CIBSE JOURNAL

CIBSE

The official magazine of the Chartered Institution of Building Services Engineers

October 2015

**SECURITY EXPERTS**
CIBSE conference speakers warn of threats to industry

**OPEN ALL HOURS**
Soft landings help 24-7 library cut energy use

# ADJUSTMENT BY DEGREES

The challenge of HVAC optimisation at the University of Oxford

WITH THIS ISSUE *Hotel & Leisure Special*

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**Hotel & leisure special**
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# Early warning

One of the key themes at next month's CIBSE Building Performance Conference and Exhibition is security, and we were fascinated to hear what conference speakers currently perceived as the greatest threat to the building industry. Business may be booming for many, but often this is the time when organisations should be looking at insulating themselves from unexpected future shocks.

Some of the answers were sobering (page 17). The building industry may be experiencing a boom in the UK at the moment but some of those speakers reminded us that there are serious structural defects in the industry that need to be addressed.

Past CIBSE president Rob Manning recognises the dangers of a booming economy, having experienced several cycles of boom and bust. He bemoans the loss of highly skilled engineers when economies suddenly hits the buffers. He says public sector spending must be more stable to help smooth over shortfalls in private investment. At the moment, he says, governments have a knee-jerk attitude towards investment, piling money into infrastructure, such as hospitals, schools and railways only to remove it as soon as the Treasury needs to shore up UK plc's finances.

> The conference speakers remind us that there are serious structural defects in the construction industry

His hope is that the Construction Leadership Council – containing a mix of industry leaders and asset planners in government – will provide long-term investment plans.

You only have to look at the sudden removal of government funding for renewables to see that something needs to change. Feed-In Tariffs are the latest green grant under attack (page 9), and the government has not yet revealed whether it is going to replace other initiatives that have been scrapped since the election. The Government Spending Review is on 25 November – let's hope that it provides some Christmas cheer.

One of the speakers at the CIBSE conference is head of building services at University of Oxford, Stephen Pearson. He warns that over-complication is making buildings too difficult for users to understand. On page 36, we look at what Hoare Lea is doing to simplify buildings for users on the University of Oxford estate. Relatively small changes are having a stunning effect on performance and energy bills. Those organisations currently wondering whether to act on their Energy Saving Opportunity Scheme audits should take note.

**Alex Smith, editor**
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# NEWS

*All the latest news from around the building industry*

## BRADFORD CAMPUS AIMS FOR 'EXCELLENT' AFTER OPENING ITS DOORS

The Advanced Technology Centre (ATC) at Bradford College has just accepted its first intake of students.

The 3,600m² campus was designed by Bond Bryan Architects and the building services engineer was Couch Perry Wilkes.

Situated next to the high-profile David Hockney Building, the college features solar panels, a bio-diverse roof and energy efficient plant, with the aim of achieving a BREEAM 'Excellent' rating.

The project was funded by the Skills Funding Agency and Bradford Council, and the contractors BAM had to deliver the project in time for the start of the academic year.

# Gore savages UK government over energy policy U-turns

Al Gore 'puzzled' by Britain's policy U-turns

TRAVIS P BALL / GETTY IMAGES

**Politicians under attack for scrapping green initiatives**

Former Vice-President of the United States Al Gore has criticised the UK government's dramatic change of direction on carbon reduction and energy efficiency.

Speaking at a Green Alliance event in London, Gore said he was 'puzzled' by Britain's recent policy U-turns, including: the scrapping of zero carbon building targets; the cancellation of the Green Deal; and plans to cut Feed-In Tariffs (see page 9).

He urged the government to show leadership in the build-up to December's international climate change talks in Paris, and provide 'actions rather than words'. He said he was tempted to use the word 'betrayed', before going on to question whether the Prime Minister had been coerced into making decisions he disagreed with under pressure from Conservative party colleagues.

Ben Goldsmith, chair of the Conservative Environment Network, told the conference he was 'devastated' by the recent changes. 'I hope they have got a plan,' he added. 'They have scrapped some of the most exciting things that have been set up in the past four or five years.'

He poured scorn on the suggestion that the decisions were based on a shortage of funds, pointing to the agreement to build the Hinkley Point nuclear reactor as an example of 'financial hypocrisy'. He also said fossil-fuel subsidies were '10 times greater than those provided to renewables every year'.

CBI director-general, John Cridland, said the business community wanted to be 'part of the solution', but UK companies 'must be given confidence that ministers really mean to tackle climate change'.

'The green economy is an emerging market in its own right, brimming with opportunity,' he said. 'Yet, with the roll-back of renewables policies and the mixed messages on energy efficiency, the government risks sending a worrying signal to businesses.'

Former Treasury chief economist Lord Stern piled on the pressure in an interview he gave for television.

The author of the seminal 2006 report on the economics of climate change said it was 'potty' to put a carbon tax on renewables, which was the effect of the Chancellor's decision to remove their exemption from the Climate Change Levy.

## Tories aim for 1m homes by 2020

The Conservative government has declared it wants one million new homes built in the UK by 2020, to tackle the country's housing crisis.

Housing minister Brandon Lewis announced the target, which is slightly higher than the 974,000 homes that the National Housing Federation estimated needed to be built between 2011 and 2014; figures from 326 councils show that only 457,490 actually were.

The federation claims about 245,000 new homes are needed each year in England. Its director of policy and external affairs, Gill Payne, said: 'In some areas, there is a drastic shortage, causing prices to soar, and putting homes out of reach of many people. We haven't built enough homes in this country for decades.'

Several factors have been blamed for this, including: slow planning procedures, a shortage of skilled labour, and a big drop in the number of councils building new homes.

Housing charity Shelter's chief executive, Campbell Robb, said of the government's announcement: 'We are past the time for another grand statement of ambition. We need to see investment.'

## Accreditation for CIBSE Certification

The United Kingdom Accreditation Service (UKAS) has granted CIBSE Certification accreditation to certify energy management systems against ISO 50001. This means the company can now certify organisations aiming to use ISO 50001 to meet the requirements of the Energy Savings Opportunity Scheme (ESOS).

Released in 2011, ISO 50001 brings together several countries' local codes to provide a single standard for implementing energy management systems.

The ability to certify energy management systems is a major development in CIBSE's mission to improve energy performance in the built environment.

Andrew Geens, head of CIBSE Certification, said: 'An increasing number of companies are coming to recognise ISO 50001 as a method of making cost savings as strained budgets require them to do more with less.'

# Heat pump plan undermined by knowledge and skills gap

**University research says UK lacks installation capacity**

A serious shortage of suitable skills and installation capacity could derail the UK's plans to place heat pumps in the vanguard of its strategy to reduce carbon emissions from residential heating.

Researchers at the University of Westminster claim that current education and training programmes are not capable of instilling the know-how needed to meet carbon and energy-saving targets set by government advisers – particularly when it comes to replacing gas boilers with heat pumps. Their study, published in *Building Research & Information*, revealed 'deficiencies in engineering knowledge' that would have 'detrimental consequences on both the actual performance and market acceptance of heat pumps'.

The UK aims to install 600,000 heat pumps by 2020 – and between 2.5 million and four million by 2030. However, the university's research revealed that heat pumps do not perform as well in the UK as they do in continental Europe.

Peter Hansford, government chief construction adviser, said urgent action was needed and urged the industry to 'address ways in which these skills can be developed'.

The study, led by Colin Gleeson, senior lecturer in Westminster's school of architecture and built environment, said the industry had 'failed to embrace' the technical guidance and training produced by the Department of Energy and Climate Change's Microgeneration Certification Scheme. 'Few UK installers have formal heat pump qualifications at NVQ level 3,' he added.

'Training is generally offered through short courses with no strict adherence to either a common syllabus or a detailed training centre specification.'



# Apprenticeship levy may 'kill off' the CITB

The proposed training levy to pay for apprenticeships from April 2017 could undermine current arrangements in the construction industry, according to BSRIA.

In a statement, the research and testing body expressed concern that the new levy – which is designed to finance three million apprenticeships by 2020 – would 'kill off' the Construction Industry Training Board (CITB).

It would also leave employers 'in the dark' as to how apprenticeship training would be financed – and if they will be forced to pay twice.

A consultation asking views of employers on the proposed levy is under way and makes it clear 'the government is considering scrapping the existing system', the BSRIA statement added.

'Quality apprenticeships are essential for our industry to help strengthen the economy, deliver the skills that employers need and give millions more hardworking people financial security and a brighter future,' said BSRIA chief executive, Julia Evans.

'We hope our members don't have to pay such levies twice over, and that the future of the CITB is safe – especially as the training it provides is dedicated to the construction industry.'

Evans said these were 'worrying times' because of the potential impact on small and medium-size enterprises (SMEs).

Nick Mead, CIBSE President and engineering director at Imtech, said: 'Our future skills set relies on apprentices, and the training of young people. We must ensure that the provision for offering apprenticeships is not jeopardised by this levy. CIBSE will be responding to the consultation, and making clear that we feel the future of our workforce relies on the continued availability of suitable apprentice schemes.'

# Feed-In Tariffs facing axe

● **Subsidies for renewables could end by January**

The Feed-In Tariff (FIT) scheme, which offers financial subsidies to small-scale renewables, could be closed to new applicants next January. The level of payments received by those already in the scheme could also be slashed by more than 80%.

The Department of Energy & Climate Change (DECC) is carrying out a consultation into ways of 'controlling the costs' of the scheme, which could pave the way for its closure in 2019.

According to the consultation documents, if costs cannot be limited to £100m by 2018/19, 'the only alternative would be to end generation tariffs for new applicants as soon as legislatively possible, which we expect to be January 2016'.

Currently, households receive a set 'generation tariff' for the electricity they generate and use, plus an 'export tariff' of 4.77p per unit of electricity for any extra energy they deliver to the grid.

FIT payments on domestic solar panels could fall by £192 a year for the typical household – while payments for some other technologies could fall by more than 80% – if the proposed cuts to tariff levels are confirmed after the consultation.

ELENA ELISSEEVA / SHUTTERSTOCK

| New Tariff bands | Current rate (Oct-Dec 2015) p/kWh | New proposed rate from Jan 2016 p/kWh |
|---|---|---|
| 0-10kW | 11.30-12.47 | 1.63 |
| 10-50kW | 11.30 | 3.69 |
| 50-250kW | 9.21-9.63 | 2.64 |
| 250kW-1MW | 5.94 | 2.28 |
| 1MW-5MW | 5.94 | 1.03 |
| Stand-alone | 4.28 | 1.03 |

DECC said the costs of some renewable technologies had fallen by more than 50%, prompting a surge in installations that had created 'costs exceeding our expectations'.

The Solar Trade Association is calling the plans 'alarming' and more likely to cause another rush in installations that would push up costs to taxpayers. However, the manufacturers' body, EEF, said the government was right to 'be getting to grips' with the cost of the scheme.

Hywel Davies, CIBSE technical director, expressed concern at the speed of the proposed cuts.

He said: 'Rapid withdrawal of the feed in tariff could be very damaging to many of the small businesses installing PV systems. It also jeopardises the taxpayer funding already invested in the sector.'

# DECC cancels key part of FITs

The Department of Energy & Climate Change (DECC) has defied vociferous opposition and removed a key part of the Feed-In Tariff (FIT) renewable energy subsidy scheme.

After a four-week consultation that generated nearly 2,400 responses – the vast majority against the proposal – DECC confirmed the closure of the system of pre-accrediting applications before they receive planning permission. This means developers cannot calculate the likely payments their installation will receive before starting work.

A DECC statement said this would 'provide better control over spending and ensure bill-payers get the best possible deal as we continue to move to a low carbon economy'.

Energy and Climate Change Secretary, Amber Rudd, said her priorities were clear: 'We need to keep bills as low as possible for hardworking families and businesses, while reducing our emissions in the most cost-effective way.

'As costs continue to fall, it becomes easier for parts of the renewables industry to survive without subsidies, which is why we're taking action to protect consumers, while also protecting existing investment.'

The Solar Trade Association attacked the government for ignoring the results of its own consultation and public opinion.

'Just 16 out of 2,372 respondents supported the proposal to do away with pre-accreditation, yet the government has gone ahead and done it anyway,' said head of external affairs, Leonie Greene.

'This removal of pre-accreditation and the devastating cuts to tariffs are going against the tide of public opinion, with 80% of people supporting solar power – more than any other technology.'

# In brief

### MITSUBISHI EXPANDS ITS AIR CONDITIONING INFLUENCE

Mitsubishi Electric is to buy chiller maker Climaveneta and data centre cooling specialist RC Group. It has entered into an agreement with De'Longhi Industrial to buy the share capital of DeLclima, the Italian owner of Climaveneta, in a deal expected to be worth £480m.

Mitsubishi Electric is looking to become a full-scale 'climate solutions provider', particularly in Europe, where F-Gas regulations and energy efficiency demands will drive customer habits.

### WILSON MADE RAE FELLOW

Ant Wilson, director of sustainability and advanced design (building engineering) at Aecom, has been elected a Fellow of the Royal Academy of Engineering.

He said: 'There are only a few building services engineers who hold this title and I would like to thank those in CIBSE who have supported this, and the academy for the honour of this position.'

Alongside Doug Oughton, Ant Wilson is the lead author of the recently published 11th edition of Faber & Kell's *Heating and Air Conditioning of Buildings*, available at Amazon and other online retail outlets.

### COLD AND DARK SEMINAR

The East of England Engineering Science and Technology Association will host a seminar entitled 'Cold and Dark by 2050 – how sustainable is our energy consumption?' at the University of Hertfordshire on 11 November.

The speakers are: John Loughhead, chief scientific adviser to the Department of Energy & Climate Change; Goran Strbac, professor of electrical energy systems, Imperial College; and Peter Guthrie, director of the Centre for Sustainable Development. To register, visit **www.eeesta.org.uk**

# Billion-pound Battersea contract for Bouygues

French building giant Bouygues has secured the largest private construction contract ever awarded in the UK.

It will lead a £1bn project to build 1,305 homes that form the third phase of the Battersea Power Station redevelopment, on the south bank of the River Thames.

Work on the power station 'gateway' will start in 2018 and Bouygues aims to finish the Foster + Partners and Gehry Partners-designed project in 2020.

Carillion is already building the £400m phase one, while Skanska is due to deliver the £600m phase two. Mace has secured an enabling package worth £100m.

The phase-three homes will be built in parallel with the Northern Line tube extension and new underground station, which is also due to open in 2020.

## Chapman BDSP 'open to different ways of designing'


Ray Upjohn

The building services consultant working on phase three of the Battersea Power Station scheme is growing almost as quickly as the apartment blocks beginning to dot the skyline in this part of London.

Chapman BDSP has increased turnover from £10.5m in 2012 to an expected £18m this year. In part, this is because of its reputation as an engineer that can deliver 'big architecture' from the likes of Foster + Partners and Gehry Partners, which both have buildings on phase three.

Chapman BDSP has been appointed MEP, environmental, fire and vertical transportation consultant. It is also working on phase two, which includes the redevelopment of Battersea Power Station itself.

Chief executive, Ray Upjohn, said: 'We want to be known for design, and for being open towards different ways of designing.'

The engineering firm formed in 2010, when Chapman Bathhurst merged with BDSP, which worked on blue riband projects such as the London Olympic Velodrome.

Upjohn said the merger was a perfect fit. 'BDSP was doing work with big architects and Chapman Bathhurst was working in residential and corporate occupant sectors. The diverse skills in the business has helped us.'

Read more on top consultants in next month's *CIBSE Journal.*

# Optimism spreading among contractors

**Recovery 'sustained, but tentative', finds B&ES survey**

Contractors are enjoying rising order, enquiry and turnover levels, according to a 'state of trade' survey carried out by the Building & Engineering Services Association (B&ES).

The survey, which covered the period from January to June this year, revealed a positive 'net optimism measure' of 45%, up from 39% in the previous six months. Growth in orders was enjoyed by 53% of respondents – compared with 47% in the second half of 2014 – while 41% had an increase in enquiries and 40% an increase in turnover.

For the first time since the six-monthly survey was introduced in 2012, more members reported a rise than a decline.

Labour and material costs both increased; 36% of firms claimed to be employing more direct labour than six months ago and 40% expected workforce levels to increase further during the remainder of 2015.

There was also a rise in the number of B&ES members taking on apprentices and making use of agency personnel. However, a statement from the association said 'skills shortages, zero and ultra-low margins, over-long tender lists and the prevalence of late payment' were reasons for concern.

B&ES chief executive, Paul McLaughlin, said the findings confirmed the anecdotal evidence that the sector was enjoying 'a sustained, if still sometimes tentative, recovery'.

'I am also pleased that firms are responding to the challenge posed by skills and labour shortages by stepping up their training activity, to take full advantage of the commercial opportunities that are available to them,' he said.

'The optimism that is clearly spreading throughout the membership augurs well for our sector as a whole.'

# Birmingham New Street opens for business

Revamped Birmingham New Street station has opened its doors to passengers after a five-year, £750m transformation.

An impressive new atrium has been constructed over a huge passenger concourse – five times the size of London Euston's – that benefits from an abundance of natural light. There are also decluttered platforms, improved entrances, and a range of new facilities, including 43 shops at concourse level.

One of Britain's busiest inter-change stations, Birmingham New Street has been rebuilt while trains continued to run as normal for the 170,000 passengers a day who use it.

Above the station sits the new 450,000ft² Grand Central shopping complex, which will create more than 1,000 jobs and is expected to attract more than 50 million visitors a year.

Mark Carne, chief executive of Network Rail, said: 'Rebuilding one of the busiest stations in the country without impacting on passengers' journeys has been a major challenge, but Network Rail and our partners on this project have done just that. That's a significant achievement.'

# Lighting offenders face naming and shaming

**LuxLive announces Bad Lighting Awards**

Organisers of the LuxLive 2015 lighting exhibition have launched the 'Bad Lighting Awards' to highlight problems caused by 'thoughtless, ill-considered lighting' that they say 'is ruining the exteriors and interiors of some great buildings'.

They say it was time 'to name and shame those organisations with terrible illumination'.

The Bad Lighting Awards will 'cast a badly aimed spotlight on retailers, restaurateurs and high street names that are getting it wrong – in the hope that they will improve', say the organisers.

'We believe passionately that lighting really matters', says chair of the judges, Ray Molony. 'It's a big part of our experience on an evening out, for instance. It can make people look great – or terrible. It can enhance food and interiors. But so many organisations are getting it wrong.

'We hope the Bad Lighting Awards will prod people to look at their lighting again – and then change their ways.'

Early nominations for the Bad Lighting Awards include Harvey Nichols department store in London's West End, the Queen's House in Greenwich, London, and Argos in Nottingham.

The award categories are façades, retail, restaurants, hotels, public buildings and street lighting. The judging panel comprises a team of lighting designers and architects.

'We hope the winners will turn up to collect their trophies,' says Molony. 'Our panel will suggest ways in which the offending projects can be improved.'

If you would like to nominate a lighting offender email **ray.molony@luxreview.com**

# Highways England tops ethical payment table

Transport company Highways England has awarded more than £10bn of work through project bank accounts (PBAs) in the past three years, allowing it to ensure suppliers are paid within 19 days, according to the Specialist Engineering Contractors' (SEC) Group.

This approach has put Highways England at the top of the fair payment league table. It is now planning to extend the use of PBAs to a wider range of suppliers and to beat its target of placing £20bn of work through PBAs by 2020.

'The construction industry owes a debt of gratitude to the team at Highways England that has achieved this remarkable performance,' said SEC Group chief executive, Rudi Klein.

'Project bank accounts are the most effective mechanism for ensuring that supply chain SMEs are in regular and timely receipt of their cash. Other initiatives have proved to be a waste of time and effort.'

# More than 80% felt the heat this summer

**Newer, better insulated homes more susceptible**

Four out of five London residents suffered from uncomfortably hot homes this summer, according to a survey by consultancy WSP Parsons Brinckerhoff.

As a result, their health and productivity suffered, while energy consumption rose as many resorted to air conditioning.

The ComRes survey of 1,005 people in the capital found that: 83% suffered from overheating in their home at least once; 53% occasionally; 11% said their home was uncomfortably hot most of the time; and 4% said this was the case all the time. Overheating affected residents in newer homes significantly more than those in older homes, with 8% installing air conditioning to cope.

WSP Parsons Brinckerhoff said that around 2,000 deaths were caused by overheating each year in the UK and this could worsen by the middle of the century, when very hot summer days are projected to be 6.5°C warmer.

More than half (52%) of those whose home felt uncomfortably hot reported being woken up at night, and almost a third (31%) said they felt tired or unwell as a result of their home overheating.

'If building design and regulations are not changed now, the impact on health will worsen, productivity will reduce, energy consumption will increase, and the long-term value of homes will be affected,' claim the researchers.

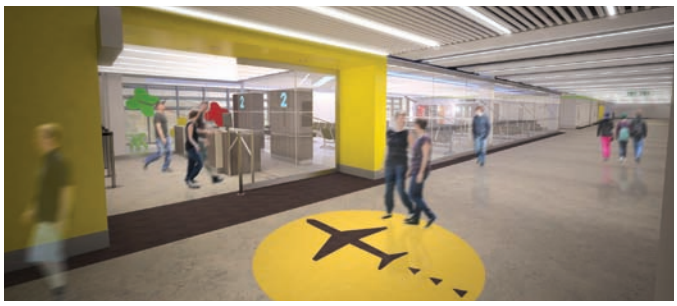
David Bownass, WSP Parsons Brinckerhoff building services director, said: 'Newer homes and flats are better insulated to cope with cold weather, but are consequently hotter in summer. Warmer temperatures will force us to use air conditioning, so we should be designing buildings now... to allow affordable retrofitting of these systems.'

# Gatwick invites bids on £750m frameworks

Gatwick Airport has invited firms to bid for places on two major construction and engineering frameworks, to deliver up to £750m of improvements over the next five years.

The frameworks are graded by complexity – with more straightforward operational projects, involving contracts worth between £100,000 and £1.5m, and minor works projects for contracts between £1m and £10m. Within each framework, Gatwick is on the hunt for a mix of building, civil engineering and mechanical/electrical specialists.

Peter Brown, Gatwick Airport principal mechanical engineer, said the frameworks will attempt to develop closer relationships directly with the supply chain. 'We will encourage and develop smaller companies, break down supply chains and reinvigorate existing business relationships.'



## In brief

### GET YOUR TICKET FOR THE SCOTTISH ANNUAL DINNER

There are still tables available for this year's CIBSE Scotland Dinner, at the Grand Central Hotel in Glasgow, on Friday 6 November.

With more than 1,000 CIBSE members across Scotland, the region is keen to encourage more people to attend, in tune with the encouraging growth and positivity across the industry.

As well as entertainment from Scottish comedian Bill Barclay, a raffle has been organised by the Young Engineers Network.

To book a table, email **e.brodie@ironsfoulner.co.uk**

### HCNW MEMBERSHIP SURVEY

CIBSE Home Counties North West region is conducting a membership survey. It is open to any CIBSE member, and the region is offering a prize of seven tickets to a Rumford Club dinner, in central London on 15 October. To complete the survey visit **www.surveymonkey.com/r/YVSMGNG**

### LIFTS GROUP SYMPOSIUM ACCEPTED BY SCOPUS

The CIBSE Lifts Group and the University of Northampton are pleased to announce that the proceedings for the annual Symposium on Lift and Escalator Technologies has been accepted for inclusion in Scopus.

Scopus is the largest abstract and citation database of peer-reviewed literature, including scientific journals, books and conference proceedings. It is used by more than 3,000 academic, government and corporate institutions.

Past proceedings were reviewed by the Scopus content selection and advisory board to ensure that the conference met the required quality criteria. Visit **www.liftsymposium.org**

# Full steam ahead as new CIBSE guidelines published

**Institution has produced new technical manual**


CIBSE's latest publication, *TM58 Design and Operation of Modern Steam Systems*, provides some basic guidelines on how a modern steam system should be designed and commissioned. It also looks at the operation of a steam and condensate system.

Most steam generated today is used to produce electrical power, but this application is outside the scope of this manual. TM58 focuses on the use of steam at lower pressures and temperatures for a variety of uses in a building services environment.

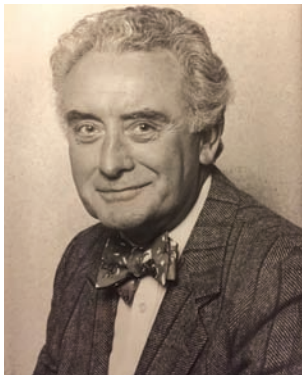
Steam systems are no longer installed just to heat buildings. Instead, they play key roles in producing hot water, humidifying air, sterilisation and even cooling.

Often, steam is overlooked in favour of what may seem to be simpler alternatives. With more knowledge and guidance, however, the benefits and flexibility that steam provides can be realised.

Regulatory changes are, of course, focusing attention on steam-system safety. This manual introduces the reader to current regulations and guidelines.

TM58 is available free to members from the Knowledge Portal at **www.cibse.org/knowledge** or to purchase, from £66, for non-members.

# A born leader remembered



*By Bryan Franklin and Donald Leeper*

Widely admired and respected by his contemporaries, Tom Smith – who died in August – was one of the leading services engineers of his generation.

After an apprenticeship in fan and structural engineering, he worked in chemical engineering for a short time before joining J R W Murland Consulting Engineers in 1950. He then went to Varming and Mulcahy Consulting Engineers, in Dublin.

In 1957, Smith came to London to open and direct the Steensen, Varming, Mulcahy and Partners practice. Under his leadership, the practice went from strength to strength, taking on the services designs of many prominent national projects.

Smith had strong views on the involvement of engineering services designers at the concept stage of projects. He promoted a greater appreciation and understanding of architecture, as well as the closer collaboration of services engineers, structural engineers and architects.

Smith served on many CIBSE committees and was chair of both the external affairs and professional practices committees. He represented the institution on various outside bodies, including BRAC, JACES, the Hertfordshire College of Building and the board of directors of the *Building Services Journal*.

In 1985, he was awarded Fellowship of ASHRAE and, in 1989, became chair of the Association of Consulting Engineers, encouraging close ties between engineers of all disciplines.

Smith was elected CIBSE President in 1991, and his presidential address encapsulated his strong belief that engineers should not only consider and practice good design, but also ensure their designs reflected the visual and aesthetic effects on buildings, in similar terms to the architect.

In 1992, Smith was proud to be elected a Fellow of the Royal Academy of Engineering.

He was a born leader with an engaging sense of humour and, through his commitment to building services engineering, influenced the lives of many of us over the years.

# Prize-winning research on air tightness and thermal comfort

- **Best papers recognised in annual awards**

CIBSE has awarded the Napier Shaw and the Carter bronze medals to papers on ventilation and air tightness, and how users adapt to building temperature in tropical climates.

YH Yau and BT Chew, both of the University of Malaysia, have won the Carter Bronze medal for their paper *A review on predicted mean vote and adaptive thermal comfort models*, examining the effectiveness of the standard international measure of comfort in the tropics.

They concluded that the predicted mean vote (PMV) model is not adequate for buildings in such climates, and that a new adaptive model is needed to balance comfort and energy use.

SG Howieson, T Sharpe and P Farren, of the University of Strathclyde, have been awarded the Napier Shaw bronze medal for their work on the effect of air tightness on air quality in buildings.

Homes tested as part of award winning air quality research

Their paper, *Building tight – ventilating right? How are new air tightness standards affecting indoor air quality in dwellings*? found that current Building Regulations and Standards don't take 'real life' ventilation scenarios into account, and that modern airtight buildings are more likely to suffer from poor air quality (read more on page 43).

The Carter and Napier Shaw medals have been awarded by CIBSE for more than 30 years. They are presented to the highest-rated papers of the year – on application and research, respectively – published in the *Building Services Engineering Research and Technology (BSERT) Journal*.

The winners will receive their prizes at the President's Dinner on Friday 9 October.

The *BSERT Journal* is available at **www.cibse.org** and *Lighting Research and Technology (LR&T) Journal* is free for SLL members.

## Inside out: Lighting and architecture

The Society of Light and Lighting (SLL) has announced that the 2015-16 masterclass series will kick off in Cardiff on 15 October.

This year's series will focus on light and architecture. Speakers from the sponsor of each masterclass – plus a guest speaker – will offer insight and informative presentations.

The SLL masterclasses were introduced in 2004 in response to demand for regional lighting events. Each series comprises seven or eight one-day seminars, plus a shortened schedule, held at LuxLive, which this year will be on 18-19 November, at ExCel, London.

Each sponsor provides a 'master' to give their peer-reviewed presentation and the Society arranges for a guest speaker at each event. The 2015-16 sponsors are: Xicato, Philips, Thorn Lighting and Trilux.

The dates for the 2015/16 masterclasses are:

- 15 October, Cardiff
- 26 November, Leicester
- 21 January, Manchester
- 18 February, York
- 31 March, Belfast
- 13 April, Edinburgh
- 26 May, London

# Make the most of your CIBSE Region


Regions offer CIBSE Members the chance to network and share ideas

As a CIBSE Member, you will belong to one of the 19 Regions around the world.

Run by dedicated volunteers, Regions offer: seminars; industry visits; networking opportunities; informal mentoring for applications; a forum for advice; and a testing furnace for new technical ideas, as well as sponsorship and referees.

Wherever you are, you'll share knowledge and make local connections. Elected volunteers, acting as representatives of CIBSE, ensure each region has a dynamic personality of its own.

'CIBSE's Regions have always been diverse communities, with a vast range of specialist opinion, knowledge, training and experience,' said Chris Jones, chair of CIBSE Home Counties North West.

He added that many are keen to serve a larger proportion of CIBSE Members in their territory, and to attract other disciplines – even the general public. As well as covering technical innovation and regulation, some regions lead on emerging issues affecting the art and science of building services engineering. Expert input from Members means Regions are often one step ahead of the rest of the industry.

Jones said today's Regions are less formal than their predecessors, and more inclusive and welcoming: 'They help remove barriers in the industry. Their person-to-person exchanges bring a sense of belonging and identity in a professional community.'

He added: 'Regional friendships and informal mentoring often outlast company roles and locations, so why miss out? In fact, why not volunteer?'

Taking up an elected position on a committee requires commitment, said Jones, but this is more than outweighed by the results. The friendships and experiences shared are the lasting rewards on offer.

For more information about the Regions and to find out about regional membership, and how to get more involved, visit **www.cibse.org/regions**

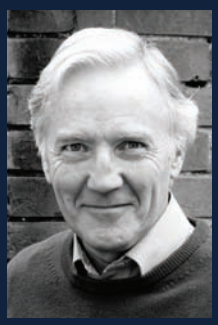
# STORM WARNINGS

Security is a key theme of CIBSE's upcoming Building Performance Conference, so we asked seven speakers what they think is the greatest threat to the design, construction and operation of buildings

MAT COLMER, **lead technologist (built environment) at Innovate UK**

A lack of focus on operational outcomes is the greatest threat. The fundamental question of 'what is this building trying to achieve?' is being lost during construction. This lack of end-use focus allows compromised design choices, poor commissioning and handover processes, and overlooked systems maintenance – resulting in a building that does not match user or client expectations.

Buildings exist to perform a function and to be used by people. Design and construction are merely means to achieve this. How a user experiences the building is paramount to its success. A modern building, however, is a result of a regulation-driven approach, not a design-driven one – which leads to loss of function or, at the least, a messy compromise.



MICHAEL DIXEY, **principal consultant at GGR Associates**

In design, the threat is unforeseen problems with new designs of buildings and new construction materials, which can perform unexpectedly when used in novel ways.

The threats in construction are a lack of the right skills in boom times, plus pressures to keep down costs – resulting in faulty construction and failure to monitor the standard of subcontractors' work adequately.

In operation, the threat lies in a lack of on-site staff responsible for the care of buildings. Instead, there is a reliance on systems that can fail in an emergency, and service contracts that are neither sufficiently comprehensive nor fit for purpose. As these systems become increasingly sophisticated, the need for regular maintenance and testing is not always fully recognised.

RICK HOLLAND, **lead technologist at Innovate UK**

Most of us instinctively know that the case for whole-life sustainability is undeniable. Business practices have changed and the evidence has mounted against bottom-line savings, corporate branding plus-points, and the revenue-enhancing benefits.

Many of the innovations behind these were driven by progressive regulations and government policies. However, government cannot always take the lead and, in many situations, it is better for government to keep out of the way.

So the greatest threat to the whole-life sustainability of buildings is if clients and professionals fail to promote a business-led demand that accelerates innovation.

At the conference, we will showcase

some of the available resources, including: national facilities for collaboration; assets for developing new solutions; and novel ways for businesses to accelerate the innovation journey, from concept to commercialisation.

ROB MANNING, **part of government Level 3 BIM team at Engineering Construction Strategies**

I believe the greatest threat comes from the economic cycle of 'boom and bust'.

Several times during my working life I have seen the departure of bright minds from construction to other sectors because the threat of a downturn has shaken their sense of job security. I have also seen the departure of experienced people in mid-life, whose incomes were deemed unaffordable. These losses have happened across craft, technical, management and leadership roles.

Recessions also have an impact on recruitment requirements, the demand for places in educational establishments, and the continuity of training within companies.

As we emerge from each recession, we hear the cries of company leaders that they are struggling to recruit people with the necessary skills – is it surprising?

In recent years, the impact of each recession has usually been made worse by a preceding construction boom. We are stuck with economic cycles influenced by many factors, and private-sector investment planning is usually quite short-term. The May 2011 *Government Construction Strategy*, however, suggested that 40% of construction turnover was generated by public-sector spending. This public sector workload should be planned long-term, and could provide a stable platform for recruitment, education and training in construction. But how often have we seen high-expenditure, short-term programmes to build what might be called critical national infrastructure assets, such as hospitals, schools, highways, railways, flood alleviation and power generation. Each of these has exacerbated 'boom and bust'.

The period associated with asset investment planning for major national infrastructure is much greater than the term of office afforded to governments, so investment patterns are subject to five-year terms of political pressure. Should they be?

I would like to think the reformed Construction Leadership Council – with its mix of industry leaders and those dealing with asset investment planning in government departments – will have a strong and well-considered voice across all political parties, to provide a longer-term plan for the construction of assets that our society needs?

Can major infrastructure decisions be made across political parties in a timelier manner? Could this provide a managed pipeline of work for designers, constructors and operators around which to plan recruitment, education and training?

MIKE O'MAHONY, **managing director at Andrew Reid & Partners**

To my mind, a lack of detailed, ongoing collaboration between specialists is the common thread.

A lack of early dialogue between design and specialist commissioning engineers can result in issues not being found until late in the construction process – when time is at a premium – or, worse, after occupation. This presents business risks and results in user dissatisfaction. Remediation is then also disruptive and costly.

During construction, it will be no surprise that – in our experience – cost, time and quality are the key issues. Shorter programmes, client and design changes, and attention to detail all have an effect on how the services are commissioned and validated. A failure to act collaboratively throughout the entire process risks routine matters having a real impact on how the building is perceived – and, ultimately, on how it performs.

Poorly commissioned and/or poorly optimised systems limit the opportunities for facilities management (FM) teams to make the most of their assets.

STEPHEN PEARSON, **head of building services at the University of Oxford**

Over-complexity. Building systems and their controls are becoming more and more complex. Often, the driver for this is to chase very marginal improvements in performance. Communicating the design intent through the whole supply chain – and through the client's 'user and building support' chain – has always been a challenge, but becomes more difficult as complexity increases.

Complex designs are often sold as being flexible; in my experience, the converse is often true. Service personnel and end users are very unlikely to change or adjust systems they do not understand. Unless all parties fully understand how systems are designed to work, it is unlikely the performance gains will ever materialise. Worse still, the system's efficiency could be badly compromised by uninformed alterations.

ANDREW SIERADZKI, **head of security at BuroHappold**

Threats come from numerous directions, and can change during the design, construction and operation journey.

A topical concern, from a security perspective, is in recognising the true value of project information. From the outset, a simple CAD drawing of the security system may be innocuous – especially if it only represents the designer's original intent, rather than the actual construction information that comes later in the programme. However, with the drive towards using collaborative digital techniques – such as BIM, digital engineering prototyping and building virtualisation – the information owner is presented with a significantly greater problem. First, there may be wider uncertainty as to who has processed and accessed the information; and second, if individuals with ill intent secure – and later rely on – this information, it could be used against the facility with little forensic trace.

The threat, therefore, is data security – and the challenge is locking down data appropriately, so that it is accessible to those who need to use it, while kept beyond the reach of those who wish to misuse it.

● **CIBSE Conference and Exhibition**

The second Building Performance Conference and Exhibition will be held at the QEII Conference Centre, in Westminster, on 3-4 November.

This year's theme is 'working together for resilient, efficient and healthy buildings', and chairman of the Lords Committee on Climate Change, Lord Deben, has been confirmed as the keynote speaker.

# TOP 10 AIMING

The industry's leading young engineers will be honing their presentation skills ahead of the 20th CIBSE ASHRAE Graduate of the Year Awards in London

This year's CIBSE ASHRAE Graduate of the Year Award has 10 leading young building services engineers vying for the first prize of a trip to the ASHRAE Winter Conference in Orlando, Florida.

Each of the finalists will give a short presentation to the judging panel and a large industry audience at the Institution of Mechanical Engineers (IMechE) headquarters, in London, on Thursday 8 October.

The award, which this year celebrates its 20th anniversary, is supported by CIBSE, ASHRAE and IMechE, and is sponsored by Andrews Water Heaters, Ruskin Air Management and Schneider Electric. It is also supported by the CIBSE Patrons.

As well as the trip to the ASHRAE winter meeting for the winner, there are cash bursaries from the Rumford Club for the two runners-up.

'The judges had a very difficult job in cutting the shortlist down to just 10,' said Tim Dwyer, chairman of the CIBSE/ASHRAE Group and the judging panel. 'The quality and volume of entries never ceases to amaze, and was particularly high in this landmark year. We are repeatedly told that the industry is suffering from a skills shortage, but the calibre of the graduates competing for this high-profile accolade gives us all great hope for the future.'

The CIBSE Employer of the Year awards will also be presented at the event. The shortlisted companies are: Hoare Lea and Aecom, large employer category; Ethos Engineering and TB + A, medium category; and SDS and JDP from the small company entrants.

Presentation of the IMechE Construction and Building Services Division annual award will be followed by the ASHRAE Presidential Lecture, by the Society's president, David Underwood, visiting from the US.

The awards event is free, but anyone wishing to attend must book in advance at **www.cibse.org/yea CJ**

- More than 20 young engineers from CIBSE around the world will be meeting for the YEN annual conference in Hong Kong in November, – the first time it has taken place outside the UK. Young engineers will be reporting on CIBSE Twitter (@CIBSE) and LinkedIn from the conference.

## DEMETRIOS CONSTANTINOU

**National Technical University Athens/ Foster+Partners**

Constantinou has a degree in electrical and computer engineering from the National Technical University of Athens, and an MSc in sustainable energy futures from Imperial College, London, where he graduated with a distinction.

For the past nine months, he has been working in the environmental engineering group at Foster + Partners on several high-end retail and mixed-use development projects. Constantinou's main areas of interest are lighting, power distribution and sustainable design, which have led to him becoming a LEED Green Associate, working towards LEED AP Building Design + Construction accreditation.

## RUTH HOWLETT

**University of Nottingham/ Aecom**

Howlett graduated from the University of Nottingham with an MEng (hons) degree in architecture and environmental design, then joined Aecom as a graduate public health engineer. She completed an on-site work experience secondment, learning how public health services systems are installed and tested, as well as encountering the problems that can occur on site.

As a STEM ambassador, Howlett has attended careers fairs at universities and senior schools to talk to students about building services engineering. She also regularly gets involved with CIBSE YEN, SoPHE and WIBSE events and is in the process of starting a young engineer division for SoPHE. In 2014, Howlett was runner-up in the SoPHE young engineer award.

## ANDREW JAMES

**California State University/Buro Happold**

James graduated in 2013 from California Polytechnic State University (Cal Poly) with a BSc in mechanical

# FOR ORLANDO

engineering, specialising in HVAC&R. Alongside internships with building services firms, he held a leadership role in Cal Poly's ASHRAE student chapter, organising meetings and bringing in industry professionals. In recognition of his academic and industry efforts, he was awarded ASHRAE's Reuben Trane Scholarship.

Since joining Buro Happold's Los Angeles office in 2013, as a graduate engineer, James has involved himself in mechanical system design and building physics analysis, spanning higher education, commercial, healthcare, and the arts & culture sectors. He is currently working on the design of a new art museum with a net-zero energy goal.

## PENG JIANG

**University College London/Skelly & Couch**

Born in Wenzhou, on the east coast of China, Jiang began his university course at an overseas campus of the University of Nottingham, in Ningbo, near Shanghai. Inspired by the UK's outstanding engineering reputation and heritage, he continued his studies in Nottingham, where he was awarded a first-class honours BEng in architectural environment engineering in 2012.

The following year Jiang achieved a Master's degree in environmental design and engineering at The Bartlett, University College London, where he became an LEED Accredited Professional in Building Design and Construction.

After graduating, Jiang joined Skelly & Couch in September 2013, and has gained valuable experience on many projects, including: a new visitor pavilion at the Grade I-listed Waddesdon Manor, Buckinghamshire; the design of a full BIM Level 2 primary school in Croydon; project design for the University of Kent; and energy modelling for Oxford's Jericho canalside mixed-use community.

## ALEXANDRA LINDESAY-BETHUNE

**University of Edinburgh/Arup**

Lindesay-Bethune graduated from the University of Edinburgh in 2013, with a first-class Master's degree in electrical engineering with renewable energy. Before her MEng, she gained a merit for the Foundation Diploma in Art and Design from Central Saint Martins. She won a scholarship with the Women's Engineering Society, and was ambassador for engineering at the University of Edinburgh.

Since joining Arup, Lindesay-Bethune has worked on the Crossrail electrical engineering design and has spent 12 weeks at the Druk White Lotus School, in Ladakh, India, as the resident engineer and lead electrical engineer. She developed a design brief for the school to address its immediate and longer-term needs, while managing the on-site construction. This involved learning and applying multi-disciplinary engineering and design skills.

## JORGE ABARCA MONTERO

**Sheffield Hallam University/Cundall**

Montero, from Costa Rica, graduated with a BSc in mechanical engineering from Florida Institute of Technology, in the US. He then completed an MSc in advanced engineering and management at Sheffield Hallam University, where he was awarded the international achievement scholarship.

His passion for the built environment developed after early visits with his grandfather to construction sites inspired him to pursue a career in building services. Montero joined Cundall as a graduate building services engineer in 2014, and has since been involved in various projects across the educational, healthcare and residential sectors.

His enthusiasm for sustainable development earned him a seat on the steering committee for the revision of *CIBSE Guide L: Sustainability*. Montero enjoys meeting other young engineers and sits on the committee of CIBSE Young Engineers Network (YEN) NW and ACE Progress Network NW.

### ABDUL WAHAB MALIK

**NED University/ Meinhardt, Pakistan**

Malik graduated in mechanical engineering from the NED University of Engineering & Technology in Pakistan.

During his time at NED, he volunteered for the American Society of Mechanical Engineers (ASME) and was selected to take part in the 'In-charge Programmes and Communication, Student District Operating Board (SDOB)'. The following year, he became a member of the SDOB advisory committee. He was also nominated by ASME to represent Pakistan at three international conferences.

Currently working as a fire protection and HVAC design engineer, Malik plans to advance his studies in thermo-fluid sciences.

### CHARITY NICHOLLS

**Heriot-Watt University/Atkins**

Nicholls graduated from Heriot-Watt University with an MEng in architectural engineering in 2013. Her final-year industrial project was based at the Scottish Parliament, looking at energy reduction in the building's existing HVAC systems.

She joined the Atkins graduate development programme in September 2013, as a mechanical building services engineer, and has successfully completed a secondment to a client site, working on government projects. Nicholls is currently part of the Atkins Heathrow Q6 team, working on Terminal 4's heating system.

A passionate STEM ambassador, over the past year she has been a mentor, coordinated the setting up of a new STEM club for five local high schools, arranged mock interview sessions and helped at The Big Bang Fair.

This year, Nicholls was shortlisted for the Women in Construction Awards: Best New Starter (under-25) category, and was a finalist at Teambuild UK.

### RYAN RODRIGUES

**London South Bank University/Hurley Palmer Flatt**

Rodrigues graduated in 2010 with a first-class BEng (Hons) in electrical and electronic engineering from the University of Greenwich, where he was also presented with the Best Student Award in an Engineering Programme. He initially worked in the defence industry, in the R&D department at Thales.

Joining Hurley Palmer Flatt as a graduate engineer, Rodrigues was put forward for a part-time MSc in building services engineering at London South Bank University. In 2012, he was seconded to UBS as part of their client technical team, working with the bank's EMEA property portfolio. Rodrigues' Master's dissertation was entitled 'Impact of a Data Centre's Thermal Properties on Energy Efficiency', and he graduated this year, with a distinction. He has resumed working at hurleypalmerflatt as an engineering consultant.

Rodrigues is an active STEM ambassador and The Big Bang Fair judge, and looks to encourage the future generation of engineers.

### WILLIAM WEBB

**University of the West of England/ Buro Happold**

Webb graduated with a first-class BEng (Hons) degree in architecture and environmental engineering from the University of the West of England (UWE), a course jointly accredited by CIBSE and RIBA. He received the CIBSE South West prize for best dissertation, writing on the topic of climate-based daylight modelling. He also received the Buro Happold award for the best integration of architecture and engineering for his final-year project: an independent, sustainable Bristol masterplan and the design of the new government's assembly building within the city centre.

At UWE, Webb was often employed by the university as a peer assisted learning leader for younger students, and as a student ambassador for a range of schools' outreach activities. He has now begun his involvement with the regional CIBSE YEN.

After completing a successful student internship at Atkins in 2014, Webb now has a graduate position at Buro Happold, working between their sustainability and M&E teams. He has also been invited back to UWE as a visiting tutor from September.

# Feedback

## This month, CIBSE LinkedIn group members contribute to the debate on 'sexist' air conditioning and the role clothing plays in workplace thermal comfort


Control 'finger walking' could be to blame

SINISA BOTAS / SHUTTERSTOCK

### Gender specific

Maastricht University's research ('AC settings too low and "sexist" for modern mixed-gender workplaces', *CIBSE Journal*, September 2015) is fascinating because it confirms what any of us who has been responsible for detailed hands-on system commissioning of an occupied building have found: women in the office workplace favour warmer conditions than men. It is not a sexist conclusion, but an observable fact.

In my experience, this is true both in winter and summer, as the Maastricht team found. But the logic of their conclusion – that the effect results mainly, if not totally, from heat emission per unit area and the higher skin surface temperature that goes with it – deserves closer analysis.

The reason for saying this is the simple observation that much of the difference could arise from fashions and allowable dress codes – women, in summer and winter, being far more lightly dressed than men. The male equivalent of women's hot-weather office dress is closer to open-necked summer shirts, shorts and sandals without socks, but with a lightweight cardigan 'to hand'.

Conversely, in winter, the female equivalent to men's cold-weather dress is closer to a warm cotton vest, serge or heavy jeans trousers, a heavier cotton shirt, plus tie, closed shoes with socks, and with a pullover – or jacket or waistcoat – 'to hand'.

It would, therefore, be interesting to know, as with Fanger's original research, exactly how all the participant/subjects were dressed. An overall 'clo' value (the unit of measurement for the insulation of clothes) is not adequate, and one really needs detail of clothing to understand whether men and women – when identically clothed – feel the same.

As a backup, staff in offices where the dress code requires almost identical clothing should be studied to see if they have a significantly closer agreement on comfort conditions. It is most welcome to have one's conclusions confirmed as not being simple sexism, but surely it is time that the automatic conclusion that conditions should be altered to suit only women should be challenged as sexist. It would be more appropriate to recommend realistic dress codes for men, or to normalise codes on a thermal basis when employers insist on them.

*John Moss*
*Consultant, building performance and systems*

> It is time the automatic conclusion that conditions should be altered to suit only women should be challenged as sexist

## CIBSE LinkedIn group members debate 'sexist' air conditioning

*Paul McGrath*
Women's clothing style often changes each day, whereas men typically dress consistently, and can easily throw on a jacket or sweater if it's cool.

*Katrina Christopoulos*
Women also have the option of a jacket or cardigan. People of both genders should use layers of clothing to address their needs. As long as a building sits within a sensible indoor air temperature range (21°C to 24°C) there should be no adjustments.

*Hermione Crease*
Dressing warmly and appropriately for a hot commute and a cold office is probably more challenging for women.

*Matt McLeod*
Having managed building controls and HVAC at an airport, virtually every complaint we investigated was due to an air draught, not temperature.

*Bruce Boucher*
The correct definition of air conditioning is: heating, cooling de-humidification, humidification and filtration. Don't confuse comfort air conditioning with the true definition.

*Bob Beattie*
Biggest thing is 'finger walking' on controls, sending the air conditioning into a frenzy. Many systems with room setpoints have a display that allows the culprit to change settings but, after they walk away, it reverts back to the original.

*CIBSE Journal* welcomes readers' letters, opinions, news stories, events listings, and proposals for articles.
**Please send all material for possible publication to: 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.

# WHAT ECODESIGN MEANS FOR HOT-WATER SYSTEMS

New European rules on the manufacturing and labelling of a wide range of products that influence energy use have been extended to cover hot-water systems. **Hywel Davies** explains

Much of the focus on energy saving in the building services sector is on energy use in operational buildings, and how to design buildings that will use less energy. Indeed, the current target for our Building Regulations is to achieve 'nearly zero energy buildings' within the framework of a 'cost optimal' approach to setting minimum energy efficiency standards.

Significant energy use in buildings and elsewhere, however, is caused by the products that are used or installed in them – from personal entertainment devices and kitchen appliances to equipment permanently installed in a building, such as air handling units, boilers, pumps, hot-water producing equipment and lighting.

To reduce the environmental impact of these energy-using products, the European Commission proposed, in 2005, a framework directive setting Ecodesign requirements for all energy-using products (EuP – 2005/32/EC). This enabled the Commission to develop product-specific Ecodesign specifications that would apply at the design phase of the product, and set minimum energy efficiency standards for the products.

In all, 57 different product groups, or lots, were identified, and specifications have been adopted – or are being developed – for many of them.

In 2008, the Commission proposed extending the directive to cover energy-related products (ErP) – such as windows, doors and insulation materials – which do not directly use energy, but have a significant impact on its consumption. The recast directive (2009/125/EC) was adopted in 2009.

The EU Labelling Directive on the indication by labelling and standard product information of energy consumption and other resources by energy-related products (2010/30/EU) provides a framework for EU labelling requirements for all the products covered by the Ecodesign Framework. This directive is currently being reviewed by the Commission and a draft revision has been proposed.

NIKKYTOK / SHUTTERSTOCK

Requirements for water heaters came into force on 26 September

> Honest mistakes will be treated appropriately, while those, who have no intention of complying, will be targeted

The Commission estimates that adopting these labels and standards will save, overall, around 166 million tonnes of oil equivalent (MTOE) by 2020 – which is roughly equal to the annual primary energy consumption of Italy. Consumers are predicted to save around £315 a year on household energy bills and the measures are expected to create £40bn in extra revenue for European companies. And these figures do not take account of the avoided investment in – and subsidies for – the generating capacity that will no longer be required.

The Ecodesign Framework directive does not set binding requirements on products. It creates a legislative framework enabling the adoption of 'implementing measures' on a case-by-case basis for each product group or lot. The list of product groups to be addressed through these implementing measures is set out in the periodic Working Plan. The directive is the joint responsibility of DG Enterprise and Industry (DG ENTR) and DG Energy (DG ENER).

By setting the minimum energy efficiency standards for products at an EU level, and using EU-level implementing measures, the framework not only reduces aggregate energy demand across Europe, but does so using common standards, avoiding the potential for separate standards in different member states. This helps manufacturers wishing to sell building services products across the EU by avoiding multiple standards and compliance requirements.

This is particularly relevant in the case of replacement windows, for which there are already a number of national voluntary schemes, which could hinder cross-border trade.

A major milestone for building services was marked on 26 September, when the regulations relating to the design and labelling of water heaters, hot-water storage tanks and packages

of water heater and solar devices, came into force (see box on the online version of this article at **www.cibsejournal.com**).

There are several regulations covering a range of products, including space heaters, combination heaters and packages of either of these, together with temperature controls and a solar device. They cover electric, liquid fossil-fuelled and heat pump systems. Separate regulations covering the specifications for solid-fuel systems have recently been published, although the labelling requirements have yet to be finalised.

This means that all of these products will now have to meet the design requirements of the relevant regulation, and be labelled. One consequence of this is that the current Compliance Guides for domestic and non-domestic building services – published by the Department for Communities and Local Government (DCLG) as supporting guidance under Part L of the Building Regulations – will need to be updated to reflect the various Ecodesign regulations that have been published since the compliance guides were produced in 2013. DCLG acknowledges the need for an update, but with a spending review under way, we will have to await further announcements.

This particular set of product requirements has been a long time coming, and the leading manufacturers and their trade bodies have been heavily involved in the development of the regulations. Specifiers and contractors will now need to become familiar with the new specifications, especially in relation to labelling and the associated test requirements, which may not be identical to the current test requirements for all products.

## Enforcement

The National Measurement and Regulation Office (NMRO) is responsible for the enforcement of the Ecodesign directives. It offers business support to increase compliance, alongside market surveillance and product testing, and provides comprehensive guidance on a government website at **http://bit.ly/1ONHiFN**

NMRO policy states that enforcement should be proportionate, intelligence-led and risk-based, with minimum form-filling and information requests, with forms and required data provided electronically, if convenient.

NMRO states that it 'will assist industry to comply with the regulations by working with stakeholders, and providing the best information and advice possible. In all cases of non-compliance, the full suite of possible actions will be considered, and the most appropriate selected to help those aiming to comply and pursue vigorously those that intend to flout compliance, including possible prosecution.'

In other words, honest mistakes will be treated appropriately, while those who have no intention of complying will be targeted – an approach that might well be adopted by other enforcement bodies.

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

# OUR VOICE AS ONE

What should the institution's contribution be to the resilience of our cities? **Susie Diamond** makes an impassioned appeal to CIBSE Members with vision, passion and a story to share, to contribute to a collection of essays on the issues and challenges of future city design

I was drawn to join the new CIBSE Resilient Cities Group through a funky mixture of curiosity and pessimism about the future of our urban environments.

Cities around the world have been evolving for centuries, at an ever-increasing pace. What they will look and feel like to inhabit in even 50 years' time is hard to imagine.

A large proportion of our current buildings will probably remain, but they will be interspersed with many new ones – and the way we'll be using them could be very different. Some of this change could be really exciting, but I am troubled by the uncertainties of climate change and what the implications might be for future generations of city dwellers. How will we manage to maintain the standards of comfort we are used to, and keep using the technology we value, without exacerbating climate change?

When this group got together, we quickly realised that writing a definitive guide for CIBSE members on adapting and designing resilient cities was not a realistic proposition.

A great deal of work is being done across many sectors to plan and 'future gaze' on this subject. Organisations such as The BRE Trust Future Cities Programme, the C40 Cities Group and the Future Cities Catapult are just the tip of the iceberg.

So we felt a more useful remit was to start collating and disseminating the information already out there that is most relevant to CIBSE members. In this way we can begin to create some thought leadership on what our contribution to the resilience of our cities should be.

The Cabinet Office definition of resilience is 'the ability of assets, networks and systems to anticipate, absorb, adapt to and/or rapidly recover from a disruptive event. In its broader sense, it is more than an ability to bounce back and recover from adversity, and extends to the broader adaptive capacity gained from an understanding of the risks and uncertainties in our environment.'

RADOSLAW MACIEJEWSKI / SHUTTERSTOCK

**A collection of CIBSE-oriented essays might inspire or even enrage**

One dissemination avenue that the Resilient Cities Group is pursuing has been inspired by a book edited by Angela Brady, past president of the Royal Institute of British Architects (RIBA) and director of Brady Mallalieu Architects. Entitled *The British Papers: Current Thinking on Sustainable City Design* (RIBA Publishing), it is a collection of 31 essays – covering a wide variety of topics and themes – that give diverse personal perspectives on the issues and challenges of future city design.

The contributors are largely from an architectural background, and their pieces are illustrated, short and relevant. It's a really good read.

So why not develop the theme and build a similar collection of essays with a CIBSE focus? We know lots of interesting people within the industry – people with vision and passion; people with a story to share or a new technology to develop.

> The ideas may be ignored or, ultimately, may make their way into our thought processes

Climate modelling has given us a good idea of where the Earth's climate is heading, but there is a wealth of opinion about how this will affect us, and how our cities will adapt and evolve to suit conditions in the late 21st and 22nd centuries. Hearing these voices would be inspiring, thought-provoking – or even enraging. The ideas presented may be ignored and forgotten or might take hold and, ultimately, make their way into our thought processes and the way we practice our work.

Without the resources (yet) to publish a physical book, we are inviting essayists to write pieces to be published on the group blog as part of a series that will build up over the coming months.

If you are interested in contributing to this, please get in touch with us at **resilientcities@cibse.org**

**SUSIE DIAMOND** is partner, Inkling LLP, and vice-chair of CIBSE Resilient Cities Group

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Soft landings is instrumental in helping Aecom target tough energy requirements for the University of East London's new library in Stratford. **Andy Pearson** found out how continual refinement of the building, once in operation, helped it win CIBSE's New Build Project of the Year (up to £10m) award

# BUILDING BY THE BOOK

The University of East London's brief to Hopkins Architects and services consultant Aecom was clear: design a new library for its Stratford campus that would meet its exacting sustainability agenda and extremely low operational energy targets.

Its brief set an annual energy target of 100kWh/m² for both regulated and unregulated energy consumption, including small power and IT systems, for the new three-storey building. 'It was quite a tight target for a library open 24-seven,' says Sara Kassam, CIBSE's head of sustainability development, who – at the time – was UEL's sustainability manager and one of the team responsible for setting the energy standards that were integral to this challenging brief.

To put the target into context: the Elizabeth Fry Building, widely recognised as one of the most energy efficient university buildings in the UK, has an annual energy use of 98.8kWh/m² based on a daytime, weekday occupancy. 'The building we set out to design was effectively operating three times longer than the building we were trying to match it against,' says Martin McLaughlin, a regional director at Aecom.

Aecom's solution for the £8.6m scheme has been to develop a demand-led building services design, which – according to McLaughlin – means energy-consuming plant 'is only ever on when it is needed'. It is a solution that is starting to reap rewards; the building is still undergoing intensive fine-tuning as part of its soft landings programme but currently its annual energy consumption is 164kWh/m².

The design team's efforts were recognised at this year's CIBSE Building Performance Awards, where the scheme won the New Build Project of the Year (for schemes with a value of up to £10m) category. The judges described the scheme as 'A fantastic achievement for a very complicated project with clear and ambitious targets'.

The starting point in the development of the low energy design for the 4,200m$^2$ library was in gaining an understanding of how the new building was likely to be used at different times of the day throughout a year. 'Having an in-use energy target meant that we had to understand occupational use,' explains McLaughlin.

Fortunately the university had occupancy data for the campus's current library. This showed, as expected, that the number of students using the library dropped significantly overnight, but that there were still sufficient students present and equipment operating to create a small services demand.

'The risk with this is that if you put up a simple building that operates with simple controls, there is a danger that all the lights will be switched on and all the plant will run,' McLaughlin says. 'Developing a demand-based solution meant that actual operational loads could be minimised by operating plant only when it is needed'.

A demand-led displacement ventilation system keeps the building supplied with fresh air through an underfloor variable air volume (VAV) system. To ensure the system can cope with occupancy levels, which vary from several hundred during the day to as few as 15 insomniacs dotted about the three-storey library at night, the floor plates have been sub-divided into 6m by 6m ventilation cells.

Each cell has its own VAV box, complete with temperature and carbon dioxide sensors to control the quantity of fresh air supplied to the cell. 'This system ensures that at night, ventilation to each cell can be shut off unless the controls say it is needed,' explains McLaughlin. Cooling, for example will only be provided to a particular zone when it is occupied and when its temperature rises above the set-point.

Air returns from the floors to four roof-mounted air handling units (AHUs) via the building's central light well – a duct-free solution that helps eliminate duct friction losses to keep fan power to a minimum.


> Aecom's solution has been to develop a demand-led building services design, so energy-consuming plant is only ever on when needed

The AHUs have been selected to minimise energy consumption. 'We opted for a bigger air handling box to keep air speeds and specific fan powers low, which is important for a fan that will operate 24-seven,' says McLaughlin. In addition to their generous dimensions, each AHU is fitted with a mixing box controlled by a $CO_2$ sensor to maximise recirculation of treated air and minimise the energy needed for treating fresh air. Heat is also recovered from the exhaust air by a thermal wheel.

'During the day the library is very heavily occupied so we set the units up with the best possible set-point for energy efficiency, meaning the $CO_2$ level is at the higher end of the acceptable range, but with the option of the university switching to a lower $CO_2$ setting using the building management system, if the library starts to feel stuffy,' McLaughlin explains.

To help keep the building cool, the AHUs incorporate a cooling coil. 'Because we're using a displacement ventilation system, it means the chillers can make use of free cooling for the 85% of the year when the outside temperature is below 18°C.'

The design team did look at other cooling options, including an underground thermal labyrinth and a TermoDeck-type solution, where the supply air passes through hollow-core floor planks. These were developed and analysed with a lifecycle costing analysis undertaken to develop the solution. The university's facilities team involved with system selection as part of the soft landings pre-construction review, dismissed both systems. The TermoDeck solution wasn't taken forward for energy and flexibility reasons, and the labyrinth solution wasn't pursued because of both cost and maintenance reasons. The maintenance team was concerned about keeping the air shaft and labyrinth clean and maintaining good fresh air quality with a low level air intake that would have to be located in the main students courtyard. The designers also looked at natural and stack ventilation-based solutions and a mixed mode option but, after a detailed energy appraisal, the demand controlled solution using big AHUs still proved the most energy efficient option.

To keep plant operation to a minimum, the rectangular building has been designed as a tightly sealed, insulated box. Every element of the building's fabric has been designed to be more energy efficient than the minimum standards demanded by Part L (see panel 'Stratford Library fabric U-values').

In addition, fabric air leakage was measured at a meagre 2.9m³/hr/m² at 50Pa (far lower than the 10m³/hr/m² at 50Pa permitted under Part L of the Building Regulations). 'Because of the 24-hour operation we don't have to heat the building quickly, or cool it back down again, because we've designed it to be kept at a steady temperature,' McLaughlin says.

Thermal mass provided by the building's exposed concrete soffits and reinforced concrete frame help to minimise internal

### Stratford Library fabric U-values

| Element | Part L minimum (W/m²K) | Notional building standards (W/m²K) | UEL's Stratford Library (W/m²K) |
|---|---|---|---|
| Roof | 0.25 | 0.18 | 0.17 |
| Wall | 0.35 | 0.26 | 0.24 |
| Floor | 0.25 | 0.22 | 0.16 |
| Window | 2.2 | 1.8 | 1.5 |
| Rooflight | 2.2 | 1.8 | 1.56 |

**Every element of the building's fabric has been designed to be more efficient than the minimum Part L standards**

temperature fluctuations further. For most of the year the soffits help moderate temperatures by absorbing heat during the day, when occupancy, solar gains and small power loads are at their peak; this heat is then released back to the space at night, when heat gains and occupancy are reduced.

The only exception to this method of operation is during the summer break, when the library closes at night; the system will then operate on a night-ventilation strategy, purging the concrete of excess heat to recharge the thermal mass.

In winter, two gas-fired condensing boilers provide space heating for when temperatures drop below -1°C. The boilers feed a series of trench heating coils, which have been set into the base of the window reveals. The boilers also supply heat to the hot water system thermal stores through a plate heat exchanger, which helps keep the boiler return water temperature low enough to ensure the boilers run in full condensing mode to maximise their energy efficiency.

In addition to the design of the heating and ventilation systems, the designers also followed the demand-led approach to reduce lighting and small power loads. 'When we looked at the initial energy appraisal for the building, a big chunk of energy use sat with small power and lighting,' says McLaughlin. He said that a mixture of high frequency T5 lighting and LED's were used throughout the building.

Rather than use high levels of illumination across the floors, the team opted for the lower energy solution of using task lighting focused on the bookshelves and desks, supplemented by minimal background lighting. In keeping with the demand-led approach, all light fittings incorporate presence detectors, while light fittings around the building's perimeter and atrium additionally incorporate daylight sensors to make the most of natural light.

The building's electrical supply is supplemented by a 409m$^2$ area of photovoltaic panels covering its roof. These are expected to provide 55,075 kWh/y of electricity, giving a present value payback in the range of 11-16 years.

To keep IT power loads to a minimum, the university's IT team worked hard to incorporate energy saving features into the building's PCs. In addition, IT server rooms are cooled using outside air blown into the room by a fan. In winter, this warmed air is used to provide additional heating to the library, while in summer it is returned outside. Only when the outside temperature rises above 25°C does a DX cooling system start to operate.

A soft landings engineer (SLE) was engaged during construction and, prior to commissioning, to witness development of the controls and metering strategy. The SLE worked closely with the sub-contractors and project specialists to lead the client training sessions ensuring that, on handover, the UEL team was familiar with the building's engineering systems.

Following the June 2013 handover, a

post-completion soft landings monitoring programme was established to help fine tune the systems and achieve the client's 100kWh/y/m² target. When the scheme opened, for the first two weeks engineers were based on site two days a week, and one day a week for the following month to help optimise the systems in operation. After the initial six weeks, the soft landings project was continued with monthly on-site meetings for the remainder of the first year of operation.

The engineers' continued presence has allowed the design team to adjust the services in response to use and performance. For example, the library's night time occupancy has been lower than expected, which has allowed the operations team to shut down the building's top floor at night, saving further energy.

The soft landings team's job has been even more challenging because of problems with some of the sub-meters, which meant the total energy from the sub-meters failed to equal the total energy consumed on the main meter. 'We had challenges around sub-metering, which were due to a couple of meters giving incorrect readings,' explains McLaughlin. This has now been resolved.

The soft landings team also found that the library's energy consumption was higher than expected. One reason for this was found to have been down to the $CO_2$ set point in one of the VAV boxes having been adjusted from the original position. 'In future we will strongly advocate that there is a BMS head-end screen that gives a detailed explanation as to why each particular set point is important, what its operating range should be, and the likely impact of adjusting the setting operational energy use,' McLaughlin says.

Currently the BREEAM Excellent scheme is consuming 164kWh/y/m². When compared to the original design predictions, actual use has delivered 54% less lighting kWh, 63% less small power kWh, and the server rooms have consumed 80% less energy for both IT and cooling. However, the mechanical systems are consuming more energy than expected, which will require a further period of controls fine-tuning to match the building's services to its operation to meet the clients target of 100kWh/y/m². **CJ**

## PROJECT TEAM

- **Client:** University of East London
- **Architect:** Hopkins Architects
- **Building services engineer:** Aecom
- **Project manager:** JLL
- **QS:** Turner and Townsend
- **Contractor:** Volker Fitzpatrick

## Aecom's building performance awards hat-trick

In addition to winning the New Build Project of the Year (value up to £10m) category, Aecom also scooped the Collaborative Working Partnership and the Building Services Consultancy of the Year (over 100 employees) awards. The Collaborative Working award went to Aecom's team working with the BBC on the transformation of Broadcasting House in London. The judges said: 'The team did so much and achieved a great result.' The Building Services Consultancy award went to Aecom for its provision of a broad range of consultancy and sustainability services, its commitment to training development of its workforce and its investment in research. The judges said Aecom had submitted 'a comprehensive submission that provided really good examples of building performance'.

The building's roof-mounted photovoltaic panels are expected to provide 55,075 kWh of electricity per year

When the project team uncovered issues with a new ground source heat pump in a flagship building at the University of Oxford, it prompted a large-scale investigation of existing HVAC systems across the estate. **Liza Young** looks at how system optimisation is helping the university to cut its carbon emissions

# UNIVERSITY CHALLENGE

When an innovative ground source heat pump system at the University of Oxford's Department of Earth Sciences suffered reliability issues soon after handover, in 2011, the original project team – including Hoare Lea – returned to the building to get the system working and carry out a three-year post-handover review. (See 'All hands to the pump', August 2013 *CIBSE Journal*).

Three main issues were identified: component failure, inconsistencies in the way heat meters had been 'zeroed', and problems with controls. After the team's intervention, the system $CO_2$ savings reached 24% more than predicted.

At the same time, Hoare Lea was appointed to provide technical support for the Midnight Oil project, delivered from 2010 to 2012 by the University of Oxford Estates Services' environmental sustainability team and the Environmental Change Institute. This project aimed to reduce carbon emissions at Oxford's 24-hour access research buildings by better managing their out-of-hours use.

As a result, the university began to wonder whether it was missing other potential issues across its estate. In January 2015, Hoare Lea was employed to carry out detective work on existing university systems that may be failing to reach their full potential.

This carbon-reduction programme – led by manager Lucinda Lay – is imperative for the university, which has set a target to reduce the $CO_2$ emissions across all functional buildings on its estate, in order to meet the requirements of the Higher Education Funding Council for England. By 2020-21, it aims to have cut 2005/06 baseline carbon emissions by 33%, which would equate to 21,773 tonnes of carbon dioxide ($tCO_2$).

The university is currently investing more than £2m per year in carbon-reduction projects on existing buildings. To meet its target using this funding, it is seeking to average £670 per $tCO_2$ saved.

Oxford calculated that optimisation of the BMS would cost £429 per $tCO_2$ saved. This compared favourably with other measures; for example, solar PVs came out at £3,088, lighting at £1,300, and behaviour change at £670. (See chart on page 41 for the cost of 10 energy-saving measures).

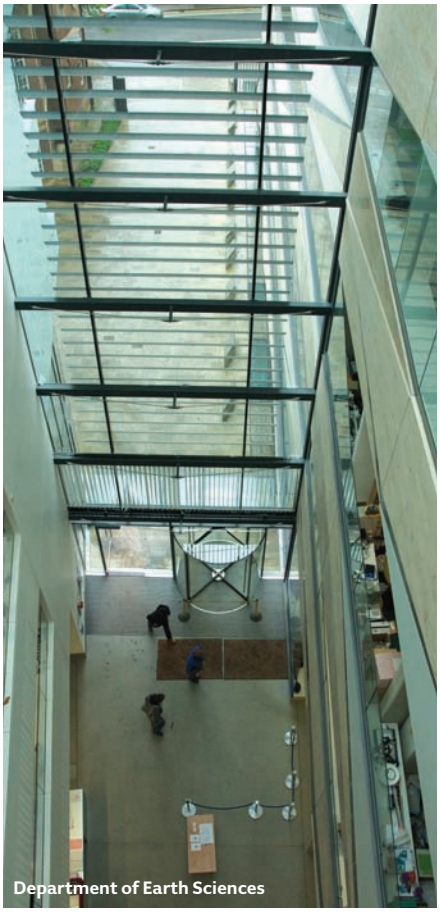
As well as redesigning HVAC system control settings, the university and Hoare Lea have worked with occupants to address the way they interact with the buildings, and to ensure operational instructions are clear.

After calculating the amount of $CO_2$ emitted per $m^2$ per year for every building with a BMS system, Lay decided to tackle the biggest carbon-emitters first.

So far, upgrades to the BMS have been completed at the earth sciences and biochemistry departments, with a further nine departments lined up for 2015-16, including: the Weatherall Institute of Molecular Medicine; Saïd Business School; Old Road Campus research building; the Richard Doll


Department of Biochemistry

CREDIT TIM CROCKER AND KEITH COLLIE


Department of Earth Sciences

building; and the Henry Wellcome buildings.

Hoare Lea's building performance project lead, Eimear Moloney, and the University of Oxford's head of building services, Stephen Pearson, explain how detective work uncovered operational anomalies and helped engineers to optimise HVAC systems.

## Department of Earth Sciences

Moloney says user interaction – and increasing occupants' understanding of how the building systems work – were important steps in the BMS optimisation process at the 7,100m$^2$ Department of Earth Sciences facilities, which are arranged in two wings around a common open atrium.

Moloney and the team first tackled ventilation, including heating and cooling, interviewing students to understand when they were most likely to be using the buildings. The systems were originally set to run between 9am and 5pm, but undergraduates said they used the buildings later in the day, so services were adjusted to operate between noon and 11pm.

Some time was spent analysing the underfloor heating system in the atrium. The team found that the pump for the system was running continuously, even though the hot water was switched off.

It transpired that the temperature sensor activating the underfloor heating pump had been mislabelled on the BMS. Instead the system was being controlled on a sensor in the cold-water system storage tank – indicating to the BMS by the tank's low temperature that the atrium was constantly cold, so the pump was left running.

After the issue was discovered, Hoare Lea activated the correct sensor in the atrium, significantly reducing the run-time of the underfloor heating pump.

Having designed the original services, Hoare Lea knows the importance of a good handover to building users, and has learned that instructions should be easy to understand.

> By 2020-21, the University of Oxford aims to have cut 2005/6 baseline carbon emissions by 33%, which equates to 21,773 tonnes of carbon dioxide

> The word 'plant' resonates with engineers, but to most people that means green things that grow in the ground
> – *Stephen Pearson*

'We are trying to get away from communicating in terms that only engineers would understand, and actually put ourselves in the heads of the users,' says Moloney.

She cites the example of a label on a button that operated out-of-hours ventilation. It was marked 'plant extend', but users failed to understand how this related to ventilation and, as a result, the button was unused.

Pearson adds: 'The word plant resonates with engineers, but to most people that means green things that grow in the ground.

'Although earth sciences is a well run department, with good procedures and staff inductions, you still end up with "plant extend" buttons falling into disuse because recognising what they are for is not intuitive.'

He says understanding human behaviour is a huge part of system optimisation, and the university has made an effort to stop maintenance staff manually overriding plant controls to overcome short-term problems, which inevitably creates long-term issues.

'This is all about providing information, training and support to fitters, rather than "banning" controls from being overridden,' says Pearson. 'That override ignores time clocks and doesn't compensate for outside air temperature, so the system will run like that forever. We want to get across that, if you turn a switch, there will be implications for that building's energy bills.'

Overall, the department saved approximately £15,500 on its energy bill, and 84.5 $tCO_2$.

## Brown-bag lunches

The challenge of BMS optimisation is bringing the user along with you, says Stephen Pearson, head of building services at the University of Oxford Estates Services.

'We have extremely busy departments, and students are motivated by saving energy,' he says, 'but they are also nervous about anything we might do to jeopardise their projects – especially those working in labs, because their environment is sacred.'

A lot of effort was put into ensuring departments had confidence in what they were going to do. For example, the team joined the earth sciences 'brown bag lunches' – a regular get-together to discuss research. 'We saw this as an opportunity to tell everyone what we are trying to do,' says Pearson. 'Once we've done that, people engage much more – and instead of being a "pull" exercise it becomes a "push" exercise, with users demanding change rather than resisting it. When this happens you can really make some big strides.'

Every department is a separate entity responsible for its own energy bills, so the team had to keep all users and managers in the loop.

'We cannot run departments independently of the users and facilities' managers,' says Pearson. 'Unless there's information flow, the nuances of design enabling that performance aren't going to happen.'

Moloney adds: 'We've had success with this project because of the willingness of the building managers to embrace change. Dave Muller (biochemistry), Ashleigh Hewson (earth sciences) and Roger Essex (Saïd Business School) have been critical to its success.'

### Department of Biochemistry

The Hawkins Brown-designed biochemistry building was completed in 2006, and is the fifth-largest emitter of carbon dioxide in the university's portfolio.

After the university's and Hoare Lea's intervention – which included optimising the chillers, variable air volume units (VAVs), and the atrium and bioinformatics ventilation systems – the department has saved approximately £33,815 and 185 $tCO_2$ – or 5.8% on its annual emissions.

The chiller plant has its own internal controls, running at 6/12°C. The plant sequencing was inefficient, however, with both chillers running almost continuously. The team made changes to the controls, which


CREDIT DAVID FISHER

Earth sciences (left) and Saïd Business School (above)

meant the second chiller only operated when the lead chiller had reached 100% load. They also optimised frost-protection controls and run-on times of the shunt pumps. In total, the reconfigured chiller controls saved £4,000 and 18 $tCO_2$ per year.

Overnight setback of VAVs in laboratories and write-up areas was another major carbon saver for the department. Because the building had been designed to operate 24 hours a day, all the spaces were conditioned at all times, regardless of occupation. Although controls were demand-led, investigations also uncovered an excess of conditioning.

Each lab has an associated write-up area, connected to a large atrium, and because these spaces had a secondary source of conditioned ventilation, the team reduced the flow rate from the VAVs to the write-up areas to 0 l/s during the low-occupancy period between 8pm and 8am, saving £20,500 and 105 $tCO_2$. A $CO_2$ sensor was installed so the space could be closely monitored, and there has been no impact on conditions to date.

Moloney believes even more can be saved, however: 'The VAV boxes have their own controls, so we cannot change parameters through the BMS. To get the changes made, we had to have the right people on site, doing things manually. But some changes seem to have made no difference. Even though the BMS is saying a damper is closed, we can see it is open. The signal is not getting to it, so we have to keep monitoring and making changes.'

The team then addressed the ventilation in the atrium, which – aided by high-level extract fans – uses the stack effect to heat the building and reject unwanted heat. The incoming air comes via the undercroft, which has a 120kW heater battery designed continuously to supply the atrium with air at 19°C.

Although installed for a valid reason, Moloney says occupancy levels in the atrium did not warrant 24-hour heating. The team updated the controls so the system turned off at night, making a yearly saving of about £7,000 and 50 $tCO_2$ (see graph, below). 'Although a small win, it was easy to do, and we looked at it because we were hungry for more savings,' says Moloney.

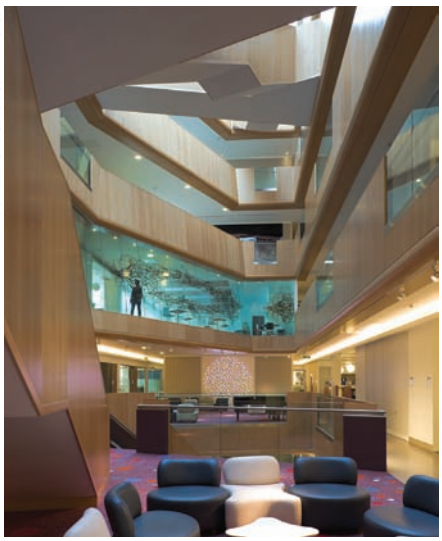
Finally, the bioinformatics room had been designed to serve a heavy IT load, but was being used as a typical office. As a result, the existing ventilation system, which comprised two large wall-mounted air conditioning units, 26 floor fan units, and central air handling units, was over-specified. The team's decision to disable one air conditioning unit and 13 floor fans, resulted in annual savings of £1,860 and 10 $tCO_2$.

System optimisation implemented at the biochemistry department resulted in an overall $CO_2$ reduction of 185 tonnes, shaving £33,000 off its £570,000 annual energy bill.

## Saïd Business School

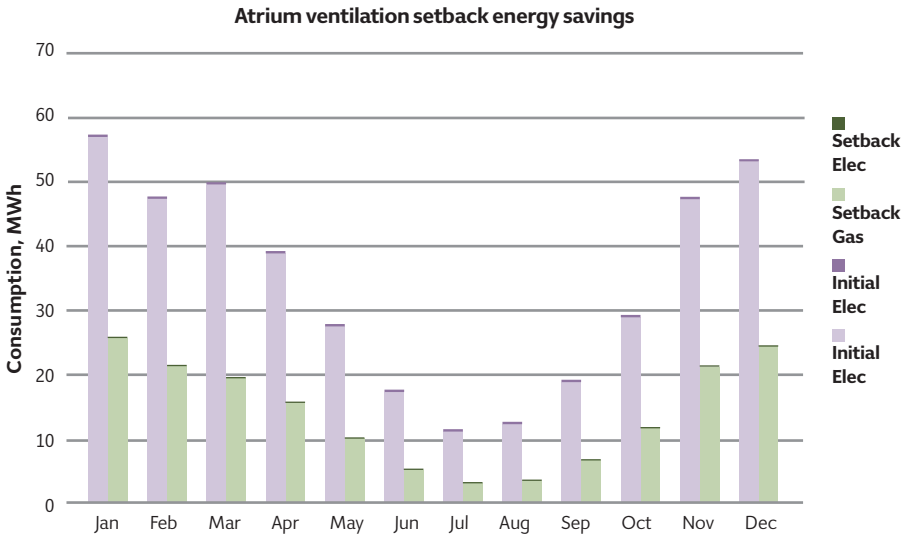
Conditioned ventilation of the five large lecture theatres at the Saïd Business School is one of its biggest energy consumers.

A lack of integration between the room-booking system and the BMS is common in many teaching spaces, and Saïd Business School is no different: ventilation has been set to run continuously from 7am to 11pm, regardless of whether the rooms are occupied. Changes to air flows can only be made manually, however, because the rooms are



CREDIT TIM CROCKER AND KEITH COLLIE

Department of Biochemistry atrium




The updated controls in the biochemistry atrium have resulted in a yearly saving of £6,919 and 50 $tCO_2$

# Electrical storage will support a flexible energy future

**Paul Reeve, Director of Business Services at the ECA, discusses the future of renewables and energy storage.**

A major - and well known - downside of renewable energy systems such as solar PV and wind turbines is that they don't always produce power when it's most needed. So, for example, the UK output from the installed wind capacity varies from a still very impressive 7GW to a less remarkable 500MW, when measured over a given day, and some of it is generated when it is needed the least. A cost-effective method of storing electrical energy is therefore a vital asset in addressing peak energy demand and smoothing out the energy taken from the local power network.

And in recent times, considerable attention has been given to the use of Lithium-ion and other chemical means of localised electrical energy storage, such as the Tesla 'Powerwall'.

A key goal is to be able to store electrical energy at less cost than it takes to generate it. If this can be done, at scale, then electricity could be used for heating buildings more cheaply than gas heating, and much of this heating will come from renewable energy sources, which are vital to lowering carbon emissions. More has to be done with the technology, and it's worth pointing out that energy storage in buildings does not come without operational challenges.

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For example, a large capacity battery has a potentially very high fault current and the design of an electrical installation should take this into account, and incorporate the necessary protective devices. Commissioning initial and periodic testing will require equipment and procedures that ensure work is carried out in safety. If the installation is designed to work autonomously, then equipment to enable synchronisation with the local power network will also be required. Furthermore, any design of storage and 'smart' systems needs to take into account the safety and stability of the overall power network, which will be transformed from a central power network to a network with many distributed power sources, acting independently.

Improved access to cost-effective energy storage is vital if we are to harness the UK's renewable energy sources to the full. High capacity batteries and other storage solutions present challenges but the solutions are increasingly out there, or appearing on the horizon. Cost-effective storage is still a work in progress, but developments in electricity storage products and services should make the next few years very interesting for the building services industry and its customers.

*Paul Reeve CEnv is Director of Business Services at the ECA.*

booked on an *ad hoc* basis. The brief when the school was constructed, in 2005, was to ensure the spaces were readily available for last-minute meetings. Since then, technology has moved on and the team believes it may now be possible to join the Trend BMS with the room-booking system.

Booking data for 2014 indicates the air-handling units in the five rooms were on for 5,000 hours, even though they were occupied for only 1,400 of these. This is equivalent to 100 tonnes of $CO_2$ potentially being wasted.

A similar situation has been tackled at Imperial College London, where the head of IT has written software to connect the BMS with its internal booking system. Hoare Lea – working with John Matthews, head of BMS at the University of Oxford, ABEC Controls, and the Saïd Business School – is hoping to apply this solution in Oxford. 'If it works, it could be replicated across the university,' says Moloney.

## Forward thinking

University of Oxford Estates Services has significantly benefited from continuing appointments beyond practical completion, and now requires all major capital projects to undergo a form of seasonal commissioning.

It has extended appointments to three years for every new building, to optimise systems according to users' needs.

Lay says: 'We want to encourage capital teams to build significantly longer post-occupancy into their budgets, so buildings are not left to run themselves for years without any optimisation.'

Moloney adds: 'One of the arguments we come up against from clients is that they have already paid for a building that works. But that's not right. Clients have paid for a building that complies with a set of arbitrary conditions, which often have very little basis in reality. Every building is a prototype and it needs to be seen as such. It's not going to be perfect from day one. There will always be spaces that get used for something else – so you end up ventilating a storeroom – or grilles that people put books against.'

Lay says the university is on track to reach 53% of its target by the end of 2016. Its BMS optimisation programme has begun to address inefficiencies and will now be complemented by new buildings that are fine-tuned for 36 months post handover.

Universities are notoriously competitive (just ask Jeremy Paxman) and other institutions will no doubt be following Oxford's HVAC optimisation project with interest. King's College London is another enlightened university; its use of BMS optimisation software from CIBSE award-winner Demand Logic has helped it save £400,000 per year. **CJ**

● See 'Knowledge is Power', December 2014 *CIBSE Journal*, for more on Demand Logic's work at King's College London

**Carbon savings programme – £/t$CO_2$ for each category**

- Motor controls – £308
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- Lighting - £1,300
- CHP – £1,885
- Building management system – £429
- Insulation pipework – £776
- Equipment – £1,187
- Behaviour change – £670
- Insulation roof/walls – £306
- Solar PV – £3,088

**Optimisation of the BMS costs £429 per tonne of $CO_2$ saved**

**Each lab in the biochemistry department has an associated write-up area (right) connected to a large atrium**

# BUILD TIGHT VENTILATE RIGHT?

Indoor air quality in housing is being compromised because ventilation scenarios in Building Regulations are not realistic, says Strathclyde University's **Stirling Howieson**, who co-wrote the paper that won the 2015 Napier Shaw Bronze Medal

> Reliance on trickle ventilators to provide background ventilation in airtight buildings should be reconsidered

In 1992, Perera[1] gave us a clear rationale 'build tight – ventilate right'.

The paper emphasised that a building cannot be too airtight, but it can be under ventilated. This approach built on a BRE publication[2] claiming there was wide acceptance that a whole house ventilation rate of 0.5ach$^{-1}$ – supplemented by mechanical air extraction during cooking and bathing – was sufficient to dilute indoor pollutant concentrations and suppress relative humidity below 70% (the threshold associated with problematic condensation and mould growth).

Trickle ventilators incorporated in window frames appeared to be the answer, and this strategy was subsequently enshrined in the Building Regulations as being satisfactory.

In 2011, the Scottish Government – concerned that 20 years of retrofit programmes appeared to be making little impact on condensation dampness figures – as reported in the *Scottish House Condition Survey* – revisited this area and commissioned the BRE[3] to test whether the standard remained robust for a new generation of 'airtight' dwellings.

A mid-terrace dwelling at Garston was selected and tested under a variety of conditions. The report concluded that dwellings built to the new airtightness standard of 5m$^3$/m$^2$/hr@50Pa, which incorporate trickle vents, will provide air change rates roughly in line with CIBSE's recommendation of 8l/s per person.

To those working in the field, progressively aware new dwellings are both 'stuffy and stinky' (hence the increase in the air freshener market), such an outcome did not ring true.

The test protocol used by the BRE measured $CO_2$ decrement with all internal doors wedged open, creating a unified air mass of 192m$^3$. Such a test method ignores 'real life' scenarios, given that, in practice, occupants tend to keep internal doors closed for reasons of privacy, noise transmission, thermal comfort and, in flats, will be required to do so for fire safety.

There was also no occlusion of the vents by blinds or curtains. Such test conditions would undoubtedly result in external wind conditions driving both positive and negative pressures on the

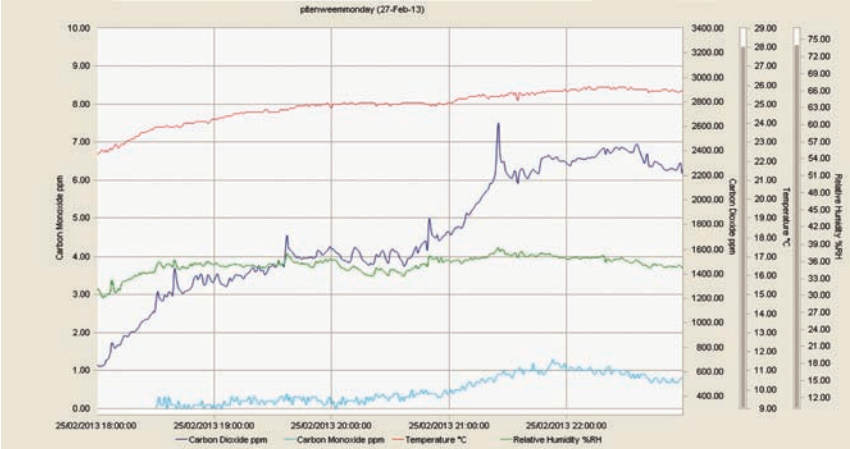


Figure 1: Living room (MHRV disabled)

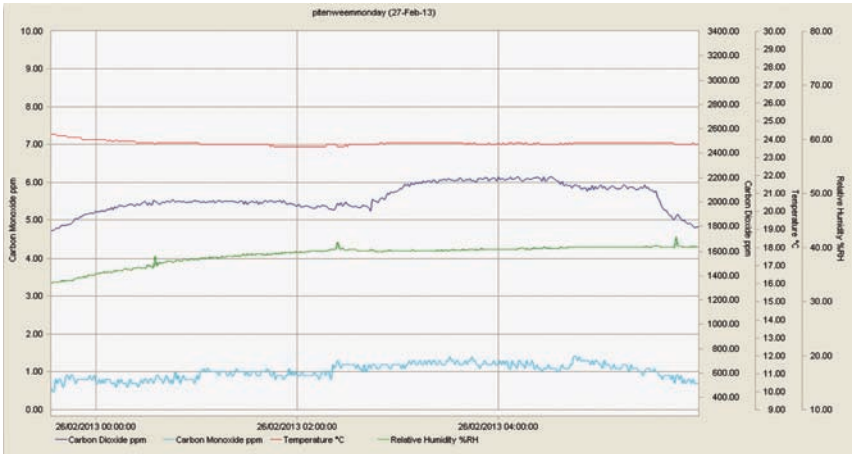


Figure 2: Bedroom (MHRV disabled)

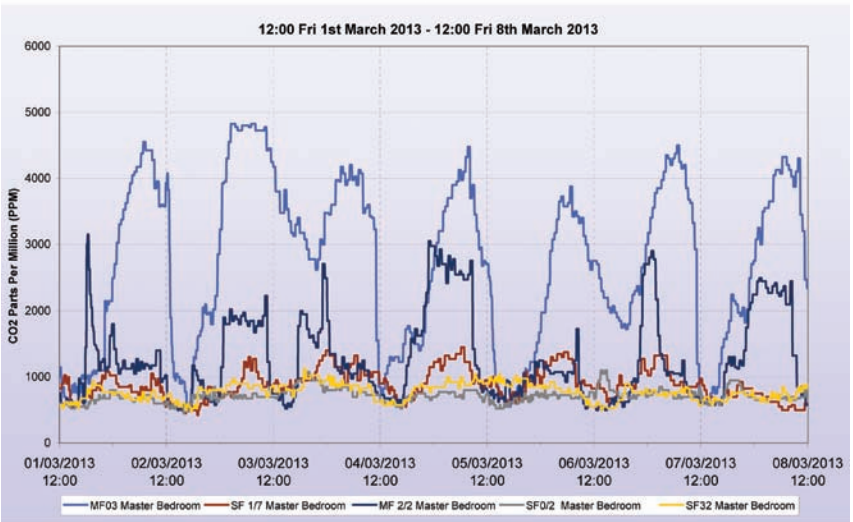


Figure 3: CO2 levels in a Glasgow bedrooms

elevations, producing cross, displacement and stack ventilation. The task presented was thus to identify a 'tightly' constructed test house, where air quality under 'real life' conditions, could be measured in discrete room volumes.

## Measuring air quality

A recently completed Passivhaus in Fife, provided an opportunity and air pressure testing produced a figure of 1.18m³/m²/hr@50Pa. The tightness of this dwelling was then reverse-engineered by fitting tarpaulins to the living and bedroom windows with standard trickle vents incorporated. After achieving the target air leakage/infiltration rate of 5m³/m²/hr@50 Pa, $CO_2$ levels in the occupied living room (five people) and master bedroom (two people) were monitored, for 48 hours.

## Results

When occupied by two adults and three children, $CO_2$ levels in the living room (Figure 1) climbed at a rate of 514ppm/hour, peaking at just above 2,600ppm. In the master bedroom, which had an unusually large volume for a public sector, tenanted dwelling (44m³), two adults were able to maintain the $CO_2$ level of 2,200ppm for the eight-hour overnight sleeping period – well above the recognised 1,000ppm threshold. For bedrooms with the more typical volume of 28m³, equivalent $CO_2$ generation would be likely to peak at more than 4,000ppm. When the MHRV system was re-activated, $CO_2$ levels fell and were maintained within a range of 910-1,280ppm.

Coincidentally, colleagues at the Mackintosh Environmental Architecture Research Unit were monitoring a range of new-build houses in five locations across Scotland. Airtightness of these dwellings had been measured with an average of 4.66 m³/m²/hr@50Pa. $CO_2$ levels in occupied bedrooms provided a good comparative measure because they tend to have consistent conditions in terms of occupancy and ventilation regimes. Figure 3 shows $CO_2$ levels measured over a seven-day period at one location in Glasgow.

This data shows a consistent pattern for $CO_2$ with levels in the bedrooms consistently rising to an overnight peak of 4,800ppm. Longitudinal observation of $CO_2$ levels across all 20 new dwellings confirmed high levels in bedrooms at night, with an occupied mean peak of 2,317ppm, and an occupied time-weighted average of 1,834ppm (range 480-4,800ppm). Although such levels may induce headaches and relatively minor physiological changes, $CO_2$ is normally found in 'bad company', and these figures indicate that occupants in new-build dwellings are being exposed to much higher concentrations of toxic compounds and particulates, off-gassing from a multitude of indoor pollution sources.

## Occupants and trickle vents

This work triggered a further investigation by the Building Standards Division of the

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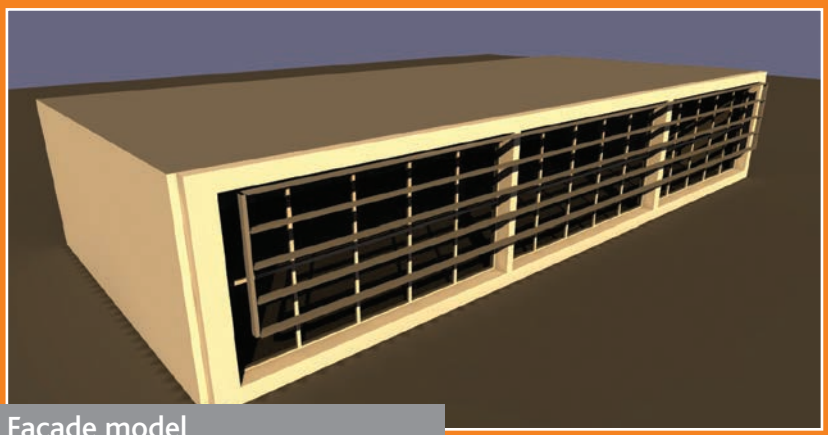
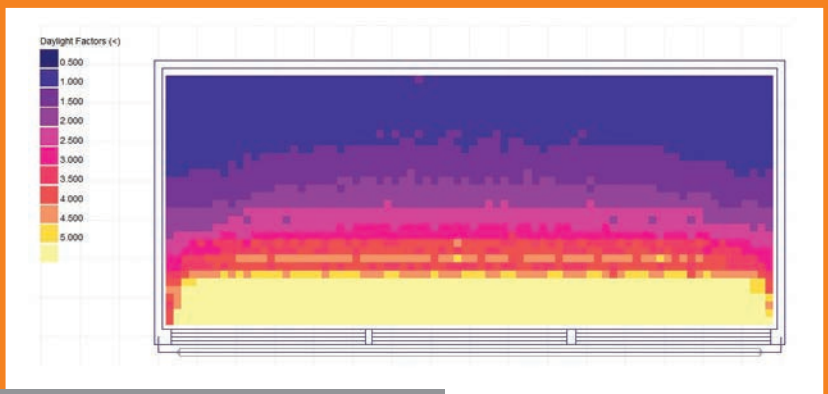
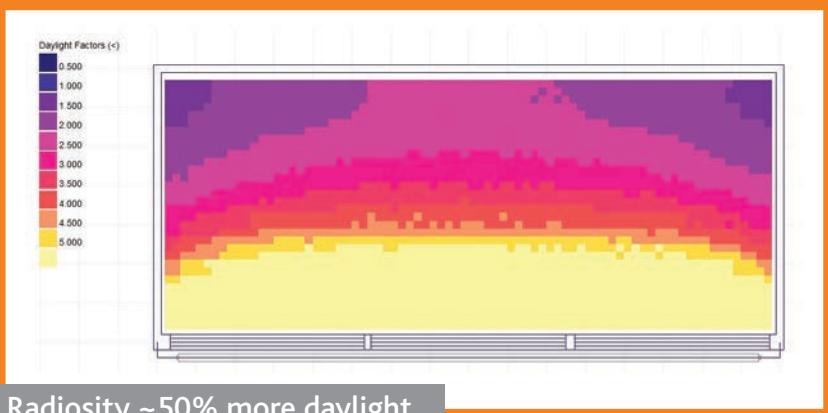


Façade model




BRE Split Flux daylight

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Scottish Government, to investigate occupier interaction with a dwelling's ventilation provision. The subsequent contract required the research team to survey more than 200 new-build homes. This study found that 65% of occupiers had no interaction with their trickle vents, with the majority being kept permanently closed.[4] Although the survey did not attempt to measure the effect of vent occlusion from blinds and/or curtains, such barriers would undoubtedly have an inhibiting effect on air flow in the 25% of dwellings where vents were kept open.

In addition, more than 40% of occupants reported they kept their bedroom doors permanently closed. Closing bedroom doors is entirely rational and, where this occurs, trickle vents on one window elevation are opening into what is effectively a 'dead-end'. Without a potential exhaust, it is difficult to conceive how an opening area of 12,000mm$^2$ could provide anything close to healthy ventilation rates; an air exchange of 120m$^3$ (intake and exhaust) per hour being required through the slot, when a bedroom is occupied by two adults.

These studies demonstrate why current regulations are not fit for purpose. They highlight the drivers behind the acceleration in the deterioration of measured indoor air quality that is apparently, inadvertently, caused by airtight construction techniques.

## Conclusions and recommendations

New airtight construction targets are reducing what could be perceived as historically fortuitous background ventilation rates, and this is likely to result in a more toxic indoor environment, with significant negative long-term and insidious impacts on public health.

Technical Standards should be enforced with designers and house builders required to demonstrate a planned ventilation strategy that maintains 'healthy' IAQ (below 1,000ppm) in all occupied rooms.

Reliance on trickle ventilators to provide background ventilation in airtight buildings should be reconsidered, with a greater emphasis placed on the planning and prediction of overall house ventilation strategies, taking into account, either solely or in combination: cross, stack, permanent, displacement and mechanical ventilation, whether positive pressure or balanced.

Monitoring or control of actual performance, for immediate feedback to occupants or mechanical systems, could be achieved by using $CO_2$ or humidity sensors. This could include a small $CO_2$ 'traffic light' installed in the living room to alert occupants when levels exceed 1,000ppm (amber) and 2,000ppm (red). This may stimulate occupants to open a window, allowing $CO_2$ levels to equalise with external air. **CJ**

## References:


1 Perera E & Parkins L, *Build tight – ventilate right*, Building Services, Chartered Institution of Building Services Engineers, London, June 1992, pp 37-38.

2 Building Research Establishment. *Digest 297: Surface condensation and mould growth in traditionally built dwellings.* BRE Press, Garston, 1985

3 Building Research Establishment. *The effect that increasing airtightness may have on air quality within dwellings.* Scottish Government, Building Standards Division, Livingston, April 2012

4 Occupant interactions and effectiveness of natural ventilation strategies in contemporary new housing in Scotland, UK, Sharpe T, Farren P, Howieson S, Tuohy P, McQuillan J, 21 Jul 2015 *International Journal of Environmental Research and Public Health.* 12, 7, p. 8480-8497 18 p.


**STIRLING HOWIESON** is a senior lecturer in architecture at Strathclyde University

Airtightness test on Fife Passivhaus

## The 2015 Napier Shaw Bronze Medal

This summary is based on the paper *Building tight – ventilating right? How are new air tightness standards affecting indoor air quality in dwellings?* by Stirling Howieson, T Sharpe and Paul Farren of the University of Strathclyde.

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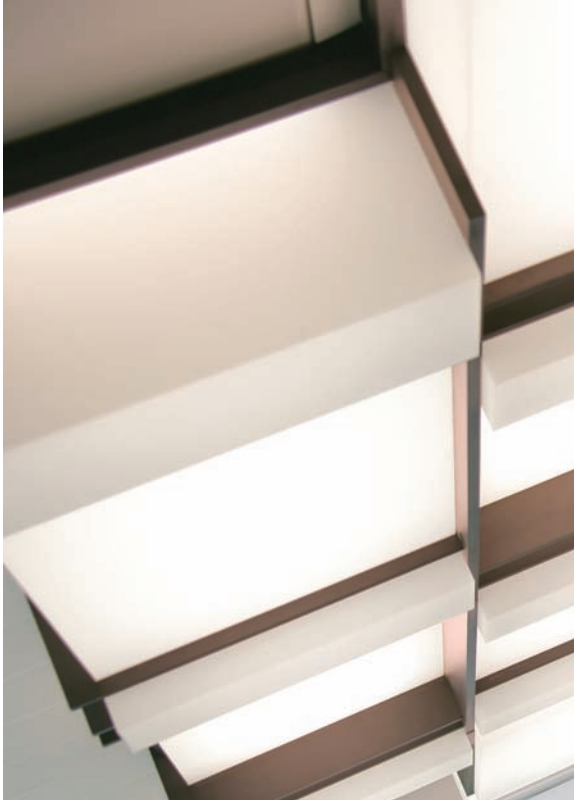
# Bank of LIGHTS

An interlocking cuboid lantern forms the centerpiece of an entertainment suite at a prestigious global bank. **Alex Smith** pieces together the design puzzle



A room named after the founder of a prestigious global bank was bound to impress, with floor-to-ceiling glazing to the south and west sides of the corner room on Victoria Embankment offering City financiers sweeping views of the Thames.

In the interior, the visitor's attention is drawn upwards to a jigsaw of diffuser boxes attached to the ceiling of the L-shaped space. These cuboids of varying sizes and depths are bound together by a fine bronze trim and backplate, and make up the 6.1m x 4.8m lantern that provides lighting to the room.

The design by architect Gensler looks simple and elegant – it bears a resemblance to one of Charles Rennie Macintosh's rectilinear designs – but its appearance posed some challenges for the lighting manufacturer Future Designs, which had won the contract to replace lighting in this London office.

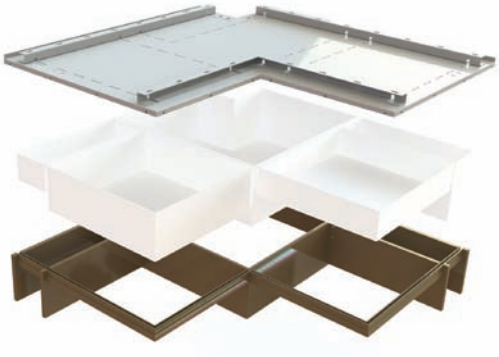
The room hosts client meetings and presentations during the day and formal dining and corporate events in the evening. The luminaire had to provide even illumination during business hours and a warmer atmosphere for more informal events in the evening.

With the natural daylight constantly changing, the lantern's cubes had to be adjustable to maintain an even distribution of light. Every box is dimmable and glows at different colour temperatures between 2,700K and 5,000K depending on the requirements of the users and the daylight levels.

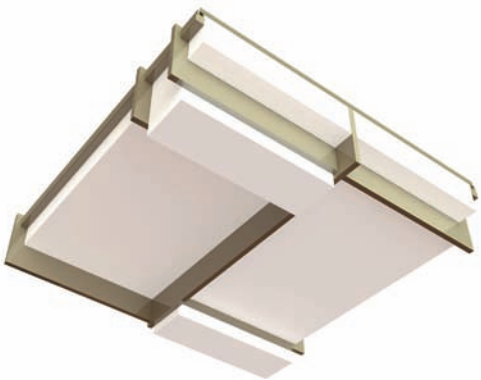
The varying geometry of the cubes meant the LED boards in each had to be programmable to enable each fixture to appear identically illuminated.

The end result is simple and elegant, but its appearance belies the complexity of the design process. The following explains how Future Designs met the client brief.

Modular and exploded views helped the manufacturer develop the invisible fixing and integration method for the trays, cubes and bronze frame divider.

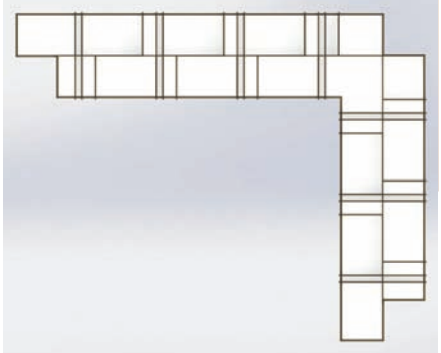


Gensler's rendering depicts the architect's view of the space, which enabled the manufacturer to capture a clear image of how the installation should look.



The render captures detailing of the luminaire allowing critical dimensions and aesthetics to be checked.

A reflected ceiling plan detailed the modular elements of the design.

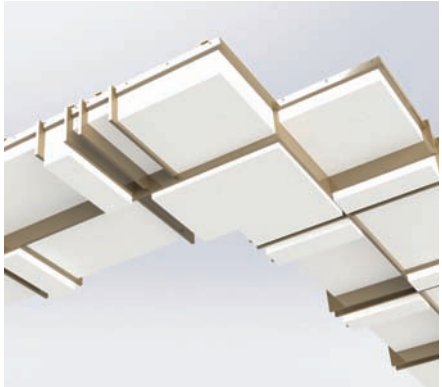


## KEY FACTS

- 166,500mm flexible LED mounted to individual aluminium heatsink
- 83,250mm of 2,700k and 83,250mm of 5,000k LED working in pairs
- 6,660 high efficiency LED chips
- 20mm solid aluminium plate fins anodised Analok 549 bronze
- 43 hand made bespoke diffuser cubes
- Every diffuser cube individually controllable with dimming and colour change
- Future Designs supplied 3,800 LED luminaires for general office areas

LED light engines were tested within the light boxes to check for optimum spacing, colour consistency & heat dissipation. To obtain the desired effects Future Designs experimented with various components and materials, the LEDs' pitch and the spacing between the rows of LEDs

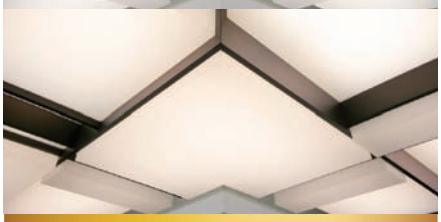
The trays mounted in the ceiling show different rows of colour temperature LEDs. DALI dimmable control gear meant each LED section could be tuned to provide an even level of illumination across each diffuser box.



A full 3D render was compared to the architect's design and used for final design checks to ensure measurements were accurate.

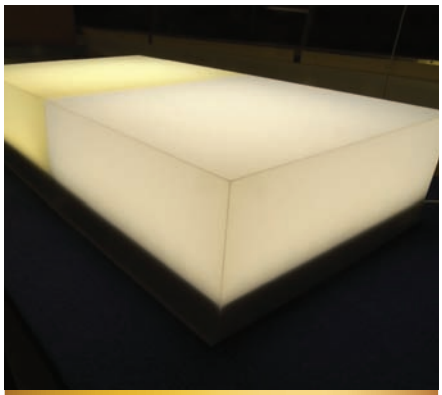
There was no time or budget for a full mock up.

LED trays were fabricated in the factory.



Above, cool white (5,000K) and below warm white (2,700K)

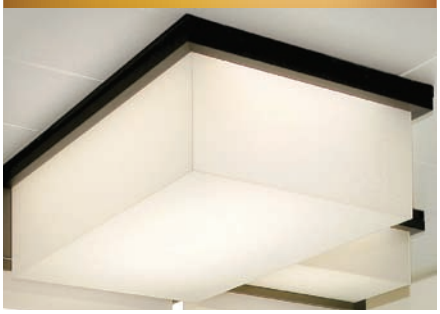
The LEDs allow the lantern to be illuminated in cool white, warm white and any temperature between, enabling the users to create different moods.



A series of light tests were performed using a mock-up of the largest cube, which could be divided into various sizes and depths to cater for every eventuality.

The frame dividers are constructed from 20mm extruded aluminium. An anodised finish matched Gensler's specification – Analok 549 bronze – which complemented the room's aesthetic.

The diffuser boxes have no adhesive joint visible, and each box was fabricated from mitred panels to +/- 0.1mm and bonded by hand.



To access the lighting, the lantern has been designed in eight sections, which can be individually lowered to allow access for maintenance of the air conditioning system.

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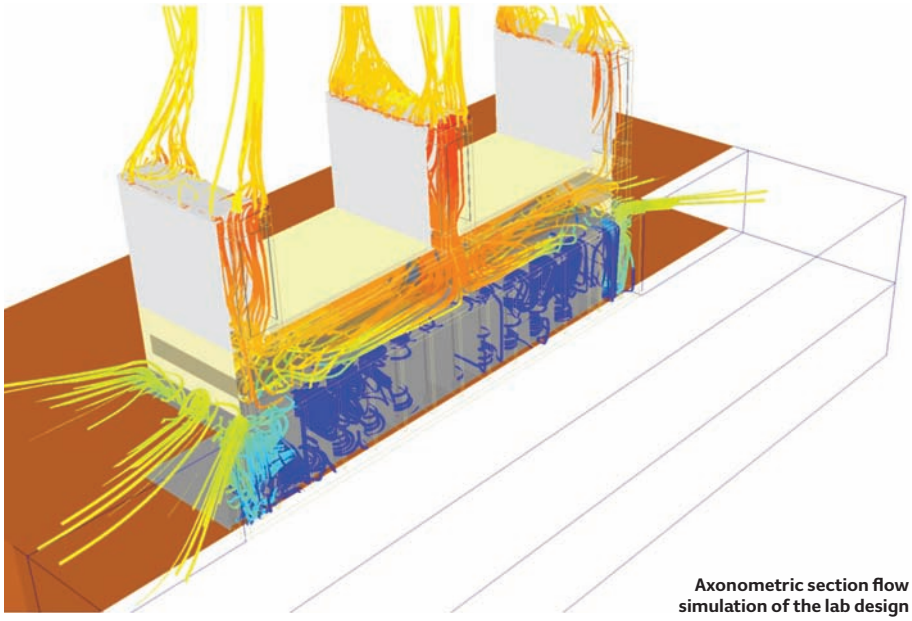
# COOL SCIENCE

After years coordinating mechanically ventilated laboratories as lead consultant, **Mark Jankó** decided to consider naturally ventilated alternatives. His patent design, which uses a concrete labyrinth and the stack effect to ventilate research spaces, has just been validated by Hurley Palmer Flatt



**Axonometric section flow simulation of the lab design**

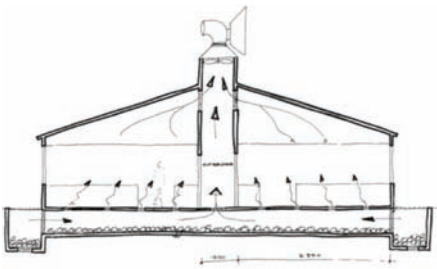


**Figure 1: Initial sketch section**

I have spent years working with consultants on the design of biology research laboratories. They have always been mechanically ventilated buildings – and must be when the containment level needs to be very high, for example when designing labs for research on viruses such as HIV and Ebola. These need to adhere to Advisory Committee on Dangerous Pathogens Containment Level 3 (ACDP CL3), which requires full mechanical ventilation and a high level of temperature, humidity and negative air pressure control.

Labs requiring a lower containment level have less stringent requirements. ACDP CL2 facilities only require a controlled flow of air in and out of the space, and a closed door between the lab and other spaces.

The complexity of the mechanical systems often used for Class 2 facilities mean they require careful commissioning and maintenance. The risks of underperformance are numerous; for instance, heat gains are underestimated – often specification or usage changes – and additional constraints may be applied, such as the acoustic enclosure of chillers, which can potentially knock out the laboratory on hot days.

For Class 2 laboratories, why not bite the bullet and offer a simple natural ventilation system, which has a few warm-degree days every year, less construction risk and considerably smaller lifecycle costs?

In 2009, I started work on an alternative to mechanically ventilated laboratories, which received a UK patent in 2013. It combines a labyrinth with stack ventilation to produce a habitable space in-between, the size of a typical laboratory module (Figure 2).

The idea started with a sketch and an initial spreadsheet calculation; this demonstrated that the sketch was impractical because a considerable height difference was required between the air supply and extract, by way of a deep basement and tall chimney.

The benefits are reduced energy consumption and maintenance. There is no mechanical ventilation machinery, save for apertures at the top and bottom of the laboratory.

The module does require basement radiators or a ground source heat pump (GSHP) system to regulate the basement temperature through the cool or hot season, depending on the geographic location.

The module requires flushing through with large volumes of cool night air, which means it is not a 24/7 facility. The airflows are reduced during normal user operating hours to receive the moderated air from the basement. A filter can be applied to the basement inlet aperture to reduce particulate pollution; as the module is a 'once through' air system, it is suited to ACDP CL2 work.

Safety cabinets and fume cupboards can be introduced, contained within the stack with fans on the roof, as required.

The module is sized to suit a typical laboratory bench layout, using the appropriate circulation guidance dimensions. It consists of two labs with a central island double bench with a 1,500mm circulation space to the two flanking benches on the perimeter walls, the bench depths being 750mm (1,500mm for the double). The module can be repeated indefinitely.

Typically, 35-50% of the capital cost of a conventional laboratory is for mechanical services, so omission of complex mechanical

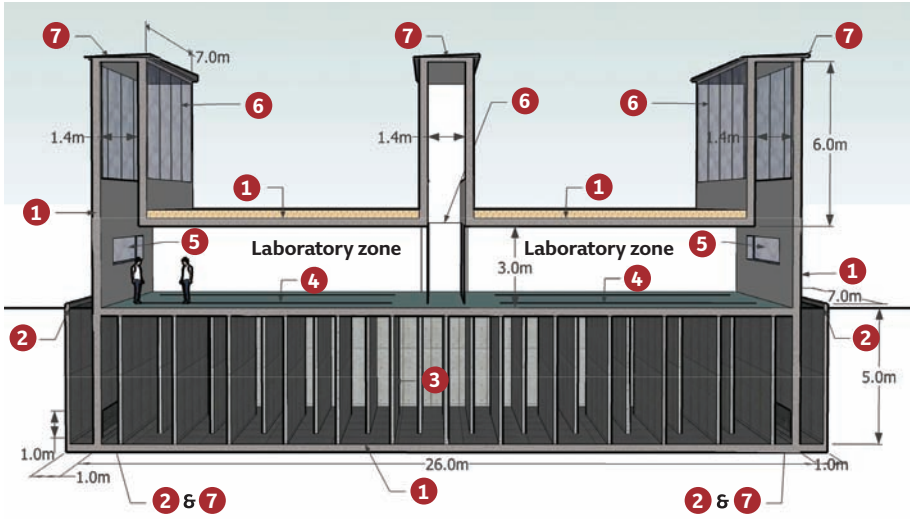



**Figure 2: Section through the low-energy module**

## Key design elements

**1** To achieve the required thermal mass, walls and floors have a density of 2,000kg/m³.
**2** External air passes through a fixed opening at the top of an ante chamber, from where it passes through an openable filtered aperture at its base, into a dry basement. A filter on the air intake reduces particulate pollution.
**3** The basement is five metres deep and has concrete fin walls of 2,000kg/m³ density, creating enough thermal mass to achieve a stable temperature. Hygroscopic pumice stone is spread over the entire floor or placed on a grate in the horizontal plane to absorb excessive moisture in the air. This regulates humidity and affects the dry-bulb temperature.
**4** A series of permanently open ventilation slots in the ground floor (10-15% of floor area) allow cool air to rise into the laboratory zone at ground floor level.
**5** The laboratory zone is kept cool or warm by the air rising from the basement. The laboratory zone windows at ground floor level are not openable, as this would compromise the stack effect, air cleanliness and humidity.
**6** The laboratory zone opens into three solar-gain chimneys. These are sized to enable the stack effect and extract warm air from the laboratory through openable vents. They are glazed to increase solar gain and the stack effect.
**7** Apertures can be adjusted to control the volume of airflow, depending on the time, season or weather. In this way, the temperature within the laboratory zone is regulated.

| Ambient (°C) | Floor (°C) | Flow rate (l/s) | Room (°C) |
|---|---|---|---|
| 30.0 | 14.3 | 1,017 | 23.2 |
| 25.0 | 14.0 | 977 | 23.3 |
| 22.5 | 14.2 | 914 | 24.1 |
| 20.0 | 17.6 | 905 | 27.6 |
| 17.5 | 18.5 | 1,236 | 25.9 |

**Table 1: Induced flows no solar assistance – 12°C labyrinth temperature**

ventilation can cover the cost of building the labyrinth basement.

Hurley Palmer Flatt recently completed an independent validation, using IES software. Associate director at the engineering consultancy John Gibson – who has considerable laboratory-design experience and is joint author of the Wellcome Trust JIF Laboratory Guidelines – led the validation with Karl Else, of FDynamics. The results are very encouraging.

### Validation analysis

Initial analysis showed that acceptable temperature variation within the habitable zone could potentially be maintained without mechanical cooling in the summer.

For summer operation, apertures are fully open at night: this cools the basement. Aperture openings are narrowed during the day to reduce heat gain from the hot external air, but still allow cooling through air changes from the cool basement.

To determine the airflow rates induced through the system by buoyancy at maximum cooling conditions – with the surface temperature in the labyrinth at 12°C – a series of steady-state simulations were carried out for a range of external temperatures. In these cases the chimneys are not glazed, so there is negligible solar assistance.

These results show that system performance varies with external temperature (Table 1). At 17.5°C, the flow rate is approximately 6ACH (1,200l/s). The flow rate decreases as the ambient temperature approaches 20°C, then slowly begins to slowly increase again as external temperatures head towards 30°C.

For this set of conditions, the required flow rate cannot be achieved without some form of assistance for ambient temperatures between 17.5°C and 30°C. This could be by running fans, but buoyancy forces can be increased by introducing heat into the chimneys above the occupied space. This could be achieved by using high G value, low U value glazing in the chimneys to maximise solar gains.

These results show that, with modest solar assistance, the flow through the system can be boosted to 6ACH or greater (Table 2).This will further decrease the number of hours it will be necessary to run the fans.

Computational fluid dynamics (CFD) simulations were also carried out with fans in operation. These were used to calculate a heat transfer coefficient for the labyrinth system, for use in the annual performance calculation.

### Annual performance

It has been established that the labyrinth potentially provides adequate cooling to maintain laboratory conditions under steady-state conditions. To maintain an adequate airflow, fan assistance will be required for a proportion of the year.

Using data derived from the CFD simulations, a computer model has been constructed to predict the performance of the laboratory for a typical UK year.

The simulation assumes that a single laboratory module is operating for nine hours per day for a five-day working week. Under

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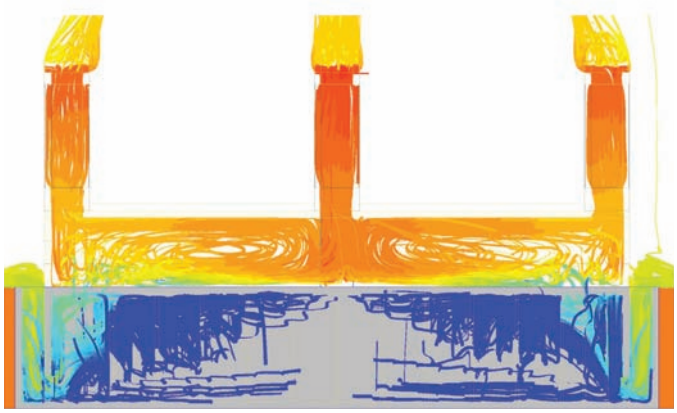

**Figure 3: Long section flow simulation**

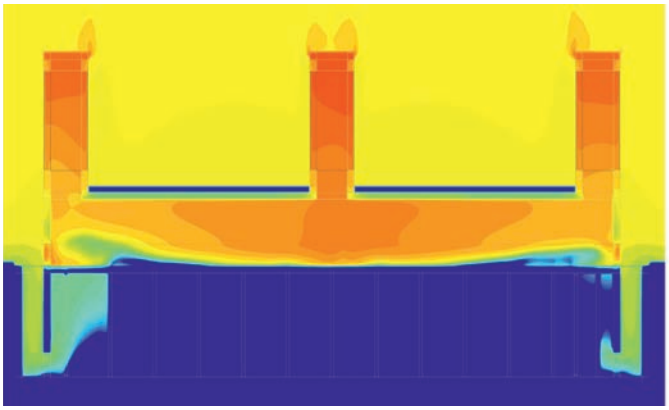

**Figure 4: Long section temperature summer simulation**

daytime operating conditions, the fan-assisted system draws air through the labyrinth and into the laboratory. Under winter conditions, the incoming air is heated so that it enters the supply grilles at 18.5°C to maintain temperature in the laboratory.

To cool the labyrinth in summer conditions – and, to a much lesser extent, warm it in winter – air is drawn through the labyrinth during unoccupied periods. The model was run for typical south-east England conditions, with a minimum temperature of -3.6°C and a summer maximum of 30.8°C. On this basis, the proposed system provides the following performance:

Hours below 22°C: 0
Hours above 24°C: 59
Hours above 25°C: 20
Hours above 26°C: 3
Hours above 27°C: 0

Although the heating is only operated (if necessary) during laboratory operating hours, the total heating demand for the year is predicted as 22,300kWh. This value is because of the requirement to supply 6ACH of tempered fresh air to the space.

## Possible improvements

The shape volume and form of the module is critical to its satisfactory performance. For instance, Figures 3 and 4 show the central stack to be slightly undersized and some stagnation in the central labyrinth area.

The validation exercise also identified the need for sufficient heat gains in the chimneys to drive the stack effect. As a result, the part use of extract fans in the validation exercise could be eliminated. The introduction of GSHPs to the labyrinth would effectively provide a temperate supply zone year-round, and reduce the winter basement heat demand consumption. Further development of the model with GSHPs in the basement for heating and cooling could make the model suited to less temperate climates.

## Conclusion

This validation exercise confirms the initial idea of the naturally ventilated displacement ventilation model. Optimum form volume and shape are key, as is the careful control of temperature differences between external ambient, labyrinth and chimney to generate the required stack effect.

As a new method of ventilating a laboratory, it poses a deliverable risk to a client, though the financial risk may be passed on to the consultant or contractor consortium responsible for the design and construction. As a way of addressing these concerns, a small-scale prototype may be considered. **CJ**

**MARK JANKÓ** is major projects manager at Brunel University London and previously worked at the University of East London

## Design criteria

- During occupied hours the laboratory space will require an air exchange rate of 6ACH (which is approximately 1200l/s for the single module considered here)
- Filtration will be required
- Laboratory temperatures maintained between 22°C and 24°C (or 3°C below external ambient, whichever is greater).

**Assumptions**

Single labyrinth module:
Laboratory heat loads: 60W/m²
Filtration: Filters: Two at 4.5m by 6.8m. Face velocities are low (less than 0.02m/s so losses are negligible)
External inlet louvre: 50% free area.

## OTHER EXAMPLES

There are other examples of similar and successful labyrinth stack-effect designs, which – while more generic in application and less focused than a laboratory module – are worth noting. Also worthy of mention is a laboratory-specific evaporative cooling downdraught design, cited below.

1. AVCI Architects with Atelier 10 – Turkish Contractor's Association HQ , Ankara, Turkey 2013 **http://bit.ly/1Llrf11**
2. Short Associates Lanchester Library, University of Coventry 1999 **http://bit.ly/1LlreKc**
3. Nimish Patel & Parul Zaveri – Torrent Research Laboratories, Ahmedabad, India 1997 **http://bit.ly/1gwCRRV**

| Ambient (C) | Floor (°C) | Flow rate (l/s) | Room (°C) |
|---|---|---|---|
| 30.0 | 14.2 | 1,124 | 22.2 |
| 25.0 | 14.7 | 1,364 | 21.4 |
| 20.0 | 18.0 | 1,347 | 24.7 |

**Table 2: Induced flows 1.1kW solar per chimney – 12°C labyrinth temperature**

# Wolverhampton University saves 5-6% energy with Spirotech


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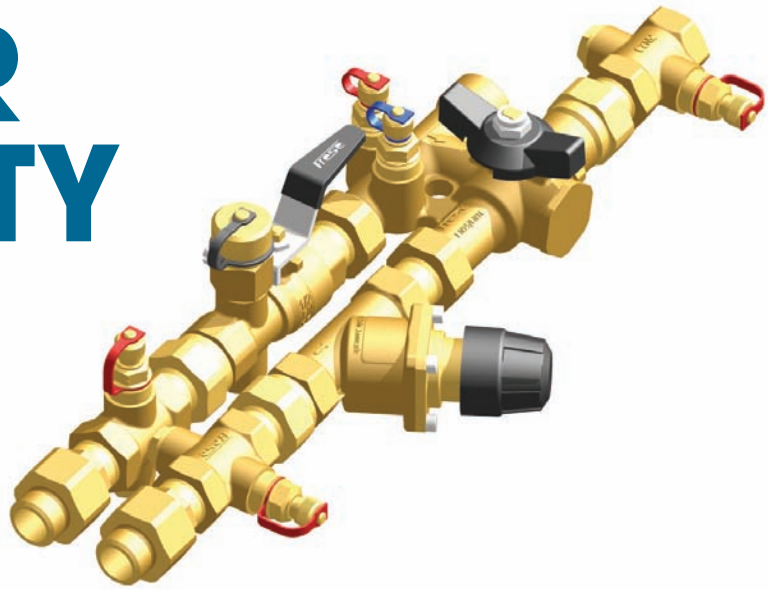
This month: Pressure independent control valves, CIBSE top tips on toilets and washrooms, ASHRAE guidance on corrosion

# A HIGHER AUTHORITY



Pressure independent control valves can offer extensive energy benefits according to manufactures. Frese has fitted 1,060 units to an office building at Chiswick Park, so Tim Dwyer spoke to managing director **Stephen Hart** to find out more

A 12-storey office building at Chiswick Park has been upgraded with 1,060 energy efficiency valves that manufacturer Frese claims will cut the energy consumed by a circulating pump by up to 50%.

It says the Optima Compact pressure independent control valves used in the heating and ventilating system in the 33,400 m$^2$ Building 7 will also lead to a major reduction in energy bills, as they also make boilers and chillers run more effectively.

*CIBSE Journal* technical editor Tim Dwyer asks Frese managing director Stephen Hart to explain the performance of the company's pressure independent control valves.

**What are the benefits of the valves regarding valve authority and turndown of PICVs?**

Pressure independent control valves (PICVs) can have a very high authority (approaching 1)[1]. Since the integral differential pressure regulator maintains a constant pressure differential across the control valve and, so practically, the only section the control valve influences is the valve body. This will allow the valve turndown to approach the test value of valve rangeability.

At an authority of, for example, 0.2 the turndown ratio would be half the rangeability as the ability for the valve to control over the range is severely affected at low authorities.

**What is the life energy use compared to using 3-port diverting applications or 2-port?**

Studies have shown that systems with 2-port throttling PICV rather than 3-port diverting control valves can reduce pump energy consumption by 65%.

Furthermore, 3-port diverting applications reduce the overall system temperature drop at part load (by allowing some water to return directly). This is likely to reduce the efficiency of central plant such as boilers and chillers.

## WHAT IS VALVE AUTHORITY?

Valve authority is an indicator of how much influence a valve has over the flow rate in the controlled system. So, if a traditional valve was excessively large for the application, there would not be a significant change in the flow rate (as the valve starts to close) and it is said to have a low authority. In pressure terms, the greater the relative pressure drop across the device when fully open (compared to the influenced system), the greater the influence of the device on the flow rate through the system.

For a valve under test conditions (where the pressure drop across the valve is kept constant) the ratio of the maximum controllable flow to the minimum flow is known as the 'rangeability'. So, for example, rangeability of 25 indicates a valve that will be able to maintain stable control down to 4% of its maximum flow. When a valve is installed in a real system, the ratio of actual design flowrate to the minimum real controllable flow is known as 'turndown'. The higher the valve authority, the greater the turndown. However, high authorities in traditional valves will mean that the valve will consume more pump power.

Case studies by Frese and others indicate the potential energy savings in central plant energy consumption (for example, gas to boilers) can be double the pump energy saving.

**What are the comparative lifecycle costs?**

A 2005 Iowa Energy Centre Study demonstrated that PICV travelled 60% less distance and reversed direction on 40% fewer occasions over time than an equivalent conventional 2-port control valve.[2]

This is because the spring and diaphragm in a PICV absorbs fluctuations in pipe pressure immediately. Consequently the actuator does not move the PICV in response to pressure changes as there is no temperature fluctuation.

As PICVs replace three separate components (for example, 2-port control valves, regulating and differential pressure controllers) the number of valves in the system reduces more than 50%.

Life expectancy of actuators are longer due to the reduction in reversals and accumulated travel over time when fitted on a PICV rather than a conventional 2-port control valve. **CJ**

● Read more at **www.cibsejournal.com**

## References:

1 BSRIA BG51 'Selection of control valves in variable flow systems' 2014

2 Figure 12, Energy Efficient Pumping Systems – A Design Guide (BG 12/2011), BSRIA **http://bit.ly/1ixggG7**

3 Figures 3-11 and 3-13 Testing of belimo pressure independent characterized control valves, IOWA Energy Center 2005 **http://bit.ly/1NNkchC**

# DISSIMILAR METALS HEATING AND AC PIPING SYSTEMS

Using different metals in heating or air conditioning piping does not necessarily mean corrosion will occur. **Walter J Sperko** provides guidance on the successful use of dissimilar metals

Most engineers understand that the presence of different metals in a heating or air conditioning piping system may cause accelerated local corrosion, and that one should avoid using dissimilar metals together wherever possible. This is good thinking, but sometimes availability or cost of materials make it necessary to join dissimilar metals together to build engineered piping systems.

Using different metals does not mean that galvanic corrosion will cause a failure, nor does it mean that dielectric fittings must be used at transitions between materials. This article presents guidance on what to do when different metals are used in heating and air-conditioning piping systems.

## Basics of aqueous corrosion

Four conditions must be present for corrosion to occur in aqueous solutions:

- An anode
- A cathode
- A metallic current path between the anode and cathode
- An ionic conducting medium.

Corrosion can be reduced by blocking current access to the anode or cathode – or both – or by increasing resistance to current flow in the current path or the liquid medium.

## Galvanic couples

The reason that joining two metals together may cause accelerated corrosion is that some metals are more easily corroded than others. This goes back to basic chemistry. All engineering metals react with their environment, and some are more reactive than others. The rate of reaction depends on the environment; when dissimilar metals are electrically connected to each other, each interacts with the environment, and the more reactive metal takes the brunt of the reaction, as shown in the iron/zinc couple in Figure 1.

While corrosion in a couple always occurs at the anode, there is normally little if any corrosion at the cathode. The potential of metals for galvanically driven corrosion is ranked using the galvanic series, and the most widely published of these is for metals in seawater. At the top of this series[1] (the most cathodic or corrosion-resistant) is platinum, followed by titanium, Hastelloys, 18-8 and other high-chromium stainless steels, Inconels, copper-based alloys, tin, lead, cast iron and steel, aluminium and zinc. Magnesium is last and is the most anodic metal on the list. The further apart two metals are on a galvanic series, the greater the potential difference, and the faster the anode will corrode.

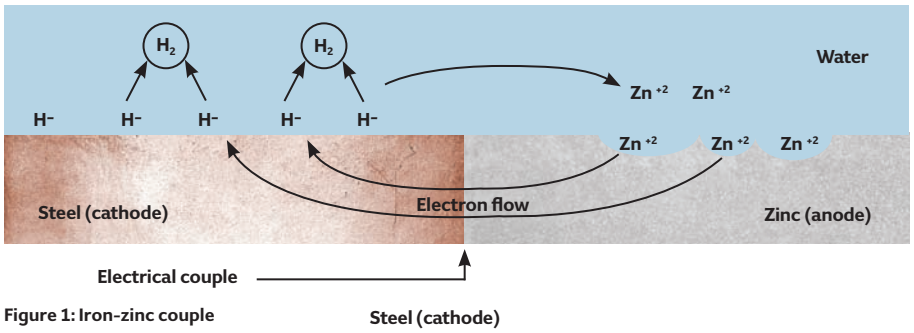



Figure 1: Iron-zinc couple

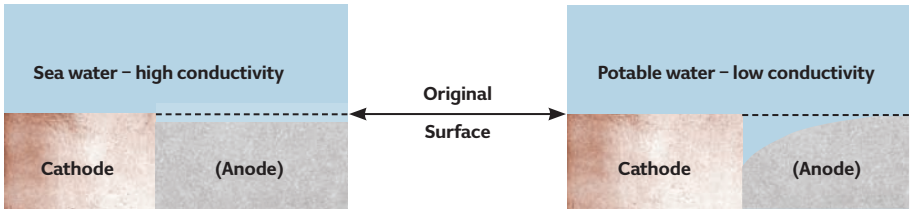



Figure 2: Distance effect with high- and low-conductivity water

## Environmental effects

The galvanic series, however, is not the final answer when determining the potential for galvanic corrosion. The arrangement of alloys in any galvanic series depends on the solution, and the specific corrosion behaviour of the metals involved in that solution. Three examples are:

- In Figure 1, current must flow between the metals and through the solution. If the fluid is non-conductive, galvanic corrosion does not occur.
- A zinc anode in a steel potable water tank will protect the steel because it is electronegative to the steel. However, if the water temperature exceeds 180°F (80°C), the reversal of potential occurs, and the steel tank becomes the anode and the zinc becomes the cathode.[2] If this happens, the tank corrodes to protect the zinc, which is not good. That's why magnesium anodes should be used where the water temperature exceeds 160°F (70°C).
- When aluminium is coupled to steel, the aluminium acts as an anode in chloride solutions, such as brackish or seawater solutions, but it acts as a cathode in potable water.[3]

Fluid conductivity heavily influences the overall corrosion rate. Condensation that collects on the outside surface of a chilled water line that is indoors in an office/school/hospital environment is a comparatively low conductivity fluid. Accordingly, the corrosion rate due to condensation on the outer surface of a couple in such a line will be low.

That same condensate on an outdoor line in an industrial or seacoast environment will be contaminated with salt or chemicals and become highly conductive; not only will a couple corrode at a greater rate, but the pipe will rust. Outdoor piping in industrial/seacoast environments should be protected – even when there is insulation.

> When the fluid is highly conductive, galvanic effects reach beyond the immediate area of the couple, and attack will occur over a distance

Another factor that controls corrosion rate is the presence of corrosion products on the surface. These corrosion products form a barrier that slows the reaction rate and may effectively stop further attack. Titanium coupled to steel in highly conductive seawater, for example, does not result in accelerated corrosion of the steel, even though there is a large potential difference between titanium and steel. This is because the titanium forms an oxide barrier that blocks current flow.[4] This phenomenon is referred to as polarisation.

Some polarisation occurs with all metals when oxides and other corrosion products are formed on the surfaces; the extent of polarisation controls the rate of corrosion. As a result, each metal and each solution has its own electrochemical corrosion behaviour. Characteristically, corrosion rates are initially high, but they decrease as polarisation occurs. Polarisation occurs with individual metals and with couples.

Wet fire protection systems are an interesting example of polarisation combined with a change in the environment. Wet fire protection systems are usually filled with potable water that is only mildly corrosive and contains some oxygen. The oxygen attacks the steel surface, forming a tight rust film. Once the oxygen is used up, corrosion stops[5], including any corrosion associated with couples. Periodic testing of a fire-protection piping restarts corrosion as new water and oxygen are introduced during the test.

Since the amount of oxygen is small, the extent of corrosion is usually small, even after many refills. Addition of a small amount of sodium silicate to the water during filling[6] would inhibit this process, but this is not common practice. The biggest risk with wet sprinkler systems is the introduction of hydrogen sulfide and anaerobic bacteria (frequently found in well water), which do not require oxygen to cause extensive and rapid damage.

## Distance effect

When the fluid is highly conductive, such as seawater, galvanic effects reach beyond the immediate area of the couple, and attack will occur over a distance. In lower conductivity solutions, attack occurs near the couple, resulting in 'knife-line' attack along the edge of the couple[7] (Figure 2).

A similar phenomenon (for example, limited distance of attack) occurs when the fluid is highly conductive, but the fluid is limited to a thin film – such as a surface condensation film. When this happens, corrosion occurs rapidly at the metal interface surface and may not be observed during casual examinations.

The distance between flanged faces made of dissimilar materials affects the corrosion of the anode because the current through the fluid has to flow across the gasket. For low-conductivity solutions, the presence of a non-conductive gasket between flanges reduces the galvanic corrosion rate because the current encounters more resistance due to the longer path it has to travel, as shown in Figure 3. For high-conductivity solutions, the gasket thickness makes no difference.

## Area effect

Imagine that two copper plates are joined using steel rivets, and two steel plates are joined using copper rivets. Both are immersed in seawater. After 15 months, the steel rivets will have corroded away, but the copper rivets will still hold the steel plates firmly together.[8]

In both sets of plates, the steel is anodic and will corrode to protect the copper. Because the surface area of the copper plates is large

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compared to that of the steel rivets, the rivets will be consumed protecting the copper plates. Although the steel plates will rust, there is plenty of steel surface available to sacrifice itself to protect the copper rivets.

In low-conductivity water, the overall corrosion rate is lower, and corrosion is limited to the steel immediately surrounding the copper rivets. Area effect is less of an influence with lower-conductivity solutions, but most low-conductivity solutions are less corrosive to begin with.

Because of the area effect, thin copper tubes can be used in a thick steel tubesheet in a heat exchanger, and the steel tubesheet will protect the copper tubes from corrosion. Although the tubesheet will corrode over time, extra thickness of the inexpensive steel can be provided to compensate.

The corrosion rate of couples may be reduced by coating or lining the members near the couple. Even though it seems that 'protecting' the part that will be attacked (for example, the anodic metal) would be a good idea, coating only the anode is a bad idea. When only the anode is coated, the smallest flaw in the coating results in rapid local corrosion at that flaw due to the area effect, leading to rapid penetration and leakage.

If only the cathode is coated, a small flaw in the cathode has no significant effect, but current flow is reduced due to the coating barrier. Coating of the cathode is usually an effective corrosion-mitigation tool when couples are involved unless hydrogen evolution occurs at the cathode; when this happens, the coating will disbond and plug up the system. Coatings should be used with care.

When evaluating the relative surface area of a couple, it is the wetted surface areas that affect corrosion. For example, if there are two different metals in a tank that may be partially filled at any time, the relative areas of the metals that are wetted at any given time control the corrosion rate at that time. That is, a carbon steel surge tank that has a stainless steel drain plug at the bottom won't suffer from much galvanic attack when the tank is full because there is a large wetted carbon steel (anode) surface. However, it may be attacked heavily when the tank is nearly empty because the wetted carbon steel (anode) surface is small.

## Conclusions

Although different metals are used in a heating or air conditioning piping system, it does not mean that galvanic corrosion will cause a failure or that dielectric couplings must be used. Engineers and owners should recognise that using dielectric isolators is not a substitute for proper water chemistry control, which can eliminate the need for troublesome dielectric fittings, and also ensures a long service life for the piping system. For the section on inhibitors, please visit this article on the website at **www.cibsejournal.com** CJ

**WALTER J SPERKO** is president of Sperko Engineering Services

## References:


1 Fontana, M G, 1986, *Corrosion Engineering*, NY: McGraw-Hill, p43.

2 *Corrosion Engineering*, p44.

3 Revie, R W, 2000, *Uhlig's Corrosion Handbook*, Second Edition, John Wiley & Sons, p144.

4 *Corrosion Engineering*, p45.

5 Lane, R W, 1993, *Control of Scale and Corrosion in Building Water Systems*, NY: McGraw-Hill, p164.

6 *Control of Scale and Corrosion in Building Water Systems*, p203.

7 *Uhlig's Corrosion Handbook*, Second Edition, p146.

8 *Corrosion Engineering*, p46.


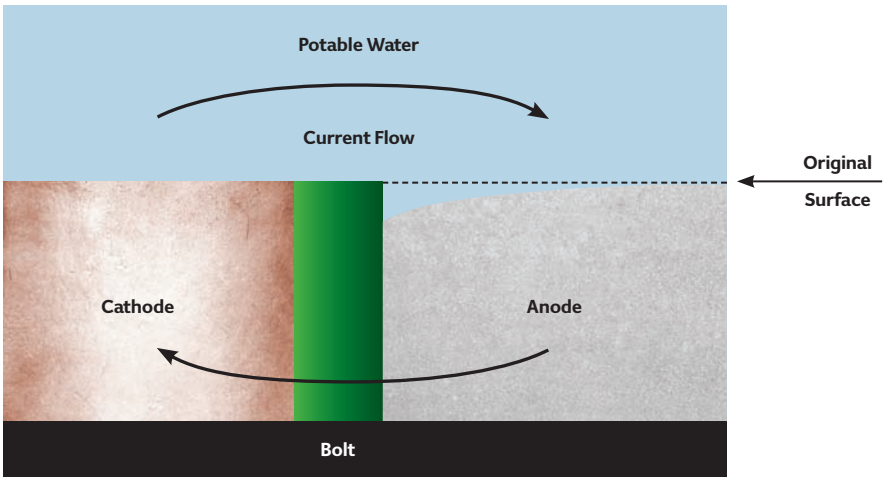


**Figure 3: Effect of a gasket in low-conductivity water**


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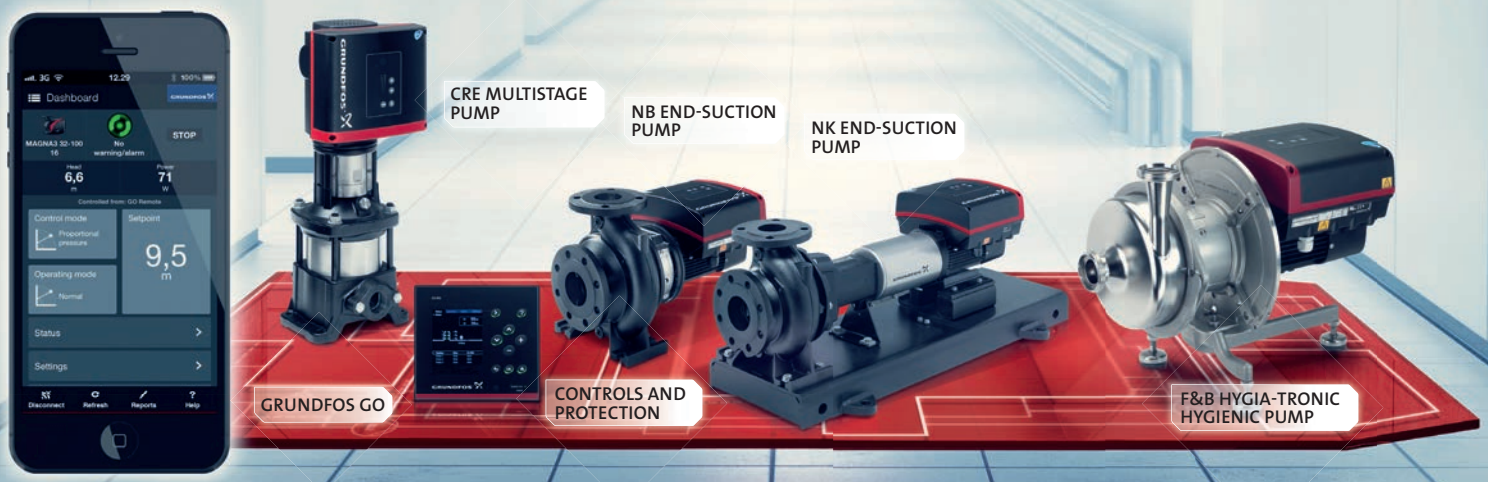


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# SANITARY CHECK

Property operators, facilities managers and designers need to understand the provision of sanitary conveniences, washing facilities and drinking water, and to comply with regulations. This CIBSE guide aims to inform users about what they can do to ensure building environments are healthy, comfortable and productive

Employers have a duty to ensure, as far as is reasonably practicable, the health, safety and welfare of their staff. This includes providing an adequate supply of drinking water and suitable, readily accessible, toilets. These also need to be kept clean and functional, as well as stocked with appropriate materials.

The Workplace (Health, Safety and Welfare) Regulations apply to a wide range of workplaces, including factories, shops, schools, hospitals, hotels and places of entertainment.

## How much provision is needed?

Requirements for sanitary conveniences are set out in the Building Regulations. The minimum number of toilets depends on the size of the workforce: one toilet for up to five people; two for up to 25; three for up to 50.

An employer should provide an effective toilet flusher, toilet paper and a coat hook, as well as a bin for sanitary dressings where toilets are used by women. Special provision should be made for workers with disabilities.

Separate rooms must be provided for men and women, except where a toilet is in a room used by one person at a time and has a lockable door.

Readily accessible, suitable and sufficient washing facilities – including showers – must also be provided for health reasons or where the nature of the work requires it.

Washing facilities will be considered 'suitable' if they are:

- In the immediate vicinity of sanitary conveniences
- In the vicinity of changing rooms
- Provided with a clean supply of hot and cold (or warm) water – where practicable, the supply should be of running water – with soap or other cleaning means, and towels or other drying means
- Sufficiently ventilated and lit
- Kept clean and orderly.

Separate washing facilities must be provided for male and female staff, except where a room is used by one person at a time, and can be secured from the inside. This does not apply to facilities for washing the hands, forearms and face only.

An adequate supply of drinking water – which must be wholesome, readily accessible and conspicuously marked – must also be available, as well as sufficient cups, unless the water is supplied as a jet.

Where a landlord provides the facilities, the employer must ensure these requirements are met.

## Design and installation

The designer's objective is to create a sanitary system that complies with current Building Regulations, is environmentally compliant, meets the needs of the building occupants and has good life expectancy.

Access doors and covers should be easy to open, and constructed and installed to suit the particular type of building.

> Suitable sanitary conveniences and drinking water are legal requirements at work, and failing to provide them could result in a prosecution

Toilet rooms must be adequately ventilated and lit, while sanitary accommodation and washing facilities – including showers – should ensure the privacy of the user.

## Maintenance, examination and testing

Any cistern, tank or vessel used as a drinking-water supply should be covered, kept clean and tested, and disinfected as necessary.

Repair and maintenance work should be carried out regularly, with a preventive maintenance schedule in place – for example, to ensure that taps and appliances are descaled regularly in hard-water areas, lights are working, and surfaces are hygienic.

Drinking-water taps should be cleaned and sanitised with a mild household disinfectant.

The frequency of maintenance, and precisely what it involves, will depend on the equipment or device in question. The age and condition of equipment, how – and how often – it is used should also be taken into account. Sources of advice include published Health and Safety Executive (HSE) guidance, British and EC standards, manufacturers' information and instructions, and trade literature.

## Cleaning and housekeeping

Toilets and sanitary conveniences must be kept clean and in good order, with ready availability of necessary materials, and washing facilities in the immediate vicinity for toilets. Prompt, reactive maintenance is essential for all toilets.

## Failing to provide

Suitable and appropriate sanitary conveniences and drinking water are legal requirements at work, and failing to provide them could result in a prosecution, leading to a fine or imprisonment, as well as adverse publicity.

Employees, visitors and the public expect that such facilities will be available in a clean, useable condition. Failure to provide them suggests an employer has no interest in the welfare, health and safety of their staff. **CJ**

### CIBSE TOP TIPS

CIBSE regularly publishes short guides for property operators, facilities managers and designers. This information sheet is the third in the series. See more at **http://bit.ly/1G4pKhE**

### General references:


1 Under the Health and Safety at Work etc Act 1974

2 TSO (1974) Health and Safety at Work etc. Act 1974 (Ch 37) (London: TSO) – **www.legislation.gov.uk/ukpga/1974/37/pdfs/ukpga_19740037_en.pdf**

3 TSO (1992) Workplace (Health, Safety and Welfare) Regulations 1992 No. 3004 (London: TSO) – **www.legislation.gov.uk/uksi/1992/3004/contents/made**


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# Professional development

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

# Biomass boilers for low lifetime costs

This module examines the elements that determine the real costs associated with a biomass system, and key considerations when specifying a biomass boiler

Drivers such as the Renewable Heat Incentive (RHI), changes to Building Regulations and increasing environmental awareness have combined to accelerate the adoption of biomass boilers for low temperature hot water (LTHW) production. With a high capital cost compared with traditional oil or gas boilers, there is uncertainty as to the real long-term costs of installing biomass. Recent evidence has suggested that poor design and installation – and lack of maintenance – contribute significantly towards the lifecycle cost (LCC) of the installation.[1]

This CPD will examine some aspects that determine the real costs associated with a biomass system, and identify key areas to consider when specifying a LTHW biomass boiler.

A recently published Department of Energy and Climate Change (DECC) study[1] showed that the average biomass system efficiency is around 66%, whereas manufacturers will factory test boilers typically above 92% efficiency, highlighting that it is the design, installation and operation that is affecting the reported overall system efficiencies. The CIBSE application manual for biomass heating (AM15:2014) identifies that there are many factors – aside from the boiler itself – that must be considered. These include: boiler sizing; flue design; fuel specification and store design; hydraulic design; system monitoring; and operation and maintenance considerations.

### Boiler sizing, selection and flue arrangements

It has been reported[1] that installations have been sized so that the biomass boiler output optimises RHI income, rather than specifically meeting the pattern of heating loads. This may be driven by the significantly higher capital cost of biomass compared with fossil-fuel boilers. A biomass boiler does not work in the same way as a fossil-fuel boiler, and the design specification should account for the differences – CIBSE AM15 is an excellent resource for determining how to integrate biomass with fossil fuels.

The potential heat-demand profile is the basis of correct boiler size selection. For retrofit projects, historical use data is often used – ideally in the form of half-hourly heating data. Where this is not available, an appropriate model or simulation (as specified by EN ISO 13790[2]) can be used.

With this data, the designer can determine the base and peak loads in both summer and winter, so that the boiler is sized based on an appropriate operational regime (peak load or base load). The Biomass Decision Support Tool (free to download from the Carbon Trust website[3]) is aimed at assisting with correct sizing.

Biomass boilers respond slower than fossil-fuel boilers, so require adequate time to heat up/cool down. Any associated gas boiler must not operate too early – the biomass boiler is often designed to act as the 'lead' boiler.

Installing a buffer vessel is essential, unless there is a minimum constant load of around 30%, as most biomass boilers have turn-down ratios of between 2:1 and 3.5:1.[4] Biomass boilers cannot operate effectively with short cycling periods. This can have a very dramatic affect on overall boiler thermal efficiency – much more than for a gas boiler. A buffer vessel will improve this, but rules of thumb should not be used for sizing, as capacity ratios vary considerably depending on the particular installation factors. For example, for pellet-fuelled boilers, this could range from 10 to 60 litres per installed kW biomass boiler load.[4]

When selecting a boiler size – whether a single biomass boiler or a biomass/fossil fuel combination – practical and economic considerations such as capital costs, RHI tariff break points and physical constraints on site should be taken into account. A biomass boiler sized to 50% of the peak demand will normally

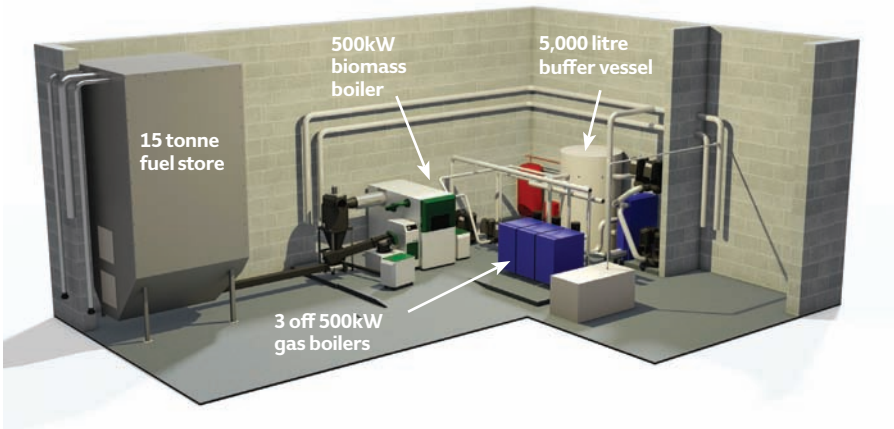


**Figure 1: This biomass boiler and the modular gas boilers are supplying 180 residential homes (Image source: Rural Energy)**

be able to provide 80-85% of the building's annual heating needs.[3] Sizing a biomass boiler to 100% of the peak load is unlikely to be a cost-effective strategy, as it will operate at full output for less than 1% of the year. It is much more efficient and cost-effective to install two smaller biomass boilers, or a single one alongside a peak-lopping fossil-fuel boiler. However, integration of the controls needs careful consideration – conventional building management system methodology alone is unlikely to be appropriate. When including fossil-fuel boilers, they should connect after the biomass boiler/thermal store with a 'series injection' connection (as described in AM15 section 7.4) to ensure the highest possible biomass utilisation. The biomass control must meet the demands of normal operational requirements, as well as maintaining biomass system efficiency, ensuring greatest utilisation of the biomass boiler and thermal store, and reducing the use of the peak-lopping fossil-fuel boiler.

The flue arrangement for the boiler has a significant impact on system performance. It must produce adequate draught to remove, and then appropriately disperse, gaseous products of combustion and – critically – ensure that they do not enter occupied spaces. A flue that is too short can cause the induced draught fan to provide increased flow, resulting in excessive fuel burn, boiler overheating and increased nitrogen oxide ($NO_x$) and particulate matter (PM) emissions. Boiler life is shortened and boiler efficiency reduced. Conversely, a correctly sized flue without a draught stabiliser can cause the same problems. Flues should be carefully considered as an integral part of the design process, as described in AM15 section 10.

## Fuel specification and store sizing

A frequent cause of failure in a biomass boiler or fuel-feed system is the incorrect use of fuels. The exact requirements for the fuel vary between boiler manufacturers, models and fuel-feed system; however, fuel should be supplied to BS EN ISO 17225[5] (and, previously, BS EN 14961). Industrial boilers may be configured to run on atypical fuel types but, in this case, the manufacturer should be contacted and fuel testing would normally be required.

Pellets require moisture content of <10%, while wood chips can vary typically between 15% and 40%. On some boilers, the rated output is only achievable up to fuel moisture content of 25%, even though they are capable of burning wetter fuels. The reduction in output will be approximately 8% for every 5% increase in fuel moisture content – and this will also cause incomplete gasification and oxidation, so producing black smoke and tar accumulation. These factors should be taken into account when calculating payback. Higher moisture content wood chip can also form a 'bridge' around augers rather than feed into them, starving the boiler of fuel, despite the fuel store being full.

Fuel prices are lower for bulk deliveries and often cheaper if unloading times are short. Generally, a larger fuel store – despite the higher capital expenditure – offers lower lifetime costs. Larger fuel stores also allow increased flexibility with delivery intervals. Fuel stores that allow for quick tipping of deliveries – such as underground stores, compared with auger-based feeds – mean reduced standing time for the delivery driver, so lower fuel costs for the client. Vertical augers may also require a significant power supply that can greatly increase electrical consumption, so adding to the cost of fuel. The consequence of differing delivery regimes can significantly alter the LCC of a biomass installation. For example, a bulk transport truck consistently delivering full (seven tonne) loads of wood pellets to customers can be less than 40% of the delivery cost for that same truck delivering small loads.[6]

Many boilers can operate on either wood chip or pellet, though they are likely to require recommissioning if the fuel changes by more than 5% compared with what was originally used. By selecting a boiler and fuel-feed system that can operate on a range of fuels, the operator has a degree of protection against price rises and is able to switch between fuel types to maintain low operating costs.

For smaller systems, fuel levels may be monitored visually, but larger systems can have automated feedback-using sensors, weighing pads or other similar devices. This often triggers an alert – in the form of an email or text message – direct to the fuel supplier when the level is sufficiently low to require re-ordering of fuel. So the level is maintained with little intervention by the end user and there is a low chance of the boiler running out of fuel.

## Hydraulic design

The hydraulic design is a major factor ensuring a high level of system efficiency and fuel usage. The design should take into account the specific requirements from the manufacturer, as well as relevant industry standards. When integrating additional boilers with biomass, issues can often occur if the gas boiler comes into operation too early. It is typical to see a comparatively small output biomass boiler installed alongside a much larger gas one (as in the system in Figure 1). If the hydraulic design and pump and piping layout is not properly considered, the smaller boiler may not be able to deliver its full potential of heat to the system.

Care should also be taken to arrange the pipework to reduce the amount of turbulence in the thermal store and allow it to stratify effectively. The best type of store piping arrangement – such as two-port, three-port or four-port – can vary from project to project. CIBSE AM15 provides examples of preferred arrangements to utilise the biomass boiler fully.

## Biomass sustainability regulation deadline, October 2015

There is new UK legislation on sustainability requirements for biomass, which is related to the source of the fuel and sets a life-cycle greenhouse gas emissions target of 34.8g $CO_2$e per MJ of heat.[7] (For comparison, UK natural gas is 51.2g $CO_2$e per MJ of heat.[8]) See Ofgem's guidance at **http://bit.ly/bioSustain**

Specifying the correct equipment can greatly affect the operational costs of the system. Components should be selected not only to be safe and fit for purpose, but also to reduce associated electrical loads. Pipework and pumps should be correctly sized, with the pumps appropriately controlled. All pipes and stores must be insulated to a suitable standard – the thermal store will require more insulation than a normal calorifier, as the standing losses need to be very low to ensure that hot water maintains a sufficiently high temperature to remain useable for long periods. Ideally, plate heat exchangers should be selected to have a low internal pressure drop; a typically used value is less than 35kPa, but a lower pressure drop reduces capital expenditure on pumps, as well as lowering operations cost. Pumps are available with integral sensors to monitor the flow and return temperatures, modulating speed in response to load demands.

## System monitoring

Remote system monitoring allows the client, manufacturers and installers to inspect the boiler and system performance readily. This can be used pre-emptively to address issues and enable preventative maintenance programmes to maintain boiler availability and performance. A useful monitoring system is able to track the fuel used, as well as the heat produced by the boiler and delivered to each separate load, both allowing tracking of heat demand and identifying areas of concern. The manufacturer's ability to access and control the boiler remotely can expedite the identification of faults and, potentially, allows faults to be corrected without having to call out a site technician. Commonly, a wired or wireless internet connection is required for the boiler house to connect the boiler and monitoring systems. Many institutions are concerned with data security and only allow limited use of this connection. The alternative is to use a system that works with a mobile phone signal – and, for areas with uncertain signal strength, devices can be used that switch between mobile telephony providers to use whichever network's signal is strongest.

## Operational considerations

Biomass boilers require weekly checks and cleaning by the operator to maintain efficiency. If there is no-one available on site, this may be through a service contract. Although there is often a temptation to place boilers in as small a place as possible – such as shipping containers – to keep initial costs down, there need to be suitable access hatches to allow cleaning to occur quickly and easily.

Figure 2: A biomass boiler installation showing the fuel feed (in the foreground), through to the integrated bins (on the left) that automatically remove the ash from the combustion chamber (Source: Rural Energy)

All financial models should take into account the cost of servicing and maintaining the biomass boiler, fuel-feed system and fuel store. Suppliers should be able to provide an idea of typical costs or replacement parts that may be required. Some boiler manufacturers also offer five, 10 or 20-year maintenance warranties on their products, which eliminate the unknown cost of call-outs and repairs for the main lifetime of the heating plant.

When specifying a boiler, not only must it perform efficiently, but it should also be easy for the end user to control and maintain. Some boilers require far more user intervention and manual cleaning than others – so unless the person who will be operating and maintaining it is prepared to undertake this work, these types of boilers must not be considered.

A well designed, operated and maintained biomass heating system can provide a high level of system availability and efficiency. It will require increased initial planning and investment, and will achieve very good comparative lifecycle costs when it is used in conjunction with the RHI. The owner and operator play a key role in the process, and must be included in the development and application of the system. Along with clear written guidance and training, they are vital for effective biomass system commissioning, handover and lifetime operation.



● Our thanks to Rural Energy for supplying practical information that provided the core of this article.

## Further reading:

CIBSE application manual for biomass heating (AM15:2014).

## References:


1 Luke S, *Desk-based review of installation and performance practices of biomass boilers*, Department of Energy & Climate Change (DECC), 2014.

2 EN ISO 13790:2008 – *Energy performance of buildings – Calculation of energy use for space heating and cooling*, 2008.

3 Biomass Decision Support Tool, **www.carbontrust.com/resources/tools/biomass-decision-support-tool**, accessed 8 September 2015

4 CIBSE AM15, *Biomass heating*, 2014.

5 BS EN ISO 17225:2014. Solid biofuels. Fuel specifications and classes.

6 EN 378:2008+A2:2012, *Refrigerating systems and heat pumps – Safety and environmental requirements.*

7 *New biomass sustainability requirements for the Renewable Heat Incentive* – DECC, February 2015.

8 **www.ukconversionfactorscarbonsmart.co.uk**, accessed 22 August 2015.


**Turn over page to complete module**

# Module 82

October 2015

Rural Energy
INSTALLING BIOMASS SINCE 2002

**1. In optimum conditions, at what efficiency could current technology biomass boilers ideally operate?**

- ☐ A 53%
- ☐ B 66%
- ☐ C 79%
- ☐ D 92%
- ☐ E 99%

**2. Which CIBSE document provides specific and extensive guidance on biomass boilers?**

- ☐ A CIBSE Guide A 2015
- ☐ B CIBSE AM15
- ☐ C CIBSE TM43
- ☐ D CIBSE Guide C
- ☐ E CIBSE Guide B5

**3. If a biomass boiler is sized to 50% of the peak demand, what proportion of a 'typical' building's annual heating needs might it be expected to provide?**

- ☐ A 35%
- ☐ B 50%
- ☐ C 65%
- ☐ D 80%
- ☐ E 95%

**4. What reduction in output is likely for every 5% increase in fuel moisture content?**

- ☐ A 4%
- ☐ B 8%
- ☐ C 12%
- ☐ D 16%
- ☐ E 20%

**5. What is a typical maximum plate heat exchanger internal pressure drop used in these system?**

- ☐ A 20kPa
- ☐ B 25kPa
- ☐ C 30kPa
- ☐ D 35kPa
- ☐ E 40kPa

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## Evinox Energy future-proof heat interface units

With advances in technology, communal heating supplier Evinox Energy can offer improved methods of electronically controlling heat interface units (HIUs) to maximise comfort for the end user.

Its ModuSat units use a Proportional Integral Derivative (PID) control logic, in combination with pressure independent control valves (PICVs) and fast-acting actuators, to quickly modulate the primary flow rate to match water or heating demand.

PID control logic allows an HIU to regulate differential pressure control, flow modulation and full energy shut off using only one control valve. This reduces the size and weight of the unit, and lowers maintenance costs.

Evinox HIUs are supplied prepayment ready, with a room controller for the user, so there is no requirement for additional controls, sensors or equipment to switch the user to a debt-free, pre-payment system.

Units can also feature remote monitoring integration for diagnostic and optimisation purposes.

● **Call 01372 722 277 or visit www.evinoxenergy.co.uk**

## Full speed ahead for Airflow at HVAC 2015

Airflow Developments will be exhibiting at HVAC 2015, part of UK Construction Week, which takes place from 6 to 8 October.

Airflow will be showcasing its Duplexvent commercial ventilation with heat recovery units, designed for offices and schools.

The event, at Birmingham NEC, will bring together innovators and manufacturers. It will also feature debates, workshops and panel discussions on the key issues facing the HVAC industry today.

● **Visit www.airflow.co.uk**

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## Mitsubishi video demonstrates how to reduce energy in your building

A new video from Mitsubishi Electric shows how the company took its head office from an 'E' to a 'B' energy rating. It also offers advice.

With tough legislation focusing attention on energy use in the built environment, how we heat, cool and ventilate our buildings is coming under consistent scrutiny.

'Any business could improve the performance of its building,' says Russell Jones, who hosts the video. 'The fact that we have improved so much and have significantly reduced running costs shows the advantages that can be gained.'

● **Visit www.youtube.com/mitsubishielectric2**

## Andris Lux: Ariston's new electric water heater replaces Europrisma

Ariston has released its new Andris Lux electric heaters to replace the popular Europrisma product from September.

Under Energy-related Products (ErP) legislation, Ariston offers a choice of retail and professional models, available as three over-sink and two under-sink units.

Over-sink models come in 10l, 15l and 30l variants, while under-sink models have capacities of 10l and 15l, with an ErP 'B' rating.

● **Visit www.ariston.co.uk**


## All-round top performance from Mirona's RL LED

The latest member of the Mirona product family, from Trilux, is a genuine all-rounder for energy-saving lighting, with premium visual comfort.

The Mirona RL LED withstands dust, knocks and humidity thanks to an IP 65 protection rating, while temperature fluctuations between -30°C and +35°C are no problem.

This makes the luminaire ideal for lighting in production areas and warehouses. Thanks to its design appeal, the luminaire is also suitable for more robust retail settings.

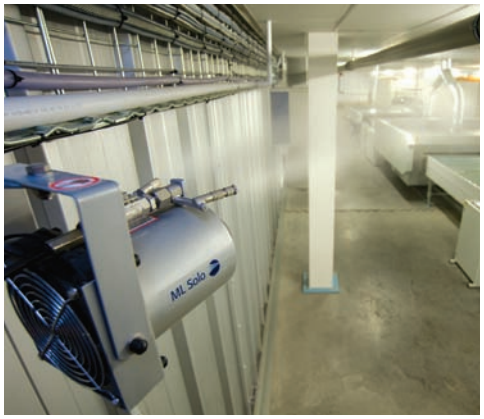
● **Visit www.trilux.com**

## Testo 420 volume flow hood – less weight more precision

The new Testo 420 volume flow hood is now available from BSRIA Instrument Solutions. The 420 weighs 2.9kg, and features swirl and multiway grilles, pacified with in-built flow straighteners.

It is most suited to facilities with larger air intake and outlets, such as offices and cleanrooms. Each unit also supports app integration for mobile devices.

● **Call 01344 459, email info@bis.fm or visit www.bis.fm**




## Condair maintains humidity at Polestar Sheffield

A Condair ML Solo high-pressure humidification system has been installed in the Polestar print company's plant in Sheffield.

The unit was installed by Arcade HVAC engineers, solving the problem of electrostatic charge generation when paper is removed from litho plates.

The ML Solo maintains a relative humidity of 45%, while requiring only 5% of the energy used by equivalent steam humidifiers.

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## In the Vanguard of change

Ideal Commercial Boilers has increased its popular Vanguard L pressure jet boiler range to offer an even wider choice of outputs, up to 7,000kW.

The seven new outputs double the previous maximum output, allowing a reliable and efficient pressure jet heating solution for a greater variety of applications.

The Vanguard L range features steel shell and tube construction, single-piece boilers, with a variety of innovative features to optimise efficiency and ease of installation.

● **Call 01482 492 251, email commercial@idealboilers.com or visit www.idealcommercialboilers.com**


## Knauf Windliner stands the weather at primary school build

Ease of handling and speed of construction were among the features that led Wates Construction to choose Windliner Sheathing board, together with the Knauf SFS façade system, when it built Barclay Primary School, in Leyton, London.

Knauf Windliner is a 12.5mm gypsum-based sheathing board faced with specially treated terracotta paper to resist rain, and is ideal for sites with particular fire-safety needs.

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● **Email kd@web-response.co.uk**

## Omnie offers total controllability

A key consideration in achieving genuine energy efficiency and fuel savings from high-performance renewable technologies is having the correct controls – which is why Timóleon's holistic Omnie range encompasses a comprehensive selection of control units.

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● **Call 01392 363 605, email Chris.Weaver@timóleon.co.uk or visit www.omnie.co.uk**


## Metsec demonstrates commitment to quality with BSI Kitemark award

Cold roll-formed steel specialist, voestalpine Metsec, has further boosted its long-standing reputation for top quality by achieving the BSI Kitemark for its cable-management products.

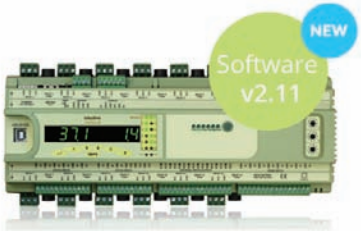
Metsec chose BSI to test its entire product range – which includes cable trays, cable ladders, metal framing and cable trunking – to help highlight its commitment to quality. The Kitemark also provides customers with a guarantee that Metsec's products continue to be of the highest standard.

● **Visit www.metsec.com**

## Get connected with new Danfoss digital actuator

Danfoss has launched the NovoCon digital actuator, which makes it possible to connect a HVAC system to the building management system (BMS) via the BACnet communications protocol – adding advanced levels of hydronic balancing and control, while saving time on site. The NovoCon combines a digital actuator, flow indicator, BMS communication device and data logger.

● **Call 0845 1217400 or visit www.heating.danfoss.co.uk**




## New software release v2.11 for RDM intuitive controller

RDM's powerful, yet economically priced, 650TDB intuitive controller can control up to 480 points using expansion modules.

A compact solution, it reduces both installation space and time. The new software – v2.11 – introduces a number of enhancements and five new features, including Type Editor, which allows users to create their own Modbus templates.

These facilitate communication with third-party devices and help deliver maximum networking capability, and an open system that incorporates existing assets.

● **Visit www.resourcedm.com**

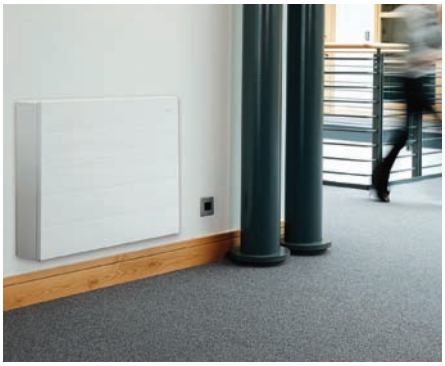
## Purmo's Compact radiator – for great quality, performance and availability

The Purmo Compact offers a leading performance, even when installed on low temperature systems.

The radiator is finished in an epoxy polyester head and abrasion-resistant powder coating, so it is outstandingly hard and stable, and resistant to scratches, moisture and acids. The product range includes type 11, type 21, type 22 and type 33, and is available in more than 60 stocked sizes.

The standard colour is white RAL 9016. Other colours and sizes are available on a made-to-order basis.

● **Call 0845 070 1090, email uk@purmo.co.uk or visit www.purmo.com/en**



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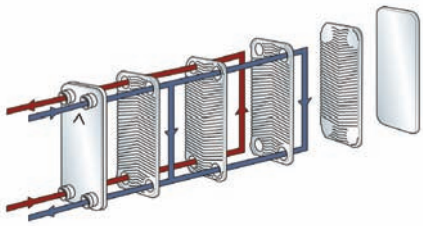

## Rinnai goes Solo in UK first

Rinnai has launched the Infinity Solo re-circulator water heater with storage combined.

The Infinity Solo range of condensing and condensing low-$NO_x$ water heaters is the first Rinnai product for the UK to combine the technology of its wall-mounted continuous flow water heaters with a stainless steel storage cylinder, all in one.

Infinity Solo is renewables compatible, so thecustomer can, at a later date, integrate a solar thermal or heat pump system with minimal alterations.

● **Visit www.rinnaiuk.com**


## Grundfos iSOLUTIONS – pumps and system in harmony

Efficiency is a function of good pump design and not purely a stand-alone benefit, so it is important to understand the value of pump efficiency.

To achieve the highest overall efficiency, the installation needs to be examined in terms of the entire system, as opposed to just viewing the pump in isolation.

By thinking beyond the pump and taking the complete pumping system into account, it is possible to optimise the way pumps and their processes operate.

A manufacturer such as Grundfos can incorporate specific demands and translate them into state-of-the-art pump intelligence – for any application. This approach – which is integral, as well as encompassing the integrity of the entire system – is called Grundfos iSOLUTIONS.

The need to optimise and control speed is something that will only gain in importance, so the ability for systems to become increasingly synchronised will also continue to play a more significant role.

● **Call 01525 850 000, email grundfosuk@grundfos.com or visit www.grundfos.co.uk**

## Toshiba targets air conditioning growth in Ireland

Toshiba is targeting growth in Ireland as the country's resurgent economy opens up opportunities in both the commercial and residential air conditioning and heat pump sectors.

The company has appointed Ken Lawlor as sales manager for Ireland to spearhead the strategy, with a brief to develop the distribution and direct sales channels.

It is already bearing fruit, with the company securing two major orders for VRF air conditioning over the past month. The move is part of Toshiba's aim of doubling air conditioning sales by 2020.

● **Visit www.toshiba-aircon.co.uk**

## Rugby World Cup 2015 tickets up for grabs

Toshiba distributor AMP has joined forces with the air conditioning manufacturer to run a competition to win tickets to the Rugby World Cup.

The tournament started on 18 September and will feature 47 matches, played across England and Wales, before the final on 31 October.

Over the past few months, AMP customers and prospective customers have had the chance to win tickets for four high-profile matches. Those for England v Uruguay, in Manchester on 10 October, are still up for grabs. The closing date for entries is 5 October.

● **Call 01707 378 670 or visit www.ampair.co.uk**

## ATAG commercial boilers provide a lesson in economics at Keele University

Keele University has installed ATAG XL boilers in its science blocks to delivery energy efficiency, low emissions and reliability.

The IC1 block contains three XL140 and one XL70 linked to a standard ATAG cylinder, while three XL110 boilers with an ATAG solar cylinder service the IC2 block.

The boilers were supplied by ATAG Commercial and installed by Climate Heating and Plumbing Services.

● **Email info@atagcommercial.co.uk or visit atagcommercial.co.uk**

## Monodraught exhibiting at HVAC 2015

Adding to an already formidable line-up of industry leaders that have been signed up, UK Construction Week has announced that Monodraught will exhibit at the inaugural HVAC 2015 this month.

Monodraught offers a complete turnkey service, from research and design all the way through to installation.

Taking centre stage at Monodraught's stand will be its Cool-phase hybrid system, which links high efficiency air-to-water heat pumps with the company's natural cooling, phase change material system.

● **Visit www.ukconstructionweek.com or follow @UK_CW on Twitter**

## Siella LED – a new standard in office lighting

Trilux has added to its Siella LED range with the UGR 19.

Siella UGR 19 has been specifically designed to provide lighting for offices in which occupants are working on computer screens. It offers a uniform, elegant design – suitable for all office areas – as well as excellent capital and lifetime costs.

Installation is made incredibly easy because Siella has an extremely low, 12mm construction height, so the recessed models flush-fit into almost all ceiling spaces.

● **Visit www.trilux.com**

## Daikin's new multi-scroll chillers offer smart energy management

Daikin Applied (UK) is pleased to introduce new additions to its multi-scroll chiller product series. For tight spaces, the EWA(Y)Q~G air-cooled multi-scroll chillers offer capacity requirements of 75kW to 150kW, and the EWWQ-G or L R-410A water-cooled chillers and heat pumps are suitable for larger applications with capacity requirements from 90kW to 721kW, all with compact footprint design.

● **Call +44 (0)1322 424950, email info@daikinapplied.uk, visit www.daikinapplied.uk or follow @daikinapplieduk on Twitter**

## Waterloo's hi-tech test lab offers state-of-the-art facilities

When it comes to ventilation, Waterloo Air Products is an expert, and the Waterloo Tech Hub can provide the information and solutions needed.

From mock-ups in the test lab to one-off designs, practical solutions and training, the lab can provide customers with fast and accurate results.

Waterloo's test lab was established more than 25 years ago. It uses the latest technology, and Waterloo invests heavily in R&D to develop new products that are rigorously tested.

● **Call 01622 717 861, email alan.smith@waterloo.co.uk or visit www.waterloo.co.uk**


## Rinnai steams ahead at Eton Dorney Olympic rowing lake

Rinnai is providing the hot-water solution for the Sports England rowing facility – without missing a stroke.

Eton Dorney, near Windsor – which is owned and constructed by nearby Eton College – hosted the London 2012 Olympic Games rowing and kayak events on Dorney Lake. It is now home to Sports England's rowing training facilities.

Rinnai's Infinity HDC products incorporate two heat exchangers to achieve optimum water heating generated from every cubic metre of natural gas or LPG, producing efficiencies of 95-97%.

● **Visit www.rinnaiuk.com**

# PRODUCTS & SERVICES

**Telephone:** 0207 880 7633 **Email:** greg.lee@redactive.co.uk

## Pel protects University of Liverpool campus in London

PEL Services has successfully completed a fire-alarm installation contract for the University of Liverpool campus in Finsbury Square, London.

The seven-storey building accommodates 1,300 students and 100 members of staff. As part of its £8m refurbishment, the fire detection system was completely upgraded.

Consisting of eight sets of loop panels with more than 600 devices, PEL installed a further 150 new devices and repositioned approximately the same number to accommodate the change in building usage.

● **Call 0333 123 2100 or visit www.pel.co.uk**

## New CDL training and technical support partnerships pay off

Cool Designs (CDL) has introduced a comprehensive programme of training and technical support, enabling air conditioning installers to achieve national accreditation.

It includes theoretical and hands-on training, plus on-site commissioning and trouble-shooting support. Those who complete the programme receive qualified status under the Toshiba scheme, opening up new business opportunities.

Ahead of legal requirements, CDL was one of the first air conditioning distributors in the UK to require evidence of F-Gas registration before supplying equipment.

● **Call 0191 549 6964**


## Coastal housing development uses Polypipe heat recovery systems

Polypipe Ventilation's Silavent Green Line HRX MVHR systems are being installed into a new housing development in Weymouth, Dorset.

The HRX uses an efficient counter-flow heat exchanger, reducing the need for additional heating. It also prevents condensation and mould build-up, thereby improving indoor air quality. Manufactured in the UK, the system complies with 2010 Building Regulations and is listed in the Product Characteristics Database.

● **Call 0344 371 5523, email vent.info@polypipe.com or visit www.polypipe.com/ventilation**

# DIRECTORY

**Your guide to building services suppliers**

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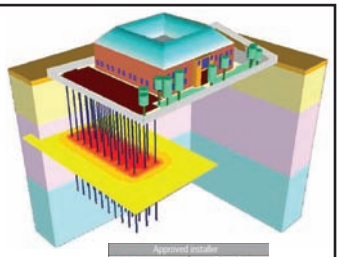

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All remuneration packages are negotiable based on experience and qualification profiles.

Closing date – 30th October 2015. No agencies.

**www.mgpartnership.com**

VINCI

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**University Hospital Coventry and Warwickshire**

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VINCI Facilities are seeking an exceptionally talented Project Director to lead its high profile Private Finance Initiative contract delivering all major aspects of hard facilities management to a busy teaching hospital of 1,250 beds.

Applicants should have a minimum of 5 years' experience of managing similar NHS or complex facilities with full responsibility for all elements of the contract from financial and commercial to statutory, H&SE and risk.

A sound knowledge of the PFI payment mechanism and contract would be a major advantage together with a proven track record of working in partnership with public and private organisations at Board and senior manager levels.

Educated to degree level in an appropriate Engineering or building discipline and member of a recognised Institution giving Chartered status or at minimum working towards.

Candidates must be able to demonstrate strong leadership and team-building skills and be able to drive change and quality through continuous improvements. Experience with ISO9000 or alternative would be an advantage.

**Application with CV to:**
**recruitment@vinci.plc.uk**

Informal discussion can be held upon request

Closing date for applications 14th October 2015
Interviews will be held in October/November 2015

# FROM STRENGTH TO STRENGTH

The CIBSE ASHRAE Graduate of the Year Award is a huge stepping stone for a young engineer starting out in their career. Last year's winner, **Emilia Targońska**, shares her experiences since lifting the trophy

Emilia Targońska completed an environmental engineering degree at Warsaw University of Technology, followed by a low-energy building services engineering MSc at Loughborough University.

Her MSc research dissertation was accepted for presentation at the People and Buildings Conference, organised by LEARN at London Metropolitan University, and she graduated with distinction.

Before starting her MSc, Targónska worked alongside her father, helping to design HVAC systems for various developments in Poland.

She joined the Hoare Lea team, in London, in September 2014.

### What was it like to win the Graduate of the Year award?

It was one of the most rewarding moments of my life. I did not expect to win, and felt honoured just to be shortlisted and have the opportunity to present to some of the brightest engineers and designers in our industry. I was really touched I could share the story of my father – a building services engineer with more than 40 years' experience – who inspired me to pursue a career in engineering. My parents helped me follow my dreams and study abroad, so the best thing was being able to make them proud.

### What have you learned?

To believe in myself, and that anything is possible if you work hard. I have always wanted to study abroad and explore the world, yet I never expected to do it and win such a prestigious award. It opened up so many new opportunities and gave me more confidence. I gained a global perspective on how we, as engineers, can have a positive impact on people's living conditions and reduce the impact on the environment. I could not have asked for a better start to my career.

> I gained a global perspective on how we, as engineers, can have a positive impact on people's living conditions

### What has been the highlight?

My trip to the ASHRAE Winter Conference in Chicago was an unforgettable experience, especially because of all the amazing people I met. I was overwhelmed by the warm welcome I received and really felt like a member of a big ASHRAE family. I loved having the opportunity to discuss design issues with extremely experienced engineers and specialists from around the world. I was impressed with how passionate everyone was about building services, which I believe is one of the key factors to ensure the best possible future for our industry.

### Has it changed your view of the industry?

Yes. I won the competition shortly after graduating from university, so the past year has been a never-ending learning curve. The award gave me an opportunity to attend many events and meet people who have really inspired me to challenge myself even more. The industry leaders I met showed me the importance of constantly improving our designs to make them more efficient, as well as pushing the boundaries of what is possible. The future of the industry – and the environment – is in our hands. It is a great responsibility.

### Has it changed your career plans?

No, it has only reassured me that a career in building services is something I am really passionate about. On the other hand, it opened many doors for me and revealed exciting opportunities I would like to explore in the future.

### What advice would you give to young people considering a career in building services?

Work hard towards your goals. Make sure you are positive and passionate about what you do. Get involved as much as you can. Take every opportunity to learn from those more experienced, but also challenge yourself. There are many interesting events in the industry, which are free to attend and offer a great opportunity to meet highly experienced designers. Don't be shy; introduce yourself and ask questions!

### What are you working on now?

I am involved in an HVAC design for a high-end residential skyscraper for the Newfoundland scheme within Canary Wharf group. I am also preparing for the ASHRAE Energy Modelling Conference in Atlanta, where I will present the results of my research on the airflow and thermal comfort assessment of a naturally ventilated educational building. The results will soon be published in a paper I am working on with Loughborough University.

### Do you have any advice for this year's finalists?

Work hard, be well prepared and, more than anything, just be you. Let others see your passion for engineering – this is what helped me win.

● Read about this year's Young Engineers Awards finalists on page 20.

● **EMILIA TARGOŃSKA** is graduate mechanical engineer at Hoare Lea

# Events & training

## NATIONAL EVENTS AND CONFERENCES

**Young Engineers Awards**
8 October, London
The event brings together the Graduate of the Year, and Employer of the Year awards. Book your place to see who takes the crown this year.
www.cibse.org/yen

**CIBSE Building Performance Conference and Exhibition**
3-4 November, London
CIBSE's annual event returns for the second year to the Queen Elizabeth II Centre, Westminster. The conference programme is available to view at www.cibse.org/conference

## CPD TRAINING

For more information, visit **www.cibse.org/mcc** or call **020 8772 3640**

**Fire risk assessment to PAS 79**
6 October, London

**Emergency lighting to comply with fire safety requirements**
7 October, London

**Sanitary and rainwater design**
8 October, London

**Energy efficiency building regulations: Part L**
8 October, Manchester

**Introduction to electrical services in buildings**
13 October, London

**Lighting design: principles and application**
14 October, London

**Design of heating and chilled water pipe systems**
15 October, London

**Energy management system ISO 50001 (ESOS compliant)**
16 October, London

**Mechanical services explained**
20-22 October, Manchester

**Introduction to combined heat and power (CHP)**
20 October, London

**Building drainage explained**
22 October, London

**Fire safety in purpose-built blocks of flats**
23 October, London

**Building services explained for FMs – 3 days**
27-29 October, London

**Electrical services explained**
27-29 October, London

**Energy strategy reports**
29 October, London

**Energy management system ISO 50001 (ESOS compliant)**
30 October, Exeter

**Electrical distribution design**
30 October, London

## ENERGY ASSESSOR TRAINING

For more information visit **www.cibse.org/events** or call **020 8772 3616**

**Heat networks training**
6-7 October, London

**EPC training**
6-7 October, Manchester

**DEC training**
13-15 October, London

**ESOS training**
20 October, London

**Heat networks training**
21-22 October, Manchester

## CIBSE GROUPS, REGIONS AND SOCIETIES

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

**Book launch: Transient free surface flows in building drainage systems**
6 October, London
SoPHE event.

**CIBSE EM: An introduction to sprinkler systems**
6 October, Northampton
An evening hosted by CIBSE East Midlands region.

**CIBSE NE: Membership briefing**
6 October, Newcastle upon Tyne
15 October, Bristol
Find out about the CIBSE application and interview process. These sessions provide an opportunity to discuss your application with CIBSE staff and registered interviewers.

**YEN London: Paperless office**
7 October, London
CIBSE YEN London explore the practicalities of a paperless office in 2015.

**WiBSE Leadership Part 4: Leadership in the workplace**
7 October, Manchester
Seminar with Imelda O'Keefe.

**CIBSE HCNW: Debate at Swedenborg: Sustainability – paradox or new beginnings?**
8 October, London
With Sara Kassam, head of sustainability, CIBSE; Charlotte Juhl Koch, 4 Green Architecture; and Caroline Kuzemko, Energy Policy Group, University of Exeter.

**Hong Kong Chapter: Design of safety protection for escalators**
8 October, Hong Kong
Seminar introducing the typical design of safety protection for escalators.

**Hong Kong Chapter: Guide M – Maintenance engineering and management**
13 October, Hong Kong
Seminar focusing on the updated Guide M.

**The colour of daylight indoors**
14 October, London
Daylight group event with speaker Joe Lynes.

**CIBSE West Midlands technical seminar: CIBSE Guide M**
14 October, Birmingham

**CIBSE HCNW: Designing for life: Whole life**
14 October, London
CIBSE FM and Jo Harris of BSRIA bring a vital FM perspective.

**SLL & IET: Lighting for residential buildings and LG9**
15 October, Hixon
With SLL vice-president, Richard Caple.

**SLL Masterclass series: Inside Out: Light & Architecture**
15 October, Cardiff
The 2015-16 Masterclass series kicks-off. This year it will focus on light and architecture.
www.cibse.org/sll

**CIBSE MNW: CHP utilisation**
15 October, Merseyside
A closer look into the theory and practical application of CHP.

**HCNW Region: Dinner with the Rumford Club**
15 October, London

**WiBSE personal effectiveness: Saying 'no' assertively when you need to**
15 October, London
With speaker Helen Zarod, executive and personal performance coach.

**CIBSE NE: Henrik Clausen seminar**
20 October, Newcastle upon Tyne
A lighting presentation by Henrik Clausen.

**CIBSE HCNE: BS 7671 17th edition amendment 3 – discussion of effect on the industry**
20 October, London
Featuring speakers from the ECA and the ESC.

**CIBSE ANZ Region: Victoria Chapter: Electrical switchboards**
20 October, Thomastown
An evening seminar.

**SoPHE Scotland seminar**
21 October, Edinburgh
ACoP L8 and HSG274 legionella training seminar, presentation by SMS Environmental, and domestic hot water heating: Sizing/selection/Part L/$CO_2$ reduction/efficiency by Lochinvar.

**CIBSE EM: Student evening**
22 October, Nottingham

**Hong Kong Chapter: IHEEM Symposium**
23 October, Hong Kong
A platform for healthcare professionals to update their knowledge on current healthcare engineering technologies.

**CIBSE YEN: National Ball**
24 October, Birmingham

**CIBSE EM: CDM Regulations 2015**
27 October, Northampton

**CIBSE West Midlands: Technical seminar: Energy: The event horizon**
28 October, Birmingham
Can technology outrun future energy supply constraints, and the transition to renewable energy?

**ANZ Region & AIRAH: Building tuning**
28 October, Darwin
How and where do you look to tune a building?

## The Jonathan Speirs memorial lecture

### 21 October, Glasgow

Following the inaugural event last year, the second Jonathan Speirs memorial lecture will take place in October, celebrating the life and work of lighting designer Jonathan Speirs.

This year's event will be held at Trades Hall, Glasgow, with lighting designer, Carrie Donahue Bremner, of Speirs + Major, and architect Neil Gillespie, of Reich and Hall, presenting on Maggie's Centre, Lanarkshire. The centre has recently been shortlisted for the RIBA Stirling Prize and swept the board at the Scottish Design Awards.

The event is free but places are limited so registration is essential. Book online at **www.cibse.org/events** or email **sll@cibse.org**

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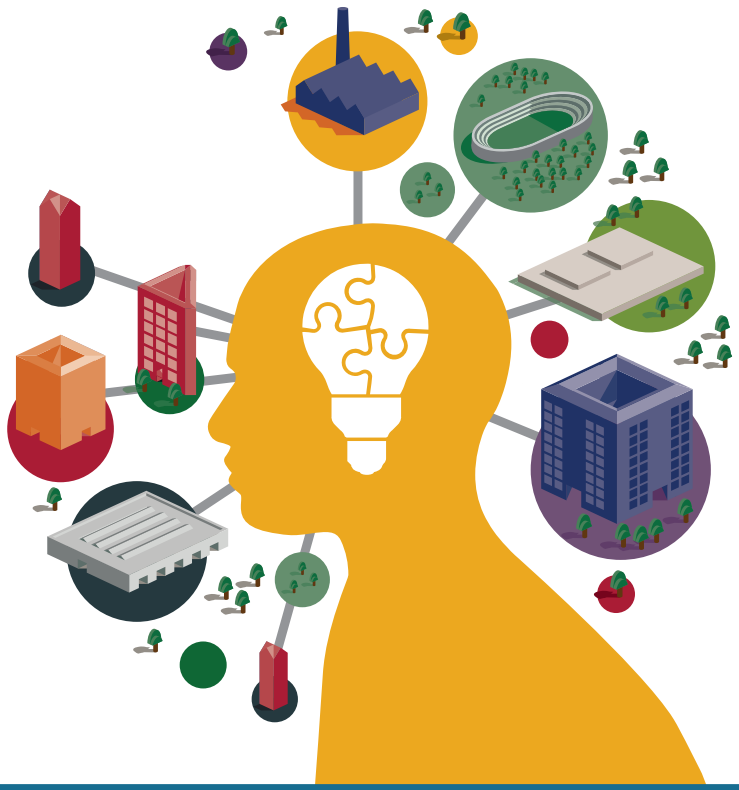

## Speakers and Chairs include:

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- **Hugh Boyes;** *Principal, Cyber Security Centre*
- **Mat Colmer;** *Lead Technologist – Built Environment, Innovate UK*
- **Rhiannon Corcoran;** *Co-director, Institute of Public Policy & Practice, University of Liverpool*
- **Susie Diamond;** *Founding Partner, Inkling LLP*
- **Joe Dignan;** *Interim Head of Business Development, Future Cities Catapult*
- **Ian Ellis;** *Immediate Past President BCIA, Siemans Building Technologies*
- **David Fisk FREng;** *Professor of Systems Engineering and Innovation, Imperial College London*
- **Mark Hawker;** *Senior Engineering Design Manager – Property, Sainsbury's Supermarkets*
- **Paul Jones;** *Industrial Director, SPECIFIC, Swansea University*
- **Dr Paul Littlefair;** *Principal Lighting Consultant, BRE*
- **Rob Manning;** *Government Level 3 BIM Team, Engineering Construction Strategies*
- **Dr Cath Noakes;** *Professor, Leeds University*
- **John O'Hagan;** *Group Leader, Public Health England*
- **Jim O'Neil;** *Technical Director, ECA*
- **Ashraf Patel;** *Energy & Environment Manager, Arcus Facilities Management*
- **Stephen Pearson;** *Head of Building Services, Oxford University*
- **Luke Price;** *Senior Radiation Protection Scientist, Public Health England*
- **Nina Reid;** *Director: Responsible Property Investment, M&G*
- **Andrew Sievadzki;** *Head of Security, Buro Happold*
- **Mike Simpson FREng;** *Technical and Design Director UK, Philips Lighting*
- **Warwick Stannus;** *Association of Mechanical Contractors, Australia*
- **Dhan Tagie;** *Head of Technical Development, Cofely UK*

Book Now at **www.cibse.org/conference**

## Keynote address: **Lord Deben**

**Chair of the UK's independent Committee on Climate Change, Lord Deben is confirmed to give the keynote address on day one - 3 November 2015.**

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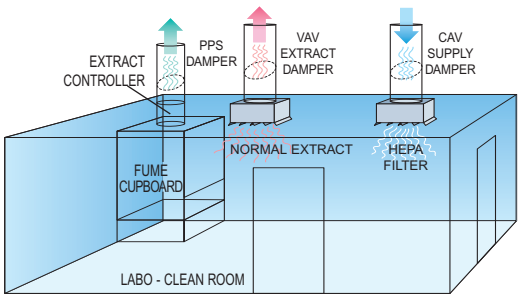


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