

CIBSE

JOURNAL



The official magazine of the Institution of Building Services Engineers

April 2010

PART L REVISIONS

We assess the latest policy developments

GREENER GASES?

Supermarkets opt for refrigerants overhaul

UGANDAN LESSON

Sustainable design for low-cost schools



Retrofit to the rescue

Firefighters win plaudits for energy saving refurb

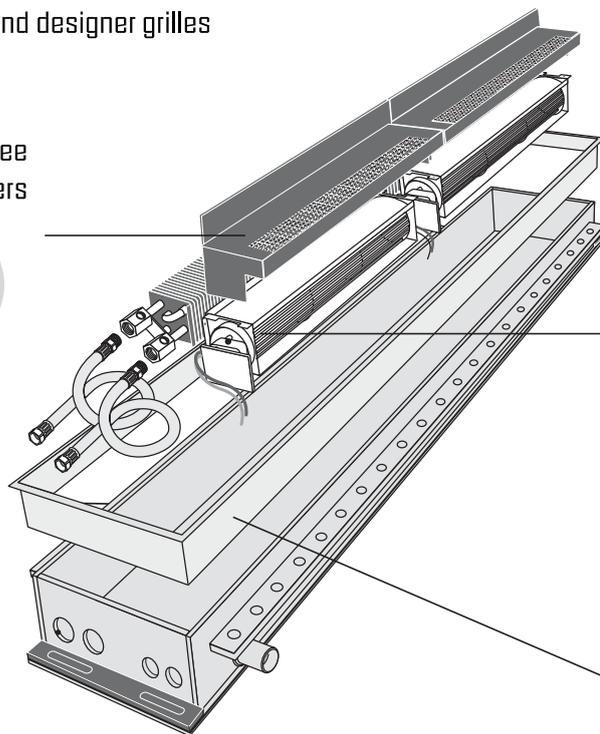


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Cover image: Courtesy of London Fire Brigade



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From the editor



Opportunities for change

And so it's official. The UK government's own chief construction adviser (CCA) confirms that the plethora of policy initiatives that have flooded the industry in recent years has been a hindrance as well as a help in the battle to 'green' the nation's building stock. Paul Morrell's first major announcement since taking up the new CCA post is a palpable hit against his own paymasters. The body he leads, the Innovation & Growth Team (IGT), is studying whether the construction industry is 'fit for purpose'.

The IGT's interim report, before the final version is issued at the end of the year makes, for both refreshing and disturbing reading (see page 9). After years of government carbon-cutting targets and mile-high consultation documents, the IGT goes to the heart of why doubts remain that the aims will ever be met: any low-carbon plans for both new-builds and refurbished properties must be measured against the actual performance of these structures; and a rigorous programme of publicly funded post-occupancy evaluations is needed to provide the intelligence that is now lacking about purportedly green buildings and technology.

The report, of course, does not make this case quite so starkly; but it does gently imply that the loss of such intelligence has been a major stumbling block to making the policy intentions and targets achievable. The buck doesn't stop solely with central and local government, of course. Another significant point highlighted in the report is that professionals across the construction supply chain must get their act together, literally, in working seamlessly towards the fulfilment of low-carbon design intentions.

There is some good work going on in the industry to bring this about. One notable example is the Construction Industry Council's programme – in which CIBSE is involved – to develop the notion of 'carbon-critical' design. Another is the BSRIA-led Soft Landings framework on pre and post-occupancy joint working between professionals.

As CIBSE's own assessment of key aspects of the new Part L 2010 shows, much greater attention must be given to the fabric of the building at the design stage, ensuring it is as low-carbon as possible, before a load of expensive mechanical gizmos and renewables are planned in and fitted (see page 22). CIBSE's recent workshops for professionals to comment specifically on the

targets for 'zero carbon' non-domestic buildings offer a valuable insight – a pre-election focus group, if you like – of what a range of professionals, young and experienced, feel is needed to make the government's laudable aims achievable (see page 24).

I'd urge the main political parties, in drawing up their election manifestos, to take

note of these views (and CIBSE's assessment), if they are serious about greening the building stock. The Conservatives' apparently glib comments to date on their panacea for change – unleashing private sector investment and streamlining the Building Regulations (see page 27) – raise more questions than answers, and have the smack of empty ideology. I don't make a party political point; I do hope that the manifestos and debate from all parties will offer much more clarity, for the sake of all professionals in the construction industry.

Bob Cervi, Editor

bcervi@cibsejournal.com

 **The loss of building intelligence has been a major stumbling block to making targets achievable** 



ONE LESS THING TO WORRY ABOUT.

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News in Brief

'Investment' Budget

The UK government pledged £2bn of equity from a newly created infrastructure investment bank to help boost public sector spending, in the Budget last month. The cash will initially be injected into green transport and sustainable energy, and in particular on wind power. The Renewable Energy Association, which had campaigned for such a 'green bank', said it could potentially issue green bonds as well as provide 'cornerstone' funding.

Getting connected

A consultation looking at how renewable technologies will connect to the grid has been launched by the UK government. Improving Grid Access – Technical consultation on the model for improving grid access, opened for three weeks from 3 March. It is hoped it will help renewable projects connect to the grid in time to meet the 2020 renewable energy targets. www.decc.gov.uk

More schools projects

Six more local authorities across England have been given the green light to join the BSF programme. The six projects are Buckinghamshire, Cornwall, Gateshead, Lincolnshire, Oxfordshire and Sutton. Each of them will embark on their BSF schemes by this summer.

BSF 'transforms' learning

Schools rebuilt or refurbished under the Building Schools for the future programme are raising pupil aspirations and improving behaviour, according to the third annual survey by PricewaterhouseCoopers. More than eight out of 10 head teachers believe that the BSF scheme, aimed at refurbishing the entire secondary school estate, is transforming learning.

Correction

A News in Brief on page 6 of the March issue was missing a final statistic. The story should have read: Adults who believe climate change is 'definitely' real, dropped from 44 to 31 per cent in the past year.

Ministers confirm key changes to Part L 2010

Changes to Part L of the Building Regulations have finally been announced by the government, with the new amendments set to come into effect in October this year.

The new Part L 2010 will tighten up emission standards, with the changes requiring a 25 per cent improvement in energy efficiency above current standards for new homes and non-domestic buildings.

The changes form part of the government's drive for every new home built from 2016 to be net zero carbon, with all new buildings reaching the zero carbon standard from 2019.

The amendments to Part L will increase the minimum levels of energy efficiency for building fabric and services, so that CO₂ reduction targets can't be met through the use of renewables alone.

Similar measures will apply to new work on existing buildings, and will cover extensions and conversions, fabric renovations, replacement windows and boilers.

The Department for Communities and Local Government (CLG) announced the amendments on March 12, and, as the Journal went to press, the revised Approved Documents relating to Part L 2010 were expected to be published before Easter.

Among the other amendments announced by the government,



Changes to the Building Regulations have been confirmed.

changes to Part F of the Building Regulations provides new requirements and guidance for installation and commissioning of ventilation systems. These measures aim to ensure that greener more efficient air-tight homes and offices are sufficiently well ventilated.

Similarly, revisions to Part J – including the requirement for the provision of carbon monoxide alarms when installing solid fuel appliances – are aimed at ensuring combustion appliances can continue to be used safely in airtight homes.

The government is also introducing changes to Building

Regulations Competent Persons Schemes (CPSs) and minor technical amendments to Part G of the Building Regulations, which will take effect on 6 April 2010.

Geoff Wilkinson of the Association of Consultant Approved Inspectors said: 'The industry needs time to train and raise general awareness levels, which cannot begin until the documents are available to us all. History must not repeat itself here – we just cannot afford a recurrence of the issues raised over the last Part L introduction.'

<http://www.communities.gov.uk/news/corporate/1503247>
See Part L analysis, page 22



London landmark achieves double first for BREEAM

The new PricewaterhouseCoopers (PwC) offices at the More London development near Tower Bridge, is the first building in London and the first major office in the UK, to be awarded A BREEAM Outstanding rating, according to consultancy BDP, which worked on the project. The building, which has an A-rated energy performance certificate, includes biofuelled combined heat and power units, active chilled beams and lifts with regenerative braking.

Green agenda still faces too many barriers, says study

A 'plethora' of government policies and initiatives has hindered progress on greening Britain's buildings, according to a major new report.

The study from the Innovation & Growth Team (IGT), a cross-industry body set up by government to assess the state of the construction sector, points to a range of 'barriers' to implementing the low-carbon buildings agenda in the UK.

Too many policies and reports from government departments and non-governmental bodies are 'incapable of absorption by businesses who need to focus on the more immediate interests of their own clients', the report says.

Another major concern is the 'evidential gap between the design criteria of buildings in use and their performance on completion', it says.

The report says government should consider re-introducing



UK Green Building Council

Paul Morrell... Lays out strategy

independent 'audits' of buildings' energy performance, which should be compared with their design intentions.

All publicly funded construction projects could be used as test beds for a green 'transformation' of the industry, it adds.

The industry itself needs to devise a 'tighter' description of how the different parts of the sector,

throughout its supply chain, can work more closely together and become 'integrated'.

Paul Morrell, the government's new chief construction adviser who leads the IGT, said: 'No one should underestimate the sheer scale of the opportunity the transition to a low carbon economy will offer the construction industry.'

'The requirement for low carbon construction is probably the biggest change management programme that the industry has faced since Victorian times. The industry and government need to rise to this challenge.'

Business secretary Lord Mandelson welcomed the report, adding: 'The construction industry is central to the UK meeting our stretching carbon targets.'

The IGT report is an interim study and will be followed by a final document due at the end of this year. www.bis.gov.uk/constructionIGT

Gold for Dubai

The US\$3.6bn 'Dubai Pearl' development in Australia has achieved LEED Gold pre-certified status. The 1.85m sq m mixed-use development incorporates a large-scale solar boosted hot water plant, a high efficiency building façade, heat recovery systems and intelligent building, according to building services engineers Meinhardt.



Aircon inspection report rules may be tightened

The lodging of air conditioning inspection reports would become mandatory in the UK under plans being considered by the government.

The move has been welcomed by CIBSE, which believes it would increase compliance with the regulations.

Under current rules, new air conditioning installations or systems above 250kW should have been inspected by January 2009, and any system above 12kW should

be inspected by January 2011, and then at five-yearly intervals.

Ministers are now also looking at requiring the 'lodgement' of air conditioning reports (ACRs) in England and Wales, according to the new consultation document, Making better use of energy performance certificates and data,

At present there is no central register for ACRs, leaving government and industry with little or no information on aircon performance or efficiency, no way

of monitoring standards, ensuring quality or knowing what impact energy saving recommendations are having on carbon emissions.

Bryan Franklin, CIBSE Low Carbon Consultant steering group chairman, said: 'Air conditioning inspections already have the lowest compliance rates – well below five per cent – and if these issues are not resolved, it is difficult to see how the industry can increase compliance.' www.communities.gov.uk See 'EPC rules flouted', page 16

BDP opens in Abu Dhabi

Europe's largest building design practice, BDP, has announced that it has opened a studio in Abu Dhabi after agreeing to merge with locally based multidisciplinary design practice SYNA.

SYNA has more than 30 years of experience of designing viable and successful projects across the Gulf particularly in the hospitality sector, and has had offices in Abu Dhabi since 1993.

BDP has recently been growing its presence in the Middle East but chose to merge with SYNA because of its ability to deliver complex projects through understanding the region's culture and practices.

'Now is the right time for BDP to become a true global player,' said David Cash, BDP's international director.

WSP acquisitions to continue

WSP Group has announced its intention to carry on acquiring companies in the future, after announcing a significant drop in profits.

The company's turnover dropped four per cent to £723m in 2009, with pre-tax profits falling from £52.1m to £25.4m during the same period.

The company admitted it had been 'a testing year', but that performance had largely been in line with expectations.

But chairman Chris Turner vowed that the business would continue to make progress as markets improve.

He said: 'We have a track record of successfully acquiring and integrating people businesses and we expect this activity to continue when appropriate. We have positioned the business to succeed in these challenging times.'

WYG 'progress' on debts

Converting more than £50m of debts into new shares has led to 'good progress' for consulting engineers WYG.

The company reduced its debts by £52.9m during the year after agreeing terms that gave its banks a 60 per cent share in the company. During the six months to 31 December, turnover dropped by 20 per cent to £115m, with a loss before tax of £4.6m.

News in brief

Wave power for 1.4m homes

The first full strategic environmental assessment to enable wave and tidal energy to be generated for England and Wales has been outlined by the government. Renewable UK's analysis shows that up to 2 gigawatts of wave and tidal capacity could be installed by 2020 – enough to power 1.4 million UK homes.

Peak oil crunch in five years

A follow-up report says that oil shortages, insecurity of supply, and price volatility will destabilise economic, political and social activity within five years. The second report of the UK Industry Task-Force on Peak Oil and Energy Security (ITPOES) was launched by six UK companies from a range of industries – Arup, Foster + Partners, Scottish and Southern Energy, Solarcentury, Stagecoach Group and Virgin.

www.peakoiltaskforce.net

Sustainable shopping

Cundall has provided engineering design services for the £170m redevelopment of Eldon Square Shopping Centre in Newcastle. Cundall's services included structural, civil, transportation, environmental, and mechanical and electrical design. The phased project has included the reconfiguration of the existing bus concourse into a new shopping mall and a new bus station.

Awards for green heroes

Developers, clients, architects and building services professionals involved with environmentally friendly new buildings or recent renovations in north west England are being urged to enter the Northwest Business Environment Awards 2010. www.greenheroawards.co.uk

EAL training accreditation

EMTA Awards, an industry certificate-awarding body, has launched a national accreditation service for in-house training programmes across the building services, engineering and manufacturing sectors. eal.org.uk

Green strategy is a lost opportunity, says body

A trade body in the energy and power industry has accused the UK government of missing a golden opportunity to maximise household CO₂ reductions.

The British Electrotechnical and Allied Manufacturers Association (BEAMA) says the 'Warm Homes, Greener Homes' strategy, which was launched by the Department of Energy and Climate Change last month, fails to give prominence to the effective role of any type of controls – particularly those for heating and hot water systems.

The government claims the new strategy will help people make smarter use of energy in homes, encouraging people to take action and reduce bills.

It says installing some technologies, such as solid wall insulation, could see energy bills cut



Howard Porter... Criticises strategy.

by £380 a year (averaged between 2013 and 2020) – and that the new strategy will also be good for employment, with up to 65,000 jobs required in the green homes industry as a result.

Howard Porter, BEAMA's chief operating officer, said the government is right to address insulation measures. 'But

households must simultaneously consider other issues, such as improving their boiler's efficiency and ensuring it sits within a well-controlled heating system. These very cost-effective measures have received much less focus.

'Surely, it must be better to have a whole-house approach, including a requirement for a minimum controls package, and ensure that all homes with boilers have a programmer, room thermostat and thermostatic radiator valves.'

Rob Manning, CIBSE president-elect, said: 'We need to focus on fabric energy efficiency first, then meet the remaining demand using efficient systems, including appropriate controls, and choose the appropriate technology to do that. We need to apply the government's own hierarchy for zero carbon new build to this.'

Red tape a 'barrier' to uptake of MCS

The Microgeneration Certification Scheme (MCS) is being stifled by bureaucracy before it has even begun, according to a major supplier of solar panels and heat pumps.

From this month, UK householders will be able to sell solar and wind energy back to the national grid, at up to 41p per kilowatt hour.

But Worcester Bosch's head of sustainable development, Neil Schofield, says the scheme risks

being scuppered by a severe lack of engineers qualified to carry out the necessary work.

Schofield said about 60,000 registered heating engineers have expressed interest in registering for the three-year qualification scheme set up by the UK government – but because of the high costs of the scheme, and the excessive red tape involved in applying, few have taken their application any further.

There are only about 500 certified

installers of renewable energy equipment in the UK at the present time. Schofield said: 'It's hellishly complicated and expensive. You have to have a customer complaints procedure, and health and safety documentations.'

'For a one-man plumbing operation, they are just not interested. The scheme has become a barrier to uptake – we welcome consumer protection but we just need some common sense.'



Developer wins

The MIPIM Architectural Review Future Projects Awards 2010 have been announced, with Land Securities' One New Change (pictured) the second British scheme ever to win both the Overall and Mixed Use categories. The commercial and retail development uses loop bore holes that extract and discharge water from the underground aquifer, with 219 closed loop energy piles, designed by Hoare Lea. www.mipimarfutureprojects.com



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Twickenham Stadium

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News in brief

BakerAECOM wins contract

Consultancy AECOM Technology Corporation in Los Angeles has announced that its engineering arm, BakerAECOM LLC, has been awarded a contract worth up to \$600m to provide production and technical services for the US Federal Emergency Management Agency's (FEMA) risk mapping, assessment and planning (Risk MAP) programme, by the US Department of Homeland Security.

Winners to bridge gap

Powell-Williams Architects and multidisciplinary engineering consultancy Buro Happold have won a European design competition for a new pedestrian bridge that will kickstart a four-year development project in the city of Aveiro, Portugal. The eventual development will include a new 'sustainability park' to help transform the city.

Engineers' key role

HRH The Princess Royal has stressed the global importance of the engineer in rebuilding the lives of those affected by natural disasters. She spoke at the 'Engineering a Better World' conference, organised by the Institution of Civil Engineers and the Commonwealth Engineers' Council, which aims to increase co-ordination between all the bodies involved in humanitarian aid.

RPS opens Down Under

Multidisciplinary consultancy RPS has opened a new office in Gladstone, Queensland, Australia. Its new team will work closely with the local development, civil and resources sectors to provide a variety of services, including planning, surveying and environment services. Currently, more than A\$40bn worth of future projects are planned in the area.

Championing waterways

Arup's Brisbane office in Australia is appealing for water 'champions' to come forward and be recognised, by entering the Healthy Waterways Awards in South East Queensland. www.healthywaterways.org

New academy aims to plug green skills gap

A new academy for the UK's 'green' building services industry will help to plug the skills gap in the sector, according to an industry leader.

The planned National Skills Academy for environmental technologies will coordinate skills in design, installation, maintenance solar panel technology, heat and power, and wind and micro-generation,

The programme, to be set up with £3m of government funding, is being overseen by SummitSkills, the skills body for building services engineering sector.

SummitSkills chief executive Keith Marshall told the Journal that the aim was for different sets of training providers to each concentrate on one area of green-building technology.

He said he hoped the academy would help to address some of



Keith Marshall... Need more skills.

the skills shortages that are seen as existing among suppliers and fitters of environmental technologies, sometimes resulting in less appropriate solutions being provided.

'I don't want to overstate the problem, but certainly we don't want a provider saying to customers "here's a ground source heat pump" simply because this is all that they do,' he said.

Separately, the government also

announced that it would co-fund the delivery of up to 1,000 new apprenticeships a year in the nuclear sector, depending on demand from employers.

In addition, the UK Commission for Employment and Skills, in its first National Strategic Skills Audit, highlighted the critical role that the building services engineering sector will play in the installation of the UK's low carbon infrastructure.

The report said the sector needs to change and improve its skills to meet this challenge.

Marshall said of the report: 'Future jobs and employment in the sector depend on the ability of businesses and employers to develop the skills to deal with the task of fitting the environmental technologies which will be commonplace as the UK meets its commitments to the low carbon agenda.'

CRC a financial 'opportunity' for business

The approach businesses take towards the Carbon Reduction Commitment Energy Efficiency Scheme could drastically affect their bottom line, a study has found.

A business with an annual energy bill of £1m could see a net cost of £280,000 a year if it only complies with the basic CRC requirement,

says the report. However, those taking action to optimise CRC performance could receive a net income of £130,000 – leaving them £410,000 better off than those adopting the basic approach.

The analysis of the CRC's potential impact was conducted by consultancy huntleypalmerflatt,

based on information from its clients of the past two years.

'Those [clients] that see the CRC as an opportunity will benefit,' said huntleypalmerflatt's Stuart Bowman. 'The CRC is not a tax – companies that understand it and approach it well can end up adding to their bottom line.'



Industry achievers line up for National Training Awards 2010

Young building services engineer Gemma Scott (centre left) lines up with other winners in the National Training Awards 2010 ceremony in London. The awards, whose sponsors include CIBSE, celebrate high-achieving newcomers across the industry sectors. Scott, who works for Smith Group UK, won two gongs – Technician of the Year and a new judges' discretionary Environmental Excellence Award. www.summitskills.org.uk/awards/460



The future of commercial heating is changing dramatically. Rising fuel costs and the need to reduce carbon emissions are driving the demand for renewable technology.

As heating accounts for over half of a typical building's total energy use, it is the obvious area to target. Mitsubishi Electric have therefore pioneered a range of commercial **'heating only'** systems using heat pump technology to meet the challenges of commercial heating for today, tomorrow and beyond.

Ideal for use in new build or refurbishment, our advanced heat pump systems are recognised as renewable technology and provide a simple, cost-effective means of meeting tough renewable energy targets.

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News in brief

Guidelines on renewables

New guidelines have been published by the UK government to help regional authorities in England assess the potential for renewable and low carbon energy in their area. It is hoped that the guidelines will enable the regions to set themselves ambitious renewable targets to help the UK meet its overall target of using 15 per cent renewable energy by 2020.

www.communities.gov.uk

Fire review commissioned

The UK government has commissioned research into the spread of fire in apartment buildings, following recent cases where blazes have spread through roof voids. The research will include a review of current building practices and the detail of 'compartmentation' presently being used by the building industry.

Excellence rewarded

This year's winners of the BREEAM Awards 2010 have now been announced. In order to win an award, each building must have excelled in every environmental category within BREEAM (for example, from energy to ecology). To see the full list of winners, visit www.breem.org

Flexible cities

Funding totalling £250,000 has been announced to research 'the flexible city' by the University of Oxford. Six projects have been selected to benefit from the study, which aims to deliver scientifically robust, cutting-edge research into the social, technological and climatic changes cities will face over the next 50 years, and how cities can be made more flexible to meet these challenges.

Energy Institute merges

The British Energy Association has merged into the Energy Institute (EI) and changed its identity to become the UKWEC – the UK member committee of the World Energy Council. UKWEC will offer members access to seminars, research activities and networking events. The EI retains its branding. www.worldenergy.org/uk

Morrell questions demand for early 50% carbon cut

The UK government's new chief adviser on construction has raised doubts over a call to cut carbon emissions by 50 per cent in just 10 years' time.

The target is contained in a new 'manifesto' from the UK Green Building Council (UKGBC). The manifesto, launched at the annual Ecobuild conference in London last month, identifies five steps that the UKGBC believes are essential to meet the UK government's 2020 and 2050 carbon targets.

Those steps include committing to a 50 per cent cut in greenhouse gas emissions by 2020 – 16 per cent higher than current government policy stipulates under the Climate Change Act.

Paul Morrell, who recently took up the newly created post of chief construction adviser to government, said he welcomed the manifesto.

But he added: 'My only reservation is a target that may actually defeat the purpose of the exercise. I love the idea of cutting 50 per cent carbon emissions by 2020,



Paul Morrell at Ecobuild... Question marks over UKGBC manifesto.

and if it were that good and that simple we should say yes to it.

'But the thing that worries me is twofold; firstly that this is a massively complicated landscape, and some people are just beginning to get it and then you move the goalposts.

'Secondly, we are not going to get into people's houses twice. The price of quick wins here may be that we don't get the more important, bigger, longer win because we won't get back into people's houses.'

Other points in the manifesto

include creating a national accreditation scheme to ensure tradesmen have the right skills, and using sustainable community infrastructure, such as heating and water harvesting, more widely.

Morrell added that he wholeheartedly agreed with making better use of sustainable community infrastructure, describing it as a 'mistake' for government to support on-site renewables as a non-cost effective way of addressing the issue.

See Ecobuild coverage, page 26

Roadmap call for British homes refurb

The UK government needs to set out a roadmap for upgrading Britain's homes if it is to have a chance of reaching its targets, according to an independent advisory body.

Ministers have said that they want 7m homes to have makeovers by 2020, to increase their energy efficiency. The Energy Saving Trust said this would require as many as 13,400 home makeovers every

week up to 2020. The trust said whole-house refurbishment would likely include upgrading the basic insulation of a home and then adding other measures such as water efficiency, advanced insulation or micro-generation.

Philip Sellwood, chief executive of the trust, said: 'We need a roadmap towards a low carbon existing housing stock – laying out a set of

standards that we expect our homes to reach in 2015, 2020, 2030 and 2050.'

The trust said the scale of the challenge is huge, with an estimated 6m homes still needing cavity wall insulation – nearly a quarter of all UK homes. There is still an estimated 13m properties that need loft insulation.

www.energysavingtrust.org.uk

New build set for BREEAM Excellent

De Montfort University's Hugh Aston building in Leicester, UK, is set to achieve a BREEAM Excellent rating, according to engineers working on the £35m project. Natural and hybrid ventilation techniques are being used, and sustainable features include ground source heat pumps, adiabatic cooling to air handling units, solar hot water arrays and daylight-linked lighting. The engineering works were carried out by Pick Everard.



Social housing to trial large-scale retrofits

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A large-scale retrofitting programme in the UK is set to start after 87 social housing projects were given a share of £17m to test low carbon building technology. The competition, entitled 'Retrofit for the Future', aims to create housing prototypes that could eventually be rolled out across the UK.

The scheme is run by the Technology Strategy Board in conjunction with the government.

Examples of key retrofit features include: substantial internal insulation upgrades using natural materials; heat recovery in high temperature areas; air-tightness strategies to eliminate draughts; and intelligent heating systems.

The results of the projects will be shared to help show how the UK's

current housing stock could be made more energy efficient.

David Bott, director of innovation programmes at the Technology Strategy Board, said: 'It is critical that we look at ways to dramatically improve the performance of our existing housing stock. Retrofit for the Future provides the test beds we need to ensure the development of long-term, mass solutions.'

In the initial design phase, more than 190 organisations received up to £20,000 each to carry out full feasibility studies and devise innovative proposals. Eighty-seven will now receive an average of £142,000 to carry out retrofits on current social houses. Each demonstrator house will be evaluated by the Energy Saving Trust for at least two years. www.innovateuk.org

Code 4 homes scheme eschews renewables

A consortium of partners has been created to build 12 Code Level 4 homes without relying on renewable technologies.

Named AIMC4, the government-backed consortium comprises six members who aim to build the Level 4 houses under the Code for Sustainable Homes – believed to be the first project of its kind.

Twelve energy efficient innovative homes will be constructed using fabric and primary building services. Funding for the project comes from a £3.2m investment from the developers, matched by funding

from the Technology Strategy Board.

Three different methodologies will be investigated: timber, masonry and hybrid.

The focus will be on optimising the actual fabric of the building, rather than add-ons.

In particular, the six companies are looking to reduce heat loss from a building's fabric, improve passive solar gain into buildings, reduce uncontrolled air leakage from a building, and improve the accuracy of controlling space heating, ventilation and/or heating in buildings. www.aimC4.com

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EPC rules still being 'flouted'

The number of commercial buildings failing to lodge an energy performance certificate (EPC) during their sale or rent remained high in February, with 61 per cent flouting the rules, according to an index of EPCs.

The figure is just a three per cent improvement on January's figures, despite the certificates being a legal requirement for more than a year.

The monthly index is run by NES and Building.co.uk, and monitors how many commercial buildings currently being marketed have a valid EPC. NES is now working with authorities such as East Sussex County Council (ESCC) to boost awareness.

Paul Taylor of ESCC said: 'The legislation contains too many grey areas, like "no fixed heating or ability". The fines are too low and trading standards are becoming increasingly intel-led – but, unfortunately, not many people complain about the lack of an EPC.'

The sample for February includes 1,084 buildings taken from Cumbria, Buckinghamshire, East Sussex and Leicestershire, and includes properties that have a floor area in excess of 50 sq m and which have been on the market for at least six months.

Funding for renewables

Thirty-three community-based organisations will share more than £610,000 for renewable energy technologies in the seventh round of the Community Sustainable Energy Programme (CSEP) capital grants scheme. Winning applications include village halls, community centres and schools.

In addition, more than £672,000 has been awarded in project development grants, enabling almost 300 community organisations to undertake feasibility studies and decide if their buildings could benefit from renewable energy.

CSEP is a three-year open grants scheme funded by the Big Lottery Fund. It is designed to help community-based organisations in England reduce their energy bills and environmental impact.

www.communitysustainable.org.uk

Government green planning statement 'fails markedly'

The Royal Town Planning Institute (RTPI) has dismissed a government planning statement on energy as 'not fit for purpose'.

The professional body, which represents 22,000 planners, has given a robust response to the government's consultation on a National Policy Statement for Energy, which will determine how plans for energy facilities are decided upon by the new Infrastructure Planning Commission.

The government statement was presented as 'a triple boost' for councils tackling climate change, by updating planning rules, granting nearly £10m to improve green skills and backing the progress made by the second wave of eco-towns.

It claimed the new policy statements on climate change, natural environment and coastal change would give councils a 'green planning rulebook'.

But the RTPI was scathing in its response. Matt Thomson, acting director for policy and partnerships,

said: 'The draft national policy statement on energy is not fit for purpose.'

'It makes no attempt to translate the national need for energy infrastructure into guidance on where such development should be located, and so provides no reassurance for potential investors or local communities.'

'We face a critical situation in providing the right framework to encourage investment into new energy facilities, particularly as the government has made strong commitments on reducing carbon emissions from energy. The current energy policy statement markedly fails in this respect.'

Meanwhile, the Conservatives have proposed an overhaul of energy policy. The policy paper, *Rebuilding Security*, sets out 12 actions, including promoting nuclear and renewable power through streamlined planning, and a new 'energy internet' that puts consumers 'in control' of their energy usage.



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● UK planning rules have been reformed to help save developers money when applying for more time to build new developments. The move will see businesses pay lower fees when extending planning permissions during the economic recovery, helping to save up to £69m a year and enabling developers to invest in new projects, according to the government. **See Legal column, page 32**

Big ideas to take centre stage at CIBSE national conference

Every MP should personally take ownership of their constituency's carbon cuts in order to equal or better the national CO₂ target during their five years in office.

This demand is among a number of 'big ideas' proposed by CIBSE members to central government to help towards tackling the UK's energy problems.

Six ideas to lobby government on energy issues have been shortlisted as part of CIBSE's One Big Idea campaign, launched by president-elect Rob Manning.

The winning idea will be chosen at CIBSE national conference in April, at the British Museum (pictured), where delegates will vote for their preferred suggestion.

If members vote for MPs to take ownership of their constituency's carbon cuts, CIBSE will lobby ministers, and then support them by preparing a guide document.



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Other ideas put forward include the government commissioning and publishing full post-occupancy evaluations for all construction or refurbishment carried out in the government estate since the introduction of the 2006 Part L of the Building Regulations.

The six shortlisted ideas:

- Make 'Education for Building Energy Efficiency and Sustainability' (eBEES) a

compulsory topic for children at both primary and secondary schools (possibly for inclusion in the National Curriculum). CIBSE could contribute local energy experts/mentors to schools and provide web pages and some simple coursework suggestions. This initiative will promote CIBSE as a leading institution, and building services engineering as an exciting career choice;

- Introduce personal carbon allowances along with a carbon credit card to create a personal carbon trading scheme;
- Tag business rates to asset ratings (CO₂ production). Businesses would get a reduction in rates according to the amount of CO₂ reduction. If a building has not yet been assessed, owners will have to pay a default tax, only getting a reduction when they implement recommendations

All-electric future could 'double dependency'

An academic report has highlighted critical challenges in the current 'all-electric' approach to decarbonising the UK energy system.

The report, *Building a Roadmap for Heat*, compiled by scientists at Imperial College London and the University of Surrey, concludes that the current approach to increasingly using electricity to heat buildings and power cars intensifies our dependence on the electricity system to unprecedented levels.

This dependence might also risk undermining the government's ability to meet its own stringent 80 per cent carbon cuts by 2050, it says.

In the report's scenarios, this dependence could double the peak electricity demand in 2050 – from around 80GW to more than 150GW.

To combat this problem, the report recommends a more integrated approach, using combined heat and power (CHP), district heat networks, biomass and carbon capture and storage more widely. This would lead to a number of benefits, including:

- Reduced energy losses from power generation by 8 MTOE (million tonnes of oil equivalent);
- Reduced peaks in electricity demand and greater capacity to store surplus heat;
- A 13 per cent reduction in electricity demand as compared to the benchmark 'all-electric' approach;
- A 33 per cent reduction in the demand for coal-fired generation (saving 13 MTOE); and
- A 30 per cent reduction in energy losses from power generation.

The report was commissioned by the Combined Heat and Power Association. www.chpa.co.uk



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from a DEC/EPC or A/C report;

- A lack of compliance with non-commercial properties obtaining EPCs during the marketing process, and the general lack of implementation of the recommendations made in the reports, should be addressed. In particular, business rates should be partially based on the building's asset rating, with each band being subdivided so that the most efficient buildings pay fewer rates than the least efficient within that group. Those that have implemented the recommendations will be rewarded and those that don't will be encouraged;
- Require each and every MP, regardless of party, to personally take ownership for ensuring that their constituency delivers carbon cuts equal to, at least, those of the national commitment over the five years of their tenancy. CIBSE will support MPs by preparing, with others, a guide document setting-out an action implementation plan. This would commence with establishing the

current carbon emissions of the particular constituency. The guide would be delivered and explained to the MP concerned by regional CIBSE members who would then continue to assist as required and help monitor progress; and

- Commission and publish full post-occupancy evaluations (POE) (following the PROBE model) for all construction or refurbishment carried out in the government estate since the introduction of the 2006 Part L of the Building Regulations (or the national implementation of the EPBD). This information is essential for the establishment of national benchmarks and standards, for the validation of new designs and techniques, for the development of robust national policy and for the development of up-to-date and authoritative teaching materials.

The CIBSE national conference will take place on 27-28 April at the British Museum, London. Visit www.cibse.org/nationalconference

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More titles on offer

As well as our own publications, CIBSE also sells a large number of titles by other publishers, many of which are available at reduced rates for members.

Some of the recent additions to the bookshop are:

Fundamentals of HVAC Control Systems, an introduction to all aspects of HVAC control systems. Members £20/ non-members £25.

Water Regulations in Brief is an indispensable reference book, providing all the information needed to comply with the regulations. Members £16/ non-members £19.99.

Modern Wiring Practice is a fully revised 2010 edition providing an up-to-date source of reference to building services design and installation in the 21st century. Members £20/ non-members £24.99.

For more information on these, and all our publications, visit www.cibse.org/publications or call 020 8772 3618.

Plus look out for your 2010 bookshop pricelist that is being sent to all members this month.

The pricelist includes all the latest bookshop titles from CIBSE and other publishers, as well as special offers and discounts that are available for a limited time only.

AGM planned for May

The 2010 CIBSE annual general meeting will be held on Thursday 6 May 2010 at the Royal Aeronautical Society, 4 Hamilton Place, London W1J 7BQ. It will be followed by the president's address by the incoming CIBSE president Rob Manning. The calling notice will be circulated shortly with details of timings and registration for the meeting and address.

New LUCKINSlive.com directory launched



Theo Wood

Amtech's Mark Tindall and CIBSE's Stephen Matthews sign the deal.

CIBSE has entered into an exclusive agreement with IT provider, the AMTECH Group, for members to access the new LUCKINSlive.com directory of industry products and services.

LUCKINSlive.com is the first online information centre for the UK building services industry that provides a single source of

comprehensive, accurate and up-to-date information for hundreds and thousands of products. The centre boasts a clear, easy-to-use design, with consistent product presentation, is accessible to all and includes regular newsletters.

Stephen Matthews said: 'CIBSE members are becoming more and more focused on the need

to provide building users with buildings that are as excellent in operation as they are on the drawing board. The only way they can achieve this is to ensure that they specify the right products and that they are competently installed.

'I believe LUCKINSlive.com – accessible via CIBSE's website – will be a resource to which industry professionals turn on an almost daily basis.'

Amtech group managing director Mark Tindall added: 'LUCKINSlive.com is set to revolutionise the way that building services specifiers and installers access product and industry information. CIBSE's endorsement is the latest development in a relationship between our organisations that continues to facilitate the work of engineers and enhance the services they provide.'

Visit www.luckinslive.com or call LUCKINSlive.com on 0800 028 2828.

Appeal for founder members for new 'homes for the future' group

A proposal has been received to establish a special interest group on homes for the future.

It will aim to inform and promote best practice in building services when constructing better homes. The main areas of interest will be energy strategies and services for new and refurbished homes, and their integration with overall fabric and design. There is a growing demand for high-quality housing to meet increasingly complex design and performance standards, as well as the challenging targets for delivery and performance of housing – namely Part L1 of the Building Regulations and the Code for Sustainable Homes. The zero

carbon housing agenda poses a significant engineering challenge, as will refurbishment of existing housing stock to achieve low-carbon performance.

At present, the house-building agenda is being developed with limited detailed engagement with building services engineers – and this will not be sufficient to deliver the zero carbon goal. The principal terms of reference for the proposed group are:

- To act as a knowledge exchange for best practice and to increase members' knowledge, skills and awareness of techniques, tools and solutions for the residential market;
- To provide accurate information

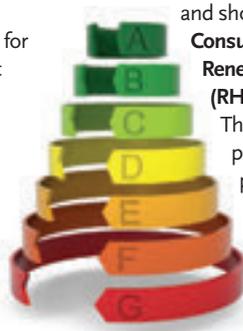
to meet service demands, planning requirements and Building Regulations;

- To produce information on fabric design, and analysis and engineering systems that are practical, modern and sustainable;
- To propose and contribute to the development of new publications, to provide design guidance;
- To work with other CIBSE groups to ensure knowledge is included on residential services design; and
- To identify and support the research required to fill the knowledge gaps.

The group needs support from 20 CIBSE members to proceed. Email nhughes@cibse.org

Keep up to date with EPBD and RHI policy consultations

Two major consultations are currently open for comment: **Making Better Use of Energy Performance Certificates and Data**. This consultation develops proposals to make data from EPCs available more widely (first proposed in 2008) with a stepped level of access depending on intention for use, and providing draft criteria for applicants to meet prior to being granted access to this data. The consultation also covers: a proposal for mandatory lodgement of air-conditioning reports; the roll-



out of DECs to the commercial sector (a short briefing is available at www.cibse.org/comdec); and clarification of when an EPC is required for a non-domestic building for sale or rent. Other issues covered include EPCs for houses in multiple occupation and short-term holiday lets.

Consultation on the Renewable Heat Incentive (RHI)

The Energy Act 2008 provides the statutory powers for a renewable heat incentive scheme to be introduced across England, Wales and Scotland. This consultation

seeks views on the proposed scheme for a Renewable Heat Incentive (RHI), which the Department for Energy and Climate Change (DECC) aims to introduce in April 2011. The RHI will provide financial support for those that qualify under the scheme to install renewable heating, supporting a range of technologies and heating scales. Tariff levels have been calculated to bridge the financial gap between the cost of conventional and renewable heat systems.

These consultations can be accessed at www.cibse.org/knowledgebank. For further information or to comment, email smcdonough@cibse.org

Training and development

Submissions

The closing dates for annual submissions to be considered at the May and July 2010 Training and Development Panel meetings are 13 April and 8 June respectively.

Training submissions and any queries, plus employers' enquiries and applications for approved company training schemes, should be addressed to Parvin Begum, training and development administrator. Call 020 8772 3612 or email pbegum@cibse.org

CPD Directory update

To be added to the Directory of CPD Course Providers, contact Parvin Begum on 020 8772 3612 or email pbegum@cibse.org

We also accept applications for online courses and we will welcome more e-learning applications. A concessionary rate is available for entries of the following categories:

- Academic institutions;
- Not-for-profit organisations offering free or non-profit training courses;
- Sole traders who are members of CIBSE and offering free or non-profit training courses; and
- Sole traders who are members of CIBSE and for whom the training business amounts to less than five per cent of their annual turnover.

For more information on training and development visit the IPD CPD section of the CIBSE website: www.cibse.org

Debating the façade issues

The Society of Façade Engineering is hosting a free talk and debate after its AGM on 15 April.

Façade Engineering – Challenges and Opportunities for the Discipline and the Society, will feature guest speakers Peter Cablehorn, technical director at Scott Brownrigg, highlighting the architect's view; and Professor David Nethercot, head of civil and environmental engineering at Imperial College, arguing the engineer's case. Visit www.cibse.org or email wwilliams@cibse.org

Venue: RIBA, 66 Portland Place.
Time: 6pm to 8.30pm.

Play for your profession

The Building Services World Cup is now calling for teams.

The football tournament, now in its second year, will take place in Liverpool on Saturday 12 and Sunday 13 July. The tournament is open to anyone within the building services sector, and will once again be supporting the Everyman Campaign.

Registration for 11-a-side teams is open, and closes on the 31 May.

Three additional events are also being held in support of the Building Services World Cup/CIBSE Trophy:

- 21 April: World Cup Charity Golf Day, Manchester;

- 12 June: Building Services World Cup Summer Ball; and
- 29 September: World Cup Charity Golf Day, Maidstone, Kent.

To register a team, or to find out more information about any of the events, visit: www.buildingservicesworldcup.com



Last year's winners, AECOM FC.

Launch of SoPHE Scotland

CIBSE is delighted to announce the launch of SoPHE (the Society of Public Health Engineers) in Scotland, following a successful inaugural event in February.

Almost 60 delegates attended the Edinburgh-based event at which Ernie Fisher and Darren Crane of Polypipe Terrain gave an interesting and informative presentation on the need for, and the design and implementation of, rainwater harvesting systems.

The event was run in

conjunction with CIBSE Scotland and its chairman, Stuart MacPherson, hosted the evening. At least three SoPHE events will be held each year in Scotland, with the second planned for late May in Glasgow.

The SoPHE Scotland organising committee comprises Paul Angus of WSP, Joe Hendry of Buro Happold, and Lynne Jack of Heriot-Watt University.

For more details or to join, email l.b.jack@hw.ac.uk

Entries sought for the CIBSE Undergraduate Award 2010

Give yourself a winning edge with CIBSE's Undergraduate Award!

The award is aimed at final year BSc, BEng and MEng students to encourage academic excellence and to recognise the industry's future leaders. Sponsored by Hays Building Services, it offers students an excellent opportunity to showcase their skills at a national level as well as adding an extra competitive edge to their CV if their project is shortlisted.

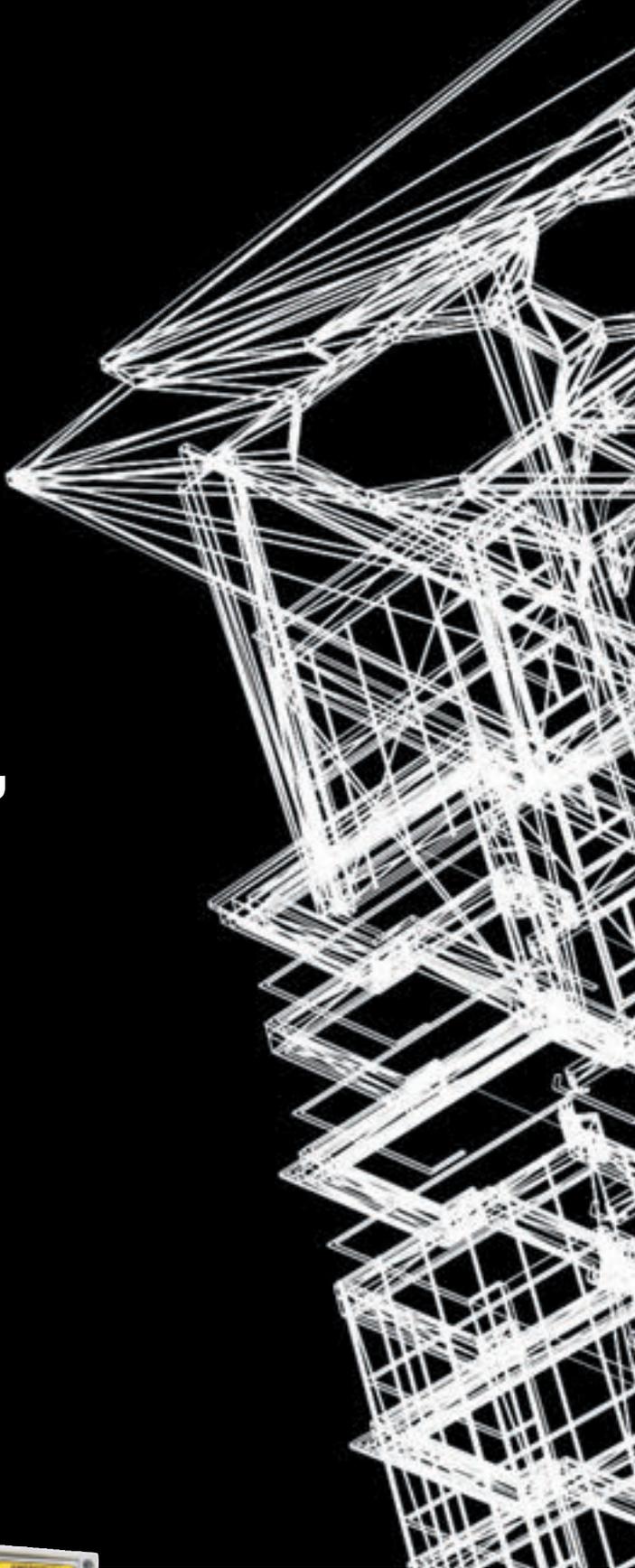
The 2009 winner, Nicole Jean,

from Heriot-Watt University, received fantastic exposure and is now a graduate electrical design engineer at Gifford.

The first prize is £500, with a runner-up prize of £100. To enter simply send in a 2,000-word synopsis of your final year project, together with your completed application form, by 31 July. You have already done the work – so there's nothing to lose! To download an application form, go to: www.cibseyoungmembers.co.uk

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Fabric of success

The ambition to achieve zero-carbon buildings in the UK non-domestic commercial sector has become a centrepiece of the government's drive for a greener environment. CIBSE's Hywel Davies considers the challenge ahead



Hywel Davies addresses professionals attending the London workshop

The greatest single challenge facing the UK construction industry is to be able to deliver low carbon buildings on the ambitious scale envisaged by government policy and required by the Climate Change Act. The recent consultation on proposals for achieving 'zero carbon' non-domestic buildings, and the forthcoming 2010 changes to Part L create a whole new set of issues.

Last month Communities and Local Government (CLG) confirmed that the 2010 changes to Part L will require a further reduction of 25 per cent in carbon emissions from new buildings. The 2013 revision is likely to increase that cut to 44 per cent, which looks set to be the level for fabric energy efficiency requirements for zero carbon buildings from 2016.

To inform the response to the CLG consultation on zero carbon non-domestic buildings, CIBSE held two workshops in February for groups of practitioners and colleagues. The events, in London and Bristol, were organised with Sponge, the young professionals' network, and CIBSE South West Region.

Some of the comments made at these workshops are shown on page 24. One overriding point that participants made was the need for policy to focus not just on carbon, but on actual energy use.

CIBSE's assessment of the issue of zero carbon 'non-doms' is illustrated in the pyramid shown opposite. CLG proposed a threefold hierarchy comprising energy efficiency, followed by on-site or linked renewable energy, and finally 'allowable solutions', primarily off-site renewables. CIBSE has developed this hierarchy to show the need to focus on fabric energy efficiency, demand reduction and efficient use of energy before considering renewables on any site, or any other form of 'allowable solution'.

CIBSE agrees that challenging energy efficiency standards for non-domestic buildings should cover space heating and cooling, and use kWh/sq m/year as an indicator of energy performance. However,

The CIBSE energy hierarchy explained

Fabric energy efficiency – make the building envelope as efficient as reasonably possible for all buildings, using all available passive means. Incorporate back-stop requirements for solar gain and airtightness as well as an overall kWh/sq m/annum target.

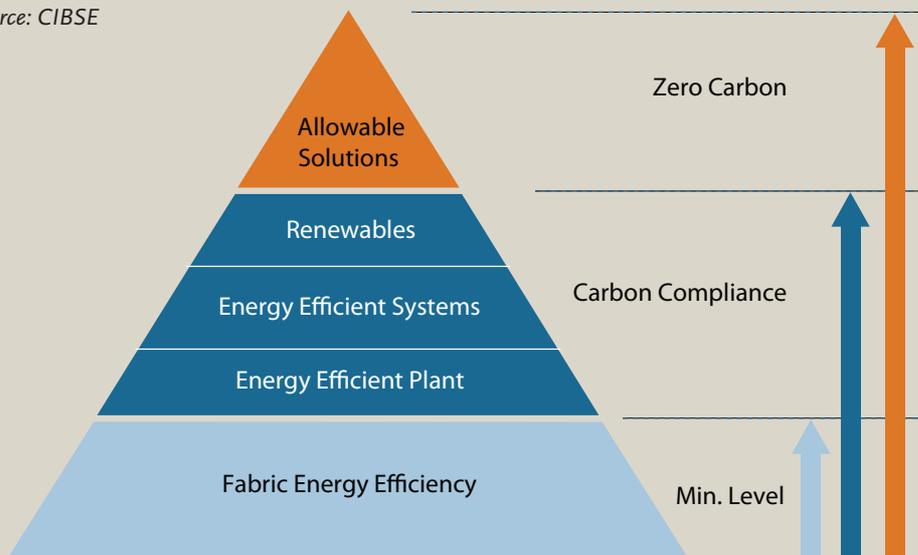
Energy efficient plant – install energy efficient heating, cooling, ventilation and (if needed) refrigeration plant, lighting, and other energy using systems such as lifts, escalators and other, long life energy using equipment. NOTE: this requires some currently unregulated uses of energy to be brought within the scope of Part L in the future (2013 or 2016).

Energy efficiency systems – reduce energy demand of installed plant at the systems level, with: controls

that are installed and commissioned; trained operators; and maintenance and management systems. It is far too easy to install state-of-the-art, energy efficient kit, but then to connect it together in inappropriate ways, with inadequate controls and operator or occupant training, and lack of awareness and insufficient maintenance. The dream specification delivers nightmare performance, with emissions to match and energy costs to make the nightmare recur every time a bill comes in.

Only once we have energy efficient fabric and efficiently operating systems should we move to provide renewable energy to power those systems, whether on site, off site, or a mixture of the two.

Source: CIBSE



" We need to ensure that buildings are built, signed off and operated as they were designed to "

minimum values should apply to air tightness, solar gain and heat loss, as they do in Part L.

However, the kWh/sq m/year metric will be a real problem where different fuels with different emissions factors are used. You cannot add x kWh of electricity to y kWh of gas. If you want to know the carbon emissions you must first convert each kWh figure to carbon, using the correct emissions factor, and then

add the emissions, not the energy figures. According to the CLG consultation, other options for allowable solutions – apart from off-site renewables – include advanced building controls, energy efficient appliances and renewable heat provision.

But CIBSE's view is that controls are a current requirement of Part L, and so should not be classed as an allowable solution. Indeed, controls systems should >



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> be seen as an essential element of any proper services design and installation.

It is also important that systems are well maintained and operated, and audited regularly to ensure continuing effective operation. Better use of building management systems could also be encouraged through the new Carbon Reduction Energy Efficiency Scheme (CRC) and by proposed wider roll-out of display energy certificates.

Electricity generated from renewable sources should also be included as an allowable solution, where practicable. Moreover, while the CLG consultation was about new buildings, allowable solutions should also encompass measurable improvement of the existing building stock, or the export of heat or electricity to existing buildings around the site of the new development.

More generally, details of what are finally deemed to be allowable solutions must take into account the time needed by the industry supply chain to develop and offer these solutions.

The greatest achievement of display energy certificates has been to highlight the gap between predicted building performance and reality. Buildings do not use the energy calculated for Part L compliance: they use a lot more. But this is often because of the gap between what was designed and specified, and what actually got built and installed.

We need to ensure that buildings are built, signed off and operated as they are designed to be, and that commissioning records and the building logbook remain with the building throughout its life, and are updated to reflect reality. This information requirement was introduced into Part L in 2002, but it is even more important now that it is delivered and that it reflects the as-built reality, not the designers dream. It needs to become a recognised first port of call for facilities managers wanting operational information about a building.

Although CLG's consultation was about new buildings, clients and property developers would do well to balance the costs of building from scratch with those of refurbishment. The carbon savings from reducing CO₂ emissions from a poorly performing G-rated building by 20 per cent are equivalent to making a



Professionals attend a workshop on the non-doms policy held at London's Canal Museum

New training on Part L

CIBSE is running a new course giving a comprehensive overview of the changes to the existing Building Regulations Part L, Approved Documents and technical tools, and introducing the changes in detail.

The course will review the requirements, the practical procedures and assessment techniques to demonstrate compliance for new and existing buildings and their engineering services.

For further details, dates and locations visit:

www.cibsetraining.co.uk

similar-sized B-rated building completely carbon neutral. But the cost of the carbon neutral building will be several times the cost of improving the G rated one. In addition, delivering energy improvements and carbon reductions to existing buildings should be very much on the agenda as an allowable solution, integrating new and existing buildings.

As comments from our two workshops highlight, achieving zero carbon new buildings of any sort is about more than what goes into them. Post-occupancy

Achieving and maintaining zero carbon new buildings will require attention to the structure's fabric, and ongoing performance assessment

evaluations of these building will be crucial to ensuring optimum energy efficiency and providing useful intelligence. And the public sector can have a key role here.

The CLG consultation proposed that the public sector take a lead in trialling allowable solutions. CIBSE supports this, provided that the information gained is captured, maintained and shared. Extensive performance data on pilot buildings must be released and externally audited to ensure that the achievements claimed are verified and can be replicated. There must be more research on how buildings really perform when occupied, where the energy costs are, and how they are performing in terms of kWh/sq.m/year. This could be pioneered by public sector trials.

As the news story on page 9 shows, last month's interim report from the chief construction adviser's cross-industry Innovation & Growth Team calls for a programme of post-occupancy evaluation to be restarted as a matter of urgency. Achieving and then sustaining zero carbon new buildings will require attention, not only to the fabric of the structure – as the pyramid shows – but also to ongoing assessment of performance. CIBSE agrees that a successor to the former PROBE studies would provide one mechanism for this programme of evaluation. ●

Hywel Davies is technical director of CIBSE.

What they think

Professionals' views captured at the CIBSE workshops

'Reducing energy demands should be addressed as well as energy consumption – But based on different building-usage.'

'If the pursuit of zero carbon is too expensive you will undermine everything you are trying to achieve.'

'We need a directive for responsible behaviour towards efficient operation by occupants of the building.'

'Enshrine in law that a fee be paid for a decent building-user manual and post-occupancy attendance.'

'"Allowable solutions" need clarification – are they just a stop-gap until a genuine zero carbon solution is available?'

'A minimum energy efficiency standard needs to be clearly and quickly defined.'

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Zero carbon homes policy 'is becoming a fiasco'

The UK government's targets on zero carbon buildings are turning into a fiasco, according to eco-property developer Pooran Desai. The co-founder of the BedZED project in London said: 'We are seeing unfolding a bit of a fiasco in terms of the zero carbon policy. It has not been led by practical, frontline, on-the-ground experience.'

'We found that exceeding the Building Regulations produced no savings in overall greenhouse gases.'

Desai said building to a higher specification than level four of the Code for Sustainable Homes produced very small savings in greenhouse gases (GHGs).

'By building homes beyond level four of the code, we are producing diminishing returns. In the next few years we'll find that level four is about right,' he said.

'The current zero carbon policy definition is problematic – it's a tax on new homes. A lot of big house builders don't know what they are signing up to.'

He added that, by focusing on

"The current zero carbon policy definition is problematic – it's a tax on new homes"
– Pooran Desai



Paul King of UKGBC, a supporter of Ecobuild... Overall our emissions are going up, but government targets do matter.

CO2 emissions from buildings, the industry was ignoring the importance of 'embedded' carbon in products and services.

However, a senior sustainability official at the Department for Communities and Local Government defended the zero carbon buildings policy. Bob Ledsome said: 'Yes, there are extra costs but we are putting in place mechanisms that will help cover that cost – such as feed-in tariffs, and the renewable homes initiative for developers.'

'The policy is also about encouraging investment to bring

down the cost,' he added. 'This is a complicated business – there is no silver bullet. Therefore we need a balanced portfolio of responses.'

Paul King, chief executive of the UK Green Building Council, which has been involved in the development of the zero carbon policy, insisted that 'no other government policy has done so much in influencing so much'.

But he conceded: 'Overall we aren't making any difference to CO2 reduction. Overall our emissions are going up. However, with buildings we can offer very cost effective CO2 reductions.'



Pooran Desai... Critical of targets.

Efficiency needs to be resold to the public – and drop the renewables

The whole concept of zero-carbon homes needs to be remarketed to the public if there is any hope of meeting the government's 2050 carbon reduction target in existing homes.

UK property developer Stephen Stone, chief executive of Crest Nicholson, said that part of the problem is the language we use. 'Nobody really understands what tonnes of carbon reduction is,' he

said. He added that the two key drivers for home buyers remains location and proximity to shops and schools, describing energy efficiency as a 'nice to have'.

'That's why the second-hand stock has got such a huge challenge facing them for 2050, because people just do not want to engage in the big agenda,' he said.

Neil Jefferson, chief executive of the Zero Carbon Hub (ZCH),

agreed that marketing of energy efficiency has to change, while one delegate told the auditorium that all talk of technology, such as photovoltaics and ground source heat pumps, has to stop.

The concept of eco-homes should also be dropped, according to Ed Brown, chief executive of Davis Langdon, who would like to see a move towards homes that are just 'more sustainable'.

Another problem endemic in the industry, according to Stone, is its fear of selling the credentials of more sustainable homes when not enough data has been collected to support the claims, as well as the fact that it has very little or no research and development activity.

He suggested that perhaps part of the solution is to create a 'refurbishment hub' to carry out similar works to that of the ZCH.

Industry at risk of misselling technology, warns Strong

There is a real danger of major misselling and misapplication of certain technologies aimed at making buildings more efficient, said Professor David Strong, chief executive of Inbuilt Consulting.

He said examples of such technologies included micro combined heat and power, and micro-wind power.

'And the flavour of the month in technology terms is the air source heat pump,' he said, adding that he was concerned about their performance in heavy snow because of the risk of iced-up evaporators.

'The greatest challenge is the huge commercial vested interest in selling plant and equipment, a lot of which can be designed out,' he said.

But this was difficult partly because: 'Many architects and engineers link the value of their fees to the value of the capital works – that introduces a highly perverse incentive in the whole process,' Strong insisted.



David Strong... For passive solutions.

Speaking in the same conference session entitled 'Zero carbon without the bling', Howard Liddell, principal of the eco-designers Gaia Architects, accused the sustainable-building sector of indulging in 'techno-optimism'.

He said any technology in a house that took it above level four of the Code for Sustainable Homes, would lead to green bling.

Liddell, one of whose projects



Howard Liddell... Against Passivhaus.

was featured in *CIBSE Journal* last July, said: 'Eco-bling will not take one person out of fuel poverty. We need to incentivise the reduction of technology.'

He also attacked the Passivhaus building standard that emanates from Germany, arguing that there were concerns over levels of ventilation in such highly air-tight dwellings.

'Passivhaus means mandatory

"We are not learning from Germany and Sweden, which are 20 years ahead of us"

– Howard Liddell

heat recovery and fans,' said Liddell, who preferred a more naturally ventilated environment.

He added that there was also a danger that the standard would become part of the UK Building Regulations, which meant that Britain was 'not learning from Germany and Sweden, which are 20 years ahead of us'.

Strong, a proponent of Passivhaus, rejected the idea that mechanical ventilation would form part of regulatory requirements.

He insisted that relying on natural ventilation was a 'hit or miss approach', adding: 'The least worst option is mechanically ventilated heat recovery.'

Parties vie for green turf as election looms

Leading politicians from the three main political parties vied to be seen as having the greenest agenda for Britain's building stock.

The three formed a panel discussion on the impact of the recent Copenhagen climate change summit, which failed to produce a binding agreement.



Joan Ruddock... Backs 'pay as you save'.

Greg Barker, the shadow climate change minister, said Labour's policies were simply a 'watered-down version' of the Green Deal launched by Tory leader David Cameron.

He singled out the Conservatives' pledge to give every home £6,500 worth of energy efficiency measures.

But Climate Change Minister Joan Ruddock insisted that '£6,500 won't get you solid wall insulation or micro-generation'.

She said Labour was already piloting such 'pay-as-you-save' schemes to support home improvements.

Simon Hughes, the Liberal Democrats' climate change spokesman, insisted that the real issue was about 'not spending on things that you don't need to do'.

'The key is getting finance in, and the precondition of this is getting a reliable, proper survey,' he said.

But the political parties all shared

the common ground of wanting to be sufficiently efficient and warm.

The fourth member of the panel, John Sauven from Greenpeace, agreed with Hughes that it was important 'to get the basics right'.

He said: 'There has been a lot of misselling [of home improvements], and a lot of eco-bling.'

Attacking the government green initiatives, he said: 'My problem with targets is that I don't believe any of them [will come true]. They are missing them all.'

In response to questions from *CIBSE Journal*, Barker said that a Tory government would bring about 'changes in the regulatory framework' for buildings – a reference to the party's plans to streamline the Building Regulations.

Barker said: 'There are far too many itsy-bitsy, stop-go initiatives [under Labour]. We want to see a change in the whole culture so we get away from these grants that are



Greg Barker... No to 'stop-go' initiatives.

dribbled down on a stop-go basis through a plethora of programmes, and actually end up with some long-term certainty. By deploying private capital you can actually start to get a framework for long-term investment.'

Letters

Our green ambitions must not lose sight of embodied energy

Embodied energy appears to be the elephant in the room when it comes to low and zero carbon technology. On investigation of the embodied energy of various technologies with manufacturers, the same response is given: 'We are looking into that.' This concerns me, because there should surely be quantitative figures before that technology is classed as low or zero carbon?

This ignorance around embodied energy was further highlighted when I read your article 'Down to Zero' (February *Journal*, page 36). The article investigated the cost of changing buildings to zero carbon. Now, forgetting the obvious question as to whether these homes would be zero carbon in reality, I was enormously frustrated to read how ordering photovoltaic cells in bulk from China will reduce cost. This is another example of how zero carbon energy is being implemented to tick boxes without the question of embodied carbon being raised, let alone answered.

Surely each manufacturer that wants to provide low and zero carbon technology should have to prove their embodied energy credentials before they are classed as such, with government grants promoting their implementation. To me, this is just the start of the further investigation into low and renewable technology.

An obvious next step would be the investigation into the impact of the tapping of locally generated electricity into the national grid. We are told that the grid is already at breaking point, so these technologies are required. However, arguably this breaking point is not due to load but because of inefficiencies within the grid. These local technologies will only add to this situation unless they are regulated sufficiently.

Lyndon Jones *Disillusioned low carbon building services engineer*

We need national leadership on Building Information Modelling

Rob Manning and Chris Hindle's article in the January *Journal* ('Model activity', page 48), which explains the process and application of Building Information Modelling (BIM) in industry, was very interesting and highly informative. A key point communicated

was the need for collaboration that supports the successful design and construction of a building.

BIM is an ideology that is currently in its infancy in terms of industry-wide implementation – therefore the doors for innovation remain open and opportunities exist for those who wish to cross the boundaries currently set.

But industry is still hindered with slow

page 24) by advocating that design engineers be required to take a sabbatical once every seven years to operate the buildings they have designed.

Eur Ing Int PE Larry Spielvogel, PE, CEng, FASHRAE, FCIBSE, FSLL

Nuclear soaks up funding

I'm surprised that there is still confusion with regard to the difference between electricity and primary energy (March Letters, page 26). Aside from the fact that nuclear power hasn't generated 20 per cent of the UK's electricity requirement for decades, this is not the same as '20 per cent of the total energy generation'. In fact the contribution to total energy supply from nuclear power is around 4 per cent.

Disregarding all the other downsides associated with nuclear power, the real monetary costs are so great that all other technologies, including energy efficiency, are invariably starved of adequate funding, and progress which could be made is slowed almost to a standstill. This must not be allowed to happen if we are to move to a sustainable future.

Brian Edwards MCIBSE

Driving forward on nuclear

Given the growing media hype concerning the 'saviour' of the energy crisis, namely the electric vehicle, am I the only one who sees this as akin to the children's tale, *The Emperor's New Clothes*? Are the powers that are advocating this initiative mindful of where we get our electricity from, and more importantly how inefficient and carbon rich this process is?

Now if the government were pushing nuclear powered cars that would be another matter, but you wouldn't want to crash one of those would you!

Stuart Long MBA, CEng, FCIBSE, MASHRAE



adoption, software interoperability issues and the unwillingness to explore technological advancements. In order to resolve such issues, the development and implementation of BIM practices requires the support of various bodies – government regulators, discipline-specific institutions, contractors, consultants and manufacturers/suppliers.

The formation of a national infrastructure focusing primarily on the development and implementation of BIM practices and standards in the UK is vital to enhance efficiency in the design and construction industry.

Nahim Iqbal, *BIM development leader, Ryder Architecture*

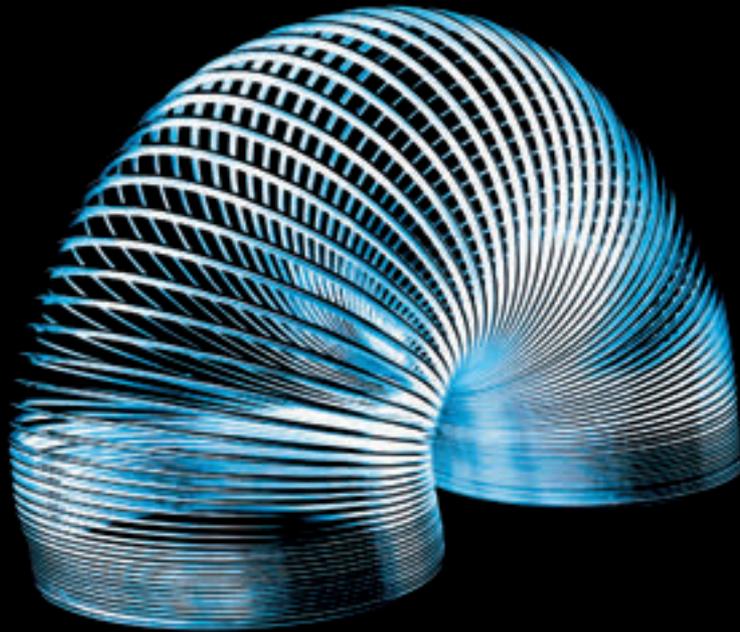
Let's all take a sabbatical

I would go further than Roger Smith ('Complementary skill', February *Journal*,

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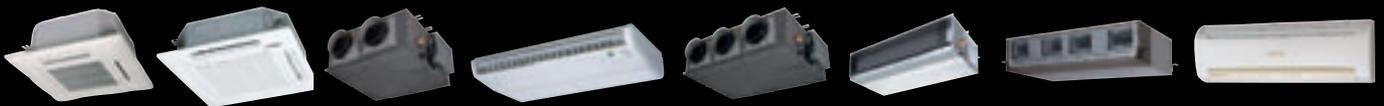


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Not yet fit for purpose

Despite national and international targets to cut CO₂, new buildings simply result in a net increase in emissions. But there is an answer, says architect **Craig White**



As an industry, we're very good at outputs – building on time, on budget and defect free. We take photographs, hand the building over to our clients and cross our fingers that nothing goes wrong in the first 12 months. But carbon changes everything. Forty-five per cent of UK CO₂ emissions come from operating buildings, and to meet Kyoto targets every new building would have to be carbon negative, not just low or zero carbon. Sadly, new buildings simply result in a net increase in emissions.

And, I don't mind admitting that architects tend to over-promise and under-deliver on CO₂ performance. On paper, low carbon buildings are not rocket science, we simply need to be Mean, Lean and Clean. Mean – design without any energy through passive design. Lean – minimise the use of active, energy-using systems. Then, and only then, go Clean – meeting residual demand using renewables. Instead, of course, out comes the eco-bling, such as wind turbines that sit sulking on top of buildings. There is still a way to go before building-integrated renewables really deliver.

Then there are energy performance certificates (EPCs) and display energy certificates (DECs), eco-labels for buildings. We predict a B through the EPC, but the client discovers through the DEC that their building is D or E rated operationally. When challenged, we retreat from the issue saying: 'It's not our fault, the EPC only looks at regulated CO₂, didn't you know that?' I don't think clients will accept this as an excuse for much longer. And the gap between B and E is ripe for litigation.

When it comes to low carbon heating the technology and know-how is there, but low carbon power is still a pipe-dream, because people determine its control. Put simply, if you expect people to switch things off, they don't. Occupants can more than double energy use; they can occasionally help to halve it – but mostly they double it. So now we need to understand behaviours and how they might be changed, which is more commonly the domain of psychologists rather than designers. There's also the question of whether

clients should be willing and able to engage with buildings to help reduce emissions, especially if we haven't designed them to make it easy.

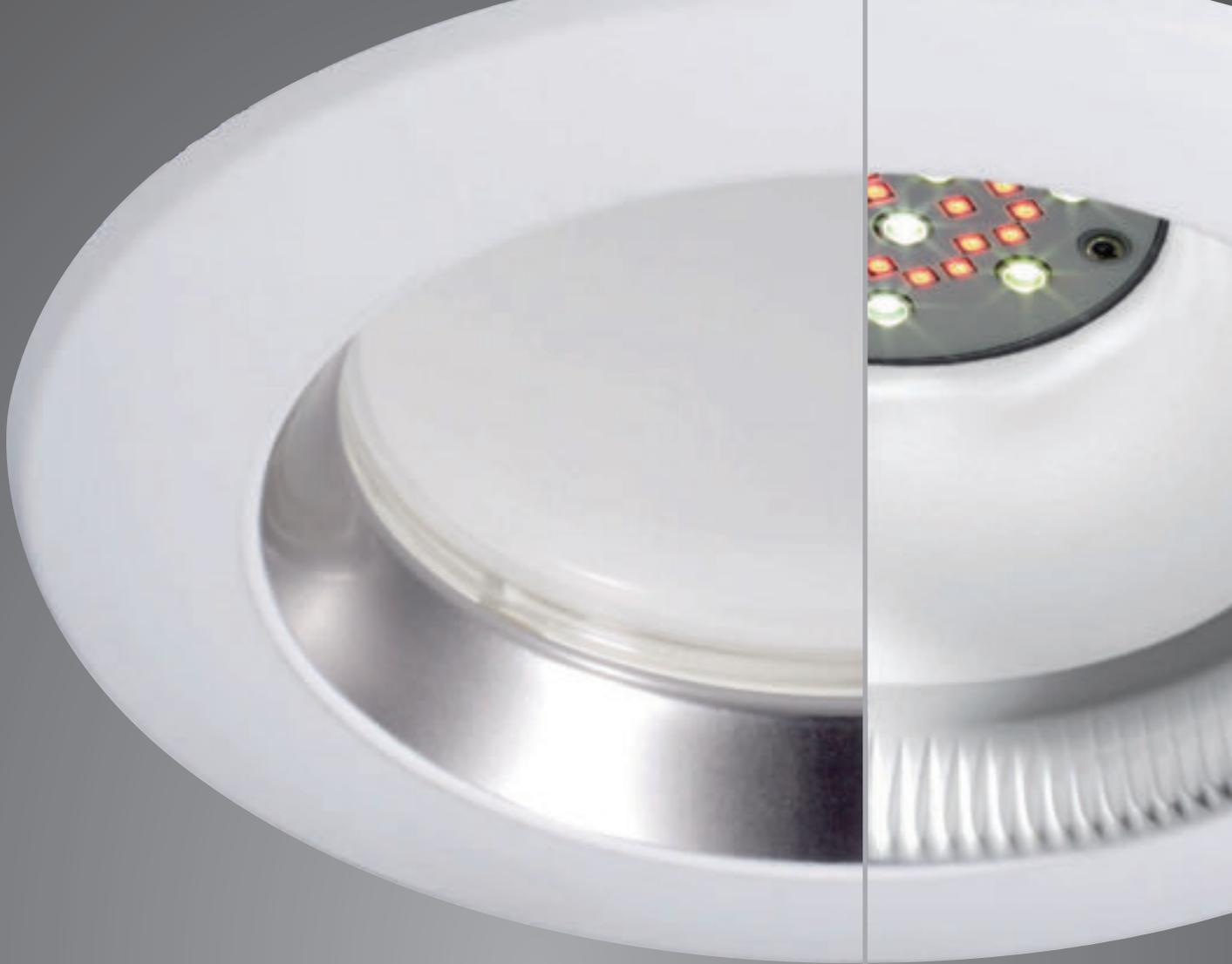
We also need to do a reality check and look at the carbon footprint of our buildings as a whole. For example, 23 per cent of emissions from a UK domestic household are accounted for by food not operational energy (12 per cent). And what about embodied carbon? There's a bigger picture to carbon.

Is there a silver bullet? I think there is: we've got to allow people to not want to switch things on in the first place. If they are switched on, we have to allow them to switch them off. Easier said than done. To help us, we have appointed a behavioural psychologist and we are now 'carbon profiling' building-user behaviour. A low carbon building that's genuinely fit for purpose is not just the sum of its design and engineering parts. We need to understand how we can help people choose the low carbon option and then identify the design and technology solutions that support this. Not the other way round. Blaming our clients' behaviour for a D rating is not good for business. Helping them achieve the A, is. It's all about learning how to generate wealth in the new low carbon economy. To this end, we now offer our clients CO₂ performance-linked fees. Some think we're mad.

Architects, engineers and clients need to see that a building's CO₂ emissions will not be reduced by design and technology alone. Instead, we are going to have a life-long relationship with our buildings, their users and CO₂. Anything less will not be fit for purpose. ●

I don't mind admitting that architects tend to over-promise and under-deliver on performance when it comes to CO₂ emissions

Craig White is co-founder of the architectural practice White Design. www.white-design.co.uk



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Base LED finally puts paid to the perception that environmentally responsible products come at the expense of performance, efficiency and comfort.



Greening the planners

The government aims to bring the planning system into line with a host of other low carbon policy developments. **Hywel Davies** looks at how this might work



The Department for Communities and Local Government (CLG) has just released a new draft policy setting out revisions to the existing planning policy statements on climate change (PPS1 supplement, 2007) and renewable energy (PPS22, 2004). The new draft sets out 'a planning framework for securing enduring progress against the UK's targets to cut greenhouse emissions and use more renewable and low carbon energy, and to plan for the climate change now inevitable'. Why do we need another draft Planning Policy Statement on this issue so soon? And why does it matter to services engineers, designing low carbon systems?

Research commissioned by CLG looked into how current regional special strategies address climate change and implement the existing PPS1. This resulted in findings of 'considerable inconsistencies' in spatial strategies, with implementation of PPS1 'patchy'. So CLG has decided to bring the PPS1 supplement and PPS22 together, to overcome the inconsistencies and sharpen implementation and skills.

The consultation explains that a 'central challenge for planning is to respond to, and integrate with, the Government's ambitions to tackle climate change. Planning makes a significant contribution to both mitigating and adapting to climate change, through its ability to influence the location, scale, mix and character of development.' Engineers should welcome this, and encourage planners to appreciate that different materials, with different thermal properties, influence scale and character, but also influence comfort, overheating, and energy use.

The draft PPS sets out how planning, in providing for new homes, infrastructure and jobs, should help shape ways to achieve lower carbon emissions and greater resilience to the impacts of climate change, by setting out the overall framework for development. CLG says that 'this should help secure progress against the UK's emissions targets, both by direct influence on energy use and emissions through, for instance, encouraging energy efficiency, and through bringing together and encouraging actions

from others. Planning should give local communities real opportunities to take action on climate change and should be doing so now.'

The consultation goes on to say that, with regard to the target dates for zero carbon homes (2016) and non-domestic buildings (2019), and to Part L 2010 change and the proposed allowable solutions: 'All of these initiatives are designed to cut greenhouse gas emissions: planning needs to ensure that it integrates with, not duplicates, or worse still obstructs these initiatives to achieve the most sustainable outcome possible.' Whilst these ambitions are laudable, anyone with recent experience of trying to deliver a serious low carbon refurbishment could be forgiven for choking on their cornflakes. CIBSE spent nine months getting

the planners to approve triple glazing for the refurbishment of Delta House, CIBSE's head office in south London, as part of the CIBSE Carbon 60 project. Nobody on the top deck of the 155 bus to Clapham can spot the difference, but it had to go through the mill. Any client other than CIBSE would probably have given up. A recent private refurbishment in Hackney aimed to achieve an 80 per cent reduction, but they were

not allowed triple glazing at the front. And that is before we try to install anything unusual on the roof to generate power or hot water.

The real challenge of course, will be to make this work consistently, coherently, and with technical understanding of what is realistic and what is not, from one planning department to the next. Engineers with stories of how planning has got in the way of low carbon, rather than facilitating it, should look at the draft PPS, and see whether the proposals would have solved their problems. If not, we need to tell CLG now, while they're asking.

If you have experience of trying to implement the low carbon policy and facing planning problems, please get in touch via technical@cibse.org and share your pain. At least we can use it to inform the promised change of policy. ●

Hywel Davies is technical director of CIBSE.

“ This real challenge will be to make this work from one planning department to the next ”

RELATED LEGISLATION

The Local Democracy, Economic Development and Construction Act 2009:

Introduced a new regional strategy from April 2010. Climate change is now a priority for these strategies, along with economic development and housing.

The 2008 Energy Act:

Introduces Feed-In Tariffs and the Renewable Heat Incentive to drive increased renewable energy generating capacity, and will affect planning.

The Planning Act 2008:

Created the Infrastructure Planning Commission to consider nationally significant infrastructure projects, including energy generation plant over 50 megawatts; also introduces a new requirement for regional strategies to contribute to mitigation of and adaptation to, climate change.

The Climate Change Act 2008:

created a statutory target to cut carbon emissions by 80 per cent below 1990 levels by 2050, with an interim target of 34 per cent by 2020.

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The need to renovate Croydon's 1960s fire station provided an opportunity to make the building more energy efficient.



Two biomass boilers have been fitted to meet all heating and hot water needs.

Hosing down waste

The need to renovate a 1960s fire station gave its owners the opportunity to make a wide range of efficiency improvements to the building. **Mark Jansen** takes a look at the CIBSE award-winning project

Building services managers at the London Fire Brigade (LFB) have a particularly challenging remit compared with some other parts of the UK. The service has been ordered by the Mayor to cut carbon emissions from its estate by 60 per cent by 2025. However, around 30 per cent of LFB's 113 properties are listed, which limits the amount of work that can be done to them.

Therefore, says LFB energy manager Ian Shaw, when an unlisted fire station is to be refurbished, the building services team will look to go all-out to achieve the biggest carbon savings it can. The refurbishment of Croydon fire station in south London, built in 1961, presented just such an opportunity. The project was completed last October, and the team was soon rewarded by winning the Refurbishment of the Year award in the 2010 CIBSE Low Carbon Performance Awards.

The £1.3m Croydon refurbishment was financed partly with £375,000 from the brigade's Invest To Save fund for low-carbon projects. This fund 'loan' will be repaid gradually from the anticipated savings on fuel costs, which Shaw believes will amount to £7,200 a year at current fuel prices.

The savings were calculated using SBEM software to model the premises before and after construction. The payback period for the £375,000 funding is predicted to be 17.4 years, which may seem like an aeon to the private sector, but Shaw points out that the fire brigade tends to occupy its buildings for very long periods of time, with the Croydon site expected to serve the brigade for another 70 years.

The cost of exceeding the minimum required by the Building Regulations has been calculated at £125,000. This was spent on improvements to the thermal insulation of the walls with cavity insulation, fibre installation to cavities behind the rainwater cladding and the concrete frame, and foam insulation to the roof. The fenestration was improved by replacing single with double glazing featuring Pilkington Optitherm S4 glass with a 16 mm cavity and argon-filled, Optifloat green glass.

Biomass

The station, which measures 2,932 sq m across three storeys, has two biomass boilers to meet all heating and hot water needs. The building energy management system has been optimised to maintain the most effective use of the biomass boilers in maintaining the temperature to the low loss header, Shaw says.

The Croydon site had an ideal, ready-made fuel store in the form of a redundant Derv tank underground that can hold 14 tonnes of biomass fuel, he adds. The Croydon site also offered good access for fuel deliveries, and the fuel is ordered automatically, based on the remaining levels in the store.

The wood pellets are sourced in Farnham, nearly 30 miles away. Ten tonnes of pellets are delivered every three to four weeks during winter. Biomass fuel is significantly more expensive than gas, at just under 4p per kilowatt hour compared with 3.2p per kilowatt hour for gas, according to Shaw, but he argues: 'Our targets are carbon targets, not fiscal targets, so we are paying to save carbon,' adding that the station will use far less >

■ **Our targets are carbon targets, not fiscal targets, so we are paying to save carbon** ■ – Ian Shaw

“ There is no pressure on the industry to bring down the embodied energy in its products ” – Lloyd Bentley

> fuel than previously, so there will be significant savings overall. Shaw will be comparing fuel consumption data from before and after the refurbishment.

Night cooling

Fire stations are in operation 24 hours a day, and so have considerable energy needs. The old station had three non-condensing gas boilers and a gas-fired hot water heater. A previous programme of asbestos removal meant that by the time of the refurbishment, there was virtually no insulation. Old cast-iron radiators had poor controls and were left running almost year-round, with the result that, even in the middle of winter, staff kept the windows open to prevent overheating.

The refurbished station relies entirely on natural ventilation, assisted by a new night cooling system. A new building management system automatically opens a large vent in the roof of the office floor during the evening. Two fans suck cool night air inside, while the increased air pressure pushes the warm air out of the vent.

Lloyd Bentley, the brigade’s coordinator for the Croydon refurbishment, says he hopes the system will bring the internal temperature down to about 16C by the time the office staff arrive at work in the morning, with temperatures peaking sometime in the afternoon at around 24C, although this has yet to be tested during a summer period.

Staff working at the office have been briefed to close the windows when they go home at night, to help maintain the air pressure needed to make the cooling system work properly.

Solar PV and biomass heating are two key renewable resources used by the station.

Controls

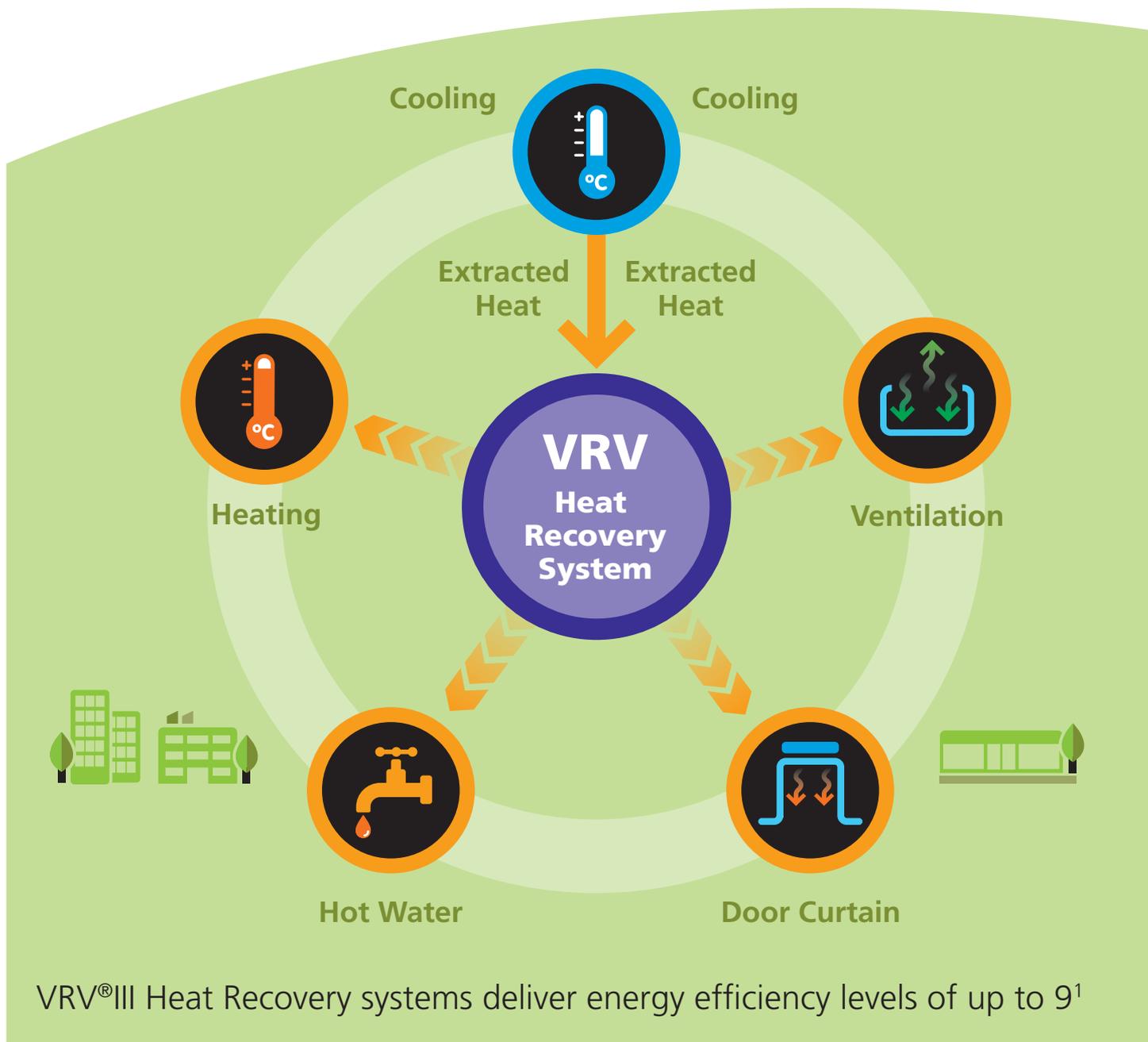
The building management system also controls the heating outputs from the biomass boilers. Bentley explains that although the radiators boast thermostatic controls, allowing staff to make their own adjustments, the real control remains with the building management system, which is set to maintain internal temperatures at 21C. A fire station has a very transient population of firefighters and staff working shifts around the clock, says Shaw: ‘They don’t take ownership of the building, so we’ve got to take as much control away from them as possible, because they won’t turn things off or turn them down.’

Shaw and Bentley will continue to tweak the building management system for several months before they hand it over to the local facilities management team. Because of the building’s vastly improved insulation, the pair believe it should be possible to lower the settings on the heating system while still maintaining an average temperature of 21C, with office equipment and body heat generating enough heat to make up the difference. While the system currently switches off at 21C, residual heat in the office can push the air temperature to 23 or 24C. ‘We’re trying to get the balance right,’ says Shaw.

Lighting accounts for 70 per cent of the electricity used in a typical fire station. New lighting controls at Croydon are expected to save 30 per cent on electricity, thanks to the installation of occupancy and daylight switches throughout the building. Bentley says that before the Croydon refurbishment, the lights in the fire engine bays were never switched off. >



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¹ REYQ8P8 model at 50% cooling – 50% heating load in conditions: outdoor temperature 11° CDB, indoor temperature: 18° CWB, 22° CDB

Data

Fire station's projected improvements

Design consultant: Scott Wilson

M&E Engineer: JSMS Ltd

Total project cost: £1.3m.
Fuel savings of £7,200 a year predicted

Display energy certificate: projected improvement from D90 to B25

Boilers: two 45 kWh biomass boilers with a 600 litre thermal store provide all heating and hot water

Overall heat load: expected to fall from 425,000 kWh to 86,200 kWh. All energy use to be compared against historic data

Lighting controls: high frequency lamps with occupancy and daylight control in all areas of the building. Expected to save 30% of electricity load

Insulation materials: in both the walls and roof. Chosen for their minimal environmental impact with zero ODP and low GWP

Photovoltaics: 14.4kWp of PV mounted in four strings on the appliance bay and main building roof. Currently contributes 6% to 7% of electricity, short of eight per cent projected, with shortfall attributed to poor weather

Windows: double glazing with low emissivity glass

Projected improvement in U-values (W/sq m K):
Roof: 2.502 to 0.24 = 90%
Walls: 1.58 to 0.548 = 65%
Cladding: 2.37 to 1.2 = 49%
Windows: 5.7 to 1.2 = 78%



Photovoltaic solar cells on the roof provide about 7 per cent of the station's electricity needs.

> Photovoltaics

Conventional electricity supplies have been supplemented with 14.4 kWp (kilowatt peak) of photovoltaic (PV) cells mounted on roof areas of the fire station. Shaw hopes the cells will provide 8 per cent of the station's annual electricity consumption, although he admits that the current contribution is closer to 6 to 7 per cent, which he blames on poor weather.

The existing Automatic Meter Reading for electricity has been supplemented with remote logging of the PV system, so that comparisons can be made between predicted and actual outputs in real time.

A grant of £40,000, half the total cost of the PV system, was obtained through the government's Low Carbon Buildings Programme. Shaw admits PV is expensive but argues: 'On a fire station you want something simple that no one has to bother with. There are no maintenance costs; you put it on the roof, plug it in and it works.'

Insulation

While the London Fire Brigade is enthusiastic about renewable energy, Bentley would advise anyone attempting a low-carbon refurbishment to focus first on insulation and air tightness: 'It's the most effective thing you can do.'

The U-values of the roof have been improved 90 per cent, from 2.502 to 0.24 W/sq m K, while the walls, to which cavity wall insulation was added, have improved 65 per cent, from 1.58 to 0.548 W/sq m K. The U-value of the cladding that covers several of the station walls has improved 49%, from 2.37 to 1.2 W/sq m K.

Bentley says extra insulation was added, above and beyond the original design specification, to voids in the wall cladding that were discovered as the building work progressed. 'Obviously you end up with a bigger bill, but you won't get another opportunity to do it for 30 years, so there's no point leaving it,' Bentley reasons.

The U-values of the windows were improved 78 per cent, from 5.7 to 1.2 W/sq m, after single-glazed, wood-

and-steel windows were replaced with aluminium-framed, double-glazed windows made with low-emissivity glass.

Materials

Bentley tried hard to use materials with low embodied carbon and consulted the University of Bath, which publishes a free online database of embodied energy and carbon for building materials (<https://wiki.bath.ac.uk/display/ICE/Home+Page>). He was mostly successful; the only high-carbon element in the Croydon refurbishment is the aluminium frames for the windows and the rainwater cladding on the walls, he says, although he rues the fact that there is no low-energy glass available currently.

Bentley is frustrated by what he sees as secrecy and obfuscation among manufacturers on the issue: 'There is no pressure on the industry to bring down the embodied energy in its products. Manufacturers will not tell you how much embodied carbon is in them.'

Following the refurbishment, Shaw is hoping to achieve an improved display energy certificate (DEC) rating of B25, compared with D90 before the work started. He calculates that the building's overall heat load has been cut from 425,000 kWh down to 86,200 kWh, based on the new U-values compared with the previous ones.

Bentley explains that the projected savings are based on the actual heat requirements of the old building, measured using the metered gas supply to the old heating boilers, including an assumed percentage efficiency, compared to the new heating requirements for the new insulated buildings. These figures were compared with the results from the SBEM calculations to give a reality check.

Shaw will be monitoring the results, using the automatic meters for the electricity and biomass boilers and comparing the data against the historic data on gas and electricity usage. 'I have personal targets to make sure these things work,' says Shaw. ●

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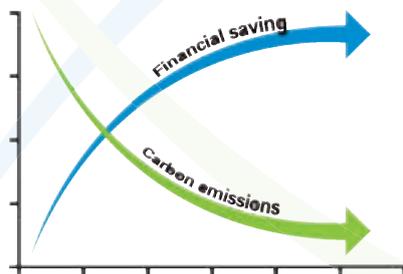
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efficiency Tailor-made

In the low-carbon age, building services engineers need to seize hold of a discipline that helps create a truly sustainable building devoid of green bling, writes **Doug King**

During the 20th century, architecture was liberated by abundant cheap energy, allowing forms of building that could not previously have existed. In the 21st century, buildings must evolve to meet the twin challenges of climate change and energy security. In order to conserve diminishing fossil fuel supplies, we will have to cut down on waste and inefficiency.

The need for genuinely sustainable buildings is more pressing than ever; it is no longer acceptable to bolt green bling onto conventional, energy-hungry designs. Before renewable energy generation is even considered, it is vital to ensure that buildings are as energy-efficient as possible, otherwise the potential benefits are simply wasted in offsetting unnecessary consumption.

The shift to a new low-carbon paradigm will require engineers to take the lead. Building projects are traditionally led by architects or project managers, but building energy performance hardly features in architectural education. This lack of essential knowledge to inform strategic design decisions early in a project's life has led to the perpetuation of an experimental approach to building performance, rather than an approach based on rigorous analysis, synthesis, testing and feedback.

Building physics, the engineering of the building form and materials, creates the opportunity for engineers to engage with the design at early concept stage when the critical decisions affecting passive performance are made.

In order to address the root issues of sustainability, professionals throughout the construction industry need to be well-versed in the discipline of building physics. Building physics emerged during the latter part of the 20th century at the interface between building services engineering, applied physics and building construction engineering.

Unique mix

Building physics investigates the areas of natural science that relate to the performance of buildings and their indoor and outdoor environments. Yet few people in the industry are presently aware of the discipline, and it is taught only as a minor part of a limited number of engineering degree courses.

Building physics deals principally with the flows of energy – both natural and artificial – within and through buildings. It covers a unique mix of heat and mass transfer physics, aerodynamics, material science, meteorology, construction technology and human physiology.

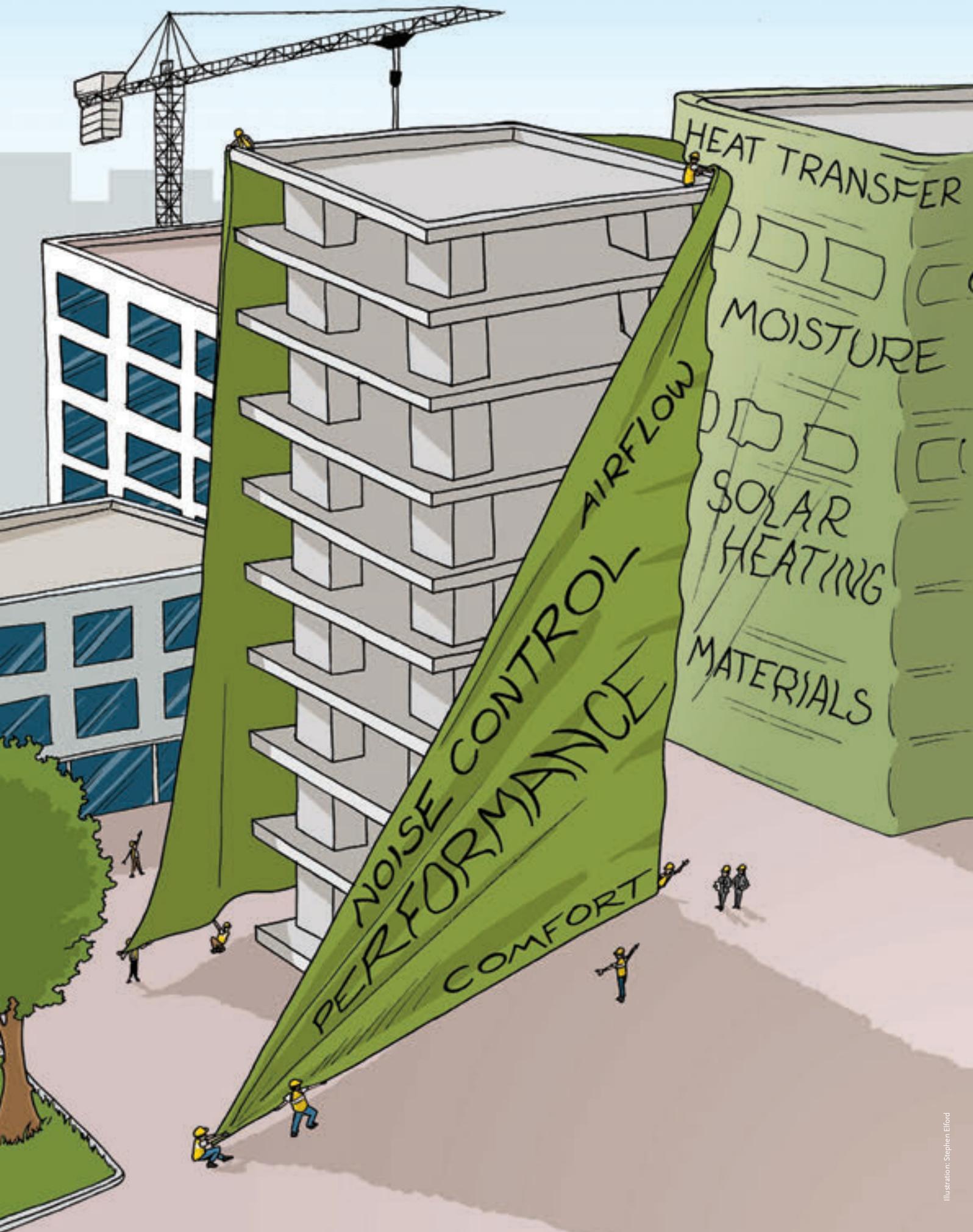
The discipline complements and supports building services engineering, formalising many aspects of the work that building services engineers are already called upon to do. Building physics provides the tools to analyse the thermal and energy performance of parts of the building not traditionally considered to be building services systems, such as the structural frame and envelope.

In an industry where each product is essentially a prototype, and when it may take years or decades for building performance problems to come to light, we can no longer afford the luxury of experimenting with the physical form of buildings. In order to create buildings fit for the 21st century, rigorous performance analysis and energy prediction needs to replace experimental building development.

Systems engineering recognises that complex products, such as buildings, require many interdependent systems to function in harmony. Building physics already encompasses architecture, structure, façades and building services, and so can provide the framework for developing a systems approach.

Clients of industry and construction need clear guidance on which parties in the design team >

“ Without a dramatic increase in skills, the proposed acceleration towards zero-carbon new buildings by 2020 will be hard to deliver ”



> should be responsible for low-carbon design. There is no universally accepted scope of services for low-carbon design in the way that there is for the building services engineer, as set out in the ACE Conditions of Engagement. The work is often undertaken by consultants from wide-ranging backgrounds, who may not be conversant with the principles of building physics – or even engineering. This lack of consistency results in enormous variations in the standard of service provided by practitioners.

Wider alignment

Furthermore, it is now common for confusion to arise between the architect and building services engineer over responsibility for the specification of thermal insulation, building air tightness, solar shading devices and window performance. In order to achieve genuinely low-carbon design, we will have to reallocate design responsibilities on the basis of whole building performance rather than on the basis of components.

The professional institutions and trade associations must therefore recognise a multi-discipline, problem-solving approach to design and delivery that overthrows conventional sectarian relationships and embraces building physics and a systems engineering approach.

CIBSE is ideally placed within the industry to adopt building physics as part of a wider alignment of science and engineering for low-carbon buildings. The institution will need to establish professional standards for conduct and service to ensure consistent and reliable delivery of low-carbon design. CIBSE should also develop new criteria for education and professional development, aligned with the UK Standard for Professional Engineering Competence.

Government must prioritise education and skills development in construction to deliver a manifold increase in low-carbon professionals that is vital to the achievement of national policy objectives. The current ‘trajectory’ for carbon reductions embodied in UK government policy requires a dramatic increase in skills right across the construction sector.

Skills shortage

Yet the skills that will be essential to delivering this scale of reduction are simply not taught at present in the majority of universities. Building physics needs to become a core part of undergraduate teaching for all construction professions.

Government should also consider the opportunities for training and re-education in the field of low-carbon design and construction for professionals throughout the industry. At a time when we need to increase the

professional skills necessary to deliver low-carbon buildings, the industry is losing swathes of experienced professionals through redundancy.

A further pressing need is for reliable information on the actual energy and carbon performance of recently constructed or refurbished buildings. This information is essential for the establishment of benchmarks and standards, and the validation of new designs and techniques. The dissemination of real building performance information, rather than the marketing hype so often published, will not just inform future low-carbon buildings, but also allow for the development of robust national policy and up-to-date, authoritative teaching materials.

Government should commission post-occupancy evaluation of all new buildings in the government estate constructed since the introduction of the 2006 Building Regulations. This would quickly establish a useful national database of design techniques

and carbon performance. Government must also establish the benchmark for procurement practice, by setting and enforcing performance targets for its own buildings, something it has singularly failed to do to date. Achievement of carbon targets should be linked to financial outcomes for all publicly funded projects, with publication of the design criteria and measured performance data for the benefit of future designs.

The need for a radical overhaul in education and practice in the UK construction industry is

urgent and undeniable. Our national goal is to deliver an 80 per cent cut in carbon emissions by 2050. The scale of the challenge in reducing fossil fuel dependency in the built environment is vast. The rapid pace of change in the regulation of building energy performance has already created problems for the construction industry.

Without a dramatic increase in skills, the proposed acceleration of regulatory change towards zero-carbon new buildings by 2020 will only widen the gulf between ambitious government policy and the industry’s ability to deliver.

The changes necessary to achieve a sustainable built environment need to be far reaching in the areas of policy, finance, procurement practice and management. However, unless we urgently equip the industry with the fundamental skills that will allow it to design and deliver genuinely efficient buildings, the transition to a low-carbon economy simply will not happen. ●



■ Building physics creates the opportunity for engineers to engage with the design when the critical decisions affecting passive performance are made ■

Doug King is principal of consulting engineers at King Shaw Associates and author of the recent Royal Academy of Engineering report, *Engineering a Low Carbon Built Environment*.

Future features in CIBSE Journal

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Sustainability on

Works are under way to build a sustainable school in rural Uganda using compressed earth blocks, and on a budget of £2,000 per classroom. **Farah Naz** and **Chris Soley** explain how

Over the past 10 years the number of children in primary education in Uganda has doubled. To meet the United Nations Millennium Development Goal of giving all children access to primary education by 2015, Uganda has embarked on a countrywide school building programme.

A big part of this success story has been due to the time, money and expertise provided by non-governmental organisations such as Building Tomorrow, an international organisation that supports educational infrastructure projects in Africa.

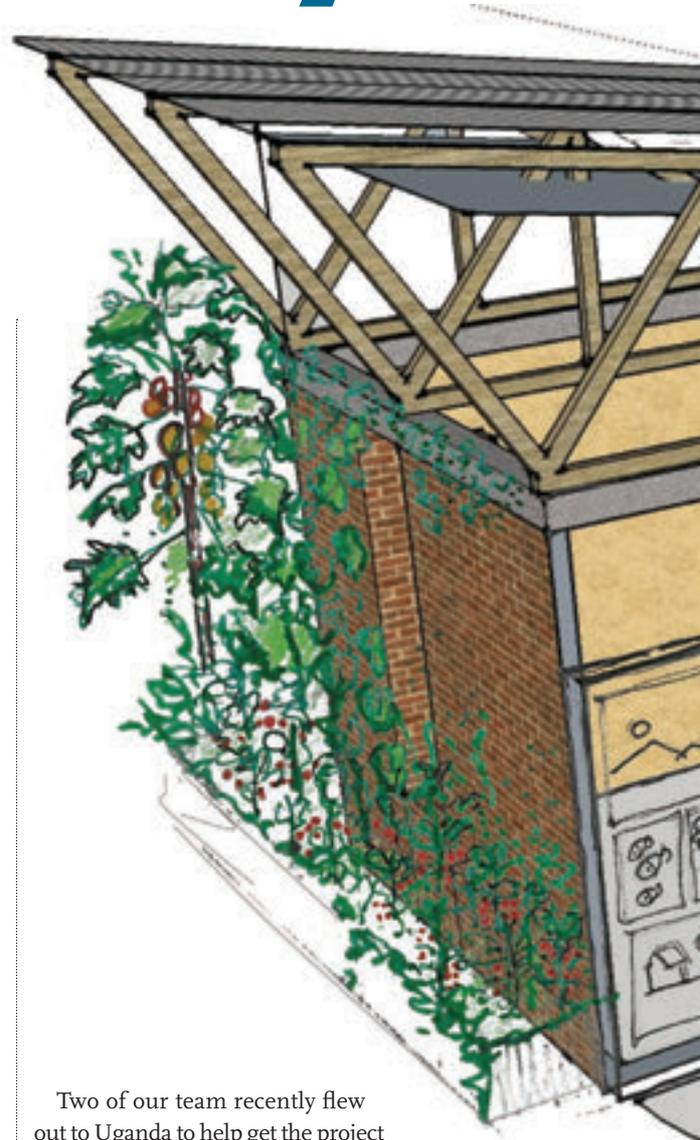
The Open Architecture Challenge 2009 was a worldwide design competition hosted by Architecture for Humanity, and engineering consultancy Gifford won the Building Tomorrow category of the competition. The aim was to produce an innovative design for a 50-person classroom that can stand alone or be duplicated to form a larger school. Each classroom should cost no more than \$3,000 (£2,000).

At Gifford, we have been developing the design for the school over the past few months. Our first school is the Academy of Nakaseeta, situated in a village outside of the Ugandan capital, Kampala. The 500-pupil academy, which measures 43 sq m, will serve a number of villages that currently have no school within 5km. The academy will consist of 10 classrooms, one office and a library room.

Our ambition was to design a sustainable school, balancing the social, economic and environmental needs of the individuals, the community and the wider world. In the developing world there is an increased focus on the socio-economic elements of sustainability. What is important to the community is delivering the biggest benefit within a tight budget, and the core of any sustainable design philosophy should be in low-cost enhancements to the types of construction that they are already set up to deliver efficiently. This was our design philosophy when we came to design a school for rural Uganda.

Our concept was to take features from exemplar vernacular architecture in similar climates, build with local modern construction techniques, and enhance this hybrid with the good practice design tools and principles that we apply to our work in the UK.

■ We must meet the needs of the present without compromising the ability of future generations to meet their own needs ■



Two of our team recently flew out to Uganda to help get the project moving on site. We plan to travel out later this year when two classrooms are built, to help with construction and to evaluate and optimise our design – which is intended to be used for another two academies – adding value by closing the ‘reality gap’ between our concept and the constructed classrooms.

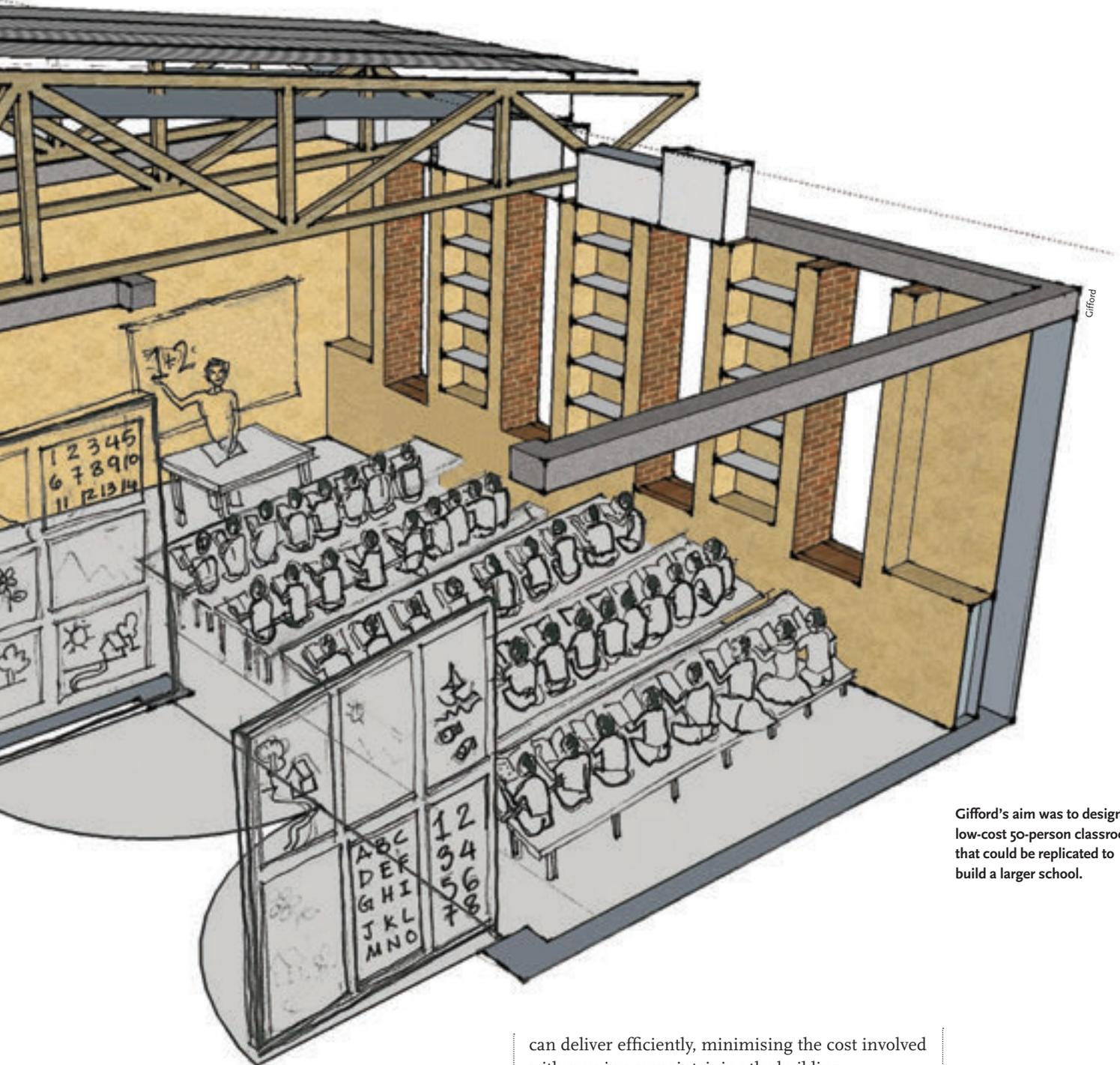
We envision the research element of the trip as an important step in delivering the best possible building, which is to be used by Building Tomorrow for a number of future schools – especially for our hybrid wall system and solar roof made from crinkly tin.

We intend to monitor the performance and survey user comfort in the finished building, and its suitability for a traditional classroom in Uganda.

Design philosophy

A school should offer simplicity, serenity and security. The simplest forms are often the most adaptable

a shoestring



Gifford

Gifford's aim was to design a low-cost 50-person classroom that could be replicated to build a larger school.

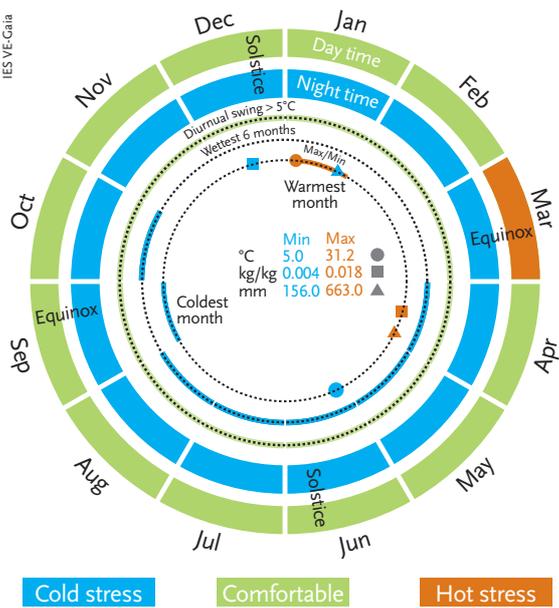
and provide a blank canvas on which the local community can impose themselves. Good acoustics, thermal comfort and privacy lead to a calm, serene environment that is conducive to learning. A secure classroom provides safety for the children and protects the resources of the school.

Crucially, the design must be one that local builders

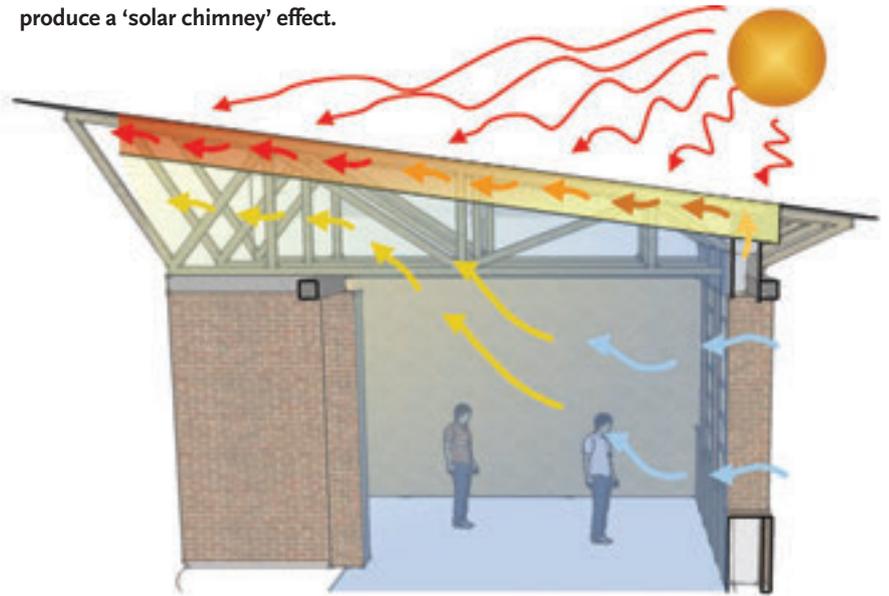
can deliver efficiently, minimising the cost involved with running or maintaining the building.

Form and functionality

The vernacular building form is usually rectangular or circular, with community spaces integrated within the cluster of structures. Our design features a shallow plan linear teaching space that provides the teacher with a clear view of the class while optimising daylight and ventilation. A smaller teacher's annex forms an >



An insulated ceiling void with openings helps produce a 'solar chimney' effect.



Gifford has been developing a design for the school in recent months. Two classrooms are currently being constructed.



A model of the classroom currently under construction.

> L shape, with the main space and acts as secure storage for books or as office space. Spatial flexibility was introduced with space dividers made of tin and bamboo, or with curtains that turn the large classroom into smaller group rooms.

The doors are painted with blackboard paint so they can double as educational apparatus and act as a display area for children's artwork. Alcoves are formed by the window recesses, and structural piers contain shelving made out of small pieces of plyboard to store books and artwork.

Materials

New public buildings in Uganda are typically made from wood-fired brick walls or concrete blocks with tin roofs. These are favoured over the traditional construction of wattle and daub with a thatched roof because of the former's longer life and lower maintenance. However, they have poor thermal performance, and both types of building have significant carbon footprints.

The walls of the Ugandan classroom are interlocking stabilised soil bricks (ISSB) – compressed earth blocks stabilised with cement and an interlocking form that reduces the requirement for mortar. These are championed by UN Habitat, (the United Nations Human Settlements Programme) and the Good Earth Trust, and save money and carbon over the wood-fired bricks and concrete blocks.

(UN Habitat promotes socially and environmentally sustainable towns and cities, while the Good Earth Trust is a charity that encourages the creation of decent homes, proper sanitation and clean water.)

Thermally massive buildings stay much cooler than the thin-walled brick buildings, but increasing the structure beyond what is necessary is environmentally and economically unacceptable. So the envelope is a hybrid of structural ISSB bricks and added thermal mass from a thick internal adobe render that can be made at little cost.



JESSICA ROBINSON

Solar control and daylight

The strong equatorial sun has a huge impact on thermal comfort. An important part of our design is the control of solar gain. A generous roof overhang blocks out high sun, and recessed north and south-facing windows keep direct early morning sun out of the building.

Tin is favoured over thatched roofs because of a better resistance to rainy season weather, but the re-radiation of incident solar energy into the space is a significant problem. To isolate the space from the hot tin roof we have an insulated ceiling void with high and low level openings which, combined with the mono-pitch roof, function as a solar chimney.

This 'solar roof' drives airflow through the cavity and acts as conveyer belt for the solar gain, removing it from the space.

The school has no artificial lighting, so natural daylight is critical. A narrow-plan form with tall single-sided windows, clerestory openings (a high wall with a band of narrow windows along the very top) and large doors that can be left open to provide a good distribution of daylight.

Ventilation

The classrooms have occupancy densities double that of the UK norm, so ventilation is critical. The classroom will have high- and low-level openings on opposite sides of the room to increase ventilation.

Acoustics

Acoustics are important in any classroom. Brick, concrete and metal are all hard surfaces with long reverberation times. Hiding these with the wooden ceiling and cob render will reduce reverberation in the classroom.

Community

Construction provides the opportunity for the



The walls comprise a hybrid of interlocking stabilised soil bricks and a thick internal adobe render that can be made at little cost.

community to learn new skills – specifically the use of the ISSB brick machine. About 150 community members have pledged their support and will volunteer 25,000 hours of labour, making 35,000 bricks over the coming months.

Half of the world's emissions over the next decade are expected to come from emerging and developing countries. In Africa, like any other country, the building industry is the largest cause of deforestation and environmental pollution. To quote Our Common Future: 'We must meet the needs of the present without compromising the ability of future generations to meet their own needs.' ●

The vernacular style of the local villages has informed the design of the planned school.

WEB LINKS

buildingtomorrow.org
unhabitat.org
goodearthtrust.org.uk
gifford.uk.com
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Mellow Lighting V

The next generation



When the Mellow Light fluorescent fitting burst on to the cave-like Cat 2 office environment in 1989, it was nothing short of a lighting revolution. Not a louvre in sight and, as its name suggested, it produced a soft diffuse glow and a lighter ceiling effect.

‘It’s hard to imagine a change as big as the move from the louvre to Mellow Light,’ says Zumtobel’s Marketing Director Steve Shackleton. ‘It was enormous – a 180-degree turn in the opposite direction. It took time for acceptance to grow.’

But grow it did. Like any successful product, it spawned a raft of rip-offs, luminaires that mimicked the look but invariably lacked the performance. Having now reached its fifth incarnation in the form of the new MLV, the Mellow Light is firmly established as an integral part of Zumtobel’s portfolio.

So how do you reinvent a classic? How do you make a nod to its pedigree while still moving it forward? The answer has been both aesthetic and technical changes, but it is the latter which is the most striking. This new breed of fitting is 20 per cent more efficient than its predecessor, the MLIV, launched in 2001.

With a light output ratio of 87 per cent, the MLV EM 155 delivers 65 luminaire lumens per circuit watt. That exceeds the current Part L stipulation of 45lm by 50 per cent and, according to



Shackleton, will probably still be 25 per cent better than the new standard due out in October. 'The thermal design and optical components that are used are arguably as big a step forward in terms of the technology as the original step forward in change of appearance,' he says.

Three areas have been addressed in order to achieve this efficiency, according to Manfred Petschulat, Zumtobel's product management director for interior commercial luminaires. 'First the centre optic has been changed completely to allow a lot more light through it. Second, the diffusers in the light chambers have been changed from opal to prismatic. Third, we have cooled light sources to the optimum point. The combination of these three aspects adds up to the improved performance.'

The key, says Petschulat, has been achieving those levels of efficiency without compromising the quality of the light which has always been the Mellow Light's selling point.

Aesthetically, designer James Irvine, former partner of Ettore Sottsass, has softened the edges, blurring the boundary between fitting and ceiling.

'I moved away from the language of the steel box,' says Irvine. 'My idea was that when you look into a room where there are hundreds of them the impression you would get is less a chequerboard of boxes that were illuminated, but a mellower impression.'

Or as Petschulat puts it: 'The technology is inside. We didn't want it to look like a machine.'

For more information please visit www.zumtobel.com/ml-preview

'My idea was that when you look into a room where there are hundreds of them the impression you would get is less a chequerboard of boxes that were illuminated, but a mellower impression.'

Designer James Irvine





Greener solutions?

Leading supermarkets in Britain are overhauling their refrigeration systems to make them more eco-friendly. **Andy Pearson** looks at their differing approaches and asks whether they are doing the right thing

Supermarkets in the UK consume 15,000 GWh of electricity a year. About 40 per cent of this consumption is used to power refrigeration systems for display and storage of food. But it is not just the energy used to keep peas frozen that needs to be considered – such systems can have a far bigger impact on the environment through leaking refrigerants, many of which have a global warming potential (GWP) in excess of 1,000 – GWP being a measure of the relative impact of a gas on global

warming compared to CO₂, which has a GWP of one. But this looks set to change. In a series of recent announcements, some leading supermarkets have declared sweeping changes to the way they cool their food storage units, as well as the stores themselves. These changes will see many retailers launching ambitious programmes to replace conventional refrigerant systems with greener alternatives, based on natural refrigerants, such as carbon dioxide and propane, which do not contribute to ozone depletion >



Key dates: F-Gas regs

1 January 2010 – No virgin HCFC can be supplied or used for servicing existing equipment

4 July 2011 – latest date by which personnel servicing equipment covered by the regulations must have obtained an appropriate national qualification

4 July 2011 – The commission will publish a report based on the experience of the application of this regulation, which may include an extension to the ban on use.

1 January 2015 – No recycled or recovered HCFC can be supplied or used to service existing equipment.

M&S has a policy that fridge installations will be based on CO₂ where possible.

> and have a low GWP. Over the past 20 years, legislation has restricted the use of many ozone-depleting refrigerants including CFCs and HCFCs. Under the EU's F-gas regulations, from January this year, firms are no longer allowed to buy virgin HCFC refrigerant and they have five years to use any recycled refrigerant.

Faced with several thousand major supermarket stores in the UK, the refrigeration industry potentially has a huge task to meet the planned roll-out of new refrigeration systems in many of them. CO₂ (or R-744, as it is known) is the refrigerant now favoured by many of the supermarkets.

It has a GWP of one, is non-toxic and non-flammable, and so is suitable for use on refrigerant runs through the customer area.

In November 2009 Sainsbury's announced that all new stores will use CO₂ refrigeration as standard. Moreover, the retailer has pledged to switch to CO₂-based fridges in all stores by 2030 and has earmarked the first 135 stores for conversion by 2014. Meanwhile Tesco, which opened its first store using CO₂ four years ago, has stated that, from this month, all new stores will have CO₂-based refrigerant systems.

Marks & Spencer has a policy that all installations will be based on CO₂ wherever possible. Bob Arthur, M&S head of store refrigeration and a committee member of the British Refrigeration Association, says the firm has a replacement schedule that will see all the firm's HCFC systems replaced. In the interim, M&S will retain refrigerant from the HCFC systems it has replaced and use it in the remaining systems (although, recycled HCFCs will have to be phased out by 2015).

But it is not just HCFC-based systems that M&S is reviewing. Arthur says the retailer's use of HFC-based systems is also under consideration. The supermarket

■ There is a vested interest by some in the industry to keep things as they are because some of the big, global manufacturers are tied into HFCs ■

– Tim Mitchell

is in the process of rolling out the use of the HFC refrigerant R407 across 90 stores by next month.

Waitrose, however, has taken a different route, opting for an ambitious hydrocarbon-based refrigeration solution using the flammable gases propane and propene – a system which, says the retailer, is 'cost neutral' and 'wholly natural'. Its solution is based on a combination of high-efficiency air-cooled chillers utilising propane, R-290; and supermarket cabinets operating on a propene, R-1270. Propane has a GWP of five.

The system has been devised and developed by Waitrose working with refrigeration specialists Carter Thermal, Geoclima, Synergy Building Services Consultants and chiller specialists Klima-Therm.

Chilled cabinets are often scattered throughout a store. Each cabinet and freezer in a store has its own small self-contained propene-based refrigeration unit.

The system works using a chilled water circuit to cool the condenser water in each refrigerated cabinet, which makes it easy to refurbish a store. Large propane-based chillers are used to cool this chilled water circuit. It is also more energy efficient, since cooling the condenser water means that the chilled water temperatures can be relatively high (24C/18C), which means the system is expected to run for 55 per cent of the year in free cooling mode, with the chillers turned off.





Waitrose uses a hydrocarbon refrigerant solution using the flammable gases propene and propane.

Klima-Therm project manager Tim Mitchell dismisses concerns about the flammability of propene because the refrigerant charges are so small: 'The amount of refrigerant in a cabinet is so tiny that even if the cabinets in a store discharged all their gases at the same time, you'd still be well below any flammability limits in the regulations.'

Waitrose says that the advantage of this system is its 'relative simplicity' compared with the hydrocarbon-free refrigeration technologies used by other supermarkets. Waitrose has set a timescale of 10 years to work through its entire estate of 222 shops fitting the new technology.

The switch to non-HFCs by leading supermarkets is not without its critics in the building services engineering sector, however. Some question the efficiency of natural refrigerant-based systems. There are also concerns that there are insufficient numbers of competent engineers to design, manufacture and maintain such systems. CIBSE and leading trade bodies argue that it is important to focus resources on these maintenance and quality control issues, so as to minimise both leakage and inefficiencies in existing systems.

The question of the industry's preparedness for new refrigerant systems was raised by Sainsbury's chief executive Justin King speaking at the Environment Agency Conference last November, when he said that a serious barrier to the roll-out of new refrigeration technologies was 'a lack of skilled engineers to build and maintain these units'.

Although HFC-based systems are still legal, uncertainty over the refrigerant's long-term future has raised doubts over its viability.

'The uncertainty is that the EU has said that it will review the refrigerant regulations in 2011, and that review could apply new criteria to the regulation, which could affect its future viability,' says M&S's Arthur.

'This is important when you are investing in refrigerant

systems with an equipment life of up to 25 years.'

But Cedric Sloan, director general of manufacturers' organisation FETA, says: 'There is a revision of F-Gas Regulations due in 2011 but I know the officials at DEFRA [the environment department] and a number of EU officials understand that there has not been enough work done on alternatives to HFCs to even think about a ban on them.'

Sloan insists that there is still no proof that CO₂ systems are more environmentally friendly: 'They are bigger systems that work on higher pressures so they use up just as much energy, if not more energy than HFC systems, so you are adding to CO₂ emissions.' He adds: 'I don't see a great pressure on supermarkets to go to CO₂ – some of them may want to go that route for other reasons but I don't think they are being propelled that way by regulations.'

Number of UK stores for some major supermarkets converting to CO₂ or hydrocarbon-based refrigerants

Supermarket	Number of stores	Number of stores currently converted	Number of stores planned for conversion
M&S	650	13	All new stores from January 2010
Tesco	2,282	7	All new stores from March 2010
Asda	364*	3*	No information available
Sainsbury's	525	2*	135 stores by 2014. All stores by 2030
Morrisons	422	20	CO ₂ or hydrocarbons in all future stores + refits where possible
Waitrose	222	3	All stores by 2010

Sources: Company information. *Based on information correct at August 2008



Supermarkets are revamping their refrigeration systems, but are the trained engineers available to service them?

> Along with changes to legislation, political pressure is also being brought to bear on the supermarkets, some of whom were already undertaking small-scale trials of alternatives to conventional refrigerants. However, the move was given increased impetus in February last year following the publication of the first *Chilling Facts* report, compiled by the campaigning group the Environmental Investigation Agency (EIA), which is calling for all supermarkets to phase out HFCs by 2015. An updated *Chilling Facts*, published last month, reported that only two per cent of major supermarket retail stores in the UK have refrigeration systems that are HFC-free.

Graeme Fox, head of contractor Specialist Mechanical Services, and HVCA and British Refrigeration Association representative at the Air Conditioning and Refrigeration European Contractors' Association, says that although he disagrees with much of the data used in the first *Chilling Facts*, politicians accepted it as fact and put pressure on the supermarkets to act. 'I think a lot of supermarkets have acted not on the best advice, but on the need to be seen to be green because they could not be seen to do nothing,' he says.

Sainsbury's CEO is not alone in expressing concerns about the lack of engineers competent to work on CO₂. M&S has launched an in-house CO₂ training programme, while Andy Campbell, head of refrigeration at Tesco, is so concerned the store's plans will be scuppered by a lack of competent personnel that he has instigated an initiative to create a cross-industry CO₂ standard.

Campbell chairs a committee made up of the British Refrigeration Association, the Institute of Refrigeration and the Air Conditioning and Refrigeration Board along with SummitSkills, the sector skills council for Building Services Engineering, and training body City & Guilds to develop a qualification to cover all CO₂-

■ If the supermarkets go large on alternative refrigerants there will be skills, equipment and training issues to overcome ■ – Cedric Sloan

based refrigeration systems. The new qualification is expected to be launched in the summer. A specification has been developed and is in the process of being approved. A similar qualification for hydrocarbon-based systems is set to follow.

In addition to a shortage of trained engineers, specifiers and contractors working on systems based on alternatives to HFC refrigerants are also constrained by a lack of equipment. 'As soon as you get into specialist gases you do limit your choice of manufacturer and plant is more expensive because there is not much of it about so every machine is effectively bespoke,' says Klima-Therm's Mitchell. 'There is a vested interest by some in the industry to keep things as they are because some of the big, global manufacturers are tied into HFCs because of the amount of research and development work they've done, but prices will come down as competition increases,' he says.

With the majority of natural refrigeration schemes yet to commence, it is still early days for these pioneering green technologies. Currently the refrigeration industry appears to be responding to the challenges of designing, constructing and maintaining both CO₂ and propane-based systems. However, if many of the supermarkets attempt to meet all of their commitments at once, then this situation will change rapidly. 'If the supermarkets do decide to go large on alternative refrigerants such as CO₂, then there will be skills, equipment and training issues to overcome,' warns FETA's Sloan. ●

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Making the running on efficiency

Concern about the environment is increasing pressure on those who run buildings to ensure they meet higher efficiency standards. But do we need a new army of 'operational engineers' in order to make this happen? John Osborne finds out

It has been suggested in the pages of the *Journal* in the past year that facilities managers may not always know enough about engineering to efficiently manage the new breed of buildings, and that building services engineers are often so preoccupied with design that they cannot be expected to take on this apparently emerging role.

Some in the industry feel that bridging the gap between the two professions could be a daunting challenge, and yet it is one which must be faced if we are to overcome the problem of highly green designs performing poorly.

'Commitments to reduce energy and carbon, effective management of building systems and risk has continued to develop the need for highly effective operational engineering managers,' says Geoff Prudence, chairman of CIBSE's FM Group.

Roger Smith, a partner in Hoare Lea and principal of its engineering management group who has written about the topic in the *Journal* (February 2010, page 24), says his company aims to provide an operational engineering skills set to staff so that they are more able to play a key role in the effective running of buildings.

'The mindset of a designer of new buildings is different to that of somebody dealing with an operational building,' says Smith. 'Clients want an engineer who can go into a building and know what to do.'

Philip King, a director at Hilson Moran, agrees: 'There are lots of facilities managers, but there is a shortage of facilities managers with engineering knowledge.'

He says that as it is now necessary to keep 'so-called log books', it is important to have somebody who understands how to relate that data to how a building is



performing. 'We have a new generation of buildings but the building services profession lacks the skills to use the log books to take corrective action.'

Pat Coleman, technical director, AECOM, shares Smith's concerns but says that significant change will need to be in place before the importance of this role becomes sufficiently recognised: 'I totally agree with the concept projected by Roger Smith,' says Coleman, but adds: 'Significant change will be required before the importance of this role becomes sufficiently recognised. I crossed over into facilities engineering, from being an HVAC design engineer through to function and value management.'

'Having delivered function and operational management for 18 years, I have seen considerable



AECOM

Do we need to turn building services professionals into 'operational engineers' to ensure energy efficiency?

“ I have seen improved M&E maintenance contractors, yet the building services industry has not evolved from its core principals ”
– Pat Coleman

improvement in the attitude of clients in obtaining professional advice for resilience, maintenance cost management, statutory compliance and sustainability of properties.

'I have also seen improved IT and M&E maintenance contractors with people skills yet the building services industry has not evolved from its core principals. This may be because consultancy skills in building services are required to be precise, disciplined and structured on delivering a contractual "design" service in accordance with the ACE Form of Agreement.'

Rob Manning, CIBSE president-elect, agrees that the envisaged role of operational engineer is important: 'People are currently being recruited who understand how a particular component such as a pump or a control

valve works, but do not understand how the system as a whole works. Hoare Lee is seeing this as an opportunity to sell their skills.'

However, it will be difficult to attract enough young people to fulfil this role, he adds. 'There is a need to spend money on education. The universities cannot get the candidates to take up building services engineering because it is not an attractive subject to young school leavers.'

Professor Tony Thomas of London South Bank University believes that the facilities management profession must 'fully embrace the operational engineer concept', adding that this realisation is 'growing'.

He adds: 'The education of facilities managers is by its nature rather broad and a new approach is required >



Modern buildings designed for efficiency may fail to achieve this operationally.

> for the development of what is increasingly called operational engineers.'

Terry Dix, a director of Arup, says he has met FM people who have approached buildings on the basis of 'if it is not broken, don't fix it', and that the facilities engineers do not know how to fix things. Design engineers have a great understanding of the practicalities of what they have designed.

Dix believes, however, that there is a solution. It is the Soft Landings process for encompassing new-building procurement, handover and longer-term monitoring, as developed by the Useable Buildings Trust and research body BSRIA. Anyway, argues Dix, the role of operational engineer has existed in other forms: 'Sometimes they have been called energy managers.'

Coleman concurs: 'Many good value initiatives such as HOBO (Handover of Building Operations) and Soft Landings have been available for nearly a decade without becoming common practice, even within the current environment of energy consciousness and reduction in the financial market. Because the consultancy business

is focused on growth by competitive bidding to win big projects with tier-one clients, operational engineering is likely to remain a bespoke service provided for the property user, occupier or manager.'

The role of an operational engineer could also be performed by maintenance engineers, claims Bob Quinn, a regional director at WYG. He says that he is a member of the British Institute of Facilities Management and describes himself as an operational engineer.

'There are a lot of people with my background in maintenance engineering,' he says, adding that such people understand the consequence of a design in which, for example, the plant and equipment are put on the roof where a crane would be required to get at it.

Quinn thinks that the way to bridge the gap is to try to ensure that trainees learn about design and maintenance demands – something WYG aims to do. He believes it is crucial to continue the long-standing practice within the construction industry of training each professional to understand the other's viewpoint.

However, Quinn advises caution. He believes that the impetus to create the role of an operational engineer could disappear because it is based on a topical issue – the environment. 'The energy side was a major driver up until 18 months to two years ago. The issue of lifecycle costings has been driven by the Private Finance Initiative [PFI] people.'

He says that is because PFI-minded professionals are often concerned with buildings that are designed to last for 25 to 30 years and that they have a strong commercial incentive to ensure that all the costs of running a building are taken into account.

Quinn's assessment of the need for operational engineers suggests that the profession should be wary of rushing into conclusions about what is really needed. It may be difficult to reconcile the interests of architects and designers with the priorities of those involved in running a building. However, this custom of trying to bring the various professionals together is established.

'It is important to make sure that design engineers are skilled enough in maintenance engineering,' says Dix. 'Interposing somebody in the middle – an operational engineer – may not be the best solution.' ●

" We have a new generation of buildings but the profession lacks the skills to use the energy log books to take corrective action " – Philip King

CIBSE event Focus on maintenance management and achieving performance and compliance

To adhere to growing legislation and the rising demand for sustainable, cost-effective services, a high standard of maintenance management is crucial. Managers need to have a broad knowledge of the issues they are facing and the responsibilities they have to fulfil, such as the legal requirements and changing client demands, as well as environmental concerns.

Preparation and planning are key to implementing effective management and ensuring that there is an efficient use of resources, a competent way of dealing with potential risks and working within budget.

CIBSE's half-day conference on 13 April, *Maintenance management – achieving performance and compliance*, aims to update attendees on the current state of maintenance and address issues of performance and compliance in a practical way. Organised by the CIBSE Maintenance Task Group, the event is relevant to engineers, maintenance managers, facilities managers, technical managers, designers and contractors.

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The link-up between water heaters and renewable installations is becoming more central to low-carbon building design.

Brimming over with solutions

As water heating becomes increasingly important in the energy performance of buildings, system providers are looking to offer greener products. **Ian Vallely** looks at recent developments

Insulation and air-tightness levels in many buildings are improving. Consequently, space heating loads are dropping and hot water is becoming the dominant load.

Alan Clarke, technical support manager of Heatrae Sadia Heating, puts it this way: 'As buildings become more thermally efficient, their heating requirements decline. However, hot water usage will remain more or less constant and, as a percentage of the overall energy use in the building, it will go up. That means water heating will have far more focus in the design of the property than it has in the past.'

This, according to some industry experts, is why the energy efficiency focus is shifting away from heating and towards hot water. It is also why Baxi Commercial is pushing heat pumps more at hot water generation than space heating, according to Yan Evans, the company's technical director. He says: 'We are looking especially at air source heat pumps working in conjunction with direct fired water heaters.'

'If the designer is going for Code for Sustainable Homes Level 3, for example, or trying to get a percentage of the energy from some form of renewable technology on an office block or a hotel, it seems sensible to focus the renewables on water rather than space heating.'

The big driver in the design of water heating systems – as in many other areas of building design – is energy efficiency, and a key piece of legislation to cover this is the Energy Related Products Framework Directive (the ErP, which replaced the Energy Using Products Directive in November last year). The EuP Directive covered products that were using energy. The new ErP Directive covers these as well as products that indirectly

affect energy use (for example, double-glazed windows and taps).

Clarke says: 'The European Commission sees this directive as a tool to encourage people to buy more energy efficient products. So, for instance, after a period of time yet to be specified – but probably a couple of years after the directive is implemented – lower [performance] categories will be banned from the market. That will obviously push specifiers down a certain route because only certain products will be able to be specified.'

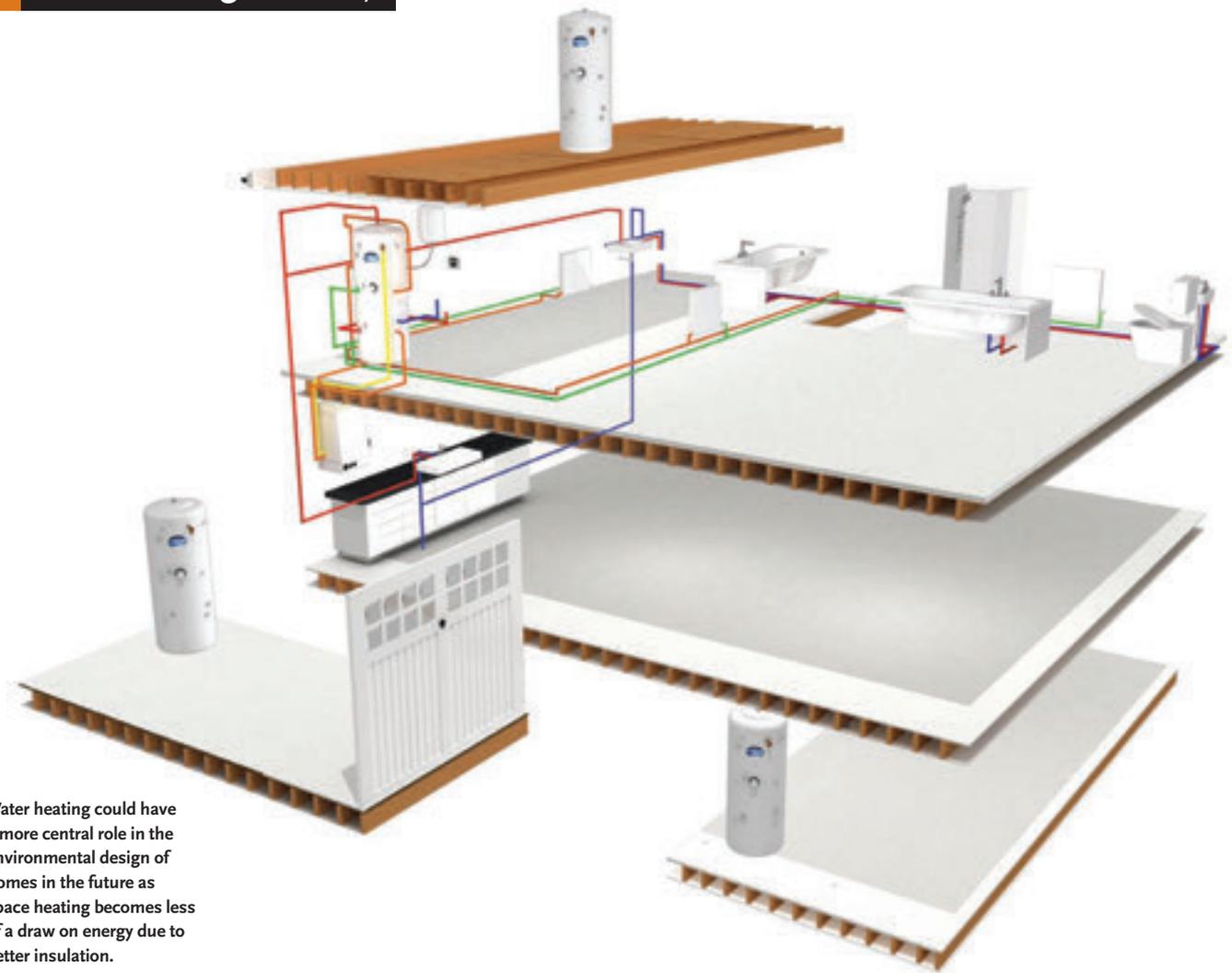
Evans believes the ErP Directive could have a bigger impact on the industry than the 2010 changes to Part L of the Building Regulations – due to come into force in October this year – because it looks at system rather than appliance efficiency. And this, he says, presents a challenge throughout the supply chain.

'Everybody has a part to play in system efficiency – whether it is designed correctly, installed properly, supplied appropriately and therefore whether it is controlled, integrated and operated effectively. Everybody from M&E design through to merchant has an impact on the delivery of efficiency.'

David Dutch, technical director of Ormandy Group, also supports the principle of the ErP Directive because, he believes, it promotes the total system approach to designing building services solutions and could have a significant impact on how heating systems are put together in future.

'The directive should deliver more integration, which is the key to ensuring equipment operates efficiently, reliably and for the longest possible time. For example, demand for off-site fabrication is increasing as >

“ We are looking especially at air source heat pumps working in conjunction with direct fired water heaters ”
– Yan Evans



Water heating could have a more central role in the environmental design of homes in the future as space heating becomes less of a draw on energy due to better insulation.

“A lot of people feel solar will answer all their problems, but the main part of the hot water system has got to be right too”
 – David Pepper

> specifiers look for ways to achieve integration from the point at which the equipment leaves the factory,’ he says.

‘There will be some devil in the detail of the directive, however, as legislating for a total system approach and actually achieving it technically are two very different things.’

Clarke says electrically-heated appliances are not looked on particularly favourably under the ErP Directive, not because of the efficiency of the appliance itself, but rather the efficiency of generating electricity. He explains: ‘They are penalised because a fuel factor is applied to efficiency. Because of the relatively high carbon content of producing electricity, there is a fairly high factor applied at the moment.’

Although he says this makes electrical water heating products less attractive, manufacturers are addressing the issue: ‘To meet the minimum requirements under the directive, water heaters will have to be better insulated, but specifically for electrical water heaters they will have to have more sophisticated control systems. The days of the on/off switching thermostat with a set point of around 60 deg C are limited because that is a pretty inefficient way to control them.’

Clarke believes that, in future, more controls will adapt to the usage patterns of the users so that the system switches on when people want hot water rather than remaining all day at 60 deg C not being used.

These ‘smart controls’ match the energy input to the water to ensure that the customer gets the temperature

they require at the time they require it. Controllers are also a critical component for Ian Hughes, technical director of Kingspan Hot Water Systems, and he believes it is important that the hot water system designer is aware of what he calls the ‘human-machine interface’.

For Hughes, no matter how good the controller, it is useless if the user can’t operate it easily because it simply won’t be used: ‘Designers will have to take into account the uses of the property or equipment. So, for example, it is no good expecting an elderly person with poor eyesight to try to press tiny buttons on a controller in a cupboard under the stairs.’

And, he adds, when a number of systems are trying to work together, control systems become critical: ‘An extreme example would be an air conditioning (ac) system and a heating system that are independent of each other. The ac will be trying to cool the room as the heating system is heating it. This is a recipe for wasted energy.’

Another potential technology clash is conventional hot water generation equipment and renewables such as heat pumps or solar systems which are increasingly being asked to work together in hot water systems as users receive financial rewards for using renewables.

Indeed, Dutch believes the financial incentives being put in place by the UK government to help stimulate the renewables market will gradually have an impact. ‘Feed-in tariffs are a welcome development, but the Government could have been a lot bolder. A 3p export >

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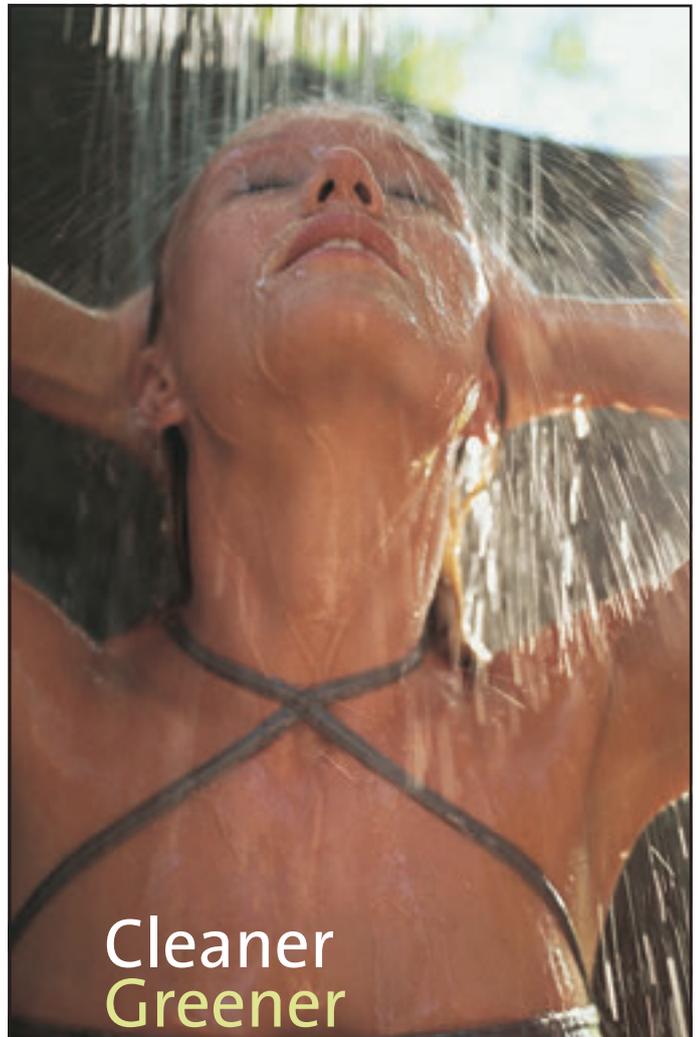


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Above left: ECOflor and solar thermal cylinders, from Andrews Water Heaters; and right: EcoForce wall-hung condensing water heaters and steel storage vessels from Lochinvar.

> tariff is rather meagre and we would also have liked to see more support for larger combined heat and power systems,' he says.

'However, the principle is good and, hopefully, the Renewable Heat Incentive (RHI), when it comes in next year, will start to make investment in a range of renewable and low carbon heating technologies more attractive to end users. Currently, we get less than one per cent of our heat from renewable sources and that really must be improved quickly.'

The integration of renewable technologies with traditional water heating technologies is a critical issue for David Pepper, managing director of Lochinvar: 'There has been a clamour for using renewable technologies for providing heating and hot water services in buildings. As far as hot water is concerned, solar seems to be the most popular.

'Because it is in the news, everybody concentrates on the solar aspect, but in actual fact it is still the secondary

provider in terms of energy. I can see a lot of people thinking that solar will answer all their problems and it is not necessarily the case; the main part of the hot water system has got to be right as well.'

Pepper believes we could help reduce carbon emissions with a stronger emphasis on reducing the use of fossil fuels rather than making 'unrealistic attempts' to replace it with renewable technologies 'because the technology is not there to provide much more than 25-30 per cent in commercial buildings'.

Nonetheless, renewables are becoming increasingly important as pressure grows to save energy and cut emissions.

And, says Hughes, this increase in technology has implications for the education of consultants: 'There is going to be a big requirement for knowledge and many people are going to have to do an awful lot of swotting up, not because it's more difficult but because there is much more data available to them.' ●

Currently, we get less than one per cent of our heat from renewable sources and that really must be improved quickly – David Dutch

UK market Cylinders still dominate hot water use

Vented or traditional cylinders have been the most popular units on the UK market for a long time, according to research body BSRIA. That's if you exclude sales of electric shower units (see table, right).

However, this market has been declining by about 10 per cent a year in recent years, partly due to increasing sales of combination boilers.

Sales of traditional cylinders go mainly to the replacement market, with the new-build sector oriented towards unvented storage systems – with cylinders for solar thermal and heat pump installations having particularly good prospects in the years to come.

Cylinders are overwhelmingly used in residential heating systems in the UK, therefore the use of electric storage water heaters is very much restricted to the sector. Units below 15 litres storage capacity are the most popular.

Forecasts for UK water heating, volume ('000 units), 2009-2012

Source: BSRIA

	2009	2010	2011	2012
Gas instantaneous	36.1	37.0	38.9	40.8
Gas storage	9.0	8.8	8.6	8.5
TOTAL GAS	45.1	45.8	47.5	49.3
Electric instantaneous	127.7	126.4	126.3	126.3
Electric storage <15 litres	152.0	146.7	145.2	148.1
Electric storage > 15 litres	10.6	9.9	9.5	9.1
Electric boiling appliances	49.6	48.6	48.1	48.0
TOTAL ELECTRIC (excluding electric showers)	339.9	331.6	329.1	331.5
Traditional cylinders	443.2	412.2	383.3	356.5
Unvented storage	265.1	246.6	234.2	227.2
Other mains pressurised	65.0	61.7	58.6	55.7
TOTAL CYLINDERS	773.3	720.5	676.1	639.4

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Chancellor highlights work at Thorn Spennymoor

Chancellor of the Exchequer Alistair Darling has praised the Thorn site at Spennymoor, County Durham, the largest single manufacturing project in the north east in the last decade.

He described the modern, purpose-built lighting factory as a shining example of how to combine traditional engineering skills with knowledge to lead new industries.

The company employs 550 people and makes fluorescent luminaires for the professional lighting market.

● For more information call 020 8732 9954, fax 020 8732 9819 or email hugh.king@thornlighting.com



CitizenM checks in to Glasgow



CitizenM, a 180-room hotel offering affordable luxury in the cultural heart of Glasgow, has rooms or pods prefabricated in Amsterdam

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To support the infrastructure and meet the highest expectations, Grundfos Pumps worked with contractors Hulse Building Services and consultants hurleypalmerflatt to supply the 'best fit' energy-efficient pump solution.

● For more information call 01525 850000 or email uk-sales@grundfos.com

Fabulous at 40



HygroMatik is celebrating 40 years of innovative design and manufacture in 2010.

As one of the world's leading designers and manufacturers of humidification equipment, HygroMatik will be marking the anniversary throughout the year, with a range of events and product enhancements.

HygroMatik prides itself in producing energy-efficient products, and is one of the largest manufacturers of various types of air humidifiers and air humidification systems. It has a rich history of innovation of products and services.

● For more information visit www.feta.co.uk/humidity

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Mitsubishi enters second generation

Mitsubishi Electric has launched its second generation of R410A City Multi Replace models, offering an 80 per cent increase in COP, halving the installation time and cutting installation costs by up to 40 per cent when replacing a 10-year-old R22 air conditioning system.

The units join the existing Replace line-up to offer one of the widest and most efficient replacement model ranges on the market.

● For more information call 01707 282880 or visit www.mitsubishielectric.co.uk/aircon

Coolair celebrates 30th birthday



After 30 years in business, Coolair Equipment is looking to continue its success story by expanding into new fields.

The company's growth has been

based on a strong engineering and design capability, seeing Coolair prosper over three decades.

'Since day one, we have focused on air conditioning solutions that meet our customers' needs, and supported them with the best engineers and designers available,' said managing director Nick Parker.

● For more information call 0161 343 6000 or email sales@coolair.co.uk



Heating installer course is Logical

Logic Certification has launched a new underfloor heating installer course designed to provide an entry-level qualification for experienced domestic heating installers.

Approved by the Underfloor Heating Manufacturers Association (UHMA), the course focuses on wet underfloor heating, covering the predominant systems in the UK. Candidates must be experienced in the design and installation of domestic heating systems and familiar with heat-loss calculations.

● For more information visit www.logiccertification.com, call 020 8838 2439 or email enquiries@logic-cert.com



SAS overcomes heating and cooling challenges

More than 1,580m of active Integrated Service Modules (ISMs), providing both cooling and heating, were supplied and installed by SAS International at the refurbishment of Lewins Place in Bristol.

Working closely with M&E consultants Hulley & Kirkwood and architects Stride Treglown, the active ISMs helped achieve a BREEAM rating of 'very good' – a significant achievement in this 1970s refurbishment.

● For more information email enquiries@sasint.co.uk or visit www.sasint.co.uk

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Dimplex FXLi offers advanced fan storage performance

Dimplex has enhanced its FXL range of fan-assisted storage heaters to create the FXLi range, which can add up to six points to a property's SAP rating.

Fan-assisted storage is listed as the recommended upgrade for storage-heating systems within the guidelines of energy performance certificates, now mandatory for all homes whenever built, rented or sold.

● For more information call 01489 773336, email marketing@dimplex.co.uk or visit www.dimplex.co.uk



Bilco puts safety on top

A London regeneration project undertaken by Ballymore Properties has put health and safety first by installing Bilco's market-leading smoke vents.

Bilco's REM polyester powder-coated smoke vents have been fitted in the roofs of new residential buildings in the Crossharbour project, part of the Isle of Dogs regeneration scheme. All 26 vents are fitted with Bilguard railing systems and seven can be used as maintenance access hatches.

● For more information visit www.bilco.co.uk

MWA launches independent meter testing service



MWA Technology, an independent metering supplier, has launched a meter testing service for any brand of rotary or turbine meter with flow-rate capacities from one cubic metre per hour to 650 cubic metres per hour.

The company has invested in a sophisticated test rig and installed it at its Birmingham headquarters in order to offer customers the service.

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● For more information email info@mwatechnology.com or call 0121 327 7771.

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The increasing potential for ground source heat pumps

The recent Renewable Heat Incentive proposals have clearly confirmed that the UK government considers that technologies including both air source and ground source heat pumps are deemed 'renewable'. This CPD module outlines the drivers for the selection of GSHPs and outlines some examples of how novel application might further improve their appeal

The conjunction of changes in Part L of the Building Regulations, impending European legislation prompted by the EuP (Eco-Design of Energy Using Products) Directive and the Code for Sustainable Homes are placing ever increasing demands on improved appliance and system efficiency for space heating and hot water generation.

Building heating and hot water systems are more frequently becoming 'bivalent' with a combination of heat sources being deployed in plant rooms to deliver the carbon savings demanded by local authorities and the underpinning legislation. Commercial heating and hot water systems will inevitably need to include a combination of conventional products such as boilers, direct-fired water heaters and calorifiers married with more innovative technologies such as solar thermal, heat pumps and combined heat and power (CHP) in order to deliver low carbon plant room solutions.

The UK government's Renewable Heat Incentive (RHI) is planned for introduction in April 2011 and is aimed at supporting heating at all scales, including households, businesses, offices, public sector buildings and industrial processes.

The 'clean energy cashback' tariff levels proposed by the RHI for biomass, biogas, heat pumps and solar thermal vary according to installed system size. Ground source heat pumps up to 45 kW will qualify for tariffs of 7 pence/kWh; between 45 kW and 350 kW, 5.5 pence/kWh and those above 350kW will qualify for a tariff of 1.5 pence/kWh. The two lower bands would not require any metering of energy supplied to the building by the GSHP (being based on installation size and deemed annual generation) and the payments would be made for at least 20 years. Despite the proposed legislation being a year away systems that are installed now (that are certified and registered under the Microgeneration Certification Scheme,

MCS) would benefit. The MCS (or equivalent schemes accredited under EN 45011 [1]), certify microgeneration products and installers in an attempt to provide consistent European standards.

The principle for ground source heat extraction

The ground source heat pump is driven by solar radiation that, in this case heats the ground; as well as the continuous flow of heat from the earth's core. As a result, the ground temperature shows seasonal fluctuations to depths of about 15 m where the temperature is approximately equal to the mean annual air temperature (8 - 11°C in the UK) [2].

The temperatures above this will alter throughout the year as illustrated by the graphs in Figure 1 [3]. Ground source heat pumps use this stored energy to provide a thermal source for one side of a refrigeration cycle recovered through the use of a 'ground loop' that draws its heat from either 'open' >

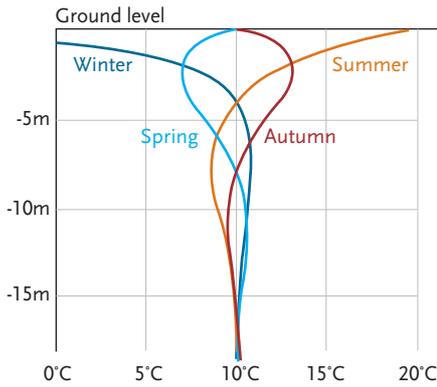


Figure 1 – Approximate UK Annual Ground Temperatures

or ‘closed’ ground loops. This would most frequently employ a vapour compression refrigeration cycle. The available heat generated (and released from the condenser of the refrigeration cycle) is then used for low temperature space heating or supporting the generation of hot water.

There are two heat exchangers in a GSHP: **Source side – the evaporator:** A ground loop manifold provides the interface between the fluid that is drawing the heat from the ground and the source side exchanger as shown in the example in Figure 2. **Load side – the condenser:** Transfers energy between the high pressure, high temperature refrigerant gas (post compression) and the heating/hot water circuit.

The complete heat exchange cycle is shown in Figure 3.

The heat transfer fluid is a water/glycol mix to prevent freezing during periods of low ambient air temperatures and ground frost.

Open and closed loops

Water that naturally flows through the ground in aquifers (in spaces between gravel, sandstone, and fractured rock) will tend towards the temperature of the ground through which it is flowing. By drilling holes into the aquifer, the depth of which will vary depending on location, the water can be diverted (pumped) to provide a source

of heat for the heat pump evaporator. This is known as an open loop system and to determine the availability of such a resource requires a specialist hydrogeological survey to determine the extent and longevity of the available resource.

As a consequence of the more complicated survey requirements of this technique and due to greater uncertainties (such as unforeseen geological conditions, air locking and collapse of the boreholes or a falling water table), closed loop systems are more frequently employed where the heat exchanger is constructed within the ground itself. Closed loop heat exchangers usually consist of a sealed loop of polyethylene pipe containing a heat transfer fluid which is pumped around the loop.

The heat exchanger may be installed vertically or horizontally, the choice of the arrangement will depend on the available land, local soil type and excavation costs. Like open loops they can still suffer from air locks and they require careful protection both during installation and after they have been installed to prevent blockages.

Closed loop ground heat extraction using a horizontal trench

Where horizontal trenches are used to extract energy from the ground, then the depth would normally be between 1.5 and 2 metres. For strip trenches (used commonly with ‘slinky’ type coils) the width of the trench is typically the same as that of a bucket on a digger.

The actual area required for the ground loop will depend on the type of ground and the annual heat extraction period. Based on Central European data EN 15450 [3] provides the guidance in Table 1.

Operation period	1 800 h per year	2 400 h per year
Soil type:		
dry, non cohesive soil	10 W/m ²	8 W/m ²



Figure 2 – Manifold for connecting multiple ground loops to evaporator heat exchanger

moist cohesive soil	20 to 30 W/m ²	16 to 24 W/m ²
water saturated sand or gravel	40 W/m ²	32 W/m ²

Table 1 – Practical heat pump extraction rates per m² ground

So, for example if a load of 10kW was to be drawn from ground that is made up of wet clay for around 2,000 hours per year it might be reasonable to use a value of 25 W/m². Hence the ground loop should cover a ground area of 10000/25 = 400m².

The pipe should be laid no closer than 0.8m apart [4] and so this would mean a pipe length of at least 400/0.8 = 500m. To ensure that there is not excessive pressure drop in the ground loop (to both reduce operating costs and maintain reasonable pressures) the practical pipe length is related to the pipe diameter. The recommended maximum length for 25mm is 100 metres and for 32mm pipe is 200metres [4] so in this case if 25mm pipe was used then four loops would be used linked up via a manifold (as in Figure 2).

Closed loop heat extraction via deepbore hole

Vertical bore hole based ground loops are suited to applications where there is limited ground availability as in more densely populated areas but are more expensive to install. Bore holes are required to be deep (in the order of 50 to 100 metres) to accommodate the appropriate length (and hence surface area) of pipe to extract the required heat from the ground. The bore holes would normally be no closer than 6 metres apart and the pipe would be surrounded by a grouting medium (injected at the same time as the pipe is inserted) to ensure good heat transfer between the ground and the pipe. The amount of heat that can be extracted from the borehole is determined by the type of ground and the annual operation period. Table 2 [5] provides an abstract of the data derived from applications in Central Europe giving the approximate available heat that may be extracted per metre of vertical borehole.

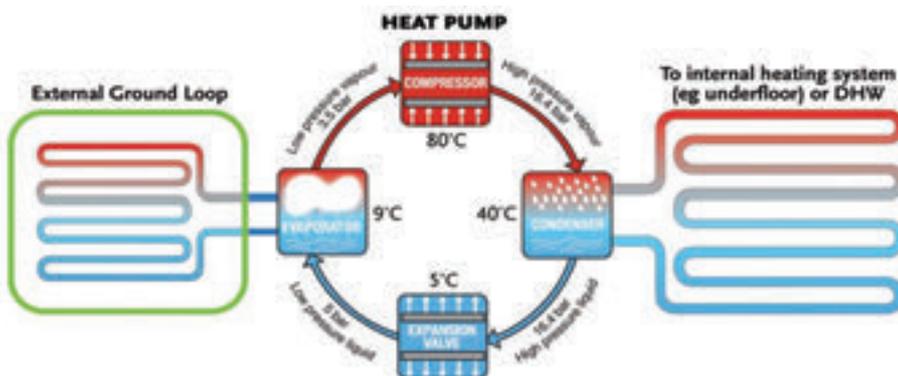


Figure 3 – The heat exchange process in a GSHP system

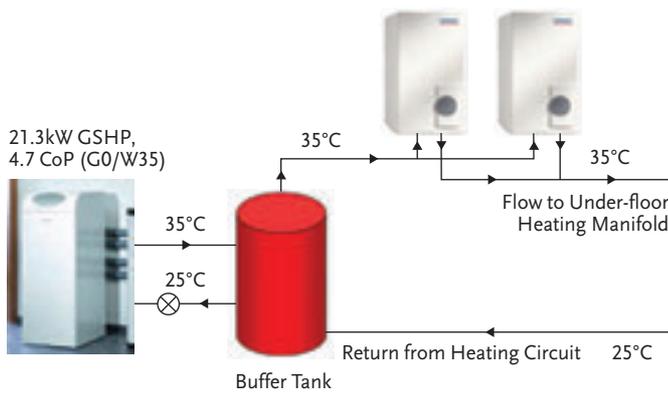


Figure 5 – Space Heating (Under-Floor) Application

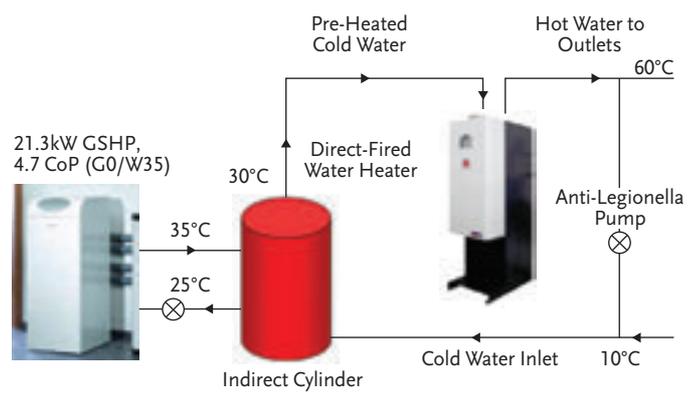


Figure 6 – Cold Water Pre-Heat Applications

Operation period	1 800 h	2 400 h
Ground type:		
poor underground and dry sediment	25 W/m	20 W/m
normal underground and water-saturated sediment	60 W/m	50 W/m
consolidated rock	84 W/m	70 W/m

Table 2 – Practical heat pump extraction rates per metre run of vertical bore hole (see EN 15450:2007 for full detail)

And so using the same 10kW load as before the extraction rate would be just under 60W/m and so the vertical borehole would need to be 10000/60 = 167 metres deep. Practically, two bore holes of approximately 85m deep or three at 60 metres are likely to be used. In recent years there have been a growing number of ground source loops being integrated into the piles of buildings.

Whether the ground loop is open or comprises horizontal trenches or deep bore holes, it is always recommended to conduct a geological survey.

Optimising operational performance

The key aspects to ground source heat pumps delivering economic and environmental benefits is control of its operation. The Coefficient of Performance (COP) of the heat pump is a function of the ground loop temperature and the load into which the thermal output of the heat pump is being discharged – the closer the two temperatures are the greater the COP and COP may be calculated from:

$$\text{COP} = \frac{\text{thermal heat delivered (kW)}}{\text{electrical power supplied (kW)}}$$

As the temperature of the ground loop is relatively constant, unlike air source heat pumps, seasonal variations in performance with a ground source heat pump will be less than for air source. For comparison purposes the performance of heat pumps is frequently measured on a seasonal basis using the



Figure 4 – 'Slinky' coil being installed

seasonal performance factor (SPF) and $\text{SPF} = \frac{\text{heat energy delivered (kWh/season)}}{\text{electrical energy supplied (kWh/season)}}$.

As electricity is being consumed and thermal energy is being generated, the financial benefit offered by ground source heat pumps is a function of the electricity tariff and the cost of the fuel being used as a primary source of heat (gas, LPG, oil or electricity). In a properly installed GSHP the heating energy costs should be below that of any other centrally supplied fuel.

The better COP is achieved in applications where the ground source heat pump is integrated into a heating system using low temperatures such as under-floor heating, such as the one shown in Figure 5.

Another application to ensure low flow and return water temperatures to the heat pump condenser is to use the heat pump to pre-heat hws feed water where, using an indirect cylinder as an interface, the ground source heat pump can operate in conjunction with a direct-fired water heater or a hot water calorifier as shown in Figure 6.

The schematic shows the ground source heat pump load side temperatures being controlled to 35°C flow and 25°C return. At these operating conditions temperatures

within the pre-heat cylinder can rise to 25°C. This reduces the amount of fuel required in the primary heating appliance to raise the hot water service to 60°C with a subsequent reduction in energy costs and carbon emissions.

Additionally the use of the indirect heater will provide some buffer storage – this is beneficial as it is not recommended [6] that ground source heat pumps start up more than three times in a one hour period. If a pre-heat cylinder is employed then particular care must be taken when determining operational requirements to avoid legionella.

In under-floor heating applications, if the size of the heating array is relatively large, holding a high volume of water, this may act as buffer storage and could mitigate the need for the buffer vessel. This needs careful consideration and depends on the under-floor heating zoning, and a buffer tank may be needed and detailed calculations are needed to determine the requirements to prevent heat pump cycling.

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1. BS EN 45011:1998 - General requirements for bodies operating product certification systems. 1998
2. Survey, B. G., Ground source heat pumps - Development of GeoReports for potential site characterisation. http://www.bgs.ac.uk/reference/gshp/gshp_report.html Accessed
3. BS EN 15450:2007 - Heating systems in buildings — Design of heat pump heating systems. 2007
4. Heat Pumps - A guidance document for designers - BG 7/2009. BSRIA, 2009
5. BS EN 14511:2004 - Air conditioners, liquid chilling packages and heat pumps with electrically driven compressors for space heating and cooling. 2004
6. Evans, Yan, Baxi - internal notification. 2010. Evans, Yan

Module 15

April 2010

1. Under the proposed RHI what 'clean energy cashback' tariff is being proposed for ground source heat pumps up to 45kW?

- A 1.5 p/kWh
- B 3.0 p/kWh
- C 5.5 p/kWh
- D 7.0 p/kWh
- E 9.0 p/kWh

2. At 2m below the ground what is the approximate range of temperatures over a year in the general UK data shown in the article?

- A Always 10°C
- B 9°C to 11°C
- C 8°C to 12°C
- D 7°C to 13°C
- E 0°C to 19°C

3. What is the least depth at which the ground temperature is approximately constant (ie less than +/- 0.5K) throughout the year?

- A 1m
- B 2m
- C 5m
- D 10m
- E 15m

4. What approximate area of ground would be needed for the example trench ground source heat exchanger if it was in dry soil (as opposed to moist cohesive soil).

- A Half as much area
- B The same area
- C 1.5 times the area
- D 2.0 times the area
- E 4.0 times the area

5. A ground source heat pump system delivers 4000kWh of heat per season. If the Seasonal Performance Factor is 3 and electricity has a carbon emission factor of 0.544 kg CO₂/kWh how much CO₂ is likely to be attributed to the operation of this heat pump for the season.

- A 300kg
- B 544kg
- C 725kg
- D 1200kg
- E 12000kg



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- **29 April, 2010 Passive ventilation design – does it work? And East Anglia region AGM (tbc)** Bury St Edmunds
jonathan.page@mlm.uk.com

CIBSE/OTHER TRAINING

- **13 Apr 2010 Maintenance Management** London
A conference event. www.cibsetraining.co.uk
- **20 Apr 2010 Providing renewable feasibility studies & retrofitting** London
CPD event. www.cibsetraining.co.uk
- **21 Apr 2010 Building Regulations Update** Exeter
A practical approach to building regs. michelle.taylor@inst.riba.org
- **22 Apr 2010 Lighting and energy efficiency** London
A CIBSE CPD event. www.cibsetraining.co.uk
- **28 April 2010 Natural**

Nemex 2010

NEMEX, The National Energy Management Exhibition, is the UK's leading energy and renewables event.

The three-day show includes seminars, an exhibition and the Environment and Energy Awards 2010, and brings together energy executives and decision-makers across a range of industries, all of whom are helping to shape the UK business approach to the latest energy crisis.

A range of topics across energy and building services will be covered, including behaviour change, energy skills, energy efficiency research, lighting, and energy performance in buildings. Plus there will be case studies focusing on issues such as climate change and low carbon.

There will also be a number of



Last year's show attracted thousands.

well-known speakers and chairmen hosting the events, including Ant Wilson, of AECOM, and CIBSE's Jacqueline Balian, who will be looking at making sure buildings are capable of withstanding the effects of changing weather and growing litigation.

The 2010 show will take place on 20-22 April in halls 3 and 3A at Birmingham NEC. To find out more visit www.sustainabilitylive.com

- Ventilation** Bristol
A RIBA event on ventilation. michelle.taylor@inst.riba.org
- **10-14 May 2010 Training for BSEN16001** Birmingham
www.cibsetraining.co.uk

CPD TRAINING

- Visit www.cibsetraining.co.uk, call 020 7675 5211 or email eventbookings@cibse.org
- MECHANICAL SERVICES**
- **13 April 2010 Air conditioning basics one: comfort, climate and heat gains** London
 - **14 April 2010 Air conditioning basics two: the air conditioning process** London
 - **21 April 2010 Introduction to building services** London
 - **27-29 April 2010 Mechanical services explained (three-day)** Loughborough
 - **29 Apr 2010 Design of heating and chilled water pipe systems** London
 - **30 Apr 2010 Design of ductwork systems** London
 - **06 May 2010 How to specify a ground source energy system** London
- BUILDING REGULATIONS AND ENERGY EFFICIENCY**
- **13 April 2010 A522 Smart metering** London

- **14 April 2010 Energy surveys** London
 - **15 April 2010 Introduction to sustainability** London
 - **16 Apr 2010 2010 Building Regulations Part L2** Manchester
 - **22 Apr 2010 Building Regulations Part G (2009) explained** London
 - **27 Apr 2010 2010 Building Regulations Part L2** Birmingham
 - **29 Apr 2010 Low carbon buildings and energy infrastructure for local authorities** London
- BUSINESS MANAGEMENT**
- **12 April 2010 Customer care: the key to profitability** London
 - **10 May 2010 Presentation skills for engineers** London
- ELECTRICAL SERVICES**
- **28-30 Apr 2010 Electrical services explained (three-day course)** Birmingham
 - **11 May 2010 Building electrics basics three: physical distribution within building constraints** London
 - **12 May 2010 Building electrics basics four: final outlets and component selection** London

Send your event details to cbailey@cibsejournal.com to see your activity listed

Building Services Engineering in Liverpool

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CIBSE membership requirements have been integral in the development of these courses, because LJMU recognise the importance of professional membership.

21st century courses developed to create modern capable engineers to meet the practical challenges of sustainability and the changing environment.

The courses have been developed in conjunction with practising professionals - as well as gaining degree level academic skills and knowledge, Building Services graduates from LJMU will be proficient in the design, and in the technical and managerial challenges inherent in overseeing the installation and commissioning of building engineering systems. They will also be able to manage the operation and maintenance of modern sustainable buildings and their engineering systems. Clearly the engineers of the future must comprehensively understand the technologies required to achieve zero carbon buildings and Building Services courses at LJMU will equip them with the practical know-how and skills necessary to make sustainability a reality.

The School of the Built Environment at Liverpool John Moores University is one of the leading providers of teaching, learning and business focused research in the UK. Our mission is to continue to provide high quality teaching, scholarship, research and enterprise activities to help generate business success and to create a generally more sustainable built environment.

Located close to Liverpool city centre with the buzz and development from the Capital of Culture, the history and the cosmopolitan atmosphere, it's a great place to live and learn.



Degrees with added 'WoW' factor



To find out more about the courses, content, and admissions contact Laurie Brady on 0151 231 2848, email L.J.Brady@ljmu.ac.uk or Derek King on 0151 231 2845, email D.C.King@ljmu.ac.uk Website www.ljmu.ac.uk/BLT

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27th April 2010

Hosted by the Young Engineers Network

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Tickets cost £45 + VAT per head / £450 + VAT for a table of 10

For more information visit www.cibse.org/nationalconference
or contact our Events team on eventbookings@cibse.org or 020 8675 5211



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Senior MEP Design Engineers

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Our client is embarking on a major recruitment drive to facilitate their selection as the M&E provider for a number of major projects in the UK. You will be required to lead projects, be client facing with a strong technical background to carry out and support other design staff in the preparation of designs, calculations and conceptual drawing production. Ideal candidates will have experience in healthcare or research facility projects, but should also have a wide range of project experience from the education, commercial and retail sectors. You should be able to demonstrate significant experience of both conceptual and detailed design in Building Services environments.

REF: BAR425

Intermediate Mechanical Engineer

**Surrey
to £30k + benefits**

Our client is a leading global engineering, construction and services company, with more than 50,000 employees on six continents. The successful candidate will be working in a multi-disciplinary engineering team within Defence services, providing engineering support for numerous ongoing contracts with the UK MOD assisting in design, validation, specification, selection and documentation services relating to mechanical equipment for utility services, HVAC and other mechanical systems for buildings. The necessary skills are typically acquired through an undergraduate degree in building services/mechanical engineering followed by relevant employment experience.

REF: BAR434

Principal Electrical Engineer

**Cambridgeshire
to £60k + car + benefits**

Our client is among the UK's leading independent providers of building services, mechanical, electrical, ICT, off-site manufacture, interiors, systems integration and maintenance solutions. They employ some 3,500 people and have a turnover in the region of £600m. They require an engineer to support the Divisional Technical Engineering Manager/Design Team Manager in providing a high quality service covering all the electrical aspects of projects from inception through to project completion and client handover. Applications are invited from degree qualified chartered engineers with extensive design management experience from within a building services environment.

REF: BAR441

Electrical Associate/Director

**London
to £60k + benefits**

An exciting position has arisen within our client's organisation for an Associate/ Associate Director to assume full technical responsibility and operational accountability for their Building Services team output on Mass Transit related projects. The candidate will work closely with the company's rail community to capture internal and external rail and metro business opportunities and will be responsible for the long term growth strategy of business unit. You should therefore be a commercially aware, degree qualified, chartered engineer with excellent communication and leadership skills, and the ability to develop and maintain key client relationships.

REF: BAR425

Chief Electrical Engineer

**London
£400 per day**

Our client is a leading UK consultancy specialising in the provision of planning, design and management services for infrastructure development worldwide. This position represents a fantastic opportunity to involve yourself in the Crossrail project, the impressive, innovative, and visionary new high frequency railway for London and the South East. The successful candidate should be degree qualified and have the ability to demonstrate extensive experience of Railway/ Station design works. The candidate will also have significant supervisory experience of design engineers, and should be focused on targets and achieving deliverables.

REF: BAR439

Senior Electrical Engineer

**Surrey
to £45k + benefits**

This position represents a great opportunity to work within an internationally renowned consultancy working on large scale multidiscipline projects from within the rail, airport, hotel/leisure and commercial sectors. The successful candidate will have the capability to take a brief, provide a comprehensive Building Services bid response, manage a team, and deliver Electrical Building Services design from concept through to construction issue and site supervision. Applicants should be I.T. literate, commercially aware, degree qualified, and possess considerable experience working in a design consultancy coupled with suitable project references within the sectors identified.

REF: BAR437

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Alternatively, why not come and visit our new look website at www.b-a-r.com where you can apply for these positions, search our other vacancies, and register for jobs by email so that we can notify you immediately when a relevant new job is added.

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£38,961 - £41,616

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We require an innovative Engineer to provide energy-efficient sustainable designs that deliver buildings with a positive impact on the environment.

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www.barnsley.gov.uk



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We are looking for a talented and enthusiastic Mechanical Engineer to join our busy Building Services Design team, based in Matlock. You will be able to work on a variety of projects, designed by the in-house multi-disciplinary Design team, including schools, care homes and on-going maintenance of our existing building portfolio. You will be part of a successful team that lead the way on energy efficient and innovative projects.

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Nottinghamshire
County Council

Electrical Engineer

Corporate Services

£24,646 - £28,636 p.a. (pro rata for job share)

Ref: ESC/0929/AF

Nottinghamshire County Council is one of the most progressive authorities in the UK today. With innovative policies and well managed services resources, we are determined to provide the highest standards of professional services possible. If you would like to embark on a challenging and rewarding career path and receive all the recognition and support you deserve, then we would like to meet you. We require a dynamic electrical design engineer with enthusiasm for the built environment and commitment to what is a busy professional practice and a design workload which includes schools, Adult Social Care and Health buildings, Community Services complexes and corporate office buildings.

Based at Trent Bridge House, West Bridgford, you will be a highly experienced Building Services Engineer, qualified to BTEC HNC or HND in Building Services Engineering (or equivalent) and a minimum of 3 years post qualification experience, with the ability to work on a number of different projects at once. You should enjoy working as part of a team and helping colleagues. You will be preparing designs and specifications in multi-disciplinary project teams and be involved in the preparation of designs for elements of large projects and have opportunities to contribute to the early design stages. IT literacy is a pre-requisite skill for this post. You must be able to undertake unaccompanied site visits, which may involve crossing difficult or uneven terrain. The ability to climb ladders and work in confined spaces is also an essential requirement as is the ability to work outside normal working hours, including weekends, when required. **Closing date: 15 April.**

Disabled applicants who meet the essential shortlisting requirements will be guaranteed an interview. Job share scheme available. We are committed to safeguarding and promoting the welfare of children, young people and vulnerable adults and we expect all staff to share this commitment and undergo appropriate checks.

Application forms and further details are available on-line at: www.nottinghamshire.gov.uk/jobs

or e-mail: jobs@nottscc.gov.uk stating job title/reference, your name, address and postcode. Alternatively, tel: 08449 80 80 80 (8am-8pm Mon-Fri, 8am-12 noon Sat). Minicom available during office hours tel: 01623 434993.



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- **Building Services Engineering and/or**
- **Renewable Energy Systems**

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For full role profiles and how to apply see:
www.inbuilt.co.uk/about-us/careers.aspx

Building Services Vacancies



Not just any recruitment.

Associate Director - Mechanical Building Services Design

Ref: 11102 Surrey **£50,000 to £60,000 plus excellent benefits**

Our client, an established Surrey based Building Services consultancy, requires a mechanical building services design engineer to join their management team. With excellent client/management skills and up-to-date knowledge of CIBSE guides and the Building Regulations, e.g. Part L, you can discuss sustainable design to a competent/expert level. You will have gained ONC/HNC/A-Levels/Degree engineering qualifications along the way. This role is an excellent opportunity for a mechanical design engineer looking for an opportunity to move their career to the next level.

Contact Darren Warmington for further information about this and other Mechanical and Electrical Engineering opportunities.

Electrical Design Engineer

Ref: 11103 Surrey **£27,000 to £29,000 plus excellent benefits**

This is an excellent engineering opportunity for an electrical engineer, qualified with an Engineering Council recognised engineering degree and preferably a Masters Degree in a Building Services related subject. The successful applicant will benefit by working within a professional engineering environment and a CIBSE approved programme that will lead to Chartered Engineer status.

Contact James Hayes for further information about this and other Mechanical and Electrical Engineering opportunities.

Mechanical Associate, Building Services - London Office

Ref: 11098 Central London **£50,000 to £60,000 plus excellent benefits**

We are working for a multi-disciplinary consultancy with nationwide Building Services Design Departments. They require an individually motivated engineer able to use his/her initiative to lead a team of engineers and grow the London office. The engineer shall liaise with clients, develop briefs during the various stages of the design processes and have ambition to succeed at senior/management engineer level. The successful candidate will preferably be Chartered, commercially minded and have experience in the London market. With firm roots within the construction market this managed expansion program complements a wide portfolio of exciting and challenging projects. This opportunity will suit a professional looking to combine the latest technological developments with a structured career path.

Contact Lucy Hooper for further information about this and other Mechanical and Electrical Engineering opportunities.

Call us on **01483 768600** or email contact@bsvconsultants.co.uk to enquire about these and other vacancies.

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An established Consultancy, our client is looking for Senior M&E Engineers with the potential of becoming an Associate. These are strategic appointments designed to strengthen and develop the business. Career defining opportunities!

Senior Electrical Design Engineers | Cambridgeshire | to £65K | ref: 0073
We are looking for Chartered Electrical Design Engineers with significant experience within rail. You will be familiar with LUL and NR standards and have a solid building services background! Excellent opportunities!

Mechanical Associate | West London | to £55K+ | ref: 0066
An international multi-disciplinary Consultant is looking for a Chartered Mechanical Associate to lead the team. You will have solid experience at senior level across a broad range of sectors.

Junior/Intermediate M&E Design Engineers | London | to £30K | ref: 0087
Our client, a busy Consultancy, is looking to strengthen their team with Junior/Intermediate M&E Design Engineers. You will have a several years PQE and be familiar with TAS and Hevacomp! Opportunities for progression!

Senior Mechanical Design Engineer | West London | to £50K | ref: 0184
Our client, an established M&E Consultancy, is looking for an experienced Mechanical Design Engineer. Ideally Chartered you will have worked on hospital projects with particular experience within laboratories!

For more information or a confidential discussion please contact Mark Butter

t: 02392 603030

e: mark.butter@blueprintrecruit.com www.blueprintrecruit.com

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Closing date: 15 April 2010 Ref: 3712/CIB

Further details and an application form are available on our website: <https://jobs.dur.ac.uk>; tel: 0191 334 6499; fax: 0191 334 6504.



HVAC and Energy Technology specialist

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This role is a first for Australia and will significantly shape the industry. So if you are an entrepreneurial senior manager with a strong commercial focus, great engineering and financial experience and have excellent communication, negotiation and relationship management skills, we'd love to talk to you!

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Saving the world

Richard Groves, a trained engineer, explains how he is helping to fulfil a personal ambition in his new role

Richard Groves became an engineer to save the world. The 34-year-old, formerly an engineer at AECOM, has only been in the industry for five years, but already believes he has made a good start – helping to reduce carbon emissions from Pizza Hut and Marks and Spencer.

But he hopes his recent appointment as energy and environmental manager at Goldsmiths, University of London, will build on the inroads he's already helped to make in cutting carbon. His role at Goldsmiths was newly created after the university realised that it needed to get its CO₂ emissions under control, as well as reduce its overall environmental impact.

Groves arrives at the office at 8am, but he can often be found walking around any of the university's 80-plus buildings, working out what can be done to reduce the environmental impact of each of them.

One of his current projects is redesigning the domestic hot water system for a recently completed building that comprises a teaching area, artist studio, lecture theatre and psychology research laboratory.

This involves finding all 18 electric water heaters around the building and establishing which areas they serve. So far Groves has discovered the electrical use of all the water heaters, and the trace heating being used to keep the water warm in the pipes, is 'horrendous' – around 50kWh per day.

The new system will use solar power for pre-heating the water, and then gas for 'topping up' the water to the required temperature. Once Groves discovered the sizing of the hot water heater, integral storage tank and number of solar panels, and sized and routed the new pipework, he began obtaining prices for carrying out the work.

'I am expecting a saving of around 7,000 to 8,000 kg/CO₂ per year. While there may be a long financial payback, I consider the changes worth doing, due to the carbon reductions.' But Groves



“ Now we have a Carbon Champions network, as well as a general feeling around the campus that we all need to do our bit ”

stressed that there may never be an end to this type of work, because there are always 'going to be new and great ways to reduce energy use'.

Other projects he's working on involve undertaking an extensive programme of thermal imaging all the buildings while the weather is cold, and pushing a particular building that is currently under construction from a BREEAM 'very good' rating, to 'excellent'. He also spends much of his time meeting with staff and students who want to help with Goldsmiths' aims of reducing wasted energy and resources.

'There are many people here who are passionate – as I am – about reducing our environmental impact, but have not previously had a single point of contact who can get things done. Now we have a 'carbon champions' network, as well as a general feeling around the campus that we all need to do our bit.'

To find out more about what Groves helped to achieve at Pizza Hut, see page 36 of the March issue of the *Journal*.

Email your latest people appointments and role profiles to cbailey@cibsejournal.com

Movers & Shakers



Allan Cook CBE has become the new chairman of engineering design group, Atkins. Cook, who

is a chartered engineer with more than 30 years' international experience in the automotive, aerospace and defence industries, was previously chief executive of Cobham PLC. In his new role he will support chief executive Keith Clarke and the board.



Design, engineering and project management consultancy, Morgan

Professional Services (MPS), has appointed **John Jenkins** as managing director. He joins MPS from WYG Engineering Ltd, where he was also managing director. Jenkins will now lead the company's business in the UK and internationally.

Porie Saikia-Eapen, a senior client sales manager and New York city area manager for CH2M HILL, has been awarded Fellowship of the Chartered Institute of Building (CIOB). Saikia-Eapen accepted this honor in Ascot, UK, earlier this year at a CIOB presentation ceremony. CH2M HILL is a global full-service engineering, procurement, construction, and operations firm.



Tony Byrne has joined building services firm SES as operations director at its London and

south east division. Byrne will now be responsible for the operational management of SES project teams working on a variety of developments in the London and south east area.



Gordon Hudson, technical director at management, engineering and development consultancy Mott

MacDonald's, has been appointed as enterprise chairman in sustainability at Northumbria

University, Newcastle. Hudson's new role will help to drive forward excellence and promote knowledge exchange in the built environment.



Mike Proctor has been appointed deputy managing director at Comserve Ltd, a company

specialising in the building services equipment, maintenance and engineering sector. He will help strategically drive the business forward. Proctor was previously commercial and operations director with Cofely.



Carbon reduction company Sustain has recruited **Annie Brown** as its new building services manager. Brown will lead

the building services team, which specialises in low-energy advice and design for existing and new buildings. She was previously a member of the energy and sustainable development team at Halcrow Yolles.

Robert Judson, a fellow of CIBSE, has been awarded a doctor of business administration by Kingston University for his research into the combined effects of organisational culture and leadership style on organisational performance in the UK building services industry.



HVCA president elect **Martin Burton** has joined Maidstone-based Delron Services Ltd (DSL) as

contracts manager with special responsibility for developing the company's commercial contracting arm.

Martyn Horton has joined the Bowdon Group, which operates a portfolio of businesses in the electrical and mechanical engineering services sector. Horton will be working closely with the group's T W Sampson team to raise its profile and help it grow.



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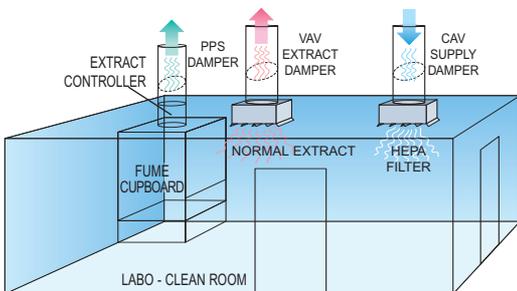


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