the wrong time of year to be operating in natural ventilation mode.'

Natural ventilation will also keep the support rooms beneath the lower tier of seating comfortable. These spaces include a gym, changing rooms, offices, meeting rooms, storage, a shop, workshop and a bicycle hire facility. The gym and meeting rooms will also have a mixed mode option with local district expansion cooling if needed. The main mechanical plantroom containing the heat exchanger from the site's district heating, the calorifiers and cold water storage are also tucked under the lower bank of seating.

These rooms even have a night cooling mode to keep running costs to a minimum when Lea Valley Regional Park Authority takes over the venue – further proof that the design team has enshrined Dave Brailford's philosophy of obsessive attention to detail throughout this iconic structure. **CJ**

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# INTO THE NIGHT GARDEN



A new building at the Royal Botanic Gardens in Edinburgh is the centrepiece from which to showcase the organisation's conservation work, as **Andy Pearson** discovers

**T**he Royal Botanic Gardens Edinburgh (RBGE) is a world-renowned centre for plant science and conservation.

However, not all of the gardens' 700,000 annual visitors will be aware of the importance of its work. To change this situation, the RBGE wanted its new John Hope Gateway Building to act as both an access point to the site, and as an exhibition space – to show the public what the organisation does, to educate them as to the

harm being done to plant life and ecosystems the world over, and to illustrate what they can do to make a difference.

Critically, from the design team's perspective, the RBGE wanted to deliver this message through a building designed to demonstrate how it was possible to minimise man's impact on the planet. The team – Edward Cullinan Architects, building services engineer Max Fordham and structural engineer Buro Happold – won the

competition to design the new visitor centre back in 2003.

'They wanted it built from raw materials and to operate naturally,' says Colin Hamilton, a senior partner at Max Fordham. Design Quality Indicators (DQIs) were used for design development to ensure the design team delivered what the client wanted. 'DQIs are a means to compare what the design team thinks they are being asked to do, with what the client thinks it wants,' Hamilton explains. This was the first project to use the online version of DQIs, for the nine members of the client's team and all members of the design team.

'The discussion is then about prioritising



different issues to enable us to make sensible recommendations to the client,' Hamilton adds.

### Best-laid plans

The resulting 2,700 m<sup>2</sup>, two-storey visitor centre, built on the site of the former shop, is essentially rectangular in plan. It is built along a north-south axis and comprises a large transparent entrance lobby to the north, leading to a ground floor science studio and exhibition space, complete with a giant curved wall overlooking a new biodiversity garden to the east. On the first floor there is a public restaurant – this is separated from the organisation's private offices by a full-height



The central atrium features a large fig tree

atrium. The restaurant's Douglas fir timber floor extends over the exhibition space as a roof deck, before merging into the adjacent hillside. The deck allows visitors views out over the ponds and gardens. The building is topped by a flat sedum-covered roof, which overhangs the eaves to the south and east.

Natural materials with minimal embodied energy feature heavily in the design. The building's structure is formed from timber glulam beams, and sections of the external wall are clad in local Caithness stone, while responsibly sourced Scottish larch timber is used to clad the remainder of the walls and roof.

At the time of its design, the building's fabric had high levels of insulation to give a fabric thermal performance 25% better than the Building Regulation's minimum. However, by the time funding was in place and construction commenced in August 2007, the regulations were more rigorous and the 25% improvement, although still better than the regulation's revised minimum heat losses, sounded less impressive.

The team's approach to minimising the building's impact on the landscape has been to engineer the building's form and fabric to provide a holistic solution that maximises the use of natural assets. 'We engineered the building fabric to utilise natural resources, such as daylight, air, heat and water, to reduce

“ Natural materials with minimal embodied energy feature heavily in the design



At an early stage in the design, the engineer and architect worked to ensure suitable levels of daylight within the building

The central atrium is fundamental to the building's ventilation strategy. It allows warmed air to rise up and out of the building

the base energy load as far as possible,' says Hamilton.

Daylight was an important resource for the scheme. At an early stage in the design, the building services engineer worked with the architect to ensure suitable levels of daylight within the building. This was partly to minimise the need for artificial light but, more importantly, it was also to ensure daylight levels were sufficient to ensure the health of plants the RBGE wanted to incorporate into the visitor centre's rooms. 'Daylight is the key to the design of the building,' says Hamilton.

One of the most critical areas for light was the central atrium, which features a gigantic fig tree as its centrepiece. To ensure daylight levels are sufficient for the plants' health, the atrium's roof is formed of ETFE (a fluorine-based plastic) pillows; these have exceptionally high light transmission, even at the ultra-violet end of the spectrum.

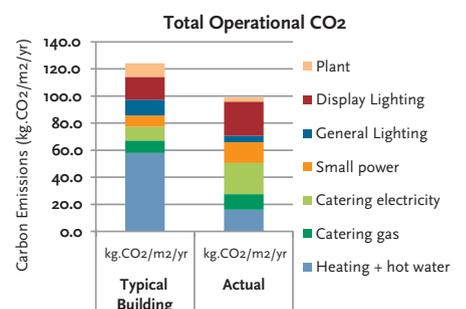
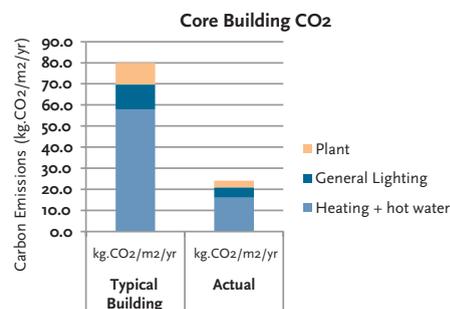
The entrance lobby, too, has an ETFE roof and glass walls to ensure daylight levels are sufficient to enable tropical plants to be grown in the space. By contrast, daylight levels in the exhibition space are reduced to enable less energy to be used to illuminate the exhibits. Lighting controls dim electric lights automatically to reduce energy consumption throughout the building, while PIR (Passive InfraRed) sensors in the toilets turn the lights off.

### The heat is on

With daylight comes heat. As part of the design development, the engineers modelled the visitor centre, using a dynamic thermal modelling programme, to investigate energy consumption, thermal comfort and solar shading. To control solar gains, the roof was extended to overhang the south and east faces of the building by four metres, while vertical fins on the building's western elevation and high-performance glazing throughout help reduce summertime heat gains. At the same time, it allows passive solar heat to enter the building from the low-angle winter sun.

Light distribution is aided by the ponds outside the curved window of the exhibition space, which act as natural light shelves to reflect the low angle sunlight deep into the space. In summer, the ponds help cool the air entering the building as part of the natural ventilation strategy.

The central atrium is fundamental to the building's ventilation strategy. It allows warmed air to rise up and out of the building through a series of high-level windows, drawing in cooler air through the perimeter. The atrium's stack ventilation is enhanced by cross ventilation, driven by wind pressure on



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► the building. Depending on wind speed and direction, internal and external temperatures and rainfall, the high level windows on both the ground and first floor open and close under control of the building management system (BMS). The BMS also opens the windows at night to flush the building with cool air as part of a night cooling strategy.

Not all windows are under control of the BMS. A push-button override in some public rooms enables staff to open and close windows independent of the BMS, while windows in the staff offices are opened and closed manually. The only areas not naturally ventilated are the toilets and kitchen, both of which have mechanical ventilation.

Although not a specific requirement under Scottish Building Regulations, the building was pressure-tested to ensure it was airtight with minimal uncontrolled ventilation heat losses. The pressure loss was measured at  $7.55\text{m}^3/\text{m}^2 @ 50\text{Pa}$ .

Even with a relatively airtight building, one of the biggest challenges faced by the building services engineers was to heat the building efficiently. 'One of the problems of the public wandering in and out of the building is that you don't want to heat the spaces using an air-based system,' says Hamilton. The giant, glazed entrance lobby

is unheated; it acts as a buffer zone between the outside and the building's heated interior. Inside, Max Fordham has used radiant heating.

In the central atrium, the radiant heating takes the form of underfloor heating, with pipes cast into the solid concrete floor. In the other rooms, suspended ceiling-mounted radiant panels will warm the visitors. The panels also incorporate acoustic absorption to help limit reverberation times resulting from the large area of hard surfaces.

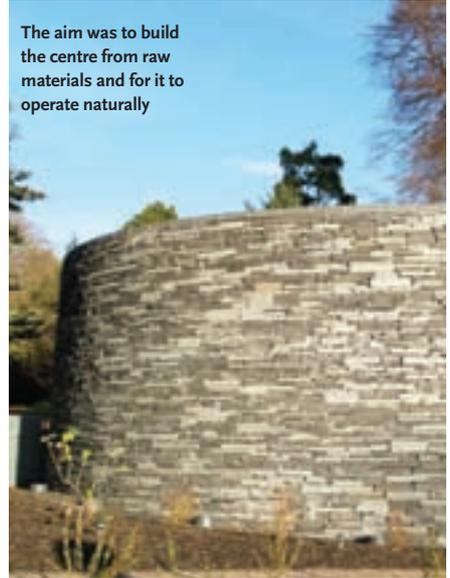
Heat for both the radiant heating and hot water systems is supplied by a 200 kW biomass boiler housed in the basement plant room at the southern end of the building. The boiler is fuelled with locally sourced wood.

'This provides an 86% saving on carbon emitted from the heating and hot water demand of the building, when compared to a gas-fired system,' says Hamilton. The scheme does, however, have two small gas boilers to help heat the hot water in summer and to provide back-up to the biomass system for the remainder of the year.

The biomass boiler supplies top-up heat to the hot water calorifier in winter. The primary source of heat for the hot water, however, is a  $15\text{ m}^2$  roof-mounted, evacuated ►

6 One of the biggest challenges faced by the building services engineers was to heat the building efficiently

The aim was to build the centre from raw materials and for it to operate naturally



The entrance lobby is unheated and acts as a buffer zone



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6 The wind turbine generates some electricity for the site, but the technology was not selected for its payback

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▶ tube array of solar thermal panels. These are estimated to have a peak output of 12 kW – enough energy to meet the building’s hot water needs in summer and to preheat the water in the winter.

In addition to the solar thermal, the building’s roof also houses an 11 m<sup>2</sup> array of photovoltaic (PV) panels, with a peak output of 1.5 kW of electricity. The PVs were a client requirement to enable the building to showcase the technology.

**Harnessing energy**

Another renewable technology that RBGE was keen to demonstrate was wind energy. The visitor centre features a prominently positioned 6 kW vertical access wind turbine (VAWT). A vertical axis model was selected because it does not need to track the wind and so would perform better in the turbulent air caused by the site’s many mature trees.

This model also had the advantage of being quiet in operation, while its sculptural form will adorn the building at times when there is no wind. Under ideal conditions, the wind turbine can generate up to 8500 kW of electricity a year, offsetting 3.5 tonnes of CO<sub>2</sub> in the process. ‘The wind turbine generates some electricity for the site, but the technology was not selected for its payback,’ explains Hamilton.

In the future, the RBGE plans to install live energy displays to show the public in real time what the renewable systems are producing, and also how much they have contributed to meeting the building’s energy needs over time.

In addition to using sunlight and wind, the building also makes use of rainwater to flush toilets and urinals. Rainwater is collected from the building’s roof; passive cyclonic filters are used to remove debris from the rainwater before it is stored in two 7m<sup>3</sup> tanks. One tank is buried below ground to the south of the building, from where water is pumped to the toilet blocks at this end of the building. The other tank is mounted above the circular toilet block, adjacent to the building’s main entrance at the northern end of the building.

This tank supplies the WC cisterns with gravity-fed water. Annual rainfall here is predicted to be more than 333 m<sup>3</sup> a year – enough to meet 35% of the predicted water demand of the WCs. Any shortfall is made up with mains water.

The building does not have a BREEAM rating. ‘There was a lot of discussion as to whether or not to apply BREEAM to the project because it would have been expensive and, to achieve the highest rating, the gardens would have to do things they wouldn’t necessarily have chosen to do,’ says Hamilton. He admits the lack of a BREEAM certificate does make it difficult to compare the building with others using standard sustainability criteria.

The building was completed in August 2009 and opened by the Queen in July 2010. It won a CIBSE Building Performance Award in 2012. The team’s holistic design solution has delivered a building with an ‘A’ EPC rating, achieving a 55% improvement over the Target Emission Rate. When the John Hope Gateway Building’s core carbon emissions – those included in the EPC calculation – are compared to a typical building, it emits 70% less carbon.

Energy logging of the building during use is finally taking place. Contractual issues meant that commissioning was not fully completed at the time of handover, however, seasonal commissioning has now been completed by an independent specialist so that the building’s performance can now be optimised.

The results so far show that the scheme has been a victim of its own success; it has proved so popular that, due to the large number of visitors using the building, figures for total carbon emitted are close to those emitted by a typical building. **CJ**

The many tall trees cause a turbulent air flow, suitable for a vertical axis turbine



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# JOINED-UP THINKING

There are many benefits of prefabricating pipework, says **Andy Carter**, product engineer at Victaulic, which is why Glasgow velodrome has adopted the strategy

**P**iping is often not seen as a critical value-engineering element within the scope of a construction project, but it is an area where significant productivity and efficiency gains can be made. When it comes to pipe-joining, the choice of method and strategy can have a big impact on the project schedule and total installed costs.

Within the piping sector, prefabrication is considered to be up to four times more productive than field fabrication. Twice as much work can be completed per man-hour, due to the controlled environment of off-site prefabrication and the availability of specific tooling. In addition, twice the productive hours can be achieved due to better materials flow control and improved supervision.

Not surprisingly, leading contractors prefabricate as much as possible off site. Traditionally this has been done using welding, yet grooved-end mechanical pipe-joining has been shown to deliver even greater benefits.

## Reduced risk

The goal of prefabrication is to reduce the risk inherent in the variability of field labour, while producing the best possible result at an overall total installed cost advantage. Fabrication shops provide predictable productivity and thereby reduce exposure to variable labour risk.

They provide a controlled production environment, which enables the optimum organisation of work and utilisation of skills to achieve the highest standard of workmanship. As a result the quality and consistency of prefabricated pipework is typically greater and material wastage is reduced. Productivity is further enhanced, since production can continue unaffected by adverse weather, poor light or limited space, all of which can impede work on site.

The grooved pipe-joining system lends itself to prefabrication, since pipes can be cut and grooved and valves fitted to pump assemblies offsite ready for final assembly in the field as needed. Working in such a way avoids the risk of loss or damage to components on the jobsite, while reduced materials handling lowers the potential for accidents.

## Improved safety

Time spent on the jobsite is a critical cost factor, which drives many contractors to prefabricate off site. It is also a significant safety factor. A benefit of reducing field man hours is the consequent reduction in exposure to potential jobsite injuries.

Materials handling – one of the primary causes of on-site accidents – is also kept to a minimum. Fabrication shops provide a cleaner, more organised environment where tooling and efficient shop layouts allow pipe spools to be manoeuvred more safely and more quickly than on the jobsite. Big advantages of prefabrication are realised in larger-diameter assemblies, which exceed the legal maximum weight for manual lifting.

Preassembling large spools where the necessary lifting gear is in place not only makes sense from a health and safety perspective, but makes best use of resources and saves installation time on site.

## Cost efficiencies

Prefabrication has a place in the majority of installations. To determine the optimal level of prefabrication for the job at hand, project managers have to take into account a number of key factors when doing cost analysis. These include the logistics of the site, the design of the piping system, the schedule of the build and whether the contractor has to outsource the prefabrication or not. Once the estimators



► have finished their work, prefabrication can be utilised to minimise the variability of field labour and maximise the predictability of the project schedule.

Greatest cost efficiencies exist for mid-to-large sized contractors that have their own prefabrication shops yet cost benefits can also be achieved by smaller contractors using prefabrication, with proper planning and a solid build strategy. If prefabrication is used on key spools that will create the greatest productivity impact in the field, the outsourcing of the fabrication of products to a third party can be cost efficient.

### 2D versus 3D prefabrication

The logistics on a typical jobsite present challenges that dictate the complexity of prefabrication that is done prior to delivery. There is a tipping point, however, when complex, three-dimensional prefabrication becomes impractical in terms of materials handling and logistics. Handling time of 3D prefabricated spools on site is estimated to be approximately 50% higher than that of straight pipes.

Two-dimensional prefabrication (where straight lengths of pipework are fitted with grooved elbows) provides advantages in many situations because the assembled lines

handle similarly to a straight length of pipe, but provide the advantage of the prefabricated fitting. The uniqueness of project designs, site logistics and the contractors' experience and capabilities will dictate optimal build strategy.

### Ease of installation

Contractors utilising grooved-end pipe-joining systems can increase their direct installation productivity by 50% by using two-dimensional fabrication such as the fitting of elbows onto straight lengths of piping.

Errors are inevitable on any jobsite and even prefabrication is not a perfect science: a small number of errors in the positioning of tees or headers coming off of a pump can have significant impact on an installation schedule. To make the field management of such rework easier, using a mechanical joining system where there is a union at every joint allows simple field correction of any prefabrication alignment errors, minimising scheduling disruptions onsite.

By minimising the interference of everything from weather to other trades on the jobsite and overcoming space constraints, prefabrication reduces on-site risk and increases overall installation speed and quality. **CJ** ►

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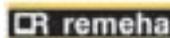
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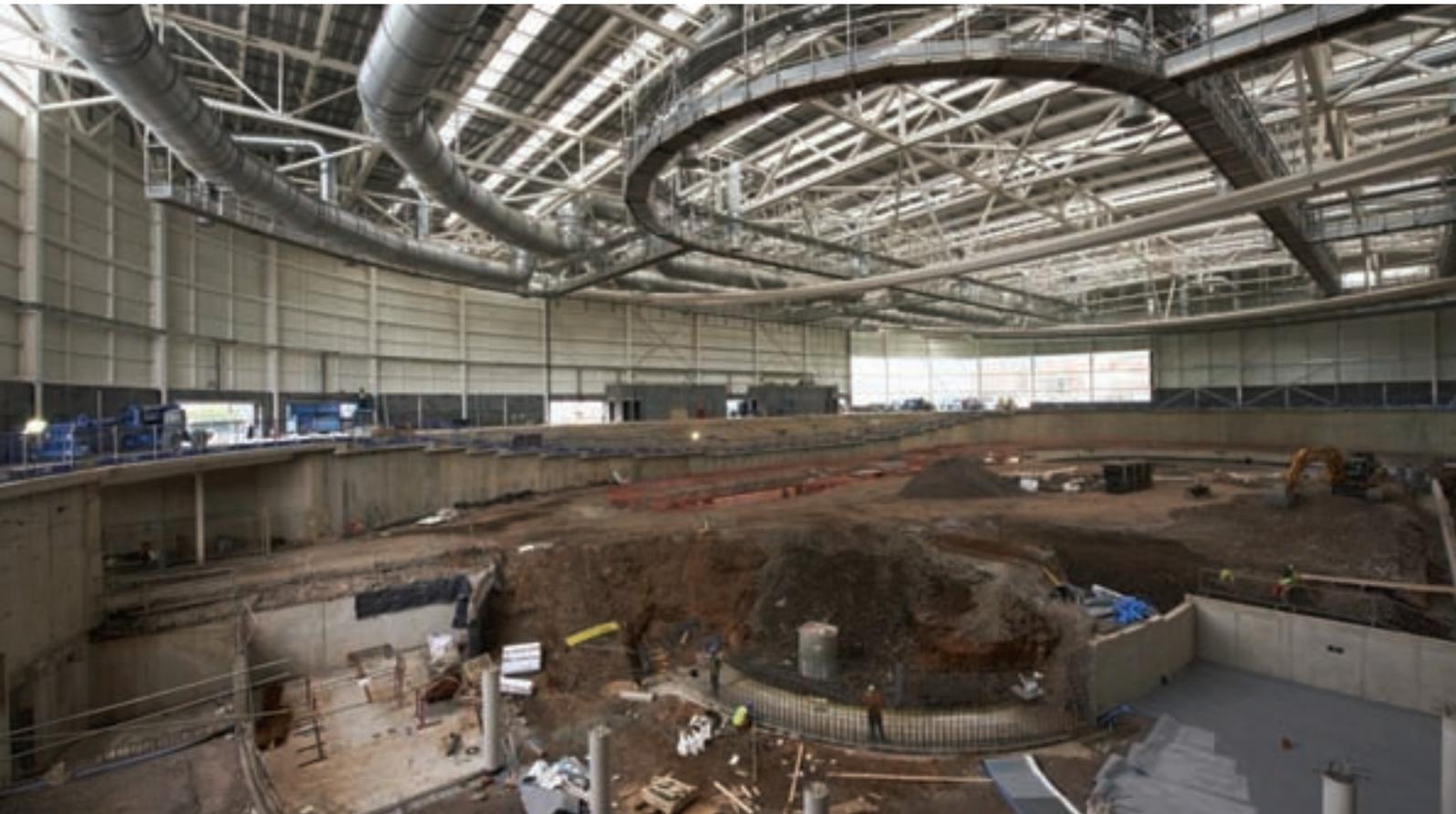
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When harsh winter weather hampered work on site, production continued in the prefabrication centre to keep to the construction schedule and achieve on-time completion of the work



## Sir Chris Hoy's prefabulous pipes

SPIE Matthew Hall provided the HVAC piping services for Glasgow's new velodrome and indoor sports arena that will be used for the 2014 Commonwealth Games. Changing from welding and flanging to Victaulic grooved pipe-joining systems and prefabricating off site were key to the success of the flagship project.

Prefabrication delivered productivity gains. For example, three people were employed exclusively on pipe preparation, keeping a grooving machine and hydraulic pump fully utilised, while others carried out assembly. Preparing pipes in batches according to diameter maximised equipment utilisation and reduced machine set-up and changeover times.

Around 2,500 pipe spools were prefabricated in six weeks on a 12-hour, seven-day shift system. When harsh winter weather hampered work on site, production continued in the prefabrication centre to keep to the construction schedule and achieve on-time completion of the work. "We were unaffected by the weather or lack of light and able to compress schedules on site," says SPIE Matthew Hall prefabrication manager Mark Graham.

Manufacture in a controlled environment meant that all tasks were carried out at a safe

working height. Delivery of prefabricated work where and when required reduced materials handling and the potential for accidents on site. This practice also improved on-site productivity and efficiency.

Because modules were pressure tested, dry fitted and checked off-site and transported to the job site ready for installation, workers could easily complete the final assembly without the need for time, space and special facilities to carry out other operations.

'No allowance is made for people to work in the mechanical room area when the drawings are made,' said construction manager, Gary Walker. 'If we had welded we would have had to have a separate shop next to the mechanical room and take all the necessary hot works precautions, which would have slowed us down.'

Keeping welding to a minimum kept costs down. 'You can fix material costs but it's difficult to get fixed labour costs,' Graham explained. 'Using Victaulic reduced the labour risk due to less labour being involved in the manufacture so we were able to give an accurate quote and deliver on budget and on time.'

The Sir Chris Hoy Velodrome is due to open in November.

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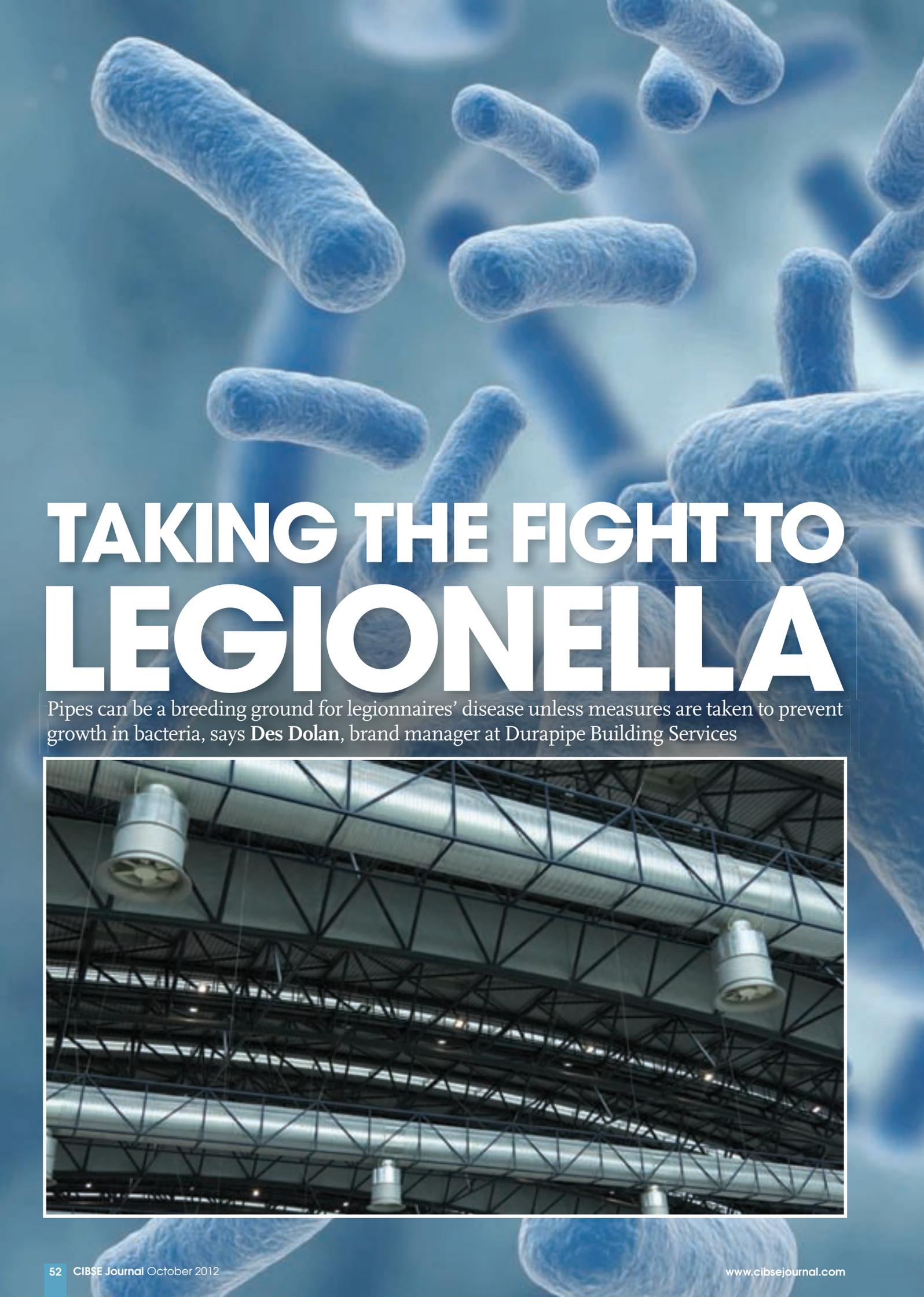


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A microscopic view of Legionella bacteria, showing several rod-shaped organisms with flagella, set against a blue background.

# TAKING THE FIGHT TO LEGIONELLA

Pipes can be a breeding ground for legionnaires' disease unless measures are taken to prevent growth in bacteria, says **Des Dolan**, brand manager at Durapipe Building Services



Legionnaires' disease hit the news headlines this summer after a severe outbreak in Edinburgh affected more than 80 people, with a further 21 people struck down with the disease following a separate outbreak in Stoke-on-Trent. This has caused companies up and down the country to assess their systems to ensure they are operating safely.

Legionnaires' disease is caused by a bacterium, legionella, that has always existed in water and remains inert at temperatures below 25°C. It proliferates in water circuits at temperatures fluctuating between 25°C and 45°C, meaning sanitary hot water and air conditioning circuits are most at risk from contamination.

Legionnaires' disease is spread by inhalation and cannot be contracted from ingestion. Infection occurs when water mists containing legionella bacteria are inhaled. These water mists can occur anywhere where water is taken from pipework systems, with showers, cooling towers, spas, high-pressure washers and humidifiers among the most likely systems to spread the disease.

These pipework systems can be a major carrier of legionella bacteria within buildings, so it is crucial that steps are taken to prevent growth of this bacteria within the pipe network.

#### Growing concern

A variety of factors that can increase the potential for bacteria growth, including stagnant water, dead volumes/loops – and temperatures from 25°C to 45°C. Within

pipework systems, the legionella bacteria develops and fixes in the presence of high concentrations of lime, magnesium, metallic residues and sludge, usually originating from corrosion and scaling. Within hot water and air conditioning circuits, bacteria can develop in pipework systems that are ageing, badly maintained, corroded and scaled.

While it is important that pipework systems are maintained regularly to ensure system safety, the initial product selection can also impact on the long-term health of pipes. Some materials are more likely than others to assist bacterial growth, so careful consideration should be given to pipework selection at the outset of a project.

Bacteria settle and develop in biofilm, which easily attaches itself to sharp or jagged parts of a pipe's surface – probably caused either by the quality of the extrusion of the new pipe or to the corrosion/scale build-up inside the used pipe – so a rougher surface will provide a stronger platform upon which to grow. This is because rough surfaces have more surface area for potential bacterial attachment and growth, and also provide more shielding from flow.

#### Smoothness

So the smoothness of the selected pipework is an important factor to consider; while the surface of some metallic pipes is rough, the smooth bore of plastic pipes ensures that the ability for bacteria growth is limited. Although

While it is important that pipework systems are maintained regularly to ensure system safety, the initial product selection can also impact on the long-term health of pipes

There are many effective methods that can be used to kill bacteria in pipework systems, including flushing through systems, thermal shock and chlorine shock

copper has natural antimicrobial properties, as limescale builds on the used, corroded pipe surface, biofilms cling to the limescale and begin to colonise it.

Once pipework systems are installed, it is good practice to protect chilled water and heating systems from biofilm development – and the resulting bacteria growth – by undertaking regular flushing and treatment processes from the outset. There are many methods that can be used to kill bacteria in pipework systems, including flushing systems, thermal shock and chlorine shock.

**Flushing**

Flushing will limit bio-film thickness in water systems; the sheer force caused by flushing will remove bio-film that extends out into the turbulent flow in the centre of a pipe. Plastic pipework should always be flushed out in accordance with BS5955 part 8.

**Thermal shock**

To work effectively, a temperature of 70°C must be reached and maintained throughout the entire pipework system over a period of at least 10 minutes, as legionella bacteria dies at temperatures above 60°C. This solution

is the most natural, and is very effective for circuits that are in good condition.

**Chlorine shock**

Another method proven to be successful is water disinfection. Circuit chlorination can be carried out by filling pipework and tanks with a chlorine mix at a concentration of 15 mg per litre of cold water for 24 hours, or 50 mg per litre for 12 hours, followed by draining and thorough rinsing of all pipework. Not all pipework is suitable for chlorine shock, however, and while C-PVC systems have exceptional resistance to chlorine, an ABS system would not be suitable for this method.

**Prevention**

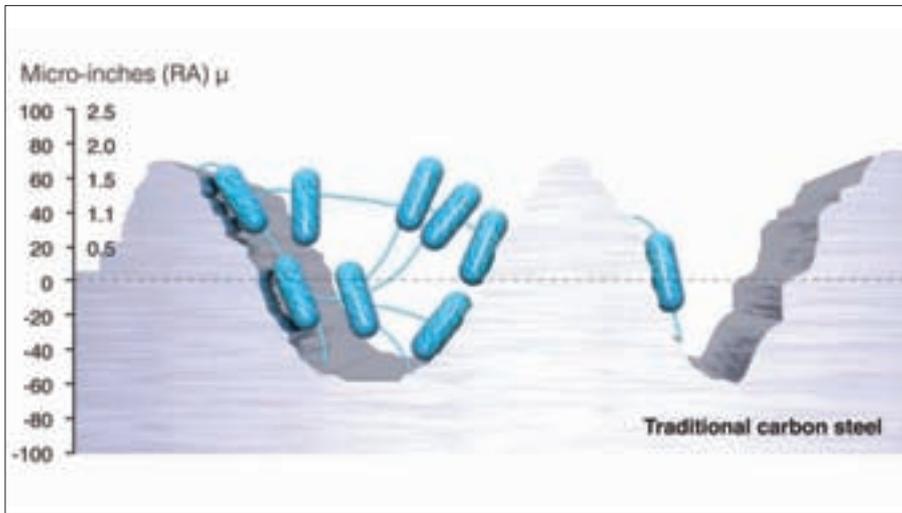
However, the correct design and pipework material is the first area to address. Once this is installed, it is vital to apply continuous preventative measures and undertake regular and thorough maintenance, sampling, cleaning and treatment. It is important, then, to ensure on an ongoing basis that there is no water stagnation, and to allow good water circulation throughout the system. By their very nature, plastic pipework systems can help combat bacterial growth; the material characteristics offer corrosion- and limescale-resistant properties, resulting in a smooth bore that can limit and slow the growth process.

While specifiers or consultants are looking for guidance on the safety of pipework, regulations and guidelines on legionella in water applications are constantly evolving. However, the Health and Safety Executive (HSE) has published HSC L8 (2000) *Legionnaires disease: the control of legionella bacteria in water systems*, the approved code of practice and guidance setting out the statutory requirement for dealing with that risk. This applies to all premises with a water system.

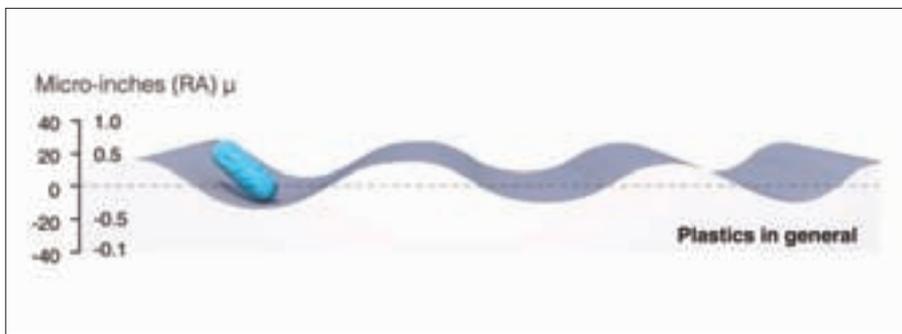
Proliferation of legionella bacteria in water networks can become a major health risk, with around 6,000 cases of legionnaires' disease diagnosed in Europe every year. The industry needs to be assessing the safety of current systems, and considering new specifications to ensure that they meet the approved regulations and offer a safe and healthy solution over the lifetime of a system. CJ

● CIBSE's Mid Career College is running Introduction to legionella one-day courses in London on 31 January 2013 and 9 July 2013. See more at [www.midcollegecareer.co.uk](http://www.midcollegecareer.co.uk)

Legionella can breed readily on the more undulating surfaces of older steel pipes



The smooth interiors of plastic pipework tend to inhibit the growth of legionella



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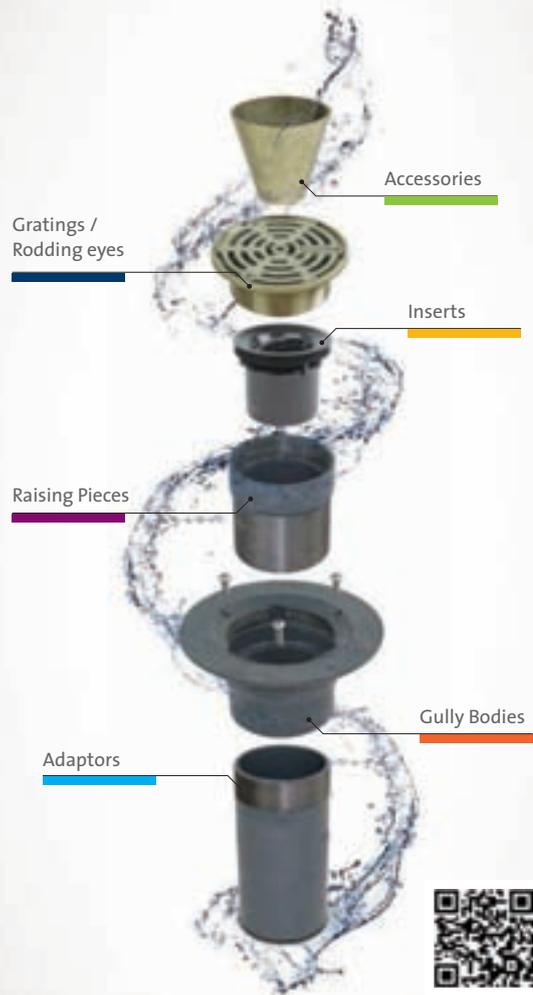
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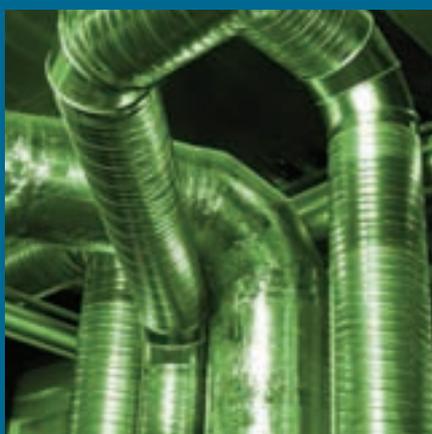
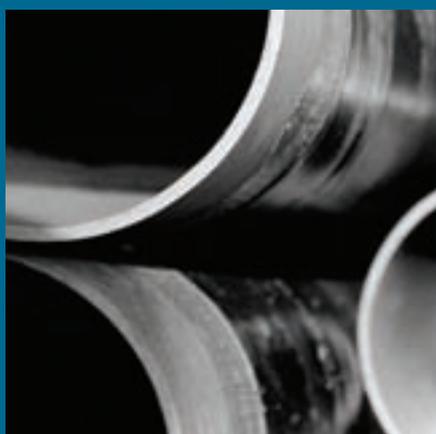
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# TACKLING THE FLEXIBLE FIENDS

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Cowboy firms are taking advantage of confusion over flexible ductwork standards. As a new *Flexible Ductwork Guide* is published to help industry adhere to the latest rules and regulations, ADCAS chairman **Philip Johnson** asks whether industry is doing enough

**T**hree years ago a client asked us to provide fire certificates meeting British Standards for flexible ductwork for a hospital project we had supplied goods for, following a fire at the hospital. We provided the fire certificates to our client and they were satisfied that everything met British Standards. However, in the 10 years I have been involved in ventilation distribution, it is the one and only time I have ever been asked to provide evidence of fire standards – and we are involved in excess of 200 projects a year.

It set alarm bells ringing. Who is ensuring standards are being met?

Who is checking that guidelines are being adhered to? A poll of members of Association of Ductwork Contractors & Allied Services (ADCAS) confirmed my concerns. Confusion over which products are and are not allowed in the UK is a great cause for concern due to the potential for catastrophic consequences.

The main problem is that there is a lack of clarity over statutory requirements, product standards and technical guidance relating to flexible ductwork. This has given rise to much confusion and a wide variety of interpretations of product requirements. Confusion exists over European and British Standards. When products and designs come from overseas, they may meet European Standards, or their country of origin's standards, but building owners and even suppliers may not know if they meet UK standards, which invariably are the ones specified on projects.

For example, harmonised procedures for the classification of reaction-to-fire

Our members told us that cowboy firms were undercutting competent suppliers and undermining standards within the industry, particularly fire-rated standards

performance have been produced in the European Union. The intention is that these procedures will replace the national standards in the member states of the EU, but at the moment the harmonised and national standards co-exist.

This means that most flexible ductwork products have multiple national performance classifications. However, Class 4 products have been known to be used in A1 classifications, when they should only have been used in D classifications. The person who owns the building may be asking for the appropriate products, but no one is ensuring the right products are installed.

In addition, the wide variety of interpretations by those parties involved in the design, specification, manufacture, installation and maintenance of ventilation and air conditioning systems containing flexible ductwork has offered opportunities to the cowboy element.

Our members told us that cowboy firms were undercutting competent suppliers and undermining standards within the industry, particularly fire rated standards. Cutting costs can put lives and buildings at risk. If it sounds too good to be true, ask to see qualifications and evidence.

### Compromised building performance

Falling short on industry standards and design specification may save you money in the short term, but in the long run it could have costly and even devastating consequences for your energy consumption, ventilation requirements, fire safety, system durability and system hygiene.

Substandard products and poor installation can mean the system has to work harder, which uses more energy, making it less efficient in its ventilation requirements. This could also affect the hygiene and fire protection capabilities. Using the correct products to meet the design when it comes to fire safety enables us to meet the appropriate evacuation windows specified. When flexible ductwork standards have not been adhered to, the evacuation time window can be reduced dramatically, which could lead to devastating consequences.

Insurance companies would be horrified if they knew the amount of flexible ductwork that didn't meet the standards going into buildings. Needless to say, if the worst happened it is unlikely the insurance

company would make a payment if the fault lay with substandard flexible ductwork.

### ADCAS' new flexible duct guide

The new ADCAS Flexible Ductwork Guide fills an information gap. It aims to encourage better installation, thus improving the performance of buildings and further ensuring public safety by providing guidance about the legislation, product standards, design, installation and maintenance relating to flexible ductwork.

In answer to the question: 'What guidance should I take into account when specifying flexible ductwork?', the guide specifies statutory conformance requirements, British Standards and industry guidance relating to flexible ductwork, focusing on the four most important areas:

- Reaction to fire performance;
- Dimensions and mechanical requirements;
- Installation; and
- Maintenance.

In addition, the guide includes a table entitled: 'Equivalence in reaction-to-fire performance classification in Europe', which depicts the seven major classes of the European classification system for reaction-to-fire (A1, A2, B, C, D, E and F) as a means for examining equivalence in reaction-to-fire classification in different EU countries.

The guide also includes a frequently-asked-questions section, answering questions such as: What reaction-to-fire standards apply to flexible ductwork? What should be the maximum installed length of a section of flexible ductwork? How do I check that flexible ductwork imported from Asia will be of the right size and be strong enough?

There is no doubt it can be quite an emotive subject. It should send alarm bells ringing. To end the confusion surrounding the standards, to end the cowboy element actively undercutting with potentially disastrous consequences, to avoid the risk to life and business and to protect those companies who are adhering to the requirements at the risk of losing contracts to the cowboys, any ambiguity needs to be removed. This guide is a simple step towards that.

● To obtain a copy of ADCAS' Flexible Ductwork Guide, email [info@feta.co.uk](mailto:info@feta.co.uk) or call 0118 940 3416.

Flexible Ductwork Guide front cover



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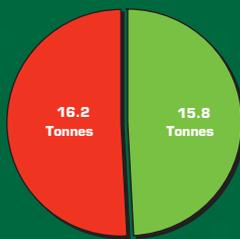
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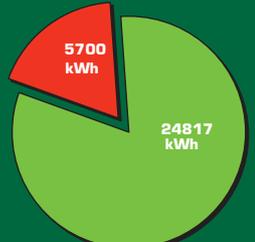


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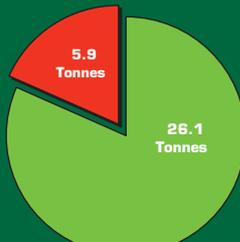


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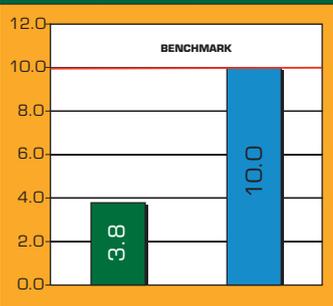
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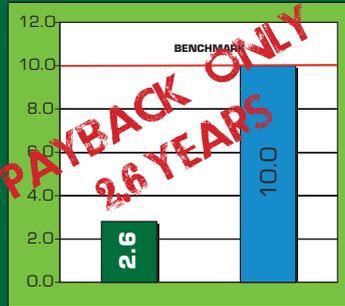
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## Demand controlled ventilation to reduce fan energy use

This module looks at demand controlled ventilation as a way of adapting airflow to meet actual demand and potentially improving the energy efficiency of a system

The challenges of establishing demand controlled mechanical ventilation (DCV) for homes was discussed by Chris Irwin in September's *CIBSE Journal* (*How much ventilation does this room need?*, page 45). By contrast, the non-residential sector has seen significant application of DCV, both in Europe and the US.

A demand controlled ventilation (DCV) system adapts the airflow rate to meet the actual demand and, compared with constant air volume flow (CAV) systems, can decrease average airflow rates – potentially using less energy for fan operation and for heating and cooling the supply air. DCV is most successful when reducing ventilation rates – and so reducing fan energy use – when meeting the demands of indoor air quality (IAQ). It is not necessarily so successful, in energy terms, for high design cooling loads, since airflows will increase above the required IAQ minimum to meet space cooling loads. Practically, this is likely to mean that IAQ-driven DCV is most effective in ASHRAE climate zones<sup>1</sup> 4 and above (for example, London is in zone 4, Edinburgh zone 5, Helsinki zone 6 and Valencia zone 3).

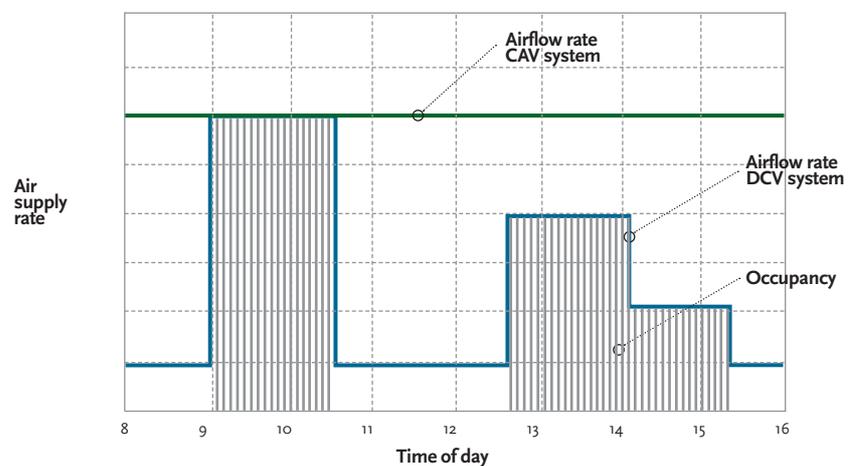


Figure 1: Applying DCV systems to control airflow rates in rooms with varying occupancy (Source: REHVA<sup>2</sup>)

### The driver for demand controlled ventilation

A DCV system based on air-quality control varies the airflow rate in line with the actual internal pollution load, which is often proportional to the occupancy. Rooms in applications such as offices or schools are almost never all occupied at the same time, and it is unlikely that the peak design occupancy occurs simultaneously in those occupied rooms. Collected studies<sup>2</sup> have shown that in cellular offices, typically

less than 50% to 65% of rooms in an office block are occupied concurrently and the 'normal' peak may only reach 75% to 84% of all offices (these are simple occupancy and do not take into account numbers of people). Recent, ongoing Nordic work indicates surveyed cellular office rooms typically have about 50% design occupancy, and landscape offices about 75%. Average occupancy periods found in an office building range from 45% in photocopy rooms through to 33% in ▶

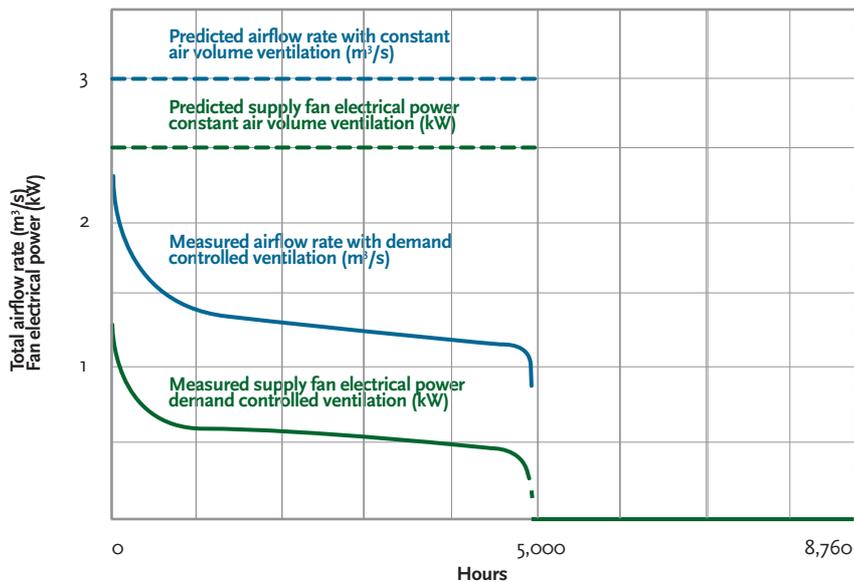


Figure 2: Measured supply airflow rates and corresponding electricity use of the supply air fan over a year for a monitored 2,500 m<sup>2</sup> Swedish office, with 58 cellular offices and meeting rooms with a total design flowrate of 3m<sup>3</sup>/s (Source: REHVA<sup>2</sup>)

offices and 16% in meeting and conference rooms. Similarly, contemporary research in Scandinavian schools has shown occupancy periods in rooms of some typical Norwegian schools of four hours per day, with occupancy numbers significantly lower than design.

With a CAV system, the airflow rate is kept constant, while with a DCV system, it is modulated to meet the actual demand (as shown in Figure 1). A DCV system based on room temperature control adapts the airflow and, hence, the cooling capacity to meet the cooling load – and larger load variations will provide increased potential for energy savings.

Figure 2 is based on hourly measurements during one year in an office building in Sweden. The 2,500 m<sup>2</sup> building comprised 58 cellular offices and a number of meeting rooms. The DCV system controlled both temperature and air quality (with no water-based room units).

In this case study building, the VAV diffusers in the rooms controlled the airflow rates, both by temperature and occupancy sensors. The supply air temperature was kept constant at about 15°C. Due to the relatively low supply air temperature, individual room airflow control was particularly effective. Also, there was almost no need for additional winter heating in the air handling unit by applying heat recovery.

Interestingly, the DCV system never reached the design airflow rate of 3.0 m<sup>3</sup>/s during the measurement period. The maximum measured airflow rate was approximately 76% of the design, and there

was less than 45% of the design airflow rate for 80% of the operating hours, due to the occupancy variations.

The energy saving potential of a DCV system will depend on:

- The variation in, and periods of, occupancy for the rooms;
  - The minimum flow rate required and its relation to the design airflow rate of the system. This will depend, for example, on the number of rooms, the base ventilation rate in these rooms, and the minimum airflow rate possible with the airflow control devices;
  - The chosen indicator for indoor air quality control. For example, if airflow rates are controlled by simple occupation sensors, the airflow rate in the room varies automatically in just two steps: minimum and maximum – average airflow rate will likely be higher with varying occupancy in the room, compared to a CO<sub>2</sub> feed-back;
  - The supply air temperature in a temperature controlled DCV system. With low supply air temperatures, the airflow pattern control in the individual rooms is more effective. VAV diffusers can manage relatively low supply air temperatures but, depending on the diffuser configuration, CAV diffusers may require higher supply air temperatures to avoid air distribution problems. Higher supply air temperatures are also required for displacement ventilation; and
  - The design of the system, static pressure control strategy and dimensioning of the components.
- These can have a significant impact on

performance.

The estimation of occupancy patterns and load profiles presents the greatest uncertainty in predicting the potential savings

### Air supply to rooms

The airflow rate in individual rooms meets demand either by variable supply air diffusers (VAV diffusers) or by airflow control dampers (VAV dampers) in the supply duct. Minimum airflow rates are often decided by the minimum flow rates possible with the chosen airflow control device. VAV diffusers are designed to control down to relatively low airflow rates, while VAV dampers can typically control much higher maximum airflow rates, but the minimum controllable airflow rate (determined by the ‘turn down ratio’) can also be rather high, especially with larger dampers. The air should be supplied to provide a stable air movement pattern without risk of draught or stagnation, independent of the flowrate. A VAV diffuser changes its outlet configuration automatically to suit a controlled supply airflow rate, whereas in CAV, the air outlet area is constant and so could fail to deliver appropriate room air distribution at reduced flows. Since the airflow control components will, by design, provide a significant pressure drop, they should be designed, or attenuated, so that there are acceptable noise levels while supplying the required range of flowrates (this is most demanding at minimum flows). Variation in individual airflow rates will affect the static pressure in the supply ductwork, so control methods should be applied to avoid an excessive increase in pressure when the average airflow rate is low.

To operate effectively, temperature controlled DCV systems would typically have cooling supply temperatures of about 15°C to 16°C, and the supply air devices must be able to properly supply air with this relatively low air temperature. This is not particularly suitable for displacement systems, as they usually require a supply air temperature of 18°C or higher. Since in a temperature controlled DCV system the airflow rate, and the cooling capacity, is continuously adapted to the actual load, the need for extra heating in individual rooms at low occupancy is reduced compared to a CAV system, although this may not be totally removed.

Integrated ventilation and lighting control in the room, often employing the same occupancy sensor, may be used

with airflow control devices from several manufacturers. Care should be taken to commission the systems to avoid nuisance cycling of lighting. However, the thoughtful scheduling of ventilation delay times, from zero up to a few minutes, can have a significant effect on the average system airflow rates.

In a DCV system based on indoor air quality control, the airflow rate is continuously adapted to the actual pollutant emissions from activities and processes in the room. It can be challenging to define the reference parameters influencing indoor air quality that the sensors must measure.

### Sensing IAQ

The main indicator in HVAC systems for thermal comfort is room 'temperature' or sometimes a combination of simple dry bulb temperature and humidity. Air quality is defined by the composition of air in terms of gases, mainly CO<sub>2</sub>, and particulate matter (see *CIBSE Journal* CPD of September 2009 for further details of the parameters that influence comfort and air quality – [www.cibsejournal.com/cpd/2009-09/](http://www.cibsejournal.com/cpd/2009-09/)). The airflow rate may be controlled by monitoring the room air (feed-back control), the measured/predicted load (feed-forward or predictive control), or a combination of these, to supply air to the room by some form of variable air volume (VAV) system.

The choice of an indicator or pollutant for determining indoor air quality is dependent on the possibility of measuring this parameter. There are no sensors that measure the 'quality' of air. Instead, surrogate gases and particles can be measured and linked to the air quality. However, in many cases, the link between the perception of air quality, the concentration levels of various substances and their influence on comfort and health is still somewhat unclear.

Carbon dioxide (CO<sub>2</sub>) is a commonly used indicator for indoor air quality in premises where people and their activities are the main pollutant source (for example, classrooms, assembly spaces, theatres, and so on) and is not suitable for spaces with low occupant density (such as apartments and houses). The rate of generation of carbon dioxide by occupants is nearly proportional to the rate of other bio-effluent generation – both are generated at the rate proportional to the number of people, their body size

and their activity level. Although CO<sub>2</sub> levels have been correlated to comfort complaints indoors, carbon dioxide does not influence the perception of air quality in the concentration levels typically found in ventilated rooms. However, the reality of accurately controlling ventilation rates might be more difficult to sustain, due to the reported variations<sup>3</sup> in the absolute accuracy of room-mounted CO<sub>2</sub> sensors. A US study<sup>3</sup> indicates that there is a broad need for improvements in calibration or sensor technology for a range of wall-mounted CO<sub>2</sub> sensors so that they can reliably meet local code requirements.

For controlling pollutants from sources other than people, the direct measurement of volatile organic compounds (VOCs) and particles may be of interest. Generally available mixed-gas sensors non-selectively measure a wide range of gases and do not indicate which gases are detected or their concentration levels. Such control regimes need to monitor both the supply and exhaust air to account for variations in pollutants in the outdoor air. Yet there is a lack of standards that describe acceptable concentrations for many common air contaminants for non-industrial buildings, and this limits the application of mixed-gas sensors for ventilation control.

An alternative way to control occupancy-based pollution is to apply the presence of people as an indicator. This strategy is very often referred to as an occupancy-based DCV system, where the supply volume flowrate will be 'feed-forward' controlled by people entering the room, providing the exact ventilation rate per person needed to dilute the pollutants to the required levels.

Traditional occupancy sensors indicate only when the room is occupied or unoccupied, and so are suitable when the exact number of people occupying the room can be predicted, for example, in cellular offices. However, sensors that count the number of people entering/leaving a room can be used to provide greater discrimination; technologies are evolving, and they could provide the basis of a more accurate method of control than gas sensing techniques.<sup>4</sup>

The main advantage of occupancy-based DCV systems is that the control and regulating equipment is much simpler than that used in gas sensor measurement and likely to require less maintenance. This is still a developing technology.

### Temperature and IAQ sensor location

The sensor location is not so crucial when mixing ventilation is applied, and if a good mixing is assured, both room and duct located installations are suitable. For single zone systems, to reduce initial cost, placement in the exhaust duct is often a preferred solution. When sensors are mounted in the room, the placement should be representative of the overall occupied zone, avoiding areas of direct influence from occupants, while avoiding stagnant areas, draughts or confusing radiant sources. For example, it is suggested that in rooms where occupants are located at different heights, such as auditoria, the air quality sensor should be placed at the top of the occupied zone, while the air temperature sensors should be placed in the lower part of the room and at the top of the occupied zone. For displacement ventilation, in rooms of normal ceiling height, the air quality sensor should be located at the breathing height of seated occupants. It is recommended that temperature sensors should be located between 0.2 and 0.5 metres above floor level for rooms with wall-mounted or free-standing diffusers.

In all cases, it is important to provide ready access for maintenance and calibration.

DCV systems have the potential to provide a significant decrease in energy usage when compared to systems with a constant airflow rate, while achieving a comparable level of indoor climate. However, to realise the potential and benefit from the additional cost and complexity compared with a CAV system, careful design and rigorous maintenance procedures are required for both the mechanical and control systems.

Much of this information for this article is abstracted from the recently published REHVA publication *Design of Energy Efficient Ventilation and Air-Conditioning Systems* – see [www.rehva.eu/en/guidebooks](http://www.rehva.eu/en/guidebooks) © Tim Dwyer, 2012.

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# Module 44

October 2012

## 1. Which ASHRAE climate zone includes Edinburgh?

- A 1
- B 3
- C 5
- D 7
- E 9

## 2. In the quoted studies, what level of occupancy was typically found in cellular offices?

- A 16% design occupancy
- B 33% design occupancy
- C 50% design occupancy
- D 65% design occupancy
- E 75% design occupancy

## 3. Which of these is likely to have the greatest effect on predicting the energy saving potential of DCV?

- A The chosen indicator for indoor air quality control
- B The static pressure control strategy
- C The supply air temperature in a temperature controlled DCV system
- D The variation in, and periods of, occupancy for the rooms
- E The VAV terminal type

## 4. Which of these is most likely to be true?

- A CO<sub>2</sub> levels directly affect the perception of IAQ in typical ventilated offices
- B Monitored CO<sub>2</sub> is typically used to provide the input in feed-forward control of DCV
- C CO<sub>2</sub> sensors are consistently reliable and require little maintenance
- D Monitoring VOCs is practically the easiest way to control IAQ
- E CO<sub>2</sub> levels provide a surrogate means of monitoring IAQ

## 5. What location is suggested for IAQ sensing in an auditorium?

- A Between 0.2 and 0.5 metres above floor level
- B Breathing height of seated occupants
- C In the supply duct
- D Lower part of the room
- E Top of the occupied zone

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## Snoozebox project isn't sleepy for Bristan

Bristan has announced that it has specified products from its commercial range for pop-up hotel, Snoozebox. Through Bristan's contacts with plumbing and heating merchant PTS, the company has already kitted out 700 pods in the hotel with its Prism basin mixer tap and Opac TMV3 approved commercial shower valve. Snoozebox is a novel concept of transportable, temporary hotel, providing convenient, on-site accommodation at festivals, sporting events and exhibitions.

● For more information visit [www.specifybristan.com](http://www.specifybristan.com)

## Iso Cool – closed circuit adiabatic cooler saves energy and water

Evaporative cooling technology has just had a major upgrade with the arrival of the Adcooler. Launched exclusively to the UK market by energy-saving cooling company, IsoCool, the Adcooler is a closed circuit adiabatic dry cooler that offers the cooling performance of an adiabatic system with the benefits of a dry cooler. The result is a water-saving and contamination-free alternative. The Adcooler is ideally suited to provide cooling for air conditioning condenser water circuits on reciprocating, absorption chillers and reverse cycle heat pumps.

● For more information call 01376 328455 or email [info@isocool.ltd.uk](mailto:info@isocool.ltd.uk)



## Urmet appointed to provide access control

Audio and video door-entry manufacturer Urmet has been appointed as the supplier for the first two residential buildings at the 67-acre King's Cross Central development. It is a major mixed-use development site in central London, featuring offices, restaurants and shops, new homes and a university.

Planning permission for 50 new and restored buildings and 20 new streets was granted in 2006, making this new site the largest single-ownership project to be masterplanned and developed in central London in more than 150 years.

● For more information call 01376 556 010 or email [marketing@urmet.co.uk](mailto:marketing@urmet.co.uk)



## Marking two decades of CableCalc Level P with a free version of new twin and earth calculations

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

● For more information, call 01293 871751 or visit [www.castlinesystems.com](http://www.castlinesystems.com)



## Polypipe training course accepted for competent person schemes

Polypipe Ventilation's independently accredited training programme for Domestic Ventilation Installers has been recognised by Competent Person Schemes, who are eager to provide domestic ventilation installation services under the latest revision of the Building Regulations. Due to widespread poor installation practice found in Mechanical Ventilation with Heat Recovery (MVHR) and Mechanical Extract Ventilation (MEV) systems, which affect system efficiency – most notably the Specific Fan Power (SFP) – heavy penalties are applied to SAP calculations, the official method used to calculate the energy consumption in dwellings.

● For more information visit [www.polypipe.com/installertraining](http://www.polypipe.com/installertraining) and 08443 715 523



## Shining bright: introducing the e<sup>3</sup>co Star from Fläkt Woods

Fläkt Woods has enhanced its range of high performing energy recovery units with the addition of the new e<sup>3</sup>co Star. Available in six models with flow rates from 0.08 to 1.00m<sup>3</sup>/s and specific fan powers as low as 0.17 w/l/s, the new cost-effective unit utilises a Eurovent certified aluminium heat exchanger to provide efficiencies of up to 70% – perfect for schools, offices, sports centres and hospitals. Additional benefits include extremely low noise levels, plug and play controls, as well as fans with EC motor technology for reduced energy consumption.

● For more information visit [www.flaktwoods.co.uk](http://www.flaktwoods.co.uk)

## Airflow promotes efficient design with Passivhaus range

Airflow now offers a full complement of Passivhaus-approved MVHR units, ranging from smaller domestic units through to larger commercial applications. The DV150, Duplexvent Multi 50 and 80 and Duplexvent Flexi 1600 and 2600 have all been given the stamp of approval by the Passivhaus institute. Complying with the stringent test requirements means the unit is perfect for incorporating into Passivhaus schemes as part of the energy efficient

design and construction process. The unit is available in three sizes up to 3600 m<sup>3</sup>/h.

● For more information call 01494 560 800 or visit [www.airflow.com](http://www.airflow.com)



## Transdek's innovative mezzanine lifts on show

Transdek, the lifting equipment specialist, is demonstrating its unique mezzanine floor lifts on stand D110 at Building Services 2012 – the official CIBSE Conference and Exhibition – at London Olympia on 10-11 October.

The company, which this year won a second Queen's Award for Enterprise in Innovation, is showcasing a working mezzanine lift model that will enable visitors to experience at first hand the unit's unique technology and design, ease of operation and advanced safety features.

● For more information, call 01302 752276 or visit [www.transdek.com](http://www.transdek.com)

## Sustainable heating for agricultural specialists

Agricultural machinery specialist P Tuckwell, based in Essex, has fitted high efficiency, low carbon, air source heat pumps to its new showroom in Colchester. The new system offers the company maximum operating efficiency with minimal impact on the environment. Consisting of two 43 kW Ecodan@CAHV air source heat pumps (ASHP) from Mitsubishi Electric, the system provides a sustainable energy source for all the showroom's heating and hot water requirements. They were installed by Midlands-based renewable energy specialists, Climate and Power.

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



## College embraces ADT's Generation 6

ADT Fire & Security is upgrading the fire alarm system at South Devon College from an analogue to digital addressable system using its latest innovation, Generation 6 Detection Technology. Based on ADT's advanced MZX Technology, the digital system will provide triple technology detectors featuring a remote wireless link that enables two-way communication with the new 850EMT Engineering Management Tool.

This will ensure that the main college building on the Paignton campus benefits from reliable and efficient programming that increases safety and reduces service changes due to the longer lifespan of the detectors.

● For more information visit [www.adt.co.uk](http://www.adt.co.uk)



## MHS Boilers at junior school

MHS Boilers has supplied two 120kW Thision L boilers and a 500 litre Gemini calorifier to St Meriadoc C of E Junior School in Camborne, Cornwall. Replacing two ageing cast iron units, the new boilers were installed on a freestanding cascade frame with a low loss header and Pisces Minifill pressurisation unit. The boilers were specified by Penryn-based Blue Flame (Cornwall) Ltd. Commenting on MHS Boilers, installation manager Duncan Impey said: 'With restricted floor space in the plant room, we needed to specify boilers that had excellent efficiencies as well as a compact design.'

● For more information visit [www.mhsboilers.com](http://www.mhsboilers.com)



## Saint Gobain PAM UK launches new VortX drainage solution

Iron technology solutions provider, Saint-Gobain PAM UK, has announced the launch of its new VortX range of cast iron floor drainage products for the commercial and construction market. VortX is available now and will be supplemented by a new range of roof drainage products set to follow in the new year. Designed in accordance with BS EN1253:2004, the range comprises more than 60 components that can all be installed in conjunction to create complete floor drainage solutions.

● For more information visit [www.pam-vortx.co.uk](http://www.pam-vortx.co.uk) or [www.saint-gobain-pam.co.uk](http://www.saint-gobain-pam.co.uk)





## ADCAS continues to drive quality message

'There is chronic overcrowding in the UK ductwork manufacturing and installation market. This keeps prices artificially low, forces a high percentage of companies to sell at a loss and increases pressure on cash flow.' That stark comment on current conditions in the UK came from the Association of ductwork contractors and allied services (ADCAS) president Malcolm Moss at the start of the association's recent summer event. There is strong interest, he said, in how the association continues to champion the need for quality and maintaining UK standards. He urged members always to ensure their suppliers comply with those standards.

● For more information visit [www.feta.co.uk/adcas](http://www.feta.co.uk/adcas)



Susan Wojciechowski

## Johnson Controls and Agilent Technologies extend relationship

Johnson Controls Global WorkPlace Solutions (GWS), a provider of facilities, corporate real estate and energy management, has signed a new global contract with Agilent Technologies Inc. The third-generation contract, which takes the companies' relationship to 2017, was awarded to Johnson Controls GWS due to its proven ability to meet the changing needs of Agilent Technologies, the world's premier measurement company. Susan Wojciechowski, vice president technology market, Johnson Controls GWS, welcomed the move.

● For more information call 01252 346409 or visit [www.johnsoncontrols.com](http://www.johnsoncontrols.com)

## Vortice specified at Gurdwara Temple in Glasgow

Vortice air handling units have been specified at a new Gurdwara Temple in Glasgow. Following its purchase of the Italian air handling expert Loran last year, Vortice has been growing its air handling unit business throughout Europe. Handling air volumes from 80-120,000 cubic metres per hour, the Vortice AHUs are hygiene classified, Eurovent certified and carry the BSEN1886 certification.

Every air handling unit is of a bespoke design and build, so the AHU team at Vortice is working closely with architects and design consultants to help specify the right product.

● For more information visit [www.vortice.ltd.uk](http://www.vortice.ltd.uk)



## Sentinel Performance Solutions – water treat for show visitors!

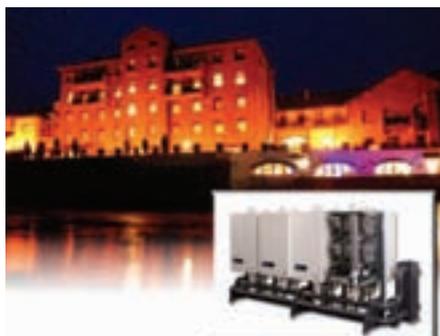
Sentinel Commercial, a leading water treatment specialist for the commercial heating sector, will be exhibiting its award-winning X Range for boilers, R Range renewables products and KalGUARD water conditioner on stand E50 at this year's Building Services event between 10-11 October. What's more, the innovators behind these products – Sentinel Commercial's senior team of chemists and engineers – will be on hand to provide visitors with specialist advice on maximising boiler performance through advanced installation and maintenance techniques.

● For more information call 01928 588330 or visit [www.sentinel-commercial.co.uk](http://www.sentinel-commercial.co.uk)

## Warm welcome guaranteed at Cumbria's White Water Hotel

When it came to replacing its ageing heating system, the White Water Hotel Spa and Leisure Club in Cumbria chose five super high efficiency ATAG boilers. The hotel needed a heating system capable of providing full heating and hot water to its 38 luxury ensuite bedrooms and its Cascades Spa and Leisure club. The boilers, five XL 110kW models in a Cascade installation, feature ATAG's tried and tested 316 stainless steel heat exchanger technology.

● For more information email [info@atagheating.co.uk](mailto:info@atagheating.co.uk)



## LG spaces out on style and efficiency

New from LG is the Multi V Space II unit. With 57 patents, it is designed to provide the perfect ambience – 16 kW cooling, 18 kW heating – via ceiling and floor units in living spaces such as urban loft developments and apartments. Key features of the Multi V Space II include front suction and front discharge, reduced noise, a four-step modular design and right- or left-hand side discharge options. Outdoor units feature an airflow system that can discharge air to the right or left depending on the model.

● For more information call 08448 471 402 or email [UK.aircon@lge.com](mailto:UK.aircon@lge.com)



## LG introduces new generation of VRF with Multi V III

The Multi V III is LG's latest range of VRF air conditioning products designed for commercial buildings, office complexes and large retail outlets. LG's Multi V III offers three key benefits: higher energy efficiency, larger capacity and longer piping lengths. LG says the Multi V III is expected to be a key player in the UK VRF market. This third generation of LG's popular Multi V series is being introduced at a time where there is an increasing market demand for energy-saving technology.

● For more information call 08448 471 402 or email UK.aircon@lge.com



## Nuaire expands range of wall-mounted MVHR solutions

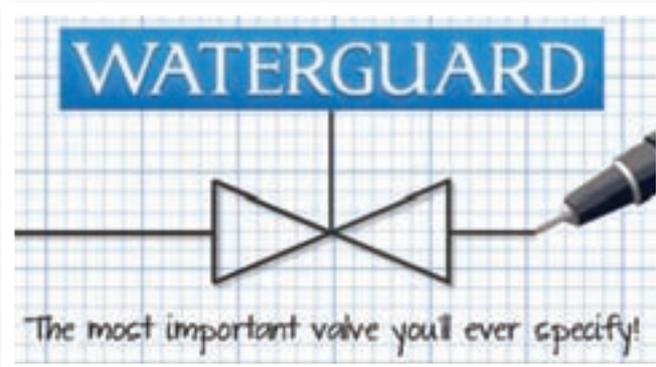
UK provider of ventilation solutions, Nuaire, has revealed the newest mechanical ventilation heat recovery (MVHR) system that will extend its latest range of wall-mounted products created specifically for the modern needs of residential architects and building designers. The MRXBOX95-WM2 is a high efficiency, low power and low noise product. Part of Nuaire's wall-mounted range of discreet MVHR solutions, it has been designed to help meet current new-build regulations while providing energy-efficient, quality ventilation in modern residential build set-ups.

● For more information call 029 2085 8200 or visit [www.nuaire.co.uk/residential](http://www.nuaire.co.uk/residential)

## Waterguard – the solution for all water leak prevention applications

Insurers paid out a massive £680m last year to repair damage caused by escaping water, resulting in an increased demand for our products. Insurers and designers are insisting on Waterguard to protect property, conserve water and save money. The range includes: Waterguard Home, the ideal solution for any new build or retrofit from the smallest apartments to large family homes; Waterguard Series 7, which protects industrial, commercial and public buildings including BREEAM; and Waterguard PIR, motion sensor units that will safely isolate washrooms or kitchens that are not in continuous use. Any size water pipe, any volume of water, any type of property, Waterguard meets BREEAM requirements delivering unrivalled quality and customer satisfaction. All Waterguard products are registered with DEFRA on the Water Technology List attracting Enhanced Capital Allowance. Let our engineers support you with your specification, installation and commissioning.

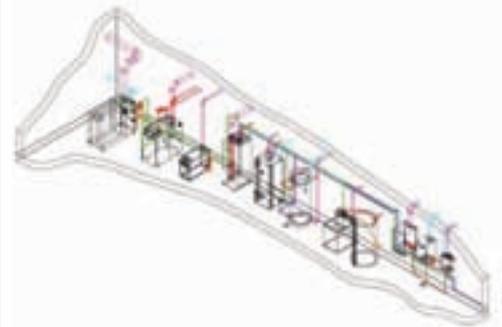
● For more information call 01226 447151 or visit [www.waterguardservices.co.uk](http://www.waterguardservices.co.uk)



## Baxi at CIBSE conference and exhibition

Baxi Commercial Division will show a selection of high efficiency condensing products and low to zero carbon (LZC) technologies, together with innovative integration solutions, available from Andrews Water Heaters, Potterton Commercial and Baxi-SenerTec UK, through its 'one-stop shop' facility. Expert assistance will also be on hand with regard to specification and application technology, including an introduction to the recently introduced Baxi Commercial Division Building Information Modelling – BIM libraries. Baxi Commercial Division has led the way in developing and launching a library of BIM content for all its condensing and LZC products.

● For more information call 0845 070 1055 or visit [www.baxicommercial.co.uk](http://www.baxicommercial.co.uk)



## Fastlane playing its part at the London Olympics 2012

West Midland based Fastlane Ventilation, the supplier of air handling equipment, heating and heat recovery systems, was part of the team looking after the media at the London Olympics, 2012. A Fastlane air handling unit (AHU) provided the supply ventilation specifically for the kitchens – part of the 12,000m<sup>2</sup> catering village serving 50,000 meals per day to the broadcasters, photographers and journalists that brought the Games to a worldwide audience.

● For more information call 01384 720460 or visit [www.fastlaneventilation.com](http://www.fastlaneventilation.com)



# PRODUCTS & SERVICES

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

## Solatube launches Energy Care Optima range delivering exceptional thermal performance

The Solatube Energy Care Optima range meets the strict criteria set for Passivhaus construction and is available as an upgrade for the Solatube Brighten Up series. Independent tests show the Solatube Energy Care Optima range now meets the stringent criteria set by Passivhaus standards, with outstanding U-values. Independent testing was carried out to BS EN ISO 12567-1 2000 for windows and doors. The Solatube 160 DS Energy Care Optima produced a U-value of 0.5W/m<sup>2</sup>/K.

● For more information call 01234 241466 or visit [www.solatube.co.uk](http://www.solatube.co.uk)



## KE Fibertec nozzles reduce ductwork

KE Fibertec has been supplying fabric ductwork to the big four supermarket chains for more than a decade. Typically Direjet nozzle systems with long throw 24 mm nozzles are used on the sales floors and low velocity Inject mixing systems for cafeterias and staff areas. The latest development, Direjet Vario, uses adjustable angle 48 mm nozzles to cover the whole checkout area from the blank ends of the sales floor ducts. This reduces the requirement for ductwork in the most congested part of the store.

● For more information call 02380 740751 or visit [www.ke-fibertec.co.uk](http://www.ke-fibertec.co.uk)



## New humidification guide

The HEVAC Humidity Group has collaborated with CIBSE to produce a unique pamphlet on humidification – KS 19 – in the approachable CIBSE Knowledge Series (ISBN : 978-1-906846-25-1).

Filling an obvious gap in available information on the topic, this document provides a clear introduction to the basic science, covers the range of equipment in use and advises on selection and essential maintenance.

In other words, it is an ideal primer for designers and specifiers who require an understanding of humidification. It is available in hard copy or pdf format from the CIBSE bookshop.

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

# DIRECTORY Your guide to building services suppliers

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See: Taking Control - CIBSE Journal Dec 2011  
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**Senior Mechanical Design Engineer** | Cambridge  
**£43,000-£45,000 Plus Benefits**

A Leading national Building Services company are currently recruiting a Senior Design Engineer. The main function of this role is to take overall responsibility for the Conceptual design, design innovation, compliance with the employer's requirements, and final detailed designs in accordance with the subcontract agreement with their client. The ideal candidate will have experience managing a small team of Junior design engineers and managing externally commissioned design packages. Ideally the candidate will provide technical support to contracting and commissioning functions. A fantastic opportunity, with excellent prospects for career development.

**Associate Engineer** | Croydon  
**£50,000-£55,000 Plus Benefits**

An ambitious multidiscipline consultancy is currently seeking an enthusiastic, talented and experienced individual to join them at Associate level. The main purpose of the role is to assist the Director in controlling and developing the activities of the Practice, ensuring that quality, output and service targets are met within the agreed Business and commercial objectives. The ideal candidate will have experience with being responsible for a team of engineers / technicians. Commercial and universities experience would be beneficial. Preferably a member of the IET or CIBSE.

Contact: george@conradconsulting.co.uk | 0203 159 5387  
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**Int & Snr Electrical Design Engineers | London | to £35-£55K | ref: 2845**

An international consultancy is searching for an Intermediate and a Senior Electrical Engineer to join the team. Ideal candidates will have had some exposure to mission critical projects and have Chartered status, or be working towards. This is a superb opportunity to be working on projects with major UK and international clients.

**Int/Snr Mechanical & Electrical Engineers | London | £NEG! | ref: 2900**

Blueprint has a number of clients who have recently been awarded some large Crossrail projects. We are looking for intermediate and senior engineers on a contract or permanent basis to be based in London. Ideal candidates will have previous experience working on NR and / or LUL projects.

**Mechanical Design Engineer | Essex | to £22LTD | ref: 2862**

Our client, a large M&E contractor, is looking for an Intermediate Mechanical Design Engineer to work on education projects. Ideal candidates will have worked on similar projects and be available at short notice. 3 month+ contract.

**Principal / Associate Electrical Engineer | London | £50-£60K | ref: 2790**

A blue-chip multi-disciplined consultancy is looking for an experienced Electrical Associate to work on various Rail projects in London. Ideal candidates will have experience in rail station upgrades and heavy power 11kv and 33kv design, with the ability to run and lead a team.

**Snr Mechanical Design Engineer | Portsmouth | to £50K | ref: 2819**

Our client, a small privately owned M&E consultancy, is looking for an experienced Mechanical Design Engineer to lead projects from initial inception through to completion. Ideal candidates will be Chartered, or be working towards.

**t: 02392 603030**

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

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



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**Electrical Design Engineer (Data-Centre)**  
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Our client has been established for more than 80 years and operates in Europe, USA and the Middle East. They are a multi-disciplinary engineering consultancy providing expert design services in the fields of Energy Supply, Sustainability, MEP systems and Master Planning on data-centres, airports, clean room, laboratories and healthcare projects. Currently they have a requirement for an Intermediate Electrical Building Services Design Engineer with Data-Centre experience. Candidates will be responsible initial and detailed design, writing specifications and attending site and client meetings.  
BAR922/JA

**Senior Mechanical Design Engineer**  
**Doha, Qatar, 35000 QAR PCM + Relocation + Annual Flights**

Our client is a major player in the engineering consultancy market and employ 15,000 staff internationally. Their current requirement is for a mechanical engineer with a sound technical understanding of district cooling, wet cooling, or chilled water distribution solutions. The successful candidate should be degree qualified, and possess a minimum of 8 years consultancy experience having undertaken a lead role on a variety of project types, from initial design to completion.  
BAR913/PA

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Contact: [darren.warmington@bsvrecruitment.co.uk](mailto:darren.warmington@bsvrecruitment.co.uk)

**HVAC & Electrical Design Engineer**

**London | £ Negotiable | Ref: 12967**

Due to recent project awards we are being contacted by several Building Services Consultants in London keen to recruit M&E Design Engineers focused on developing their careers. You should be professionally qualified and be able to demonstrate a stable employment history and be conversant with the latest regulations and industry software. **For a confidential discussion please contact Paul Bartlett FIRP on 01483 768600. Email: [paul.bartlett@bsvrecruitment.co.uk](mailto:paul.bartlett@bsvrecruitment.co.uk)**

**Junior / Graduate Electrical Design Engineers**

**Central London | £26/30k | Ref: 12983**

Award winning Consultant working alongside signature Architects on prestigious and innovative Buildings worldwide are looking to engage a Junior Electrical Design Engineer to join their London office. With an industry related Degree you should display a good understanding of general Design principals, be computer literate and career driven. Contact: [paul.bartlett@bsvrecruitment.co.uk](mailto:paul.bartlett@bsvrecruitment.co.uk)

**Account Manager**

**C. London & South East | £45-£60k + Comm | Ref: 12981**

A major supplier of Low Carbon technology HVAC equipment requires an Account Manager or Engineer to assist with the increased demand for their products. You should know the S.East consultancy market. This is a great field role accompanied by expert technical support. Contact: [darren.warmington@bsvrecruitment.co.uk](mailto:darren.warmington@bsvrecruitment.co.uk)

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# Events & training

**NATIONAL EVENTS AND CONFERENCES**

**Building Services – The CIBSE Conference and Exhibition**

**10-11 October, London**  
Bringing together the entire building services supply chain to debate the challenges, identify the most successful business strategies, and forge and renew relationships.  
[www.buildingservicesevent.com](http://www.buildingservicesevent.com)

**SLI Masterclass**

**11 October, London**  
The first of the Society of Light and Lighting Masterclass series.  
[www.sll.org.uk](http://www.sll.org.uk)

**CIBSE Young Engineers Awards 2012**

**11 October, IMechE, London**  
The Young Engineers Award and the Employer of the Year award take place together for the first time. ASHRAE president Tom Watson will also be presenting.  
[www.cibse.org](http://www.cibse.org)

**Energy Performance Group Seminar: Regulated vs Unregulated**

**16 October, London**  
Can we bridge the performance gap between regulated and unregulated?  
[www.cibsetraining.co.uk/conferences](http://www.cibsetraining.co.uk/conferences)

**Engineering Environmental Architecture: University of Bath 30 years on**

**17 October, Bath**  
Celebrating the philosophy of architectural and engineering education at the University of Bath.  
[www.fcbstudios.com/events](http://www.fcbstudios.com/events)

**CIBSE Annual Lecture**

**7 November, London**  
The annual CIBSE lecture, this year with guest speaker Alistair Buchanan CBE, chief executive of Ofgem.  
[www.cibse.org/annuallecture](http://www.cibse.org/annuallecture)

**CIBSE GROUPS AND SOCIETIES**

For more information visit [www.cibse.org/events](http://www.cibse.org/events)

**Young Engineers Network Autumn Ball**

**6 October, London**  
Black tie event, with live entertainment and reception.  
email: [williams@cibse.org](mailto:williams@cibse.org)

**Blast Enhancement in Glazing Design**

**8 October, London**  
Joint event with Society of Façade Engineering and Institution of Structural Engineers with speakers from Waagner Biro.  
[www.cibse.org/sfe](http://www.cibse.org/sfe)

**Lighting Regulations – BS12464 and others**

**16 October, Colchester**  
Home Counties North East Region event, with guest speaker Peter Thorns from Thorn Lighting.  
[James.bourne@atkinsglobal.com](mailto:James.bourne@atkinsglobal.com)

**BIM: The Interface Between MEP Designer and Installer**

**17 October, Birmingham**  
A West Midlands region evening event.  
[chiahuaylau@hoarelea.com](mailto:chiahuaylau@hoarelea.com)

**Mind the Gap – Design Prediction vs Reality**

**18 October, London**  
A Home Counties North West Region evening seminar.  
[www.cibse.org/events](http://www.cibse.org/events)

**Lighting (Efficiencies, Part I)**

**18 October, Bristol**  
A YEN evening event.  
email: [millham.orchard@tiscali.co.uk](mailto:millham.orchard@tiscali.co.uk)

**Lighting for emergency situations**

**31 October, Birmingham**  
A West Midlands region evening event.  
[chiahuaylau@hoarelea.com](mailto:chiahuaylau@hoarelea.com)

**Blue Roof Technology**

**6 November, London**  
A presentation by Alumasc.  
[steve.vaughan@aecom.com](mailto:steve.vaughan@aecom.com)

**CPD TRAINING**

For more information visit [www.cibsetraining.co.uk](http://www.cibsetraining.co.uk) or call the events team on 020 8772 3660

**EPC Training**

**2-3 October, Birmingham**  
**Legionella Control: Role of the Responsible Person**  
**3 October, London**

**Introduction to Biomass Heating Systems**

**3 October, London**  
**Biomass Systems Operation and Maintenance**  
**4 October, London**

**Electricity at Work Regulations Explained**

**4 October, London**  
**Part L Building Regulations**  
**4 October, Manchester**

**Low and Zero Carbon Energy Technologies: Undertaking Feasibility Studies and Understanding Design Considerations**

**5 October, Newcastle**  
**Sanitary and Rainwater Design using BS EN 12056:2000**  
**9 October, London**

**Mechanical Services Explained (three days)**

**9 October, Newcastle**  
**Energy Monitoring and Targeting**  
**10 October, London**

**The Carbon Reduction Commitment**

**11 October, London**  
**Understanding and Application of Psychrometric Charts**  
**16 October, London**

**Lighting and Energy Efficiency**

**16 October, London**  
**Running Projects Effectively**  
**17 October, London**

**Building Regulations Section 6 (Energy)**

**17 October, Glasgow**  
**Air Conditioning Inspection for Buildings**  
**17 October, Birmingham**

**Fire Sprinkler Systems: Design to BS EN 12845**

**18 October, London**

**London's legacy: a celebration in light**

**11 October, London**

Durham Marengi, Mike Simpson and Giulio Antonutto will speak at the next Society of Light and Lighting Masterclass on 11 October.

The lecture will describe the floodlighting at the Olympic Arena, introduce techniques to overcome lighting of high definition television in arenas generally, and highlight the magnificent lighting of the New Year's Eve and Jubilee celebrations in London.

Philips Lighting's Mike Simpson will describe the floodlighting at the Olympic Arena, while Ove Arup will discuss 'Good HDTV sports lighting design for television – what is required?'

Major stadium design considerations include vertical illumination,



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disability glare, spectator lighting uniformity, camera f-stops, camera flicker and super slow motion pictures.

Giulio Antonutto will give examples of quality lighting conditions at major sporting venues and outline proposals to provide a generic set of guidelines that could be used by designers to achieve a successful HDTV lighting scheme for the broadcast of televised sports pictures.

To register for this free event, visit [www.sll.org.uk](http://www.sll.org.uk)

**Applying for the Renewable Heat Incentive – What You Need to Know**

**18 October, London**  
**Metering Requirements for Renewable Heat Incentive**  
**19 October, London**

**How to Specify Lighting: Office Lighting**

**23 October, London**  
**Heating Services Explained (two days)**  
**24 October, London**

**Fire Safety Engineering Design: Module 1 (two days)**

**24 October, London**  
**Preparing FM and Maintenance Contracts**  
**25 October, London**

**Electrical Services Explained (three days)**

**30 October, London**  
**Building Regulations Part G (2010) Explained**  
**30 October, London**

**DEC Training (two days)**

**30-31 October, London**  
**Best Practice in Energy Management: ISO50001**  
**31 October, London**

**Cooling and Refrigeration**

**1 November, London**  
**Overview of Current Fire Legislation and Guidance**  
**2 November, London**

**EPC Training (two days)**

**5-6 November, London**  
**Energy Efficient Façade Design**  
**6 November, London**

**Standby Diesel Generator**

**7 November, London**  
**Energy Monitoring and Targeting**  
**7 November, Manchester**

**Low Carbon Buildings for Local Authorities**

**8 November, London**  
**EPC Conventions**  
**12 November, London**

**Mechanical Services Explained (three days)**

**13 November, London**  
**Part L Building Regulations**  
**13 November, Newcastle**

**Air conditioning inspection for buildings**

**14 November, Leeds**

# Building Services



The CIBSE Conference & Exhibition  
10-11 October 2012, London Olympia, UK

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Alternatively register on the day when you attend **Building Services – The CIBSE Conference & Exhibition**. To register on-site, simply visit the Conference Registration Desk at London Olympia, located just steps away from the main entrance of the Grand Hall.

This year's **annual CIBSE Conference** will feature **40+ internationally recognised expert speakers** who will present on sessions including the impending launch of the **Green Deal, BIM, Soft Landings, passive retrofit and funding** as well as the delivery of the **Games 2012 venues**.

Attendees include senior professionals from a range of organisations such as building services and architecture practices, client organisations and academia. Don't miss your chance to meet with key decision makers from the likes of **AECOM, the Department of Energy and Climate Change, Max Fordham LLP, Wellcome Trust, Cundall, Edward Cullinan Architects, Balfour Beatty and Hoare Lea & Partners** and more...



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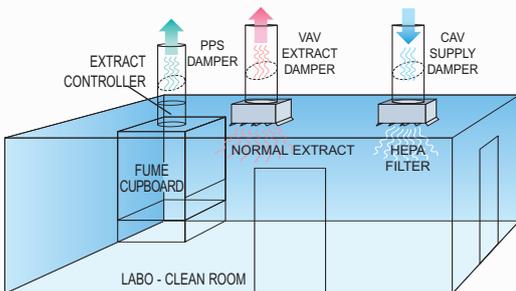


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