

CIBSE

JOURNAL



The official magazine of the Chartered Institution of Building Services Engineers

August 2016

EAGLE SOARS

Accurate modelling
salvages EPC rating
at 60s office block

PADDLE POWER

Cutting energy use
of pumps at Rio's
Olympic canoe slalom



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Contents

NEWS

6 News

New ministers as DECC axed; Brexit harming science; government commits to 57% reduction in emissions; alliance to inform EU negotiations; first Passivhaus hospital

12 CIBSE News

Ken Dale Travel Bursary winner; poll of most inspiring women engineers; CIBSE Building Simulation Group prize up for grabs; CIBSE Scotland Region round-up

OPINION

15 Feedback

CIBSE's LinkedIn group debates whether all air conditioning is necessary

17 The meaning of Brexit

Hywel Davies considers what leaving the EU might mean for energy and buildings

20 Strategy gains

Why engineers need to understand how sub-systems interrelate

21 Breaking BIM

Ben Roberts explains why buildings need to be able to talk to each other on common terms



Dynamic modelling propelled Eagle Tower's EPC rating from G to D - page 30



Features

22 Spirit of St Louis

A review of issues covered in this year's ASHRAE Summer Conference in Missouri

24 Ove Arup - the lead engineer

A great thinker's 'total design' philosophy at a new V&A exhibition

26 Pumped up

Why Rio's Olympic canoe slalom design won gold for energy efficiency

30 High-flying eagle

The value of a detailed Energy Performance Certificate assessment during a retrofit of Cheltenham's Eagle Tower

32 Taking control

Different approaches to power over ethernet when applied to lighting

SPECIAL FEATURES

● Heat pumps/healthcare

35 Compound interest

The technology behind hybrid heat pumps

40 COVER FEATURE

Heat stress

How to improve resilience and adaptation at Cambridge's old Rosie maternity unit, where women and babies have endured summer temperatures of more than 30°C

46 Source of inspiration

A social housing landlord fights fuel poverty using a community air source heat pump

LEARNING

49 CPD

Determining the feasibility for combined heat and power

CLASSIFIED

54 Products

A round-up of systems and services for the industry

PEOPLE AND JOBS

59 Appointments

Jobs at jobs.cibsejournal.com

61 Q&A

David Palin, of CIBSE Award-winning Mirvac Group, explains why performance ratings matter

62 Looking ahead

Lifts Group Symposium; CIBSE Young Engineers Awards 2016; CPD training courses; energy assessor training; CIBSE Groups, Regions and Societies



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No fun in the sun

August is known as the silly season in the UK media – a time when articles of a frivolous nature replace the normal staple of court stories and parliamentary reports. For the *CIBSE Journal*, however, the summer season is associated with the serious issue of overheating in buildings – and according to the *Climate Change Risk Assessment Evidence Report*, the topic is only going to rise up the news agenda as global temperatures increase. If the causes of climate change are not addressed, the report – by the Committee on Climate Change (CCC) – predicts heatwaves reaching 48°C in London, and the high-30s across the rest of the country.

Lord John Krebs, chair of the CCC's adaptation sub-committee, says that many impacts of climate change are affecting us now, and warns that the UK is not sufficiently prepared to deal with the scenario. He cautions that critical facilities, such as hospitals and care homes, are particularly at risk as they were not designed to be resilient when it comes to overheating.

Our cover feature refers to a Cambridge maternity hospital that is proven to be suffering from overheating in the summer. The 1983 Rosie maternity unit, at Addenbrooke's Hospital, was the subject of an academic study that recorded internal temperatures of more than

30°C in the summer. The paper, published in full by CIBSE's technical journal *BSERT*, won the 2016 Carter Bronze medal for the most highly rated paper relating to application and development. According to the authors, factors contributing to its overheating include uninsulated steam pipes, internal heat gains from lighting and equipment, large expanses

of largely fixed glazing, and windows with limited opening.

The issue of restricted opening is also highlighted by Cundall associate director Simon Wyatt. He says hospital designs relying on natural ventilation are compromised by restrictors on windows that reduce the airflow rates to a figure far lower than that factored into designers' calculations. Wyatt says there is often a disconnect between the engineer who makes the calculations, the architect who specifies the window, and the manufacturer who supplies it.

It's a reminder of how important collaboration is at the design stage – something that is being addressed by a new UCL degree course, which aims to produce graduates with a holistic approach to design (page 6). Anyone interested in recommending it to a budding multidisciplinary engineer should search for MEng Engineering and Architectural Design at www.bartlett.ucl.ac.uk

Alex Smith, editor

asmith@cibsejournal.com



In brief

UCL LAUNCHES NEW COURSE

University College London's Bartlett School of Architecture is hosting a degree course that aims to give students an integrated view of design and engineering.

The four-year MEng Engineering and Architectural Design course with integrated masters will be taught by experts from the Bartlett, the UCL Institute for Environmental Design and Engineering and the UCL Civil Engineering and Geomatic Engineering department.

It will have a strong focus on design and a third of student time will be spent in studios in UCL's Here East facility in Stratford.

THINK TANK SEEKS PRODUCTIVITY LINK

Global think tank Leesman has embarked on a two-year 'crowd funded' research project to examine the impact property management decisions have on building occupant satisfaction.

It will examine and compare corporate real estate performance data with more than 18 million lines of user experience data, which has already been collected.

The project will look at the fabric of buildings and the occupation strategies to see whether occupant density impacts on employee productivity, and if desk-sharing ratios 'have a tipping point'. The research will also shed light on whether the vertical distribution of employees across floors affects the wider sense of community.

REPORT DAMNS QUALITY OF NEW HOUSING

The quality of new housing is an increasingly serious problem for the UK, a report from the All Party Parliamentary Group for Excellence in the Built Environment has said.

It stated that, as the number of new homes has increased, the quality has declined, leading to 'devastating consequences' for families. The report *More Homes, Fewer Complaints* calls for a clear process that holds developers to account and ensures 'below-par workmanship' is put right.

New ministers take reins after Theresa May scraps DECC

● Fresh appointments to post-Brexit vote cabinet

After eight years, the Department of Energy and Climate Change (DECC) has been abolished by new Prime Minister Theresa May.

Last month, it was merged with the Department for Business, Innovation and Skills (BIS) to form the newly created Department of Business, Energy and Industrial Strategy (BEIS).

It is headed by Greg Clark, who has been appointed Secretary of State for the department.

Scottish energy minister Paul Wheelhouse said the move raised

questions about the new cabinet's commitment to tackling climate change and support for renewable energy, calling for urgent talks with the government.

But executive director at Aldersgate Group Nick Molho and Julie Hirigoyen, UK Green Building Council chief executive, believe the merger is positive.

Molho said the key thing about DECC and BIS restructuring is that 'climate change is genuinely incorporated into energy and industrial strategy decisions'.

Hirigoyen said: 'The newly created department represents a golden opportunity to put sustainable business at the heart

of jobs and prosperity. As a priority [Greg Clark] needs to provide reassurance to businesses so they can invest with confidence in a low carbon future.'

She added: 'However, the loss of a dedicated climate change department has the potential to send the wrong signal to the international community. The government needs to reconfirm its commitment to the Paris Agreement.'

On Clark's appointment, Professor Dame Ann Dowling, president of the Royal Academy of Engineering, said: 'We appreciate his interest and involvement over many years in the development of vital infrastructure, and his enthusiasm for engineering and innovation - particularly during his work as minister for universities and science, and for cities.'

Gavin Barwell, Conservative MP for Croydon Central, has been made minister of state for housing and planning, and for London, at the Department for Communities and Local Government.



Gavin Barwell



Greg Clark

Academies warn that Brexit vote is already damaging science

Seven national academies representing science, medicine and engineering have warned that Brexit is damaging science.

In a joint letter, the presidents of the Royal Society, the Royal Academy of Engineering, the Academy of Medical Sciences, the British Academy, the Royal Society of Edinburgh, the Royal Irish Academy and the Learned Society of Wales call on the UK government to make a 'bold public commitment' to prioritise research in its negotiations to exit the EU.

'The result of the EU referendum presents a challenge to maintaining this excellence,' the letter states. 'The current uncertainty is having immediate implications and raises many questions. We stand ready to help ensure that Great Britain and Northern Ireland maintain their world-leading position in research and innovation.'

Ease of movement of researchers and students

between the UK and EU countries is key to the country's future excellence, say the academies. 'It is vital that UK-based researchers and staff from other EU countries are given assurances that they will be able to continue to live and work here. Similarly, opportunities need to be safeguarded for UK researchers to gain experience in other EU countries.'

UK universities receive £850m a year from the EU, and a condition of full access to this money is free movement of people. But, following the referendum, it is unclear whether the UK will still be eligible for EU cash. Cases of British academics being asked to leave EU-funded projects or to step down from leadership roles because they are considered a financial liability, have already been brought to the fore by a confidential survey of the UK's Russell Group universities.

Of equal concern, they say, is the loss of access to networks that have been built over decades.

Government commits to 57% reduction in emissions

● Carbon Plan to set out strategy for achieving target

The government has committed to delivering a 57% cut in carbon emissions by 2032 under the terms of its latest Carbon Budget.

The new target is in line with recommendations from the Committee on Climate Change (CCC), which also reported that progress towards carbon targets was 'slowing', and that new policies would be needed – particularly in areas of building energy efficiency and low carbon heat – if these were to be achieved.

This is the government's fifth Carbon Budget and covers the period from 2028 to 2032. The 57% emissions reduction target is in comparison with 1990 levels and will 'leave the UK on track to meet



the Climate Change Act target of an 80% reduction in emissions by 2050', according to the now defunct Department for Energy and Climate Change.

The government is due to publish a Carbon Plan later this

year, outlining in more detail how it intends to deliver the targets in the fourth and fifth Carbon Budgets.

The CCC report has declared that there must be clear and consistent policies in the heating sector that are attractive to landlords and that overcome 'behavioural barriers', with particular focus on new buildings and those off the gas grid.

Progress on improving the energy efficiency of buildings had stalled since 2012, it said, largely because of a reduction in the amount of insulation being installed and the government scrapping plans for zero carbon homes. A fall of 4.5% in national emissions was almost entirely the result of greater electricity generation from renewables and cuts in the use of coal, the committee said.

Overheating threat to hospitals

Hospitals and care homes will be particularly at risk from Climate Change and overheating according to Lord John Krebs, chair of the CCC's adaptation sub-committee.

In the *UK Climate Change Risk Assessment 2017 Evidence Report*, Krebs said many hospitals were not resilient in terms of overheating. Separately, a study of the Rosie maternity unit, in Cambridge, found temperatures of more than 30°C during the summer of 2011 (page 40).

The paper, which won the 2016 Carter Bronze medal, said factors contributing to overheating include uninsulated steam pipes, heat gains from lighting and equipment, and glazing with restricted opening.

Investment hit by policy 'cliff edge'

The government's lack of long-term vision means investors lack confidence in the UK energy market, according to ministers.

A debate in the House of Commons on 4 July highlighted the 'cliff edge' in 2020, when current funding arrangements under the levy control framework (LCF) are due to end, with no indication of what is to follow.

Other reasons given for investors' lack of confidence were: the government's sudden and numerous policy announcements; a lack of transparency in decision-making; and insufficient consideration of investor impacts.

CCC report findings highlights

The Committee on Climate Change (CCC) Progress Report shows that UK emissions have fallen by an average of 4.5% per year over the past three years, and are 38% below 1990 levels. But the report shows little progress elsewhere: installation rates for home insulation have fallen by 60-90%, while take-up of low carbon heating is below 2.5% of demand.

There are no policies in place to broaden the scope of emissions reduction. The report identifies a gap of approximately 100 MtCO₂e between the likely reductions from current plans and the reductions required by the fifth carbon budget for emissions 2028-2032.

The government has committed to publishing an 'emissions reduction plan' later this year. The CCC Progress Report sets out several areas that it expects this plan to address, including: decarbonising of heat; improving energy efficiency; a new approach to the development of carbon capture and storage; and mature low carbon generation, for example auctions for generation from onshore wind, solar and sustainable biomass.

It also identifies areas in which new policies are needed, including: deployment of heat pumps and district heating; energy efficiency in new-builds; residential and industrial energy efficiency; and F-gas emissions.

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Property demand down after Brexit

● New survey reveals big drop in confidence

Investor demand in the UK property market has fallen significantly since Brexit, according to the latest RICS UK Commercial Property Survey, which recorded sentiment after the June 23 vote to leave the EU.

During the second quarter of 2016 the net balance for property enquiries was -16% compared with +25% in Q1. London saw the biggest fall in enquiries, with 41% more respondents seeing

a decline in demand. Capital values are now expected to see a moderate decline over the next 12 months, with retail and office segments being hardest hit.

Occupier confidence has also been affected, according to the survey. Across the UK, demand for space failed to rise for the first time since 2012. This has had an impact on rental projections, said RICS, with retail and office areas again suffering the biggest falls.

However availability of space and stock are fairly constrained, which RICS said will support rents and values in the short term.



PHOTO:UA / SHUTTERSTOCK

New alliance to take up BIM adoption challenge

A cross-industry alliance has been created to follow up the work of the BIM Task Group by making BIM Level 2 central to the industry.

The UK BIM Alliance will launch in October, and aims to 'lead the drive for awareness, education and adoption of BIM Level 2 compliance and its universal benefits'. It will offer a 'common and clear point of reference for

built environment companies of all disciplines, to enable and support their BIM journeys'.

The Alliance comprises more than 50 organisations representing professions across the built environment. It claims the challenge is to move from 'mobilisation' to 'business as usual' for the whole sector, not just for public sector projects.

Sub-contractor's Tier 2 BIM first

Harvey Group claims to be the first sub-contractor to gain BIM certification as a Tier 2 provider.

The M&E contractor has been certified to PAS 1192-2 information management for the capital/delivery phase of construction projects as a Tier 2 organisation. It was accredited by BSI as competent to provide

supply services for Level 2 BIM projects to main contractors.

Andy Butterfield, product certification director of built environment at BSI, said: 'To be considered for commercial projects, now and in the future, organisations must be able to demonstrate how BIM-ready they are.'

PLAIN SAILING FOR BRITISH TEAM'S HQ

The headquarters of the Land Rover Ben Ainslie Racing (BAR) team, has been awarded a Breeam Excellent rating.

The Portsmouth base for the America's Cup team is naturally ventilated and has 432 solar panels that generate 130MWh per year. This is equal to 20% of the building's energy requirements, with the rest being generated through other renewable resources.

The building features a fabric wrap that creates a heat-saving air cushion around the building, controlling solar gain and reducing the energy used for cooling.



Energy labels to be 'more transparent'

The EU has approved a proposal to simplify the energy-labelling system for appliances, in a bid to make it easier for consumers to make an informed choice.

Members of the European Parliament (MEPs) are proposing a 'more transparent' A to G system of representing the energy-efficient performance of white goods and other technologies. Clear and legible labels that show the product's energy efficiency class – as well as its absolute consumption in kWh over a given period – should be used in future, they argued.

The changes could lead to additional energy savings equal to the annual energy consumption (200 TWh per year) of all three Baltic countries – Estonia, Latvia and Lithuania – according to the Parliament.

It will also form a key part of the EU's strategy to improve energy efficiency by at least 27% by 2030.

Cutting demand will not only reduce CO₂ emissions, it will also lessen the continent's dependence on Russia for energy imports, it added.

Carillion confident despite Leave vote

Construction giant Carillion said it remained optimistic about economic prospects, despite the Brexit vote, and announced a rise in revenue and margins for the first six months of this year.

Chief executive Richard Howson said the company was on course to meet its 2016 growth targets and that Brexit was unlikely to have any short-term impact on the business; the longer-term picture was less clear, he admitted.

Carillion's construction arm secured margins of around 2.5%-3% in the first half of the year, as it stuck to its 'selective bidding' strategy, with new and probable orders worth £2.5bn. The company also secured housing contracts worth up to £366m over 10 years.

LAZULAMA / SHUTTERSTOCK

Engineering profession unites to inform EU negotiations

- Alliance to ensure needs of all sectors with a dependence on engineering are represented

The 38 organisations representing the engineering profession have agreed to cooperate to offer government evidence-based advice in the forthcoming Brexit negotiations, to secure the best possible outcome for the UK.

As the *Journal* went to press, the organisations were due to meet to nominate the Royal Academy of Engineering (RAE) to lead this work.

The result of the EU referendum will have a material effect on UK engineering, which accounts for around 27% of the country's gross domestic product (GDP) and more than half of its exports. It is critical that the government's plan for withdrawing from the EU is informed by a clear understanding of potential solutions, opportunities and risks from the perspective of UK engineering, said the group.



It added that the UK must maintain its position as a centre of world-class engineering research, remain embedded in setting globally recognised codes and standards, have access to the skills that industry needs, and retain its competitiveness in export markets.

A project has been established to: consult across engineering and beyond; gather evidence; analyse the risks and opportunities; and produce

advice to underpin a strong negotiating position and a positive result for the UK.

The RAE has sent a letter outlining its offer of support to the Secretary of State for Exiting the European Union – the department charged with leading the transition planning.

Philip Greenish CBE, RAE chief executive, said: 'Never in my lifetime has there been an issue that so emphatically requires strategic collaboration across the engineering profession.'

BSI: Brexit will not hinder standards

The UK's involvement in the development of European technical standards and product certifications will not change, despite Brexit, insists the British Standards Institution (BSI).

'Our membership of the two international standardisation organisations, ISO and IEC, will not be affected,' the BSI wrote.

The BSI will maintain full membership of CEN, the European Committee for Standardisation, and the electrical standards body, CENELEC – at least in the short term. But if the UK leaves both the EU and the European Free Trade Association, statutes will need to change to enable the BSI to stay a member.

It will also remain an EU-notified body for product certifications during the exit negotiations. 'We anticipate that products already certified, and those certified while the negotiations progress, will continue to be accepted by the EU authorities and member states,' the BSI added. For more on post-Brexit regulations, see page 17.

Movers and makers

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CREDIT: LEO GARBUIT



Peter Hansford has been appointed professor of construction and

infrastructure policy at University College London's Bartlett School of Construction and Project Management.

Formerly the government's chief construction adviser, Hansford played a key role in developing the *Construction 2025* strategy. Before this, he was an executive director at the Nichols Group and served as the 146th president of the Institution of Civil Engineers from 2010 to 2011.



WSP Parsons Brinckerhoff has appointed **Scott Baird** – formerly of Buro Happold – as technical

director in Scotland, and **Allan Follett** – formerly of Atelier Ten – as associate director.

Both men will focus on winning new business in the higher education sector, as well as supporting the firm's growth strategy.



Adam Turk has been appointed managing director of UK commercial business at

Baxi Heating.

Turk has 25 years' experience in the building products industry. Having worked for British Gypsum and Jeld-Wen, he joins Baxi Heating from Polypipe. His 11-year career with the company included being sales and marketing director at Polypipe Terrain, running the export arm Polypipe International and, most recently, being group commercial development director.

GERMANY TO BUILD FIRST PASSIVE HOUSE STANDARD HOSPITAL



WÖRNER TRAXLER RICHTER, FRANKFURT, GERMANY

Work has started on the world's first hospital to be built to the Passive House standard. The Passive House Institute has been involved in the planning phase of the Klinikum Frankfurt Höchst, which will include operating theatres and 666 beds over six floors.

Balancing the special hygiene-related requirements for sensitive areas, such as operating theatres, with comfortable room temperatures will be a key focus of the design team.

Read about hospital overheating on page 40.

Help Whitehall spend £320m on 'central heating for cities'

● Views sought from current and potential heat network sponsors and investors

A government consultation is under way on how best to spend £320m to develop low carbon heat networks for towns and cities across England and Wales over the next five years.

The money was allocated for the heat networks investment project (HNIP) after the Spending Review, and the consultation will help decide how to support 'central heating for cities', which the recently axed Department for Energy and Climate Change said could cut household energy bills by as much as 30%.

Heat pumps, combined heat and power (CHP) and geothermal plant are all options on the table to supply low carbon heat to a series of networks.

There are £2bn worth of district heating schemes under consideration in more than



Rehau's district heating pipework

150 local authorities, and the technology has the potential to meet up to 20% of heat demand by 2030, according to government estimates.

A report by the Association for Decentralised Energy (ADE) also claimed that heat networks could succeed without government subsidy from 2021. Its report *Levelling the playing field: Unlocking heat infrastructure investment* included proposals to attract investment by: reducing heat network capital risk; lowering network costs by creating a fairer tax regime; and providing local authorities with the support they need to move forward with new network investments.

Green Deal was 'abysmal failure'

The Green Deal energy efficiency scheme was almost completely rejected by householders, according to a report by the Public Accounts Committee.

The scheme, which was cancelled last year, provided just £50m worth of support for energy saving measures as opposed to the 'wildly optimistic' £1.1bn predicted by the government in 2013.

MPs on the committee said the government had failed to test the scheme and, as a result, just 14,000 loans were issued – each costing the taxpayer £17,000.

'Householders were not persuaded that energy efficiency measures were worth paying for through the Green Deal and take-up of loans was abysmal,' the report said, adding that the government must learn from this mistake.

The report added that the scheme was too complex and people were put off by interest rates of up to 10% on the loans, which made the Green Deal more expensive than other ways of borrowing the money for improvements.

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First podcast goes live

CIBSE has launched a podcast, titled #Build2Perform, focusing on the latest events and ideas around building performance.

The podcast, available to download from the iTunes library or at www.cibse.org/news-and-policy/cibse-blogs, is hosted by CIBSE press and PR executive Matt Snowden, and co-hosted by CIBSE head of sustainability development Sara Kassam.

The first podcast discussed Green Sky Thinking Week, an Open City event that ran from 25-29 April. The second podcast on women in engineering, featuring Juliet Rennie and Susie Diamond, went live last month.

REHVA guides summer sale

The Federation of European Heating, Ventilation and Air Conditioning Associations – REHVA – is offering big discounts on REHVA guidebooks.

The summer book sale includes offers, such as: buy three guidebooks and get the fourth free, and buy six guidebooks and get 70% off.

The offers are valid on printed copies until 1 October, depending on availability.

For a full list of offers and an order form, visit <http://bit.ly/29n1cax>

2017 Symposium call for papers

The theme for the 2017 Technical Symposium, to be held on 5-6 April, at Loughborough University, is 'Delivering resilient high performance buildings'.

All papers, posters and case studies will be peer reviewed and published electronically by CIBSE.

Please send abstracts by email to symposium@cibse.org no later than 12 September.

For details visit www.cibse.org/symposium

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● Choufani to travel to USA, Ecuador and Hong Kong

Elie El Choufani, from WS Atkins & Partners Overseas – Dubai, has won the Ken Dale Travel Bursary 2016.

Choufani is the second international winner of the award and will be researching energy reduction in airports. To experience a variety of climates, he will be travelling to San Francisco, Mexico City, the Galapagos Islands, Ecuador and Hong Kong.

Choufani said: 'Winning the bursary is an aspiration for most young engineers in the building services industry. To me, it means gaining a new perspective. By leaving my comfort zone, visiting new countries and experiencing



Elie El Choufani

different conditions in new cultures, I get the opportunity to push my learning boundaries in one of the most creative ways.'

The bursary offers young building services engineers the opportunity to experience technical, economic, environmental, social and political conditions in another country and to examine how these factors have an impact on the practice of building services engineering.

The bursary awards between £1,500 and £4,000 to CIBSE members, in the developmental stage of their career, who wish to spend three to four weeks outside their own country researching aspects connected to their field of work, and which will benefit CIBSE, their employer, their clients and the profession.

Prize worth £8,000 up for grabs in building simulation competition

The CIBSE Building Simulation Group is inviting entries for its postgraduate prize.

The award, sponsored by Integrated Environmental Solutions (IES), is open to UK and overseas postgraduate students undertaking a Master's – or equivalent level – research project involving the application of building simulation tools.

The qualifying research areas, with modelling as the main focus, cover: building physics; compliance and performance;

dynamic thermal modelling; optimisation methods for building simulation; indoor environment; computational fluid dynamics; HVAC systems; building renewable energy systems; daylighting and artificial lighting; fire simulation and building acoustics.

The winner will receive £1,000 and a 12-month unlimited laptop licence for the IES VE-Pro software suite, plus a place on one of IES' public three-day training courses, worth more

than £7,000. There are also two runner-up prizes of £250 each.

A one-page summary outlining the project's title, name(s) of participants and a brief description and endorsement must be submitted by 29 August.

Applicants selected to go forward for the award must submit their full reports by 28 October. The winning entries will be announced in December.

For details visit www.cibse.org/bsg

Pioneering mathematician and self-taught civil engineer top poll

● More than 25 names put forward from diverse fields

Civil engineer Emily Warren Roebling and mathematician Ada Lovelace have topped a CIBSE poll of the most inspiring women engineers throughout history.

Respondents nominated a wide range of women from the last three centuries, with more than 25 names put forward from fields as diverse as computing, civil, aircraft and naval engineering. The pair edged out pioneering aviators Amelia Earhart and Amy Johnson.

In nominating these women as the most inspirational female engineers, participants were keen to point out the practical applications of their work, which often had far-reaching consequences, as well as the personal difficulties that many had to overcome to succeed in a historically male-dominated profession.

Roebling became famous after taking

over from her seriously ill husband as the chief engineer behind the Brooklyn Bridge. She won universal acclaim from her male peers by studying a variety of disciplines from materials science to stress analysis, as the work progressed, and successfully delivering the project, despite many financial and technical problems.



Emily Warren Roebling

Lovelace is regarded by many as the world's first computer programmer. She worked with fellow computing pioneer Charles Babbage on his 'Difference Engine' and wrote the first recorded instance of computer code.

Laura Dunlop, chair of the Women in Building Services Engineering (WiBSE) group, said: 'The education, experience, dedication and perseverance that these individuals had make them amazing role models for women thinking of starting a career in engineering, as well as motivating those of us who have worked in engineering for a while, to aim higher.'

British aeronautical engineer and pilot Amy Johnson was also popular in the poll for becoming Britain's first female ground engineer, as well as American Amelia Earhart who was the first transatlantic female pilot.

Other nominees included Dame Caroline Haslett, Florence Parpart, Alice Perry and Hertha Ayrton.

Around the Regions CIBSE Scotland

Gerry Brannigan, chair of CIBSE Scotland, on what the region has been doing in its 80th year.

The first Scottish branch meeting of the Institution of Heating and Ventilating Engineers was held in Glasgow, on 15 May 1936. Since then, CIBSE Scotland has grown to almost 1,100 members – with 79 new members across all grades joining in the last 12 months.

The CIBSE Scotland committee has also grown this year, with representatives from most aspects of CIBSE membership, and a good balance of age and gender.

We have integrated groups and societies into the regional committee structure, building strength and diversity. It has truly developed into a sustainable group, with opportunities for more members to get involved in activities.

In the last year, we have delivered more technical seminars than ever before, hosted the YEN Conference and instigated new initiatives to promote membership and improve relationships across the industry.

CIBSE Scotland, in association with the Royal Incorporation of Architects in Scotland and

the Scottish government, has been developing training and an accreditation process to enable CIBSE members to self-certify their designs to Section 6. An announcement will be made at the end of the summer.

Congratulations to Kiyomi Morag Honjigawa for being the first recipient of the CIBSE Scotland Student Award, presented to the top performing student at each of the CIBSE-accredited courses in Scotland. The courses include architectural engineering at Heriot-

Watt University, Edinburgh, and building services engineering at Glasgow Caledonian University. The winner of the latter course will be announced in the autumn.

We have developed both our website and social media strategy, with technical seminars now recorded and stored online.

In response to members' requests for additional networking opportunities, we initiated the CIBSE Scotland golf championship, to be held on 25 August, while our annual dinner, celebrating our 80th anniversary, will be held in November.

For more details connect with us on LinkedIn and visit www.cibse.org/networks/regions/scotland



Honjigawa with CIBSE Board member and CIBSE Scotland committee member Lynne Jack



CIBSE Scotland chair Gerry Brannigan

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Feedback

This month, a board nominee thanks her supporters and CIBSE LinkedIn group members discuss the ‘air conditioning epidemic’

A member's gratitude

I would like to thank those members of the Institution who nominated me as a candidate for president-elect in the recent board elections; their support was valuable and very humbling. I would particularly like to thank all the members who shared and supported my vision for CIBSE, as outlined in my candidate statement. I wish the new board the very best.

I also want to thank my family for their support while I was on the board and while serving as vice-president. My membership of CIBSE has been enriched by the people I have met and their infectious enthusiasm. I hope our paths will cross again.

Cathie Simpson

LinkedIn group debates whether air conditioning is the answer

Mike Barker

We have all heard of super salesmen who could sell ice to Eskimos. In developing countries, salesmen are selling HVAC where it's not needed.

African architects, for example, fight



THISAFAN KOTIRAT / SHUTTERSTOCK

Are better building envelopes the solution?

a daily battle against the marketing might of HVAC companies that want to cram air conditioners into every building. And architects are not helping themselves by ignoring the changing climate and the need for better building envelopes.

Rav De Silva

The Passivhaus conference had a great understanding of building fabric design and room sizing.

Maybe if we had more facts from the insulation lobby groups – and less smoke and mirrors – we could get better designs.

6 African architects fight a daily battle against the marketing might of HVAC companies that want to cram air conditioners into every building

Mike Barker

In 1992, Gwyn Prins, a Cambridge University professor, called physical addiction to cooled air ‘America’s most pervasive and least noticed epidemic’.

Karla Reid

While I champion sustainability and the progress with Leed, I believe it's time for a bridge to be built between ASHRAE and CIBSE to find sustainable solutions for folks who actually need to find thermal comfort in zones where the temperature averages 45°C from May to August. Then there is the question of air quality. What's the best temperature to process and deliver it? There are a few smokescreens lingering on this issue. No-one has openly critiqued the issue of heating and what that equally does to ones health and the environment.

Bob Beattie

Window rattlers are not being installed in these countries – the systems are far more sophisticated and energy efficient than that. I take the point of the post, but you are looking at the wrong end of the design food chain.

CIBSE Journal welcomes readers' letters, opinions, news stories, events listings, and proposals for articles.

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THE MEANING OF BREXIT

On 23 June 2016, the United Kingdom voted to leave the EU. 'Brexit means Brexit', says the new Prime Minister, but what might Brexit mean for energy and buildings? Hywel Davies explains what we know so far

 Nuclear physicist Niels Bohr once said that 'prediction is very difficult, especially about the future'. On the evening of 23 June, few readers of the *Journal* would have predicted that there would be a new Prime Minister before the summer recess, let alone that it would be Theresa May. After a turbulent month in British politics, that is precisely what the UK has. But what might it mean for readers?

The legal challenges

It has been suggested that there are some 40,000 individual items of legislation affected by the decision to leave. So the legal consequences of the UK exit are complex, especially in the area of environmental legislation and energy management law. Many principles and legal obligations in the UK, Scotland or England and Wales, or devolved law, stem from EU legislation.

There are European regulations that have a direct effect in UK law under the provisions of the European Communities Act. Then there are Directives, such as the Energy Performance of Buildings Directive (EPBD), which are implemented individually by each member state – and in the UK there may be devolved implementation in Scotland and Northern Ireland, as with the EPBD. To add to the complexity, the EPBD is implemented in England and Wales in two separate sets of regulations – the Building Regulations and the Energy Performance of Buildings (EPB) Regulations.

Figure 1 shows how intertwined is legislation in Europe and England and Wales. It demonstrates the scale of the challenge facing David Davis and his new 'Department

for Brexit'. In England and Wales the EPBD is implemented through the EPB Regulations and Building Regulations. Detailed implementation of Minimum Energy Efficiency Standards uses the EPB Regulations and the Energy Act. Unpicking these will be a major task.

The Climate Change Act and Brexit

The Climate Change Act (2008) legislates for the UK to reduce emissions by 2050 by at least 80%, compared with 1990 levels. This is done through a series of statutory five-yearly carbon budgets, which are designed to represent the lowest-cost path in which the UK can contribute to global efforts to tackle climate change. The Act requires the

government to set out its policies to meet the targets, and these will now also need to reflect the UK's changing relationship with the EU, although any serious ambition to deliver on the targets excludes the option of a bonfire of EU energy and environmental legislation.

As far as F-Gas emissions are concerned, it is worth noting that the UK is a signatory to the 1986 Montreal Protocol on Substances that Deplete the Ozone Layer so is not affected by Brexit.

On 30 June the government committed to the emissions reductions recommended by the Committee on Climate Change (CCC) for the fifth carbon budget 2028-2032, which will reduce UK greenhouse gas emissions in 2030

PICHER/W / SHUTTERSTOCK



by 57%, relative to 1990 levels. On that day the CCC also published its 2016 Progress Report to Parliament, detailing how the UK is doing in reducing greenhouse gas emissions and meeting carbon budgets (see news on page 7).

The report shows that UK emissions have fallen by an average of 4.5% per year in the last three years, and are 38% below 1990 levels. It identifies a gap of approximately 100 MtCO₂e between the likely reductions from current plans and the reductions required by the fifth carbon budget for emissions in 2028-2032.

The government has recognised this policy shortfall and has committed to come up with an ‘emissions reduction plan’ later this year. The Progress Report sets out several areas that it expects this plan to address, including: decarbonising of heat; improving energy efficiency; a new approach to the development of carbon capture and storage; and mature low carbon generation.

Given the analysis by the CCC, it seems clear that unpicking the EPB Regulations and the parent Directive is the wrong answer for the climate, so there is an argument for leaving alone and incorporating these requirements fully into UK law. More correctly, this means incorporating them into England and Wales law for the EPB Regulations, and English law for the Building Regulations, as other regulations apply in Scotland, Wales and Northern Ireland. This represents another legal complexity of the exercise.

Review of energy requirements of Building Regulations

Under the EPBD, this is meant to happen in 2017. There may be some debate about whether or not it goes ahead. However, some readers may recall that before Brexit there was an argument between the Commons and the Lords over the upper house’s attempt to reinstate a zero carbon homes requirement into law.

It ended with an agreement to drop it, in return for an undertaking to review the energy

efficiency elements of the Building Regulations. It is not clear whether all parties to the deal realised that, under the EPBD, that review was required in 2017 anyway, so it was a free hit for government to offer.

However, post Brexit, with the status of the review under the EPBD in question, the deal now means that the review should go ahead, regardless of Brexit. We shall see, and, once again, it is different in Scotland, where it is more likely that there will be a review of Section 6 of the Scottish Building Standards.

Distributed generation

This is largely a domestic policy, with planning rules implementing requirements for heat networks and onsite generation – especially in urban areas – driving a transition to more efficient heating and cooling systems and networks.

UK planning policy is unlikely to change as a direct result of Brexit, although EU framework support and policy direction will be removed.

The government is already reducing renewable generation subsidies, although the CCC has identified low carbon heating as an area requiring new policy measures.

Conclusion

The EU has undoubtedly played a key role in energy management in the built environment, setting targets and legislating to improve energy efficiency in buildings and products. For the reasons outlined above, it seems unlikely that Brexit will lead to wholesale changes to existing UK legislation in these areas.

As for the timing of Brexit, the UK must give notice under Article 50 of the Treaty of Lisbon, which kickstarts a period of two years for the UK to negotiate the terms of exit. Early indications are that Theresa May does not wish to give notice until the end of 2016, so it is most likely that the actual UK exit will be late in 2018.

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



It seems unlikely that Brexit will lead to wholesale changes to existing UK legislation in these areas



FIGURE 1: ENERGY AND BUILDING-RELATED LEGISLATION

A number of existing pieces of legislation relate to energy in the built environment:

CRC Energy Efficiency Scheme (CRC) (until 2019)
Climate Change Agreements (CCAs) & Climate Change Levy (CCL)
Smart Meters
Metering and Billing Regulations
Enhanced Capital Allowances (ECAs)
Mandatory Greenhouse Gas (GHG) reporting
Display Energy Certificates & air conditioning inspections
F-gas Regulation and related requirements
EU minimum energy performance standards and labelling (ErP)
Energy Savings Opportunity Scheme (ESOS)
Minimum Energy Efficiency Standards (for rented buildings)
Energy Performance Certificates
Building Regulations (Part L, ADL2A, ADL2B)

■ Red is UK legislation, with no EU elements; ■ Blue is EU inspired, implementing an EU Directive or Regulation, ■ Purple is a hybrid that does both; ■ Pale blue is UK led, but relies on the EPB Regulations to work.

Some pieces of legislation have both a European and a national dimension. The Energy Act 2011 defines a dwelling by reference to the EPB Regulations (2012). So this domestic Act uses a term defined in an EU-inspired Statutory Instrument. In turn, the EPB Regulations are made in exercise of the powers conferred by section 2(2) of the European Communities Act 1972 and by section 74 of the Energy Act 2011. And, just for good measure, the EPB Regulations only apply to England and Wales – Scotland and Northern Ireland have their own implementing regulations.

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STRATEGY GAINS



For a building to perform as intended, it is vital that building services consultants understand how sub-systems – such as lighting, HVAC and controls – interrelate. As a result, engineers need to think strategically, says Breathing Buildings’ **Shaun Fitzgerald**

It is right and proper that society demands higher quality buildings. By this, we mean buildings that provide more pleasant, stimulating environments – that people enjoy more and are easy to control.

Furthermore, buildings need to be more energy efficient, not only to meet the standards required by today’s legislation but, ideally, to go beyond that. Fortunately, the progress of technology makes it possible to create better buildings – and to do so for less money.

Improvements in technology affect everything in a building, from materials (structural, insulation, translucence) and methods of construction to building services systems and controls. As technology develops for one element of a building, the whole design may need to change in order to reap the benefits of it. For example, the advent of exposed thermally massive ceiling tiles means it is possible to achieve cooling in a building without relying on traditional chillers, while getting away with a structurally lightweight construction.

However, assessing the performance of a system within a building as a result of the development of one component is not easy – and the optimisation of a system, accounting for new building components, can be very hard. As a result, over the past 10 years we have seen more and more suppliers of building components evolving into building systems suppliers.

Consider a natural ventilation system, for example. Historically, a building services consultant may have devised a ventilation scheme and specified components to create the final solution. The same

A consultant has to have the skills to critique the sub-systems being suggested by different suppliers

consultant will also have been given the task of designing numerous other sub-systems in the building. The problem is that optimising the ventilation solution alone is an onerous task – especially if there are multiple elements contributing to the overall performance.

One example is a room linked to an atrium, with components acting in series to create an overall system pressure for a given flow rate (see Figure 1). If we couple this with a thermally heavyweight building incorporating exposed phase change materials with non-linear heat capacity, then the optimisation of the system – if we are to minimise cost and achieve thermal comfort criteria in accordance with CIBSE TM52 – is non-trivial.

It requires in-depth analysis of ventilation flows, assessment of the heat transfer between the exposed thermal mass and air, knowledge of the costs of the individual components – and how these vary with size – and an understanding of the expense associated with installing the different components.

The increased provision of design services by suppliers is not restricted to ventilation; lighting companies and providers of cooling systems have also extended their offering.

With lighting, a design does not simply constitute a manual switch and set of discrete light sources in a room. It involves: a detailed layout of sometimes diffuse lighting elements with specific intensity; zoned control within occupied areas that react

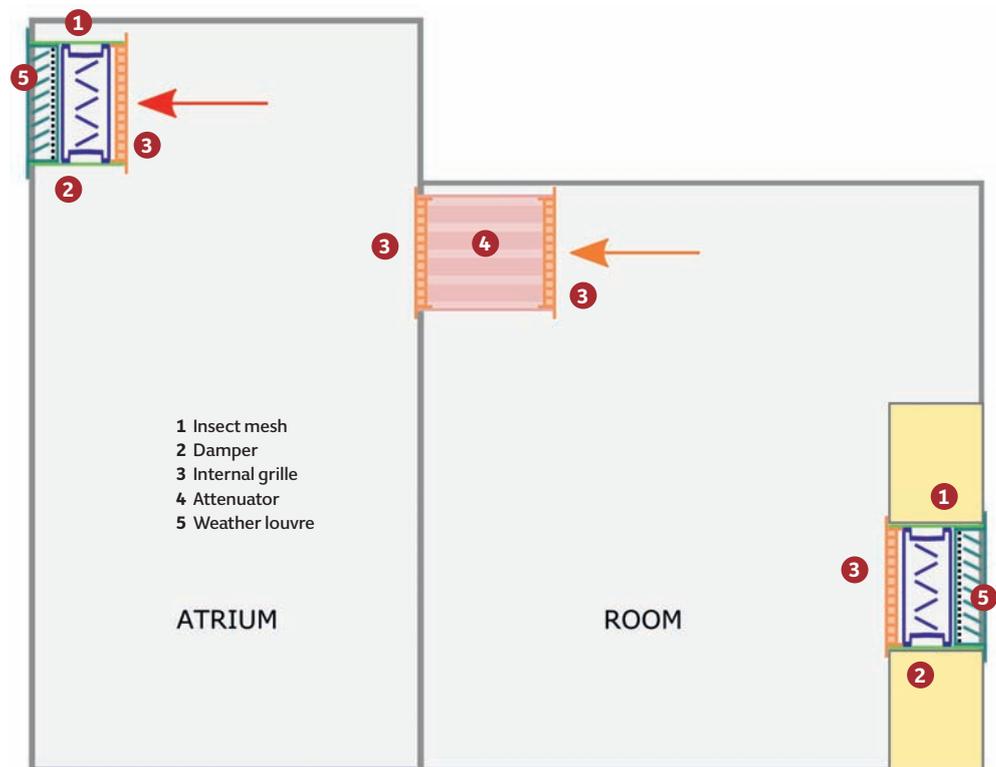


Figure 1: System pressure for a given flow rate in a room coupled to an atrium

to presence or absence of natural daylight and requirement for light; and an understanding of how light levels from the sources vary in time and space.

In the case of cooling systems, suppliers often undertake the detailed selection of in-room units, the roof-based system, the associated pipework, and the control process.

As buildings become more intelligent and incorporate a nest of controlled sub-systems, it is virtually impossible for a single designer to draw up and optimise every component for every building. So the role of the building services consultant is becoming ever more strategic, rather than being focused on designing the minute details of the sub-systems.

The really important design decisions require a deep understanding of the interaction between the sub-systems in a building. For example, the heat gains emanating from new lighting and IT systems affect the ventilation, cooling and heating requirements of a building.

The strategic building services consultant is responsible for the specification of the sub-systems and, to do this successfully, they need to draw upon their understanding of the interactions between them.

Although the consultant does not typically design the details of all the sub-systems, it is critical that they are able to ensure that the designs of the various suppliers are robust. This means that a consultant has to have the skills to critique the sub-systems being suggested by different suppliers.

The requirements are not very different from a company that decides to outsource certain functions, usually because it is cheaper to do so. It is crucial that whoever is responsible for procuring the service from the outsourced provider is able to scrutinise what is being offered. So it is with building services consultants. More and more is being demanded of them in terms of skills and knowledge, and – in the new world – we are seeing the emergence of building services strategy consultants.

● **SHAUN FITZGERALD** CIBSE is co-founder and CEO of Breathing Buildings

BREAKING BIM



In his second instalment, Hoare Lea's Ben Roberts explains why buildings need to be able to talk to each other on common terms

Imagine all the people sharing all the world. It may be hard to do right now, but 45 years after this seed was sown, its collaborative, compassionate sentiment is gaining momentum.

A recent survey revealed that 48.2% of British people agree. Despite the UK's current political direction, we are starting to realise that the best way to solve the five main problems in the world – climate change, corruption, inequality, war and BIM – is by working together and looking at the bigger picture. While this is true of people, it's also important for software platforms – and even buildings – to be able to talk to each other on common terms.

Among the many movements progressing under the BIM banner today, collaboration, interoperability and smart cities have been gaining traction recently.

Many of us have enjoyed an afternoon trying to convert native formats to IFC and back again, or chuckled at the irony of the growing number of competing open data standards. Certainly, the future of collaboration needs to be supported by software platforms that integrate seamlessly – but that is proving easier said than done. Google has made its contribution in the form of Google Flux, which offers to translate between formats automatically, saving the user the hassle of doing it manually.

Once you convert file formats, you have to make sure the information is labelled consistently, and reconfigure analysis tools so the data is useful. And this is before we get onto cloud-hosted updated-live, shared models.

If you flick through PAS1192-2, you'll find that the person responsible

for making all of this happen is the information manager (for more on this, check out John McDermott's blog post 'The curse of the BIM manager' at bit.ly/29D1UFH). Anyone who's worked

on a BIM project will be aware of the importance of this role being done properly; it can make or break a scheme. So what is CIBSE doing about this? The CIBSE BIM Steering Group has recently reshuffled to focus on three areas: guidance, product data templates (PDTs) and messaging. In brief:

- A new series of guidance is being released at the end of July, explaining EIRs, BEPs, PQQs, and CDEs. Perhaps an annoying acronym reference guide (AARG) will be released next?
- After nearly three years in development, the PDTs are now available for public use (bit.ly/1CwQSlR). A common data format is exactly what is needed for designers and installers to make instant like-for-like comparisons without constantly relabelling data fields.
- We're keeping up with what's hot and what's not; informing CIBSE members; communicating with other sectors; maintaining a presence at events, online and in publications; and offering professional recognition for BIM practitioners in the MEP industry. We'll continue to keep you updated on MEP BIM topics through this column; feel free to tell us how much you like us/ send us pictures of cats at benroberts@hoarelea.com

● **BEN ROBERTS** MCIBSE is the BIM delivery manager at Hoare Lea and a member of the CIBSE BIM steering group

SPIRIT OF ST LOUIS

The drive towards net zero energy buildings, combating legionella outbreaks, and the indoor environment were just some of the topics covered in this year's ASHRAE Summer Conference. **Frank Mills** and **Tim Dwyer** report from the event in St Louis, USA

St Louis, Missouri – a long established US Midwest city – which is now regenerating from the centre outwards, hosted the ASHRAE Summer 2016 Conference.

Creating and disseminating world-class technical guidance is at the core of ASHRAE, said CEO Jeff Littleton, opening the conference. And, as part of his final plenary address, outgoing president David Underwood announced that ASHRAE had allocated US\$1.2m for research into low-global warming potential refrigerants. Working with the US Department of Energy – which is contributing US\$3m – and the Air Conditioning, Heating and Refrigeration Institute – which is adding US\$1m – the aim is to provide substantiated information for industry and for policy-makers.

Brandishing a slide rule from his freshman year at the University of Nebraska in 1971, incoming President Tim Wentz launched his theme for the year: 'Adapting today to shape tomorrow'.

He said: 'In 1971 this slide rule served me well. It felt risky when I put it down to pick up a newfangled, hand-held calculator. Looking back, the greater risk would have been not putting the slide rule down, and not being willing to adapt.'

This year's conference focused on topical themes: fundamentals and applications; renewable energy and net zero energy buildings; indoor environment, health, comfort and productivity; smart buildings; advances in refrigerants and research topics.



The arch of St Louis and ASHRAE President Tim Wentz (inset)

The drive towards net zero energy new buildings was covered in several sessions covering equipment through to completed case studies.

Of particular interest was the session entitled 'Results of research project 1657, development of maximum technically achievable energy targets for ultra-low energy use in commercial buildings', which reported on the research results and the most promising future technologies.

Seminar 42 informed delegates on the use of biomass as a low carbon fuel, with presentations of community-based schemes in New York and other exemplars from as far afield as Austria. Biomass is not yet commonly used in North America, despite the wide availability of waste wood from forestry activities.

Jurgen Scharfe of J S Energie & Beratung, Munich, presented case studies of large district energy systems serving whole towns and cities. These included absorption heat pumps to supply cooling, as well as elevated hot water temperatures in schemes where return water was as low as 40°C.

The publication of ASHRAE Standard 188 covering legionella in water systems in October 2015 has created a great deal of interest across North America. This much-awaited standard, comes some 15

years after the UK's L8 was first published, and subsequently updated several times. Standard 188 offers an understanding of the issues associated with recent and past outbreaks and gives guidance to designers, facility managers and public health inspectors collectively to lower the risk of

6 A distrust of natural ventilation as a fresh air strategy is still rife in America, with reliance on tried and tested fan systems, perceived to deliver a measured volume of fresh air



legionella amplification within building water systems.

In seminar 7 – entitled ‘Building water systems: issues and insights from outbreaks of Legionnaires’ disease’ – an expert panel answered a range of questions, including: the reasons for outbreaks; new code requirements in ASHRAE Standard 188; and actions to minimise incidents.

Cooling towers are still popular in North America and, in some cases, are the best solution for heat rejection, so issues such as air intakes, water treatment and vapour pluming are commonly encountered.

The ASHRAE Standard 188 committee met over a three-day period during the conference, allowing members to make representations for improvements and developments to the standard, which is now being adopted across the US by states as their code requirement.

The session titled ‘Indoor environment: health, comfort and productivity’ heard speakers on topics ranging from indoor air quality (IAQ) to comfort challenges in commercial kitchens.

IAQ has been a hot topic in ASHRAE for some time, with ASHRAE Standard 62 setting fresh air levels and other air quality criteria – such as filtration levels.

ASHRAE Standards 90.1 Energy in Commercial Buildings and 189.1 Sustainability, also propose reduced fresh air levels to minimise energy use through reduced infiltration, better sealing of buildings and reduced fresh air volumes and higher recirculation in systems.

A distrust of natural ventilation as a fresh air strategy is still rife in America, with reliance on tried and tested fan systems, perceived to deliver a measured volume of fresh air whenever required.

Any engineers involved in high-rise buildings – a current trend in the UK, with Manchester announcing its first 60-storey building – would be keen to learn from seminar 4: ‘Energy use index (EUI) for tall, super-tall and mega-tall buildings’.

The EUI for tall buildings in Chicago was compared with international exemplars, highlighting the most practical and cost-effective solutions.

All the information generated over the five-day conference is available at www.ashrae.org and requires a paid registration to view. CJ

● **FRANK MILLS** FCIBSE is a chartered consulting engineer at Low Carbon Design and **TIM DWYER** FCIBSE is technical director at CIBSE



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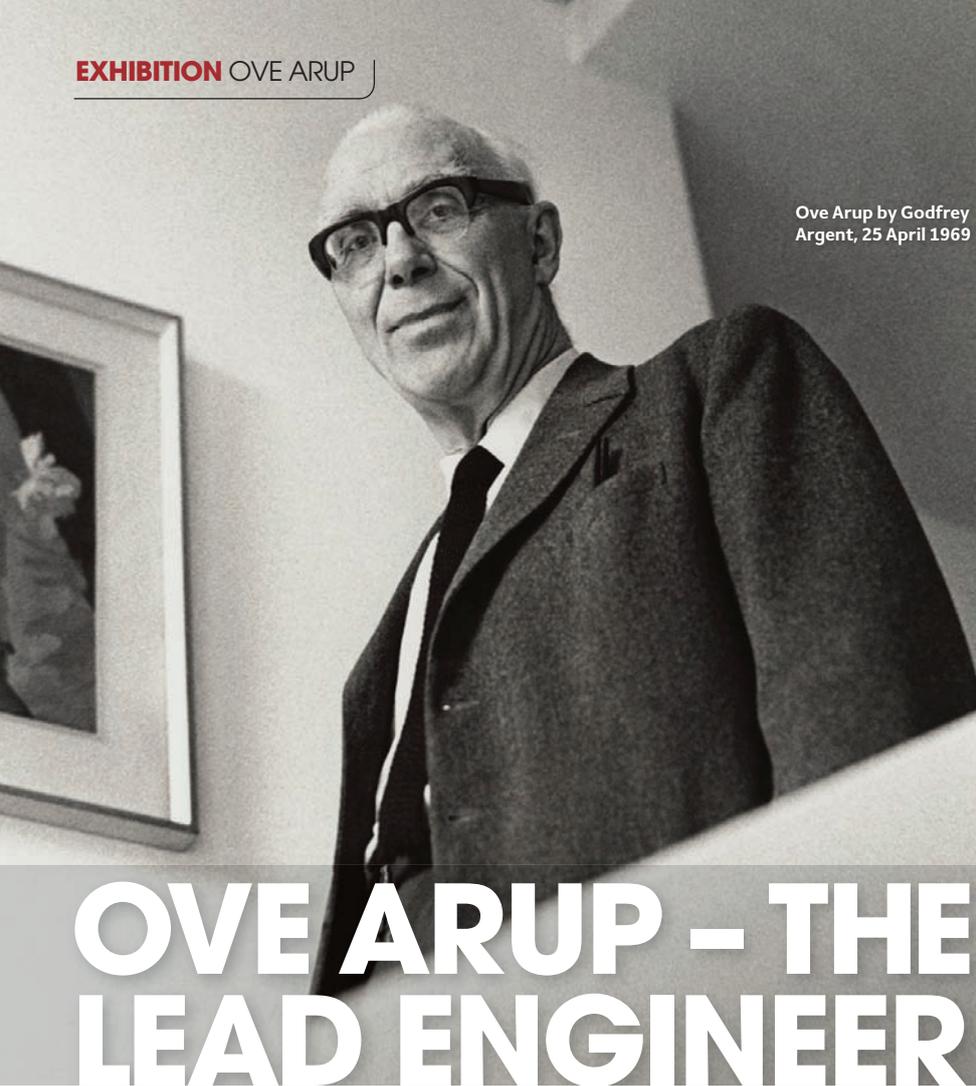
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Ove Arup by Godfrey Argent, 25 April 1969

OVE ARUP – THE LEAD ENGINEER

A brilliant engineer and a great thinker, Ove Arup's focus on collaborative design is as relevant now as it was when he set up Arup 80 years ago. **Alex Smith** discovers more about his 'total design' philosophy at a new exhibition

The V&A's retrospective of Ove Arup is not just a roll-call of his many achievements, but a potent reminder of the importance of collaboration when engineering and designing buildings.

Engineering the world: Ove Arup and the Philosophy of Total Design has more than 150 previously unseen prototypes, models, drawings, film and photography from Ove Arup's life and career, as well as examples of some of Arup's ongoing work, including an acoustic laboratory and the SolarLeaf living green wall, which uses microalgae to generate heat and biomass.

Ove Arup's multidisciplinary approach to engineering is encapsulated in a quote flashing on large screens: "Total design means to join all the professions right from the start" – and this was the founding principle of the engineering practice he set up in 1938.

At the time, this philosophy was unique – architects designed buildings without the early intervention of engineers. Arup believed there should be a holistic approach, in which the 'architect should be part-engineer and the



The ground floor of the V&A exhibition

engineer should be part-architect, to achieve a fruitful collaboration'.

The first part of the V&A exhibition looks at Arup's early career, including his studies in philosophy, mathematics and engineering, and his relationships with great modernist

architects such as Walter Gropius and Le Corbusier, which helped form the guiding principles for his firm. An early example of his holistic approach was the Finsbury Health Centre, in London, designed in collaboration with Berthold Lubetkin in the 1930s. The drawings in the exhibition will look familiar to designers today, with their emphasis on cross-ventilation, natural daylighting and expansive views through large windows.

Arup, the business, started as a structural and civil engineer, and its first project to include services design was Paris' Centre Pompidou, where elevators and ductwork defined the look of the competition-winning submission by architect Richard Rogers.

An elegant example of form following function is displayed in a model of the Kansai International Terminal building, designed with Renzo Piano Building Workshop. Its roof takes the shape of a large aerodynamic wing, and is determined by the trajectory of the air jet, which scavenges heat from a high level. Built between 1988 and 1994, the terminal was one of the first buildings to use computational fluid dynamics to model airflow accurately.

Arup vice-chair Tristram Carfrae says the unique design of the building would have been impossible without 'total design' and the input of the services team at an early stage. Despite the proven success of collaborative design, however, he only sees the involvement of primary disciplines – such as electrical, structural and mechanical engineers – in around 30-40% of the projects he works on. 'I want the engineers, lighting designers and acousticians in the room on day one,' says Carfrae. 'I want their expertise and creative input because, sometimes, they will be able to come up with far better designs.'

Carfrae cites the iconic bubble-façade of the Beijing National Aquatics Centre as an example of collaborative success. 'From day one, we had 10 engineering disciplines and four architectural disciplines,' he says.

The idea of using ETFE air pockets as an insulated façade came from the mechanical engineer, who wanted to heat the pool in the most efficient way possible; the acoustician also said it would give the centre better acoustics than a glass envelope. 'You won't get that sort of thinking unless everyone is around the table,' says Carfrae. Ove Arup's retrospective is a reminder to the industry of the value of such collaborative design. **CJ**

● *Engineering the World: Ove Arup and the Philosophy of Total Design*, supported by Volkswagen Group, with additional support from Tideway, runs until 6 November at the V&A. www.vam.ac.uk/info/engineering-season

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CFD modelling would have been too time consuming here. Old technology works really well in this application



PUMPED UP

Rio's Olympic Canoe Slalom has already won gold for energy efficiency, using 30% less power than the 2012 course. **Andrew Brister** explains how the design reduces flow rates and pumping power, but still pushes paddlers to the limit

Can Usain Bolt do it again? Will London 2012's Super Saturday trio of Jessica Ennis-Hill, Greg Rutherford and Mo Farah repeat their amazing exploits? Come 5 August, all eyes will be on Rio 2016, the first Olympic Games to be held in South America. Brazil will welcome 206 countries to 37 venues to compete for 4,924 medals across 42 sports... all

in just 17 days of action. It's breathless stuff.

It may be all over in a flash, but spare a thought for the construction teams that have been working tirelessly to create the venues. The spectacle will take place in four areas: Copacabana, for beach volleyball; Barra, home to the Olympic Park; Deodoro, for aquatics, BMX, and equestrian competitions; and Maracanã, which has two large stadiums.

Whitewater crafting

The design of the Deodoro Olympic Park, which will host nine sports, is being led by the Viglicca Marobal Consortium. Mountain bike, BMX and whitewater venues are grouped together in the Deodoro Extreme Park – or 'X Park'. Consulting engineer Cundall was part of the team that delivered the London 2012 canoe slalom course and was on board again to develop the Olympic facility in Rio de Janeiro. Cundall is working for the specialist design team, led by Whitewater Parks International (WPI), to deliver a canoe slalom course that meets the exacting standards laid down by the International Canoe Federation (ICF).

Damien Dungworth, associate director at Cundall, is part of the engineering team working on the project, based in Newcastle. 'As a civil engineer that specialises in hydraulics and loves sport, this is the perfect project for me; big concrete structures, huge water flows and a venue for the best athletes in the world! They are fascinating facilities to



MATTHEW STOCKMAN / GETTY IMAGES



BUDA MENDIS / GETTY IMAGES



design, look at and go on,' he says.

The London 2012 course, developed with WPI, was an innovative, self-contained, dual-channel facility that minimised energy consumption. This energy-use reduction has been a significant factor in its success in legacy. 'The London design concept has formed the template for Rio, where we again have a dual-channel facility – the main Olympic competition channel and a smaller training channel,' says Dungworth. 'This time, it is slightly smaller, which results in a lower capital cost and lower operating costs.'

Cundall's engineering expertise has allowed ICF standards to be met with a reduced head – the height to which the water is pumped from the lake to the top of the channel – and a reduced flow rate down the channel. Energy consumption is reduced by 30% in comparison with London.

Essentially, the venue consists of a self-contained body of water, or lake, with pumping stations to deliver the flow to the start pool at

the top of each channel. Water flows down the concrete-lined channel, within which are several obstacles to hold back the flow and create the whitewater. The concrete channel has unistrut cast into it so that plastic blocks can be bolted onto the floor to create a series of movable obstacles.

A series of axial flow, propeller-type submersible pumps – each weighing five tonnes and rated at 350kW – is the heart of the system. A boat-conveyor system is used to take canoes and rafts up to the start pool. 'We use technology from the car manufacturing and food-processing sectors, and modify and adapt it for these applications – it's not as if you can just commission a canoe conveyor system,' quips Dungworth. The final component is the water treatment plant (see panel 'Clean race').

For the competition channel there are four pumps – three duty and one standby. The standby is an Olympic requirement so that a pump failure during the games can be accommodated. The pumps operate in parallel with their own independent pipeline systems. As the pipelines are short, with a limited number of fittings, the total head is predominantly the static lift to achieve the 4.5m drop on the channel. The shaft power of each pump is around 265kW for the full flow, a total of 795kW with three pumps. They do, however, have variable frequency drives so that after the games the channel can be run at a lower flow to reduce the amount of energy.

Model behaviour

Extensive modelling has been carried out to determine optimum flow conditions into the pumps and where best to place the obstacles to create the right conditions for a challenging course. Computational fluid dynamics (CFD) modelling was used for the former, while a 1:13 scale model was built for the latter.

'It is important to get good flow conditions into the pumps. You want a nice laminar flow. If you get eddies being created, the pumps can suffer from vibration and then it leaves you with maintenance issues,' says Dungworth. The modelling allows the team to vary parameters – such as the curve of the perimeter of the lake and the length of the walls extending into the pumping station bays – to ensure a smooth flow.

A team from the Czech Technical University in Prague, some of whom are former world-

class canoeists, constructed the 1:13-scale hydraulic model of the whitewater channel segments planned for Rio. This type of modelling is intended to show hydraulic behaviours in various flow scenarios and structural configurations, the results of which informed the final design of the facility. There are steel plates on the bottom of the model channel and the obstacles have magnets on them to allow easy and quick movement. 'CFD modelling would have been too time-consuming here. Old technology works really well in this application,' says Dungworth.

The modelling allowed the team to observe hydraulic behaviours and how they could be manipulated by the obstacles placed in the channel to create the whitewater features. 'It allowed us to confirm all of the key parameters – such as flow rate, slope and width – and to measure velocities and depths, as well as observe flow patterns and hydraulic features,' says Dungworth.

Variables such as channel geometry, gradient, flow rates and obstacle placement were experimented with, and exactly how they influence hydraulic effects – such as depths, velocities, directional shifts, momentum, surging, recirculation and feature formation – was considered.

As these myriad factors were assessed, optimal configurations emerged that demonstrated ample conditions to meet the ICF's technical requirements for Olympic venues and ensure that the facility was fit for purpose, providing for fair and appropriately challenging competition.

'The model gave us and the ICF the confidence to implement design development,' says Dungworth. 'We took the obstacle locations from the model and replicated them in Rio, and the results were amazingly successful, with very few refinements. You could have run a competition on it first time out.'

Energy savings

The final results are impressive and the Rio facility will certainly have its own unique whitewater character, and realise a new standard of improved operational efficiencies.

The head on the 280m competition channel has been reduced from 5m in London to 4.5m in Rio, and the flow rate from 15m³/s to 12m³/s, with a 30% reduction in energy consumption. 'These facilities use a lot of energy, so it is important to reduce that as much as possible while meeting competition standards.' The second, training channel is 200m long, has a 1.8m drop and a flow rate of 10.5m³/s.

Cundall and WPI's efforts to minimise operating expenses will help to ensure that a vibrant post-Games legacy can be achieved. As well as recreation, the course will provide an amazing venue for school and scout groups, commercial rafting, and amateur and professional sport. It will also be a training ground for fire and rescue teams.

Dungworth is excited about seeing all the team's hard work come together in August. 'I am looking forward to watching the Olympics on the television and proudly reflecting on the journey that we have been through to create such a dynamic and spectacular venue.' CJ



BUDA MENDIS / NICOLAS PESCHIER / AFP / GETTY IMAGES



PRECAUTIONS AGAINST THE ZIKA VIRUS

The threat of being bitten by mosquitoes carrying the Zika virus, at the canoe slalom, are minimal. The mosquitoes breed in stagnant water and the slalom course features fast moving chlorinated water.

The IOC said Games venues would be regularly inspected to ensure puddles of stagnant water are removed, minimising the risk of athletes and visitors coming into contact with the insects.

Advice from the British Olympic Association includes closing windows in hotel bedrooms and keeping the air conditioning on. Athletes, officials and spectators should also stay away from water at night, and ensure they liberally apply insect repellent.



Clean race

An important consideration for the canoe slalom course at Rio is, of course, water quality. This is a water-contact sport and the athletes can be submerged should they overturn. 'Water quality levels aren't quite up to swimming pool standards,' explains Dungworth. 'We've used World Health Organization water environment standards.' In London, the team opted for a combination of sand filtration and ultraviolet disinfection to achieve the desired quality, but a more robust solution has been chosen for Rio, with the addition of chlorine if needs be. 'With chlorine, you can vary the dose as required – it

doesn't have to be used to capacity, and that's the same with the filtration.'

The biggest concern is algae growth. 'There's not a lot to filter out unless you get algae growth,' says Dungworth. 'It's a bigger water-treatment system than at London, but that's the nature of the climate – it is conducive to growth of algae. We design the lake to prevent nutrients getting into the water, which can promote algae to grow. So we slope edges away from the lake to prevent run-off from the land and we discourage birds and wildlife – that's good design practice.'

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The owner of Eagle Tower in Cheltenham was braced for an expensive retrofit to meet new standards, but a dynamic model of the iconic building revealed a better performance than expected. **Matthew Edis**, of Sustainable Construction Services, explains the value of a detailed Energy Performance Certificate (EPC) assessment



HIGH FLYING EAGLE

As the only major tower block in the historic Georgian city of Cheltenham, Eagle Tower is hard to miss. A classic 1960s, 16-storey office block, it is thought of locally as a highly desirable place to locate a business, save for one big drawback – an Energy Performance Certificate (EPC) rating of ‘G’.

‘We are very proud of the building’, says Alex Harrington-Griffin of owner Coeur De Lion Property. ‘It was the first building of this size that my father was able to purchase and he has always had a soft spot for the place.’

Despite this affection, Harrington-Griffin and his team were realistic. They knew that if they were to secure funding for future development on the building, and continue to retain commercial tenants, that EPC rating of ‘G’ had to be lowered before 2018.

Eagle Tower is not alone when it comes to poor ratings. According to the EPC register, almost one in five buildings with a certificate is rated F or G. The picture across England and Wales is likely to be even worse. Non-domestic EPCs were only introduced in 2008

and unless an older property has been sold or rented since, it will probably not have an EPC rating. In reality, the percentage of F and G-rated buildings is likely to be much higher.

Sustainable Construction Services (SCS) was initially called in on the basis that the building would probably need significant work to upgrade its energy efficiency to the target EPC rating of E. SCS took a much more strategic view and questioned whether the issue was the original rating rather than the energy performance of the building.

This is not a criticism of the previous EPC assessor and the work it carried out – more a comment on the difficulty that both SCS and its competitors have when pricing an EPC for a 16-storey office block, with the preferred assessor probably being appointed on the basis of lowest price.

If the EPC model could be built more accurately to reflect how the building was actually built, the EPC performance would improve.

Certificates are based on the data available to the assessor, through either their visual inspection on site, data supplied to them by



ENERGY ACT 2011

From 1 April 2018, the Energy Act 2011 makes it unlawful to let properties in England and Wales that do not meet a prescribed minimum energy performance standard. The now axed Department of Energy and Climate Change stated that the minimum energy standard for an EPC will be ‘E’. But how this will be implemented is still not clear.

the client, or research of products following the site visit. Where data is not available, default figures are used based on accredited software suppliers' guidance and on nationally recognised modelling conventions.

To overcome the issue of defaults where data was not easily obtainable, we conducted a more thorough investigation of the complex building services at Eagle House.

With more than 100,000ft² of office space and other ancillary spaces to survey, the site visit was not a five-minute exercise, but working with the building manager and the head of maintenance made the process easier. We went through every page and drawing of the O&M to glean additional information.

Although built in the 1960s, Eagle Tower had been internally refurbished in the mid-1990s. The boilers were replaced around this time and the chiller was upgraded in 2012.

In terms of heating and ventilation, each office footplate was zoned into four quarters with no perimeter or underfloor heating. Comfort was achieved via central distribution, controlled on the room return air temperature.

We were able to mimic a similar result to the original EPC rating of 'G' with a number of defaults used for the building services. Operating from this baseline model, we tested theories about those parts of the building that should be surveyed in detail to improve the EPC performance, saving the client money.

One example was lighting. The default of using T8 fluorescent lighting would have been a pragmatic approach on a building of this size. However, SCS undertook an extensive survey to improve the EPC lighting figure significantly. This included the recording of every fitting in the building and an analysis of light levels in each room.

We suspected that much of the ductwork



sizing had originally been designed when smoking was still commonplace in offices. Much of the building was also open plan. As a result, our engineers were able to prove that the current ventilation systems had relatively low resistance paths, leading to much lower specific fan powers being used in the EPC model.

Apart from a few small modern extensions at ground level, much of the building's fabric was original. This was tested in detail, and

“ We suspected that much of the ductwork sizing had originally been designed when smoking was still commonplace in offices

a lot of research was undertaken to find out more information about the building fabric performance to improve the model. For instance, details of some of the glazing was found hidden in the operation and maintenance manual and, in other cases, on-site measurements were undertaken.

Using different software also helped with the performance of the EPC. We are certified to use iSBEM, SBEM in IES VE (both Levels 3 and 4) but chose to model the building dynamically using IES VE Apache (Level 5).

This dynamic simulation allowed us to reflect more accurately the reality of the building's energy performance in the EPC model – although still in accordance with the regulated network configuration management protocols and conventions. It is able to mimic more precisely how a building's fabric absorbs and omits heat. The subdivision of equipment being allocated to a specific zone is also more flexible than in, say, an iSBEM model.

The result of all this hard work resulted in significant improvements in the EPC performance and saved the client a great deal of money.

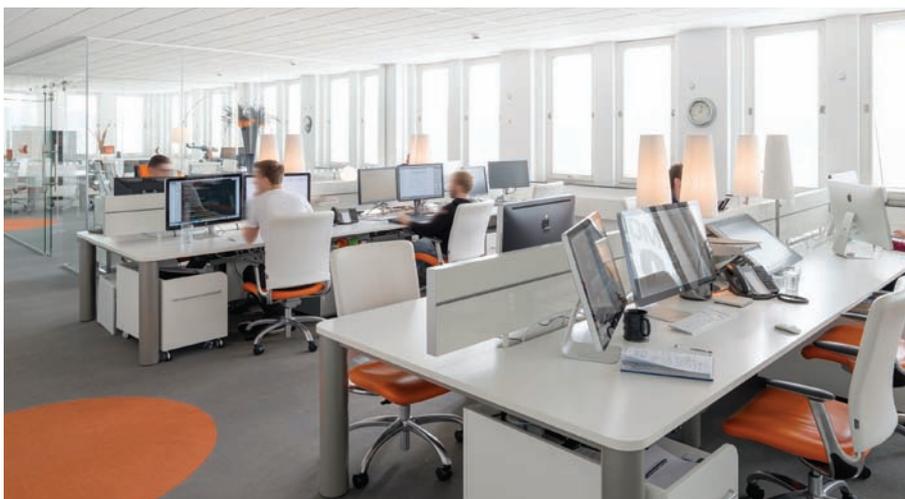
As each layer of detail was added, and defaults removed, the model kept getting better and better. By the time work was over, the target of an 'E' rating was surpassed and the building ended up with a 'D'.

Understandably, Coeur De Lion Property was thrilled with the result. 'By employing an EPC assessor to go the extra mile, we have saved ourselves a huge bill for refurbishing parts of the building unnecessarily,' says Harrington-Griffin. 'The only people that missed out were the installers and suppliers who might have benefited from being paid to install new equipment in the building.'

As far as SCS is concerned, we are glad to have worked with a client who saw the benefit of investing a bit of time in understanding what we were trying to achieve.

In terms of the industry's approach to 2018, we had thought that lawyers and building owners were going to be concerned about leases becoming invalid when the Energy Act 2011 is implemented. However, in recent years, we have found that building owners have been hedging their bets, and banking on the government watering down the requirements in the way they have done with zero carbon homes. This is now changing and we are starting to see people taking the issue seriously.

By using accurate modelling to assess energy performance in an EPC model, the task of hitting the requirements may not be as painful as it first appeared. CJ



Built in the 1960s, Eagle Tower was internally refurbished in the 1990s

TAKING CONTROL

Power over ethernet is a hot topic in commercial lighting as the Internet of Things continues to spread its web – but not all products work the same way. Prolojik's **Asela Rodrigo** explains the different approaches to this emerging technology when applied to lighting

Of the few power over ethernet (PoE) lighting systems currently available on the UK market, most are an extension of a building's IT system. In this set-up – what we term 'conventional' PoE – each luminaire becomes a point on the network with its own internet protocol (IP) address, and Cat 5 or Cat 6 network cables are used to carry both data and power loads up to around 60W. Another approach is to use PoE for what its name suggests – power. The data is communicated separately using digital addressable lighting interface (Dali) standard network cabling.

Many of the main benefits of PoE are shared in both approaches. Installation costs can be reduced dramatically because of a reduction in the amount of expensive copper wiring required, and because the 'plug and play' nature of data cabling requires minimal input from specialist electrical contractors.

It can save space too, with little need for large distribution boards within confined riser cupboards and less vertical infrastructure within the ceiling void, as the majority of traditional final circuit and associated containment are not required. Figures derived from practical installations suggest capital cost savings of up to 30% are possible in a typical commercial building, compared to mains wired systems.

Energy savings are largely derived from the intelligent power distribution. Power is only applied to the cable once the device has confirmed its requirements, ensuring the correct amount is supplied. This significantly reduces power loss in cables and heat gain in containment, requiring less cooling.

Such PoE systems have delivered savings of up to 11% compared to a 240V LED system, and 46% compared to a T5 fluorescent scheme



where it has been installed. It uses LED drivers that deliver losses of 3%, compared to 10-13% for 240V LED drivers.

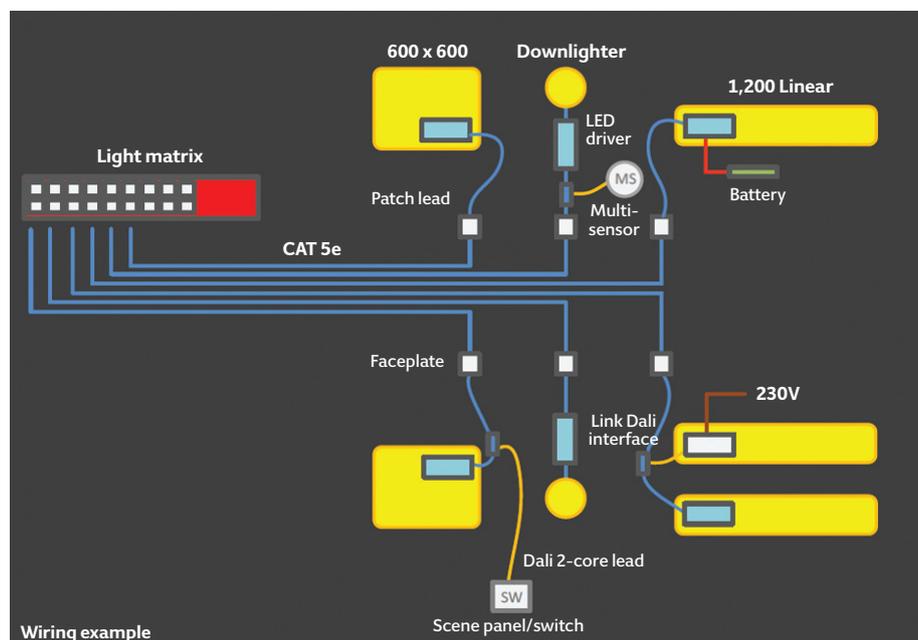
Both types of PoE lighting control systems can be operated, maintained and managed by online software products, offering easy-to-use, wireless system management. So why the two approaches when they both deliver significant



cost, space and energy savings? The 'starting point' determines the principle difference.

For some, this is the IT infrastructure – which is why conventional PoE could work well; it integrates lighting into the communication domain. For others, the starting point is the environment of the building – where lighting plays a big part – and, while seeking to harness the benefits of PoE, they are looking to keep lighting in the mechanical and electrical (M&E) domain.

In conventional PoE, each luminaire has its own IP address. While the rich networking potential of this type of system is undoubtedly exciting as we move further into a world managed by the Internet of Things (IoT), there are potential drawbacks. For a large building, having thousands of extra IP addresses means a greater security risk. The system architecture can also become unwieldy and difficult to





This type of system still offers full control of individual luminaires, because Dali controllers support broadcast, group and individual addressing, providing full control of ballasts, LED drivers, emergency inverters and sensors. It can also be integrated with numerous other building control systems. But it does decouple the lighting system from the IT infrastructure, which could be a positive or negative, depending on the driving factor behind the specification, and the requirements and skills of the building management team.

Another major factor to consider is where the management of lighting sits in the corporate structure. Typically, it would come under M&E consultants at the specification stage, then under the facilities management

(FM) team to manage, maintain and develop. With conventional PoE, it may be that this responsibility is devolved to the IT team, which is likely to have greater relevant expertise. With the alternative approach to PoE, it could remain predominantly with the FM team because it is part of the Dali network.

PoE is an important development in lighting controls, and one that will have a huge impact on our sector, the energy output of buildings and the sophistication of user controls. But one size does not fit all and, sometimes, PoE alone may not be the optimum solution. For example, configuring a PoE system in long staircases with multiple landings is extremely complex and the cost could be prohibitive in contrast to the savings usually made when installing on individual floors.

In buildings where the physical infrastructure supports PoE in some places and not in others, a combination of PoE and 240V power sources working to the same Dali standard control system could be the best solution – especially if it can be adapted and developed as technology improves.

The biggest rewards are in large buildings with complex lighting requirements. Smaller spaces may not use an intelligent PoE system's sophisticated benefits fully and, instead, could meet their needs with a more straightforward on/off/dimming control system.

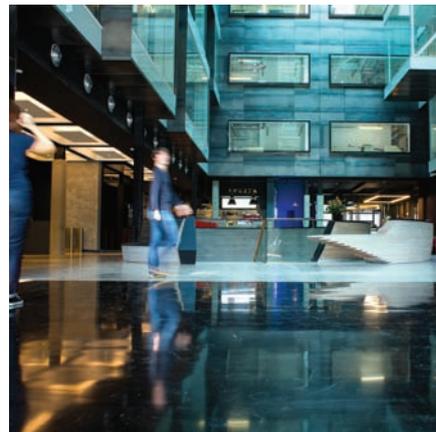
The real answer to whether PoE is right for a project can be found by looking at the needs of the occupants. Consideration should be given to the complexity of that need, how the system is to be managed, who it will be managed by, what expertise they have, and what business objectives are to be achieved by installing it. **CE**

control and maintain. For certain businesses, the future potential outweighs any security fears, particularly if a high level of security and a skilled IT team are to hand. For others, this scenario might be a little overwhelming.

One day, the IoT will be such a commonplace concept and so well developed, that fears over security will be much less prevalent. Until then, some may prefer to take a lower-risk, hybrid approach.

Combining PoE with established Dali standards means data and power are carried separately – via Dali cabling and Cat 5 or 6 cabling respectively – so luminaires do not have IP addresses. This means systems that already use Dali standards can be adapted and transformed to reap the benefits of PoE, using much of the existing equipment. In new installations, this approach offers a bridge between the security of Dali and the potential of the IoT, with the option to evolve as technology changes and becomes more resilient, and as the needs of users change.

One day, the IoT will be such a commonplace concept, and so well developed, that fears over security will be much less prevalent



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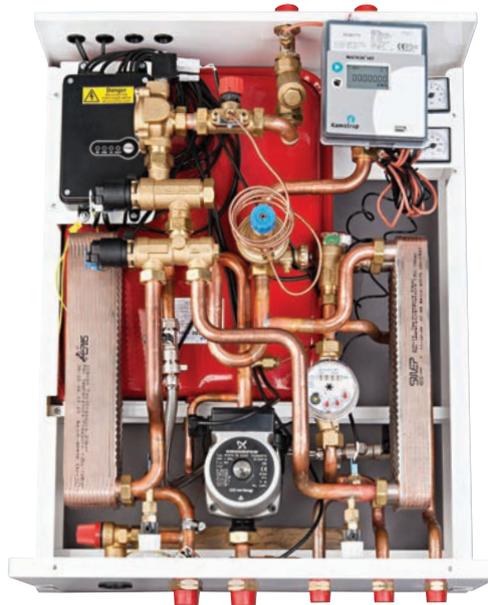
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This month: The value of hybrid heat pumps; combatting overheating in a maternity hospital; air source heat pump in Glasgow social housing scheme



COMPOUND INTEREST

Hybrid heat pumps combine a high efficiency gas boiler and air-to-water heat pump, and will be key in helping the UK meet its domestic carbon targets. **Metkel Yebiyo and Graeme Maidment**, of Sirach, explain how it works

In households not connected to mains gas, electric heat pumps offer the opportunity to supply high efficiency, low carbon heating as an alternative to electric heaters, LPG or oil-based systems.

As a result, this technology is an ideal heating solution for the four million UK households that don't have access to mains gas. However, electric heat pumps also offer large-scale carbon savings when used for heating in the 22 million households that do have gas, as well as mains electricity.

In these applications, hybrid heat pumps present an attractive opportunity for reducing fossil fuel consumption. In March 2013, the now axed Department for Energy and Climate Change (DECC) published a document entitled *The future of heating: meeting the challenge*.

This report predicted that by 2030 some 26% of the UK's heating energy output would be met by air source heat pumps

alone, and as much as 56% by hybrid systems.

A schematic of a hybrid heat pump with a condenser and gas boiler connected in parallel is shown in Figure 1.

Hybrid heat pumps consist of a high-efficiency gas boiler combined with an air-to-water heat pump. Hybrid systems are defined as those that provide heating, cooling and/or domestic hot water through the combination of two or more energy sources to form a single system, which is designed to overcome the limitations of the individual technologies.

Operation modes vary according to different manufacturers' control strategies. The heat pump can be used to cover most of the annual heating demand and only needs to be supplemented by the boiler during periods of low ambient temperature in winter, or to cover peaks in demand. In such an installation, the boiler and the heat

Hybrid heat pumps minimise running costs by dynamically switching between the systems in response to changing outdoor temperatures or to varying electricity and gas tariffs

► pump can run either in combination or in isolation.

This hybrid operation mode has been suggested to increase energy efficiency by approximately 10%, compared with a condensing gas boiler alone, and can minimise running costs by dynamically switching between the systems in response to changing outdoor temperatures or to varying electricity and gas tariffs.

The main advantage of hybrid operation is that it minimises potential pressure on the electrical distribution grid associated with switching from boilers to heat pumps during periods of high heat demand.

This can be seen in Figure 2, which shows the UK hourly demand for heat and electricity in 2010. This indicates the design point for heat delivery and the peak electricity demand, assuming conventional heat pumps are used. This is significantly greater than the current electrical delivery point. Hybrid heat pumps are one way of overcoming this limitation, since gas

boilers can be used to deliver part of the heat requirement during peak periods.

Potential applications and current market development

Hybrid systems have potential for small-scale uses, such as heating and hot water for residential applications, and on a larger scale, such as district heating or hot water in industrial processes.

A study by Delta-ee, on the market development and outlook for hybrid heat pumps, indicated that hybrid systems with gas boilers have greater potential for application in markets, such as the UK, the Netherlands and Germany.

Looking at the residential heating sector, it should be borne in mind that traditional fossil fuel-based solutions are generally characterised by low initial costs for the equipment and installation.

Hybrid heat pump-based schemes must therefore be optimised to achieve a competitive total cost of ownership in order to penetrate this market successfully. Research, development and demonstration activities that show a reduction in the total cost of ownership will help.

The Delta-ee study found that four of the five biggest gas boiler manufacturers in Europe are already offering a range of new products with 20 different hybrid heat pumps on the market. Firms offering this technology include Bosch, Daikin, BDR Thermea, Viessmann, Vaillant or Ariston, Mitsubishi Electric, Atlantic and Glow-worm.

Benefits of hybrid heat pumps

Significant benefits from using hybrid heat pumps – compared to traditional gas boilers and conventional heat pumps – can be identified. These include the potential to reduce CO₂ emissions significantly – up to 1.5 tonnes per year for domestic applications – thereby offering a more sustainable heating solution in comparison to conventional systems.

By selectively switching between different fuels, a hybrid heat pump can be configured always to deliver either the lowest cost of heating or the lowest CO₂ emissions based upon knowledge of a combination of fuel tariffs, heat pump coefficient of performance (COP) and boiler efficiency.

A key marketing advantage of heat pumps is that they are eligible for the government’s renewable heat incentive (RHI) scheme, which returns subsidy to the user of 7.42p/kWh heat generated. For

Hybrid heat pump with a condenser and gas boiler connected in parallel

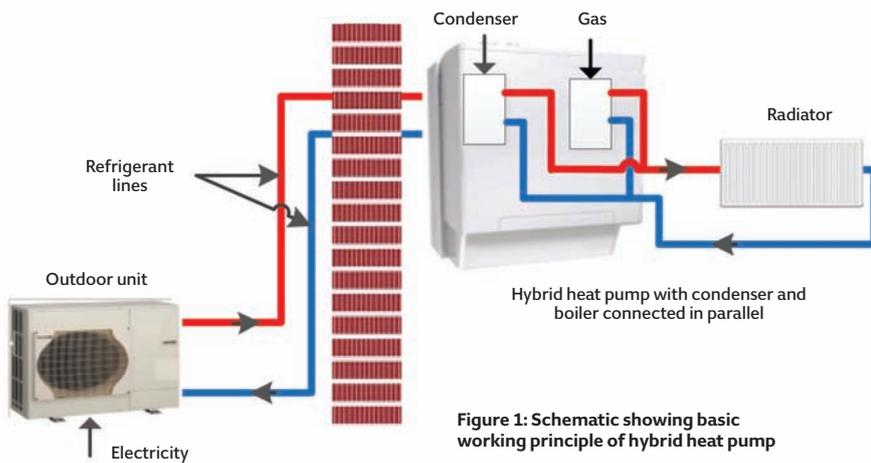


Figure 1: Schematic showing basic working principle of hybrid heat pump

UK hourly demand for heat and electricity in 2010

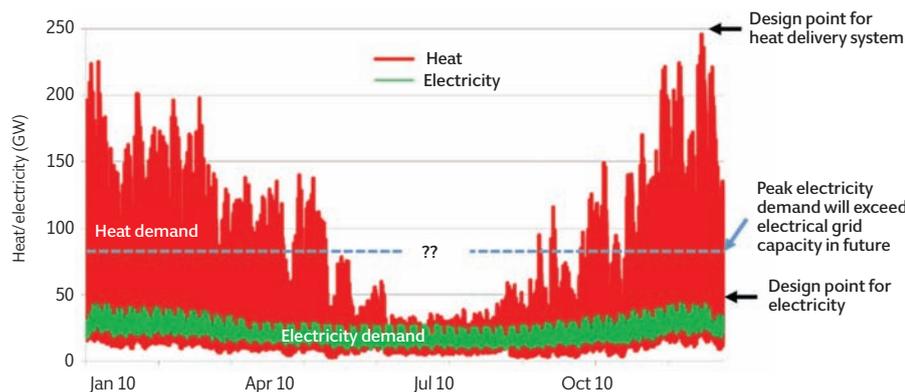


Figure 2: UK hourly demand variability for heat and electricity in 2010 (Source: i-STUTE Breakfast Forum presentation by Sugden, L)

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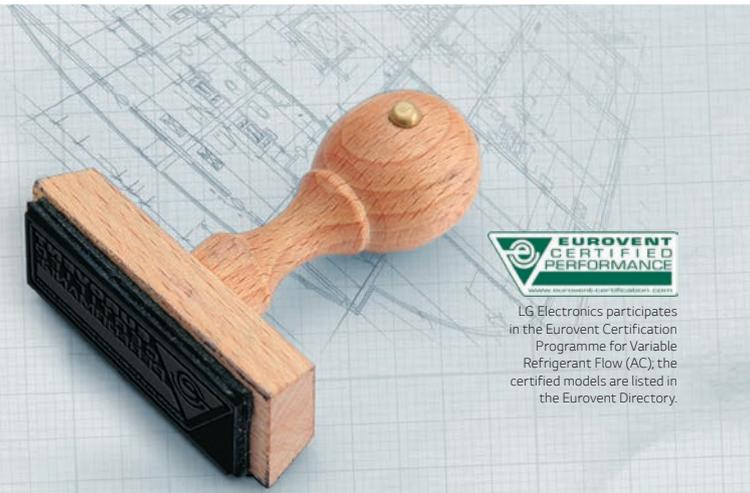
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➤ a typical house this could give an annual return of around £2,700.

Although the technology is commercially available, the market is still in the early stages of development and faces challenges around system integration, automation and standards (see panel 'Next steps for hybrid heat pumps'). But hybrid heat pumps have already been installed and tested at a range of field sites, in various climates and house types and with different heat emitters, and the technology has significant potential to reduce energy use and carbon emissions. **CJ**

● The Sustainable Innovation in Refrigeration Air Conditioning and Heat Pumps (SIRACH) network promotes new technology in refrigeration, air conditioning and heat pumps. On 23 November, the SIRACH network will be visiting the International Energy Research Centre (IERC) in Cork. For more information, or to be included on the Sirach mailing list, register at www.sirach.org.uk or email info@sirach.org.uk

● **METKEL YEBIYO** is a PhD researcher at London South Bank University
 ● **GRAEME MAIDMENT** is professor of air conditioning and refrigeration at London South Bank University

Smart systems that are able intelligently to select the fuel or hybrid mode based on pricing and or COP/ efficiency data are needed

Next steps for hybrid heat pumps

- Compact/prefabricated hybrid systems that are capable of fitting within the existing envelope of the range of conventional boilers need to be developed
- Integration kits that allow installers to easily and quickly fit the new technology into existing systems need to be developed
- Research focusing on the development of advanced algorithms for control and automation strategies is a top priority if hybrid systems are to reach their full potential. Smart systems that are able intelligently to select the fuel or hybrid mode based on pricing and or COP/ efficiency data are needed
- Hybrid systems need to maximise the combined efficiency of the technologies, while minimising both the operating cost and the environmental impact
- Opportunities exist to link with renewable energy technologies, which would provide improved performance/cost ratio, but these may require energy storage
- In parallel with system development, new standards also need to be developed
- A downside of the hybrid heat pumps is that they use a refrigeration cycle, which creates potential for refrigerant leakage.



Daikin's National Training Centre featuring hybrid heat pumps



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Mothers, babies and staff at the Rosie maternity unit in Cambridge can endure summer temperatures of over 30°C. Alan Short, Renganathan Giridharan, and Kevin Lomas look at what can be done to improve resilience at the 1983 facility at Addenbrooke's Hospital



HEAT STRESS



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This article is an edited version of the paper: *A medium-rise 1970s maternity hospital in the east of England: Resilience and adaptation to climate change*, which appeared in CIBSE's technical journal *BSERT*. The paper won the 2016 Carter Bronze medal for most highly rated paper relating to application and development. The paper was written by Alan Short, Renganathan Renganathan and Kevin Lomas (University of Cambridge/University of Kent/University of Loughborough). CIBSE members can access *BSERT* free at www.cibse.org/knowledge

The heatwave of 2003 – which peaked at 38.5°C in the UK – will be a normal summer by the 2040s, leading to related deaths more than tripling, according to the Committee on Climate Change (CCC) report published last month.

Currently no policies exist to ensure homes, schools and offices remain tolerable in high heat, and critical facilities – such as hospitals and care homes – are particularly at risk.

The paper *Design and delivery of robust hospital environments in a changing climate* – funded by the UK Engineering and Physical Sciences Research Council (EPSRC) – investigated the incidence of summer overheating in five hospital building types in the National Health Service's (NHS's) acute estate.¹ Here, we focus on the 1983 Rosie maternity hospital, part of Addenbrooke's in Cambridge, during the summers of 2010 and 2011, when it experienced elevated internal temperatures – increasingly an issue for the NHS.²

From analysis of its real and simulated performance – now and through the coming century – alternative corrective interventions were devised, with a focus on summer overheating. The full paper reports the relative costs and 'value for money' of four options.

The Rosie is a courtyard type of building: steel and concrete-framed, three storeys, with double-loaded racetrack corridors and brick-clad. Research identified 117 medium-rise courtyard examples in England, covering approximately 3 million m².

In 2010, the – since refurbished – building

was mechanically ventilated throughout the year, with a set point of 24°C. Air, which was maintained below 22°C all year, was supplied through corridors, and exhausted in wards, WCs and dirty utility rooms. Warm air heating was supplemented by perimeter hot water (HW) heating elements without local thermostatic control and with no zone control. The building provided chilled water to an air handling unit (AHU), but only delivered comfort cooling to intensive care units (ITUs) and operating theatres. Orientated east-west, the building's main entrance, and many of the multi-bed wards – occupying the second and third levels – face south.

The researchers' data loggers were placed on the second floor in June 2010. Figure 1 records factors that were observed to contribute to overheating, including: uninsulated steam pipes; internal heat gains from lighting and equipment; liberal glazing, largely fixed with a limited row of lights opening to only 100mm, exposed to direct solar radiation. Thermal comfort was marginal, even on mild days, in south- and south-westerly facing wards.

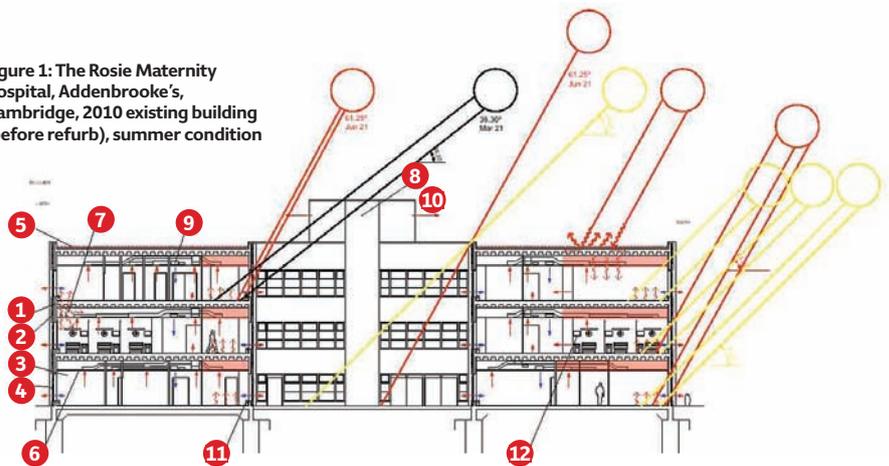
Project definitions of thermal comfort included the simple static guidelines and criteria described by CIBSE and the adaptive thermal comfort thresholds in BS EN15251. The appropriateness of these approaches and their relative credibility is discussed by Lomas and Giridharan, and considered in the recent redrafting of the health technical memorandum (HTM) 07-02.^{3,4}

The existing building enjoyed relatively low energy and low carbon performance



GEORGE DOVAL / GETTY IMAGES

Figure 1: The Rosie Maternity Hospital, Addenbrooke's, Cambridge, 2010 existing building (before refurb), summer condition



- 1 From inner leaf to external cavity wall above glazing spanning full structural bay
- 2 External leaf of 100mm brick, 50mm polyurethane insulation in cavity, inner leaf 140mm concrete blockwork. Occasionally steel stud and two layers of plasterboard
- 3 Non-structural internal partitions vary: plasterboard on 100mm softwood studwork or 140mm concrete blockwork plastered both sides
- 4 External windows double-glazed in hardwood frames, mullions and transoms (75x100mm), opening lights restricted to 100mm since late 1990s
- 5 Roof: 150mm RC slab, waffle 300mm deep, 50mm roof deck of pre-screeded slabs with reinforced edges, asphalt, 50mm extruded polystyrene 'Roofmate' held down by 50mm of washed gravel
- 6 Lightweight suspended gypsum ceiling tile grid
- 7 HW pipes suspended within ceiling void, original

- 8 insulation, some missing, water circulated at 55°C or 60°C continuously to avoid bacterial growth
- 9 Service riser to east and to west sides. Each connects to a plantroom on the ground floor (level 1), three AHU units in east, fresh air supply drawn down riser ducts from roof level
- 10 Supply air, two AHUs heating, one AHU cooling per plantroom. Unconditioned air supplied when external temperature below 22°C. Conditioned air delivered at 21°C through variable speed fan
- 11 Exhaust air vented mechanically. No heat recovery
- 12 Perimeter heating: thermostatic radiator valves recently installed (2011) supplied by HW at min 65°C. Target temperatures 24–25°C in all rooms/wards
- 13 Internal gains: TV 2.2w/m²; bed lamp 2.8w/m²; general ceiling mounted lighting 3.3 w/m² as calculated for multi-bed ward

against the Department of Health (DH) guidance benchmarks – but at the cost of comfort, unable to shed heat in relatively mild external conditions.

Hobo U2 temperature loggers monitored 26 spaces on three levels at hourly intervals from July 2010 to October 2011. The second level emerges as the hottest floor, where logger AR2-SB202 recorded the hottest space at 30.7°C. Maximum ambient temperatures during the summers of 2010 and 2011 were 29.6°C and 31.2°C respectively.

The year 2010 was relatively cool. Night temperatures were consistently uncomfortable – 23.4°C to 26.1°C – and one bedroom recorded 1,992 hours above 25°C, 888 of which occurred at night. Simple threshold criteria miss this. In the 2030 Design Summer Year (DSY), the existing building has a mean night temperature in excess of 25°C. The mechanical ventilation rate is too low – in most bedrooms it does not reach a minimum value of 10l/s/p.

To predict the annual frequency of overheating of the wards, and the energy demands and CO₂ emissions in the current climate, the dynamic thermal model IES was used.⁵ The full paper records reasonable agreement between IES predictions and measured values.

Current and future weather files were created by the Prometheus research team at Exeter University, and the future probabilistic weather files were derived using UKCP09 data. A detailed account of this process has been presented elsewhere.⁶ Schemes intended to deliver greater resilience to hot summers were

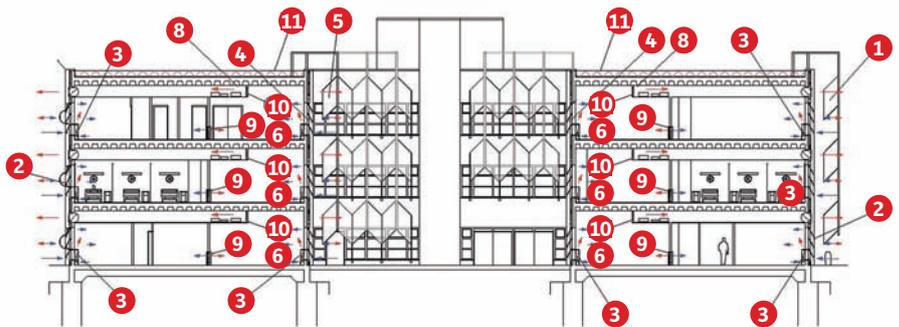


Figure 2: Natural cross-ventilation perimeter heating (option 2)

- 1 External sunshading applied to south, south-east, south-west elevations. Wing geometry of shade designed to maximise view to upper sky, in translucent coloured material
- 2 Existing timber window units, currently four upper panels open, restricted to 100mm. All eight glazed panels made openable to 45° with window guards to fulfill NHS safety regulations. Lower opaque elements to open, to admit air across perimeter heating units
- 3 Perimeter heating below glazing
- 4 Courtyard glazing units: all glazed panels opening to 45° protected by window guards
- 5 Sunshading as (1) applied to south-west and

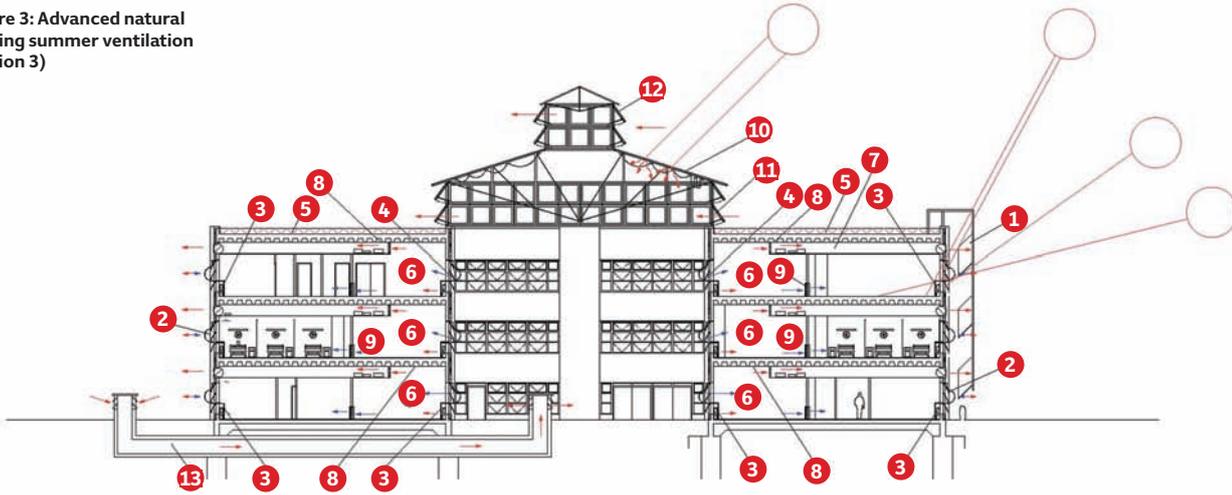
- south-east elevations
- 6 Cellular rooms at centre of each elevation to courtyards removed to open circulation areas directly to courtyard fresh air supply; these become patient day areas
- 7 Service risers maintained
- 8 Suspended lightweight ceiling removed to expose concrete waffle slab
- 9 Transfer grilles enable fresh air from courtyards to cross-sections
- 10 Transfer ducts within suspended ceiling exhaust opened courtyard patient areas
- 11 Additional 100mm extruded polystyrene added to roof

devised, starting with what appears to have become the enlightened – but questionable – industry standard Passivhaus-derived model.

Option 1: Sealed mechanical ventilation heating and cooling (SMVHC)

In this option glazing is sealed, airtightness

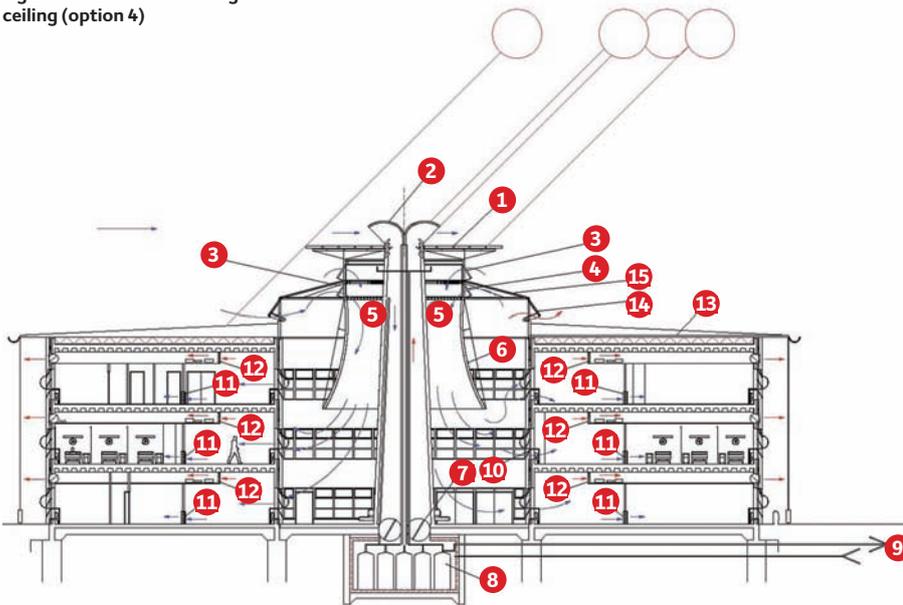
Figure 3: Advanced natural cooling summer ventilation (option 3)



- | | |
|---|--|
| <p>1 External sunshading applied to south, south-east, south-west elevations. Geometry of shade designed to maximise view to upper sky, in translucent coloured material</p> <p>2 Existing window units, currently four upper panels open, restricted to 100mm. All eight glazed panels made openable to 45° with window guards to fulfill NHS safety regulations. Lower opaque elements to open to admit air across perimeter heating units</p> <p>3 Perimeter heating below glazing</p> <p>4 Courtyard glazing units: all glazed panels opening to 45° protected by window guards</p> <p>5 Additional 100mm extruded polystyrene insulation added to roof</p> <p>6 Cellular rooms at centre of each elevation to courtyards removed to open circulation areas</p> | <p>directly to courtyard fresh air supply, become patient day areas</p> <p>7 Transfer ducts exhaust inboard spaces (6) to exterior</p> <p>8 Suspended lightweight ceiling removed to expose concrete waffle slab</p> <p>9 Transfer grills admit supply air from enclosed courtyard to wards</p> <p>10 Lightweight steel-framed double-glazed roof across internal courtyards with actuated fabric awnings to exclude direct sunlight in overheating season</p> <p>11 Low-level actuated vents cross-vent 'atrium', perform as smoke vents</p> <p>12 High-level lantern vents summer heat gains from upper part of atrium</p> <p>13 Low-level supply to atrium formed in spun concrete pipework</p> |
|---|--|

improved, and 100mm of insulation added to the roof and external walls. Mechanical ventilation is operated to achieve the then DH recommendation of 6ach, with 60% heat recovery. DSY peak temperatures will oscillate around 28°C, so additional cooling capacity will be required and will become increasingly necessary. Does the building have the capacity to accommodate it? Predicted energy demand is high (Figure 5) and associated CO₂ emissions very high – 130kgCO₂/m² (Figure 6). Almost two-thirds of this will result from its electrical demand, which will, of course, rise as cooling capacity is increased.

Figure 4: Passive downdraught ceiling (option 4)



- | | |
|---|--|
| <p>1 Solar water heating panels supply 'winter' tanks below courtyard</p> <p>2 Wind catchers flush thermal storage chambers as required</p> <p>3 Opening glazed vents to exterior supply cooling batteries (5)</p> <p>4 Internal opening glazed vents allow recirculation</p> <p>5 PDC cooling batteries</p> <p>6 Cone of acoustic absorbent material on light frame to direct PDC air flow</p> <p>7 Vent connects cooled water tanks chamber to external environment as required</p> <p>8 Cooled and warmed water tank enclosures formed</p> | <p>below courtyard</p> <p>9 Flow and return to geothermal array via horizontal pipe to field or borehole</p> <p>10 Air admitted through opening vents in each bay of elevation</p> <p>11 Transfer ducts through outer corridor partitions</p> <p>12 Exhaust ducts connect courtyard-facing spaces to outer envelope</p> <p>13 Lightweight insulation on roof</p> <p>14 High-level vents to flush upper part of courtyard when PDC not engaged</p> <p>15 Glazed roof with retractable shading</p> |
|---|--|

Option 2: Natural cross ventilation retaining perimeter heating (NCVPH)

This reintroduces natural ventilation as the primary ventilation strategy (Figure 2); roof insulation is increased; all glazing to south – southwesterly and southeasterly elevations – is shaded externally, to a geometry that preserves bedhead-level views out; all glazed panels open to 45° (safeguarded with grillage); opening, opaque panels are added; and the whole recipe is repeated on the glazed courtyard elevations.

Spaces adjacent to the courtyards are opened, to enable distributed cross-ventilation by the removal of some cellular rooms to form larger, open, patient day-spaces. Suspended ceilings are removed in these areas to reveal concrete soffits that capture 'coolth' from cross-ventilation. Ducts connect these inboard spaces directly to the perimeter.

Peak DSY temperatures hover between 33.5°C and 34.9°C. Additional cooling will be required, but night ventilation cooling is wholly excluded by current set-point policy. A peak of 31°C is predicted in Test Reference Year (TRY) summer conditions. More research is required into clinically safe night conditions in maternity wards. Option 2 has the lowest energy penalty (Figure 5) and markedly lower CO₂ emissions (Figure 6) than option 1.



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Option 3: Advanced natural cooling summer ventilation (ANCSVPH)

Courtyards are unheated, glazed atria with a liberal opening area above to dissipate summer solar gains (Figure 3). Air is supplied via concrete ducts below the ground slab, offering a measure of ground cooling. All glazing to the atria becomes operable to 45° and perimeter heating is retained. In winter mode, air is admitted through damper-controlled perimeter heating units. Transfer ducts exhaust air from zones adjacent to the atria and, as in option 2, suspended ceilings are cut back to expose thermal mass. All vulnerable glazing is shielded from direct summer solar gains. Option 3 offers similar DSY peak conditions as option 2, but TRY peaks within current guidance. Predicted energy demand and CO₂ emissions are only marginally higher than option 2 (Figures 5 and 6).

Option 4: Natural ventilation incorporating Passive draught cooling and perimeter heating (NVPDCPH)

This option (Figure 4) also proposes enclosing the courtyards, but developing the low energy cooling strategy of the authors' UCL School of Slavonic and East European Studies in London. Cooled water batteries at high-level openings induce a downward flow of pre-cooled air, contained by a lightweight, acoustically absorbent, fabric shroud. The cooled air is then drawn across surrounding occupied spaces.

The diagram proposes ground-sourced cooling to supplement the action of the Passive draught ceiling (PDC) by using seasonal thermal storage, readily available water tanks, so that heat gained from summer hot spells is dissipated in winter, and winter coolth used in summer. Banks of passive solar water heaters on the roof of each PDC rooftop supplement warming of winter supply tanks. Recovered heat from all sources is gathered in winter to supplement the supply to the perimeter heating system. Option 4 offers lower TRY and DSY peaks than options 2 and 3. Energy input is higher, but the CO₂ penalty is in line with options 2 and 3 (Figures 5 and 6). This is a complex option to model.

During extreme years, DSYs, option 1 (not illustrated) projected the best performance, while the 2010 building exhibited the worst performance. For the current DSY extreme conditions, all four options broadly met the HTM 03 1%/28°C, while – for the 2030s – option 2, 3 and 4 exceeded the criteria. But improved performance is achieved at a cost. Although the 2010 building, unaltered, had the

worst thermal performance, it had the lowest energy consumption (Figure 5).

The DH Energy Efficiency Fund Scheme of 2013-14, which Alan Short administered in part, would not have funded any of the options; the Treasury requires a return on investment of 2.4 within five years of implementation. This is potentially a major barrier to achieving the adaptation of the public, non-domestic building stock – which is unfortunate given that the NHS Retained Estate seems a particularly promising place to implement a public sector adaptation scheme.

Acknowledgements

The authors would like to acknowledge the contributions of Phil Nedin and Shahila Sheikh, mechanical engineers at Arup; Paul Banks and David Nichol, quantity surveyors at Davis Langdon Aecom building cost consultants; Short and Associates Architects for producing adaptive design drawings; colleagues engaged in the EPSRC project; the Addenbrooke's hospital estates and facilities department; and the staff of the Rosie for their forbearance during data collection. CJ

● This article was written by Alan Short, University of Cambridge; Renganathan Giridharan, University of Kent; and Kevin Lomas, University of Loughborough

References:

- Short CA, Lomas KJ, Giridharan R and Fair AJ Building resilience to overheating into 1960s UK hospital buildings within the constraint of the national carbon reduction target: adaptive strategies, *Building and Environment*, 55, pp73-95 (2012) 10.1016/j.buildenv.2011.12.006
- Heatwave Plan for England 2014. *Protecting health and reducing harm from severe heat and heatwaves*. Public Health England, May 2014, bit.ly/1mKfofo downloaded 23 October 2014.
- Lomas KJ, Giridharan R, Thermal comfort standards, measured internal temperatures and thermal resilience to climate change of free-running buildings: a case study of hospital wards, *Building and Environment*, 55, pp57-72 (2012) 10.1016/j.buildenv.2011.12.006
- The guidance on energy efficiency for the NHS, Health Technical Memorandum (HTM) 07-02, published in March 2015 at bit.ly/29umkeX
- Integrated Environmental Solutions (IES) (2010) IES VE Software Version 6.4, www.iesve.com accessed 23 February 2012.
- M Eames, T Kershaw, D Coley (2011), On creation of future probabilistic design weather years from UKCP09, *Building Services Engineering Research and Technology* 32 (2) (2011) 127-142.
- NHS Energy Efficiency Fund 2013-14, adjudicating the distribution of the £50m fund across NHS England, with the professor of sustainable engineering, reporting to the under-secretary of state for health. The executive summary was published in February 2015, bit.ly/29umj15

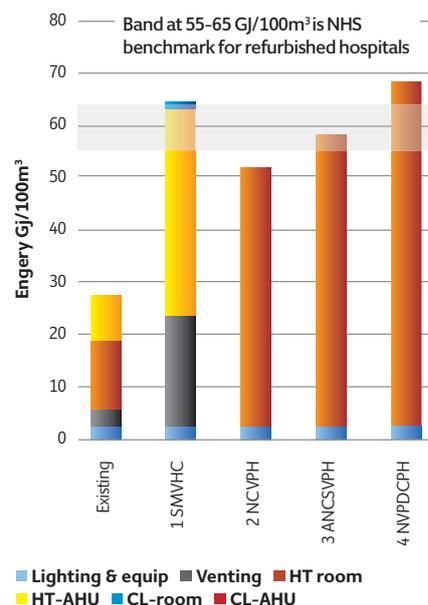


Figure 5: Predicted energy demand for existing and refurbishment options for the year 2010, Cambridge (Bedford weather file). The energy values are the average of monitored and modelled spaces AR1-EX, AR2-MB2 and AR3-DR

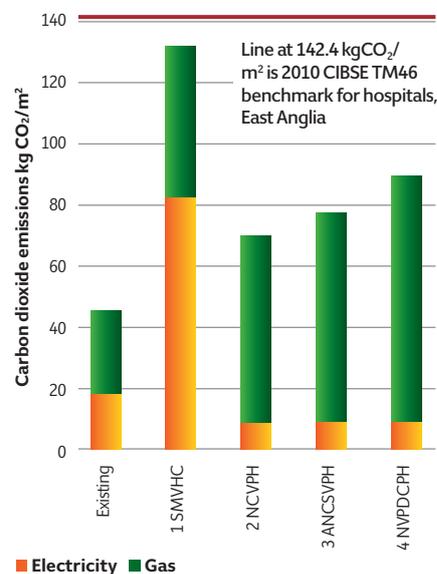


Figure 6: Predicted CO₂ emissions for existing and refurbishment options for year 2010, Cambridge (Bedford weather file). The CO₂ values are the average of monitored and modelled spaces AR1-EX, AR2-MB2, and AR3-DR

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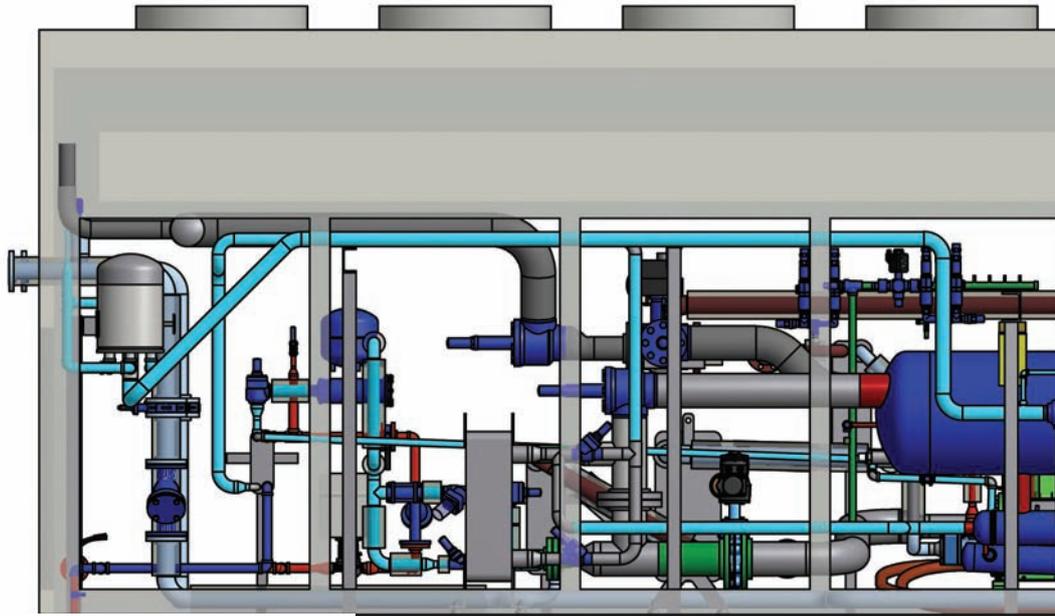
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Scotland's largest social landlord is aiming to alleviate fuel poverty on a Glasgow estate with an industrial-scale air source heat pump connected to a district heating network. **Alex Smith** reports



SOURCE OF INSPIRATION

The installation of an industrial-scale air source heat pump (ASHP) on a Glasgow housing estate represents a pioneering approach to heating in the UK. When connected to a heat network at the 350-home Hillpark Drive, it will be the first ASHP to provide heating and hot water for a residential high-rise estate on this scale.

It will replace electric storage heating on the 1970s estate, and generate space heating and hot water for seven blocks via a heat network and hydraulic interface units (HIU) in each property. At 8m long and weighing 10 tonnes, the ASHP has in-built control systems for remote monitoring.

The project is a partnership between Glasgow Housing Association (GHA), WSP Parsons Brinckerhoff, heat pump manufacturers Star Energy, and British Gas. GHA is part of the Wheatley Group, Scotland's largest social landlord, with 70,000 properties. Alleviation of fuel poverty is key for GHA; its sustainability and energy manager, Colin Reid, aims for heat to be sold to occupiers of Hillpark Drive at less than 10% of their income.

One of the main challenges, according to WSP Parsons Brinckerhoff principal engineer Ewan Jures, was working out how a system based on a heat pump could use conventional radiators. With any heat pump system, flow temperatures are limited, says Jures: 'We had to find the right combination of flow and return temperatures, and radiator sizing, to fit the heating systems into the flats, yet get maximum efficiency out of the heat pump.'

The team concluded that the heat network

could work on a variable temperature. 'When it is mild – which it is most of the time in Glasgow – we will run the network at 60°C, the optimum temperature for the heat pump,' says Jures. When it is very cold, the heat supply will be topped up by boilers. 'It avoids having to oversize radiators and equipment to compensate for the few hours of the year when it is very cold,' Jures adds. After taking into account the temperature variations across the year, the project team has predicted a seasonal coefficient of performance (COP) of 2.9.

Dave Pearson, director at Star Renewable Energy, says heat losses across the network will be minimised because of high insulation and a relatively low flow temperature. He claims it will be less than 2K across the network – the equivalent of 10% heat losses. Extreme care



Star Renewable Energy's air source heat pump

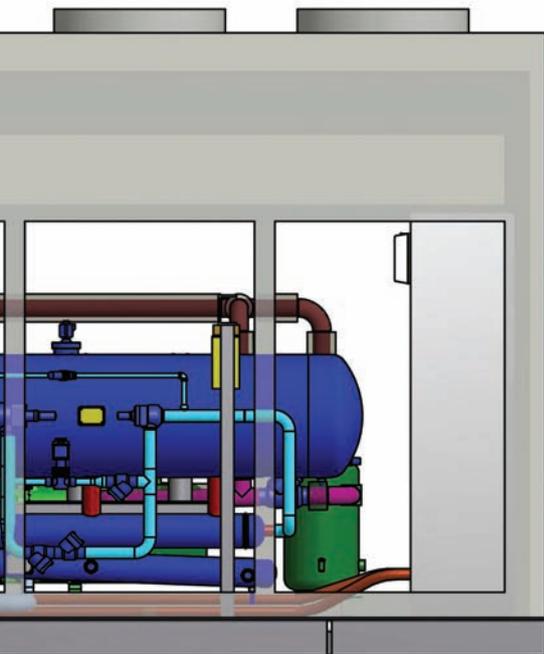
will be taken over levels of 'bleed' through HIUs (where the hot flow water goes straight into the return) because this results in losses in performance as the temperature difference between flow and return reduces. Heat pumps deliver a 0.5% gain in performance for every 1K increase in that temperature difference.

The design team has also worked hard to minimise flow temperature – as there is 1.5% benefit for each 1K lower flow temperature – while maximising temperature differences across the network. This need for high-flow temperature has been reduced by minimising the approach temperature (the difference between the primary return and secondary return temperatures) so it does not exceed 5K at the heat exchanger in the HIU.

The ASHP uses R134s as a refrigerant. Pearson says ammonia (R717) could be used to deliver higher temperatures and higher efficiency, but the additional complexity would make it unsuitable in this pilot project.

Solar PV arrays will be installed on some blocks and connected into the same grid as the heat pump and help to offset electricity consumption. Jures calculates a 53% saving in carbon emissions for the scheme, but he expects that to increase as the grid emissions factor – the amount of carbon dioxide released in the production of electricity – declines as the National Grid generates cleaner energy via nuclear, renewables and more efficient combined-cycle gas turbine plants.

'As the grid emissions factor goes down, the heat pump emissions go down at an even faster rate,' says Jures, who adds that a large ASHP and industrial-scale refrigeration technology mean a longer life span, one point of servicing, and maintenance that is easily monitored. 'It fits into the industrial refrigeration technology maintenance regime.'



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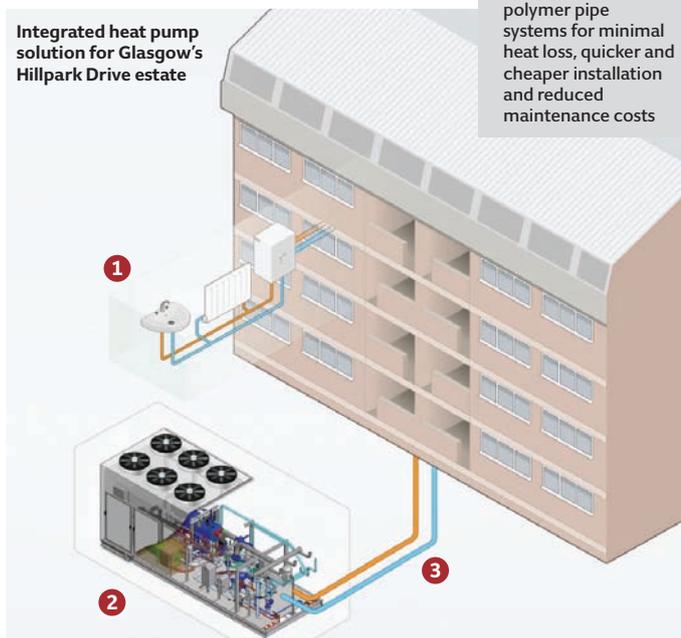
Jures assessed other technologies for Hillview, but they could not be deployed as 'cost-effectively and rapidly'. 'Biomass suffered from issues of delivery access, air quality concerns and potential flue stack height. CHP was difficult because of a locally constrained gas grid and, currently, it has low electricity export prices. Ground source heat pumps were not an option as there was a lack of available grounding in the area.' A water source heat pump was not considered because the distance to the local White Cart river was too great. 'The pipe route required would have incurred substantial costs,' says Pearson.

There's clearly a potential for community ASHPs in Scotland. 'It is highly replicable,' says Reid. 'We have 127 high-rise blocks in Glasgow alone – all on electric storage heating – and we've identified about 10,000 properties where district heating is financially viable.' CJ

Key areas

- 1 High-performance HIU supplies conventional radiators and unlimited hot water
- 2 ASHP, with a claimed seasonal COP of 2.9
- 3 Low temperature heat network using pre-insulated polymer pipe systems for minimal heat loss, quicker and cheaper installation and reduced maintenance costs

Integrated heat pump solution for Glasgow's Hillpark Drive estate

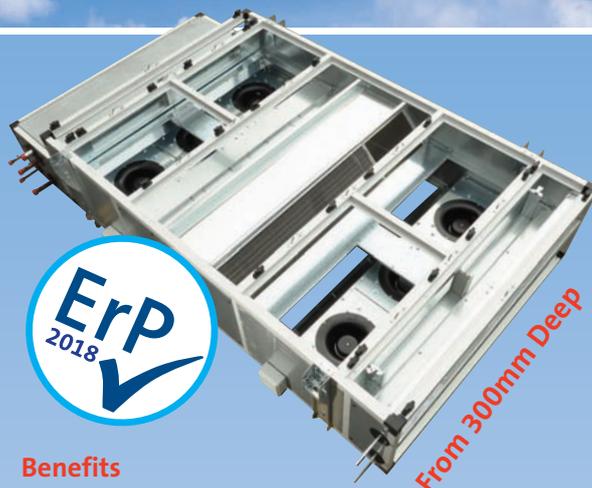


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Determining the feasibility for combined heat and power

This CPD looks at what is required to carry out a proper feasibility study for a modular CHP implementation, to ensure it can meet design loads in a cost and carbon-effective manner

The modular combined heat and power (CHP) market has matured so that gas-fired appliances are readily available for commercial applications. In the UK – and elsewhere – this has coincided with a reducing carbon factor for grid-supplied electricity, so it is more important than ever to ensure that CHP applications are properly investigated before installation. This should establish that not only are they able to meet the design loads for a site, but that they do so in a cost-effective – as well as ‘carbon-effective’ – manner.

Much in this CPD will draw directly from a key reference for this area – CIBSE AM12¹ – to determine the requirements for a proper feasibility study for a modular CHP implementation. The focus will be on systems that are less than 50kW_e output, typically known as ‘mini’ or ‘small-scale’ CHP.¹

CHP compared with traditional systems

The benefit of applying local CHP is that it uses energy that would otherwise be wasted in centralised power stations (by rejecting heat to the atmosphere). CHP also avoids transmission and distribution losses that – for mature networks – will lose 7-8% of the power.² Considering the primary fuels employed in centralised power generation, in

CPDs on CHP

The April 2016 CPD *Applying CHP to reduce CO₂ emissions and operating costs for the supply of domestic hot water* provided an account of the application of CHP associated with producing domestic hot water. That article provides complementary information to this one on CHP technology.

the UK over the past year grid electricity was predominantly produced³ from gas (31% with a rising trend); nuclear (18%); coal (16% with a falling trend); and wind and solar (13% with a rising trend).

The efficiencies of centralised generating plants will also vary, but tend to be around 35% (other than solar/wind). With appropriate design of complementary electricity generation and heat recovery, overall efficiency in CHP plants can be in excess of 80%, and the generalised comparison, as shown in Figure 1, would be indicative of systems in the UK and Ireland. This CHP process can be applied to renewables, such as biomass and biogas, and to fossil fuels, including natural gas and LPG. CHP can use either turbines or engines, and each has specific applications, but spark-ignition gas engines

are the predominant technology used for CHP in buildings.

Determining the feasibility of mini-CHP

A feasibility study will normally be required to determine whether it is worth investing in a CHP project, as capital costs will be significantly higher than for conventional systems. CHP schemes can be considered as a retrofit measure in an existing building or as part of a new construction. In both cases, the arguments for and against a CHP scheme will be compared with those for ‘conventional’ plant alternatives, such as condensing gas or biomass boilers, together with grid-supplied electricity.

Data gathering

A basic understanding of site energy demands is required to make any assessment of the viability of the CHP scheme. Some data will be readily available – typically, as quarterly or monthly fuel bills – whereas other data, such as daily or weekly energy profiles, may have to be developed or synthesised. When designing conventional power and heating systems, the capacity of the plant is determined largely by maximum demands, so the plant will operate at part load most of the time. High plant

► utilisation is required for CHP to be viable, so when selecting a CHP scheme, the minimum energy demands in the running period are as important as – and often more important than – the maximum demands. There are usually significant differences between winter and summer demands, and an understanding of these differences will be important in determining the capacity and expected running hours for the potential CHP system.

In an ideal case, data that identifies heat and power energy demands at hourly intervals throughout the year will be obtained from monitoring of electricity, heat or gas meters. Where this is the case, the route to CHP selection will be somewhat clearer. Using monthly data to assess loads available for a CHP scheme can be misleading and over-optimistic where there is significant variation in demand over a 24-hour period (for example, between day and night). Using monthly average profiles will tend to overestimate the potential operating hours from CHP during the ‘shoulder’ months (in the spring and autumn).

If there is insufficient discrimination or detail in the available data, specific energy surveys, temporary metering and audits may be required. If time is available, sample monitoring of meters on representative days (weekday and weekend, heat and power demand data) in each month would be beneficial; otherwise, days in late spring or early autumn should be selected. When converting from fuel use to heat demand, a pessimistic boiler efficiency level should be assumed.

As well as taking into account existing energy consumption, consideration should also be given to future changes in consumption. These might be affected by the implementation of energy efficiency measures, the addition of new facilities, discontinuing old processes, or simply changes in operation, organisation or occupancy patterns. These aspects may be evaluated by undertaking sensitivity analyses of any calculations.

For new buildings, the heat and power demand profiles must be estimated. Such estimates may be based on: a combination of building design data; dynamic thermal simulation of the building; projected occupancy patterns; benchmark data from similar buildings; and empirical data from energy models or consumption codes for different buildings by type of use, floor area and volume. The confidence level attached to the demand profiles derived must be recognised when selecting a suitable CHP plant rating.

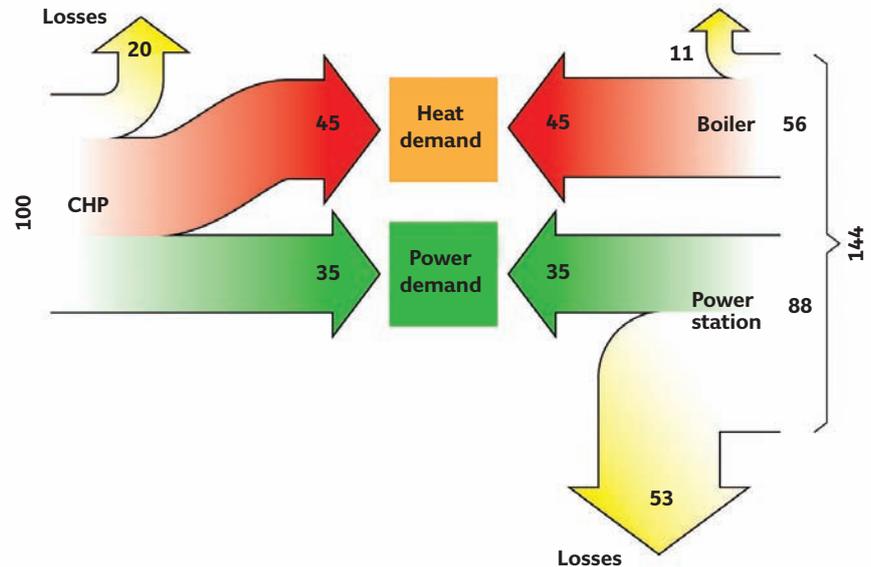


Figure 1: The basic case for CHP (Source: CIBSE AM12)

The CHP system assessment requires intelligence on how the energy is ultimately integrated into the building operation. For electricity, this could include: the supply and building system voltages; the system fault levels; switchgear arrangements; distribution layouts; and possible connection points.

The heat from the CHP is most effectively absorbed in systems with a near-constant demand throughout the year and with an operating temperature of 80°C or below. So it is important to ascertain the type of heating systems and loads (for example, heating or hot water) that are in use, together with their operating temperatures, the users, peak loads and load profiles, and the existing plant performance, age and condition.

Typically, modular CHP units would be self-monitored by their own stand-alone controls, which could be used with remote

monitoring, and would be able to integrate into the building energy management system. Fuel options for most CHP plant are natural gas, LPG, gas oil, biogas and liquid biofuels. For the majority of mini-CHP installations, natural gas will be the fuel, as it can be supplied virtually on demand and requires no on-site storage facility. It will be necessary to establish the available capacity, metering and supply agreement details of any existing gas supply. However, if the gas is not immediately available, then the cost of providing a supply must be determined (which might be influenced by other potential systems that would also benefit from a gas supply). Where the supply condition is not adequate, a gas pressure booster may be required, and this will impact upon energy consumption, space and cost.

As it is not possible to match heat and power demands continuously, the planned operating strategy will often require additional heat from conventional boilers or heat rejection, power importing or exporting, and modulation of CHP output. Different operating strategies will need to be considered for such part-load considerations, such as: the benefits of exporting power; heat rejection to atmosphere to maintain power production; the requirement for night operation; and the necessity for a thermal store. The potential benefit of a thermal store is that it smooths peaks in building heating demand, so allowing heat to be supplied without the CHP being operated. Stored heat may be used to satisfy night-time heat demands, as generating night-time electricity may not be economic. At times of low heat demand (typically in summer), the CHP can be operated for fewer hours but at higher output. (Without a store, the demand may be below



Figure 2: CHP unit with close-coupled thermal store (Source: SenerTec)

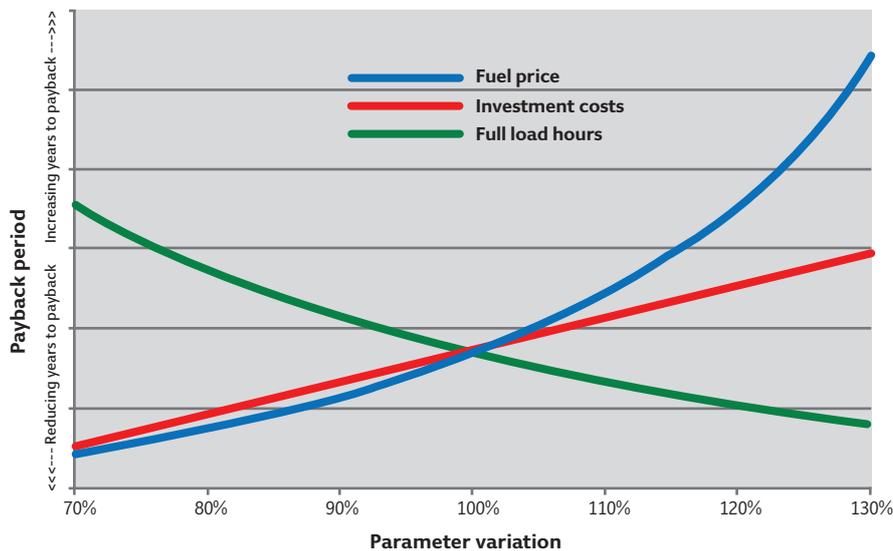


Figure 3: Examining the sensitivity of payback to other example parameters

the CHP unit's acceptable turndown limit.)

The physical integration of the CHP must be considered, as they are far heavier than traditional condensing boilers. Adequate space must be available to allow proper access for servicing.

Renewable technologies to supply heat and power may need to be considered, especially for new-build projects, and the interaction with the CHP system should be quantified to ensure that two technologies are not competing to supply the same demand.

Typical capital and maintenance costs and efficiencies for gas-engine CHP will generally be evaluated in terms of £/kW_e. These can be provided by the manufacturer or through tables such as those in AM12.

The modular mini-CHP units are typically designed to run practically unattended (with facilities for remote monitoring) and are likely to require servicing annually. It is typical for maintenance contracts to be written in terms of a fixed cost per hour of operation, so operating at part load will effectively incur additional maintenance costs per unit of energy produced. Generally, specific maintenance costs reduce with the CHP capacity.

Financial viability

A spreadsheet model can be set up, from which operating costs and savings can be evaluated. This needs to be subjected to sensitivity analysis on energy prices and also on variations in site energy demands. The accuracy of the final result will depend upon the reliability of input information. However, by setting up a spreadsheet model, it is a straightforward process to test the sensitivity of the result to fluctuations in input parameters, such as gas or electricity prices.



Figure 4: A 5.5kW_e/12.5kW_{th} – 15.5kW_{th} with condenser – CHP unit (Source: SenerTec)

Using a simple payback approach assumes constant operational savings and ignores the project benefits beyond the payback period – which may be higher if energy prices rise. Where multiple investment options are being compared, a simple payback period is also of limited value, as the capital investments may vary significantly. For a project that could generate variable revenues over a period in excess of 10 years – or where there are many options to evaluate – a discounted cash-flow analysis would be more appropriate.

To compare a range of options – such as several sizes of CHP and other low carbon heat source investments – net present value (NPV) or internal rate of return (IRR) are used. The NPV is the total value of the project (both capital and operating costs over

a period of years) expressed at today's value, equivalent to a capital cost. A positive NPV means that a project is viable. The IRR value for a project identifies the return that money invested elsewhere would have to earn to give a better return than the chosen project. Many companies and organisations will set a 'hurdle' rate of return that must be achieved for a project to receive funding. Both methods are considered in more detail in AM12.

Sensitivity of results

For any appraisal technique, care must be taken about the reliability of input data and the sensitivity of results to changes. The aim is to give confidence about a project's viability under variations in key project parameters, including heat and power demands, gas and electricity prices, and capital expenditure. Computer-based spreadsheets allow many scenarios to be compared swiftly, potentially producing output as in the example in Figure 3.

A likely uncertainty that can be built into the model is the availability of grants and incentive schemes.

Applications for mini-CHP

There are particular applications that are likely to fare well in the foregoing feasibility study, such as small care homes, police and ambulance stations, and social community housing. Mini-CHP can be suitable for small hotels and leisure centres – applications with significant year-round hot water requirement (and so heating load) and demand for power. Remote, potentially off-grid locations that have the opportunity to produce biogas may also present a good opportunity for CHP, such as the unit shown in Figure 4.

CHP can only provide benefit if it is sized, installed and operated correctly. Manufacturers' experience suggests that including the supplier, contractor and operator at the early stages of the feasibility and design leads to more effective implementations that are both carried out appropriately and operated effectively. This can provide systems that are environmentally and economically sound, even with the reducing carbon factor for grid electricity.

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References:

- 1 CIBSE AM12, *Combined heat and power for buildings*, CIBSE 2013.
- 2 <http://data.worldbank.org/indicator/EG.ELC.LOSS.ZS> – accessed 6 July 2016.
- 3 *Energy Trends: June 2016*, DECC, UK.

Turn over page to complete module ➤

Module 98

August 2016



1. Which CIBSE Applications Manual is the most appropriate as a reference for CHP for buildings?

- A AM10
- B AM11
- C AM12
- D AM13
- E AM14

2. In the article, what overall efficiency is quoted for CHP plants?

- A 50%+
- B 60%+
- C 70%+
- D 80%+
- E 90%+

3. At what temperature will the heat from the CHP be most effectively used?

- A 100°C or below
- B 90°C or below
- C 80°C or below
- D 70°C or below
- E 60°C or below

4. Which of these is not specifically a benefit of a thermal store used in conjunction with CHP?

- A Heat may be supplied without the CHP being operated
- B It enables CHP to operate for fewer hours at part load
- C It limits the need to operate CHP when grid electricity prices are low
- D It reduces the need for a pre-installation feasibility study
- E It smooths peaks in building heating demand

5. What method may be used to determine total value of the life cost of a project, expressed at today's value?

- A Capital cost
- B IRR
- C Maintenance cost
- D NPV
- E Simple payback

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Martin Trentham MCIBSE IEng, Interserve Engineering Services.



Having gained a BEng degree, I needed to demonstrate technical ability to Masters Level to gain CEng registration. There were two options open to me, either return to university full or part-time to complete a Masters or undertake a Technical Report. I decided to pursue the Technical Report Route.

James Outram, MCIBSE CEng, Hoare Lea.

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www.cibse.org/membership



New EC motors for Advanced Air fan coils

Advanced Air has incorporated a new EC motor in its horizontal fan deck design. The motor has a chip – developed by Nailor, Advanced Air's American parent company – that provides a pressure-independent unit and makes the fan coil self-balancing, requiring no commissioning on the airside.

Using large, horizontally mounted motors means energy efficiency is maximised, with specific fan powers of 0.15 w/l/s or lower. With slow-running fans, noise levels are also reduced and NR25 has been achieved on several projects.

Advanced Air manufactures its own fan decks, which adds to the company's flexible approach. As most fan coils are batch produced, special designs are not a problem and do not attract a cost penalty. Andrew Sargent, general manager, said Advanced Air's aim is 'Innovation in Action' – to communicate to the market a more flexible approach and to develop project-specific designs.

● Call 07767 776 843 or email tchambers@advancedair.co.uk



Iconic Belfast building to use DX underfloor air conditioning

Underfloor air conditioning manufacturer AET Flexible Space is delivering equipment to the former Ireland Brothers warehouse at 27-37 Adelaide Street, Belfast. Northern Ireland distributor Titan Air Conditioning received the order at the end of 2015.

The system specified is a CAM-C direct expansion system, with supply and return air distributed via the floor plenum.

The fantiles are TU4 floor terminals, while Daikin heat pumps will maximise the use of space and energy efficiency.

● Call 01342 310 400 or email lucy@flexiblespace.com



Updating your water supply system can save you money, advises Aquatech Pressmain

Installing new and up-to-date water-supply equipment can increase the efficiency of the system and save money.

For flats within Hammond & Dickson House, in Stoke-on-Trent, Aquatech Pressmain visited the site and produced an in-depth proposal. This included bespoke solutions for Stoke-based mechanical and electrical company JPR Engineering.

The company installed pressurisation units, two water boosters and three circulating pumps – all designed and built for the project by Aquatech Pressmain.

● Call 01206 215 121, email sales@aquatechpressmain.co.uk or visit www.aquatechpressmain.co.uk

Climaveneta presents TECS-FC

Climaveneta has launched TECS-FC, a high-performance air-cooled chiller range with magnetic levitation compressors, flooded evaporator and EC fans.

Dedicated to IT-cooling and process-cooling applications, in which cooling demand is constant all year round, the chillers use cold, outdoor air for cooling the indoor environment – fully harnessing the savings potential of this renewable source.

TECS-FC features a smartly managed free-cooling system. Depending on the outdoor air conditions and operating water temperature, the chiller automatically switches between total free-cooling, hybrid free-cooling and mechanical cooling mode, thereby achieving high operating efficiency – energy efficiency ratio (EER) values around 220. Premium performance results are not just delivered during the total free-cooling mode, however. Within the hybrid and mechanical operations, the top level technology of the compressors with magnetic levitation brings benefits in terms of performance, adjustment, vibrations and weight – keeping the unit EER efficiency values always above the competitive technologies.

● Email info@climaveneta.com or visit www.climaveneta.com



Manufacturing expansion

British engineering company Gilberts Blackpool has expanded its manufacturing and warehousing capacity.

The family-owned and run independent air movement specialist is experiencing a significant increase in demand for its advanced grilles, louvres and diffusers, as well as its natural ventilation solutions.

This is partly because of growth in the building and construction sectors, but also reflects Gilberts' new approach to sales and technical research and development.

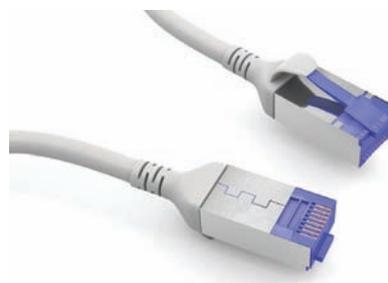
● Call 01253 766911 or email info@gilbertsblackpool.com

Draka launches Slimflex space-saving Cat6a copper patch cables

Cables and systems specialist Draka, part of the Prysmian Group, has launched a small-diameter Category 6a patch cable. Its reduced diameter gives it flexibility and saves space in high-density patching areas.

The 30 American wire gauge (AWG) stranded copper cable occupies just 60% of the space that is required by standard 24AWG patch cords, which allows for easier system changes and additions. The tighter bend radius also makes for easier cable routing and simplified cable management.

● Call 08705 133 143 or email uc-connect@prysmiangroup.com



Former chocolate factory transformed

The former Terry's chocolate factory in York is being transformed into an exclusive housing development called The Residence. The five-storey, Grade II-listed building will be converted into more than 170 apartments and penthouses.

Evinox Energy has worked closely with property conversion specialist The PJ Livesey Group to create a comprehensive district heating solution to suit this unique development. This includes the primary network design, prefabricated plant room skid, heat interface units (HIUs), and ongoing service and maintenance of the plantroom and HIUs.

Evinox will also provide a billing and full revenue-management service, including fully itemised energy bills for residents and a billing app to manage their account online.

A district network offers considerable energy savings compared to individual gas-fired boilers, and greatly reduces carbon emissions for the scheme as a whole – which was very attractive to the developer.

● Call 01372 722277 or visit www.evinoxenergy.co.uk



FDS helps former British Newspaper Library make headlines again

Smoke ventilation contractor Fire Design Solutions (FDS) has been appointed to work on a new residential development on the former British Newspaper Library site.

Fairview New Homes is building its Edition development of 395 apartments on the site in Colindale, in the London Borough of Barnet. FDS has been appointed to design, supply, install and commission natural and mechanical smoke ventilation systems. It will also install its corridor environmental systems, to mitigate excess heat buildup in common areas.

Working with the project's designers, FDS carried out computational fluid dynamics (CFD) modelling to justify the smoke ventilation system. Construction of the apartments is due to be completed in early 2018.

● Visit www.firedesignsolutions.com



Vent-Axia completes the set

British ventilation manufacturer Vent-Axia has added the high-performance Sentinel Kinetic F to its popular Lo-Carbon Sentinel Kinetic range of mechanical ventilation with heat recovery (MVHR) units.



This latest addition means Vent-Axia now offers a full set of MVHR solutions to meet all types of applications, from one-bedroom apartments to light commercial projects, such as student accommodation. Manufactured in the UK, the Sentinel Kinetic range now has MVHR options with airflow from 15 l/s to 200 l/s.

● Call 0844 856 0590 or visit www.vent-axia.com

New 12mm fitting makes Geberit Mapress Copper an end-to-end solution

Geberit Mapress Copper is now available in a 12mm fitting size, giving installers the ideal tool to overcome issues of installing copper piping in retrofit projects where hot works are not allowed.

The new size means Geberit Mapress can be used throughout restoration projects, such as in Grade II listed buildings, and ensures the company is a one-stop shop for installers' entire supply requirements. An end-to-end range of copper fittings is now offered, from 12mm to 108mm.

● Call 01926 516800 or visit www.geberit.co.uk



Multiple options: Thision L Evo cascade systems from Elco

To complement the launch of the Thision L Evo wall-mounted boiler, Elco Heating Solutions has upgraded the unit's cascade functionality, with an improved, prefabricated cascade rig and comprehensive built-in controls systems.

The cascade kit allows a modular system of up to eight Thision L Evo boilers to be created, delivering a maximum output of up to 1.1MW. Wall-mounted in-line, freestanding in-line and freestanding back-to-back systems are available.

● Visit www.elco.co.uk or follow @elco_uk on Twitter



Gilberts supports Liverpool's 'premier league' bid and delivers added value

Liverpool is moving into the 'premier league' of exhibition venues, supported by Gilberts Blackpool, with the new £66m Exhibition Centre Liverpool.

Built by ISG, the vast space will remain airy and fresh thanks to Gilberts Blackpool, which was used by contractor Briggs & Forrester Engineering Services. The venue's air-

movement solution involves Gilbert's DL drum louvres and GSJA/T patented thermal swirl diffusers, with adjustable vanes on heating inset into a single run of ductwork at high level along the length of the atrium.

● Call 01253 766911 and email info@gilbertsblackpool.com



HygroMatik is part of initiative to invest in the Brechin community

A £25.6m project to rebuild the former Brechin High School, in Angus, Scotland, has entered phase two of its transformation to become the Brechin Community Campus.

Having been tried, tested and trusted on past projects, swimming pool and spa designer and builder Barr + Wray again specified HygroMatik for use at the campus's steam-room facility.

The HeaterCompact CDS was specified alongside a standard collection of products to ensure the smooth running, low maintenance and easy installation of the steam room.

● Call 02380 443127, email info@hygromatik.co.uk or visit www.hygromatik.com

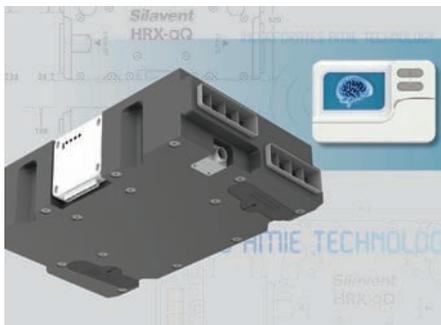
Intelligent home air solutions with Polypipe Ventilation's new HRX-aQ MVHR systems

Polypipe Ventilation has announced its next generation of mechanical ventilation with heat recovery (MVHR) appliances – the Silavent HRX-aQ, which intelligently manages air conditions for maximum homeowner comfort, while being easier to design-in.

The HRX-aQ matches ventilation rates to the internal environment and occupants' requirements through advanced air management for indoor environments (AMIE) technology.

It features digital humidity control, automated summer bypass and accurate system balancing – and it is the quietest, most compact Silavent MVHR unit available.

● Call 03443 715 523 or visit www.polypipe.com/ventilation



Remeha launches the Quinta Ace 160

New from Remeha is the small but mighty Quinta Ace 160, a wall-hung boiler with a high output (34.6kW to 161.4kW) but a compact size.

The Quinta Ace 160 is an extension to the Quinta Pro range, with a next-generation control platform and new aluminium heat exchanger. The result? Outstandingly high performance, with efficiencies of up to 99% gross calorific value (GCV) and ultra-low nitrogen oxide (NO_x) emissions.

It's also exceptionally easy to install, thanks to its small footprint and multiple flue-ing capabilities. The Quinta Ace 160 can be installed alone or in cascade, with further options to mix with Quinta Pro boilers.

● Call 0118 978 3434, email info@remeha.co.uk or visit www.remeha.co.uk

What have you BIM waiting for?

Hamworthy Heating has extended its digital drawing library to include 3D Revit models for its Powerstock range of calorifiers and storage tanks, as well as its Chesil pressurisation units.

These new building information modelling (BIM) objects add to the company's BIM library, which includes many well-known boiler and hot-water products.

Partnering with bimstore – the original BIM component library – Hamworthy Heating's Powerstock models have been designed to the highest industry standards. They are packed with relevant metadata on size, outputs, efficiencies, dimensions and clearance zones.

● Call 0845 450 2865, email sales@hamworthy-heating.com or visit www.hamworthy-heating.com



All pumped up about London

What do the Tate Modern, The Shard, Wimbledon, the 'Walkie Talkie' building, Lord's, the Francis Crick Institute, Royal London, the Supreme Court, the ArcelorMittal Orbit and the O2 have in common?

Apart from being landmarks in London, they are all structures supported, on a day-to-day basis, by a wide range of Grundfos pumps.

Behind closed doors, locked away in plantrooms, is a veritable army of Grundfos pumps and pump solutions meeting their heating, cooling, water supply, waste water, and fire-suppression demands, as well as their water-boosting needs.

Such functions are all part of maintaining these buildings in a healthy, operational state and supporting the people who live, work and play within their walls.

While Grundfos is pleased to be associated with such important schemes, it is also proud of the many other projects up and down the country that it supports on a daily basis.

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



Mikrofill supply Stanbrook Abbey Hotel

In 2014, a decision was taken to upgrade the oil-fired, low pressure hot water (LPHW) heating and hot water supply (HWS) circuits at Stanbrook Abbey Hotel, a former monastery.

Building services consultants Energy Performance Solutions (EPS) put together a design featuring two new plantrooms, to be supplied by Mikrofill.

Products included Ethos FS550kW twin burner-condensing boilers, a Mikrofill 1,400/2 pressurisation package and two Extreme 500 HWS loading cylinders.

The building's character was preserved by lining existing brick chimney stacks to accommodate the new boilers.

● Call 03452 606 020 or visit www.mikrofill.com



Mitsubishi Electric announces full-scale entry into UK chiller market

Mitsubishi Electric will begin marketing and selling Climaveneta chillers in the UK, following the acquisition of the Climaveneta brand earlier this year.

The Climaveneta NX range of air-source and water-cooled chillers is now available from Mitsubishi Electric. The expansive portfolio of energy-saving, low-noise and innovative chiller solutions increases the choice available, and extends the range of customisable cooling options that the company is able to offer.

Each chiller model in the NX range comes in up to six configurations, allowing bespoke application design for individual projects.

There are two levels of efficiency available and a further three options on sound emission levels: standard, low noise, and super low noise. Capacities range from 39kW to 371kW, with a choice of plate or shell and tube heat exchanger.

Mitsubishi Electric's purchase of Climaveneta means it acquires more than 45 years' experience and knowledge of this industry sector.

● Call 01707 282880 or email chillers@meuk.mee.com

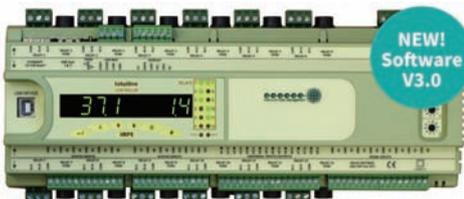
Intelligent and intuitive: RDM extend capabilities of flagship product with new software update

Resource Data Management (RDM), a global controls and remote monitoring specialist, has released major software updates for the Intuitive TDB programmable logic controller (PLC).

The controller with built in PLC software, features a new web graphical user interface, upgraded display features, new unit measurement controls, remote monitoring integration and more.

The powerful, yet cost-effective controller can be used to control up to 480 points, delivering maximum networking capability.

● Call 0141 810 2812 or email rebecca@resourcedm.com



The slimmest panel LST on the market

Myson's new 420mm-wide low surface temperature (LST) radiator means its range now offers the slimmest panel LST on the market – a great choice for projects that require flexibility.

The 420mm LST is perfect for smaller areas, such as bathrooms and cloakrooms, and in environments where safety is key – such as schools, nurseries, hospitals, nursing homes and social housing projects. Its rounded edges minimise the risk of injury and the range complies with NHS Estates Health Guidance Notes 1998.

● Call 0845 402 3434 or visit www.myson.co.uk



New videos highlight Pel Services' expertise

Pel Services has launched four videos on its website to introduce potential customers to the company and its range of professional services, including sound, fire, security, assistive technologies, audio visual and music.

The short, informative films feature comments from a range of Pel's employees, looking at what the company does, how it meets customers' needs, and the firm's ethos.

The videos touch on the company's 35-year history and the many customers it has worked with during that time.

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



New low-cost super-condensing boilers

Atlantic Boilers has introduced a new product onto the market – the BK series of super-condensing boilers, which burn diesel oil or natural gas.

There are three models in the range – 50kW, 70kW and 100kW – with efficiencies exceeding 92% gross calorific value (GCV) throughout the year, including in mid-winter. The boiler benefits from multi-pass heat transfer, while a neutraliser removes sulphur residue from the oil. Flue outlet temperatures are always less than 48°C.

● Email technicalsales@atlanticboilers.com or visit www.atlanticboilers.com



Complete drainage solution for the new hospital from Saint-Gobain Pam

Saint-Gobain Pam is supplying a complete above-ground sanitary soil and internal rainwater drainage system for the new £429m Royal Liverpool University Hospital, in Liverpool.

In addition to the Ensign Soil drainage system, the company is supplying products from its new Vortex range, including plant gullies, shower drains and roof outlets, ductile iron pipe-fittings for the pump drainage systems, and grip collars.

The acoustic performance, durability and fire-safety features ensured Saint-Gobain Pam products were chosen.

● Visit www.saint-gobain.co.uk

Cool beams

Sontay, manufacturer and distributor of building measurement and control peripherals, offers a complete range of sensors to control and monitor chilled beams. These water-based cooling systems are environmentally friendly and unobtrusive, making them a popular choice for commercial buildings.

Sandy Damm, Sontay's managing director, said: 'Chilled beams can be a great solution, but they need to be controlled correctly to get the maximum benefit – which is why we have put together a range of temperature, relative humidity, condensation and air velocity sensors.'

● Call 01732 861 200 or email sales@sontay.com



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Omnie systems help self-builder achieve low-energy profile

Exeter-based Timóleon has supplied a heating and ventilation solution for a self-builder to achieve his ambition of creating a home with very low environmental impact and low running costs.

The design features an Omnie 7kW air source heat pump, delivering domestic hot water and warmth via the manufacturer's Omnie Foilboard Floating UFH System, and an Omnie Compact 185 heat recovery unit, supplying pre-warmed air throughout.

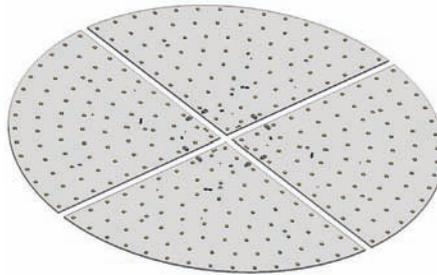
● Call 01392 363 605, email Alex.Chalk@timoleon.co.uk or visit www.omnie.co.uk

New LED module CLE Quadrant G2 Adv
Tridonic's new generation of LED modules, CLE Quadrant G2 Advanced, now offer even greater flexibility for luminaire manufacturers for round ceiling and pendant lights.

High efficiency and a high luminous flux can now be combined in a single module.

Three new sizes are available – with diameters of 522mm, 802mm and 1,082mm – and large luminaires can now be fitted with the modules, which achieve a module efficiency of up to 185 lm/W. Various colour temperatures are available.

● Call 01256 374 319
or email matt.caygill@tridonic.com



BSS scores double top in safety awards

BSS, UK distributor of heating and pipeline products and services, has won awards from the Royal Society for the Prevention of Accidents (RoSPA) and *H&V News*, in recognition of its contribution to health and safety.

RoSPA honoured the company with the Silver Achievement accolade at its 2016 Health & Safety Awards, while *H&V News* named the company's safety programme, LiFT, as the Safety Initiative of the Year in its annual competition.

● Call 0116 245 5961 or
email jason.currall@bssgroup.com

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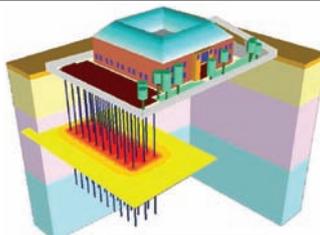
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Associate M & E Engineers
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Senior Mechanical Engineer
North London, £45k - 55k + benefits

Excellent package offered for an aspiring Associate Director. You will be working on London's biggest projects, managing a team, and winning new business. You must be driven and dedicated as the client is looking to grow, further cementing their excellent reputation for delivering quality. Residential and Mixed-use experience required. Ref: 3336

Senior Mechanical Design Engineer

London, £40 p/h

Global mechanical and electrical engineering design firm with a commitment to sustainable design. An opportunity exists to work on large complex stadium/arena projects, prior experience of projects with similar scale and complexity in particular sports facilities is vital. You will be required to carry out all technical design and co-ordination of project HVAC systems. Ref: 3239

Revit Technician

London, £35k - £45k + benefits

Experienced Revit Technician required for a dynamic independent M&E environmental consultancy working on projects worth in excess of £50m. The role will involve developing 3D BIM using REVIT MEP and implementing 3D coordination. The successful candidate will also be responsible for leading a dedicated BIM and CAD team in the London office. There is scope for development, and promotion for the ambitious. Ref: 3556

Public Health Engineer

Bath, £35k - £45k + benefits

A global MEP Building Services consultancy who are working on projects in the UK exceeding £250m in value. Projects across high end hotel, residential, and commercial sectors along with one of the largest data centre projects currently in the UK. This role is for someone who is looking to be part of a team, improve their technical skills, and gain experience of working on highly complex projects. In return, you will receive excellent rates of pay, career progression, and further training. Ref: 3551

Senior Public Health Engineer

Central London, £40 - £42 p/h

My client is an international consultancy that is at the forefront of high performance buildings with a focus on sustainable design. An opportunity exists for a Senior Public Health Engineer to join the well-established team in London. You will have the opportunity to work on some of the most iconic buildings in the world that will push the boundaries of design within the built environment. Ref: 3539

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Intermediate Public Health Engineer

Central London | £40k + benefits package
International projects / building services consultancy / good CPD programme

French Speaking - Principal Mechanical Engineer

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SIRIUS ABOUT ENERGY RATINGS

The FM team at the Sirius office building, in Canberra – which achieved a six-star Nabers Energy rating – scooped the FM accolade in the 2016 CIBSE Awards. Mirvac's **David Palin**, explains why performance ratings matter



Mirvac was the first organisation to achieve a six-star Nabers Energy rating on a project without having to rely on onsite renewables exporting energy into the grid.

Since it opened in 2010, the 46,147m² Grade A office building has achieved a year-on-year reduction in gas and electricity use of more than 20%. The FM team have maintained the six-star rating over three rating years and have improved building performance, reducing energy consumption by 32% from the first full year of operation in 2011, to 2014 – a \$107,844pa saving.

How did you achieve a six-star Nabers energy rating at the Sirius Building?

Sirius is well designed, thoroughly commissioned and operated with a keen focus on energy efficiency. To quote Luke Menzel, Energy Efficiency Council CEO, Sirius is an outstanding example of what can be achieved when property owners, facilities managers and tenants work together.

The team implemented a range of technologies: chiller plant optimisation; LED lights with integrated microwave sensors; simple timers to control domestic hot water boilers; and a solar PV system. They are set to launch the Skyspark analytics tool – a telemetry system for the cooling towers to monitor CT efficiency actively – and stretching the control system's economy mode parameters.

How is the building's performance maintained?

Sirius has a highly experienced and engaged FM team, including the onsite senior FM supported by a divisional engineering and operations manager,

“Having an inquisitive, curious nature that constantly looks for opportunities sounds clichéd, but it's at the heart of delivering market-leading performance

and a sustainability engineer. They work with the building contractors, who share our desire to maintain performance.

Importantly, the team do not take the building performance for granted and perform continual tuning with the aid of daily building profiles, monthly performance reviews, quarterly tenant performance feedback and a programme of night audits undertaken to minimise baseload and plan new initiatives. This approach has identified scheduling inefficiencies, optimised sensor lighting periods and highlighted opportunities for lighting upgrades.

The night audits have also offered an excellent opportunity to train facilities managers informally and transfer knowledge across the project team.

How much training does the FM team require?

Training and experience are important, but attitude is critical. Having an inquisitive, curious nature that constantly looks for opportunities sounds clichéd, but it's at the heart of delivering market-leading performance.

New systems require initial training but we find that embedding them into our processes is the really important element that delivers value and always seems to uncover more opportunities.

What premium does a six-star building attract?

High Nabers ratings have quickly become a tenant expectation rather than a 'nice to have'. Any premium or A-grade property would be seriously disadvantaged in attracting high quality tenants without a good Nabers rating.

In February 2014, the Australian Green Property Index found that green office buildings outperformed

the general market on investment returns, net operating income, capital expenditure, vacancy rates and weighted average lease expiry. See more at <http://bit.ly/1TYBtdA>

Have you used Nabers on other buildings?

Approximately 95% of our office portfolio has a Nabers Energy rating – typical for all the major Australian property groups. Nabers has also been embedded into government legislation, such as Commercial Building Disclosure and programmes like the Green Building Fund, where it is used as a recognised industry rating system.

Has Nabers made monitoring the norm in Australia?

I believe that it has been one of the major drivers in raising the environmental performance of commercial buildings. The ability to normalise and benchmark building performance consistently has made monitoring and improving building performance 'business as usual' for the major property groups.

Are the fundamentals of Nabers being used in non-commercial buildings?

There is certainly cross-pollination; in Mirvac's portfolio, office and retail assets have exchanged knowledge and technologies and fed back operational learnings into the design process.

● To learn more about Mirvac's 'This changes everything' sustainability strategy, visit www.mirvac.com/Sustainability/Overview/

● **DAVID PALIN** is sustainability manager, office and industrial, at Mirvac Group

Events & training

NATIONAL EVENTS AND CONFERENCES

CIBSE Young Engineers Awards 2016

13 October, London
Comprising the Graduate of the Year and Employer of the Year prizes.
www.cibse.org/yea

CIBSE Building Performance Conference and Exhibition

17-18 November, London
The annual conference returns to the QEII Conference Centre, with a programme that again promises to inform and inspire. Speakers include Max Fordham and Patrick Bellw. Visit the website for the full programme and to book.
www.cibse.org/conference

CPD TRAINING

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

Mechanical services explained

7-9 September, London

IET wiring regulations

16 September, London

Mentoring skills workshop

22 September, London

Energy efficiency building regulations

23 September, London

Earthing and bonding

23 September, London

Building services overview

27 September, London

Building services explained for FMs

28-30 September, Birmingham

Fire sprinkler systems: Design

28 September, London

Gas safety regulations

30 September, London

Practical HVAC controls

5 October, London

Emergency lighting to comply with fire safety

7 October, London

Mechanical services explained

19-21 October, Manchester

ENERGY ASSESSOR TRAINING

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

Air conditioning inspector training

8 September, Sheffield

Heat networks

7-8 September, Manchester

LCC design and EPC

15-16 September, London

Air conditioning inspector training

20 September, London

LCC building operations and DEC

20-22 September, Manchester

ISO 50001:2011 Energy management systems

26 - 28 September, London

CIBSE GROUPS, REGIONS AND SOCIETIES

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

North West BIM Steering Group launch

4 August, Manchester
Launch of new CIBSE NW Regional BIM Group, set up to help develop standards and guidance for BIM users. The CIBSE BIM Group will attend.

Northern Ireland: Golf day

4 August, Belfast
Taking place at Dunmurry Golf Club.

West Midlands: Summer social - guest pass to Loton Park speed hill climb

6-7 August, Shrewsbury
Guest pass to Loton Park speed hill climb in Alberbury, near Shrewsbury.

Scotland: Golf championship

25 August, Glasgow
Individual and team prizes, team bonding, client business development, networking

and an overall fun day. Taking place at Eastwood Golf Club. Sponsored by Kingspan Insulation.

Northern Ireland: Golf day

1 September, Belfast
The last CIBSE NI golf outing for 2016 will take place at Rockmount Golf Club.

Ireland: CIBSE annual golf outing

2 September, County Kildare
The annual CIBSE golf event, held at Castlewarden Golf Club.

SoHPE Young Engineers Awards presentation and AGM

6 September, London
The announcement of the Society of Public Health Engineers Young Engineers competition, together with its AGM.
www.cibse.org/sophe

SLL and CIBSE South West: LG6 - The Exterior Environment

8 September, Bristol
A talk by Alan Tulla, IENG, FILP, FSLL, Assoc PLDA, independent lighting consultant, technical editor for Lux magazine and chair of the LG6 task group.

Ireland: CPD 2 New form of contract and implications for M&E sector

14 September, Dublin
Presentation by Sean Downey, director, specialist contracting at CIF.

HCNW and SLL: The HCNW lighting paper at GX: Dialux

14 September, Chalfont St Peter
Seminar explaining how BIM-orientated design software DIALux evo supports the designer in producing an integrated lighting layout, and how it can be used to create complex buildings and use-control systems.

SopHE: Embedding acoustics into design

21 September, Manchester
A talk by Joanne Ansell, specification sales director, and Mark Milligan, Geberit UK.

HCNW: Natural and more than natural - trench heating in Milton Keynes

26 September, Milton Keynes
Seminar by Varano, covering natural convection, the evolution of trench heating, reasons to consider trench heating as a low energy solution, design outputs and guidance, and fan-assisted versions.

HCNE: Membership briefing

27 September, London
Focusing on applications for the Associate and Member grades, and registration with the Engineering Council at the Incorporated Engineer and Chartered Engineer levels.

West Midlands: Technical seminar on radiant heating panels

28 September, Birmingham

HCNW: The HCNW debate

6 October, London
The annual HCNW debate, with expert panel.

West Midlands: Technical seminar on new Liff Standards EN81-20 and EN81-50

12 October, Birmingham
CPD seminar on new lift standards.

HCNW: Building physics and optimised design - design by algorithm?

18 October, High Wycombe
This debate will focus on current technologies and developments in BIM, looking at the possible trajectory where 'deep learning' and quantum computing may have the potential to automate building services design.

CPD event: Energy, economy, environment - the event horizon

19 October, Dublin
Chris Jones, MCIBSE, chair of CIBSE Home Counties North West, will explain how money is a promise of future energy, how resource depletion has brought diminishing returns in the real economy, and discuss whether technology can outpace these challenges.

Lifts Group Symposium 21-22 September, Northampton

The sixth annual Symposium on Lift and Escalator Technologies will bring together experts from the field of vertical transportation, offering speakers an opportunity to present peer-reviewed papers on their research. Speakers include industry professionals, academics and postgraduate students.

A workshop on Lift Industry Training and Academic Education will also be held. It is a collaboration of the three main interest areas in lift industry education and training - CIBSE, LEIA and The University of Northampton - and will look at the range of courses available from academic providers, apprenticeship training at vocational level, professional engineering institutions and the engineers' registration system, run by the Engineering Council UK.

For full information and to book, visit www.liftsymposium.org



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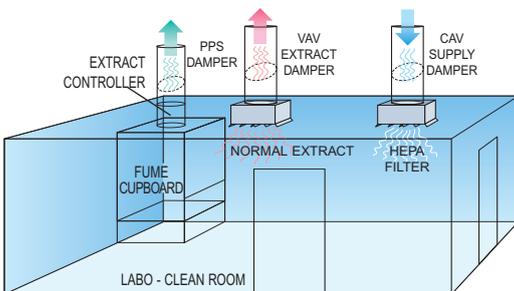


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