

CIBSE JOURNAL



The official magazine of the Chartered Institution of Building Services Engineers

November 2010



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1994
GOLD A
1,6 m³/s



2004
Big sizes
8,3 m³/s



1996
3,6 m³/s



2006
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Plate Heat & Coil Heat



2009
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sold units!



2010

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From the editor



An omission on emissions

Major government policy announcements can be as interesting for what they don't say as for what they do. When George Osborne, the UK Chancellor, unveiled his four-year spending review, a great deal was said about cutting carbon emissions. One significant confirmation was that the Renewable Heat Incentive would be introduced (although, of course, with reduced funding). Feed-in tariffs (FiTs), aimed at encouraging householders to save energy, are safeguarded, too – although, ominously, the scheme will now be 'refocused' on selected technologies (see pages 8 and 14).

At the time of writing there is no indication which specific systems will fall foul of this moving of the FiT-eligibility goalposts, but manufacturers and specifiers will want to know soon enough, since the scheme is already being taken up by householders.

Other matters also need clarifying urgently in the wake of Osborne's announcements – particularly if the coalition is still aspiring to be the greenest-ever government. One crucial omission from the laying-bare of departmental spending plans was the whole issue of energy certificates for non-domestic buildings. More specifically, when will the government clarify its intentions for the wider roll-out of display energy certificates (DECs) that are currently required for public buildings, to the commercial sector?

The Department for Communities and Local Government consultation on this question ended some months ago, yet ministers still seem to be dithering. This perhaps suggests that certain

forces in government – which, it is rumoured, include no less than the Communities Secretary Eric Pickles himself – do not want the roll-out to occur when it would add burdens to the private sector at the worst possible time.

Pressed on the matter by the *Journal*, Pickles's department has revealed that the extension of DECs to commercial buildings may now be voluntary rather than mandatory (see page 8). If this turns out to be the case, then the roll-out will, in effect, be a non-event, as it is the current requirement on public buildings to display and update their DECs that is having a positive impact on climate change. And to date, very few

commercial properties have adopted DECs voluntarily since the system came into force in 2008.

What we have still to see from this coalition is some real commitment to a regulatory regime for requiring energy certificates for all non-domestic buildings. Ministers can also give a massive boost to their credentials and go further than the previous

government by actually backing such a regime with real enforcement teeth. As CIBSE's Compliance Campaign has emphasised, it is no good leaving it to overburdened – and, after the spending review, even more severely financially squeezed – local trading standards departments to enforce the energy certificates system.

So, despite the swingeing cuts now facing the nation, there is still an opportunity for Osborne and his coalition colleagues to show they are serious about cutting carbon emissions from large parts of Britain's building stock.

Bob Cervi, Editor
bcervi@cibsejournal.com

There is still time for the coalition to show it is serious about cutting carbon emissions from our buildings



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News in brief

Plan for route map to BIM

Chief construction adviser Paul Morrell told delegates at this year's Autodesk BIM Conference that publicly procured buildings should use building information modelling (BIM) in the future. A team of BIM experts has already been commissioned to prepare a route map showing how the public sector can make a progressive move to BIM to reduce costs. The report is expected to be released in March. See page 52 for details of CIBSE's one-day conference next month on **Building Information Modelling**

SMEs struggle to compete

Small construction companies are still facing crippling barriers when competing for public sector work due to the complex demands of government procurement policy, says the National Federation of Builders. With the demise of public projects such as Building Schools for the Future, small and medium-sized enterprises (SMEs) are feeling excluded from the bidding process, with fewer contracts available, says the NFB. www.builders.org.uk

Correction

The main picture caption of the article on hydrogen fuel cells in the October issue of *CIBSE Journal* (see page 57) was mislabelled: the photograph showed, not a hydrogen storage tank, but a hot water thermal store. We apologise to Transport for London for the error.

Industry split over claims of new carbon stealth tax

The unexpected change to a key UK carbon-reduction scheme that was announced by the government in its spending review appears to have divided parts of the business sector.

Under the Comprehensive Spending Review (CSR), unveiled by the Chancellor last month, all the money generated from the Carbon Reduction Commitment Energy Efficiency Scheme (CRC) will now go to the government instead of being redistributed among the companies affected.

Under the CRC, introduced in April, companies that reduced their carbon emissions would receive a rebate from the government on the levies paid, while those that did not reduce emissions would pay the levy in full.

The unexpected change to the CRC last month prompted

some business leaders to accuse ministers of introducing a green 'stealth tax', while the British Property Federation said the change would 'cost the wider business community almost £3.5bn more than it would have'.

However, some property company professionals told the *Journal* they believed the change to the CRC could be a positive step.

David Fairbrother, environmental director at developer Land Securities, said: 'We are hopeful that this [change to the CRC] will open up routes to discussions for clarifying the CRC scheme even further and make it a true beneficial trading mechanism.'

Paul Edwards, head of sustainability at Hammerson, said: 'By converting the complicated CRC system to a tax from 2012, the coalition government has

simplified the whole system in one quick move.'

The spending review also confirmed that a Renewable Heat Incentive would be introduced, and the Chancellor allocated £1bn to set up a 'green bank'.

In addition, a Localism Bill, to be published shortly, will include details of major reforms to the planning system. But CIBSE's technical director, Hywel Davies, said such reforms could have consequences for delivering low carbon buildings: 'It could have serious implications for the delivery of "zero carbon" homes – if the planners do not like renewable technology, then it could become difficult, costly and in some cases not be commercially viable to meet the increasingly stringent zero carbon targets.'

See our News Analysis on the spending review, page 16

Ministers may drop DEC roll-out

The idea of a mandatory roll-out of display energy certificates (DECs) to commercial buildings could be dropped by the government.

The Department for Communities and Local Government (CLG) held a consultation on the issue earlier this year, and is still considering its position more than three months after the consultation ended.

But a CLG spokesperson told the *Journal* the department was unable to confirm what action

the government would take, and added: 'No decision has yet been taken. In light of the economic situation, I think government is very mindful of bringing in more red tape. If it does happen, [the roll-out] will be on a voluntary rather than a mandatory basis.'

But CIBSE's technical director Hywel Davies said that businesses can already get a DEC for their buildings, and don't need to wait for the government to do anything.

He said: 'People can get a

voluntary DEC now; there's nothing to roll out for that, voluntary DECs are already there.

'And, from government's own work on DECs, we understand that fewer than 50 buildings have voluntary DECs.'

The government states in its official response to the Committee on Climate Change's second annual report that it is still considering its position on DECs. It is not clear when a final decision will be made.

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Councils mount legal challenge to closure of school-building scheme

The UK government is facing a multi-pronged assault on its school and house building policies, with four councils and at least one property group threatening legal action against it.

Nottingham City Council, Sandwell Council, Luton Borough Council, and Waltham Forest Council have started judicial review proceedings after hundreds of millions of pounds worth of school projects were halted without notice. Some were only weeks away from construction starting.

Education Secretary Michael Gove announced in July that plans to modernise or rebuild more than 700 schools would be abolished under Building Schools for the Future (BSF) as part of the multi-billion pound spending cuts.

Gove has said he will fight such



The closure of the BSF programme led to the cancellation of several school projects

legal action. During parliamentary questions last month he said: 'We will vigorously contest the judicial review of our decision. It is really important that people appreciate that the Building Schools for the Future programme had failed.

'Unfortunately, in 2008, instead of 200 schools being built, fewer than 50 had been built. We will make no apology for ensuring that, in the education budget, money goes not to lawyers and consultants, but to the front line.'

Under BSF, Gove said, £11m had been wasted on consultants, with one consultant securing the equivalent of £1.35m.

The government is also facing legal action from Catesby Property Group over the coalition's decision to refuse planning permission for 400 homes in Bude, Cornwall, despite an inspector approving the application at appeal.

According to Eversheds, the law firm representing the developer, the Secretary of State rejected the inspector's recommendation because of his own decision to 'revoke regional strategies and, in turn, the abandonment of the draft Regional Strategy for the South West'. Regional strategies were implemented by the Labour administration and set local authorities home building targets.

Winning graduate heads for Vegas

Michael Gardner receives top prize in the 2010 CIBSE/ASHRAE Graduate of the Year Awards, sponsored by BAXI Commercial, held in London last month. Gardner wins a trip to Las Vegas, to attend ASHRAE's winter meeting in January. He received the award from ASHRAE president Lynn Bellenger. Also pictured is Rob Manning, president of CIBSE.

Gardner was one of six graduate finalists who competed at the awards event by giving a presentation to

judges and invited guests on the topic: 'What tools does the modern building services engineer need to help society create a sustainable world?'. Second prize went to Mike Slessor, who works for Buro Happold, and third to James Wood, at 8build. This is the 15th year of the award, which aims to champion the achievements and potential of young building services engineers.

www.cibseashrae.org

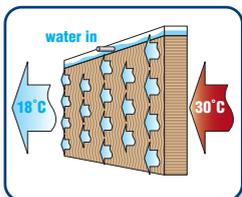
See Michael Gardner's opinion column on page 24



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News in brief

Chance to win £100 prize

Readers giving their views on *CIBSE Journal* to help us improve the magazine will have a chance to win £100 of gift vouchers of their choice. Please fill in the online survey at www.cibsejournal.com

EU change moves forward

The EU has reached a formal agreement between all member states on the text of the Construction Products Regulation (CPR). The next step is for the European Parliament to consider the revised text, propose further amendments and take a vote on it at its second reading. The CPR is expected to be adopted next spring.

www.consilium.europa.eu

Sustainable refurb advice

A new study that considers how to increase levels of sustainable refurbishment in buildings is available from the National Refurbishment Centre (NRC). The report contains information from NRC workshops that were held around the country to find out what is needed to support a step-change in sustainable refurbishment delivery. www.rethinkingrefurbishment.com

Timber pledge 'U-turn'

The coalition government has been accused by the Green Party of making an environmental U-turn shortly after promising to be the greenest government ever. In a written response to Green Party MP Caroline Lucas, it admitted it will not change the law to make it a criminal offence to possess or import illegal timber. www.greenparty.org.uk

Boiler fitting costs 'inflated'

Energy suppliers have been accused of inflating their installation prices during a government scheme aimed at helping consumers replace their boilers. Figures obtained by *The Guardian* show that amounts charged by energy suppliers under the 'boiler scrappage' scheme were about one third higher than those charged by independent contractors.

Ministers urged to press on with plans for Green Bank

The coalition government must urgently plan for a Green Investment Bank if Britain is to be in a position to move forward on developing a low carbon economy, says a new report.

Ahead of the government's Comprehensive Spending Review announcement last month, the report from Aldersgate Group, an environmental and business lobby body, calls for the issuing of 'green bonds' that can be used to help finance energy efficiency loans for homes.

Legislation is urgently needed to establish the Green Bank in 2011, and a shadow board should be set up without delay, it says.

The report, *Financing the future: a green investment bank to power the economic recovery*, also suggests that a Green Bank should be able to offer innovative financial products such as Green ISAs, which could 'be a source of significant additional capital funding to drive forward low

'Green bonds' could be used to help fund energy efficiency loans for homes



carbon infrastructure investment'.

'The government's commitment to creating a UK GIB is welcome, but requires follow-through to delivery with some urgency,' the report says.

'The combination of economic damage from climate change, mandatory carbon targets, the aftermath of the financial crisis, and the short-term shrinking of the public sector, all make the GIB an idea whose time has come. Right now.'

The report also highlights a

Green Bank's role in helping to progress other areas of the economy, including meeting legally binding low carbon and renewable energy targets; creating jobs and stimulating growth; growing the manufacturing sector; and growing the 'Big Society's idea by empowering communities to meet their energy needs and share in any profits generated by green energy. www.aldersgategroup.org.uk/reports



Qatar has revealed its plans for its Lusail Iconic Stadium, a contender for the 2022 football World Cup. The stadium has been designed to be highly energy efficient and capable of performing in extreme summer climatic conditions. It will have a saddle-form roof, with a retractable central section, enabling the pitch to be either open to the elements or fully covered. FIFA is expected to decide in December where the World Cup will be hosted. www.qatar2022bid.com

Concerns delay EPC software by six months

The UK government has confirmed that the software needed to calculate an energy performance certificate (EPC) will be delayed by six months.

The software was originally intended to be released alongside the new Part L 2010 of the Building Regulations on 1 October, but it was put back 'following concerns from the sector', the Department for Communities and Local Government (CLG) said.

A CLG spokesman added: 'One specific concern was insufficient time for third-party providers to develop software and get it approved for Part L 2010.'

The changes to the software will now be introduced on 27 March 2011. Any buildings completed during the months up to this date would need to have another EPC calculation made from this date, the CLG said.

But 'virtually no Part L 2010 buildings will be completed and need an EPC before 27 Mar 2011', its spokesman added.



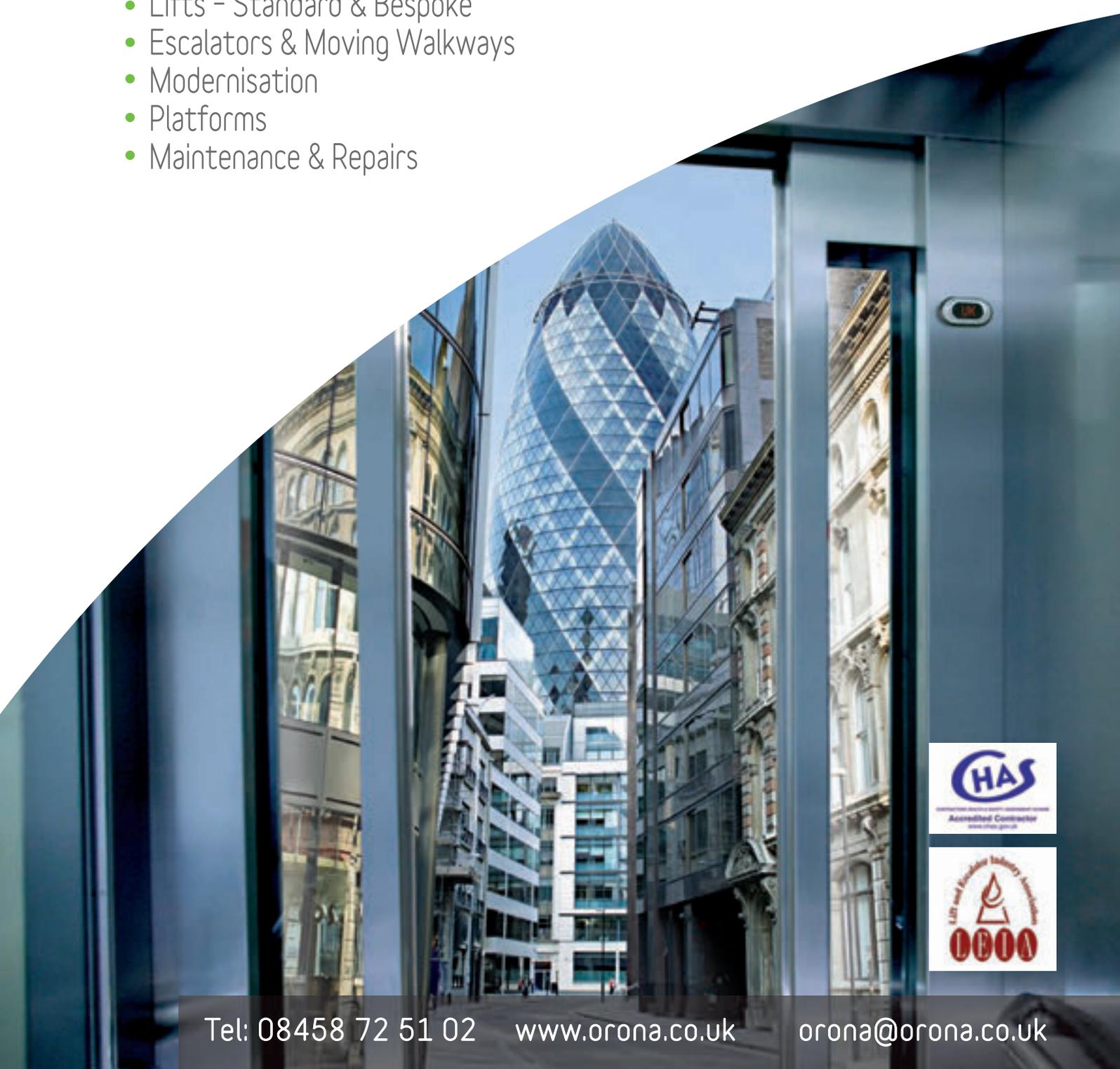
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News in brief

New homes plans 'dropped'

New research by the National Housing Federation (NHF) has found that the UK government's decision to scrap regional house building targets has already resulted, directly or indirectly, in plans for around 160,000 homes being dropped. Tetlow King, which carried out the research for NHF, says it expects that figure to increase to at least 280,000 to 300,000 homes by this time next year.

AECOM in US Navy deal

AECOM is one of four firms to be awarded a contract worth up to \$60m for planning and engineering services at the US Navy and Marine Corps facilities worldwide. The multi-disciplinary consultant will provide planning and engineering services for shore infrastructure, base development, regional shore infrastructure, logistics and housing.

Staying in fashion

Multi-disciplinary consultant Mott MacDonald has been appointed to monitor construction of the 38,000 sq m, \$160m fashion Outlet Village on the outskirts of Moscow, in Russia. MottMac is already the project's building services and structural designer.

Happold's new venture

Buro Happold has started a new business targeting international property clients. The service is expected to offer solutions to complex challenges, such as carbon reduction at an 'organisational, workplace, portfolio and management level'. The venture was launched by Happold Consulting, the multi-disciplinary consultant's strategic management arm.

The future of leisure

King Abdullah's International Gardens (KAIG) has won a second Cityscape Award for Architecture. The joint venture between British consultancies Barton Willmore and Buro Happold scooped the Leisure Future Award. The awards were held at the Grand Hyatt in Dubai last month. For all the winners, visit www.cityscapeglobal.com/awards

Conservatives promise change for energy sector

The Conservative Party has made a commitment to 'change the terms of trade' for the energy sector, decentralising the industry and 'smashing the glass ceiling' it says was put in place by its predecessor.

At the Conservative Party Conference, held in Birmingham last month, the energy and climate change minister Greg Barker said: 'We want to see decentralised energy competing alongside other sources, as a significant part of the energy mix. We have to smash the glass ceiling for decentralised energy that was put in place by the previous government.'

He added: 'The government will be looking at a range of measures to make it possible for community groups, companies and householders to participate in the energy market. We want to change the rules of the game. We want to bring in new entrants, we want to see energy efficiency compete alongside new power generation in forward capacity markets, and we want to encourage consumers to generate their own electricity. We have the chance to change the terms of trade.'



Greg Barker pledged to commit to decentralised energy during the conference.

The initiative was welcomed by Graham Meeks, director of the Combined Heat and Power Association. He said: 'The potential of the energy services sector to become a major competitive force in the energy market is huge.'

'It's not just about bringing new competition into the energy sector, but also delivering tangible CO₂ and cost-savings for consumers and communities across the UK. It is clear that Greg Barker understands

the value it can deliver, and we welcome his commitment to unlocking its potential.'

'Consumers are important participants in the energy market, but they can become very much more than simply the funders of major new power generation projects. With a thriving energy services market, customers will see their contribution to decarbonisation rewarded in the form of lower energy bills.'



Future of the moving stairway takes shape

Architects and engineers could soon be able to design escalators in any shape they want, even freeform curves, according to researchers. A new style of engineering is claimed to have been developed by Jack Levy, Emeritus Professor of Mechanical Engineering at City University in London. The system can be arranged in any configuration – such as in DNA-like double helix within a science museum, for example. It is the first time the 'moving stairway' has been significantly developed since its invention in 1897, according to the academics.

Refurb standard for Passivhaus due next year

A new version of the Passivhaus low-energy standard for use on building refurbishments is due to be launched next year.

The standard is gaining in popularity, with more than 17,000 qualifying buildings worldwide, says the Passivhaus Institut.

The development of the lower standard, called EnerPhit, requires that the energy used for space heating does not exceed 25 kWh/sq m – a more relaxed condition but one that takes account of the fact that there is less flexibility in refurbishments, according to the recently published criteria.

The retrofit standard is now undergoing testing and is expected to be launched officially next year. A number of UK architects are said to be preparing to become accredited, says the Institut. www.passiv.de



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creating energy solutions

News in brief

ICE entries sought

The Institute of Civil Engineers (ICE) has opened its 2011 ICE London Civil Engineering Awards. Categories include Infrastructure, Buildings, Community and Heritage. Projects or phases of developments substantially completed in 2010 that are located in Greater London are eligible for entry. The deadline for entries is 16 December 2010. www.ice.org.uk/LondonAwards

ISA awards announced

The winners of this year's Innovation & Sustainability Awards (ISAs) 2010 have now been announced. The event was held in association with 'Energy Solutions, Total Workplace Management, M&E – The Building Services Event', and sponsored by the Royal Institution of Chartered Surveyors (RICS). www.energysolutionsexpo.co.uk

RIBA's hub launched

The Royal Institute of British Architects has launched an online Sustainability Hub containing information for architects, students, and educators. The platform was developed to engage the architectural community with sustainability as an inspiration for design, and to pitch green design as an emerging business opportunity. www.architecture.com/sustainabilityhub.

Appeal for new director

SummitSkills, the sector skills council for the building services engineering sector, is seeking an independent director to join its team of board members from 1 January 2011. The new director will be required to dedicate just 12 days a year to the council. www.summitskills.org.uk/news

BIFM review of workplaces

The British Institute of Facilities Management is launching one of the largest ever reviews of the state of Britain's workplaces. The survey will investigate areas such as the strategic importance of the workplace and the importance of the occupiers' experience. www.leemanindex.co.uk

Carbon-cutting scheme 'needs to be simplified'

The UK government needs to redesign the Carbon Reduction Commitment Energy Efficiency Scheme (CRC) to make it less complicated before the second phase is implemented, it is claimed.

The Committee on Climate Change (CCC), the government advisory body, has said the scheme is already complex enough and would not benefit from extra requirements.

The CRC scheme, which requires large public- and private-sector organisations to buy carbon allowances to cover emissions they produce, is designed to encourage such organisations to make energy-efficiency improvements.

The government currently intends to impose a cap from 2013, with a fixed number of allowances available through an auction system. However, the CCC says such a move would only make the scheme more difficult to administer – with no benefits.



The CRC scheme, aimed at larger organisations, is 'overly complex'

The main recommendations are that:

- The sale of an unlimited number of allowances at a fixed price should be extended into the second phase;
- Separate league tables should be established for the public and private sectors; and

- Participants should have to purchase CRC allowances to cover renewable energy generation, including heat.

The CCC's chief executive David Kennedy said: 'The CRC scheme has the potential to make an important contribution towards meeting carbon targets.'

'However, current proposals risk making the scheme unnecessarily complex. We are therefore proposing that government modifies its design to make participation in the scheme easier.'

The CCC also sets out options for a more fundamental redesign of the scheme, which the government might consider in the context of a strengthened carbon price.

These include reviewing the wider regulatory system and reforming the current method of revenue recycling. The committee also said the scheme could include smaller businesses if it was made simpler. www.theccc.org.uk



First glimpse of £16m academy

This is the first look at the new £16m state-of-the-art Hastings Academy, which is sponsored by the University of Brighton and its partners. The academy will be built on the site of the existing Hillcrest School and construction will focus heavily on eco-friendly materials and design. The academy is expected to be completed during the academic 2012-13 year. Kier Longley, part of the UK-based Kier Group, has been announced as the preferred bidder. Work should start early next year.

Lamp makers to act on false energy claims

Lamp manufacturers have agreed to take action following a survey that exposed incorrect claims about energy efficiency.

The National Measurement Office (NMO) assessed the packaging claims on more than 250 lamps and found that 31 displayed incorrect information – with 15

displaying a higher energy rating than they should have. Eleven displayed a lower energy class than they should, while five displayed inaccuracies in the amount of light or energy used.

All the companies concerned have agreed to produce a 'business improvement plan' jointly with the

NMO, and to withdraw the incorrect packaging identified.

The NMO has agreed to continue working with the companies in question to ensure they adhere to their business improvement plans and to ensure that all future energy efficiency ratings are correct. www.nmo.bis.gov.uk

Trade group rejects heat pump emission claims

Claims that hydrofluorocarbon (HFC) emissions from air-source heat pumps add 20% to their carbon footprint have been rejected.

A report by Atlantic Consulting says that the overall carbon footprint of a UK heat pump is roughly the same as the footprints of gaseous fuels used in heating – using footprint estimations by the UK Department of Energy and Climate Change.

The report's author, managing director Eric Johnson, claimed that its findings call into question EU and UK policy in this area – in particular the proposed Renewable Heat Incentive (RHI) – which he says do not include fluorocarbon emissions in their evaluation of heat pumps. The report's calculations take into account a certain amount of leakage from the pumps.

Under the RHI, homes and offices in the UK would be



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Increased use of heat pumps could 're-carbonise' heating, it is claimed

subsidised to replace gas- or LPG-fired heating with heat pumps, but Johnson says: 'This will not decarbonise UK heating; in fact, it might re-carbonise it.'

The UK Heat Pump Association rejected the claim. Its commercial manager, Terry Seward, said: 'This report by Atlantic Consulting is a carbon footprinting exercise and,

as such, has no bearing on the RHI scheme, or, for that matter, the Directive on Electricity Production from Renewable Energy Sources, (RES Directive), as these both relate to renewable technologies and not carbon efficiencies.

'That said, the carbon efficiency of heat pump technologies will of course vary across Europe, depending upon the carbon intensity of electricity distribution systems applicable in each country.'

He added: 'We do not accept that the overall carbon footprint is roughly the same as, or higher than, gaseous fuels used for heating in the UK, and in our view it is totally inappropriate to attempt to factor in alleged average HFC refrigerant leakage data, as the majority of heat pumps are hermetically sealed, like a domestic refrigerator, and leaks are highly unlikely to occur.'

For a copy of the report, contact 020 7591 9610.

Supermarkets need 'holistic' view on gases

Supermarkets should adopt a 'holistic' approach to refrigerants if they are to reduce their carbon footprint, according to a trade body.

EPEE, which represents HVAC industries in Europe, commissioned a study to evaluate the performance of supermarket refrigeration technologies. It is calling for a holistic approach on refrigerants, taking into account the eco-efficiency concept, the freedom of refrigerant choice, and the need to prioritise energy efficiency.

Its director general Andrea Voigt said: 'To reduce the overall climate impact of supermarket refrigeration systems energy-efficiency, the immediate reduction of direct emissions by improving the tightness of installations and using lower GWP (Global Warming Potential) refrigerants wherever possible, as well as safety and reliability, should drive the choice of technology adapted to each application.' www.epeeglobal.org

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Greener land?

Britain's long-awaited Comprehensive Spending Review has been unveiled, but what do the cuts mean for the sector? **Carina Bailey** reports

UK Chancellor of the Exchequer George Osborne has revealed how his Comprehensive Spending Review will cut £81bn from public expenditure between now and 2014-15.

Currently, Britain is borrowing one pound in every four that it spends, and every day its debts are costing the country almost £120m in interest, according to the coalition government.

Despite this, Osborne claimed that the government will increase spending on capital projects by £2.3bn a year by 2014-15 after a review of projects highlighted the coalition's existing contractual commitments.

Carbon reduction scheme

Many of the measures announced were expected. One of the biggest surprises to industry, however, was the coalition's decision to turn the Carbon Reduction Commitment Energy Efficiency Scheme (CRC) into a carbon tax. The CRC is a carbon trading scheme targeting businesses and organisations that are large energy users. Under the original scheme, organisations had to buy carbon credits in advance, relative to how much energy they consumed. The cash generated was to be redistributed back to the companies involved, with a premium for the best performers and a penalty for the worst.

However, the cash collected will now be kept by government, generating £1bn a year for the public coffers by 2014-15. According to the CSR, the first purchase of credits will now be delayed by one year to 2012.

David Fairbrother, environmental director at developer Land Securities, is surprised by the

timing of the announcement. He said: 'We've already implemented the measures to take advantage of the recycling payments – which is now a waste of time and money. Essentially we'll lose over £1m in the first year.'

'But, having taken away the recycling league table, we are hopeful that this will open up routes to discussions for clarifying the CRC scheme even further and making it a true beneficial trading mechanism.'

Currently, the scheme leaves the landlord or building owner liable to pay for its tenants' energy use, rather than making the polluter pay.

Paul Edwards, head of sustainability at property giant Hammerson, also sees the

“ [Under the CRC change] companies can now plan initiatives knowing the cost to business ” – Paul Edwards

changes to the CRC as potentially positive. 'It would be unusual for any company to celebrate a new tax,' says Edwards, 'but by converting the complicated CRC system to a tax from 2012, the coalition government has simplified the whole system in one quick move. This has removed a huge administration burden. Companies can now plan initiatives knowing the cost to the business and therefore generate a cost benefit analysis.'

Edwards compared the approach as being similar to the landfill tax. He is now awaiting the detail of the scheme, but believes it will be a positive move that will reduce carbon in the long term. However, he stressed he would prefer to see the money generated from the tax



istock/David Hills

Companies that are large users of energy have been affected by the changes

ring-fenced and used for green initiatives, in particular for those businesses that have to pay the tax.

David Frise of contractors' body the HVCA described the change to the CRC as 'just what many in the industry have been asking for'.

He added: 'This is one of those be-careful-what-you-wish-for moments. People have been pleading with the government to simplify the CRC – well, it is certainly simpler now. A tax on consumption

it was delighted that that RHI will go ahead because it 'offers a level of certainty to the emerging renewable technologies sector'. And manufacturer Mitsubishi Electric believes the RHI will open the way for air-source heat pumps to be used more widely in homes.

The government has chosen to derive funding for the RHI through general taxation, rather than adopting the original proposals for a levy on fossil fuels used for heating. This has been welcomed by the Combined Heat and Power Association (CHPA), which feared the levy risked penalising a range of groups – from consumers in fuel poverty through to intensive energy users in industry – who were unable to access renewables.

Graham Meeks, director of the CHPA said: 'It is very encouraging to see that government has addressed the concerns of many across the energy sector.'

'Now that the RHI has been confirmed, we need to move quickly to clarify details of the scheme. There are many important biomass CHP schemes in development, but the uncertainty over the future of the RHI has caused most of these to be put on hold.'

Key details are expected to be published before the end of the year. However, there are signs that the Feed-in tariff scheme, which allows anyone generating electricity to sell it to the grid at a premium rate, has not escaped unscathed. The government says the FiT will

will push up the price of energy, so creating the ultimate incentive to save it.'

Renewable Heat Incentive

Industry has largely expressed relief that the government has finally committed financially to a Renewable Heat Incentive (RHI), although the funding allocated to it is 20% – or £105m a year – less than was originally mooted. In total £860m has been set aside to incentivise renewable heat over the spending review period. The RHI will be introduced in 2011-12.

A spokesman for the Federation of Environmental Trade Associations (FETA), which represents manufacturers, said

be 'refocused on the most cost-effective technologies', which it says will mean a saving of £40m in 2014-15. In addition, it says there will be a further £70m cut to the funding that relates to the 'lower-value innovation and technology projects'. Which technologies will fall within or outside these definitions has yet to be clarified.

Housing

Social housing has been hugely affected by the cuts, with 60% of its budget cut. The coalition says it still expects around 150,000 new affordable homes to be built up to 2015, largely paid for by an increase in the market rate for social housing rents.

The CSR also says that new social housing will be constructed using 'more modest capital investment'. However, the Decent Homes Standard, which aims to improve the state of existing social housing, will continue.

John Alker of UK Green Building Council said it feared that standards in social housing may now fall. 'Social housing has been a trailblazer for high standards of sustainability,' he said. 'In the changes that follow, these standards

must not fall by the wayside. Sustainable homes are good-quality homes and play a key role in tackling fuel poverty.'

John Hicks, partner at cost consultants Davis Langdon, said developers would have no choice but to make homes leaner: 'It puts an added pressure on the green agenda. At a time when people

expert, Dr Mike Entwisle, described the year-on-year reduction in school building as 'sadly what we expected'. But a more worrying aspect, he says, is the demise of the Commission for Architecture and the Built Environment (CABE), which has had its funding from the Culture Department withdrawn.

Entwisle added: 'The demise

finance the green infrastructure needed to transform the UK to a low carbon economy.

The government also confirmed the Green Deal programme, which will enable householders to retrofit their existing homes with no upfront costs. The money will be paid back through the savings they make on their energy bills.

However, the Warm Front programme, which currently helps householders improve the energy efficiency of their homes through simple measures like insulation, will be phased out to save £345m by 2013-14.

Other commitments confirmed in the CSR include:

- Adult apprenticeship funding will be increased by £250m a year by 2014-15, relative to current spending levels;
- Up to £1bn for one of the world's first commercial scale carbon, capture and storage facilities; and
- £4.6bn allocated to maintain funding for the highest-value scientific research.

A government business plan on details of the reforms are to be published later this year, followed by a White Paper early in the new year.

www.hm-treasury.gov.uk

" Social housing has been a trail-blazer for high standards of sustainability, which must not now fall by the wayside " – John Alker

are worried about their jobs they are naturally going to put their environmental aims lower down on their shopping list.'

Schools

Osborne promised that 600 schools and academies would be rebuilt or refurbished, at a cost of £15.8bn – a 60% reduction over the four-year CSR period – and considerably less than the £55bn of funding that was pledged under the scrapped Building Schools for the Future programme.

Buro Happold's education

of this valuable body is to be regretted and we can only hope that something emerges to replace it, whether on a local or national basis.'

Green investment

The much-trailed plan for a Green Investment Bank (GIB) has been confirmed, and it will receive a government cash injection of £1bn when it is set up, with further funding expected from the sale of government assets. According to the CSR, it will be independent of political control and will act as a catalyst for private investment to

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How we are meeting future challenges

CIBSE is already addressing the RAEng's report on engineering, says Stephen Matthews, chief executive

In January, the Royal Academy of Engineering (RAEng) published the report, *Engineering a low carbon built environment*, subtitled *The discipline of Building Engineering Physics*. Written by Prof Doug King, visiting professor at Bath University and a CIBSE member, the report was widely distributed and received an almost unprecedented level of interest.

Naturally, not everyone agreed with the findings and recommendations, but arguably the most important aspect of this report is that it has raised the profile of building engineering physics (BEP) and created a framework of recommendations going forward.

The report argues that, if we are to create low carbon buildings, then we must have a fundamental understanding both of the science of how buildings perform – building physics – and of what impacts upon the design, construction

and operation of the building in order to deliver a low carbon footprint. Furthermore, much of our understanding is gained by working practice and experience – which, while very valuable, also needs the underpinning of building engineering physics (BEP). Consequently we need to create centres of excellence to focus this BEP knowledge, disseminate it and develop our understanding quickly if we are to meet the challenges society now faces.

The report made 23 recommendations, with a significant proportion of these directed at CIBSE and the profession. What follows is an overview of how CIBSE is addressing these recommendations, and the action plan that CIBSE is now following in collaboration with the academy:

- CIBSE to be the focus for low carbon/BEP in the industry;
- Funding additional visiting professors (VPs) to promote BEP in universities;
- Support for a skills survey to identify capability gaps and a case for centres of excellence (CofE); and
- Support the RAEng in preparing a case for government funding to establish CofE.

The report has been widely discussed within the institution; the need to be the focus for a low carbon built environment falls naturally within our sphere of influence and this aim underpins a considerable part of our activity, while recognising that professional skills and knowledge are required



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at many levels and across a broad spectrum.

The report also recommended that the institution should change its name, and though widely discussed, there was no clarity on a new title, and so the board has decided to retain 'CIBSE'.

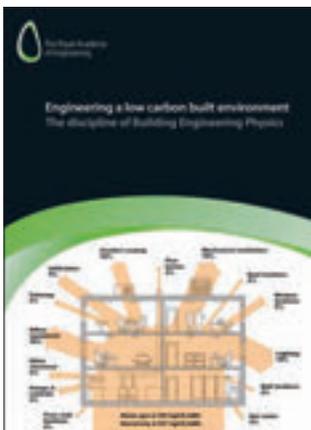
The Visiting Professor (VP) in BEP scheme has been running for some years. Its aims are:

- To introduce building services engineering and building physics to the brightest students at the best universities;
- To encourage some of the brightest students to take up a building services engineering career; and

- To ensure that future industry leaders are familiar with building engineering physics.

Currently there are four VPs – at Cambridge, Sheffield, Bath and Bristol universities – and, while the first three are coming to the end of their current funding, the intention is that these posts will become permanent. Additionally, the CIBSE board has agreed to fund VP posts for four years – at a cost of £100,000. With RAEng support, this means that we can now fund two new VP appointments.

Plans are developing quickly: one VP will be based at UCL – where there are strong CIBSE links – and the second is yet to be announced.





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With RAEng, CIBSE intends to approach industry to seek funding for additional VPs. This is clearly a very positive step forward and is very important for the development of the industry. I keep thinking that we must try and do this internationally too.

Bath has already begun the recommended skills survey – with almost £85,000 of funding pledged by a variety of supporters, including the RAEng and CIBSE. Using the knowledge already available to

“The survey is a crucial plank in the development of our industry”

Summit Skills, this will be a broad spectrum skills survey, carried out by MORI via phone. The report is due in early 2011.

The survey is a crucial plank in the development of our industry, and will help to ensure we have a workforce with the appropriate skills – or, at the very least, identify the key shortfalls and thus allow a feasible plan to be made.

Another output from the skills survey will be the production of an economic case to help the RAEng put forward a proposal to government to fund CoE.

The concept is that these will be based at universities with a good grounding in BEP. At this

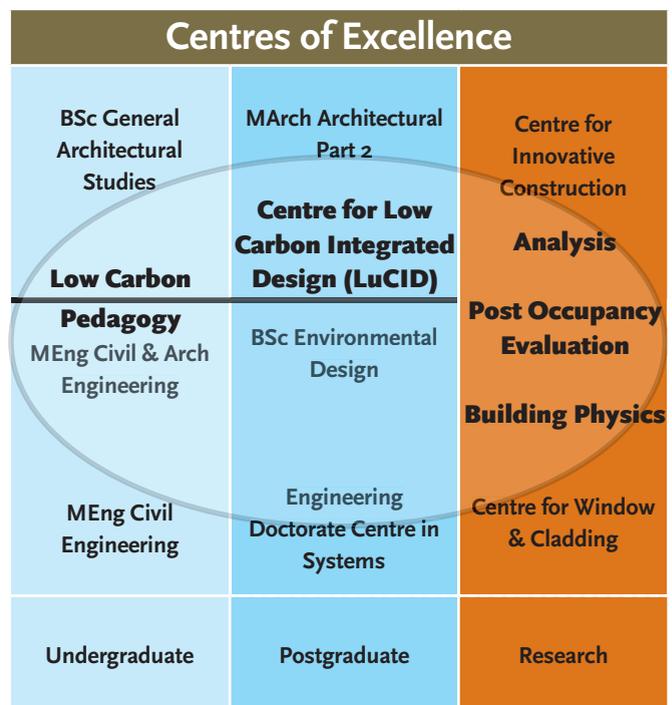
stage, we are thinking about the first two centres, but there have been suggestions that we should eventually aim for six. The diagram (right) shows how these centres may be set up:

Finally, there has been much discussion on the restricted nature of the contractual and commercial frameworks that shape so much of our industry.

We all understand what a huge challenge it is to think of modifying these commercial practices. However, I am pleased to report that through our discussions with the Association of Consulting Engineers (ACE), which has responsibility for these frameworks, its legal and commercial group has already started making plans to review its conditions of engagement. A review panel is being set up and we hope work will start soon; CIBSE president Rob Manning has already been co-opted onto the panel.

So, where do we go next? There is much to do to deliver our action plan but, so far, we appear to be on track.

Yes, we do need to have some of the brightest and the best to grapple with the science and engineering of our buildings. Equally, we have to design, build and operate these buildings within an effective and appropriate commercial framework, which necessitates



having a successful and profitable industry. We also need to look beyond UK shores as this is a global issue and there are real commercial opportunities in low carbon built environments.

Personally, I think we need to take heed of other engineering disciplines; on the assumption that we have the scientific understanding, the manufacturing base, and the skills to design and build, we then need the building

system engineers to integrate their skills to make value judgements on the interfaces of systems and sub-systems.

It is not just project management skills that are required – and they are hard enough – but we must also be able to fine-tune and adapt the complex and distil the variables, so that the correct decisions can be made and clients have confidence in the product and operation. In essence, this is the challenge.

The fund that keeps on giving

We'd like to thank you for your ongoing support to the Benevolent Fund.

We have recently given support to a member with heart and kidney problems, helping him and his wife with travel costs for outpatient care. For this, along with more than 50 other current life-challenging situations, the CIBSE Benevolent Fund is providing help and voluntary support.

This year, you will notice on your membership renewal that the contribution we're asking for from members has increased to £5. In 2010 we received a 10% increase in requests for help, and this additional donation will help us to support as many members as possible in difficult circumstances.

Please remember to continue to support the fund, and so contribute to its work. Just tick the BenFund box on your 2011 membership renewals forms. www.cibse.org/benfund

A tribute to John Holmes

John Holmes, past president of the Society of Light and Lighting (SLL), and the Illuminating Engineering Society (IES) and Honorary Fellow of CIBSE, has passed away, aged 101. He joined the IES in the early 1930s, becoming president in 1951. In 1987 he was awarded the inaugural Lighting Award.

Holmes' career was largely in optical design, starting out with the glassmakers, Chance Brothers, before becoming technical director at Holophane. There he applied his knowledge to lighting design and equipment – and designing the light fittings used in Westminster Abbey for the 1953 coronation.

As well as his vast contribution to research, he will also be remembered for devising the first flush runway lights, which made the night landing of commercial aircraft possible. He went on to devise international standardisation of coloured safety signals.

BIM's future in BSE

Rob Manning, CIBSE president, recently took part in a conference on the future of building information modelling (BIM), speaking about CIBSE's response to the challenge of adopting BIM.

Presentations from clients, such as Manchester City Council, Mott MacDonald, and Tocci from the United States, set the scene, and Paul Morrell, chief construction adviser, provided the summing up. He announced that BIM will be playing a greater role in future public sector contracts.

Manning gave a short presentation on the institution's approach to BIM, stressing the need for integrated technical models, project models and business models. He also highlighted the importance of viewing BIM as a way of working, not a software solution, and he reiterated his call for changes to the conditions of appointment, and to contracts to enable these new ways



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BIM will be playing a greater role in future public sector contracts

of working to be adopted.

Uptake of BIM in France, Germany and the UK is significant, with 34% of respondents to a recent survey having been 'using BIM' for five years or more. But one of the recurring themes of the conference was the need for MEP calculation and design software to be integrated better with drawing

packages – a challenge that CIBSE is already working on. The conference was organised by Autodesk.

CIBSE will be holding its own conference on BIM, called: 'BIM: Who Benefits?' on 2 December 2010, at CIBSE headquarters in London. www.cibsetraining.co.uk/conferences

New YEN centre launches

A CIBSE YEN centre has been set up in the north east to provide support and networking for young engineers living, studying and working in the area.

The new centre's launch was celebrated with a cruise along the River Tyne. The event, sponsored by BAXI Commercial Division, was attended by students and lecturers from Northumbria University and engineers from leading consultancies in the region.

The group was set up following

initial discussions between CIBSE's Graduate of the Year 2009 winner, Emma Marshall, and BAXI's Rebecca Johnson, with Gerard Hosford, of AECOM, and Colin Lehane, of Mott MacDonald, helping to ensure that the region was set up quickly and that the launch was a success.

Lehane said: 'This was the perfect opportunity to demonstrate what we hope to achieve with the CIBSE YEN North East region, which is for those in the industry to

be able to meet, network and share their knowledge and experience.'

Special thanks to BAXI Commercial Division for its support, as well as to Gary Kettlewell, of Compheat, and Scott Russell, of Nuair, for sponsoring the drinks.

For more information or to join, email gerard.hosford@aecom.com or colin.lehane@mottmac.com. Details of the centre's future events can be viewed at www.facebook.com/cibse.yennortheast

Hays launches new website

Hays Building Services, the leading recruiting expert, has just launched its website, giving members access to a range of benefits, including careers advice and an annual salary guide.

The new site, which can be accessed from the updated CIBSE homepage, is one of the benefits Hays is providing to members as part of a three-year recruitment partnership with the institution.

Hays will continue to support CIBSE's education, training and careers activities, and will carry on sponsoring the CIBSE Undergraduate Award.

Andrew Bredin, managing director at Hays, said: 'We look forward to developing our joint offering to members so they have easy access to essential information to help them progress their careers.'

Subscription renewals 2011

Members will shortly receive their subscription renewal notices for 2011. These will be due for payment on 1 January. Members are encouraged to pay their subscriptions by direct debit, to save 5%. To ensure we keep members up-to-date with institution communications, please check your contact details are correct at www.cibse.org

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Letters

We have tools for biomass

Regarding the news report on page 10 of October *CIBSE Journal* headlined 'Biomass boilers not low carbon, argues study', the Carbon Trust has spent considerable time and resource in trying to tackle this issue and has consequently developed a project-specific 'carbon footprint calculator'. This is available online at www.carbontrust.co.uk/cut-carbon-reduce-costs/calculate/pages/default.aspx This tool encompasses biomass-fuel systems down to the specific fuel type, fuel delivery distance, delivery vehicle and frequency. The issue was also raised at the organisation's recent biomass technical event. For more information, visit www.carbontrust.co.uk
Mr G M Howell, CEng,
MIEE, CIBSE Associate

Case study outcomes are not such a success

I am very disappointed that a development that is designed to be energy efficient is not achieving better results in its performance ('Social success', September *Journal*, page 36). Of course, Zack Gill of Buro Happold knows the real reason – occupant behaviour. Design teams can design to the highest codes but, if occupants are not prepared to reflect the same commitments in energy use, then we will be going nowhere on the reduction of energy.

When it comes to the low fabric U-values recorded for the Clay Fields homes featured in the case study, these appear low compared with current 2006 Building Regulations. Yes, the figures do look better than the national average – but this is not good enough when we consider the energy efficient design of the scheme.

Ashley Burns MSc

Scaremongering over 'peak oil'

While I agree that we are due another oil crisis on the scale of the one in the early 1970s, I have serious doubts on whether

this has anything to do with us running out of oil in the ground ('Crunch time', Opinion, August *Journal*, page 20). The peak oil scare of the Seventies was due to the difference between proven and actual reserves, and was manipulated to cause an

hidden behind a false claim that the world is running out of oil.

I accept that being prudent with our energy resources is smart thinking, but using scaremongering and claiming we are running out of a freely available, tried-and-trusted resource, is stupid. It's time we woke up, before it's too late.

Martin Gage, CIBSE Associate



Innovation can steer us through the storm

I understand the concern expressed by the *Journal* about the increasing societal and regulatory pressure on the profession at a time of economic stress, and can offer some help to the industry to steer it through these choppy waters ('From the editor', September *Journal*, page 5).

Here in California we have a state that is bankrupt, a President under duress and the constant threat of a clawback of the modest environmental gains we have managed to fashion in recent times.

The tide will always ebb and flow in a predictable way. 'The future ain't what it used to be' is an old adage, but so is the definition of the good engineer: 'one that can design for one dollar what any old fool can design for two!' Collectively we need to stick to our belief that WE can navigate these troubled times

and help redefine the built environment through combining the best of innovation and replication.

Kevin R Hydes FCIBSE
Berkeley, California, USA

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

Please send all letters and any other items for possible publication to: bcervi@cibsejournal.com, or write to Bob Cervi, Editor, *CIBSE Journal*, Cambridge Publishers Ltd, 275 Newmarket Road, Cambridge, CB5 8JE, UK. We reserve the right to edit all letters. Please indicate how you wish your letter to be attributed, and whether you wish to have your contact details included.

artificial scarcity and thus a price increase.

The truth of the matter is that we have more oil than we know what to do with, and many of the existing oil wells once thought to be exhausted are now refilling! I urge readers to research the case of Eugene Island, which is an oilfield in the Gulf of Mexico, 80 miles off the coast of Louisiana, USA. It was discovered in 1973 and began producing 15,000 barrels of oil per day (bpd), which then slowed to about 4,000 bpd in 1989 but then started producing up to 13,000 bpd. There have also been reports that Russia has vastly increased its reserves even beyond those of Saudi Arabia.

I predict the next oil scare will be used to promote the sustainability agenda but will be

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Spreading the S-word

Sustainability in building services engineering is not just about technology and knowledge, it is also crucially about passion and leadership, says young engineer **Michael Gardner**



From my perspective as a recent graduate in building services engineering, sustainability is top of the profession's agenda. But, going back to basics, we need to ask the broad question: what tools does the modern BS engineer need to help society create a sustainable world?

To answer this, we could begin with the physical tools. And, indeed, everything these days is driven from our computers. We have computer-aided design (CAD) to help us produce drawings at a faster rate and to a higher standard. We have thermal modelling to help us do all our calculations and simulations. We have the internet, so that manufacturers' information is available at the touch of a button. And, with email, we're able to communicate with colleagues very quickly and also share information.

But apart from the physical tools, what else does a BS engineer need? Excuse the management clichés, but we do need brainstorming: blue-sky thinking, thinking outside the box, ways of approaching a problem. An engineer needs imagination in order to be creative and original. Doing what we've done a hundred times before is not the way to go. We also need to be capable of judging new technologies – which means not going by what the manufacturer says but appraising the technologies ourselves. We need design knowledge, and the engineering fundamentals to appraise these options presented to us by the technology and the software.

We also, of course, need market awareness: when to use things like alternative technologies and fuels for sustainability, their reliability and any problems associated with the cost. Knowing the payback on using applications is vital, too, both for persuading the client to accept them, and potentially for funding more sustainability measures.

We also need membership of professional bodies to keep on top of this knowledge and take advantage of Continuing Professional Development (CPD) courses, technical guides and standards, journals, design aids and engineering forums. And, of course, we need the practical knowledge – the real-world skills that we obtain on site doing the job.

But, crucially, we also need to work with other parties; to know their needs. Which leads me on to the next tool: teamwork. This means applying networking skills to be able to liaise with fellow engineers and specialists. We also need to communicate with the other people in the design team – not least the architects – so that they are aware of the sustainability needs.

And we need leadership. As building services engineers, we are at the forefront of sustainability in the construction industry. But we must also pass this sustainability awareness on to the building users, to the landlords, to the people actually acquiring and/or using the building. We also need to visualise the building's performance for users so that they know what makes for energy efficiency – using information tools as simple as posters and as high-tech as building management system display screens (which appear to be very popular in schools today).

Finally, the building services engineer needs personal commitment. They need a passion for sustainability and a desire to create a sustainable world. They need pride in a job well done, and a commitment to reducing carbon emissions and to increasing sustainability awareness. And they need to pass this on to others – clients, architects, and so on – so that they're doing the same.

A building services engineer requires many skills to help create a sustainable world. But a passion for sustainability is crucial among them – as is a means and ability to spread that passion, and a determination to see the project through with pride. ●

Building services engineers need a passion for a more sustainable world – and the ability to spread that passion

Michael Gardner, who graduated with a First in Building Services Engineering from Coventry University and now works for Pick Everard, is winner of the CIBSE/ASHRAE Graduate of the Year Award 2010, which was presented last month. This article is based on his presentation to the award judges. www.cibseashrae.org

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Illuminating measures



There are other – often better – rules for promoting energy efficiency in lighting than those contained in Part L of the Building Regulations, argues Hywel Davies

Lighting is a significant user of energy in offices, schools, shops or factories. According to the International Energy Agency, 19% of electricity worldwide is used for lighting. So one might expect Part L of the Building Regulations – which covers ‘Conservation of Fuel and Power’ – to encourage the use of the British and European Standard developed by the lighting industry and lighting professionals to enable energy efficient lighting to be specified. But it doesn’t.

In only a few paragraphs, Part L sets limits on equipment efficiency through installed power density. It says: ‘Reasonable provision shall be made for the conservation of fuel and power ... Fixed Building Services [shall be] energy efficient [and] have effective controls.’

By contrast, BS EN15193, the British and European Standard for the design of energy efficient lighting for buildings, describes the Lighting Energy Numeric Indicator – LENI – which demonstrates the efficiency, or otherwise, of a lighting system. LENI specifies the annual lighting energy per sq m, and is a measure of consumed energy, embracing all aspects of the building,

Nor does the Approved Document (AD) currently supporting Part L particularly encourage good building design. But this AD is only for guidance and not mandatory – as, too, is the related Compliance Guide.

What we need is a system-based energy consumption target instead. This view is supported by the Society of Light and Lighting (SLL), the Professional Lighting Designers Association (PLDA), the Lighting Industry Federation and several other industry bodies. This position also aligns with the lighting industry’s input into a European Commission report entitled *Working document on possible measures targeting the energy efficiency of lighting in the tertiary sector*.

Faced with the shortcomings of Part L and the accompanying guidance documents, what should a professional designer do? Many lighting professionals consider the daylight element of the current guidance to be extremely weak, taking no account of location, orientation, shading or dirt.

The guidance on lighting controls is also inadequate. Automatic controls are essential and should not be optional, which in the AD and Compliance Guide they currently are. Effective controls for heating systems are required by

Part Lib(ii). And that refers to *all* fixed building services, including lighting. It should not be an option *not* to have automatic lighting controls under Part L 2010. Enough studies have shown that humans do not switch off lights, either on leaving a room or when there is enough daylight without them.

Perhaps it is time for professional lighting designers to point to the requirement for lighting systems to be energy efficient and have effective controls, look up BS EN15193 and use it. They should also point out to the client, the building control officer and anyone else who cares to ask that this is the European Standard method for designing energy efficient lighting, and therefore makes reasonable provision for the conservation of fuel and power in buildings. In other words, it meets the requirements of the Building Regulations.

In the meantime, the SLL, PLDA and other industry bodies will continue to argue for the formal introduction of LENI as the design metric for non-domestic buildings, allowing the designer to demonstrate that lighting is both suitable and efficient. BS EN 15193:2007 should be the actual basis for all calculations of energy performance, and its outputs should be incorporated into SBEM or whatever carbon compliance tool applies when Part L is next revised in 2013. There is validated software already available to calculate LENI, so its adoption is no burden on the industry.

The industry standard is the SLL Code for Lighting. A lighting designer following the Code will be very well placed to argue that they are following good practice, and that the design will be energy efficient, effectively controlled, and will deliver a lighting system that creates visually pleasing healthy environment for the occupants. Perhaps it is time for Part L to catch up with LENI, the Code and the industry. ●

Perhaps it is time for Part L to catch up with LENI, the SLL Code and the industry

Hywel Davies is technical director of CIBSE.

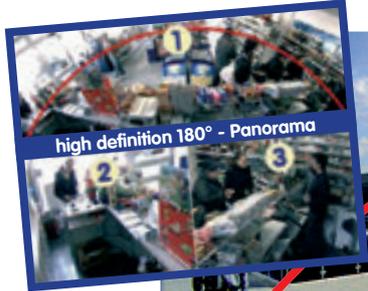
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Unequal start

Leading professions such as the law and medicine stand accused of still being bastions of social and educational privilege and elitism. But how does engineering – and particularly the building services sector – compare when it comes to access and fairness? **Simon Ellery** investigates

Certain professions in Britain – primarily, the law, medicine, the media and banking and accountancy – have come under fire for having glass ceilings that prevent equal access to top jobs. It's an issue that also faces the building services sector, but is one which the sector says it is attempting to tackle head-on.

However, at present there are still few role models for women in building services. For example, just over 5% of CIBSE's members are women. For ethnic minorities, it seems that the sector is either not on their career radar or difficult to gain access into.

Young female engineer Karen Beaumont told the *Journal* that she found the sector hard to break into but was inspired after seeing her father at work, and since then she has focused on becoming an engineer.

'Not all women are cut out to be engineers,' she says. 'I was told that it would be too hard and this probably spurred me on along the way. I had a natural fascination with the fundamentals of engineering and how and why things work.'

This type of experience was highlighted in a UK study published last year, *Unleashing Aspiration: the Final Report of the Panel on Fair Access to the Professions*, which found that the top professions in Britain were increasingly closed off to all but the most affluent (see the table on page 30).

The report, produced by an independent panel

of experts chaired by former Labour minister Alan Milburn, called for better careers advice and for more equal opportunities in education and employment to improve the prospects for young people. Earlier this year Milburn took up the post of social mobility 'tsar' for the UK coalition government, and so it remains to be seen how the panel's finding will translate into public policy.

Vocational route

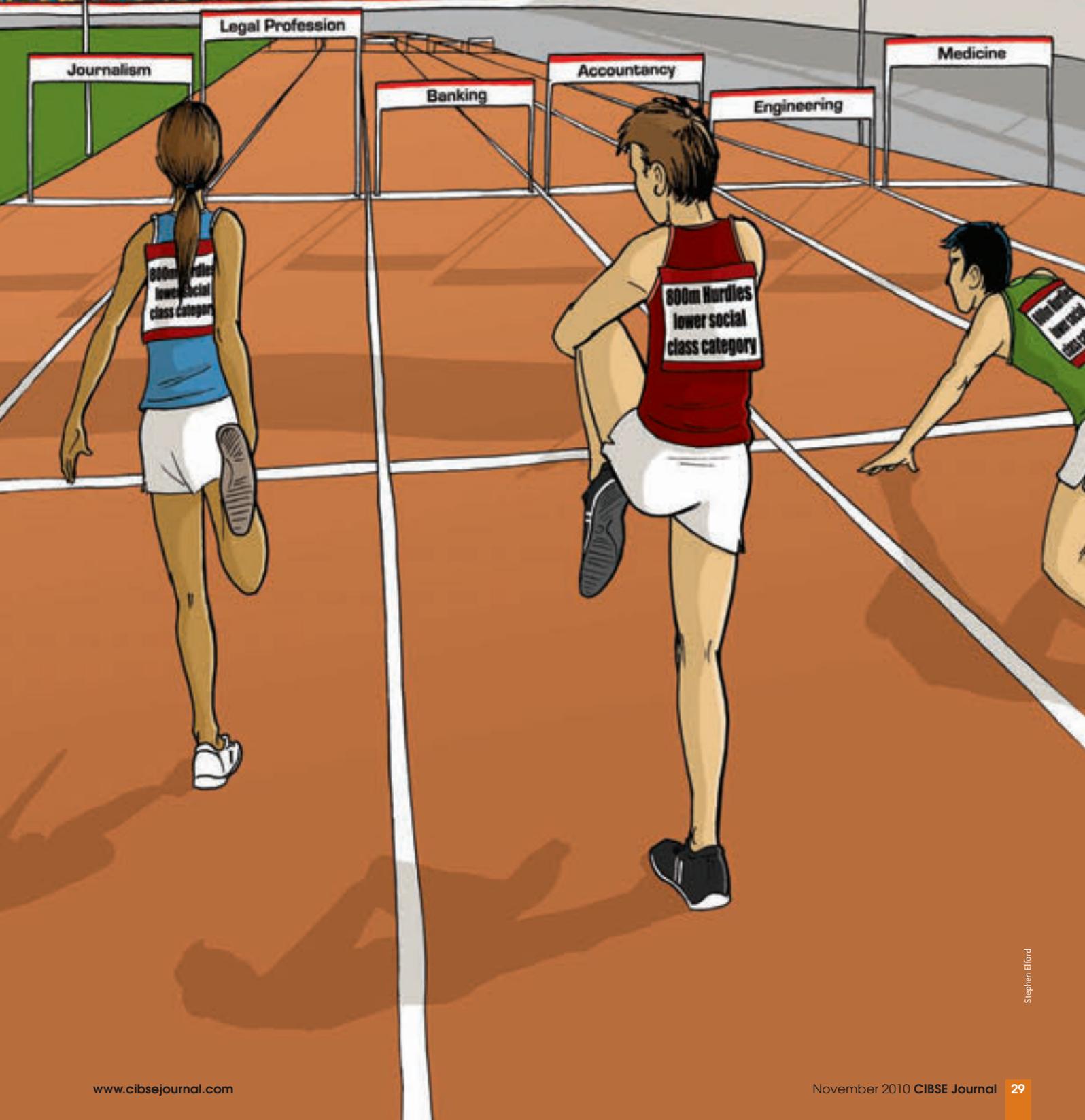
The recession has worsened the drive to widen the pool of people coming into the profession, according to some. SummitSkills, the skills body for the building services engineering sector, has warned of a loss of up to 5,500 apprenticeships.

Tim Dwyer, the *Journal's* technical editor and formerly a professor in the engineering faculty at London South Bank University, says: 'There are great opportunities to realign expectations of both the public and government on the need for traditional degree-level education to meet the vocational educational needs of the sector.'

He supports the NVQ as a means to introduce new entrants and urges industry to support it. 'My limited experience with this process has been that CIBSE and the building services sector in general are far ahead in many ways in attempts to improve accessibility to the profession at all levels.'



UK Access to the Professions Competition 2010



Some aspiring engineers who are women say they have found the engineering sector 'hard to break into'



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But, adds Dwyer, the task facing the industry is 'vast'. He calls for 'concerted efforts' through a combined initiative orchestrated and funded by the government's business and education departments. Such an initiative should be delivered through a collection of interested parties, led by an organisation such as the Royal Academy of Engineering.

Dwyer believes that reducing the engineering skills shortage is fundamental to long-term recovery and 'requires a focused effort to develop understanding and fairly funded opportunities that may take a separate

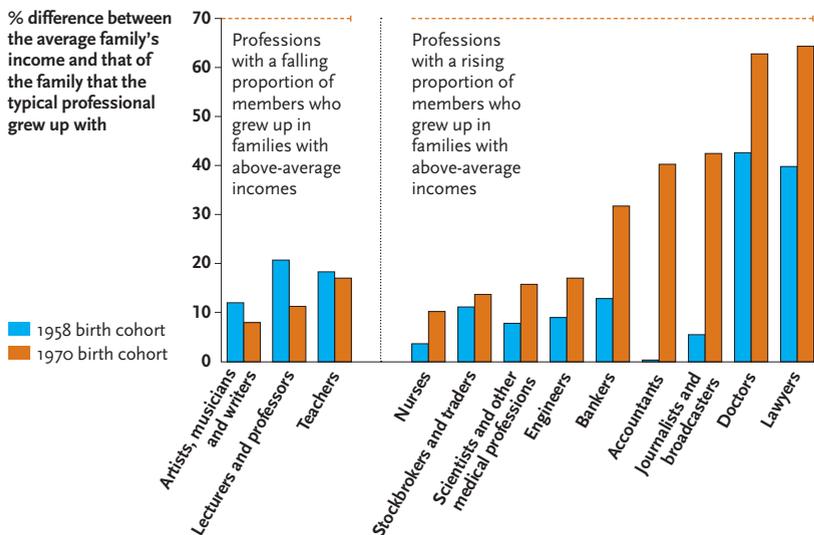
route from the other professions'. Catherine Simpson is one of only nine female CIBSE Fellows, and is director of Building Simulation Ltd, working with consulting engineers and contractors. She believes that apprenticeships will only benefit those that 'believe in themselves and have a genuine interest in what they are doing – you can teach skills, enthusiasm has to come from within'.

The sector must also make itself more appealing, says Rebecca Warren, who works for consulting engineering firm Sinclair Knight Merz in Manchester. She calls for better promotion of engineering as a profession in general 'and a greater willingness by companies to provide work experience to young people'.

Warren also supports the need for outreach work in schools: 'For a very small outlay of time whole groups of children can be shown how exciting and varied and important engineering is – but companies see no immediate benefit to themselves so it's not encouraged generally.'

But for others the problem is that employers want several years' proven track record and chartered status, which rules out not just minorities, but also anyone under 30 who isn't already in the field. 'This is coming back to trouble us,' says one engineer who did not wish to be named. 'We are not prepared as an industry to invest time in developing engineers.'

Comparison of the family-income background of typical professionals



Across the professions as a whole, the typical professional grew up in a family with an income well above the average family's: today's younger professionals (born in 1970) typically grew up in a family with an income 27% above that of the average family, compared with 17% for today's older professionals (born in 1958)

Source: Social Mobility and the Professions, 2009, Centre for Market and Public Organisation, as reported in Unleashing Aspiration: the Final Report of the Panel on Fair Access to the Professions, Crown copyright

Attacking barriers

CIBSE, which has two representatives on groups set up to implement the *Unleashing Aspiration* report's recommendations, says that many are already being carried out. These include creating career mentors, work experience tasters and school alumni networks where experts act as mentors and go back into their former schools.

The nature of the building services profession means it already scores well in terms of a mix of social class. Research suggests it is characterised by >



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CIBSE takes the initiative

License to practice
CIBSE together with BEST has launched a new development route offering professional recognition for apprentices. The scheme will allow Level Three apprentices to receive professional accreditation as engineering technicians after completing qualifying criteria, laid down by the Engineering Council. To support the launch, BEST will organise and pay for the first year's membership subscription of the appropriate professional institution for all Level Three apprentices starting in 2010/11. For details, visit: www.bestlicensetopractice.com

New CIBSE career factsheets
CIBSE has released three new career factsheets to help provide information on building services to young people and help inform them when making choices about their future. The new factsheets – entitled *Talking to the Parents*, *Fighting climate change* and *Creative design in BSE* – bring the total of factsheets available to 12. They are all available at www.cibse.org/careers or you can order hard copies by emailing aringguth@cibse.org

> family businesses and 'coming up through the tools', and typical routes to enter involve three years as an undergraduate followed by a period as a paid graduate trainee. The alternative to this is work-based learning in employment, such as an apprenticeship, with part-time study.

Compared with other professions, this would suggest there are few financial barriers. However, in evidence to the Fair Access Panel, CIBSE highlighted four other barriers. These were:

- Shortages of apprenticeships offered by employers;
- Some females still seeing engineering as a predominantly male preserve;
- The difficulty experienced by otherwise competent entrants in demonstrating the required levels of mathematics; and
- Unfairness in the tariffs system for UCAS points – good marks in science and maths A Levels are seen as generally harder to achieve.

CIBSE says it has taken a range of steps to counter these barriers. For example, via the E4E initiative, it is trying to influence the curriculum in schools (see right). Careers brochures and presentations feature female members of the institution, and women are actively encouraged to participate on committees and panels. Groups have been set up on networking websites such as LinkedIn and Twitter as a way for CIBSE's female members to keep in touch and share news, views and ideas.

The institution says that it also champions the secondary school diploma in Construction and the Built Environment, and supports the Foundation Degree currently being developed for the sector. The institution is also developing its outreach programme to school children, focused on the 'Low Carbon Heroes', at the national Big Bang Fair.

CIBSE has also entered into a partnership with Building Engineering Services Training (BEST), the training provider for the sector, to launch a new



Employers who only seek building services engineering candidates with several years' experience and chartered status are 'excluding anyone under 30 who isn't in the field', it is argued

Policy group aims to influence government

A new body is working to influence education policy at the highest level so that the UK can educate, train, attract and retain engineers at every level, according to CIBSE.

E4E was set up to address a 'critical area' and place engineering on a similar footing to maths and science, which enjoy high status in the national curriculum.

Representing 36 professional engineering bodies, the group aims to initiate and contribute to policy debates, provide high-quality information and analysis, and ensure that all learners can make connections across learning that support an education for engineering. Crucially the body aims to highlight the needs of future engineers and routes into engineering that are open to all.

Through CIBSE past-president Doug Oughton, who chairs the operational group of E4E, it is hoped that the profile of building services will be boosted.

This is particularly important when government is looking to green technologies to create a low carbon economy for the UK and it's in this arena where new engineers are badly needed, says CIBSE.

development route involving professional recognition for apprenticeship. It is hoped the scheme will raise awareness of professional qualifications for young apprentices working with companies. The idea is to enrol Advanced Modern Apprentices into student membership with progression to Licentiate Member and EngTech Registration.

Terry Giles, a CIBSE Council member and former chairman of the institution's education and training committee, says: 'Initially this will provide a seamless process for the Advanced Apprentice who is studying at level NVQ3 to become Student Member of CIBSE. The intention of the initiative is to sign up apprentices as student members at the start of their programme, and in so doing, to develop their skills against the competencies set out for Licentiate EngTech.'

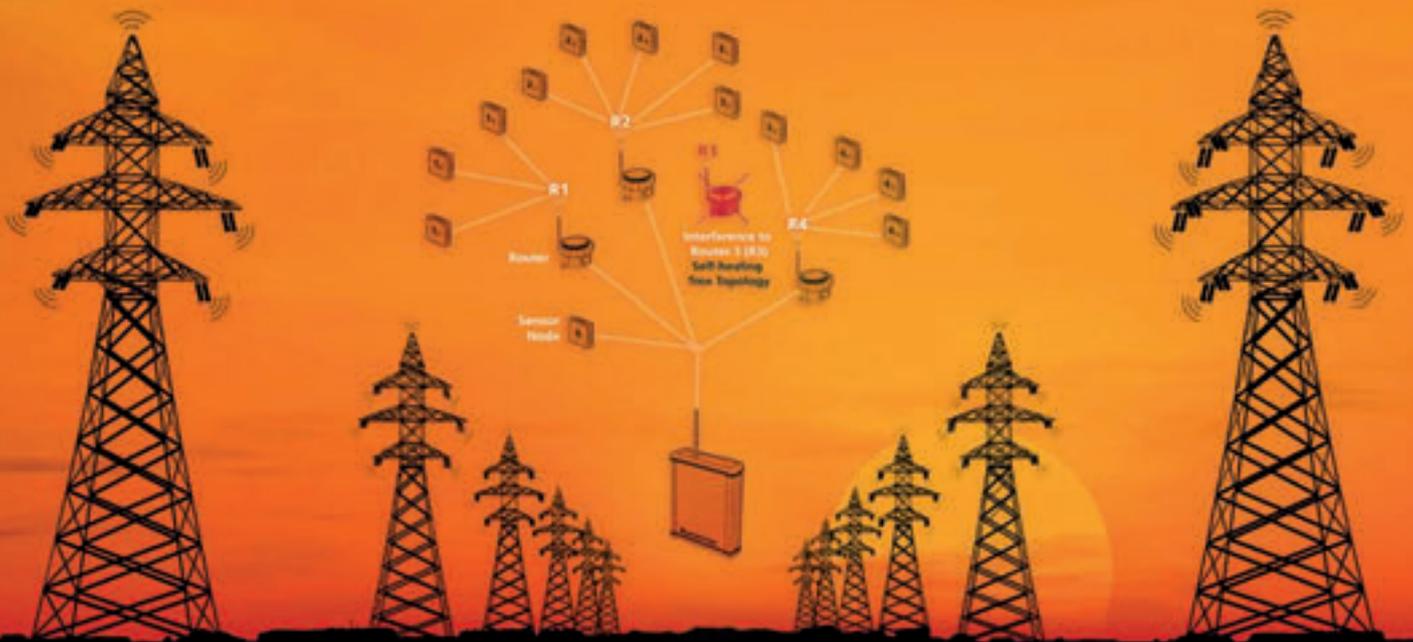
Giles points out that the CIBSE Careers Panel has undertaken significant work to provide factsheets for schools, parents and careers advisers.

While it's clear that CIBSE is taking steps to attract more young people to its sector, the engineering industry as a whole still has more to do to achieve 'fairness'. But, as the Fair Access Panel's report shows, other leading professions have much bigger obstacles to fairness in place compared with engineering, and would do well to look to the latter for good examples of how to cut these barriers down to size. ●

The work of the Fair Access Panel can be found at:
http://webarchive.nationalarchives.gov.uk/+http://www.cabinetoffice.gov.uk/strategy/work_areas/accessprofessions.aspx

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Engineers will need a broader range of skills and a more interdisciplinary approach to innovation if they are to contribute to the burgeoning service industry in Britain and around the world. By **Mark Dodgson, David Gann and Irving Wladawsky-Berger**

When Apple sells an iPhone, it has sold much more than a piece of hardware. It has drawn the buyer into a 'service economy', providing access, at a cost, to a vast array of information services. There are currently more than 220,000 third-party applications available for the iPhone, offering a bewildering array of services, and creating a great deal of new wealth.

This is just one example of innovation in services – innovations that differ in many ways from those found in the industrial economy. It is important to analyse the changing pattern of innovation, and engineers need to appreciate the differences to acquire and develop the capabilities they will need if they are to make a bigger contribution to a new wave of economic growth.

We believe that, if engineering graduates are to make a greater contribution to innovation in services, it is important to provide them with appropriate education and training in four broad capabilities. These are: the traditional engineer's knowledge of a specific domain; analytical skills; the ability to collaborate with people from other disciplines; and knowledge of organisational systems and processes.

Analytical skills are required for decision-making in complex and unpredictable social systems, such as urban environments, healthcare and financial systems. These skills need to be strongly mathematical and should utilise the massive increase in the amount of data available from sensors and computing. Analytical skills also require expertise in simulation and modelling of these systems, complex control theory, real-time information analysis, and design and optimisation, all of which can be found in traditional engineering skills.

Innovation in services focuses directly on appreciating and meeting human needs and market demands; it requires greater emphasis on understanding and adapting systems made up of information, people and organisations. This is why we believe that innovation in services also requires engineers to have



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knowledge of business systems and processes. Service innovation also changes the culture and organisation of the innovation process itself. While conventional engineering draws on engineers working in isolation with a deep 'vertical' knowledge of specific disciplines – knowledge that is still crucial to the development of services – innovation in services also draws upon many different disciplines working together.

Collaboration

Services are often highly interconnected. Innovations in the insurance industry, for example, are related to changes in the medical system, the design of safer buildings and the building of better roads. Understanding these connections requires knowledge of what happens at boundaries between disciplines and professions. Interdisciplinary and collaborative skills are therefore often critical. This is why we see the >

Engineers must develop interdisciplinary and collaborative skills



Innovation requires teams that bring different skills to bear on the design process

> ability to collaborate with people from other disciplines as one of the four broad capabilities that engineers will need to participate fully in service innovation.

Innovation in services needs teams that bring different skills to bear on the design, development and management of systems and processes. This requires 'horizontal' expertise and an understanding of the behaviour of individuals, groups and organisations in related fields. Such expertise requires the development of professionals with deep knowledge in one or two fields and who also have a broad knowledge of other fields that are critical to solving complex challenges.

Collaboration is especially important because services are not produced in the laboratories and factories of the industrial research and development (R&D) arena where they can be fully tested and optimised. Services are usually produced at the point at which they are consumed: the act of consumption rather than invention is the focal point for innovation. New services are therefore developed using a 'market-facing' approach, often connected to people and organisations that articulate and express their requirements and demands as they use the innovation.

For example, companies such as Amazon and Google, or online gaming and entertainment businesses, typically conduct hundreds of experiments a day, using different versions of web pages to test consumer preferences. This emphasises the importance of prototypes and shared experiments with users in real time, including with employees, partners, clients and the public at large. These high levels of collaboration are symptomatic of what has become known as 'open' innovation.

The nature of services innovation implies that answers to technical problems will not lie exclusively within research institutions or companies with proprietary R&D cultures. Instead, they will emerge through integration of ideas from a wide range of organisations with which they have had little or no previous experience. Furthermore, the delivery

of cheaper, better and more personalised services will require a multi-disciplinary framework for collaboration, involving STEM (science, technology, engineering, maths) alongside the social sciences and humanities.

Future proofing

Technologies such as virtual prototyping, simulation and modelling, can assist collaboration by drawing on multiple perspectives and expertise. These technologies have profound consequences for the role of engineers in the organisation and management of services innovation. They hold the possibility of major productivity improvements in services themselves, comparable to the advent of machine tools in the 1850s or lean production in the 1980s.

Research organisations are already responding to these changes. This is seen in the development of large university teams researching the interdisciplinary problems of transportation, healthcare, energy, the environment and new digital media. It is seen in new education programmes that build on interdisciplinarity and use the new supportive technologies.

One recent example of this new multi-disciplinary approach was the launch in September of the Laing O'Rourke Centre for Systems Engineering and Innovation at Imperial College London. The centre focuses on innovative research and teaching, using the insights to deliver greater value in the disciplines of mechanical and electrical engineering, building services and manufacturing systems.

The pace of change in services is not likely to slow down. Indeed, there is the potential for a new wave of innovation, based on rapidly expanding markets for personalised services, and taking advantage of the availability of massive amounts of data from ubiquitous sensors and devices and the availability of hardware and software to analyse this data flood. Realising this potential depends on the capabilities we have identified, developing and using the emerging technological infrastructure to support innovation.

These skills and technologies will also be essential if we are to deal with the intractable social and economic problems we face in health, energy and environment. The changing pattern of innovation has implications for the way in which we conduct R&D. The private and public sectors invest around \$1 trillion a year in the production of knowledge. This investment inevitably affects innovation in services, raising questions about how we choose where and how to spend that money.

Engineering's influence in these opportunities and challenges will rise when its contribution is less hidden than it has been. Engineers need to learn to engage effectively with people and organisations with which they have had little contact previously. This requires the ability to cross traditional boundaries, and a new approach to the education of scientists and engineers. ●

A longer version of this article appeared in The Royal Academy of Engineering's Ingenia magazine – see the September issue at www.ingenia.org.uk

Professor Mark Dodgson is director of the technology and innovation management centre, University of Queensland Business School. **Professor David Gann CBE** is head of innovation and entrepreneurship at Imperial College London, and group innovation executive at Laing O'Rourke. Together they are part of the Think Play Do Group, a London-based innovation consulting, training and software company. **Dr Irving Wladawsky-Berger** retired from IBM in May 2007 after a 37-year career with the company, and is currently strategic adviser at Citigroup. The authors would like to thank **Michael Kenward OBE** for his help

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Long road ahead

New technologies and good design are pushing street lighting in the right direction but will local authorities want to put in the investment? In the first of three articles in this special report compiled by **Jill Entwistle**, we look at key issues in public sector lighting. Over the pages we also consider the needs of social housing, and whether we can achieve ultra-efficient lighting





Two years ago, at its concept showcase, Sense and Simplicity exhibition in Moscow, Philips unveiled its Light Blossom solar/wind-powered amenity light. Its photovoltaic-panel petals slowly open in response to sunlight, moving heliotropically like a sunflower to optimise power. On cloudy, breezy days, the petals move to an upward, half-open position allowing them to catch the wind. The rotary movement is transferred to the built-in rotor and converted to energy. As dusk falls, the petals close and the LEDs on their underside and on the stem switch on. In standby mode, they glow at the minimum level needed for safety. A motion sensor registers when people pass by and racks up the light intensity.

This was the vision of a street lighting future – not only low energy but capable of feeding into the grid, and highly aesthetic. The designers were talking of it becoming a reality – subject to testing and modification – in just a few years. It nevertheless seems poles apart from the present-day realities. Talk to most cash-strapped local authorities and their main concern is how to cope with basic upgrades, never mind lighting utopias.

The use of solar/wind-powered lighting in the UK is currently restricted to applications such as footpaths, car parks and outlying bus shelters where light output is less critical, and for remote sites where the comparative cost of cabling makes them more economically viable. Because of our comparative lack of sunlight, the only way to get enough juice out of fittings is generally to combine solar and wind-powered elements.

However, the street lighting landscape has seen some major changes over the past five years and, driven by the need to save energy and money, is set to undergo further radical improvements.

‘There has been a lot of investment through PFI [private finance initiative] in street lighting in recent years and this has led to changes,’ says Alistair Scott, the new president of the Institution of Lighting Professionals (ILP, formerly the ILE).

‘Because contractors have been desperate to reduce their costs and make as much profit as possible, they’ve looked for innovative solutions for saving money. This has meant that white light is used a lot more widely – for instance, it is coupled with the introduction of electronic gear to give the ability to reduce lighting levels when usage is lowest.’



Philips Light Blossom solar/wind-powered amenity light



WE-Ef contains six LEDs and six lenses combined in a module (shown) so that each LED illuminates one single area using a specially developed lens. This means that turning off LEDs lowers the average light level but not the uniformity, so switching rather than dimming is viable



The Archilede can produce the same quantity and quality of light on the road surface as a traditional 150W high-pressure sodium luminaire, but with much lower energy consumption

> The gradual switch to white light is probably the most visible change to the streetscape. Few would mourn the passing of the sodium lamp and its orange glow, especially the monochromatic light of the low-pressure lamp, which renders colours indistinguishable – not only unpleasant, but also disliked by the police because it makes car colours, for instance, almost impossible to identify. The consensus for some time has been that white light is preferable, but technology (and its cost) took some time to catch up.

‘I was on the British Standards Committee, which allowed different lighting levels for white light seven years ago,’ says Scott. ‘People accepted it was a good idea but lamps were not available. Ceramic metal halide was around but it was expensive, had poor lumen maintenance, and the life wasn’t as good as high-pressure sodium.’

The introduction of compact fluorescent lamps (CFLs) for exterior use and the improvement of ceramic metal halide technology, especially the introduction of the Philips CosmoPolis system, has accelerated the change. The CosmoPolis comprises a new-generation ceramic metal halide lamp and purpose-designed electronic gear. The lamp itself is 65% smaller than a Son lamp and, according to Philips, the system efficiency is higher – between 30% and 70% – than other white light sources.

‘When CosmoPolis and CFLs for outdoor use came along, white light became a lot more viable,’ says Scott.

‘We’ve seen a dramatic rise in its use for residential roads over the past five years. The majority of new schemes would now have white light rather than sodium. But it could take another 20 years or longer to replace the old stock. You still have streets with mercury vapour and even GLS lamps.’

Central control

The second radical change is the introduction of remote monitoring or central management systems (CMS). Barely two years ago this was still technology on trial. The advantages of addressing individual street lights to check their status (no more night scouting) and controlling light levels according to location and time are self-evident. Dimming combined with an efficient light source can cut energy use by half.

There were technical teething problems, but manufacturers and local authorities have collaborated closely to identify and resolve glitches with system communication that had led to failure of lanterns to strike, for instance, or erroneous reports. Even though such systems can be retrofitted into existing lanterns, they involve a high capital cost. While the energy and cost-saving benefits are clear, local authorities have to ensure they get it right.

‘To deploy a full CMS system you need a lot of money,’ says Dave Franks, service development manager for public lighting with Westminster City Council. ‘We’ve spent two years building our business >

“Switching every third column off is not an option. You need to be able to demonstrate decent energy management”
– Dave Franks



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> case up and investigating the different systems.’

Westminster will be installing Harvard Engineering’s Leafnut system. With 1,500 luminaires already upgraded, the Smart Light programme involves just under 16,000 street lights and a four-year timescale.

‘Energy saving is a massive driver at the moment because of things like the Carbon Reduction Commitment [Energy Efficiency Scheme],’ says Franks. ‘Switching every third column off is not an option. You need to be able to demonstrate decent energy management. This is what we’re trying to achieve with our Smart Light project using CMS so we can increase and decrease light levels when required.’

‘For the outside of theatres and stations, for instance, you might generally run fittings at CE1 [the EN131201 category for 30 minimum maintained lux] but you can go up to CE0 [50 lux] and down to CE2 [20 lux]. It’s about having that flexibility. If you’ve decided your worst-case scenario is CE0, you’d be overlighting for quite a bit of the time and using more energy than you need to. It’s about understanding the environment you’re designing for and a fit-for-purpose rather than broad brush approach.’

A further refinement that Westminster is working on with Harvard will allow the police to change street lighting levels using CMS – raising them when chasing a criminal in a particular location perhaps. It’s just one indicator of the increased role that the humble street light may play in the future.

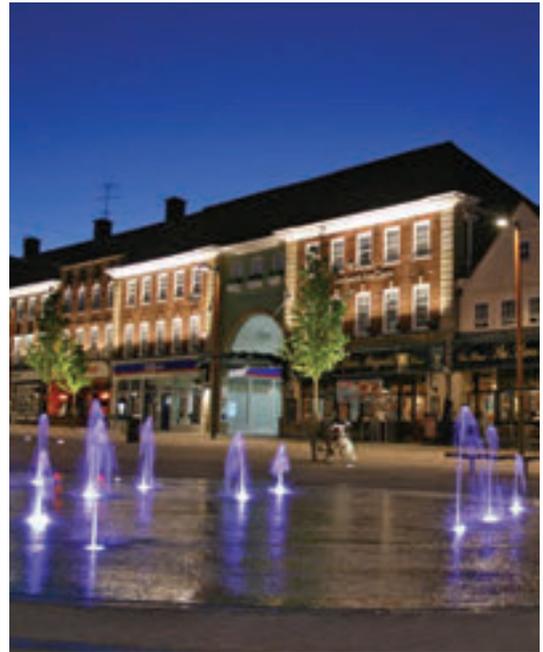
Masterplan

At the ILP conference in September, Mark Sutton-Vane of independent lighting consultant Sutton Vane Associates (SVA), called for a lighting masterplan for the UK that would radically rethink the way we light the public domain in particular. It ranges in scope from closer working between lighting designers and engineers, to using the tax system to encourage energy efficiencies and freeing lighting designers from legislation that often lags behind advances in lighting technology and techniques.

‘There’s no doubt that street lighting will have to do more in future,’ says Sutton-Vane. ‘We don’t have to look too far ahead, for instance, to envisage a time when standard street lighting links into the Smart Grid, so that a street lamp could also operate as a charging point for electric cars and bikes, and may even incorporate some form of microgeneration.’

Some street lighting is already multitasking, he adds. SVA was recently involved in lighting Letchworth Garden City’s centre. The lighting is intended to help encourage a night-time economy to develop and restore Letchworth as a destination. It includes specially designed lighting columns supporting lanterns that can be dimmed remotely, but also contain controls for CCTV and traffic signals. To save energy, astronomical clocks are used to control not only the architectural lighting in the centre, but also the highway lighting, which dims automatically between midnight and sunrise.

The one technology that hasn’t yet made it onto the



Town centre lighting design is at the heart of Letchworth Garden City’s £8m revitalisation programme

streets in any significant way is the LED, despite the fact that all the leading street lighting manufacturers are lining up their contenders. They are the obvious light source of the future, for the exterior as much as the interior – energy efficiency, longevity, reduction of maintenance costs, dimmability, viability with solar/wind-powered luminaires – all potentially give the LED massive advantages over traditional sources. They could also cheer up town centres on the decorative front – Westminster is looking into integrating colour-changing RGB LEDs into lanterns for use for special events. But as a white light source, cost and inferior performance over existing counterparts mean they don’t add up to a viable solution just yet.

‘At the moment it doesn’t make sense to use LEDs rather than CosmoPolis,’ says Scott. ‘Cosmo is more efficient at getting light on the ground and is more of a known quantity. There’s not much difference in energy consumption and it’s cheaper.’

Franks agrees: ‘There is a glare issue and the colour temperature is not right for us: they’re still coming in at 4,000K plus, which is too cold. We’re starting to see viable lanterns but they cost a fortune. The costings just don’t stack up.’

We might not be seeing the Light Blossom on our streets any time soon, but the future is bright. ‘Street lighting will be much improved,’ says Scott. ‘The competence of lighting designers is improving, the quality of sources is improving dramatically with a lot more white light, and there’s less overlighting. All of those things are pushing street lighting in the right direction.’ ●

The Society of Light and Lighting is holding a free event, Future Trends in Street Lighting, on 14 December 2010 at the Transport Museum, London. It starts at 6pm. To find out more and to register, visit www.sll.org.uk

Energy costs

Around one third of Europe’s roads and motorways are still lit using cheap, inefficient 1960s technology, namely mercury vapour lamps (an estimated 35m) which use twice the electricity necessary.

Some countries (UK, Belgium, the Netherlands, Poland) use less than others (Germany, Italy, Spain) and, along with the Netherlands, the UK is a leader in white lighting.

City councils could save €3 billion (based on 2006 energy prices) in energy costs per year by switching to the latest road lighting technology, such as ceramic metal halide lamps (non-retrofit). This equates to:

- 10m tonnes of CO₂
- 45m barrels of oil per year
- Annual output of 15 power stations at 2TWh/yr

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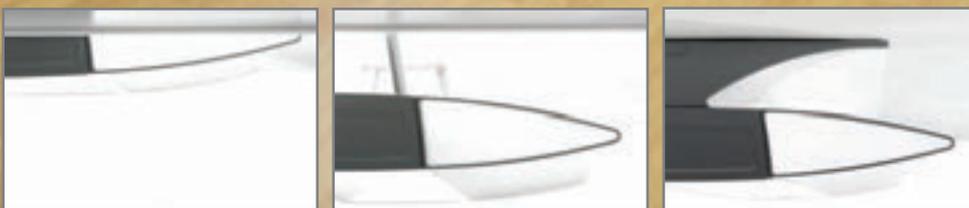


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On the periphery

Sharon Stammers and Martin Lupton call for a lighting revolution for the people living in the 'sodiumised' world of out-of-town estates

At the Professional Lighting Design Convention in 2009, French lighting designer Roger Narboni declared: 'Architectural lighting is dead.' His argument was that to move forward, the emphasis in lighting design should be on creating beautifully lit spaces for the people who do not venture into the city centre, but live in the 'sodiumised' world of social housing.

Architectural lighting for its own sake certainly needs a radical rethink. For years we have been improving city squares and retail areas, and lighting the façades of town halls, churches and museums. This has all been for the greater good of the night-time exterior environment.

But while helping to facilitate economic regeneration, this approach has only affected a minority of visitors and locals as the majority of people don't live in these spaces.

Why does a town square, barely peopled at night, deserve to be better lit than a housing estate that is always peopled at night?

City centres have become such a focus of lighting aims that they have led to the development of a whole sub-category of lighting design: the urban masterplan. Masterplans look at the lighting design of a city centre in a cohesive way, incorporating all elements of architectural lighting, road lighting, street lighting and sustainability, but rarely cover the outlying elements of a city or cross over into housing. The global rise in light festivals in the past few years has also focused on city centres.

These events are largely commercially driven and again used to boost the night-time economy.

Our progression as a profession should include moving away from city centres to the periphery where people actually live. It's rare that we get a chance to use our skills to make the everyday world a better place. Surely the home environment of the mass of ordinary people is the first place we should be improving before moving on to the places we share.

Of course, it boils down to hard cash. What is chosen as the showcase and 'face' of a place would

seem to be more deserving of a 'lighting makeover' than a housing estate that no one from out of town would visit.

There are parallels in the commercial environment, where lighting consultants are invited to do the public spaces, such as reception areas, but the offices where people work eight or more hours a day are often simply a matter of calculation and box ticking.

Of course, lighting design doesn't come cheap. Social housing and other disadvantaged communities have so many demands to meet that lighting is low on the agenda and almost universally utilitarian.

There are further implications to this issue. With so little attention paid to the night-time appearance and design of many environments, why would anyone be encouraged to look after them? As lighting designers, we can see that it would only take a small intervention in terms of lighting to drastically improve the after-dark appearance, help it feel safer and generate pride in the area.

So why, when money is being poured into urban regeneration, is my experience of a social housing estate more or less universal across the UK?

There is now a wealth of research that shows the link between lighting and crime: better lighting reduces crime and aids the perception of safety. A recent study by Brandon C Welsh and David P Farrington 2008 (*Effects of Improved Street Lighting on Crime*) includes an overview of 13 studies, eight in the US and five in the UK. It showed that the positive effect of improved street lighting has been greater in the UK but, more importantly, concluded that improved street lighting is also efficacious because it increases the feeling of pride, and thereby also informs social control in the neighbourhood.

'Our progression as a profession should include moving away from city centres to the periphery where people actually live'

The theory is that when local government chooses to improve conditions in our neighbourhood, for example through improved street lighting, they send a signal that they care about us.

This might lead us to have a more positive image of our neighbourhood, and our neighbourhood will appear better cared for. This in turn strengthens community cohesion and pride. When we become more proud of the place we live in, we also become more observant of each other on an everyday basis. We feel that public space belongs to us all. We develop a greater sense of responsibility and this leads to more social control and reduced night and daytime crime in the area.

Public or social housing was originally built and operated by councils to supply well-built homes at



below-market rents to the local population. As of 2005, 20% of the country's housing stock is owned by local councils or housing associations. This figure doesn't sound like a great deal until you consider that it accounts for more than 12m people.

Social commentators first began to report on social housing in the large cities during the Industrial Revolution describing squalor, sickness and perceived immorality. Current reports show not much has changed, concluding that the majority of social housing is home to the elderly, those in poverty, migrants and the mentally vulnerable, with estates perceived as centres of high crime. Those living in social housing are a stigmatised sector of society.

Recent consultation on one particular estate saw residents asking for improvement measures that decreased crime and antisocial behaviour, increased community safety measures, increased the attractiveness of estates and created an overall healthier environment. Lighting can do all this.

For this reason we have formed the Social Light Movement, a philanthropic initiative that has been founded in order to create a network for lighting designers and other interested parties, allowing them to work together to improve lighting for people – particularly those who are unlikely to have access to good quality illumination within their environment. ●

The Social Light Movement manifesto is available to download from its page on the social networking site, Facebook.

Light Collective was formed this year by **Martin Lupton**, former head of BDP Lighting and ex-president of the Professional Lighting Designers Association, and **Sharon Stammers**, formerly director of Phoenix Large Lightmatters and ex-regional coordinator of the PLDA

High-quality street lighting is the preserve of some town centres but is not much in evidence on housing estates

High definition

When is lighting 'ultra-efficient'? This term has been over-used, says **Alan Tulla**, but help is at hand via industry moves to offer guidance

Over the past couple of years, the phrase ultra-efficient lighting (UEL) has appeared in a great variety of documents. But it is most often used by people who least understand what it might mean. The reason, I suppose, is that 'ultra' implies technical and cutting edge, and that if efficient lighting is a good thing, then ultra must be even better.

It is well known that for ultimate energy efficient lighting, we need the right light, in the right place, at the right time, provided by the right lighting system. This means having the right lighting scheme design for a specific place, installed and operated by the right lighting system.

However, the term was widely assumed to be product based, and not enough emphasis was given to user needs, good design, daylight or even simple measures, such as switching off a light when it wasn't needed. There was a feeling among both designers and engineers that good lighting was being hijacked – on the one hand by simplistic energy regulations such as Part L of the Building Regulations, and LED (light emitting diode) manufacturers on the other.

Part of the problem has been that everyone has their own idea of what UEL actually means. Certainly, the phrase has been used by LED manufacturers to promote their products. The general idea is that LEDs are the next stage in lighting development and so the phrase UEL has been used to denote a further stage in

BSEN 15193

The BSEN 15193 standard was written in response to the Energy Performance of Buildings Directive (EPBD). The aim was to establish conventions and procedures for the estimation of energy requirements of lighting in buildings, and to give a methodology for a numeric indicator of their energy performance. It also provides guidance on setting notional limits for lighting energy derived from reference schemes. There is also advice on techniques for separate metering of the energy used for lighting that will give regular feedback on the effectiveness of the lighting controls. LENI (Lighting Energy Numeric Indicator) derives from this standard.



President of the Society of Light and Lighting, Alan Tulla, has been working with SLL members to define ultra-efficient lighting

terms of efficiency. In addition – and forgive me if this sounds cynical – the phrase UEL sounds impressive when applying for government funding. The phrase is even beginning to appear in pre-qualification questionnaires (PQQs) and public tenders.

It was this concern and a lack of clarification for all parties involved that led to a clear definition of the term being sought, led by the Lighting Liaison Group (LLG).

The LLG represents a number of lighting organisations, including the Society of Light and Lighting (SLL), which have all been working together to try to define what UEL should mean. All parties agreed it was important to move to a wider, more inclusive definition.

If such a definition existed, it would help lighting bodies have a stronger, clearer voice in discussions on the subject with government. It would also create a consensus on what was really meant by the term, and would ensure we were all working on the same basis and clarify what was required.

As a result, the LLG found that one of the most important conclusions to emerge was that a product, by itself, cannot qualify as being UEL. For example, if a luminaire is switched on when it should be off, it has zero efficiency because it is wasting 100% of the input energy. Similarly, if it is giving 500 lux when only 250 is required, half the energy is wasted. And if it doesn't respond to daylight, again it can waste energy.

That is why only the lighting system itself can be



The New York Times building, which uses a Lutron Quantum total light management system as part of a holistic approach, is an exemplar of UEL, slashing energy usage by 72% in one year. It uses 4W per square metre – a third of the power of a similar modern office building

described as efficient. The lighting system is taken to mean the lamps/light sources (including daylight), ballasts, luminaires and lighting controls that are needed to light a space. Again, the system must suit the particular location, therefore the lighting design has to take into account issues such as user requirements, relevant regulations and standards, as well as guidance, such as the SLL Code for Lighting. These all form part of the definition of UEL.

We decided the next step was to agree how an efficient lighting system might be defined and, more specifically, measured (such as lm/W, W/sq m, lm/W/100 lux, and so on). However, it was eventually concluded that there was no point in having fixed values since technology, standards and design are constantly improving.

Finally, it was agreed that to qualify as UEL, the energy efficiency of the lighting system should be in the top 20% of the range of the lighting energy efficiency ratings of installations, made in accordance with a BSEN 15193 LENI estimation (which is measured in units of kWh/sq m/year) for indoor lighting, or BSEN 13201 for outdoor lighting (see box on facing page).

This overall clarification has now been approved by the SLL and is subject to formal agreement from the other constituent organisations. Should it be formally agreed, it will become an LLG-approved definition. ●

Alan Tulla is president of the Society of Light and Lighting. The UEL definition can be downloaded at www.sll.org

What UEL should mean ...

- A product, by itself, cannot qualify as being UEL 'Ultra-efficient lighting' can only apply to the lighting system as a whole, which means the lighting equipment or lighting solution (lamps/light sources, ballasts, luminaires and lighting controls) required for the lighting scheme, and its installation and operation during the life of the scheme
- UEL includes daylight and how the space is used
- It takes account of lighting design, good practice and applicable standards
- It includes through-life costs
- It is based on BSEN 15193

... and what it could do

Mark Glover, head of the Small Business Research Initiative, provides a classic example of equating UEL in a woolly fashion with products: 'Ultra energy efficient lighting could transform Britain's homes and energy use. The more efficient the lighting, the more money we save on our energy bills. We want to see high-quality, compact ultra-efficient lighting that everyone would be happy to use at home. We have the opportunity to become a world leader in the manufacture of this technology, which would create new jobs and boost the British economy.'

'It is well known that for ultimate energy efficient lighting we need the right light, in the right place, at the right time, provided by the right lighting system'

– Society of Light and Lighting

THE SLL

The Society of Light and Lighting, a CIBSE society, is the largest professional body for those involved in the art, science and engineering of light and lighting. It has more than 2,000 members in the UK and worldwide, and carries out a full range of activities, including publications on lighting and a programme of regular seminars and conferences, and masterclasses.

The new SLL masterclass series provides insight into how we can meet the low carbon challenge in relation to lighting. For more information on the SLL, or to book onto the masterclasses, visit www.sll.org



Smart app-titude

Handheld devices, 'apps' and networking technologies provide major opportunities for more effective integration and control of services in both commercial and domestic buildings, argues **Ged Tyrrell**

The industry is undergoing a period of change that could transform how building services systems work. The widespread availability of individual appliances with 'on-board' intelligence, alongside the growing reach of the internet, now makes it possible to achieve much better control of systems at a fraction of the current cost. As a

result, the very best quality system control is available to almost everyone in the country.

The UK government has turned to the engineering sector to help it shape its future microgeneration policy, and to show it how to shave millions of pounds from the cost of running its departments. However, politicians often think in terms of clever, new, low carbon technologies when, in fact, the solution can be a lot more straightforward.

In recent years, we have seen the rapid emergence of low carbon and renewable technologies, which can now be fitted almost anywhere, but we have not seen the dramatic reduction in energy use that should have followed. Sometimes, the reason for that is the wrong choice of technologies for the wrong application, but usually it is down to a >



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> failure to look at the whole project or a building in its entirety, or to consider occupant behaviour. A radical new approach to how systems are controlled using distributed intelligence can solve the problem at a stroke, and ensure that buildings of all shapes and sizes are better balanced and, consequently, far more energy efficient.

'Mesh' networks

One such emerging technology is 'mesh networking' where individual nodes of control distributed around a building's services also act as routers able to receive and pass on control 'messages' between appliances using a standard wireless high-speed network. This allows for continuous communication between devices and, even if there is a break at one point in the chain, the nodes are able to redirect the commands via a different route.

Mesh networks are also self-healing: the network can still operate when one node breaks down or a connection goes wrong, which makes this approach highly resilient. This technology is already emerging in commercial developments, but it is in the home where we can expect this technology to make the biggest impact on carbon reduction.

The size, cost, and power requirements of the nodes has fallen dramatically, making it easy and cheap to build them into standard domestic appliances. This allows the use of sophisticated control scenarios in all types of buildings.

End-users are able to measure and monitor energy consumption closely, and service and maintenance is improved because individual products will send out alarms before they break down.

One node or device can deal with a number of different functions and can translate commands whatever network is in use – which is a huge departure from the way controls companies traditionally deployed their proprietary networks and 'locked in' users to expensive solutions. The connected world opens up smart control to everyone.

The emergence of smart meters in the domestic market and the universal availability of domestic broadband services means that the mesh can be extended to whole communities using the internet as the link between homes and services providers – including electricity generating companies.

Key components, such as a mesh-enabled smart meter, could cost as little as £10 as more are rolled out across the country swiftly, creating whole smart



Above and bottom left: Those wishing to control their buildings remotely can do so with a range of high-tech handheld devices

communities that can support each other and share information wirelessly and securely.

Individual homeowners and facilities managers alike already have the capability to monitor and control their building systems from anywhere in the world using 'apps', which are freely available for smart devices such as phones and laptops. If the 'mesh' connectivity is installed in homes and commercial buildings, this brings more and more control and information to users for multiple and increasingly ubiquitous devices as they come online.

Apps

Using apps, users can make adjustments, receive alarms and monitor energy performance. They are also able to interrogate graphs and logs for more detailed functions. For example, my company has developed an app to support building systems integration technology,

"The industry has the chance to create the networks that will allow all the devices to communicate and also to interoperate"

allowing users to manage and review information from more than 260 different sub-systems, regardless of manufacturer. We believe this is at the cutting edge of powerful management and control tools that have enormous potential.

With smart technology becoming cheaper every day as it is distributed on a huge scale, we can speed up the delivery of the fully integrated, intelligent homes we must build to meet our energy efficiency goals.

This connected approach also has huge power-generation potential: the creation of local smart grids means being able to share power between thousands of small microgenerators across entire housing estates. Even in socially deprived areas, greater power independence will be possible.

Smart electrical devices such as hybrid cars, PV panels, and so on, will be plugged into the community network and act as mini-power stations able to store power closer to where it is needed.



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The use of controls is key to saving energy in buildings

> This avoids the huge carbon burden created by power stations' generation process and transmission losses; and, with the UK rapidly approaching 'peak electricity' where demand outstrips central generating capacity, it will be absolutely essential to provide alternatives to the National Grid.

Again, this does not require a hugely complex roll-out of new technology. Instead, it calls for a new approach to using what is already available and, in many cases, already installed.

In order to make smart grid electricity supply possible, we have to consider a shared intelligence in the energy management of our white goods in our homes. This would see the arrival of pervasive machine-to-machine technology in the home, where energy-using devices could intelligently 'offer' energy

Who benefits from BIM?

CIBSE is holding a one-day conference on the 2nd of December in London entitled 'BIM: Who Benefits?' The aim of the conference is to facilitate the adoption of building information modelling (BIM) within building services.

The event will bring together lead practitioners in this new technology, who will be sharing their latest achievements and lessons learned.

BIM presents opportunities for success – and for risk for the unprepared. It requires innovative thinking and a creative approach to implementation in a field that erroneously thought that CAD was revolutionary. BIM is rapidly changing all stages of building services design and construction, from creating virtual building models, to assisting in the success of integrated product delivery. While it may be argued that BIM will become a de facto standard, it cannot be ignored, and there remain many unanswered questions.

Speakers on the day include CIBSE president Rob Manning, of AECOM; Terry Dix of Arup; and Anne King of BSRIA. The event will finish with a debate.

For the full programme, and to book for the event, visit www.cibsetraining.co.uk/conferences

saving levels to the electricity supply companies by way of permanent internet connections to 'cloud-based' computing applications, which are intelligent enough to manage individual white goods in potentially tens of thousands of homes in order to better match demand with provision.

Intelligent control

Many household appliance manufacturers are already inserting intelligent microprocessor controllers into their products as standard. Once a new intelligent device is added to a network it will 'introduce' itself and receive the necessary information for its ongoing operation directly and automatically from the rest of the network.

It will also adjust its own operation in line with changing conditions. You could call this a 'plug and play' system for all domestic appliances that consume energy.

With smart technology becoming cheaper every day as it is distributed on a huge scale, we can speed up the delivery of fully integrated, intelligent homes

To many, this might sound like scary science fiction, with machines taking over the world. It is, in fact, science reality and an intelligent approach that allows humans to deliver a better, cleaner and more carbon free future.

Currently, we rely on end-users to interpret the information they receive from devices such as smart meters and intervene (often in quite sophisticated ways) to reset systems for more efficient operation. The emerging approach will mean that most devices can make those decisions for themselves.

Keys to unlocking this potential rely on an open standard for the control and broadcast of load-shedding availability for all elements in our homes.

Equally, machine-to-machine devices need an internet protocol (IP) address, and until the advent of IPv6, we were running out of addresses.

So the question now is, if the energy companies have to deliver a system of energy management right down to small household goods, who is going to lead the way with creating the necessary standards for this interoperation between the goods themselves and, ultimately, the energy providers?

Is this not an opportunity for the building services industry to create the networks that will allow all the devices to communicate and interoperate? Or are we going to miss this chance, leaving it down to the white goods manufacturers to do this? The choice is ours. ●

Ged Tyrrell is managing director of systems integrator Tyrrell Systems www.tyrrellsystems.com

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Cooler customers

Designing and engineering data centres to be energy efficient is becoming increasingly challenging for professionals.

Chris Beier looks at the key design issues and solutions surrounding these computer powerhouses

The design of new data centres has undergone rapid change and development over the past few years, with a significant increase in the energy load of computer-server racks. Up to about five years ago a 3kW server rack load was considered high-density, but now loads in excess of 23kW are not unusual. These cannot be cooled by a conventional underfloor air distribution system that cools the whole room.

This eightfold increase in energy load has been driven by higher and faster data processing demands – which, in turn, have required the development of more innovative and energy efficient design solutions for data centre cooling and air distribution systems.

Designers can no longer apply a ‘broad brush’ cooling design load criterion of 750W/sq m with confidence for data centre halls. This was generally the accepted norm applied to these environments during the 1990s. It is also the average recommended IT load quoted in the *CIBSE Guide B, 2005, Section 2.3.9.1*, which is currently being updated to take account of new high-density server racks.

Recognising the rapid advances in future high server-rack loads, designers now need to be fully briefed, and able to obtain in advance from their clients the server-rack load expectation (both in terms of maximum load density and load density distribution) for a new or upgraded data centre.

Other crucial factors that need to be considered by designers at the outset are levels of system redundancy, system resilience, uninterruptible system

maintainability, power usage effectiveness (PUE), growth scalability, environmental considerations, CAPEX (capital expenditure) and OPEX (operating expenditure).

Hot and cold aisles

Faced with high rack densities, designers have increasingly adopted the hot-aisle/cold-aisle design concept for data centre cooling. There are several variants of this theme but, most typically, the design incorporates computer room air conditioning (CRAC) units and raised floor as the cooling delivery infrastructure. Ideally, CRAC units are located outside the data hall in an adjoining service corridor, which allows for easy maintainability of the units, while also offering a ‘clean’ data hall for optimum server rack space planning.

The concept focuses on separation of the server rack inlet cold air and the exhaust hot air leaving the server rack. The fronts of the racks are normally configured to face each other; for a contiguous row of racks in this front-to-front arrangement, the space in between is known as the ‘cold’ aisle.

For the ‘cold’ aisle to work properly it is physically enclosed by end and top enclosures. Air from the ‘cold’ aisle (typically maintained at or a little above 20C – again, there are variations to this server delivery temperature) is induced through the high heat load server racks. Hot air is discharged from the rear of the server racks into the ‘hot’ aisle (typically 30C or higher). Air from the ‘hot’ aisle is then returned to the >

An eight-fold increase in energy load in data centres in recent years has required the development of more innovative and energy efficient design solutions for cooling and air distribution systems





Faced with high server-rack densities, designers have increasingly adopted the hot-aisle/cold-aisle concept

> CRAC units for reprocessing and then returned again to the 'cold' aisle. Floor supply air grilles are located in the 'cold' aisle *only*, and return air grilles are located at high level in the 'hot' aisle. The only permissible airflow path from 'cold' aisle to 'hot' aisle is through the server racks. Any other airflow path is deemed to be undesirable short-circuiting or leakage, compromising overall system efficiency. This same concept can be applied to the use of in-row cooling units in lieu of CRAC units. In-row cooling is discussed again later.

There should be no concern about the 'hot' aisle reaching temperatures as high as 35C: this simply demonstrates that the system is extracting large amounts of heat from the racks, which is what it is supposed to do.

What is critical is the server rack intake temperature. This is governed by the server manufacturer, and it is the designer's responsibility to ensure that this reservoir of chilled air is available in adequate and filtered quantities, at the right temperature and relative humidity.

Glossary/definitions

COP: Coefficient of performance = Refrigeration Capacity / Compressor Power (a COP>3.0 is preferred)

PUE: Power utilisation effectiveness = total data centre power / IT power (a PUE<1.5 is preferred)

CRAC: Computer room air conditioning unit

Cold aisle: A contained space where air (ideally at 18C to 25C) is delivered directly to server racks

Hot aisle: A space (generally the volume of the data centre hall excluding the cold aisles' volume) which receives hot exhaust air from server racks and is then returned to CRAC's or other cooling units for reprocessing

Adiabatic cooling: Cooling achieved by passing air through a water spray washer – this maintains a constant wet bulb temperature and reduces the dry bulb temperature

It is essential that this reservoir of expensively generated chilled air is not permitted to go anywhere other than through the server racks. Otherwise, the cost of chilling and distributing the air is wasted, and the risk of 'hot spots' occurring is greatly increased. The emergence of 'hot spots' in an already established and populated data centre is not easily remedied.

Chilled-water temperatures

The cold aisle temperature will ultimately depend on the chilled water flow and return temperatures to and from the CRAC units. Chilled water flow and return (CHW F&R) temperature selection may be governed by:

1. Existing site-wide system CHW F&R conditions/ constraints;
2. Avoidance of latent cooling (dehumidification) and therefore avoidance of re-humidification. Where possible this inefficient and costly process should be avoided;
3. Optimisation of chiller coefficient of performance (COP); thereby PUE optimisation; and
4. Using 'free cooling' where chillers have 'free cooling' heat exchangers that can avail of low ambient temperatures without the need for chiller compressor operation. This again will also yield PUE credits.

CHW F&R temperatures that range between 15C and 21C can offer the greatest potential for free cooling in the UK and Ireland for several months of the year, when ambient air temperatures fall below 13C. Even above this ambient temperature, some free cooling is available.

An example of potential cost savings for a data centre with a 1,000 kW cooling load using 'free cooling' by air cooled chillers is given here: >

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Chilled water storage

The provision of CHW storage is not necessarily the only way to ensure that adequate cooling is always available. Multiple diesel generators, UPS systems and chillers configured to give adequate system redundancy and resilience will go some way to allay fears of complete system failure. CHW storage does, however, offer the client a guaranteed source of cooling supply at all times in the event of mains and/or generator failure. It's always there, ready to be used in the event of a power outage. Its provision is justified, particularly in cases where no generator and chiller redundancy is provided.

In the event of a complete power outage (mains and generator), the primary CHW generation system and plant will cease to operate. In this scenario, a properly sized UPS system must be designed to provide secondary side-cooling delivery to the data hall. This will include UPS power to secondary CHW pumps, CRAC units and associated building management system (BMS) control panels as well as the IT load itself to allow the data centre to be progressively shut down in a planned manner.

The CHW buffer vessel ideally should be sized to match the UPS autonomy in the event of mains and/or generator failure. Clearly, having a UPS 10-minute autonomy makes no sense if the cooling autonomy

can't match it, and vice versa. Some inertia in the data centre building fabric may also be taken into account. Thermal modelling predictions show that about two minutes after complete cessation of cooling delivery, air temperatures inside the data hall will rise to levels above the recommended server rack operating temperatures. This time delay will vary depending on the thermal mass of the building fabric – such as concrete floors/ceilings – exposed to the data centre space. For design purposes, thermal inertia should be ignored.

An excess of primary CHW flow rate over the secondary flow rate of about 5% is required to maintain a constant CHW reserve in the buffer vessel and avoid depletion. A further enhancement of CHW buffer vessel temperature control can be achieved by selectively diverting CHW to the top or bottom of the buffer vessel. On chiller start-up (warm) CHW can be delivered to the top of the buffer vessel, while (cold) CHW can be delivered to the bottom of the vessel. This is simply achieved by automatic valve arrangements on the CHW primary flow pipework leaving the chiller.

As an indicator of buffer vessel size, a cooling load of, say 1,000 kW would require a 25 cu m buffer vessel to match a UPS autonomy of 10 minutes, calculated as follows:

UPS Autonomy = CHW buffer vessel autonomy = $10 \times 60 = 600\text{s}$ (ignoring thermal inertia)
 Assuming CHW F&R $\Delta T = 6\text{K}$
 CHW specific heat capacity $C_p = 4 \text{ kJ/kg K}$ (allowing for say 10% ethylene glycol additive, which reduces C_p from its normal value of 4.2 kJ/kg K)
 CHW mass flow rate m , is given by $1,000 / (4 \times 6) = 41.7 \text{ kg/s}$
 To ensure continuous operation for 600s, requires a CHW reserve of $41.7 \times 600 = 25,020$ litres

A CHW buffer vessel used as a cooling reserve should always be installed in the vertical configuration so as to enable proper CHW stratification temperature management by the BMS in the data centre.

Other solutions

Alternative design solutions for high-density rack configurations are mainly variations on the same theme. These include an enlarged rack dimension that effectively houses the hot aisle (plenum) and cold aisle (plenum) within the rack itself. In this case the system boundary is not the room but the rack enclosure. Cold air is delivered by in-rack cooling modules or local cooling panels (LCPs) into a cold plenum. It then moves through the server rack, where it gains heat, and then delivers this to the hot plenum, from where it is returned to the LCP for cooling.

This arrangement offers the advantage of close proximity precision-targeted cooling without any risk of undesirable thermal bypass leaks – a scenario that is more difficult to achieve where the room is the system boundary. This is because the quality control in a >

Server-rack densities are unlikely to exceed 35kW in the foreseeable future – which means that in-row cooling units are likely to be the most effective solution



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■ A low PUE will become an increasingly important design objective for clients ■

> factory-engineered and assembled product is far better than the quality control that can be achieved on site. Adiabatic cooling is now recognised as a safe design option and, in recent years, has become increasingly favoured by designers.

In this option, outside air is admitted to large air-handling units (capable of delivering air volumes of 15 to 25 cu m/s), where it is filtered and cooled by passing air through spray washers. Water treatment is highly controlled and monitored. Reserve or supplementary CHW or DX cooling coil units are normally provided in the AHU, although these units may only need to operate for very short periods annually. Multiple fans are arranged in parallel operation, normally with 20% redundancy (for example, twelve fans, two of which are redundant).

As this solution uses large volumes, potentially 100%, of outside air, free cooling can be used for the majority of the year. This is particularly the case if the conditions in the 'cold' aisle can be permitted to extend on a high safe side to, say, 25C Dry Bulb and 70% RH. ASHRAE offers a recommended tolerable environmental envelope of 18C to 27C Dry Bulb and 40% to 80% RH. This application can yield an impressive PUE of < 1.3, as virtually no mechanical cooling or CHW pumping is required.

CRAC units can be provided with dual CHW coils and DX coils (with heat liberated from DX coils to a

condenser water system). This arrangement can be used in the event of chiller failure or to use condenser water optimiser 'free' cooling operating regimes.

Conclusion

It is unlikely that server rack load densities will increase significantly above their current levels without a major revolution in microprocessor chip design: it is hard to see how server-rack densities can comfortably exceed a peak of 35kW in the foreseeable future. At this rack load density, the application of in-row cooling units that brings the cooling source in close proximity to the cooling demand is likely to be the most, possibly the only, effective cooling solution. It is also likely that data hall capacity/footprint will need to increase to facilitate further growth, at least in the short to medium term.

A larger data hall facility footprint will also improve (dilute) unit rack infrastructure CAPEX through economies of scale. Future higher energy and operating costs will mean that the achievement of a low PUE (< 1.3) will become an increasingly important design objective for clients. ●

CIBSE is planning to publish guidance on data centres next year. More details will be available in coming months

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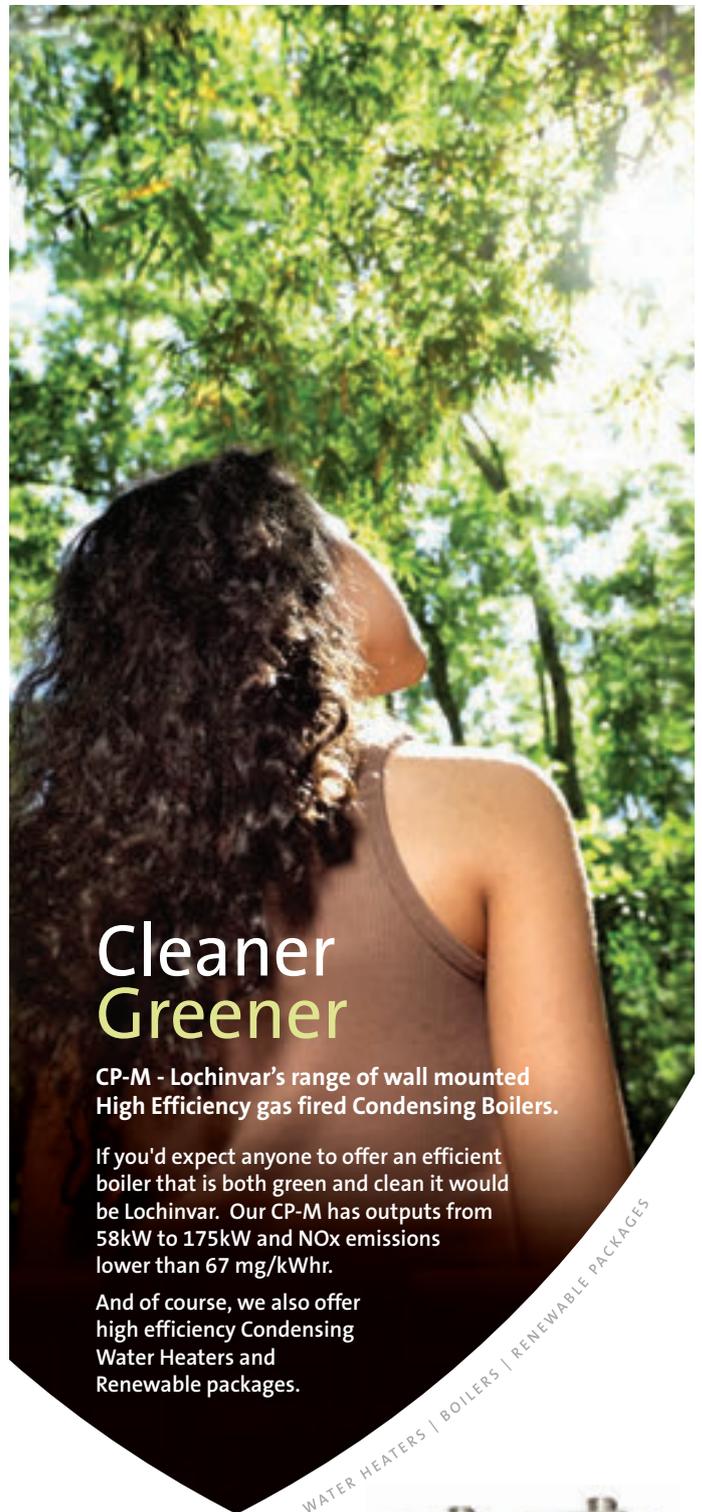
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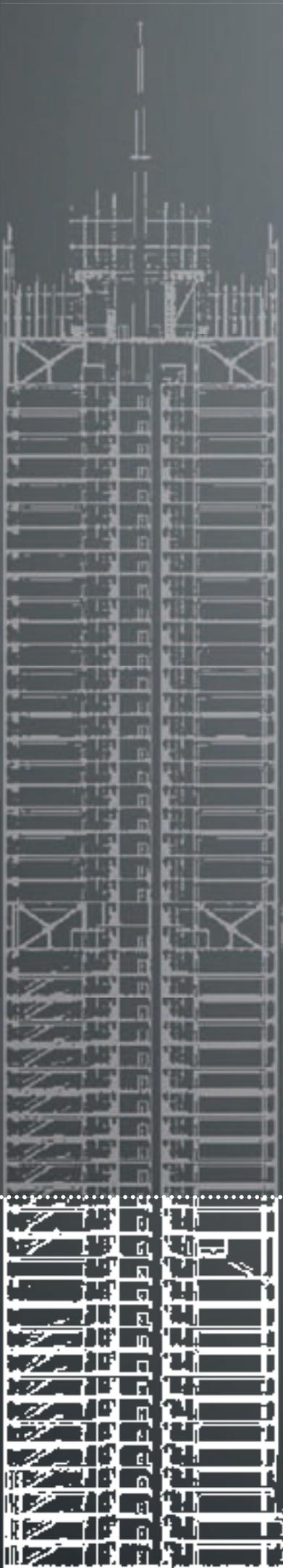
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Lighting control technologies and strategies to cut energy consumption

Lighting is responsible for the largest slice of energy consumption in offices. This CPD module looks at how lighting controls and other strategies can help reduce this electricity use and enhance user comfort. A case study on an office building in New York is also considered

Having just come to the end of the first registration period of the Carbon Reduction Commitment Energy Efficiency Scheme (CRC), many large energy users are focusing on opportunities to reduce their consumption to not only reduce costs but also to boost their corporate environmental credentials.

In a four-year, \$15m study on energy efficiency in buildings, the World Business Council for Sustainable Development^[1] reconfirmed that, worldwide, buildings account for 40% of global energy consumption (and, of course, the associated carbon footprint) – significantly more than all transportation combined.

The study clearly established what many facilities engineers have recognised, and acted upon: that buildings are a place where improvement can be readily made, at lower costs and higher returns than in other sectors. This article will focus on one particular, and

important, area – the methods and benefits of lighting control – and will provide a summary of a recent case study of an office building in Manhattan, New York.

Lighting optimisation – easy fruit?

The operation of many offices presents a particular environmental challenge due to the demands of the various occupiers, as well as the expectations of the building owner, which sometimes differs to that of the occupier. However, they also offer great potential for improvement. The chart^[2] in Figure 1 illustrates annual UK electricity use in office buildings. It clearly shows that lighting plays a significant part in total electrical consumption. Globally, lighting contributes around 20% to office energy use. Lights in offices are often left on when no one is in the room, or kept at maximum level, even when daylight streams through the windows. In all too many buildings, lighting >

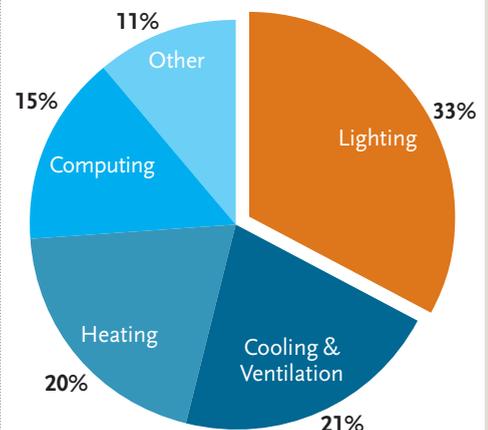


Figure 1: Average electricity consumption in UK office buildings

> control is restricted to being simply 'on' and 'off' at the whim of the occupant.

The use of a controlled lighting environment has been shown to improve employee comfort and health by providing a safe and secure work environment[3]. Where occupants are allowed to affect control on their own personal working environment (through, for example, task-oriented lighting) their satisfaction with their working environment and productivity rises and it has been shown that the improved visual environment can reduce absenteeism[4]. Increases in productivity of just a few per cent could alone pay back the installation cost of intelligent light control systems.

Total energy savings

By controlling the whole lighting installation, the annual energy use, as well as the maximum demand drawn from the electricity supply grid, is moderated – particularly where a lighting installation includes predominant daytime use and daylighting opportunities are exploited. Reduced lighting energy consumption can significantly diminish the carbon footprint of the building – each kWh of grid supplied electricity is likely to create about 0.5kg CO₂. The local night-time environment can also directly benefit by reducing light pollution from unnecessary lighting.

Figure 2[5], which is based on data gathered by a system's manufacturer, indicates that, with the adoption of 'state of the art' control for a 'typical' office building, lighting energy use may be reduced by 60% at the same time as reducing the building cooling costs by 20%. Maintenance costs can also reduce as lighting operation times are controlled.

Lighting control

In 1959 a physicist named Joel Spira invented the world's first solid-state light dimmer. In the succeeding half century this technology has evolved into integrated total light management control systems, where, for example, room occupation sensors, linked with daylight

sensors and solar shading devices, are employed to automatically adjust the lighting levels according to the type of building use without any human intervention.

By incorporating lighting level sensors together with algorithms that can determine the position of the active shading devices (blinds, louvres and *bris soleil*), these devices can be adjusted to reduce glare, heat gain and, as a result, trim cooling loads. The systems can provide enhanced user input (for example, using simplified control panels in rooms to enable single point lighting 'mood' control) and accessible monitoring so that, at a glance, occupiers can track changes in energy consumption. The marketplace for such systems is currently buoyant, with many systems being interoperable (able to communicate and operate with devices and systems from other suppliers), thereby creating a complicated array of intertwining solutions.

The DALI (Digital Addressable Lighting Interface) has been the technology that initially moved widespread adoption of automated lighting control forward. DALI is a digital communications system that was initially designed to provide lamp dimming and switching control. Each controlled lamp has a DALI dimmable ballast (transformer) with its own individual digital address allowing the lamp to be switched and controlled continuously from full output to a few percent of maximum.

One of the reasons for the wide adoption of DALI is its simplicity of connection; DALI ballasts are connected with two parallel wires (a 'bus') in a star or daisy-chain formation that provide the control signal and power to operate the ballast control. Operating at low voltage and within strictly specified limitations[6], the system is particularly robust and resistant to interference. Controller devices can now include a wide variety of inputs such as control panels, switches, light sensors, occupancy sensors and from virtual 'control panels' on



The headquarters of the *New York Times* in Manhattan, where the priority was to give natural light to occupants

personal computers, PDAs and smartphones. Each controller can send messages directly to a ballast device or to another controller, and ballasts can be addressed individually or as part of a group.

Integrating lighting control

DALI was originally conceived as a standalone system to control lamp ballasts. However, with the improvement of building fabric and the rise in occupant expectations, lighting has become an increasingly significant part of building energy consumption. This has driven the need to incorporate lighting control into the overall building management system and has, in turn, generated a profusion of standards and protocols. Probably the most significant underlying standard is IEEE 1451 – Standard on Sensors and Actuators (implemented in 1997); this is a suite of guidelines each aimed at standardising a different aspect of communications for smart transducers (sensors and actuators) [7].

Both wired and wireless protocols build upon and integrate with IEEE 1451. Some protocols provide gateways or bridges with DALI systems (such as that shown in Figure 3); and some, such as IBECS (integrated building environmental communications system) use their own microcontroller on each sensor and device. IBECS has recently been expanded to allow control of standard DALI ballasts – further blurring the differentiation between systems.

The advent of low-cost wireless systems is challenging the original 'simplicity' of the two wire DALI. Wireless technology is particularly pertinent in refurbishment projects where additional data cabling may

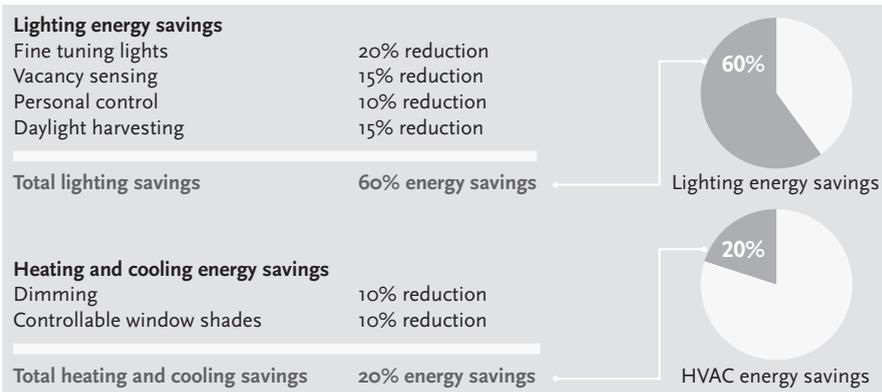


Figure 2: Example of possible energy savings in an existing office building

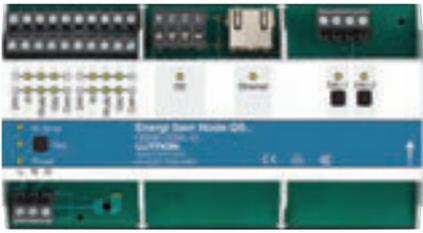


Figure 3: A lighting controller taking inputs from a wide range of sensors to drive DALI outputs. The system is linked with the building management system (and other controllers) through standard computer networks

be seen as either too expensive or simply impractical.

One of the leading contenders for the wireless protocol is the ZigBee; unlike other wireless types, this was developed specifically for remote monitoring and control with very low power requirements. Due to its 'mesh' method of transmission it has, potentially, almost unlimited range within a building. Mesh networks enable individual nodes (such as sensors) to communicate with and pass data directly to other nodes, so the data travel in short hops (just a few metres) but 'meshed' together, linked by short-range wireless, so the information may pass over long distances.

ZigBee's fast response times are particularly relevant for lighting control: users expect an 'instantaneous' response when a light switch is pressed. But, as would be expected in such a fast-moving marketplace, there are other low-power wireless systems vying for position.

Integrated building management and control is increasingly being undertaken by systems that use BACNET – ASHRAE's Data Communication Protocol for Building Automation and Control Networks; or Echelon's LONworks. These are needed to communicate with manufacturers' proprietary systems via 'intelligent' gateways and provide a framework to control and monitor subsystems (such as DALI) as well as link in the various wired and wireless networks.

Case study: New York Times HQ

The New York Times Company, a global media enterprise, decided to build a new headquarters in Manhattan, New York and, as a client, wanted to take an active role in the project. The company resolved to exercise control at every stage of the project's design and construction processes, ensuring that the new building accurately represented its corporate culture and values, and reaped real business benefits for the company, which owns 28 floors or about 62,500 sq m. The interior designer Gensler confirmed that: 'The number one priority was to allow natural light

to make employees feel more comfortable and to produce an energising work environment.'

State-of-the-art lighting control options were implemented to satisfy the requirement for integrated daylight with appropriately dimming electric lights, as well as to provide the flexibility to readily reconfigure spaces for alternative uses. The building design was based around a lighting power density of 13.5 W/sq m usable floor area. Using the DALI-based lighting management system, The New York Times Company's recorded annual average light power is just under 4 W/sq m – a reduction in operating power use over design of about 70%. The annual data for 2008 is shown in Figure 4.

The design goal of 13.5 W/sq m was set to meet the local building code that was in effect when the building was constructed; these regulations have since tightened to 11.6 W/sq m, and the operational lighting power use is still less than 35% of this figure. This disparity between installed capacity and the actual power consumption shows that there is a real challenge in modelling and predicting lighting energy use to provide evidence for code compliance when planning an installation. It needs to take account of operational factors such as the integration of daylight and variable occupancy.

Four main strategies were employed:

- Light level tuning – ensuring that the illumination levels suited the task;
- Occupancy sensing – using occupancy sensors to ensure lighting is only used (at appropriate levels) when needed;
- Daylight harvesting – managing and linking solar control with active lighting systems;
- Scheduling – Using easily programmable timed schedules to operate lighting zones.

The relative benefit of each strategy is shown in Figure 5.

Glenn Hughes, former director of construction for the project, believes that the lighting control system has established an excellent baseline for the building, but that even greater energy savings can be achieved as the system parameters are adjusted and developed by carefully monitoring the building performance.

'The key is having smart systems, where all your components work in unison to give you the optimal level of light,' says Spira the inventor of solid-state light dimming. 'The technology is getting better and faster, which means the savings are getting better and coming faster.'

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With thanks to Richard Whitbread of Lutron for contributions to this article

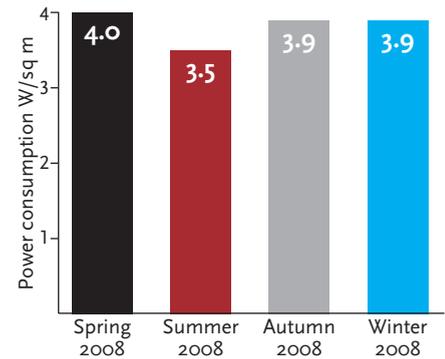


Figure 4: Quarterly averaged lighting power consumption for New York Times building

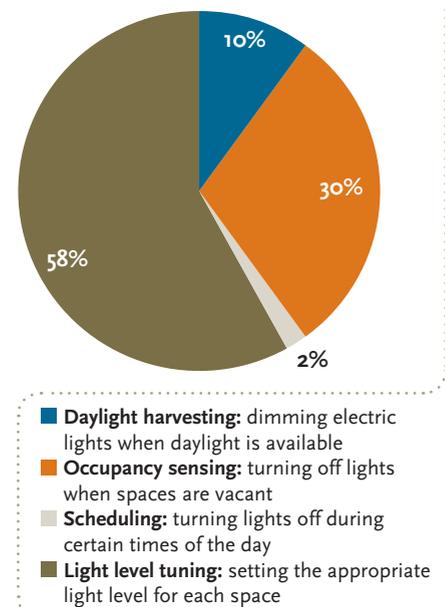


Figure 5: Lighting energy savings achieved through strategies employed in New York Times building

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Module 22

November 2010

1. What proportion (%) of electrical energy is consumed by lighting in an average UK office building?

- A 13%
- B 23%
- C 33%
- D 43%
- E 53%

2. In the *New York Times* case study what percentage of energy was saved annually compared to the full installed lighting capacity?

- A 10%
- B 30%
- C 50%
- D 70%
- E 90%

3. In the same case study, which of the described strategies was the most effective to reduce lighting energy consumption?

- A Daylight harvesting
- B Occupancy sensing
- C Light level tuning
- D Luminaire design
- E Scheduling

4. What does the acronym DALI stand for?

- A Data Addressable Lighting Interface
- B Digital Addressable Lighting Interface
- C Direct Addressable Lighting Interface
- D Dimmable Addressable Lighting Interface
- E Dynamic Addressable Lighting Interface

5. Which of the following is unlikely to be true for ZigBee systems?

- A The radio devices are low power
- B Devices can transmit individually over large distances
- C System has a fast response time
- D Does not require control wiring between nodes
- E Developed specifically for control



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

● For more info visit www.aircraftairhandling.com



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Vexica Technology provides energy-efficient LED lighting solutions for multiple applications for interior or exterior uses. A unique bespoke design service is available. Vexica provides LED-based solutions that not only offer energy efficiency for today's carbon conscious world, but also offer excellent payback periods. Vexica offers a unique approach to LED lighting, harnessing a technical team of lighting engineers with over 10 years' industry experience to help clients find the correct energy-efficient lighting system.

● For more information email sales@vexica.com or call 0113 243 4813

Spa Bridlington refurbishment includes Oventrop valves

Oventrop valves are now in control at the Spa Bridlington, which has recently undergone a building redevelopment and refurbishment to create its traditional role for the future.

The heating and cooling systems have been upgraded by Airedale Mechanical Services, Leeds, including additional gas-fired, high-efficiency boilers and associated equipment that connect to the distribution pipework serving the low pressure hot water heating system to all areas. Oventrop supplied a variety of valves.

● For more information call 01256 330441 or email sales@oventrop.co.uk



MHS Boilers heats up Holiday Inn

The newly extended Holiday Inn at Birmingham Airport is enjoying green and sustainable heating and hot water, thanks to the installation of 28 SOLARTRON R 2.5 flat panel solar collectors, as well as four Ultramax R607 floor-standing condensing boilers from MHS Boilers. The installation includes four 900 litre twin-coil and three 3,000 litre single-coil hot water cylinders from MHS. It is a low-cost system which serves as back-up for domestic hot water generation and gets good energy returns the whole year round.

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



BACnet Control from Titan Products

Titan Products has developed a range of application specific controllers. Designed for every control requirement, the controllers offer total flexibility. The BACnet range includes fan coil, VAV, room, natural ventilation and plant room controllers as well as BACnet to Modbus gateways. The controllers can be used as stand alone or as part of an integrated building management system and have an option for a built-in display. Each controller can be used in conjunction with Titans RDU (room display unit).

● For more information visit www.titanproducts.com or call 0161 406 6480



DANLERS energy-saving grid modules

The latest addition to DANLERS UK manufactured, energy-saving controls range is the PIR Occupancy Switch Module. This module measures 50mm by 25mm and performs similar functions to DANLERS'

popular PIR switches but can be suited into a Eurodata plate or built into luminaires. This discrete passive infra-red occupancy module brings the load on only when a person is present, saving on energy bills. It also includes a person detector, adjustable photocell, relay, adjustable time lag function and is available with either a 5m or 10m detection zone.

● For more information call 01249 443377, fax 01249 443388, email sales@danlers.co.uk or visit www.danlers.co.uk



New hotel makes long-term booking with Samsung

A brand new state-of-the-art Holiday Inn Express Hotel in Manchester has chosen Samsung's powerful DVM (Digital Variable Multi) air conditioning system to provide efficient climate control. A sophisticated yet simple central management system provides hotel staff with finger-tip control via the internet,

● For more information visit www.samsungac.co.uk or call 01932 455000



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Permanent/fixed clamp-on flow metering solution – the U1000

The U1000 is a transit time ultrasonic flow meter, designed to work with clamp-on transducers to provide accurate measurement of liquid flowing within a closed pipe. There's no need for any mechanical parts to be inserted through the pipe wall or to protrude into the flow system. It takes just a few minutes to install and there is no need to shut down flow or drain the system! If you need a stand-alone water meter or sub-metering of hot and chilled water services as part of your aM&T or BEM's system, the U1000 could be an ideal solution.

● For more information call 01628 810456 or visit www.micronicsflowmeters.com

Thinking Buildings Universe – your 24-hour information centre

Knowing where you can access particular information quickly and easily is something that can save you incalculable amounts of your valuable time. The Thinking Buildings Universe, from Grundfos, offers building services professionals a centralised information point that is a one-stop shop for commercial buildings services pump applications. This site was specifically designed to work as an aid during the planning and specification phases, as well as when the selections have been made and the systems are operational. At all points of the development of the new system, potential users gave their input as to what they expected, needed and wanted to see from such an information hub. If you need to know the meaning of biocide or enthalpy, for example, or have been puzzled by what a DX system or a Stribeck curve is, or can't remember the laws of affinity, then this is the location for you. Why not save this site as a 'favourite' right now?

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



LCE chosen in collaboration

Lloyd Coils Europe (LCE) has been selected by Lennox Europe to collaborate in the development of its new generation of energy-efficient rooftop air-conditioning units, the Balti range. The range will be the most innovative in its class, with the best price/service ratio and class-A energy efficiency. The major impact an air conditioning system has on global warming is the indirect CO₂ emissions that result from the production of the energy they consume.

LCE is a leading manufacturer and supplier of equipment for heating, ventilation, air conditioning and cooling markets.

● For more information visit www.lennox europe.com or www.lloydcoils.eu



A prospector's guide to spotlighting

The demand for an attractive, versatile and economic spotlight tailored to all display applications is fully met by the new range of Thorn Prospector luminaires. Designed to harness the latest LED and ceramic metal halide lighting technologies, the spotlights offer consistent contemporary styling, in a choice of silver, grey or white. With a choice of four beam distributions, plus track or pendant models, they are equally adept at focussing tightly on individual displays, or washing a large space with ambient light.

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

ICS Cool Energy chiller design

ICS has been at the forefront of chiller design and application to the process industry for 30 years. Following a series of CPD-accredited presentations over a nine-month period, ICS has confirmed that its research and development on energy and natural refrigerants has been well received. This has culminated in the manufacturing company Tricool Thermal developing its use of natural refrigerants and the launch of its first range of Green Cooling Hydrocarbon Chillers. The range provides a choice of ozone-friendly hydrocarbon refrigerants; propane, R1270 and propylene, R1270.

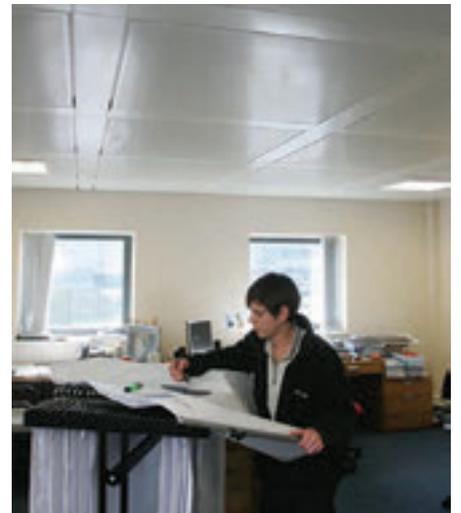
● For more information call 0238 052 7300 or visit www.icstemp.com



Hopkins' innovative approach receives industry awards acclaim

An innovative approach to building services design has won national acclaim for J&B Hopkins, of Fareham, Hampshire, with short-listings for two prestigious awards. The firm is a finalist in the 'Innovation' category of the Retrofit Awards and in the 'Industrial and Commercial Project', and 'Small End User' categories of the RAC Cooling Industry Awards. J&B Hopkins entered both awards with a case study showing how it is possible to deliver highly energy efficient temperature control using low-temperature heating and high-temperature cooling.

● For more information call 01489 584706 or email paul.hopkins@jbhopkins.co.uk



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University of Lincoln appoints BG Controls for campus developments

Building controls specialist, BG Controls, has been awarded a five-year service and maintenance contract with the University of Lincoln. BG is currently installing and commissioning an integrated heating and access control system on buildings located throughout the city-centre Brayford Pool campus, and on some of the university's satellite sites across the county. BG Controls has enabled numerous product ranges across all the buildings to interface to one central front end that can be accessed remotely. BG also remotely monitors the system on a daily basis to diagnose and rectify any potential faults and alleviate responsibility from the on-site facilities management team. The technology also automates innovative air source heat pumps, which heat and cool the interiors of Sparkhouse Studios – the university's start-up business facility – as well as the newly expanded Human Performance Centre.

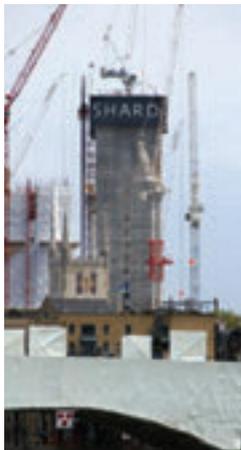
● For more information call 01909 517460 or email enq@bgcontrols.co.uk



UNIVERSITY OF LINCOLN

Prysmian launches free guide to BS8519 cable selection

Prysmian has produced a free printed guide to the selection of cable types in accordance with the recommendations of BS 8519:2010. The aim is to help designers, regulators and installers of life-safety and fire-fighting systems identify the correct cables and accessories needed to comply with the new standard.



BS 8519:2010 came into force earlier this year and anyone specifying, inspecting or regulating fire resistant cabling should be aware of it.

● For your free guide email cables.marketing.uk@prysmian.com or call 01238 029 5029



Titon chosen for new lifeboat station on the Isle of Wight

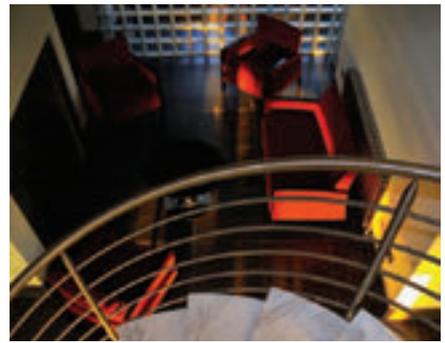
The new Bembridge RNLI lifeboat station on the Isle of Wight has been fitted with Titon-supplied window and door hardware, including Securistyle's Defender and Sterling friction hinges, PN's Combi window hinge system, tri-coated Maco RAIL espagnolettes, and Maco door locks. The high-tech facility was fitted with Iroko timber framed windows because of their strength and durability. Once complete, the new lifeboat station will house the charity's latest class of offshore rescue boat, *The Tamar*.

● For more information call 01206 713800 or visit www.titon.co.uk

Clamp-on energy meters gaining favour, says MWA

Clamp-on energy meters are starting to catch the eye of many more customers, says Martin Wardell, managing director of MWA Technology. 'Our Dynasonics clamp-on meters are fulfilling many vital needs within water, energy, chemical and sewage applications. As a result, clamp-on meters are one of our fastest growing products at the moment,' says Wardell. 'The meters, which measure the fluid velocity of liquid within a closed conduit, are very quick and easy to install, saving time and labour costs.'

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



MHS Radiators warmly received

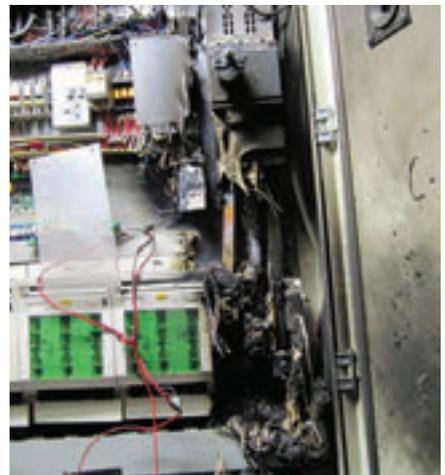
As part of a £1m development to transform a former public house into a luxury restaurant, MHS Radiators has supplied 14 Arc radiators and matching valves to the newly opened Alec's Restaurant, Bar and Grill, in Navestock Side, Essex. Owner of the restaurant, Alec Smith, said: 'This restaurant blends contemporary features into a 300-year-old building and we needed radiators that were going to make a bold statement – not shy away into the background. The MHS Arc fitted the bill perfectly. I was really impressed with the high quality of the products supplied by MHS Radiators.'

● For more information visit www.mhsradiators.com

Fire in hospital chiller sparks safety warning

A fire in the control enclosure of a chiller at a London hospital has highlighted the importance of regular maintenance. Chiller expert, LH, was called in to investigate. Representative Andy Boatwright said: 'Fortunately, the fire was contained and localised, but it could have been extremely serious.' LH uses a thermal imaging camera and the ClimaCheck performance analyser to identify 'hot spots' in plant and performance issues that cause inefficiency and could lead to future breakdown.

● For more information visit www.lh-plc.co.uk, call 020 8947 0886 or email andy@lh-plc.co.uk



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Dimplex moves towards zero carbon with solar PV packs

Dimplex Renewables is adding to its portfolio with the launch of a range of solar photovoltaic (PV) packages. Containing polycrystalline modules and everything required for installation, the kits offer a complete PV solution for residential and light commercial buildings. The kits contain everything needed to install and connect the modules, including G83 approved inverter, a roof mounting system, cabling, isolators and generation meter.

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



Community heating scheme is a breeze

An off-site manufactured packaged plant room from the Ormandy Group is to play a key role in a major sustainable construction project. The company has also provided a large number of its MiniBreeze energy efficient consumer units for the Academy Central project, currently under construction on the site of the former University of East London

in Barking. Taylor Wimpey, in partnership with London and Quadrant Housing Association, is developing 936 new-build residential units.

● For more information visit www.ormandy ltd.com



Top scores for Kingspan KoolDuct

The Kingspan KoolDuct panels, produced at Kingspan Insulation's Pembridge site and used in the fabrication of ductwork from the Kingspan KoolDuct System, have achieved a BRE Green Guide 2008 Summary A Rating. The A rating was awarded by BRE Global, which used its 2008 Environmental Profiles Methodology to assess the environmental impacts of the product across its entire life cycle. The 2008 Green Guide rating system uses such data to classify performance in a number of key areas.

● For more information call 01544 387384 or visit www.insulation.kingspan.com

Energy consumption reduced by 70% at European Bank

Fläkt Woods has completed upgrading 23 variable air volume fans and four cooling tower fans at the European Bank for Reconstruction and Development (EBRD), at Exchange Square in London. Energy usage has been reduced by around 70%. This project was designed to monitor the overall effect of variable speed drives when fitted to an axial-fanned air handling unit. The energy usage was monitored and energy usage has been calculated, conclusively demonstrating the value of the works. The expected annual savings on electricity costs are £4,266, with an environmental benefit in terms of CO₂ emission reduction of 30 tonnes. Fläkt Woods' Andrew Knight said: 'Projects of this kind offer a positive impact on the energy consumption of the HVAC plant at the same time as reducing our clients' operating costs. Making a difference through our technical site services is what we aim to do.'

● For more information call 01206 222549 or email info.uk@flaktwoods.com



Sharm El-Sheikh airport flies high thanks to Tour and Andersson

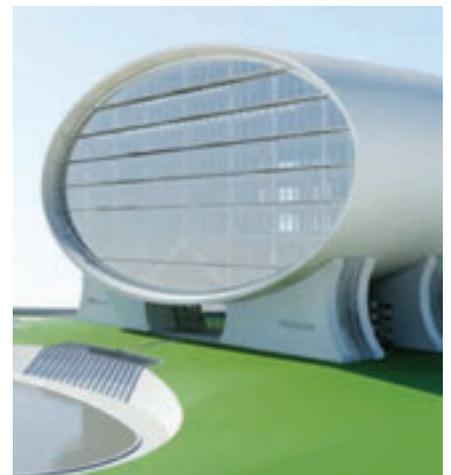
Tour & Andersson has secured the HVAC contract to supply valves for the Sharm El Sheikh International Airport project. Working alongside Shair and Partners, the Saudi Binladin Group and Delta Construction, Tour & Andersson is providing its balancing valves, alongside 251 STAG valves for pump hookups, to ensure time and labour savings are achieved on the installation and commissioning. Tour & Andersson's experience in this field made them the natural choice.

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

CIAT system will help achieve 32% energy saving

A CIAT Cristopia thermal energy storage system and Powerciat water chiller have been specified for a new branch of the Mauritius Commercial Bank, the design of which is expected to achieve energy savings of 32%. The building, oriented east-west, will have glazed façades facing north and south equipped with sun shades and tinted windows to reduce heat transmission. A 3,078 sq m photovoltaic farm will enable an average of 258 kW, to be generated during sunny weather.

● For more information call 01883 621015



Products & Services

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PACAIR sales increase rewarded with five-year rolling contract

Mitsubishi Electric has signed a five-year rolling contract with bespoke design and air conditioning supplier, PACAIR, following the company's success as an official value-added reseller (VAR) of its comprehensive range of air conditioning, heating and ventilation products. The move comes after both companies enjoyed growth during one of the toughest periods for the industry for decades, and reflects the investment that PACAIR has made, which has seen the company grow its workforce and customer base.

● For more information call 01442 254401 or email sales@pacair.co.uk



Going underground...

An Escalator Water Suppression System (EWSS) from Kentec Electronics is safeguarding new escalators at Kings Cross St Pancras underground station – the latest phase of a £800m redevelopment of the Northern Ticket Hall. The system incorporates the latest developments in linear detection cable and is designed to give a greater degree of control over the sprinkler system as it

allows sprinkler activation to be more localised, while providing a fire-safe environment and minimising service disruption from false alarms.

● For more information call 01322 222121 or visit www.kentec.co.uk



JCC Lighting catalogue launched to inspire industry

JCC Lighting has launched its new lighting brochure, Catalogue 23. This latest edition features the full range of lighting products, plus a number of new fittings and accessories which are the result of intense development, evolving technology and innovation at JCC, in order to maintain its position at the leading edge of the lighting industry. Catalogue 23 marks a departure from previous issues both in terms of design and layout. It is easier to use with an attractive practical layout and clear colour-coded sections for easy reference.

● For more information call 01243 838999 or visit www.jcc-lighting.co.uk



SE Controls – partners in façade fabrication

Façades in most new buildings now incorporate some form of automated opening devices to control natural ventilation and provide smoke ventilation in case of fire. Partnering in the area of design and supply with facade fabricators/installers is crucial to ensure trouble-free installation and

commissioning – and getting the job done right and to budget. SE Controls offers a complete service, from design through to maintenance for any building.

● For more information call 01543 443060 or visit www.secontrols.com



Hilton Doubletree spa gets the Lochinvar treatment

A luxury hotel in Cheshire has chosen leading boiler and water heater manufacturer, Lochinvar, to provide equipment for its new spa. The Doubletree by Hilton is a stylish hotel in a restored 18th century manor house, situated in beautiful gardens on the outskirts of Chester. The contractor for the project, HE Simms, installed two Lochinvar CP-M100 boilers for the provision of space heating, alongside two 300CE Charger water heaters to ensure plenty of hot water was available for guests at the spa.

● For more information call 01295 269981 or email info@lochinvar.ltd.uk



Cool air curtains Down Under

JS Air Curtains has supplied six Zen air curtains to The Reef Hotel Casino in Cairns, Australia.

The units were installed by Haden Engineering to solve a condensation problem due to an average outdoor temperature of 29°C. Glyn Wakeman, sales engineer at Haden, said: 'The problem was that hot air was being blown in when the doors opened, resulting in condensation problems and poor performance of the air conditioning. Since the Zen air curtains have been installed, they've stopped the hot air blowing in.'

● For more information call 01903 858656 or email mverney@jscurtains.com



Comprehensive indoor climate solutions for schools

Despite cutbacks to the education budget, many school building projects are still underway – so the need for energy efficient, reliable and fit-for-purpose products is as great as ever. Zehnder, one of Europe's leading indoor climate solution providers, fully understands the challenges facing architects and specifiers when designing indoor climate solutions for new or refurbished school buildings, and have an unrivalled collection of heating, cooling and air filtration solutions. Zehnder has a dedicated building schools team.

● For more information call 01252 515151 or email sales@zehnder.co.uk



Ground source energy for Scottish crime campus

Work has begun for the new Scottish crime campus at Gartcosh, near Glasgow, which is the first of its kind in the UK and will bring together on

a single site a number of agencies involved in tackling and preventing serious organised crime in Scotland and beyond.

In an innovative collaboration, the 57 borehole ground loop heat exchanger and associated equipment has been designed by EarthEnergy as part of a multi-disciplinary team.

● For more information visit www.earthenergy.co.uk or call 01326 310650



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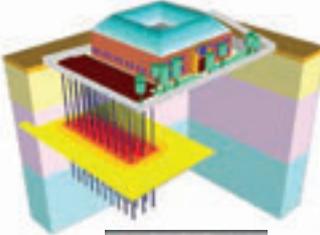
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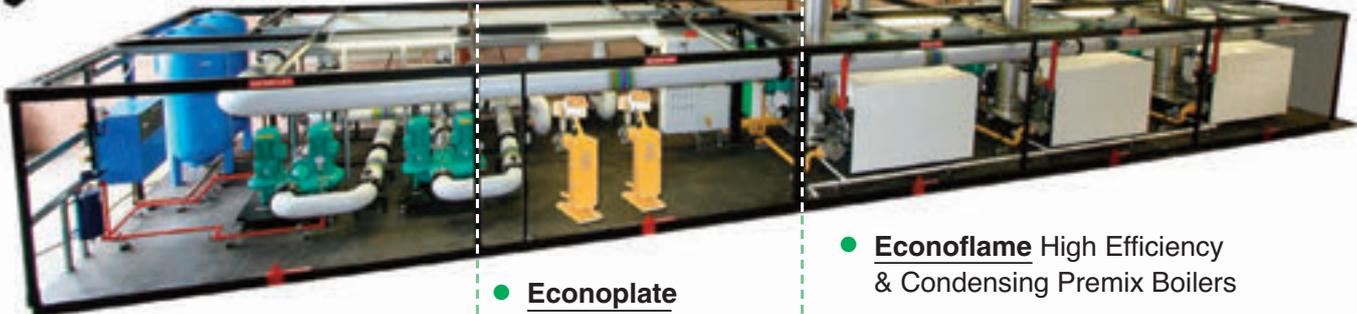
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- **Econoflame** High Efficiency & Condensing Premix Boilers

- Stokvis Stand Alone Plant or
- Heatpak - Complete Packaged Plantroom

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Events & Training

NATIONAL EVENTS AND CONFERENCES

- **09 Nov 2010** **HBF Technical Conference** Birmingham
Regulatory burden facing industry. www.house-builder.co.uk
- **10-11 Nov 2010** **Innovation Towards Sustainable Materials** London
International conference. www.iom3.org/events/sustainability
- **18 Nov 2010** **Smart Meters and Automatic Meter Reading** London
Issues in smart metering. www.cibsetraining.co.uk/conferences
- **23 Nov 2010** **CIBSE Annual Lecture** London
What does climate change mean for you? www.cibse.org/annuallecture
- **25 Nov 2010** **CHPA annual conference and awards 2010** London
CHP, district heating and community energy. www.chpa.co.uk
- **25 Nov 2010** **Essential Building Regulations one day legal update seminar** London
Everything you need to know about the changes. www.workplacelaw.net
- **02 Dec 2010** **BIM: Who Benefits?** London
Accelerating BIM within building services. www.cibsetraining.co.uk/conferences
- **09 Dec 2010** **Fred Jamieson Memorial Lunch** Belfry hotel
Plus the Trainee of the Year Award launch. rowancrowley@yahoo.co.uk
- **12-13 Jan 2011** **The Arc Show** London
Architecture, retail and commercial lighting www.thearcshow.com

SOCIETY OF LIGHT AND LIGHTING

- Visit the SLL pages via www.cibse.org
- **23 Nov 2010** **SLL Masterclass – The Low Carbon Challenge** Liverpool
eventbookings@cibse.org

CIBSE REGIONS

- **10-12 Nov 2010** **IAQ 2010: Airborne Infection Control – Ventilation, IAQ and Energy** Kuala Lumpur
Sponsored by CIBSE Healthcare Group. www.ashrae.org
- **17 Nov 2010** **Energy Efficiency**

Opportunities from Zip Heaters

- Manchester
Speaker: Adrian Hippert. m.atherton@dssr.co.uk
- **18 Nov 2010** **Soft Landing Schemes** Southampton
A technical presentation by Michael Chater of Hampshire County Council. gary@gjal.co.uk
 - **03 Dec 2010** **Natural Ventilation in the Urban Environment** London
A CIBSE Natural Ventilation Group seminar. www.cibse.org/nvg

CIBSE/OTHER TRAINING

- **04-05 Nov 2010** **Low Carbon Energy Assessor EPC Training** London
Energy Performance Certificate training. www.cibsetraining.co.uk
- **09 Nov 2010** **Part L Update for LCEAs** Manchester
Update on the changes to Part L of the Building Regulations for energy assessors www.cibsetraining.co.uk
- **11 Nov 2010** **Air conditioning inspectors update** London
Update for those undertaking Air conditioning inspections www.cibsetraining.co.uk
- **15 Nov 2010** **Air conditioning inspectors** London
Become accredited by CIBSE www.cibsetraining.co.uk
- **16 Nov 2010** **Lighting and Energy Efficiency** London
Energy efficient lighting solutions. www.cibsetraining.co.uk
- **22-26 Nov 2010** **BSEN16001** London
Qualify under new standard to produce Energy Management System www.cibsetraining.co.uk
- **23 Nov 2010** **Part L update for LCEAs** London
Changes to Part L for energy assessors www.cibsetraining.co.uk

CPD TRAINING

- Visit www.cibsetraining.co.uk, call 020 7675 5211 or email eventbookings@cibse.org.
- BUILDING REGULATIONS AND ENERGY EFFICIENCY**
 - **02 Nov 2010** **Energy Surveys** London
 - **03 Nov 2010** **Gas safety regulations explained and designing for compliance** London
 - **04 Nov 2010** **Part L Building Regulations 2010** Loughborough

Smart meters to come under the spotlight

CIBSE is holding a one-day conference on 18 November, exploring the recent focus on smart metering.

The conference will be looking at how smart meters could transform the way we use energy, while also asking just how reliable they are in practice. It is a timely topic, with the government recently announcing its smart metering initiative, and the major challenge it poses to industry. It will also increase pressure on companies to put the appropriate methods in place to implement the recent policy changes.

Speakers on the day include representatives from ESTA,

John Field, of Power Efficiency, will be speaking during the event



DECC, ECA and OFGEM, as well as John Field from Power Efficiency, who will be looking at implementation and the use of data, and Chris Beard from Logica, who will be looking at the installation process.

For a full programme and to book a place, visit www.cibsetraining.co.uk/conferences

- **24 Nov 2010** **Building Regulations Part G (2010) explained** London
- FIRE SAFETY**
- **03 Nov 2010** **Fire detection and alarm systems for dwellings BS 5839 Part 6:2004** London
- **17-19 Nov 2010** **Fire safety engineering design: principles and practice (three-day course)** London
- **24 Nov 2010** **Fire sprinkler systems: design to BS EN 12845** London
- PUBLIC HEALTH AND WATER**
- **04 Nov 2010** **Variable flow water system design** London
- **23 Nov 2010** **HSE guidance on control of legionellosis explained** London
- ELECTRICAL SERVICES**
- **09-11 Nov 2010** **Electrical services explained (three-day course)** Leeds
- **25 Nov 2010** **Standby diesel generator** London
- **30 Nov 2010** **Inspection and testing of electrical installations and portable equipment** London

MECHANICAL SERVICES

- **17 Nov 2010** **Practical controls for HVAC systems** London
- **18 Nov 2010** **Air conditioning basics 3: air conditioning plant** London
- **19 Nov 2010** **Air conditioning basics 4: automatic controls and refrigeration** London
- **24-26 Nov 2010** **Mechanical services explained (three-day course)** London
- LIGHTING**
- **09 Nov 2010** **How to specify lighting: office lighting** London
- **07 Dec 2010** **Lighting basics 1: light, sight and colour** London
- FACILITIES AND PROJECT MANAGEMENT**
- **10 Nov 2010** **Running projects effectively** London
- **12 Nov 2010** **Preparing FM and maintenance contracts** London

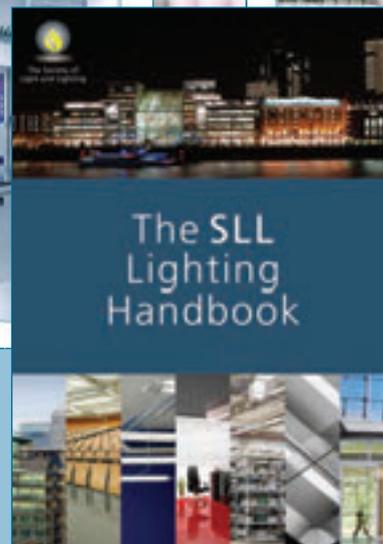
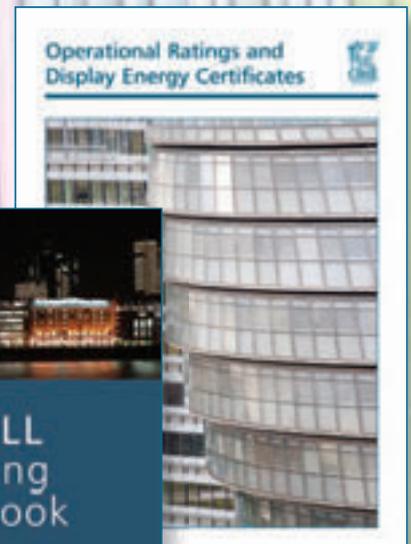
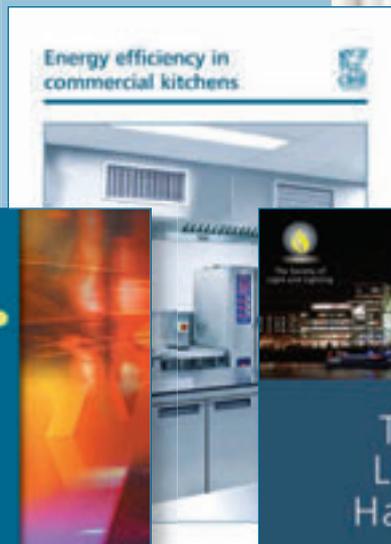
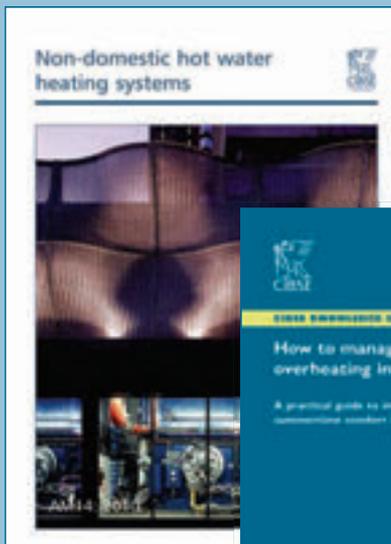
Send your event details to cbailey@cibsejournal.com



BOOKSHOP 2010

- CIBSE publications provide practical information and best practice guidance on a range of building services and energy topics.
- Publications range from the very technical to the hands on and cover a wide variety of subjects. They will be of benefit to those working throughout building services and the built environment, including: designers, facilities managers, contractors, lighting specialists and architects.

To view the full range of publications visit www.cibse.org/bookshop to order call **020 8772 3618** or email pubsales@cibse.org



BOOK OF THE MONTH

Team Manager Building Services

£40-£50k, Berkshire

An exciting opportunity has arisen for a building services team manager, working for a multidisciplinary consultancy with offices throughout the UK. Applicants will have previously led building services design teams, focusing on project delivery, resource management, initial and detailed design of building services, client liaison, conducting site surveys and writing specifications. You will be a registered low carbon consultant with detailed knowledge of sustainable technologies, and will be a chartered engineer with the ability to lead and mentor engineers.

Ref: 496/JA

Principal Electrical Engineer To £60k + benefits, London

Our client is an innovative and diverse engineering consultancy with a commitment to excellence in sustainable design. In particular, their expertise with environmentally friendly data centre design is well renowned and highly sought after around the world. This group requires a degree qualified engineer that can demonstrate significant and current mission critical project experience to undertake a management role. Successful candidates should be technically excellent, focused on delivery, and be comfortable mentoring a team of engineers.

Ref: 515/CB

M&E Design Engineers £35 p/h, Middlesex

Our client is involved in innovative Building Services solutions and is the preferred choice with clients seeking low energy designs within the education, commercial, retail and healthcare industries. They require x2 Mechanical and x2 Electrical design engineers – applicants should possess the ability to demonstrate a strong interest and experience in the execution of sustainable solutions. Candidates will be responsible and accountable for the overall design, technical delivery, quality and management of projects within defined budget and time scales.

Ref: 520/PA

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IS IT TIME FOR A CHANGE?

We are now experiencing an increase in both contract and permanent positions from our clients. If you are looking for a new role call us today!

Senior Electrical Design Engineer – Data Centres | London | £NEG! | ref: 6412

Our client is an international consultancy looking to recruit a senior engineer. You will ideally be Chartered and have significant experience, with a particular focus in the data centre sector. Excellent support and development will be provided.

Senior Mechanical & Electrical Engineers | London/Heathrow | £NEG! | ref: 2874

Our client is looking for senior level mechanical and electrical engineers for new projects at Heathrow and Gatwick. The work would be based in London or at Heathrow with visits to both airports. Solid technically, you will also be comfortable representing at client meetings.

Graduate Electrical Engineer | Hampshire | to £26K | ref: 4674

Our client is looking for an electrical graduate or a graduate with 1-3 years PQE. This is a great opportunity to join a leading UK practice who will provide excellent training and development.

Senior Mechanical and Electrical Engineers | Midlands | £NEG! | ref: 8556

Our client is looking for senior level mechanical and electrical engineers for new projects it has won. You will have a varied background and ideally be Chartered or working towards. Experience of healthcare, pharmaceutical and aviation projects would be an advantage.

Senior M&E Design Engineers – Airport/Rail | London/Surrey | £NEG! | ref: 5784

Our client is a major multi-disciplinary consultant and is looking to expand its M&E team. With significant project wins in the Airport and Rail sectors they are now seeking to recruit senior engineers with Rail and/or Airport experience to join the team. Positions are offered on a perm and contract basis.

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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jsa energy

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To discuss the role please contact James Matcham on **01628 828241** or email jamesmatcham@jsaenergy.com

CV's and covering letters should be sent to:-
JSA Energy, Tavistock House, Waltham Road,
Woodlands Park, Maidenhead, Berkshire SL6 3NH
www.jsaenergy.com www.jsaarchitects.com



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To be successful in this role, you will have:

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- Experience in building services;
- Knowledge on relevant UK building codes and standards;
- Project engineering experience, confidence, creativity, innovation and passion for what you do.

Our professional culture is unparalleled in the industry. As a part of our team you will have an individualised program of professional and personal development that empowers you to excel. The richness of our professional culture and environment is central to how we achieve our success. If you have a real desire to be a contributing key player in our successful company, then please forward your resume to us as soon as possible to Carolyn Cottle at ccottle@medland.com.au.



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For an application pack, and to apply online visit the Careers page at: www.oneitd.com

Postal applications: Claire Ruane, One Ltd, 5 The Triangle, Wildwood Drive, Worcester, WR5 2QX.

Application closing date: 31st December 2010.



To advertise your jobs with CIBSE Journal contact:
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People's choice

It's the characters you work with, as well as the 'nerdy' stuff, that makes being an electrical engineer such an interesting job, says **Ruairi Dempsey**

Engineering is not just about the 'nerdy' stuff, says Ruairi Dempsey, an electrical engineer at multi-disciplinary consultants, AECOM.

During a typical working week, he may well be expected to provide engineering design and consulting services, as well as assist senior management with the preparation of bid work, marketing, client liaison and project management. But, he says, it's dealing with the diverse personalities that makes his job so enjoyable.

He explains: 'What I like most is dealing with people of varying character traits on a day-to-day basis; some can be entertaining, and some more of a challenge.'

'Engineering can very often be considered "nerdy", and I suppose it is to a degree, but in combining the role of engineer and consultant, this allows interaction with people in a way that many engineering roles may not typically present.'

The 27-year-old has been in the industry for six years, but already he has worked on a number of eye-catching projects, not least the Bahrain Cardiac Centre and a

study of the potential for renewable heat in Northern Ireland for the Department of Enterprise, Trade and Investment.

Now he is working on another development to capture the imagination: the Titanic Signature Project in Belfast's up-and-coming Titanic Quarter area. He

What I like most is dealing with people; some can be entertaining, and some more of a challenge

is responsible for carrying out the design variations based on developing a fit-out brief, co-ordinating building services with other disciplines, liaising with statutory and utility bodies, and assisting with the co-ordination and collation of BREEAM assessment information.

To achieve all this, Dempsey



has to work with a wide range of people, from architects and civil and structural engineers, to interior designers, contractors, and of course, the client. Dempsey hopes their efforts will eventually result in a 'shiny new beacon dedicated to the memory of one of Belfast's largest engineering triumphs'. The project is expected to be completed by April 2012.

Alongside his work, Dempsey is studying part time for an MSc in renewable energy and energy management. He is currently entering his final year, as well as working towards Chartered Engineer status – quite a change from one of his more humble former positions as office horticultural irrigation manager, earlier in his career, described by Dempsey as 'the equivalent of tea-boy for plants'.

Email people appointments/role profiles to cbailey@cibsejournal.com

Movers & Shakers

Arup's chairman, **Philip Dilley**, has been invited to the Prime Minister's Business Advisory Group, which will provide regular, high-level advice on critical business and economic issues facing the country. He joins other major business leaders who have also been appointed to the group.

Andrew Swain-Smith, environmental engineering director at multi-disciplinary consultant, BDP, has been appointed to the company's board of directors. Swain-Smith joined BDP in 1994, and was appointed as an associate director in 2000. His appointment is expected to strengthen the profile of environmental engineering within BDP.

Pat Ritchie has been chosen as the new chief executive of the Homes and Communities Agency (HCA). Ritchie is currently the HCA's director for the north east. She will now head the agency as it develops its role as a smaller, enabling and investment organisation.



Consulting engineers Hoare Lea has two new partners, **Neil Roberts** and **Clive Williamson** after they accepted invitations to join the partnership. Roberts joined



Hoare Lea's London office in 1996 as an engineer. He will continue to be based in London, where he runs a multi-disciplinary project team. Williamson joined Hoare Lea in 1998 as a graduate engineer. He, too, will continue to operate in London where he co-ordinates the mechanical graduate training programme and leads a multi-disciplinary project team.

Steve Bratt is now the group chief executive at the Electrical Contractors' Association (ECA). Bratt joined the ECA as chief operating officer in 2007, and was appointed deputy chief executive in February this year.

New members, fellows and associates

CIBSE has promoted three members to fellow this month, and welcomed nearly 20 new members to the institution. The full list is:

FELLOW	
Geraldine Patricia O'Farrell	Woking
Terry Daniel Shord	Ruislip
Philip Graham Jones	London
MEMBER	
Diego Calandrino	London
Chi Kit Chan	Hong Kong
Steven Robert Bosworth	Leominster
Yu Yan Fung	Kowloon

Cheung Tak Hung	Shanghai
Sing Chung Chu	Hong Kong
Chi Ho Kam	Hong Kong
Heng Ping Chieng	Malaysia
Tin Hoi Lam	Hong Kong
Cheuk Wah Lo	Hong Kong
Sik Chuen Lo	Hong Kong
Ting Him Chan	Hong Kong
Kin Chung Cheng	Hong Kong

Nitin Tulsiram Ubale	Kowloon
Stephen Brian Whitmore	Crewes
Siu Fong Wong	Hong Kong
Sui Hang Yan	Hong Kong
Kai Wan Yap	Singapore
Ka Kit Yim	Hong Kong
Siu Chuen Yung	Hong Kong
ASSOCIATE	
Tin Sang Kwok	Hong Kong

Members who have been promoted to fellow this month are:



Geraldine O'Farrell is senior building services engineer with English Heritage, with 35 years' industry experience. She is also an associate tutor with the College of Estate Management at Reading University. O'Farrell is a member of the CIBSE Heritage Group and

passionate about the conservation of our country's industrial heritage.



Phil Jones is a long-standing independent energy consultant. He chairs the CIBSE Energy Performance and CHP groups, and is on CIBSE Council.



Terry Shord is the chief HVAC engineer at Spie Matthew Hall. He has worked on major projects throughout his career, such as the British Library, and was a pioneer in the use of CAD. He retains a keen interest in building information modelling.

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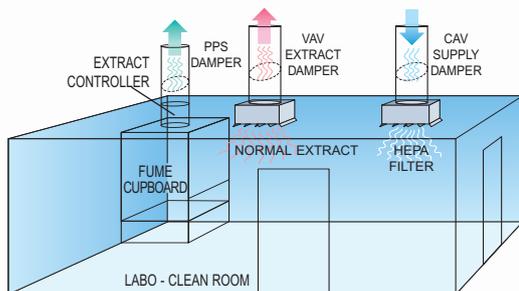


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