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## SAP to the future



Last month's IPCC report on the likely effects of climate change considers the probable impacts of global warming of 1.5°C above pre-industrial levels and the consequences of letting that increase to 2°C. It's a sobering read. It concludes that we are already 1°C of global warming above pre-industrial levels. As Dr Hywel Davies writes on page 17, if we have a chance to have a positive impact on our world, the time to act is now.

Those seeking evidence of immediate action will be encouraged by the Greater London Authority's (GLA's) new Energy Assessment Guidance, which requires the adoption of SAP 10 on London projects

from January 2019 (page 7). SAP 10 was published by the government in the summer and gave new CO<sub>2</sub> emissions factors representing the greater proportion of renewable energy sources that now make up the National Grid. These carbon emissions factors are significant because they are used by designers to determine what services need to be specified to meet carbon emissions targets. The 55% reduction in the carbon factor for electricity means homes heated by direct electric systems will produce virtually the same CO<sub>2</sub> emissions as gas, while heat pumps will produce less.

Many predict that lower SAP figures will lead to an increase in heat pump installations. This may also allow designers to use heat pumps' cooling capabilities to ensure homes don't overheat. This is one of the predictions of WSP's Mark Grace, who looks at the consequences for future design of the new carbon emissions factors on page 51. However, there is a danger that less carbon-intensive cooling provided by heat pumps, under SAP 10, will result in an increase in comfort cooling where it didn't exist before.

The consequences are foreseen in the GLA's Energy Assessment Guidance. It says that where air source heat pumps (ASHPs) are appropriate, a high energy efficiency specification will be expected to ensure systems operate efficiently and peak electricity demand is minimised. Designers must also estimate the heating and cooling energy that the ASHP would supply to the development and the electricity this would require to be generated.

While the new carbon factors have prompted talk about an electric future, other energy sources will be viable under SAP 10 in some circumstances, such as wood fuel. The feature on a biomass heat network at St Andrews University, run by Vital Energi, shows how energy efficiency can be improved, whatever the fuel, if projects are monitored closely and action is taken to quickly rectify issues (page 52).

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The IPCC report on climate change has focused government minds on limiting rises in temperature



### Jonathan Gaunt

The SoPHE chair on why the growing status of PH engineering is attracting more young people



### Reanna Evans

CIBSE's Young Engineer of the Year answers questions on why ethics matter in building services



### Tim Dwyer

This month's CPD considers the evolution of BIM working practices and the drive for standardisation



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## IN BRIEF

## Bioenergy will lead to renewables growth

The International Energy Agency (IEA) says bioenergy will be the fastest-growing renewable resource between 2018 and 2023.

Renewables, as a whole, will be responsible for 40% of all global energy consumption in the next five years and will account for almost one-third of total world electricity generation in 2023, according to the IEA's Renewables 2018 market analysis and forecast report.

'Modern bioenergy is the overlooked giant of the renewable energy field,' said the IEA's executive director, Dr Fatih Birol. 'Its share in the world's total renewables consumption is about 50% today... as much as hydro, wind, solar and all other renewables combined.'

'We expect bioenergy will continue to lead the field, and has huge prospects for further growth, but the right policies and rigorous sustainability regulations will be essential to meet its full potential.'

## Nissan and EDF to join up for battery storage

Nissan and EDF Energy will use end-of-life electric vehicle batteries for flexible power storage.

The firms aim to explore the business case for combining Nissan's second-life equipment with EDF Energy's demand-side response platform Powershift. Electricity will be stored in the batteries and released back to the grid to react quickly to drops in generation from intermittent renewables and to meet peaks in demand.

**More PVs, such as those on Blackfriars railway bridge, are helping to decarbonise the grid**

# GLA to adopt lower SAP carbon factors from January 2019

## CHP plant will have to undergo emissions testing before occupation

Planning applicants must use the SAP 10 emission factors when estimating CO<sub>2</sub> emission performance against London Plan policies from January 2019, and until the government updates Part L of the Building Regulations.

According to Greater London Authority's Energy Assessment Guidance, released last month, this will ensure that the assessment of new developments reflects the actual carbon emissions associated with their operation.

The 55% reduction in the CO<sub>2</sub> emissions factor for electricity in SAP 10 means homes heated by direct electric systems will produce virtually the same CO<sub>2</sub> emissions as gas, while heat pumps will produce even less.

This will mean technologies generating onsite electricity – such as gas-engine CHP and solar PV – will not achieve the carbon savings they have to date. Developments will need to use alternative or additional technologies to meet the 35% onsite carbon-reduction target, the guidance said.

Applicants proposing to use the current SAP

2012 emissions factors will have to justify this, and minimise the carbon and air-quality impact. Gas-engine CHP may still be an appropriate energy solution for area-wide heat networks, because of greater electrical efficiencies achievable at a larger scale.

Small-to-medium residential developments, and non-domestic developments with a simultaneous demand for heat and power that do not have a year-round base load for optimum operation of CHP – for example, offices and schools – will not be considered appropriate for gas-engine CHP.

Where CHP is applicable, the energy assessment will have to give detailed information, including: the size of the proposed engine; the provision of any thermal store and suitable monthly demand profiles for heating, cooling and electrical loads.

Cross-referencing the air-quality assessment, the energy assessment will also be required to confirm NO<sub>x</sub> emission standards will be met by emissions testing before occupation. The guidance also requires the CHP operator to monitor and supply evidence yearly.

For details, see [bit.ly/CJNov18SAP](http://bit.ly/CJNov18SAP)

## Energy minister heeds alarm call

Energy and Clean Growth Minister Claire Perry has sought guidance on whether the UK should move further and faster than other nations on cutting greenhouse gas emissions.

She was responding to a report from the Intergovernmental Panel on Climate Change (IPCC) warning that the world was heading towards a global temperature rise of 3°C this century – instead of the 2°C target set at the Paris Agreement of 2015 – and that the target should, in any case, be reset to 1.5°C to avoid serious climatic upheaval. Staying below 1.5°C will require expensive 'rapid, far-reaching and unprecedented changes in all aspects of society', according to the IPCC, which said carbon pollution would have to be cut by 45% by 2030 and to zero by 2050 to restrict global warming to this level.

Perry has consulted the UK's Committee on Climate Change on the practicalities of reviewing the current target to cut emissions by 80% by 2050. She has asked the committee to consider the cost/benefit comparison of setting more ambitious goals than other G7 nations. See Hywel Davies' reaction to the IPCC report on page 17.

## Temperature rise warning

The recent IPCC report ([bit.ly/CJNov18JG2](http://bit.ly/CJNov18JG2)) warns that we are heading towards a 3°C global temperature rise, with the 1.5°C milestone to be exceeded in just 12 years, by 2030. This summer, we had an indication of how hot UK summers could be in the future. Olga Tsagkalidou, director at T62 Studio, used measured daily air temperatures available at the open-source WUnderground database ([bit.ly/CJNov18tem](http://bit.ly/CJNov18tem)) and plotted them against CIBSE's future Design Summer Years for the 2020s, 2050s and 2080s. The summer profile of 2018 matches closely the temperature trends of middle- and end-of-century climate projections. This shows the importance of modelling designs using future weather scenarios to adapt them for current and future climate. See graph at [cibsejournal.com](http://cibsejournal.com)

## 200 jobs in jeopardy as M&E firm goes under

South Eastern Electrical has gone into administration, putting 200 jobs at risk.

The Essex-based contractor reported a £51m turnover and a £729,000 pre-tax profit in its last set of accounts for the year to the end of March 2017. However, reports suggested the firm had been hit by insurance claims and was the victim of late payments and retentions, which had affected its cash flow.

## Potential for wearables in buildings

A white paper covering wearables and wellbeing in buildings has been published by BSRIA. It concludes that there is 'substantial potential for the deployment of wearables' as part of building systems but, so far, the technology was only practical in a few 'niche areas'.

Using wearables in buildings will only be possible if occupants have a motive to share their personal data, the paper revealed, adding that this raises issues around consent, privacy and data security.

## Loss of architects after EU exit

An exodus of foreign talent prompted by Brexit will be a 'massive loss' to the architecture profession, according to the Architects Registration Board (ARB), which has recorded a 42% drop in the number of EU registrations. Its latest figures show that the ARB had only processed 485 applications from EU architects looking to work in the UK this year, up to the end of July, compared with 846 who registered via the EU route in the same period two years ago.

# Improve homes to reduce burden on NHS, says research

**A standard house would cost around £17,000 to retrofit, researchers say**



Hundreds of millions of pounds should be spent on the UK's 'draughty housing stock' to meet the government's climate change targets and improve public health, according to research published by the Institution of Engineering and Technology and Nottingham Trent University.

The researchers called for an ambitious national programme of home improvements, starting with the country's 4.5 million social homes. It should include more insulation and the deployment of renewables to meet the government's aim of cutting greenhouse gas

emissions by 80% by 2050, they said.

'A national programme for a one-off deep retrofit [of all residential property] is needed,' said Marjan Sarshar, professor of sustainability and the built environment at Nottingham Trent University. 'Costs will come down as we build up the supply chain capacity.'

The research team calculated that it would cost around £17,000 to retrofit a standard house, but as well as cutting energy bills, they claim this investment would reduce the burden on the NHS, which currently spends about £1.4bn a year 'treating conditions that arise from poor housing'.

A major retrofit programme would also cut the financial burden on local authorities, which spend more than £5bn a year on social housing maintenance and more than £4bn on energy. The researchers added that previous improvement measures had been applied 'piecemeal', which reduced their effectiveness, and a more concerted programme could make homes fit for purpose for at least 30 years.

They said the focus must be on existing homes because new dwellings would only provide around one fifth of the market by the middle of the century.

## Climate services network launched

A network for UK-based climate services providers was launched in London last month.

Mesh offers a platform for anyone working in climate services - from researchers and civil services to private sector, professional bodies and third-sector organisations - to share their achievements and knowledge. It will also help them find other UK-based organisations to work with to produce climate services

for economic and societal benefit in the UK and globally.

Mesh was co-founded by Briony Turner, of Space4Climate group, and Ben Smith, of the Global Climate Adaptation Partnership. They are coordinating the 2018-19 programme of events, before handing over the reins to another volunteering duo for the 2020-21 programme.

Visit [www.the-iea.org/space4climate/mesh](http://www.the-iea.org/space4climate/mesh)

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## IN BRIEF

## Manchester gets 'world first' test centre

A £16m centre at the University of Salford will be the first in the world to provide all-weather research for whole-building performance. It will also be capable of cutting test times for new low-energy and digital building products 'from years to a matter of weeks,' according to Greater Manchester's Mayor, Andy Burnham.

He said that Energy House 2.0 would pave the way for net-zero carbon homes and workplaces, and would play a leading part in the UK's clean growth strategy. It will also support the city's plans to position itself as a world-leading green business and clean tech hub.

## Leevers arrives at EngineeringUK

EngineeringUK has appointed Dr Hilary Leevers as its new chief executive. Currently head of education and learning at Wellcome, Leevers will join the body in January. She is replacing Mark Titterton, who will take up two Brussels-based roles.

Before joining Wellcome, Leevers was assistant director at the Campaign for Science and Engineering (CaSE), advocating for policy change to improve STEM education policies and investment. She previously worked in academia following her studies in natural sciences at the University of Cambridge and a DPhil in experimental psychology at the University of Oxford.

## RIBA removes diversity chair

The Royal Institute of British Architects (RIBA) has forced Elsie Owusu to step down from her role as chair of its diversity group.

The former presidential candidate had her tenure as chair of Architects for Change, a group that focuses on equal opportunities, ended by RIBA president Ben Derbyshire. He said it was 'no longer possible' for Owusu to lead the group after she accused a RIBA staff member of bullying and discrimination.

RIBA said Owusu refused to withdraw her allegations, despite an independent review that 'fully exonerated' the staff member and 'found no evidence in support of any of the allegations'.

Owusu said she would be raising a complaint through the Institute's grievance procedure and asking it to investigate 'discrimination'.

## Developers determined to tackle 'performance gap'

### Firms to fund investment grade rating that reflects actual performance in use

A group of the country's largest property developers has committed to a new pilot process for improving the lifetime energy performance of new office buildings.

Great Portland Estates, Grosvenor Britain & Ireland, Landsec, LGIM Real Assets, Lendlease, TH Real Estate and The Crown Estate have adopted a 'Design for Performance' approach on at least one office from each of their portfolios.

They have agreed to set targets for operational energy use 'embedding these within the development process and verifying performance during full occupation'.

The seven companies, which are all members of the Better Buildings Partnership (BBP), have also agreed to fund the development of an investment grade rating that reflects

'actual performance in use' and is based on the Australian Nabers scheme.

Consulting engineers have been invited to help deliver the scheme, with Ove Arup & Partners and Cundall the first to sign up.

The BBP firms said this 'radical step' was needed because the UK's current regulatory framework failed to measure operational performance, which means the actual performance of commercial buildings is 'invisible to the market'. This makes it hard to quantify and tackle the widespread problem of a 'performance gap' that leaves occupiers facing higher energy bills than anticipated.

'A relentless focus on performance outcomes not only delivers better designed, better constructed, better commissioned and better operated buildings, but a base buildings rating can also act as a proxy for better quality buildings that are attractive to both investors and occupiers,' a joint statement said.

## IGEM to establish hydrogen standards

The Institution of Gas Engineers & Managers (IGEM) is to develop new standards as part of a feasibility study to see if hydrogen could be used to heat UK homes and commercial properties.

Its work will be part of the £25m Hy4Heat study, managed by Arup, which will try to establish if it is technically possible and safe to replace methane with hydrogen.

'This work... will ensure that the relevant standards are developed and owned by the UK

gas industry, ensuring the UK's proud 200-year history of gas safety is maintained,' said Ian McCluskey, IGEM head of technical services.

'[It] will significantly contribute to our industry's ambition to develop a safe and secure low carbon gas network for the future.'

IGEM will be working with a number of industry partners, including the Health & Safety Laboratory, the Heating and Hotwater Industry Council, and the ICOM Energy Association.

## NEW LIVERPOOL CRUISE LINER TERMINAL DESIGNS REVEALED



Ramboll is supplying engineering services, including M&E design, for a new cruise liner terminal being built within the Liverpool Waters area. It includes a passenger and baggage facility, lounge, café, toilets and hotel.

A district heating network will supply heat, while external shading will help reduce solar gain. Electric charging points will be installed for baggage handling and other support vehicles. Architect Stride Treglown said the building's glass walls will allow views across the city and out to the Irish Sea. Site preparation works are expected to start in the new year.

## Scottish Power goes 100% renewable

Scottish Power has become the first major UK energy firm to drop fossil fuels and generate all electricity from wind, after selling its remaining gas and hydro stations to Drax for £702m.

While customers will still get some electricity from non-green sources, which the company has purchased from other operators, the firm said it will now invest more in UK renewable energy sources such as sunlight, wind, tides and waves.

It plans to invest £5.2bn over the next four years to more than double its renewable capacity.

Some smaller energy suppliers like Ecotricity, Good Energy and Bulb already offer totally renewable tariffs, with their power generated from wind turbines, solar panels and hydro sources.

Meanwhile, the Australian government has rejected the Intergovernmental Panel on Climate Change report's call to phase out coal power by 2050. Deputy prime minister Michael McCormack said Australia will continue to use and exploit its coal reserves, which provide 60% of the country's electricity, 50,000 jobs and is its 'largest export'.

## Fracking 'part of future', says minister

Operations restarted at a shale gas site in the north-west of England last month, despite local opposition and an activist blockade.

The energy and clean growth minister Claire Perry said natural gas supplies around 40% of UK electricity and 80% of home heating. It is part of the energy mix in 'every major pathway' to reduce emissions modelled by the Committee on Climate Change, Perry said. 'I have not seen a single bit of modelling that shows 100% renewables is viable.' She added that gas was helping Britain to shift away from coal.

# Delays to EU exit hit market confidence

## Construction output in all sectors is expected to fall sharply during 2019

Business concerns over a possible extension of the UK's Brexit transition period has hit market confidence, with forecasters downgrading their economic growth predictions for construction.

Instead of the possible 2.3% rebound some had forecast for 2019, many are now downgrading likely growth levels to just 0.6%. Most also believe this year will end up showing no growth after investment delays caused by Brexit.

The Construction Products Association (CPA) said even modest growth will depend on the government extending its Help to Buy home ownership scheme and giving firm guarantees about its infrastructure pipeline, which should be worth £23bn by 2020.

The UK housing market should have risen by 5% by the end of this year and a further

2% rise is expected in 2019, but analysts think output could fall next year unless the government agrees to extend the Help to Buy deadline beyond 2021.

Infrastructure schemes, such as the Hinkley Point nuclear power station and HS2, are seen as crucial to growth, but delays to the delivery of Crossrail have caused concern over the government's ability to deliver major projects.

The CPA has dropped its infrastructure growth forecast from 13% to just 8.7% in 2019 and says office construction will fall by 10% in 2018 and 20% in 2019. In its autumn forecast, it added that retail construction will have fallen by 10% this year and will drop by a further 2% in 2019.

'Even if the government eventually agrees a deal with the EU, construction output in all these sectors is expected to fall sharply during 2019 due to falls in new orders,' said CPA economics director Noble Francis.

## Hard Brexit may aid sectors

Some key construction sectors could prove resilient to - or even gain from - a hard Brexit, according to the construction market intelligence firm Glenigan.

The prospect of congestion at the ports with the end to 'frictionless' trade may create tender opportunities as UK ports invest more in upgrading and enhancing their facilities, it said. The weaker pound could also offer a further lift to the numbers of tourists visiting the UK, giving a boost to hotel construction programmes.

According to Glenigan's latest analysis, Britain leaving the EU customs union could also give a spur to the domestic industrial building/logistics sector, particularly as manufacturers and retailers seek to maintain larger volumes of components and supplies closer to home. 'Although the national picture is mixed, the demand for warehousing, distribution and logistics space is continuing to expand in key manufacturing regions,' the company said.

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## Foster wins Stirling Prize with Bloomberg HQ

Bloomberg's London office has been named the winner of the Royal Institute of British Architects (RIBA) Stirling Prize, in a ceremony at London's Roundhouse last month.

RIBA President Ben Derbyshire said the European HQ for the financial information firm, designed by Foster + Partners, was 'a profound expression of confidence in British architecture – and perfectly illustrates why the UK is the profession's global capital. This role and reputation must be maintained, despite the political uncertainty of Brexit.'

## Call for wet wood ban

People burning wet wood on inefficient stoves are poisoning themselves and their neighbours, according to a new report.

The IPPR study points out that burning wood, coal or other solid fuels in the home is the largest single contributor to production of the most dangerous pollutant, particulate matter (PM) 2.5.

According to government figures, wood, coal and solid-fuel fires in the home generate 40% of total PM2.5. The IPPR report calls on the government to ban the sale of wet wood and smoky coal in England no later than 2020, and commit to reduce all domestic PM2.5 emissions to as close to zero as possible by 2050.

# SDE to launch BIM competency scheme

## Certification awarded for effective delivery of product data

CIBSE and the Society of Digital Engineering (SDE) are to launch a competency scheme for manufacturers creating product data for engineers and specifiers, this autumn.

The aim of the scheme is to reward manufacturers that create consistent and accurate product data for projects. To gain certification, suppliers must create online data that is accessible and transportable, whatever the product type.

News of the scheme comes after a BIM and manufacturers workshop hosted, by CIBSE and SDE (see page 35), revealed that the BIM objects currently created were often rejected by designers and contractors when creating BIM models.

'Contractors often ignore the models created by consultants and start from scratch,' said CIBSE consultant Carl Collins, who chaired the workshop. 'There needs to be more joined-up thinking.'

Joseph Lally, digital engineering system leader at Crown House, said that suppliers often provided BIM objects in too much detail, which would affect the performance of the BIM model. 'We want sophisticated simplicity but what we often get is complexity,' says Lally.

This new competency scheme will assess the online and website delivery of product data by manufacturers. It will check that data meets performance and system requirements, and does not affect users' software or hardware.

Manufacturers will receive a certificate and a logo on successful completion.

## Evans and Elementa scoop young engineers' awards

Reanna Evans, of NG Bailey, has been named as the CIBSE ASHRAE Graduate of the Year 2018, as women filled the top three places for the first time in 23 years.

Elementa was also named CIBSE Employer of the Year at the CIBSE Young Engineers' Awards sponsored by Andrews Water Heaters, Kingspan Industrial Insulation, Swegon Group and the CIBSE Patrons (see page 14 and 22 for more details).

Evans, who won a trip to the ASHRAE Winter Conference in Atlanta next January, is a graduate of Leeds Beckett University and a senior project engineer at NG Bailey. First runner-up was Hannah Muller-Jones, of BuroHappold and the University of Nottingham, who received a £600 bursary from The Rumford Club. Second runner-up was Gemma Taylor, from Atkins and the University of the West of England, who won £300.

The ceremony, at the Institution of Mechanical Engineers in London, also saw IMechE's special achievement award presented to Bruce Arnold, and the Geoffrey Engert Award for a young technician go to Lucy Austin, of Atkins.

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## Trio honoured at President's Awards

### Medals presented for outstanding service to the Institution

Three CIBSE members were awarded silver medals at the President's Awards dinner in October. Geraldine O'Farrell, Seamus Homan and Brian Charlesworth were presented with the medals in recognition of their outstanding service to CIBSE.

Neil Sturrock read the citation for O'Farrell, FCIBSE MSLL, who has been a prominent committee member of the CIBSE Heritage Group for nearly 20 years and has served as vice-chair for the past seven years.

Her extensive work in other areas of the Institution prompted the award, particularly her 16-year contribution as a professional interviewer for Member and Fellow applicants. O'Farrell has also served on the nominations committee, as an elected member of the CIBSE board and a member of the council.



CIBSE President Stephen Lisk with Mike White



Brian Charlesworth

Paul Martin read the citation for Homan, FCIBSE, who is a chartered fuel technologist, a Fellow of the Institution of Engineers of Ireland, a life member of ASHRAE, and past chair of CIBSE Ireland.

In 1964, with colleagues, he played a significant role in setting up a City and Guilds HVAC technician design course at the College of Technology, Dublin, which he was later invited to help develop into a degree course. Homan is still active in promoting building services engineering, playing an influential part in the campaign to encourage Leaving Cert students in Ireland to study building services.

CIBSE Fellow Charlesworth, who was unable to attend the dinner, has been a professional interviewer for CIBSE applicants for 25 years – undertaking more than 400 interviews to date – and has helped train new CIBSE interviewers.

The annual President's Dinner recognises and rewards industry talent with a number of awards, showcasing newly qualified and experienced engineers.

### Happold Brilliant Award

This accolade, which recognises excellence in the teaching of building services engineering, was presented to Leeds Beckett University.

The judging panel particularly praised Mike White, who is an extremely motivated and popular course leader. It was impressed by the quality of the courses and the university's franchise institution, AIBE in Hong Kong, the enthusiasm for teaching, and the extensive support offered to students.

The Happold Brilliant Award was presented to White, who accepted the award on behalf of the university.



CIBSE President Stephen Lisk with Geraldine O'Farrell and Seamus Homan

## CIBSE is approved assessor for building services Trailblazer

CIBSE has been accepted on the Register of End-point Assessment organisations and is approved to be the assessor for the ST0063 – Building Services Design Technician Trailblazer apprenticeship.

As an end-point assessor, CIBSE will evaluate candidates and confirm if they have succeeded in completing their apprenticeship. It will also appraise them for EngTech registration. CIBSE has applied to be the end-point assessor for:

- Building services design engineer – degree level
- Building services engineering site management – degree level
- Building services engineering technician – EngTech level.

To comply with the end-point assessment requirements, CIBSE's membership department will need to put in place processes and procedures, and recruit additional assessors.

Trailblazer apprenticeships have been introduced to allow employers to design apprenticeships that are more responsive to their needs and aligned to the knowledge and skills they are looking for.

Unlike the old apprenticeships, which were aimed at 16 to 24-year-olds, funding for training is available for a much wider range of age and experience. The scheme is run through the Technical Apprenticeship Consortium – see [www.tacnet.org.uk](http://www.tacnet.org.uk)



## Referees needed for Technical Symposium

CIBSE is seeking volunteer referees to help peer review papers, after receiving an excellent response to the call for presenters for the 2019 Technical Symposium.

The planning committee is currently working through the abstracts. It will invite full submissions from those presenters it believes can create an informative and exciting symposium for CIBSE members and those in associated disciplines.

Referees are required to help peer review the first drafts of commissioned papers and posters, which are expected to start coming through in early December 2018. It will require a time commitment of about an hour.

Any Members or Fellows willing to review submissions should register their interest at the 'Become a reviewer' link at [www.cibse.org/symposium](http://www.cibse.org/symposium)

As well as helping to ensure the papers are of a high standard, it will give referees a chance to gain a head start on some of the developments that will be presented at the event.

The Technical Symposium 2019 is titled 'Transforming built environments: Driving change with engineering – reshaping regulation, understanding, practice and application to enhance the lifelong benefit of engineered environments', and will be held on 25 and 26 April 2019, at the University of Sheffield.

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

## Portal perk for members

The Knowledge Portal is an online reference tool that gives CIBSE members easy and free access to the full range of CIBSE published guidance. Currently, more than 140 titles are available for download, with a total cover price of nearly £7,000. In addition – and only available on the CIBSE Knowledge Portal – there are a further 640 technical papers and reports, free to access by our members. All 780 titles are peer reviewed.



Elementa's Clara Bagenal George, senior engineer; Ronan Pigott, associate principal; Simon Ebbatson, principal; and CIBSE President Stephen Lisk

# Elementa crowned Employer of the Year

## Aecom and SI Sealy came top in the large and small categories respectively

For the second year in a row, Elementa Consulting has been recognised at the Employer of the Year awards 2018 for its exceptional commitment to supporting and mentoring newly qualified engineers.

It won the Employer of the Year title in the medium-sized company category before being crowned overall champion at the IMechE in October, as part of the CIBSE Young Engineers Awards.

This year, Elementa created a training schedule and encouraged junior employees to attend and present a topic to their peers, to boost their confidence. The firm also published its first Corporate, Social and Environmental Responsibility (CSER) report, to measure and track its impact and commitment to education, leading to the launch of some new initiatives, including: increased Next-Gen attendance at industry events, encouraging junior engineers to become STEM Ambassadors, and personal training allowances.

In her supporting statement, Alkyoni Papisifaki, environmental design engineer at Elementa, said: 'Although my role is in the sustainability department, I have had the opportunity to work with the mechanical, electrical and public health teams, broadening my knowledge, widening my skill set and enhancing my confidence in my own abilities as a rounded engineer.'

SI Sealy won the award in the small company category, after showing its commitment to developing junior staff. All six of its senior management team joined the company as junior engineers and worked their way up.

In the past 10 years, SI Sealy has supported 12 engineers to achieve formal professional and technical qualifications, and has recruited

four apprentices in the past three years. Dean Simpson, senior engineer, said: 'In the 11 years I have been with SI Sealy, I have progressed from assistant engineer to senior engineer. I now train the junior engineers. I am keen to replicate the support I received to make the new, aspiring engineers feel as passionate about building services as I do.'

Aecom was the winner in the large company category, impressing the judges with its mentoring and training structure. Working with the Education and Skills Funding Agency, it has developed an apprenticeship scheme to help candidates study for a degree and gain work experience with a client, consultant and contractor. Its Apprentice Plus offers flexible working and is open to everyone, regardless of age, qualifications or experience. Every year, Aecom's schools outreach programme also offers up to 250 work experience placements.



SI Sealy won the small company category award



Aecom triumphed in the large category award



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## CIBSE presents to environment panel

**Institution's recommendations have been incorporated in the London Plan after it responded to the consultation in spring**

CIBSE participated in a London Assembly Environment Committee meeting in September, to scrutinise the proposed policies in the draft revised London Plan.

The assembly's panel was an opportunity for Julie Godefroy, technical manager, to reinforce the Institution's position that:

- Embodied carbon is an important part of cutting overall carbon emissions; there are many opportunities for carbon savings and other environmental benefits – for example, by reducing construction waste (see CIBSE TM59 for guidance on building services)
- There will be huge variations in embodied and operational carbon depending on building types, how often they are refitted, and how well they are maintained
- CIBSE does not believe it is possible, at this stage, to set a fair and well-informed target for embodied carbon; we agree assessments could be requested on major projects, and data should be gathered, particularly for building services – for example, by requesting Environmental Product Declarations from suppliers
- It is difficult to predict whole-life carbon at early design stages; we recommend that, if embodied carbon assessments are produced at planning stage, they should be updated at completion. This would not be to hold project teams to early estimates, but to build a better understanding of the impact of detailed design and supply chain decisions – for example, the selection of particular products, their country of origin and the construction process.

The other panel members included: Simon Sturgis, of Targeting Zero; Robbie Epsom, from WSP; Jane Wakiwaka, from the Crown Estate; and Anne-Marie Robinson and Rhian Williams, of the Greater London Authority. It is likely the GLA will produce supplementary guidance on whole-life carbon assessments. CIBSE is hoping to have the opportunity to contribute to this, and will share lessons with members.

Read CIBSE's response to the consultation at [bit.ly/CJNov18Lon](https://bit.ly/CJNov18Lon)

## Latest *BSER&T* now available

Academic papers on forecasting power grid carbon intensity and water fountains offering acoustic protection feature in the latest issue of *Building Services Engineering Research and Technology (BSER&T)*.

CIBSE members get free access to *BSER&T* – as well as *Lighting, Research and Technology* – published six times per year. The November edition of *BSER&T* includes:

- How indoor water fountains can obscure acoustically intrusive noises without adversely affecting the occupants' ability to hear each other
- A method to determine what effect early detection of faults in building sensors and actuators is likely to have on energy and comfort
- Analysis of novel counter-flow enthalpy recovery device for air conditioning systems using liquid desiccant
- Impacts of elevated levels of atmospheric CO<sub>2</sub> on human cognitive performance, and how it will impact design of ventilation systems
- Enhancement of PV: the integration of solid-solid phase change material with micro-channel flat plate heat pipe-based combined heat and power panels; and optimising the placement of PV panels to maximise useful solar shading as well as power generation
- Day-ahead forecasting of the power grid carbon intensity has been developed to allow building operators to plan utilisation of HVAC plant, to reduce carbon emissions based on freely available data.

To access the journals, visit [bsert.sagepub.com](https://bsert.sagepub.com) and [lrt.sagepub.com](https://lrt.sagepub.com)

# Time to act

The IPCC's Special Report 15 considers the consequences of not limiting global temperature rise to 1.5°C – and they're not good, says Hywel Davies

The Paris Agreement committed the world to limiting global temperature rise to 2°C, with an aspiration of keeping the increase to 1.5°C. Special Report 15 (SR15) of the Intergovernmental Panel on Climate Change (IPCC) considers the likely impacts of global warming of 1.5°C above pre-industrial levels, and the consequences of letting that increase to 2°C. It looks at possible future global greenhouse gas emission pathways and what might be done to strengthen the worldwide response to the threat of climate change, to keep to those targets.

The IPCC concludes that human activity has already caused approximately 1°C of global warming above pre-industrial levels. At the current rate of increase, global warming is likely to reach 1.5°C between 2030 and 2052. Put in simple terms, warming is happening fast, and there is real urgency if we are to limit the global temperature rise to just 1.5°C.

The IPCC concludes that, if we stopped anthropogenic (human-made) carbon emissions now, we would be unlikely to breach the 1.5°C limit – but we are nowhere near that point. It will require us to achieve, and sustain, net-zero global anthropogenic CO<sub>2</sub> emissions to halt global warming for the long term.

We also need to reduce, or eliminate, emissions of the other greenhouse gases, including methane, aerosols, F-Gases, nitrous oxide and sulphur dioxide.

SR15 says the climate models now project robust differences in regional climate characteristics between current conditions, global warming of 1.5°C, and warming to between 1.5°C and 2°C. These differences include higher mean temperature in most land and ocean regions, hot extremes in most inhabited regions, a real prospect of heavy precipitation, and the probability of drought and precipitation deficits in some regions. It is becoming clear that holding the line at 1.5°C will make a genuine difference to future conditions.

## Not just about climate

Climate-related risks to health, livelihoods, food security, water supply, human security and economic growth increase with global warming of 1.5°C, and will grow further with a 2°C rise. This has significant and immediate implications for national policies, and for our work as building services engineers. If we accept the need to



**“Far more must be done to cut emissions from existing buildings. Transport emissions must be cut fast, driving a switch to EVs and the infrastructure they need”**

achieve net-zero emissions, and fast, we must make significant reductions in emissions from our building stock – and fast. Far more must be done to cut emissions from existing buildings. Transport-related emissions must be cut fast, driving a switch to electric vehicles and the charging infrastructure they need. This challenge is global, requiring a global response. As a worldwide body, CIBSE has a key role to play in that response.

In Australia last month, the government lost the seat vacated by former prime minister Malcolm Turnbull on a 28% swing, to an independent candidate campaigning for more action on climate change. Even in the US, while the federal government no longer supports the Paris Agreement, states and cities are redoubling their efforts to cut emissions.

The UK has already seen a hardening of view by the independent Committee on Climate Change, which – in June – called on the government to do more to meet the current legal target of an 80% reduction in emissions by 2050. SR15 drives that call home hard. The forthcoming review of Part L in England needs to take SR15 seriously.

We know the real challenge is to cut emissions from existing buildings – a tough problem to solve. But SR15 demands that we redouble our efforts and take much more urgent action. Given the time it takes to discuss and agree changes to regulations and standards, implement them, and then start building to them, we

have no time to lose.

The message from the IPCC is clear. Time is running out to prevent a global temperature rise of more than 1.5°C. The consequences of a 2°C rise are likely to be significantly worse. This is our chance to have an impact on the world. It is time to act.

## ABOUT SPECIAL REPORT 15

The IPCC has a formal scale for stating its confidence in the various detailed assessments it makes and the likelihood of the various outcomes it suggests. The overall conclusions about the rate and scale of temperature changes are given a high level of confidence, suggesting that the scientific evidence and consensus is very clear and robust. For full details, visit [bit.ly/CJNov18HD](https://bit.ly/CJNov18HD)

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

# Regulations review: how much, how soon?

**CIBSE believes substantial changes to Building Regulations Part L are required to achieve real and significant energy and carbon savings, says the Institution's Julie Godefroy**

The government has announced its intention to review Part L of the Building Regulations. This was first included in the Clean Growth Strategy in October 2017, subject to the outcome of the Independent Review of Building Regulations and Fire Safety, which reported in May 2018. Beyond this statement of intent, however, it has not formally announced such a review and what its scope will be.

The ambition and resources that will be put into this Part L review are currently unknown, especially as the government already faces pressing demands for regulatory reform post-Grenfell.

Action to reduce carbon emissions from the built environment is, nonetheless, urgently needed – as highlighted in this summer's report by the Committee on Climate Change<sup>1</sup> – and, now, most starkly in the new report by the International Panel on Climate Change.<sup>2</sup>

CIBSE believes the current approach in Building Regulations Part L does not deliver sufficient reductions in carbon emissions in practice. This is partly because calculations under Part L only cover regulated emissions (with unregulated emissions often a very significant part of the total actual emissions), and are not necessarily a representation of actual occupation and operational conditions. We, therefore, recommend an overall review of the requirements and methodology.

In addition, we believe there is a need to improve the treatment of overheating risk and indoor air quality in Building Regulations. As covered previously,<sup>3</sup> both are inadequately dealt with in current Building Regulations and Approved Documents, with overheating addressed only through a simplistic static assessment and air quality addressed only through ventilation, without criteria for overall resulting indoor air quality and no consideration of outdoor pollution.

We would like the upcoming review of Building Regulations to be as well informed and effective as possible. So we have been consulting with members and the wider industry on changes they would like to see, and



**“We would like the upcoming review of Building Regulations to be as well informed and effective as possible”**

the speed with which these should be implemented. This will inform a CIBSE position paper on recommendations for government that we intend to circulate to BEIS and the Ministry of Housing, Communities and Local Government. We will also look to engage with the Committee for Climate Change on these issues, with a view to both the short- and longer-term agendas.

We have already gathered views from previous consultation exercises, a recent workshop with members and the wider industry, and a feedback session in association with the London Energy Transformation Initiative (LETI). Our position paper will be published shortly at [www.cibse.org/news-and-policy/policy](http://www.cibse.org/news-and-policy/policy)

Please get in touch if you would like to be involved in the next stage, when we will be developing a more detailed response to the government consultation, once published.

The feedback we are looking for includes:

- Parts L and F, and all the associated guidance, including the Approved Documents and compliance guides for new buildings and works to existing buildings.
- As well as changes, what you think currently works well and should be retained in Building Regulations Parts L and F.
- Overall approach, as well as more detailed points that, in accumulation, could lead to non-negligible improvements.
- How the methodology may have been interpreted and incorporated – or not – within approved software, if you feel this has a significant detrimental outcome on performance, or delivers perverse outcomes.

- All consultations we engage with can be found at [cibse.org/news-and-policy/consultations](http://cibse.org/news-and-policy/consultations)

#### References:

- 1 CCC 2018 Progress Report, June 2018, [bit.ly/CJNov18JG](http://bit.ly/CJNov18JG)
- 2 IPCC, 1.5°C report, October 2018, [bit.ly/CJNov18JG2](http://bit.ly/CJNov18JG2)
- 3 See, for example, CIBSE's response to the Environmental Audit Committee enquiry on heatwaves, [bit.ly/CJNov18JG3](http://bit.ly/CJNov18JG3), and to Defra's Clean Air Strategy consultation, [bit.ly/CJNov18JG4](http://bit.ly/CJNov18JG4)

**JULIE GODEFROY**  
is technical manager  
at CIBSE



## Developing a Circular Economy in Building Services

### Join us for Future Thinking series 10, focusing on Developing a Circular Economy in Building Services

Reducing the environmental impact of climate control solutions means moving away from the “take, make and dispose” model of manufacture and management, towards a circular economy in which resources, waste and emissions are minimised.

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20th November: London  
21st November: Bristol  
22nd November: Cardiff

# Coming together

There are regular calls for more collaboration in the built environment to make a coherent case to clients and deliver better buildings. Julie Godefroy reports on work by CIBSE and RIBA on the latter’s sustainability overlay

The need for collaboration was highlighted in Paul Morrell’s 2015 report for the Edge, *Collaboration for Change*, in this year’s post-Grenfell review by Dame Judith Hackitt, *Building a Safer Future*, and – most recently – in a new book *Professionalism for the Built Environment*, by Simon Foxell, architect and member of the Edge. Recent initiatives involving the RIBA Sustainable Futures Group and CIBSE are positive examples of how professionals from different institutions can work together to try to align their objectives on building performance and wider sustainability.

## RIBA Plan of Work and sustainability overlay

RIBA is reviewing the sustainability guidance given to support its Plan of Work. CIBSE has been invited to inform the revisions, along with clients, contractors and other design professions. The changes will:

- Make it clear that sustainability should be considered and integrated in every project – currently some aspects of the Plan of Work can make it look optional
- Simplify the structure of the guidance, with clearer links between the sustainability objectives in the Plan of Work and the more detailed guidance. This should give sustainability objectives more prominence – see Figure 1
- Update the guidance to reflect changes to sustainable building practice since the publication of the *Green Overlay* (2011 and revised 2013), although much of the original guidance produced by Bill Gething is still relevant and is expected to be retained
- Help architects and building services engineers work to the same level of detail simultaneously, with more clearly defined design-stage boundaries and detailed guidance on what is ‘coordinated design’.

These changes should help project teams better advise clients on how to embed building performance and sustainability in the brief and then follow them through the design, procurement, construction and handover stages. Post-occupancy evaluation (POE) is prominent in the proposed revisions, to encourage POE on completed buildings and to incorporate lessons from previous projects into the brief and design proposals.

CIBSE and the RIBA Sustainable Futures Group are planning to work together to produce advice on what constitutes building performance and sustainability, with objectives clearly referenced in the Plan of Work to inform project briefs and POE. While energy and/or carbon targets are relatively widely used, there is a high

level of discrepancy in how other aspects of building performance are considered. Greater consistency would be useful to make a case to clients and is essential across disciplines, as most aspects of building performance cannot be delivered by a single discipline.

For example, indoor air quality needs attention from the architect for the building layout, façade and specification of materials; from the engineer for the ventilation strategy; and from the contractor for construction procedures. All disciplines need to work from a common understanding of what constitutes good indoor air quality before they can put forward objectives and develop design proposals.

The RIBA Sustainable Futures Group and CIBSE are also planning to review how the sustainability criteria for their awards can be more closely aligned, to encourage a greater focus on building performance. This would send a strong message to clients and project teams on what to target and report on. It would also start breaking down the distinction between engineering and architectural awards, with the latter often seen to be given to buildings that do not emphasise how they actually perform.

There is still much to be done, but these strands of work are all leading to stronger and more consistent messages, to help teams throughout the project cycle.

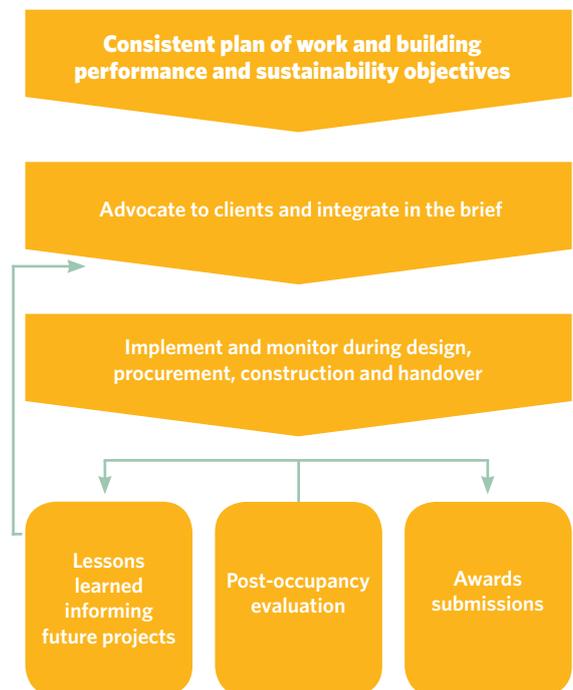


Figure 1: Collaboration on building performance and sustainability objectives: the end game?

# EPCs – call for evidence

## CIBSE wants better enforcement and detailed recommendation reports

The Clean Growth Strategy set out the government's ambitions to improve the energy performance of buildings in the domestic and non-domestic sectors. In particular, it set out an aim for properties in the private-rented sector – and all fuel-poor homes – to be upgraded to Energy Performance Certificate (EPC) band C by 2030, and an aspiration for as many homes as possible to be upgraded to band C by 2035. It also wants energy efficiency in businesses and industry to be improved by at least 20% by 2030.

In this context, a call for evidence was made seeking views on introducing additional points when EPCs might be required and ways in which they could be improved.

EPCs are widely used as a measure of the energy performance of buildings, but – in the CIBSE response to the call for evidence – we question how robust this is. You cannot manage what is not measured. For all uses of EPCs in the domestic and non-domestic sectors, the attributes of quality, encouraging action and data availability are essential.

### Powerful tool

Policy cannot assume that, just because an EPC has been produced, better energy performance will automatically follow. A whole range of other factors affect whether energy-related improvements are made to a building.

If comprehensive recommendation reports were provided, with realistic estimates of savings and costs, EPCs could become a powerful tool to improve energy performance. Enhancing the quality and overcoming the low-fee culture among those producing EPCs should be a priority.

A significant factor influencing the reliability of EPCs is the time to produce the certificate. EPCs done with insufficient time to obtain the required information related to buildings, will lead to an inaccurate energy report. Those procured in a hurry to facilitate the sale of a property are at increased risk of using default values, which are intended as a tool of last resort. Also, an EPC is a standardised form of energy labelling, but does not include operational energy use. CIBSE has long advocated the wider adoption of Display Energy Certificates (DECs) in the non-domestic sector. Operational ratings based on measured energy consumption serve a different purpose from EPCs, but can be seen as complementary and there is a good case for reporting both metrics.

There is great concern about the lack of enforcement and low levels of compliance with all certification aspects of the Energy Performance in Buildings Directive. As always, we are keen to see more rigorous enforcement of EPCs and DECs.

CIBSE's response to this call for evidence was made possible by detailed input from enthusiastic members. Next time you see a request for contributions to a consultation, please get involved and make your views heard. For CIBSE's full response, visit: [bit.ly/2qaWDK1](https://bit.ly/2qaWDK1)

**SARA KASSAM** is head of sustainability at CIBSE

# Radical solution to skills crisis

## An era of more technology-driven project delivery is on the way, says Robin Vollert

The UK faces the prospect of being unable to deliver important infrastructure and building projects because of shortages of skilled labour after Brexit.

The Prime Minister's assertion that EU citizens will no longer get special treatment when trying to access the UK's jobs market after next March has particular implications for companies trying to deliver projects in the built environment. The current free flow of skilled labour from the EU will

no longer be automatically available. EngineeringUK believes the country will need 1.8 million new engineers by 2025 and the Chartered Institute of Building estimates demand for 150,000 new recruits by 2021. Increasing the complexity of recruiting from overseas will make these numbers even more difficult to achieve.

We have some highly labour-intensive projects in the pipeline, such as the proposed third runway at Heathrow, which could need as many as 15,000 site-based workers if it is delivered in a 'traditional' way. The two planned nuclear power stations at Hinkley Point and Wylfa Newydd would each need 6,000 people with a range of specialist and non-specialist skills. Getting projects over the line will be increasingly difficult and almost impossible to do on time, and within budget, unless we do things differently. The building engineering and construction sectors need to adopt an 'offsite' model driven by modular solutions and integrated working processes, underpinned by digital procurement and design.

A recent House of Lords report argued that moving more construction offsite could improve productivity by as much as 70% and deliver better, more energy-efficient buildings. It would also ease some of the workforce pressure on employers, while creating better and safer working conditions. However, collaboration is crucial in making a more modern, integrated system work, and requires procurers to adopt a 'lifetime value' mindset, rather than looking for the cheapest upfront cost.

Transforming our delivery process into something more like a production line would allow us to develop a less disruptive supply chain management and payment model. This, allied to a safer, cleaner and more technologically driven process, would also be less adversarial and, so, more profitable. An added bonus is that it would become more appealing to prospective new recruits who possess the technological skills we now need to attract.



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**ROBIN VOLLERT** is managing director at Swegon Group UK&I [www.swegonair.co.uk](http://www.swegonair.co.uk)

Top row (from left): Finalists Josh Hunt, Ryan Wesley, Hannah Muller-Jones, and Waqar Ahmed. Bottom row (from left): Winner Reanna Evans, ASHRAE president Sheila Hayter, CIBSE President Stephen Lisk, IMechE president Tony Roche, finalists Carl Fisher and Rachel Bell



Eight finalists addressed the topics of professional competence and upholding technical standards at the Young Engineers Awards last month. **Liza Young** listened to their speeches

# RAISING THE BAR



CIBSE Graduate of the Year Reanna Evans

**E**ight young engineers showed off their presentation skills in October as they competed to become CIBSE ASHRAE Graduate of the Year 2018.

Reanna Evans, senior project engineer at NG Bailey, won the title after delivering a measured and confident five-minute presentation, addressing the topic: 'Recent events have raised questions about how the industry manages and monitors professional competence and upholds technical standards. What does this mean to you as an engineer, and where does the engineer's responsibility begin and end?'

Hannah Muller-Jones, mechanical engineer at BuroHappold's London office, was first runner-up, with Gemma Taylor, graduate building physics and services engineer at Atkins, taking third place.

Evans said trust underpins everything building services engineers do: 'People trust us to build and maintain a safer future.' But, she added, engineers should keep people at the forefront of their minds because 'sometimes, trust just isn't good enough'.

'Every time you get into a car, board a plane, settle your family to sleep at night – and every time you are at your most vulnerable, in a hospital bed – you trust the engineers, both past and present, have fulfilled their responsibilities. You do not even consider that something could possibly go wrong

because you simply trust the right people did the right thing at the right time,' said Evans, who achieved a first-class degree from Leeds Beckett University.

She questioned whether an engineer's 'sleek, corporate image' is sufficient, and whether we should instead trust the competency of engineers that are part of a registered body, such as CIBSE.

Who is deemed to be a suitably qualified and experienced engineer, Evans asked. 'Does having a couple of letters after their name, or some form of qualification card, necessarily mean they are available to do any given engineering task at any point in time?'

A cardiac surgeon takes five years to be educated, followed by a three-year fellowship, before undertaking 50 hours minimum per year of continuous professional development (CPD). 'Without that sterile environment, the surgical lights and those medical gasses, that surgeon cannot undertake their role. Engineering is of equal importance,' said Evans.

'I believe integrity and accountability contribute towards the pinnacle of engineering compliance, alongside the more technical skills, such as education and experience.

'It is my responsibility to keep up to date with the latest legislation, technology and guidance through the use of professional bodies, and through CPD.'



**"I believe integrity and accountability contribute towards the pinnacle of engineering compliance, alongside technical skills" – Reanna Evans**

It's about the human factor, too, she added – in understanding what you do and why. 'I am proud to have contributed towards enhancing lives; I'm proud to create comfortable workspaces; and I am proud to be part of major educational developments that have molded our future engineers.'

Evans' prize is a trip to the ASHRAE Winter Conference in Atlanta.

Muller-Jones, who won £600 from The Rumford Club, showed images of projects, and asked the audience to raise their hands if they thought competence and standards were upheld in each case. She said the 40-year-old Genoa Bridge, in Italy – which collapsed earlier this year – was designed by a competent team up to the standards of the time. Similarly, the Grenfell Tower renovations that many people have attributed to encouraging fire spread were done to the

standards, albeit they weren't as fire resistant as other options, she added.

However, the Takoma Bridge, in Washington, USA – which collapsed when it was hit by winds – was built too narrow and not deep enough to withstand the structural vibrations. Muller-Jones asked: 'If it is our duty, as engineers, to not only ensure we are competent, but that we encourage competency in others, it begs the question: where does our responsibility begin and end?'

If we don't share knowledge with each other, we can't call ourselves engineers, she said. 'Contractually, we have a start and end date for our responsibility, but – ethically – we are responsible for every project we work on.'

Muller-Jones added that constructability and communication played an important role at the London 2012 Olympics sports complex, where no deaths were reported – unlike the equivalent World Cup complex in Qatar.

'When we do not communicate between each other and share our principles, then we're going to keep causing things like this. We need to communicate to make sure we're all on board with the same principles and teach each other,' said Muller-Jones, who achieved a Master's degree in mechanical engineering with management from the University of Nottingham.

Taylor, who won £300 from The Rumford Club, said she was shocked that less than 4% of the UK's 5.7 million engineers hold a professional accreditation with the UK Engineering Council, which aims to maintain internationally recognised standards of competence and commitment. She asked: 'How can we be confident in the work we

deliver to the public if 90% of our practising engineers are simply off radar? We have a framework in place, but – with such a low percentage of people obtaining professional registration – I suggest we aren't even close to maximising its full potential.'

Taylor, who has a building services engineering degree from the University of the West of England, said competence is a never-ending route covering skills, knowledge, and ability to gain experience in a specialism. 'But if less than 10% are adopting the framework that encourages and monitors competence, how can we be confident to deliver our vision to instil confidence and trust in people that are not associated with our profession?'

Taylor said social responsibility overrides all the commercial pressures – such as time, cost and resource – that engineers face. 'My social responsibility begins as soon as I pick up a job and it never really ends,' she added.

No one person is responsible for an outcome, but everybody has a responsibility to contribute towards it, said Taylor, who added that delivering to the recognised standards is achieved by undertaking CPD requirements and engaging with the profession. Although she has a responsibility to be on top of her game, the industry has a part to play in being responsible 'by enforcing a mandatory registration process for all practising engineers in the UK, and by adopting a monitoring process that seeks to confirm if people operating under their name are acting responsibly and within their code of conduct'.

She said: 'How do we know if Joe Bloggs, CEng, registered seven years ago, can really still cut the mustard?' CJ



**Gemma Taylor with ASHRAE president Sheila Hayter**



**Hannah Muller-Jones receiving her certificate from Sheila Hayter**



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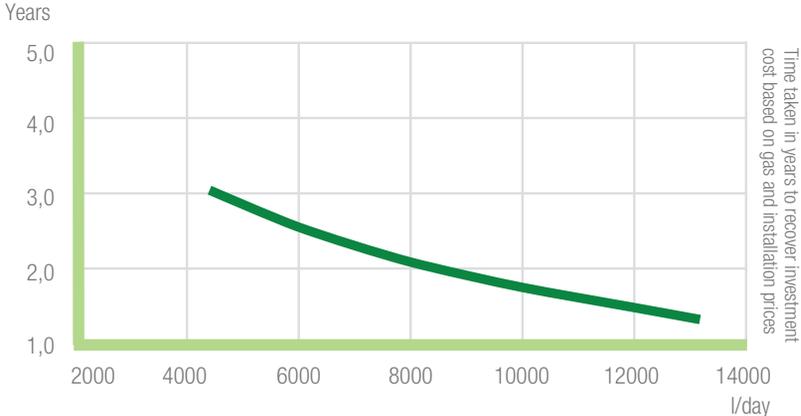
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# Power of good

With just a few weeks to go until Build2Perform Live, we explore what the event has to offer from the industry's energy experts



**E**nergy and the future of heat will be among the key themes at Build2Perform Live, at London's Olympia on 27-28 November. Ant Wilson, director at Aecom, will introduce the energy independence session at 1.45pm on 27 November. He will talk about energy efficiency in buildings and how reducing buildings' reliance on national infrastructure can increase resilience.

Joanna Clarke, building integration manager at Specific, Swansea University, will discuss developing buildings as power stations, as well as onsite generation and storage. Matt Zalewski, associate director at Atkins, will present a case study on Heathrow airport, where local heat sources are employed and waste heat is re-used.

In the energy benchmarking session, at 3.30pm on 27 November, Sung-Min Hong, data analytics lecturer at UCL, will give an introduction to the CIBSE benchmarking tool, and Claire Buckley, environmental sustainability director at Julie's Bicycle, will discuss the use of energy benchmarking in the art sector.

Caroline Cattini, from Historic England, will also present on energy benchmarking in heritage buildings, in the historic buildings session on 28 November (10am-11.30am). She will explain the database being created in conjunction with Cardiff University to enable those responsible for historic buildings to compare energy use.

■ For the full Build2Perform Live programme, and to register for this free event, visit [www.cibse.org/Build2PerformLive](http://www.cibse.org/Build2PerformLive)

## We give a snapshot of what's to come at the energy sessions:

FUTURE OF HEAT  
9.45AM-11AM, 27 NOVEMBER

### The session will cover:

- What does the future of heat look like in the UK?
- How carbon targets are changing
- The issues/limitations with CHP
- Heat pumps v heat networks debate.

DECARBONISING HEAT NETWORKS  
11.30AM-12.45PM, 27 NOVEMBER

### The session will cover:

- How district and community heating will achieve the aims of the London Plan
- What electrical heat maps can tell us about constraints in connecting to the grid
- Ambient heat schemes
- Case study: Elephant & Castle

- The role of CHP in grid support
- How proposed changes to electricity charges impact on forecasting
- The point of inflexion in new-build and retrofit projects when renewable heating systems are best deployed.

## ENERGY INDEPENDENCE

1.45PM-3PM, 27 NOVEMBER

After the recent near miss on gas supply shortage, it is now time for engineers to take a lead in making changes to our building systems, and for designs to create energy independence and future-proof the economy.

### The session will cover:

- Future-proofing our building stock to provide energy independence: designing sustainable buildings, moving away from fossil fuels, while meeting energy targets
- Energy modelling and building design
- Reducing buildings' reliance on national infrastructure to increase resilience
- Building long-term confidence (national grid rates don't go beyond three years)
- Creating/developing buildings as power stations
- Onsite generation and storage
- Case studies of energy-positive buildings
- Heathrow case study: decarbonising the airport's thermal energy infrastructure; reducing local air pollution; site-wide thermal energy sharing; use of local heat sources, and re-using waste heat.

## ENERGY BENCHMARKING

3.30PM-4.30PM, 27 NOVEMBER

### The session will cover:

- CIBSE Energy Benchmarking Tool: introduction to the tool and future plans for energy benchmarking
- Case study: use of energy benchmarking in the art sector
- Requirements of EPBD inspections and building automation.

## HYDROGEN AS A FUEL OF THE FUTURE

2PM-3PM, 28 NOVEMBER

Hydrogen has been earmarked as a pathway to our low carbon future. It can be used to power transport, store energy over long periods and to decarbonise the heating industry when used to replace natural gas. It can also work to complement renewables in the energy mix.

### The session will cover:

- The potential for hydrogen in the UK energy mix
- The economics of energy change
- The building industry's approach to energy
- Case studies, including data on how these systems can perform in practice
- What engineers can do to minimise outdoor pollution, especially NO<sub>2</sub>
- Design considerations for indoor air quality in commercial buildings
- Design considerations for residential buildings, including case studies of MVHR with PM filters and NO<sub>2</sub> filters
- Update on research into the impact of built form on air pollution in the City of London
- Measuring and monitoring indoor air quality; lessons learned from The Total Performance of Low Carbon Buildings in China and the UK project.

"Ant Wilson, of Aecom, will talk about how reducing buildings' reliance on national infrastructure can increase resilience"

# Going up

An elevator that takes passengers into space may sound like the stuff of fiction, but **Dr Bryan E Laubscher's** keynote at the 9th Symposium on Lift and Escalator Technologies reveals that interplanetary travel by lift is rooted in scientific reality

**C**hildren have long been fascinated with the idea of lifts travelling into space: think Willy Wonka's great glass elevator bursting through the roof of his chocolate factory. The characters in Roald Dahl's classic book were launched into orbit after a catastrophic lift failure, but a group of real-life pioneers have long believed in the possibility of interplanetary travel by lift.

The concept of a space elevator has been around since the 19th century, when Russian scientist Konstantin Tsiolkovsky put forward the idea of a tangible connection to outer space. In 1959, fellow Russian Yuri Artsutanov proposed the idea of a towering structure that relied on tensile, rather than compressive, strength. His concept was for a tether to be sent down to Earth from a satellite in geosynchronous orbit. This concept has captured the imagination of scientists and writers ever since.

In 1966, four scientists wrote of a sky-hook in an American science journal, while Jerome Pearson studied the maths behind the theory and, in 1975, proposed an orbital tower. The idea was explored further in Arthur C Clark's 1979 sci-fi novel *The Fountains of Paradise*.

The modern space elevator, as put forward by the International Space Elevator Consortium (ISEC), shares the same fundamental principle as Artsutanov's idea – a thin vertical tether stretched from ground to space – but that is where the similarities end.

For the latest version, a tether is attached to Earth at the equator, stretching up to a counterweight, or apex anchor, far beyond geostationary Earth orbit. The anchor reels in and out, and a thruster control is required to moderate the motion of the tether.

This orbit, over the equator, would have a radius that produces revolutions at a speed that ensures a satellite remains permanently over the same geographical point on Earth. The idea is that elevator cars – known as climbers – ascend and descend the tether at the speed of fast trains. It would take an estimated four to five days to reach geostationary Earth orbit, and a new climber could be introduced on a daily basis.

The main benefit of the elevator is to make space travel more accessible, and to ferry cargo and passengers into space, says ISEC.

Currently, it is not commercially available or affordable, and transit is neither comfortable nor safe.

The elevator has the potential to go beyond delivering payloads to space stations, however. Earth's rotational motion could be exploited to inject payloads into planetary transfer orbits. By changing where the cargo is jettisoned from the tether, different orbits could be achieved. If released after 2,000km, the payload would obtain low Earth orbit. Releasing the cargo after four to five days would achieve geostationary Earth orbit – and further still would achieve what is known as transplanetary injection. This is possible because travel along the tether increases the



» One of the biggest challenges of the space elevator will be suspending tens of thousands of miles of tether ribbon from outer space back down to Earth – and this will require multiple stages.

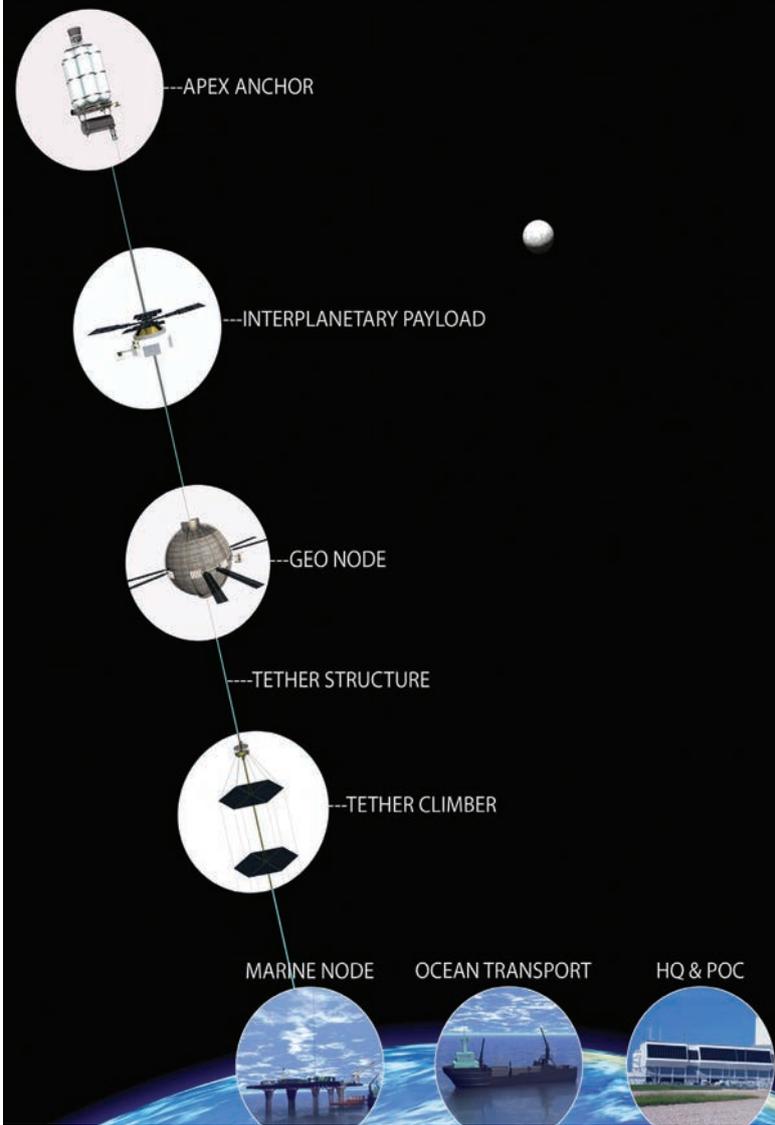
The first is lifting, with rockets, an 80-tonne ‘seed ribbon’ of carbon nanotubes from Earth into low orbit. At this point, the seed ribbon will be assembled into longer ribbon and then boosted, again by rockets, to geosynchronous Earth orbit. Additional ribbon material will be added, extending the tether into outer space and down towards Earth, until the end of the ribbon closest to our planet starts downwards, pulled by gravity. The tether will be captured at the ground station, where it can be anchored.

The tether could be reinforced while it is being lengthened, but it is calculated that a thickness of 7cm could lead to the transfer of 1,000 tons of material per day, which is equivalent to three International Space Stations.

It currently costs about \$20,000 (£15,300) per kilogram sent into space for every payload; the space elevator could slash that to mere dollars.

The ISEC is aiming to deploy a seed tether by 2031, and says single-string testing could be carried out with climbers while the tether is being reinforced. Developments are being carried out by a number of companies, including LiftPort Group, which – in 2006 – stretched carbon ribbon one mile into the sky using balloons, before sending robots to ascend the tether.

The area around the Earth port, node and tether itself will be closely monitored and protected. It will extend from the ocean floor to space and – or the geostationary Earth orbit and apex node – the protected region encompasses any volume swept out by the tether as the Earth rotates.



A potential limitation of the venture is that the tether must remain over the equator, so loading of cargo and people would, potentially, have to take place at an Earth port on the equator. However, it is possible to have two or more tethers that are reflected either side of the mirror line equator, meaning ports could be sited in populous cities in the southern and northern hemispheres.

Whether it is used for transporting tourists into space, generating solar power or delivering mining equipment to the moon, the space elevator could be the main mode of transport for tomorrow’s cosmic pioneers. **CJ**

■ **DR BRYAN E LAUBSCHER** is the founder of Odysseus Technologies, a company with the goal of developing high-strength nanotube materials

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# SoPHE'S CHOICE

Jonathan Gaunt represents the growing number of public health engineers taking prime roles in CIBSE and the industry at large. The chair of the Society of Public Health Engineers tells **Alex Smith** about his vision for the sector and explains why he is keen for graduates to get experience on site

**J**onathan Gaunt is clear about the mission of the Society of Public Health Engineers (SoPHE). 'We want to rekindle the art of public health engineering,' says Gaunt, who became the society's chair in June, and who believes it is the right time to promote the discipline and encourage more people into the sector. He says the drive for sustainable buildings is creating demand for people with the skills to deliver well-designed water and waste systems – key elements in resource-efficient buildings.

'With more emphasis on sustainable systems, such as solar thermal panels, storm water attenuation systems, and rainwater harvesting, PHE is becoming broader in scope and more attractive as a career,' says Gaunt, who cites the strength of SoPHE's young engineers group as evidence of the sector's growing popularity and status.

His own position as an associate director

of Cundall – and, currently, project manager on a large East London development – backs up his assertion that PH engineers are growing in influence and have the multidisciplinary skills to take them to the top of the building services profession. Gaunt isn't the only one in a key industry position: CIBSE President-elect Professor Lynne Jack, Paul Angus CIBSE ANZ regional chair, and Reid Donovan, chair of the CIBSE UAE Region, all have a strong PH background.

The current issue of overheating in London apartments is a prime example of why PHE is becoming more valued in services design, Gaunt says. Overheating in homes can be potentially lethal for occupants if it leads to high temperatures in cold-water pipes, which can result in the growth of legionella bacteria.

Water authorities can legally supply water into homes up to 25°C, but it must not be stored at more than 20°C within the building and, at the point of delivery, it must get below 20°C within two minutes, to deal with local heat gain. PH engineers use passive and active measures to ensure these limits are not exceeded, such as separating cold and hot water networks, with increasing consideration of chilling the water mechanically, says Gaunt. To ensure the dangers are averted, PHE must be involved in the early stages of design, he adds.

Gaunt is determined to champion the role of PH engineers during his time as chair of SoPHE. 'PHE has been a poor cousin in building

## “PHE’s been a poor cousin in building services – I want to raise its profile”

To this end SoPHE developed a memorandum of understanding with a view to opening discussions with the likes of CIPHE, Institute of Healthcare Engineering and Estate Management (IHEEM), the Water Management Society, and the American Society of Plumbing Engineers.

Gaunt is pleased with the work SoPHE has done to strengthen links with contractors, and says the society has launched a contractors working group. The evolution of this group is an example of his willingness to improve collaboration between industry groups.

Gaunt was working for Arup on the Shard when he met Modasia, who was the M&E contractor for DG Robson at the time. ‘Through Sanjay, I started organising site placements for our graduates, as it gave them exposure to good practice on site,’ he says. ‘I asked if he would like to be involved with SoPHE and encourage more contractors to join.’

Modasia took up the challenge, and there



Jonathan Gaunt took over as SoPHE chair from Steve Vaughan in June

services, and I want to raise its profile,’ he says. Gaunt intends to focus on improving education in the sector and attracting more young people. He wants to continue the work of former SoPHE chair Steve Vaughan, who helped create the Plumbing Centre of Excellence, in Havering, alongside Sanjay Modasia, senior construction manager at JA Brooks Mechanical Service. The centre, which opened in September, is geared towards providing an enhancement to the current Plumbing NVQ level 1, 2 and 3 syllabus and practical engineering skills, and is a joint-venture between SoPHE and the Chartered Institute of Plumbing and Heating Engineering (CIPHE).

SoPHE manufacturers will provide materials and put together a CPD course to support the college, while contractor members will offer three-month work placements to students. ‘It’s been spearheaded by contractors and consultants, with the support of manufacturers,’ says Gaunt. ‘We want to collaborate with like-minded organisations, and pool our knowledge, rather than head-butting each other.’

are now seven contractor members working alongside manufacturers and designers at SoPHE. ‘Enough to form a contractor working group,’ says Gaunt.

Modasia was instrumental in creating the Plumbing Centre of Excellence, and Gaunt hopes Havering will be a template for other centres in the UK. ‘The contractors provide the full circle of expertise. We had designers and manufacturers, and now we have contractors who are taking our designs and fitting the manufacturers’ products,’ he says.

‘This will enable us to give good feedback, so consultants can understand why designs might lack buildability, and contractors can tell manufacturers what hasn’t worked well.’

»



Jonathan Gaunt with colleagues at Cundall's London office

» Contractors have also pledged to offer site visits to young engineers groups. Gaunt is keen for graduates to learn from site operatives and vice versa. 'Traditionally, PH engineers came from the tools [trades], but now they're more likely to come from university. Our challenge is to retain the skills experience from onsite workers and share their knowledge with graduates,' he says.

As part of this, a SoPHE young engineers event in February will look at good practice on site with a contractor – and Gaunt is keen to develop this network. 'We want young people to liaise with each other – at social as well as technical events – so they can ask those technical questions that might be awkward to ask in the office.' He is also keen for PH engineers working in small teams to feel supported by their peers elsewhere. 'If you're the sole graduate PH engineer, it's pretty difficult to bounce ideas off your colleagues.'

Other SoPHE initiatives for young engineers will be launched soon, including the Chris Sneath Bursary and the Dr Steve Ingle Award. The bursary, run in conjunction with Havering College, will award money towards a CIBSE training course, while the award is for

students in the North West. The SoPHE Young Engineers Award also continues to highlight the skills of PH engineers; this year's challenge is to design a refillable cartridge for a filtration system, in conjunction with Engineers Without Borders UK and Caminos de Agua.

Gaunt is also keen to work closely with CIBSE and external bodies; the Society of Digital Engineering is to present to SoPHE, which is also looking to develop design and modelling tools with the society.

'Young engineers are really keen on working with the automation side of calculations. We want to develop their IT skills.' It would seem public health engineering is in rude health and safe hands. **CJ**

### ROUTE TO THE TOP

Jonathan Gaunt initially considered going into the automotive industry and completed a summer placement at a car manufacturer. But, while it seemed glamorous, he soon realised 'you could spend your whole career designing clutch pedals'.

So he completed an environmental engineering foundation course at the University of Nottingham before enrolling for a mechanical engineering degree. After a year, he transferred onto an environmental engineering course, which was more geography and hydrology-based. 'I'd studied geography at A level and really enjoyed it.'

Having been impressed by an open day at Arup during his A levels, Gaunt attended an interview in the company's sustainable engineering department after he graduated in 2000. He didn't get the role, but he was offered a position in the public health team. The rest is history.

Gaunt rose to associate at Arup and, in February 2016, joined Cundall to head up the PH team. In June 2018, he became SoPHE chair.

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A Hoare Lea plant room showing pumps with a higher level of detail than normally required

# OBJECT LESSONS

Ahead of the launch of a new competency scheme for manufacturers creating product data, CIBSE and the Society of Digital Engineering hosted a workshop that shone a light on the issues around creating product objects for BIM. **Alex Smith** reports

**M**anufacturers' BIM objects are being rejected for use in BIM models because of confusion over standards, according to speakers and delegates at an event organised by CIBSE's Society of Digital Engineering. The BIM and Manufacturing workshop revealed a large discrepancy between BIM objects created by suppliers and the data and information required by designers and contractors.

The attendees concluded that a lack of common data standards was leading to confusion over what product information was required. They said that CIBSE's product data templates (PDTs) should be promoted and adopted across industry to create a common protocol for storing and exchanging data in BIM. PDTs, hosted on BIMhawk, contain essential information about a manufacturer's product.

The workshop allowed more than 30 manufacturers to share their experiences of BIM, and to put questions regarding the suitability of the objects they create for project

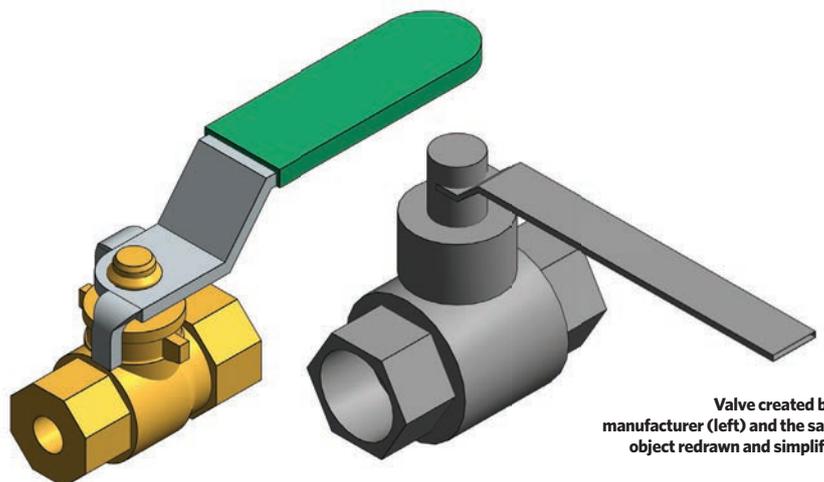
models. CIBSE consultant Carl Collins opened the session by outlining what he thought were the main issues for manufacturers creating BIM objects. These included cost, inconsistent requirements and the fear of losing intellectual property when sharing product data.

He said manufacturers often felt bullied into creating BIM objects at their own expense and saw no obvious return on the substantial investment required. 'It feels like anarchy out there. Manufacturers are afraid that if they don't do a BIM model they won't get specified,' says Collins, who added that there was a gulf between what manufacturers supplied and the strategies of consultants and contractors. 'Contractors often ignore the models created by consultants and start from scratch. There needs to be more joined-up thinking.

'What the government wants is for the model to evolve during the project, but this progression isn't happening. The consultant wants Y and the contractor says Z. It's not BIM.'

The workshop featured presentations, by two contractors and a consultant, that offered manufacturers the opportunity to learn how object data was integrated into large BIM project models.

Joseph Lally, digital engineering systems leader at Crown House, said that manufacturers' BIM objects were often too big to be used in the project BIM model. He showed the audience complex models of valves, diffusers and boilers created by manufacturers, and compared



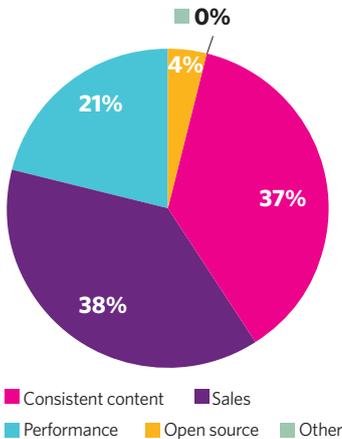
Valve created by a manufacturer (left) and the same object redrawn and simplified

**BIM SURVEY**

**Carl Collins looks at the issues and opportunities of BIM according to a survey of delegates**

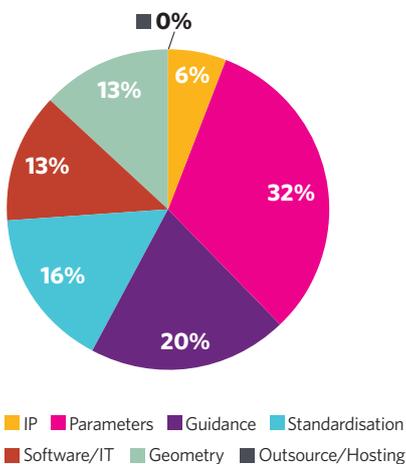
The survey revealed that perceived issues outweighed the opportunities by nearly three to one. This suggests manufacturers need assistance on using BIM, and recipients need educating on using models and data.

**Opportunities**



With consistent content requirements, the process of creating objects for manufacturers would be easier and cheaper. Delegates clearly believe that BIM could be a powerful marketing tool, with increased sales the biggest opportunity.

**Threats**



The biggest issues among delegates were a lack of standardised parameters and the absence of guidance on how to engage with the BIM process in a lean and meaningful way. Close behind were the lack of standardisation, and issues with software usage and compatibility.

Delegates were keen for guidance, want more work on PDTs, and the verification of manufacturer content.

» them with the simple objects that Crown House used in its models. A typical project model might contain 50,000 elements, so object file sizes had to be as small as possible, he said, otherwise the performance would be undermined. ‘We want sophisticated simplicity. What manufacturers do is too detailed. We don’t need visualisations; we’re not graphic designers – we’re engineers.’

Lally said accurate geometry, and the exact location and size of interfaces (such as pipe/duct connections) were of prime importance, along with correct categorisation and naming of connections – for example, flow, return, heating and so on. ‘The PDTs could be referenced externally, which would make the models less resource hungry,’ he added.

**Common data environment**

Dwight Wilson, digital engineering manager at Imtech Engineering Services, lamented the lack of a common data environment and urged BIM libraries to adopt PDTs to achieve a ‘single source of truth.’ He said centralised BIM stores were currently not aligned with PDTs and did not share data standards. This, in effect, meant contractors had to build their models from scratch.

Hoare Lea BIM delivery leader Ben Roberts called for PDT adoption and asked that manufacturers focus more on giving consistent data rather than geometry. Lally, meanwhile, pointed out the danger of not checking models before downloading them. ‘Critical dimensions have to be perfect,’ he said. ‘We used a valve from a manufacturer’s website and the thickness was incorrect. We only found out when we installed it in the factory.’

Delegates were invited to share their experience of BIM (see charts). Some complained that their BIM objects were being downloaded but not specified, while others said the files were too big and a lot of the information was never used. There was a feeling that there was a lack of awareness around PDTs, and delegates asked for more to be published as soon as possible. Others complained of changes in design and the dropping of products and BIM objects through value engineering. A lack of model control was cited as a problem, as was a lack of consistent feedback to manufacturers. There was some optimism that the use of BIM could lead to commercial advantage: 38% thought it could result in an increase in sales, while 37% thought there was an opportunity to produce more consistent content. Delegates also outlined what steps should be taken to improve BIM: guidance, more work on PDTs and the verification of manufacturer content were all high on the list.

CIBSE and the Society of Digital Engineering will be taking findings from the workshop to the Digital Steering Group to create workstreams on improving the flow of information between suppliers and the BIM model. Email [SDE@cibse.org](mailto:SDE@cibse.org) if you would like to be involved.

**CERTIFICATE OF COMPETENCY**

CIBSE and the Society of Digital Engineering is launching a new competency scheme this Autumn to reward manufacturers who show effective delivery of product data.

The scheme will assess the online and website delivery of their product data, and ask manufacturers the following about their product:

- Are the necessary performance and systemic requirements available, including basic dimensions and data?
- Is it readily available and accessible?
- Is it readily transportable to users’ PCs?
- Does it have a detrimental impact on users’ hardware or software, delaying processing?

BIM objects, when available, will also be assessed.

Manufacturers successfully completing the assessment will receive a certificate, as well as a logo that can be used to demonstrate that they meet the requirements for effective data delivery.

The scheme is aimed at building services manufacturers and suppliers who wish to demonstrate to engineers and specifiers that their product data is fit for purpose – and that they can go to their website confident they will be able to access and transport the data they require.

To check competency, a cross-section of a manufacturer’s product range will be assessed to show that the data is available and transportable to the end user, whether they are a designer, installer or facility manager.

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# MODEL BEHAVIOUR

IBPSA's Building Simulation and Optimization conference had a fundamental focus on modelling tools. IBPSA-England chair **Dr Ruchi Choudhary** reports on the event

**M**ore than 120 delegates gathered in Cambridge for the fourth Building Simulation and Optimization conference, organised by the International Building Performance Simulation Association (IBPSA) England.

A fundamental focus of the event was modelling tools, especially those that relate to using new forms of data – including geographic information system data – BIM and occupant behaviour monitoring.

Investigations into sensitivity analysis, calibration and multi-objective optimisation methods, and developments in human-centric modelling were presented.

Understanding and creating potential models of occupant behaviour was also covered, with new qualitative and quantitative data presented relating to occupant energy use behaviours. The tendency for occupants to interact with their environment to maintain thermal comfort, by manually overriding heating setpoints and opening windows – in residential and non-domestic buildings – was another topic on the programme.

Methodologies for simulation of occupant behaviour were explored, ranging from the investigation into the impact of different patterns of occupancy and energy use on simulated performance, to development of a probabilistic dynamic co-simulation model of human-building interaction.

The sensitivity of models to input data was looked at in several papers, highlighting the need for users to supply building-specific information to reduce discrepancies between calculated and observed performance.

Dealing with large quantities of data is not always straightforward, however, and several papers explored methodologies for using it more effectively, including: automatic building geometry creation from point clouds; interaction with building information models; and stochastic data-centric modelling of end-use building energy demands.

The impact of external factors on human comfort – including appraisal of the new CIBSE TM59 methodology for overheating risk – was also discussed. A parametric study performed by Simona Vasinton and colleagues, from Max Fordham – aimed at producing guidelines for the early design

stage – demonstrated the difficulty in designing residential homes to avoid overheating, as defined by TM59, particularly for future weather scenarios. The study also highlighted the need to integrate mitigation strategies to achieve a pass.

Another study, presented by Giorgos Petrou, PhD student at UCL Institute of Environmental Design and Engineering, showed how the choice of models for heat transfer and numerical solution – even within a single simulation tool – could affect the overheating assessment. Predicted overheating risk in 33% of the cases considered for one tool changed from high to low with only a change in the selected calculation algorithms.

The impact of changing models varies for different tools, whereas selecting the default options in one tool leads to a maximum overheating risk. For a different tool, selection of the default options resulted in a minimum overheating risk.

Practical measures for combating overheating were also considered. *Prediction of internal temperatures during hot summer conditions with time series forecasting models* was presented by Matej Gustin, a PhD student at Loughborough University, who won the award for best

**“The sensitivity of models to input data was looked at in several papers, highlighting the need for users to supply building-specific information to reduce discrepancies between calculated and observed performance”**



**Dr Penny Carey, of Portakabin, was a keynote speaker**



student paper. His work showcased a predictive tool for short-term forecasting of internal temperatures, potentially as part of an overheating warning system.

Another aspect of human comfort is access to daylight within buildings. Papers on this topic included studies into simulation of visual discomfort and an exploration of the impact of circadian lighting on the health of the elderly occupants of a residential home. J Alstan Jakubiec, of Singapore University of Technology and Design – who won the

award for best paper – presented a post-occupancy study of 10 daylight buildings in Singapore, where climate-based daylighting metrics were compared with occupants’ long-term subjective impressions. In *Towards Subjectivity in Annual Climate-based Daylight Metrics*, the authors found that simulated mean horizontal illuminance correlated strongly with occupants’ satisfaction with access to daylight, and that satisfaction begins at much lower daylight levels than current lighting sufficiency standards (see Figure 1).

Simulation of operation and control of novel energy systems, at scales from individual component to district supply, were also explored. Topics included: the use of optimisation for retrofitting; mitigating risk in district-level energy investment decisions; design of a shape memory alloy shading system; and development of specific models for renewable energy systems, including photovoltaics, ground source heat pumps and phase-change materials.

Real-world constraints were highlighted in studies ranging from optimisation of thermal comfort in low-income residential homes in Mumbai, India, to design of a multi-objective shading-control strategy for a market hall in Valladolid, Spain.

The programme of technical papers was supplemented by three keynote presentations. Professor Ryoza Ooka, of the University of Tokyo, described the application of optimisation techniques to environmental design, energy systems operation and building shape design, with examples including the optimisation of urban planting for thermal comfort.

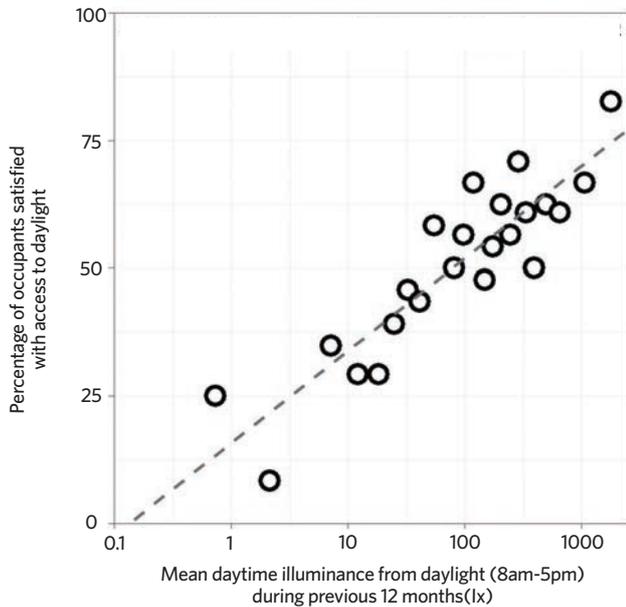
Dr Penny Carey, of Portakabin, challenged the audience to consider the obstacles facing the construction industry within Europe. She highlighted the increasing demand for higher performance and lower emissions, driven by widespread adoption of near and beyond Passivhaus standards, and emphasised the skills shortage – particularly in building physics – that the industry is facing.

Professor Joe Clarke, of the University of Strathclyde, closed the conference with a call for standardisation of approach in simulation using high-integrity models – which are complete, unambiguous, statistically deterministic and verifiable – and a more self-critical approach across the simulation community. He stressed the need for resilience testing and outlined a vision of randomised automatic simulation tests packaged with all simulation tools.

The 16th IBPSA International Conference will be held in Rome, Italy, from 2-4 September 2019. [C](#)

■ Conference proceedings will be available at [www.ibpsa.org](http://www.ibpsa.org) For more information on IBPSA-England, visit [www.ibpsa-England.org](http://www.ibpsa-England.org)

■ **DR RUCHI CHOUDHARY** is reader in architectural engineering at the University of Cambridge engineering department, and the current chair of IBPSA-England’s board



**Figure 1: Correlation between mean simulated horizontal daylight illuminance and the percentage of occupants satisfied with access to daylight**



### ABOUT IBPSA

IBPSA is a non-profit society of building-performance simulation researchers and practitioners, which aims to advance the science of simulation and modelling for the benefit of the built environment. It offers a forum to review developments in building modelling, partly through the biennial international conference – last held in San Francisco in 2017. IBPSA has more than 32 regional affiliates, including IBPSA-England, which was founded in 2006 and now has more than 500 members.

Run by 13 board members, elected by the membership, the society hosts up to three annual events for both academia and industry. Held on alternate years to the IBPSA international conference, the IBPSA-England Building Simulation and Optimization (BSO) conference is a platform to discuss current developments in building performance simulation.

The fourth BSO conference was held at the University of Cambridge in September, and was attended by 127 delegates from 23 countries. More than 90 technical papers and posters were presented over two days.

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## Government backs heat networks with £320m fund



### Heat networks could meet up to 17% of heat demand for homes

A £320m heat networks investment project (HNIP) will accelerate the adoption of low carbon heating systems, the government has claimed.

The funding was agreed in April, but the programme was officially launched last month and will operate until 2021. It will offer grants and loans to public- and private-sector projects, including local authority ones, with a heat network supplying two or more buildings.

The Department for Business, Energy and Industrial Strategy (BEIS), which manages the fund, says consumers could enjoy 30% reductions in their energy bills

by switching from an individual gas boiler to a heat-network supply.

It also said heat networks could meet up to 17% of the national heat demand for homes – and almost 24% of the demand from industrial and public sector buildings – by 2050.

‘The UK has led in the decarbonisation of electricity, and [this scheme] shows we are just as committed to tackling heat,’ said Energy Minister Claire Perry. ‘[The HNIP] creates a route to market for innovative energy projects across the country and demonstrates a key objective of the Clean Growth Strategy – to help deliver technologies that can lower bills, cut carbon and improve the quality of life for communities across the country.’

**Money is available for projects with a heat network supplying two or more buildings**

## HIU testing now available in UK

BSRIA and Enertek International have been approved as the first UK-based organisations that can test to the country’s new technical standard for heat interface units (HIUs).

Previously, only the Research Institutes of Sweden could test in support of the standard, which is managed by the Building Engineering Services Association (BESA) and was launched last year.

The performance of HIUs is seen as crucial to the effectiveness of district heating systems and developers have been calling for more data with which to compare the available products.

The standard was developed from a heat network efficiency research project supported by the Department for Business, Energy and Industrial Strategy. It is modelled on Swedish methodology, which was adapted to suit typical UK operating conditions. The test calculates the annual volume weighted return temperature from the HIU and gives evidence of compliance with other performance and reliability metrics, such as domestic hot-water response time.

The HIU standard steering group said the availability of a national standard had led to an increased level of research and development in the UK.

‘One of the standard’s great strengths is that it has been developed by users, for users,’ said steering group chair Gareth Jones. ‘It gives users a clear basis on which to evaluate HIU performance. Ultimately, this will help improve the health of the heat network industry as a whole.’

## LG launches air-to-water heat pump range

LG announced the launch of its R32 air-to-water heat pump during an event at Wembley Stadium last month.

Operating on the low global warming potential R32 refrigerant, the Therma V R32 Monobloc range (pictured below) is available in 5-16kW and 12-16kW capacities, and can supply cooling in the summer. The unit contains a plate heat exchanger, expansion tank, water pump and a scroll compressor designed with ‘wet vapour’ injection. This controls the high discharge temperature of the compressor, bringing it down from 160°C to below 110°C, resulting in an expanded heating operation range.

The manufacturer claims it can achieve 100% performance at -7°C, and has a sound power level 5-6dB lower than previous models.

LG also announced the imminent release of its metering and monitoring service package, developed with Regin, for servicing and diagnostic procedures for installers. It will run alongside the Renewable Heat Incentive (RHI) scheme, with an immediate incentive of £805. A further £115 a year will be payable alongside the remaining RHI or up to seven years of a heat pump’s installation.

Andrew Hooper, LG’s UK and Ireland air conditioning and energy solutions heating manager, said: ‘Only 16,000 air source heat pumps were installed in the UK in the past year, compared with more than one million in Germany. We will see the global air source heat pump market swell to around £90bn by 2020 and, in the UK, we will see exponential growth of renewable systems over the next 10 years, whatever happens with Brexit.’



# Air conditioning market is 'unpredictable'



## Brexit having negative impact on the UK commercial office business

Analysts have described this year's global air conditioning market as 'unpredictable'. Unusually high summer temperatures in Europe and an 'exceptional' rainy season in Southeast Asia – plus economic uncertainty caused by US-led trade wars – have made it hard to monitor trends, according to BSRIA's senior market research consultant Saziye Dickson.

The market for small residential systems had growth ranging from 10-25% in the five key European markets – the UK, France, Italy, Russia and Spain – fuelled by the long period of hot weather. Demand across much of Europe was high, but eastern parts of the continent were hit by rainy weather – and the market in Turkey also dipped because

of the weather and a rapidly falling lira. 'This growth was mirrored in larger commercial split systems,' said Dickson. 'In addition to [equipment] replacement [in the] heatwave, refurbishment activity in new-build [projects] and the launch of new refrigerants were all factors.'

Chiller sales have risen on the back of an improving construction market, but Brexit is having a negative impact on the UK commercial office business. The variable refrigerant flow market is expected to grow this year – apart from in Russia and the UK – and problems in the retail market have hit rooftop sales in key European markets, according to BSRIA.

'The Eco-design directive is pushing demand towards inverter screw and scroll compressors [so] the total value of the market will hold up better than volume,' added Dickson.

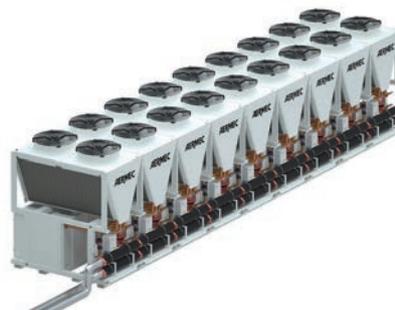
## Up to nine modules make up Aermec's new chiller

Aermec has launched its range of modular air/water chillers. Comprising independent 108kW modules, the NRV chiller enables up to nine units to be connected to each other, producing a total of 970kW.

Both the standard and 'silenced' models supply up to 46°C of outdoor air temperature at full load, according to the manufacturer.

A free-cooling version is also available and suitable for applications where the chilled water requirement is significant, even during the winter months. The greater the difference between the outside air and the requested water temperature, the greater the economical benefits of using free cooling.

The unit comprises scroll compressors, axial fans, aluminium micro-channel coils – which use less refrigerant compared to traditional copper/aluminium coils – and a plate exchanger on the system side. The option of connecting additional modules and managing them as a single unit allows for maximum return at full load, the firm claims.



## IN BRIEF

### Johnson Controls offers low-GWP chiller

Johnson Controls has introduced the York YLAA scroll chiller, available with R-454B refrigerant from 190-530kW cooling capacity.

R-454B is the lowest global warming potential (GWP) replacement for R-410A, with a GWP of 476 – 75% lower than R-410A. It gives similar properties and operating performance without major modifications to equipment design, said Christian Rudio, director of portfolio management Europe, at Johnson Controls.

R-454B also has the lower flammability and low toxicity ASHRAE classification of A2L, and a lower-burning velocity compared to R-32.

Brazed evaporators and microchannel condensers enable efficient heat transfer, providing lower life-cycle costs, the manufacturer claimed.



### Quiet air-source heat pumps from Viessmann

Viessmann has launched two air-source heat pumps with innovative noise-reduction technology.

With outputs of 2.3 to 11.8kW – and a reversible circuit within a single unit to switch between heating and cooling – the Vitocal 200-A and 222-A use a sound-optimised fan that harmonises the acoustic frequency range, with speed control to reduce airborne noise.

This stifles the lower frequency sound, so the pumps are barely audible – noise pressure in night mode at a distance of 3m is 35 dB(A).

Maximum flow temperature is up to 60°C when the temperature outdoors is -10°C, according to the firm.

The air-to-water heat pumps are eligible for the government's Renewable Heat Incentive, so users can claim back money with use, currently at a tariff of 10.49p per kWh.

Refrigeration leak testing is not required because the cooling circuit is hermetically sealed, and no F-Gas certificate is needed because the connecting pipes to the outdoor unit are filled with water.

## VITODENS 200-W

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All Vitodens 200-W boilers now have the option of an extended warranty to 10 years.

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### How to extend the warranty

Trained Installers must register models up to 60 kW on the Viessmann Installer Portal and purchase the extended warranty.

For 80 to 150 kW models you will need to complete a warranty claim form. Claim forms are available from your Area Business Manager.

# JUDICIAL RENEW

Fifty-year-old boilers at the Old Bailey are being replaced under the watchful eye of Lady Justice, in a major 10-year refurbishment. **Andy Pearson** speaks to the project team about the challenge of replacing heating and cooling without interrupting proceedings in 18 law courts

**F**rancis Capes, regional operations manager at Interserve Engineering Services, is walking down a long, dingy corridor in the basement of London's Old Bailey. He walks past a row of dusty, drab, empty prison cells, at the end of which is a small, gloomy cell in which the only means of illumination is a tiny, dirty window set high in the brick external wall, above a sturdy door.

'This is the condemned man's cell; it is unusual because it has two doors – one from the corridor, through which you enter; the other to the outside, through which you leave to go to the gallows,' says Capes, as he steps out into a small, sunken corridor.

'This is Dead Man's Walk,' he says, gesturing at a series of arches that span the passage along which condemned prisoners must pass on their way to the scaffold. The openings in the arches get progressively more narrow. 'They're built to make the point that the condemned person is only going one way, never to return; it's a cruel piece of architecture,' Capes says.

So begins the tour of the firm's project to replace the central building services plant – the boilers, chillers and air handling units (AHUs) – in what is probably the most famous criminal court in the world.

It is heading the consortium, procured under a TPC 2010 Partnering Contract, to undertake the replacement project. The team includes lead designers Aecom, project managers WSP, architect HOK and cost consultant Gleeds.

The original court building, which is owned and managed by the City of London Corporation, was erected in 1907. Parts of it were rebuilt after bomb damage in World War II, then – in the late 1950s – the facility was

## PROJECT TEAM

**Lead designer:**  
Aecom  
**Project manager:**  
WSP  
**Architect:** HOK  
**Cost consultant:**  
Gleeds



A 3.7m-high, gold-leaf statue of Lady Justice looks down from the domed roof of the Old Bailey building

**"The court building was erected in 1907 and substantially extended in the 1950s. Most of the building services plant dates from around this time"**

substantially extended and remodelled. Most of the building services plant dates from around this time.

Standing in Dead Man's Walk, Capes points out two new heating mains running the length of the passage, which were installed under the project. He also gestures towards three new, black-coloured boiler flues that rise up from a new basement boiler house to the building's roof, six storeys up. 'These were installed under Phase 1 of the project,' he says. 'Even though they are not visible from the street, we still had to have the planners' approval for them – which is why they've been painted black,' he says.

The £38m refurbishment/replacement project is split into five phases, which will be completed sequentially over a period of 10 years. Work has to be phased to avoid disruption to the criminal justice system. 'A decision was made at the outset that only two of the six courts in the 1907 building could be out of use at any one time in phase 2, and one of the 13 courts in the 1960s building at any one time going forward. It is these closures that dictate the duration of the programme,' explains Richard Morgan, associate director, building engineering, at Aecom, and Capes' wingman on the tour.



## £38m

The cost of the refurbishment/replacement project, which is split into five phases. These will be completed sequentially over a period of 10 years



The existing oil-fired steam boilers in the plantroom

Interserve has been on site since January 2015. With Phases 1 and 2 successfully completed, it has just started work on Phase 3, in which the existing plant serving courts 5, 6, 13 and 14 will be replaced with six new AHUs during a 12-month programme.

Before taking in the Phase 3 works, Capes' tour continues with the works completed under Phases 1 and 2. From Dead Man's Walk,

he re-enters the building to descend to the sub-basement. Here, in Phase 1 of the project, the firm created a new gas-fired boiler room in a space that – in 1908 – housed the building's coal-fired boilers.

'It was filthy in here,' says Capes. 'We took out what remained of the old coal boiler room and put in a louvre to create a new boiler room.'

Adjacent is a newly created pump room, reclaimed from a 'dirty, horrible and smelly' disused oil-tank room.

All of the noisy work in converting the boiler house and pump room had to be done out of hours. 'We're allowed to do noisy work before 9am, at lunchtime (between 1-2pm), and then after 5pm,' says Capes. 'Sometimes we have to work weekends and, sometimes, we work through the night.'

The gas-fired Remeha boilers and pumps enable the new heating system to run concurrently with the existing oil-fired steam boilers, which are housed in a separate plantroom tucked beneath the 1960s extension. The heating mains visible in Dead Man's Walk connect the new boilers to the existing boiler room.

Two independent heating systems allow the phased switch over of heating as the project progresses, which avoids any disruption to the criminal trials. 'It is important that there should not be any loss of service to any court, so we've designed all of the new systems to be connected to the old ones by using the "hot tap" procedure,' explains Morgan.

Seven boilers will eventually be installed in the boiler room. To accommodate them in the reclaimed space, Interserve has installed an open-mesh mezzanine floor. Two boilers are currently installed on the mezzanine level, with another two on the lower level. Two more will be installed under Phase 3.

The boilers are not a like-for-like replacement in terms of duty. According to Morgan, the current Netherton oil-fired steam boilers can produce up to 14MW of heat; however, the boilers have been sized to provide 7MW. 'To meet the calculated heat load with 1.5MW of heat to spare, 5.5MW is needed,' he says.

'The City of London Corporation was keen to improve the efficiency and reliability of the heating service, to increase comfort within >>

## THE FIVE PHASES OF REFURBISHMENT

### Phase 1 - Infrastructure and heating

- Create new boiler room in original 1907 boiler room by reinstating louvre openings in the façade to enable access for plant
- Remove oil storage tanks from adjacent room to enlarge plantroom
- Fit new mezzanine platform in the 6m-high space to increase floor area
- Install gas main to the site
- Install the first three of seven Remeha boilers
- Install new HWS calorifiers
- Install pumps to serve new circuits
- Install new LV switchgear
- Install new motor control centre in boiler room

### Phase 2 - Courts 2 and 18 (AHU 4); courts 3 and 4 (AHU 5) and courts 1 and 17 (AHU 6)

- Install the fourth boiler
- Install new humidifier water-treatment plant
- Install new heating and chilled-water mains to plantroom
- With courts 2 and 18 out of use, remove old air handling unit (AHU 04) and replace with new
- Clean existing ductwork
- Connect new AHU to existing ductwork and new heating and chilled water mains
- Undertake a similar procedure for courts 3 and 4, followed by 1 and 7
- Remove and replace AHUs 7 and 8 serving the general circulation areas, and clean ductwork
- Remove and replace AHU 9, serving the prisoner areas and clean ductwork

### Phase 3 - South wing basement, courts 5 and 13, and courts 6 and 14, with court 5 out of use

- Install temporary duct between concourse supply and court 13
- Remove and replace AHU and connect to new heating and chilled water mains
- Clean ductwork to court 5 and connect to new AHU
- With court 13 out of use, clean ductwork and connect to new AHU
- Undertake a similar procedure for courts 6 and 14

### Phase 4 - South wing 6th floor, courts 7 and 15, and courts 9 and 10, and south wing 6th floor, courts 8 and 16, 11 and 12

- Strip out six AHUs, extract fans and associated pipework, and replace
- Install the last two boilers

### Phase 5 - Chillers and cooling towers

- Strip out and replace, in a sequenced manner, chillers and cooling towers



New sub-basement boiler plant

» the building and lower running costs,' continues Morgan. The boilers were selected for their compact size and high operational efficiencies, and because they can be easily broken down into sections small enough to be manhandled from a lightwell, through a newly created opening for a louvre and into position in the plantroom.

'We only have one site entrance, which we share with vehicles bringing prisoners in and out of the building. All plant and equipment had to be small enough to be brought in through this entrance, but the maximum size of boilers was defined by the size of the opening to plantroom,' says Capes.

The boilers are hydraulically separated from the existing heating systems using plate heat exchangers. The existing system is based on two primary circuits – a low-temperature circuit (65°C-45°C) serving the AHU heat batteries and a high-temperature circuit (81°C-72°C), which originally served the radiators and calorifiers, but now serves only the radiators. Domestic hot water is now supplied from newly installed, gas-fired hot-water generators. The high-temperature circuit has had to be retained, however, to provide heat to the existing radiators, which are sized to be fed by the steam system.

The firm is also progressively installing a new building management system (BMS). 'We add to it as we progress through the various phases,' says Capes. Only the electrics powering the new plant, and lighting and power in the respective plantrooms, are being replaced. 'We don't touch any other electrics,'



Ageing equipment in the East Wing plantroom



New pumps in the East Wing plantroom

## "The boilers can be easily broken down into sections small enough to be manhandled through a newly created opening for a louvre"

he adds. There is also new LV switchgear installed in the existing LV switchroom.

'We need a lot more pumping energy [even through overall energy use will decrease], so we've had to increase the size of the electrical incomer,' Morgan explains. New low-temperature hot water (LTHW) pumps are needed because the old steam heating system generated sufficient pressure to push heat around the building, whereas the water system has to be pumped. A gas main was also needed to serve the new boilers. 'We brought the main in from Newgate Street,' says Capes. 'It was a hell of a challenge getting it to the site.'

With the heating and hot water plant replacement taken care of in Phase 1, Capes' next tour stop is the sub-basement AHU plantroom – serving courts 1, 2, 3, 4, 17 and 18 – to see part of the Phase 2 works.

'The place was awful originally; it was dingy, hot and clammy, because all the existing steam valves were leaking,' he says. Now the steam system has been removed and new AHUs installed.

'Originally, courts 2 and 18 were served by a single air handling unit; now, each court has a dedicated unit, so each can be shut down,' says Capes, standing next to the two shiny new units. These connect to the existing ductwork, which had to be cleaned internally overnight to avoid disrupting trials. The junction between old and new is clearly visible at the point where the duct leaves the plantroom. The AHUs have new chilled and LTHW connections. They also have a new humidification system, which was needed because the steam humidifiers were stripped out along with the steam heating. The humidifiers are supplied with water from a new reverse-osmosis water-treatment plant.

In addition to the single AHU serving courts 2 and 18, the single units serving courts 3 and 4, and courts 1 and 17 have been replaced by twin units in this phase of the project. The old plant had to be removed through the boiler house louvre and new plant brought in the same way. 'To keep all the courts up and running, everything had to be taken out or brought in through the louvre opening in a 16-week programme – which was not a long time, trust me,' says Capes. 'The install and maintenance programme rely on two things: logistics and planning'

Capes leads the way through an airlock into another AHU plantroom ('it was awful down here'). The airlock is in place because this plant

»

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» space is effectively an intake plenum for the three replacement AHU units serving the grand hall, ground floor and prisoner ventilation. Fresh air enters the plenum from a sunken passage, close to the end of Dead Man's Walk, and passes through a bank of filters attached to the rear of the louvre. It is 1pm at the time of the visit, so the courts are at lunch and there is no demand for fresh air (based on CO<sub>2</sub> sensing) so the dampers at the rear of the louvre are closed.

Next, it's off to a new chilled-water pump room, created under Phase 2 to supply the new AHUs.

The chilled-water system was originally arranged as a single circulating pump circuit, to distribute chilled water from the chillers to the AHUs' cooling coils at a constant volume. Water is circulated constantly through the chillers, irrespective of whether they are operating or not, and through the AHU cooling coils – again irrespective of whether cooling is required.

Under the plant-replacement works, Aecom has reconfigured the chilled water pipework into separate primary and secondary circuits. The primary circuit operates at variable flow

determined by the chiller operation, and the secondary circuits operate at variable flow, based on the cooling demand of each AHU cooling coil, differential pressure controls and variable speed inverter drives on the pumps optimise the system performance. Two new pumps have been installed under the Phase 2 works and two more will be installed in each of Phase 3 and Phase 4.

Further down the corridor, Capes enters another AHU plantroom. This contains the existing air handling plant that serves courts 5 and 13, 6 and 14, and the general concourse areas. All of this plant will be replaced under Phase 3 and the steam pipework removed. 'Everything that you can see in here will get stripped out,' he says.

The works to these courts have had to be meticulously planned. 'For this phase, we can only shut down one court at a time, even though the plant currently serves two courts,' Capes explains.

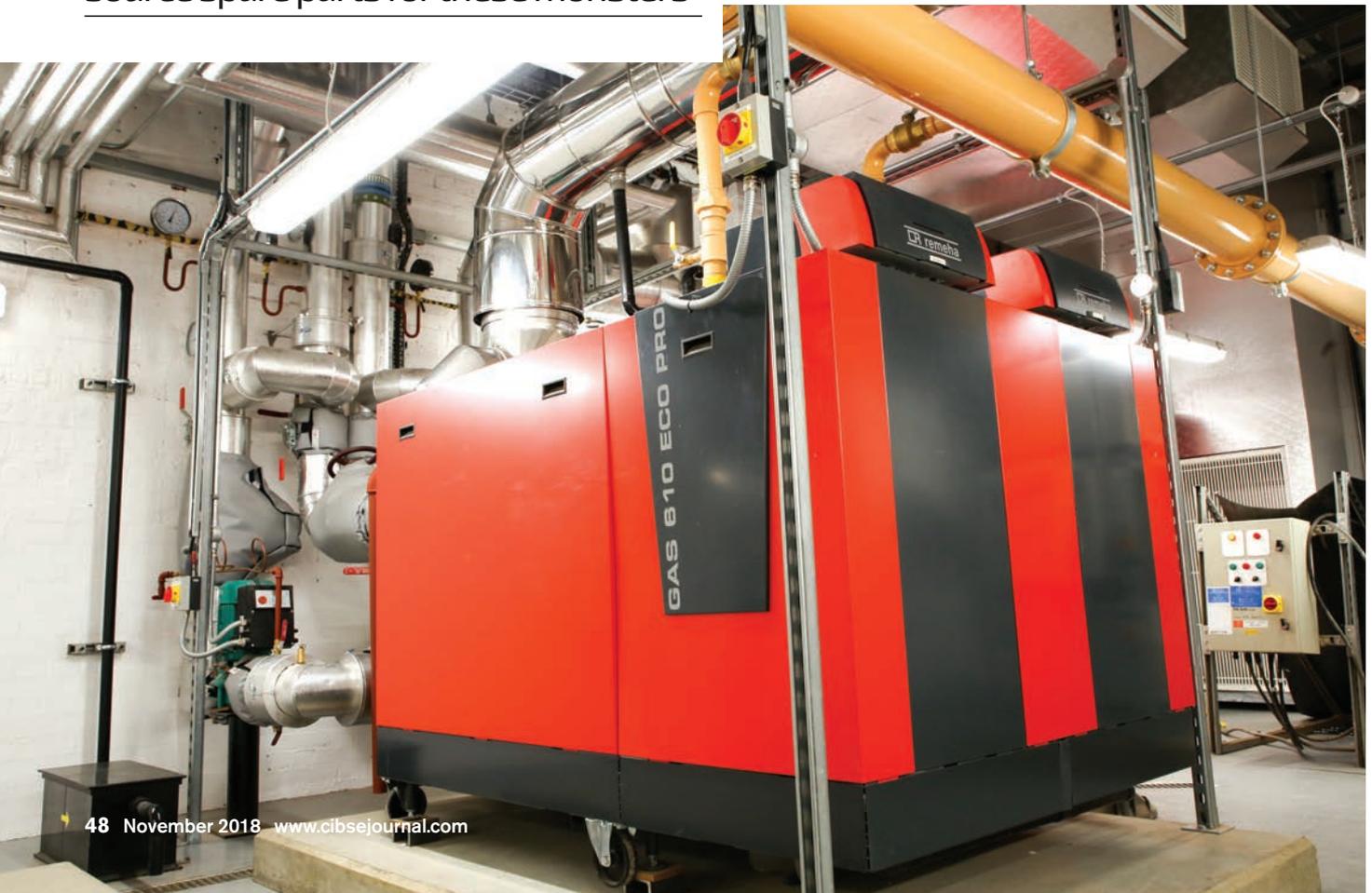
The solution is to replace the AHU serving the general concourse areas first and then take a temporary supply from that unit to court 13 while the AHU serving court 5 is replaced. Interserve will do the same for courts 6 and 14.

'This is not a big phase – it only lasts for 12 months – but, logistically, it's a lot harder,' says Capes, whose tour then passes through a space called the undercroft ('an absolute mess'). This has been cleaned out and now contains heating mains, installed under Phase 2 ready for use in Phase 3.

The tour finishes with a quick look at the existing East End plantroom ('bloody hot'), which houses the four giant Netherton oil-fired steam boilers that have successfully provided the courts with heat and hot water for 50 years. It has become increasingly difficult to source spare parts for these monsters, so the boilers will be removed in a later phase.

Also in the plantroom is an old plan chest, its top heaped high with thumbed blueprints, many dating from the original 1907 installation. It's a stark contrast with the modern BIM model being used to help the complex refurbishment be delivered while criminal cases are still being tried. **CJ**

**“Four giant oil-fired steam boilers have provided heat and hot water for 50 years, but it has become difficult to source spare parts for these monsters”**



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# Heating Tower Bridge

The success of a boiler upgrade project at Tower Bridge relied heavily on close collaboration within the project team and Hoval's end-to-end service delivery

As well as being one of London's most familiar historic landmarks, Tower Bridge is a popular venue for corporate and other events, with a number of unique spaces for hire. The ageing boilers, however, were struggling to meet space heating and domestic hot water requirements, so a decision was taken to upgrade them. The work coincided with the conversion of a 9m-high exhibition space, with the addition of a mezzanine to create two new spaces.

The design was carried out by consulting engineers Brinson Staniland Partnership (BSP) and the new boilers, along with associated upgrade works, were installed by contractors T Brown Group.

Hoval engineers worked closely with both parties in meeting a number of key challenges, ranging from providing design support to constructing the boilers in-situ because of access issues.

One of the early challenges faced by the design team was that, while regulations require condensing boilers for such an upgrade, the Grade I listing of the structure meant that Tower Bridge did not want plumes issuing from the flues on the side of the bridge base columns, 10m above the

water level. Following lengthy discussions with the City of London authorities, special dispensation was given to use a bespoke, non-condensing boiler installation.

As a result, Hoval SR-plus 225 high-efficiency, low-NOx boilers were specified for the project. However, and again because of regulations such as the ErP Directive, the fully modulating Riello burners selected for the project had to be supplied separately from the boilers. Two Hoval SR-plus 225kW boilers were installed in each of the two boiler houses, which again presented challenges.

"Not least of these challenges was access to the boiler houses through narrow walkways and corridors, steep stairwells, ship's ladders and tight turnings," recalled John Pearson, of T Brown. "To overcome this, Hoval supplied the boilers in 'complete knock-down' (CKD) form, which were then assembled on site and fully welded and hydraulically tested by Hoval's engineers, and then casings, burners and controls were fitted."

The original boilers were mounted on a platform suspended 15m above the floor and this was extended by T Brown to accommodate the new boilers.

It was important to avoid disruption to



the venue, as well as to traffic in the area, with most deliveries being made during the night. Managing this situation required interaction with the Tower of London project team, the City of London, the Port of London Authority, Transport for London and two local authorities.

"Despite all the challenges, the project went very smoothly and the clients are delighted with the end result," John Pearson concluded.

■ For further information, visit [www.hoval.co.uk](http://www.hoval.co.uk)



Hoval SR-plus boilers deliver high efficiency with low NOx emissions in a range of outputs, for use with gas, oil or dual fuel. They use a proven reverse-flame pattern of firing to ensure near complete combustion.

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## Hoval

# Carbon's X factor

The mass uptake of heat pumps and widespread comfort cooling could be the consequence of lower carbon factors, says WSP's Mark Grace, who offers his predictions of what will happen to services design as the Grid decarbonises

Lower carbon emission factors for electricity in SAP will have a profound impact on building services design in dwellings. SAP 10 proposes a 55% reduction in the emission factor for electricity, from 0.519 to 0.233kg CO<sub>2</sub>/kWh. It will be updated when the new Building Regulation Approved Document L is published in 2019 or 2020, so engineers are already looking at the consequences of lower carbon factors. Here are my predictions for what could happen to services design.

SAP 10 will result in substantially lower overall carbon emissions from buildings, as everything that uses electricity will have a lower environmental impact. The National Calculation Methodology will have to adapt so designers can still validate the performance of buildings against a 'baseline' (currently the 'notional building' in Part L). There will also be significant changes to assessment software by the likes of IES and EDSL.

Developers will pay more attention to direct electric heating, as it is cheaper and technically simpler than gas-fired heating. In the long run, gas boilers won't be able to compete on carbon emissions. That said, gas is still set to be cheaper than electricity, so it's not necessarily a win for the bill payer.

There will be fewer gas combined heat and power (CHP) specifications. The basis for using CHP in the past was its ability to generate (high emission factor) electricity from (low emission factor) gas, offsetting carbon emissions in the process. Unless a close-to-zero carbon biogas alternative becomes widely available, gas-fired CHPs will simply be unable to compete with electric alternatives.

Heat pumps will become the norm on virtually every type of building, and lower carbon factors will be a huge boost for innovation in this area; expect to see improved efficiency, viability, flexibility and even aesthetics. (People are going to see them, so they need to look nice.) There will also be an increased market for expertise in heat pump design, installation and maintenance. With that will come more affordable servicing – although the adoption of heat pumps will be a steep learning curve for clients, and there will be resistance in some quarters.

The lower carbon factors will offer more of an incentive to mechanically cool buildings. Comfort conditions of UK buildings will improve during summer months as air conditioning becomes more widespread. There will be no more ominous overheating assessments, as we should



**“Heat pumps will become the norm – expect to see improved efficiency, viability and even aesthetics”**

be able to comfort cool with minimal perceived environmental impact.

Mechanical cooling will be hugely beneficial for climate change adaptation, which we are required to demonstrate at the design stage on most projects. If cooling is incorporated in the original design, the building will be able to cope with rising ambient temperatures.

PVs will no longer be as beneficial in reducing CO<sub>2</sub> as they are now, but there will still be a place for panels on a large scale. LED lighting will also save less carbon than it does today, compared with less efficient forms of lighting. Given that its specification is more to do with operational savings and controllability, however, I don't see a reduction in its use.

There will be significant changes to the Passivhaus assessment methodology, as evidenced through the Passive House Planning Package. The existing total primary energy target won't be so challenging with lower carbon factors.

There could be issues with old infrastructure in cities as they struggle with the extra demand from people moving from gas to electricity, while a

reduction in costs for a utility connection are possible as we move away from gas on some developments. (We would need to consider how to address the perceived higher hot water demands, though – in kitchens, for example).

A rewrite of Local Development Framework policies on energy and carbon performance will be required. Current ones won't be much of a challenge under the proposed new SAP, and – given that current policies are largely based on the European Energy Directive – it's highly probable that Brexit will affect these too.

With electricity around four times the price of gas in the UK, low-efficiency heat pumps could increase clients' energy bills, even if carbon calculations point towards the technology. There are also questions over heat pump performance, with reports highlighting the expensive operational costs. Some of this will be because of poor operation and/or control, but coefficient of performance ratings are still not particularly high for the technology across the year – although we can expect these to improve.

While few of my predictions are certain – with outcomes depending on the methodology used to evaluate the performance of buildings at design stage – one thing's for sure: times are changing and engineers must get to grips with the competencies required to design electric services.

**MARK GRACE**  
is an associate  
director at WSP



The 6.5MW biomass system is capable of reaching temperatures in excess of 1,000°C

# CHIPPING AWAY AT THE DATA

A biomass district heating scheme is key to the University of St Andrews' goal of being energy carbon neutral. Vital Energi's **David Wilkinson** says operational data analysis is optimising carbon savings and ensuring a return on the £25m investment

**W**ith more than 9,200 students, 2,500 staff and a range of specialist equipment, the University of St Andrews, in Scotland, has similar energy needs to a small town. In 2013, it announced its intention to become the first university in the UK to be carbon neutral for energy, and started its journey with a £25m investment in a biomass energy scheme at the former Curtis Fine Paper manufacturing plant in Guardbridge.

The Eden Campus Energy Centre scheme involved a 6.5MW biomass furnace, capable of reaching temperatures of >1,000°C and consuming more than 300m<sup>3</sup> of woodchip per day in the depths of winter. The hot water generated is pumped through a buried, 27km district heating network, to the university's North Haugh campus, where it serves 42 buildings, including 2,600 students' residences.

Vital Energi was appointed to deliver the project and fulfill a five-year operation and maintenance agreement, which includes a 50-year warranty on the district heating pipework. Since the scheme became operational 18 months ago, we have been analysing the collected data to identify any opportunities to improve its operation.

## Rationalising the data

The first year's metered data shows substantial variations from the design estimates based on a 20-year design average (see Figure 1, first and second columns).

A review of the design data reveals a fairly simple explanation for the

majority of these variances. The calculation of the carbon savings is based on the efficiency of the existing boilers, which were retained as backup in individual buildings. The design assumption was that the boilers within the buildings had a seasonal efficiency of 60-85%, with an average of 75% across the campus. Assumptions had to be made because the existing boilers did not have specific gas or heat meters. The actual data shows an average efficiency of just 49.9%.

These boilers range from 40 years old to modern condensing boilers, but even on modern units efficiency was low. The biomass plant was also not operating during a six-week summer period due to storm damage. With low summer demand, the gas boilers were operating at part load, with elevated return temperatures and constant short cycling to meet intermittent demand.

So the actual metered data figure is not a true seasonal figure and is likely to be a snapshot of the boilers being used during summer – the worst possible time in terms of efficiency.

One of the key performance indicators (KPIs) for the project was that the biomass system would contribute a percentage of heat to the scheme. To calculate this, Vital retrofitted meters on the university's gas boilers. As well as illustrating the amount of gas used, we will be able to investigate the boilers' short-term and seasonal efficiency.

For comparison purposes – assuming the design estimate of 75% gas boiler seasonal efficiency, instead of the actual boiler figures within the carbon calculation – we see significantly reduced gas consumption. This gives annual carbon savings for the actual data of 3,844 tonnes of CO<sub>2</sub>. While this appears very low, it may be closer to the mark given the annual heat demand recorded.

### Explaining the variances

Comparing the design figures for annual heat demand against the recorded figures shows a 5,000MWh (16.5%) difference. Looking back at the design feasibility report, it shows the design figures were estimated on best available gas data for 2014 (Figure 1, third column), and normalised using 20-year average degree day data, to give a 'typical design year'.

To ascertain whether 2014 was a particularly warm year we carried out a range of sensitivity analysis including varying boiler efficiencies and pipework insulation, and removing buildings from the scheme. It was important for us to understand what

Comparison figures				
	Design 20-year average	2017 metered data		2014 gas data
Total heat demand (MWh)	29,039	24,706		24,234
Network losses (MWh)	3,291	1,630		3,291
Total (MWh)	32,330	26,336		27,525
Biomass boiler heat production (MWh)	31,035	22,615		25,760
Heat provided by gas boilers (MWh)	1,295	3,721		1,765
Biomass fuel consumption (MWh)	33,766	30,198		27,859
Gas fuel consumption (MWh)	1,727	4,961*	7,463**	2,353
Carbon savings (tonnes CO <sub>2</sub> per annum)***	5,843	3,844*	6,887**	4,679

**Figure 1:**  
 \*Assumed design boiler seasonal efficiency: 75% \*\*Actual seasonal efficiency: 49.9%  
 \*\*\*Carbon emissions factor for biomass is 0.016 kg CO<sub>2</sub>/kWh

would happen in a warm year where the biomass would struggle to operate due to minimum turn down in the summer.

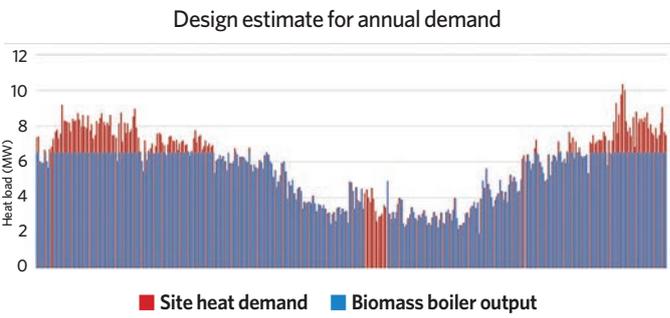
The analysis revealed that 2014 had an above average annual temperature, which resulted in carbon savings lower than the normalised design year (see Figures 2 and 3).

This shows a much closer comparison in terms of annual heat demand, and a quick check of annual temperatures from 2014 against the external temperature logs from the energy centre for 2017 (Figure 4, on page 54) shows a comparable average temperature of 9.2°C and 9.9°C respectively (2017 was also above average annual temperature).

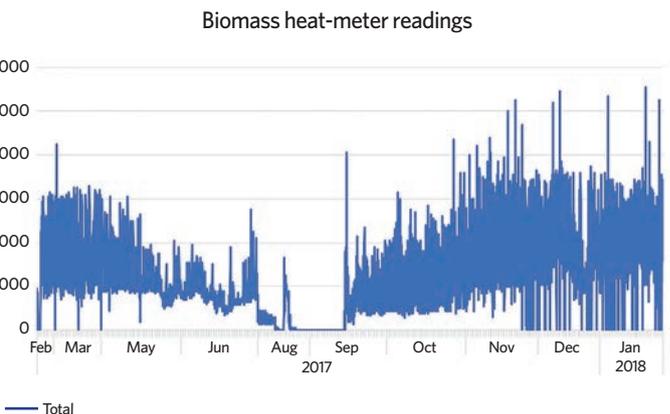
With external temperatures accounted for, the design estimation suggests we should be saving a further 800 tonnes of CO<sub>2</sub> in this year, >>



As part of the project, the university created its own wood-chipping facility at the Eden Campus



**Figure 2:** Estimated 2014 annual load profile with orange areas showing where the gas boilers are expected to be used to meet total demand



**Figure 3:** Metered load profile from 2017 showing where biomass boiler did not work for six weeks due to storm damage



The system will consume more than 300m<sup>3</sup> of woodchip per day in the depths of winter

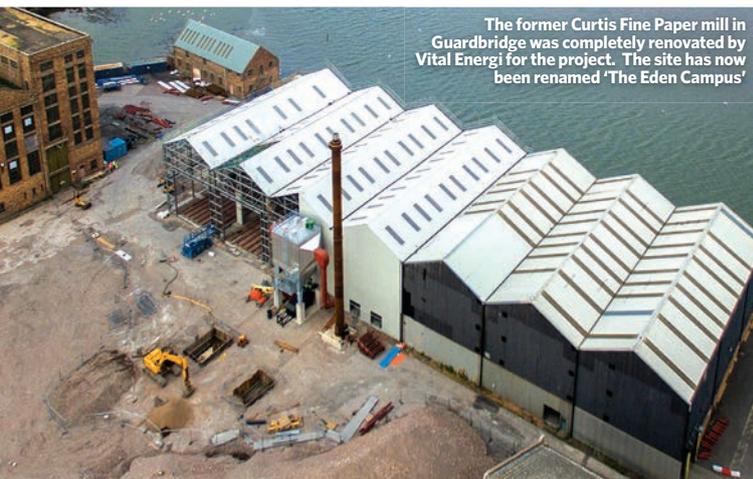
» so further investigation into the figures was required to understand the differences. The 2017 data shows the gas boilers were used much more than predicted at the design stage.

There are three main reasons for this. First, the connection of the physics building – which had the largest heat demand – was delayed. This building accounts for almost 10% of the annual heat demand, but was running with its own boilers, accounting for 458 tonnes of CO<sub>2</sub>. Second, there was an unforeseen six-week shutdown due to storm damage, which accounted for approximately 113 tonnes of lost CO<sub>2</sub> savings. Finally, the average measured moisture content of the woodchip delivered on site was 48%, as opposed to the design estimate of 40%. This caused a reduction in boiler efficiency, which accounts for 38 tonnes of CO<sub>2</sub>.

Taking these anomalies into account, savings of 4,453 tonnes of CO<sub>2</sub> could have been realised for the scheme, which is fairly close to the design assumptions, with further anomalies likely to be the result of variations in network losses, external temperatures and actual seasonal boiler efficiency assumptions used in the carbon calculation.

Mark Simpson, director of estates at the University of St Andrews, said: ‘This was an extremely challenging project and presented several substantial technical challenges including a few “firsts” for the UK.

‘We’re pleased the relationship with Vital Energi is ongoing, and they continue to work with us to analyse the data and identify areas of improvement. This is essential, as we were always committed to creating a cycle of continuous improvement, which will ensure we get the maximum financial and environmental benefits from the scheme.’



The former Curtis Fine Paper mill in Guardbridge was completely renovated by Vital Energi for the project. The site has now been renamed ‘The Eden Campus’



“Be careful when dealing with raw data. Some rationalisation will always be required to ensure an accurate comparison of like-for-like data”

### Looking to the future

Our analysis of the raw data showed how important it is to review data with comparable design estimates. Now design estimates have been rationalised to ensure accurate comparisons we can now use data to inform future design assumptions and optimise systems.

The data has shown that we need to work with our woodchip supplier to lower chip moisture content, for increased boiler efficiency. We must also investigate existing gas-boiler efficiencies, to ensure buildings remain connected and biomass downtime is minimised.

Future analysis of the data will help us to understand if we normalised the original data correctly, and show whether the predicted carbon savings are consistent over the longer term. **CJ**

**DAVID WILKINSON** is associate design director at Vital Energi

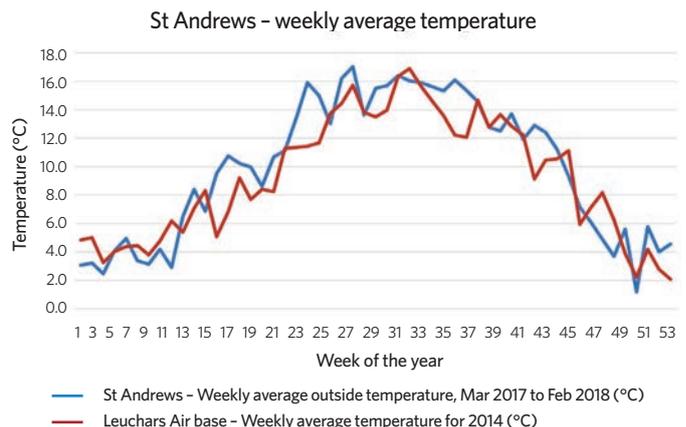


Figure 4: Annual temperatures from 2014 against the external temperature logs from the energy centre for 2017



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# MAGNETIC ATTRACTION

Helping to minimise the destructive impact of corrosion on heating systems will improve plant durability and efficiency. Adey's **Keith Thompson** looks at the role magnetic filtration plays in maintaining system performance

**C**orrosion can have a damaging impact on commercial heating systems, unless there is a comprehensive water-treatment programme in place. Magnetic filters should be part of this strategy because they capture the metal – or magnetite – by-product of this corrosion, which occurs when water circulates through boilers and pipework.

Making up 98% of system debris, magnetite particles can be very small, measuring just eight microns (0.008 mm) in diameter, which makes capture difficult. Their size means they can travel easily around a heating system; particles are deposited in low flow areas, such as heat exchangers, baseboards and radiators. If sludge accumulates in the radiators, it can limit heat output and circulation and, if trapped in the boiler or central heating pump, it can lead to outright failure.

Traditional cast-iron boilers have been replaced by more efficient stainless steel and aluminium models, over the last ten years. The newer boilers cannot match the durability of cast-iron units, unless proper protection is in place. They are smaller in size so heat cells are more prone to magnetite blockages, while the waterways – reduced from 50-60mm to as small as 8mm in some cases – are also susceptible to blockage.

Historically, dirt and air separators have offered protection for commercial systems. However, the mesh used is not fine enough to capture small magnetite particles, leaving sludge to circulate round the system.

As the name suggests, magnetic filtration has magnets at its core – these are usually powerful neodymium magnets that are tolerant to high temperatures. They attract all particles, regardless of size, to the core of the filter, ready for collection and removal.

Available in different sizes, depending on system dimensions, the filter can be fitted



Corroded system parts

**“If sludge accumulates in the radiators, it can limit heat output and circulation, and lead to outright failure”**

to the pipework of new and retrofitted heating systems. It will need to be monitored, emptied and serviced, as the sludge collects around the magnets. Some filters offer greater flexibility, with side stream and inline installation possible.

The first step in fitting magnetic filters is to clean the system with an appropriate chemical cleaner that will dislodge any sludge and make it easier to collect. A magnetic filter is then installed, which collects the sludge. This should be serviced once a year to clean the magnets and check performance. A chemical inhibitor should then be added to help protect against corrosion and limescale deposits, before a water test is carried out, with options available for chemical and microbiological testing. Specialist, commercial water-testing services enable engineers to do this easily. It is important to use a UKAS-accredited laboratory and to ensure compliance with the latest BSRIA guidance on closed heating and cooling systems.

System maintenance is essential to ensure it stays correctly dosed (it might need a chemical top-up) and that the filter continues to perform effectively. Some filters include a small sight-glass, which makes it easy to see how much sludge has been collected and whether it needs emptying.

Magnetic filters are proven to be 10 times more effective than traditional filters. Adey is awaiting verification from Gastec on tests that compare capture rates between a commercial magnetic filter and a dirt and air separator of the same size. The test

was carried out over a two-hour period and at a constant flow rate of 60m<sup>2</sup>·h<sup>-1</sup>. The results showed that the magnetic filter collected 3.29kg of sludge, while the dirt and air separator collected just 0.53kg.

University College London (UCL) is installing magnetic filtration in as part of its boiler-replacement programme. Currently more than 60 commercial filters have been installed ranging in size from 2 to 6in. It had previously had a damaging buildup of black iron-oxide sludge, which had affected water quality and led to cracked casing and heat exchangers. Now, the sludge is collected and removed, which will save UCL time and money in expensive repairs in the future. **□**

**■ KEITH THOMPSON** is commercial sales director at Adey



# PARADISE FORGED

Center Parcs Longford Forest resort required renewable energy generation, ventilation that didn't harm tropical plants and a new €4.5m, 27km gas main. **Andy Pearson** reports

**S**hort-break operator Center Parcs' first development in Ireland is the 160-hectare Longford Forest resort, currently under construction near Ballymahon, County Longford, Ireland.

Scheduled to open in 2019, it will cater for up to 2,500 guests, in 466 luxury lodges and 30 apartments nestled in woodland.

At the heart of this huge development is a 21,500m<sup>2</sup> leisure and retail plaza. Built around an open courtyard, it will house most of the restaurants, bars and leisure facilities, as well as the vast, enclosed complex of pools, rides, slides and rapids – the 'Subtropical Swimming Paradise' in resort speak.

Creating a holiday destination in woodland, in the heart of rural Ireland, is quite a challenge. 'We're effectively building a mini-town in a forest,' says Daman Ranby, director of Edmond Shipway, the project's mechanical and electrical consultants.

The task for Edmond Shipway was to develop a robust, efficient servicing solution.

Having worked as technical adviser to Center Parcs on some of its previous projects, including the recently completed Woburn Forest development helped. 'Center Parcs is an end-user client, with very high standards, that will be running this resort for many years to come,' says Ranby.

Servicing requirements for the luxury lodges are relatively straightforward: each is provided with drinking water, gas, data, electricity and sewerage connections. However, the lodges are scattered throughout the wooded site, so the service routes had to be carefully designed to optimise connection lengths and resilience.

The lodges are Center Parcs' latest design, developed, evolved and prototyped, and trialled at its other UK resorts before being rolled out in Ireland. They have been designed to exceed the minimum standards required to comply with Irish Building Regulations – for example, the air permeability of a typical lodge is 3m<sup>3</sup>.h<sup>-1</sup> per square metre at 50Pa.

## The renewable challenge

One significant difference between Ireland's Building Regulations and those in England and Wales is that, for domestic dwellings, Part L requires a minimum of 10kWh.m<sup>-2</sup> per year to be supplied by energy generated using renewables. In England and Wales, no minimum requirement for renewables on domestic dwellings is specified.

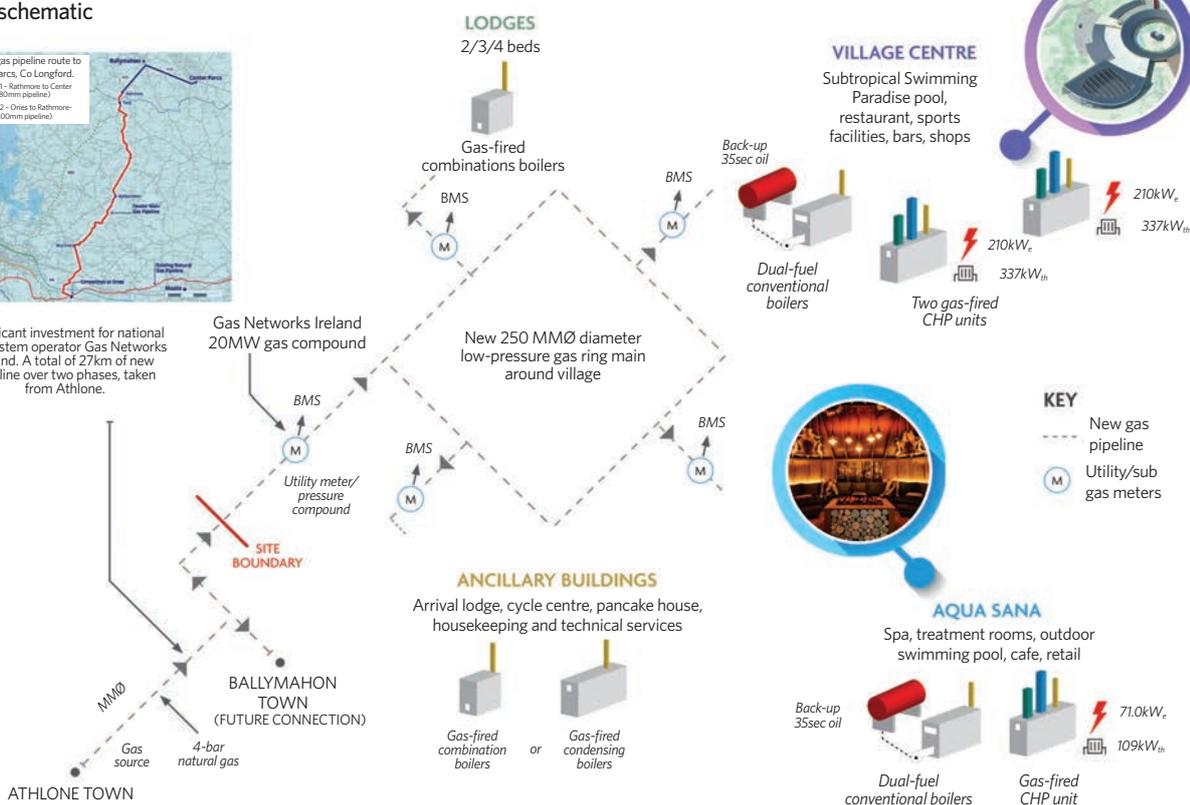
Meeting the renewable energy requirement was a challenge. The lodges' wooded location meant roof-mounted photovoltaic and solar



**Center Parcs Longford Forest  
Gas schematic**



Significant investment for national gas system operator Gas Networks Ireland. A total of 27km of new pipeline over two phases, taken from Athlone.



**Providing gas to Ireland's first Center Parcs resort was the biggest utility challenge as there was no gas infrastructure in County Longford**

thermal panels could not be used. 'The panels would have been shaded by the trees and covered in pine needles,' says Ranby.

Micro domestic combined heat and power (CHP) units were also considered, but deemed too expensive compared with a standard domestic gas boiler – and the ongoing maintenance of 466 CHP units was a 'real concern', says Ranby.

The solution is to heat each lodge using a wood-burning stove with top-up space heating. All hot water is supplied by a gas-fired condensing combination boiler. According to Ranby, the wood burner counts towards the renewable requirement, with the remainder offset by renewables used in the main leisure facilities. 'Building control was happy for us to offset the lodges' renewables obligation with

renewables in the central facilities,' he says.

Heat and power for the central facilities are supplied by two 300kWth gas-fired CHP engines for the leisure and retail complex, and one 100kWth gas-fired CHP engine for the spa complex. This low carbon technology was accepted as a suitable offset for the absence of renewables on the lodges; the expected carbon savings from the CHPs are predicted to exceed the carbon savings that would have accrued from the lodge-mounted PVs.



» ‘The thermal base load for the leisure and retail complex is approximately 700kW, and both engines will run for about 20 hours a day – and one 300kWth unit will probably run for 24 hours, to meet the continuous heat and ventilation demand from the Subtropical Swimming Paradise,’ says Dean Maude, senior mechanical engineer at Edmond Shipway.

The low-temperature hot water total heat load for the retail and leisure complex is 7.5MW, which includes heat for the pools, mechanical ventilation systems and domestic hot water.

Top-up heat is provided by five 1,500kW dual-fuel gas/oil-fired boilers. The fuel oil connection provides resilience in the event of a gas supply interruption. There is no minimum renewables requirement under Part L of the Building Regulations for commercial buildings in Ireland.

### Creating a paradise

The enclosed swimming complex is at the centre of the resort. It will be maintained at 31°C and 60% relative humidity to create a balmy environment for up to 1,500 holidaymakers and the 2,335 lush, green tropical plants and trees that will festoon the space. ‘The main draw on energy is the heat and ventilation load for the pools,’ says Maude.

The size of the pool complex – and factors such as airborne water and chlorine, as a consequence of the water slides, water jets and wave machines – mean that the calculated ventilation rate for the space is approximately 40m<sup>3</sup>.s<sup>-1</sup>, which equates to about four air changes per hour.

The three dedicated air handling units are capable of delivering 60m<sup>3</sup>.s<sup>-1</sup> to offer resilience and incorporate a margin for future changes to the pool facilities.

‘We had to use CFD modelling to develop the design because the tropical plants are very vulnerable to air movement,’ explains Maude. ‘We’ve made extensive use of fabric ducts and employed nozzle diffusers to supply high volumes of air over a long throw, so as not to disrupt the planting.’

### Infrastructure

The resort and its leisure facilities are open all year round, so ensuring heat and power are always available is a fundamental requirement. ‘One of the biggest challenges has been getting utilities to site,’ says Edmond Shipway’s Ranby.

The 3,000kVA import capacity electrical supply to the resort is delivered through infrastructure with capability of 8,000kVA via nine 10kV to 400V substations. These



The Pancake House at Longford Forest resort (main picture); an isolation transformer (left, top); and a gas skid (left, bottom)

are strategically positioned around the site: one feeds the pool area and central building west; one feeds the central building east, including other facilities in the restaurant/leisure complex; and the remainder are dotted around the site, to feed power to the lodges and spa.

‘The high number of substations is a function of how long the low-voltage cables can be before it becomes cost effective to put in a transformer; we have around 6,000m of 10kV cabling alone,’ says Ranby.

Power is supplied from a primary substation, located approximately 12km away, by a cable that has been run overhead and underground. ‘We’ve had to upgrade a primary substation and negotiate with the various landowners to bring this cable across their lands,’

explains Ranby. The supply went live at the end of July and is now powering the construction site.

Data is via high-speed fibre, which has been routed 7km from Ballymahon. ‘The biggest utility challenge was providing gas, because there was no supply available anywhere near the site,’ says Maude. In fact, there was no gas infrastructure anywhere in County Longford.

Gas is the primary fuel source for the project, which has a peak demand expectation of 14MW. To meet this, Gas Networks Ireland has installed a new 27km, 400mm diameter, 4-bar, medium-pressure main from Athlone to the site, at a cost of €4.5m. The new main is sized to deliver 20MW to allow for the resort’s future expansion; it also incorporates connections to the nearby town of Ballymahon and

»

# Gas-fired boilers continue to provide energy and carbon savings

The use of renewable or low carbon technologies to provide heating and hot water has increased significantly over the past 10 years, and products such as heat pumps are likely to play a significant role for those involved in selection of building services solutions. However, high-efficiency gas-fired boilers are still capable of making a significant contribution, especially in commercial applications.

Gas-fired condensing boilers are tried and tested, and achieve very high efficiencies; but systems are not always designed or operated to maximise these levels of efficiency; so there is good potential to improve the operation of many existing installations. The 'cleaner heat cashback scheme', recently launched in Greater London appears to have identified these opportunities, by providing significant incentives to end users who wish to upgrade heating and/or hot water systems.

At Lochinvar, we have options with both wall-hung and floor-standing commercial boilers, and both ranges are particularly suitable for refurbishment or boiler replacement projects.

## CPM wall-hung with cascade control

The majority of new commercial boilers

supplied over recent years have been wall-hung design, and it is now common to see commercial building plantrooms with modules of wall-hung boilers. These products are either fixed to the wall, or mounted on purpose-built frames. Our CPM range is available in six models, with outputs ranging from 58 to 175kW. In addition to operating at the high levels of efficiency associated with condensing boilers, the CPM range has extremely low NOx emissions, ranging from 24 to 37mg/kWh.

Having the ability to cascade control is arguably the main benefit of replacing traditional high-output boilers with a bank of lower-output boilers, and a key feature of the CPM range is its integral controls which provide cascade operation as standard.

Cascade management accurately matches boiler output to system demand, and will ensure that the boiler installation operates at optimum levels of efficiency. It is possible to install up to 12 x CPM boilers in a cascade setup, but our experience suggests that a 4 x boiler installation is probably the most popular configuration. As each boiler modulates at the ratio of 4:1, a 4-boiler cascade installation provides a turndown of 16:1, providing a highly efficient and flexible heating solution, which can make significant fuel and related savings when replacing more traditional boiler plant.

## Herald floor-standing with Con-X-us, optional, app-based controls

Before the advent of commercial wall-hung boilers, floor-standing was the norm and many of the existing installed boilers are of this type. There have been major advances in terms of efficiency of such products in the past 10 years and, from a practical viewpoint, it can be easier to replace an old floor-standing boiler installation, with a similar, modern-day, high-efficiency equivalent, such as our Herald range.

Herald boilers are available in eight models, with outputs ranging from 41 to 228 kW, and in addition to its high efficiency, its NOx emissions are also low, ranging from just 32 to 40mg/kWh.

One of the key features of the Herald boiler range is a robust stainless steel heat exchanger, which can operate at working pressures of up to 11 bar. The flue outlet is at the back of the boiler and positioned at low level, thus making Herald an ideal replacement for traditional atmospheric boilers of comparable output.

In addition to system design, the control method is another very important element in achieving high levels of operating efficiency. Herald has a number of options where interface modules are available to provide compatibility with MODBUS or BACNET systems. There is also the other option of the purpose-designed Con-X-us, app-based control system, which gives users many benefits, such as the ability to monitor performance and adjust parameters from anywhere in the world via smart devices such as mobile phones or tablets.

## Bivalent systems

Both CPM and Herald boilers can be integrated with renewable technologies, and combined installations of high-efficiency condensing boilers with heat pumps are becoming increasingly popular in commercial buildings.

■ For further information, visit [www.lochinvar.ltd.uk](http://www.lochinvar.ltd.uk)





**“We had to use CFD modelling to develop the design because the tropical plants are very vulnerable to air movement”**

» several local villages, with the potential to link them to the gas network for the first time. On site, the gas is distributed under low pressure via a 250mm diameter ring main.

Maude says the team looked at other primary fuel options for the resort – including liquefied petroleum gas (LPG) and oil, both of which are common fuel sources in Ireland – but the logistics of maintaining the fuel supply ‘made no sense’.

The team also considered biomass, which has been used successfully at Center Parcs Woburn Forest. ‘The tariffs on renewable heat are not in place in Ireland, so it was a pure capital outlay and – in our view – the long-term prospects of burning wood, and the pollution it creates, is questionable,’ adds Maude.

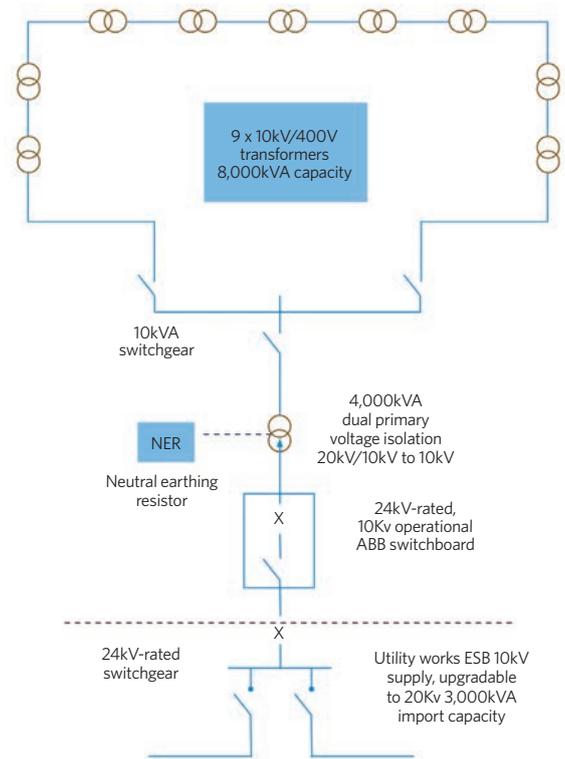
The only utility connection that did not have to be brought any great distance was water, because a 200mm water main was already in place next to the site. Average daily consumption for the resort is expected to be about 450m<sup>3</sup> of water per day, with a peak of 750m<sup>3</sup> per day in summer. ‘Center Parcs has five UK resorts, so we had a lot of historic data that we could use in determining water use,’ says Maude.

In addition to wholesome water, Edmond Shipway’s design has to cater for firefighting. ‘If this was a single building, you’d have a wholesome water main and a separate fire main – but it’s not a building; it’s a small village spread out over a large site,’ says Maude. ‘We’ve used a combined water and fire main – the same way a utility supplier would pipe up a town.’

Even as a combined fire and wholesome system, Maude estimates there are about 10 miles of pipework.

The site has 1,000m<sup>3</sup> of water stored in a tank comprising two 500m<sup>3</sup> compartments. This is based on 750m<sup>3</sup> for peak daily summer use and 250m<sup>3</sup> for firefighting. ‘We need to maintain a reserve for fire-hydrant

**Center Parcs Longford Forest**  
Simplified high-voltage schematic



Electricity substations are dotted around Longford Forest and there is around 6,000m of 10kV cabling

**A tank on site stores 1,000m<sup>3</sup> of water in two compartments**



use and storage for the sprinkler system in main buildings,’ says Maude.

The tank also helps take pressure off the local water infrastructure because the site’s peak flow rate of 17L·s<sup>-1</sup> mains connection is insufficient to meet peak demand. There is no wastewater connection to the site. ‘The connection cost for foul drainage was far too high,’ says Ranby. Instead, up to one million litres of wastewater a day will be treated in the site’s own treatment plant, where it will be cleaned and purified before being discharged into local rivers.

Center Parcs Longford Forest is set to open in 2019, at which point the mini-town in the woods will become Ireland’s newest luxury holiday resort. **C**



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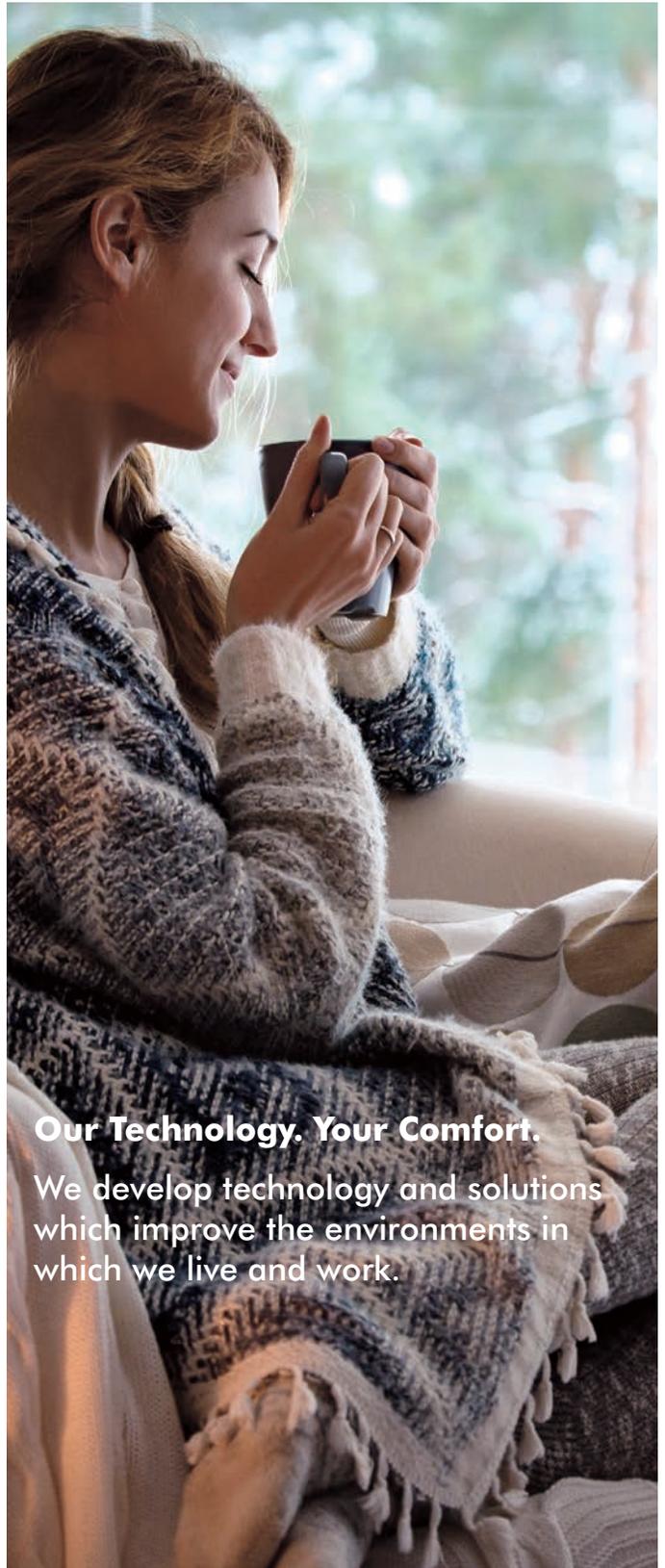


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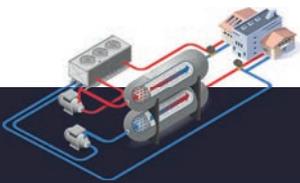
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# SOUNDING THE ALARM

Air conditioning and refrigeration firms are becoming increasingly worried about the amount of flammable refrigerant gas being used by engineers without suitable training, writes **Ewen Rose**

**T**he refrigeration and air conditioning safety register, Refcom, is receiving 'daily calls' from contractors raising serious safety concerns about the growing number of products designed to work with alternative – often mildly flammable – gases being introduced into the UK market.

These A2L classification gases are already widely used in the air conditioning and heat pump sectors, as the phasedown of HFCs gathers pace under the European F-Gas regulations. It is anticipated that they will eventually be used in a wider range of equipment, too.

The main source of concern is the lack of any specific training requirement for flammables specified under the terms of the F-Gas regulations. Employers are concerned because the issue is covered by the Health and Safety at Work Act, which makes them legally responsible for the safety of their staff and customers. It is also captured by the Classification, Labelling and Packaging of Chemicals Regulations, which were revised in 2015.

Use of flammable refrigerant gas is 'on the radar' of the Health and Safety Executive (HSE), according to head of Refcom Graeme Fox, who has predicted there could soon be a prosecution under its Dangerous Substances and Explosive Atmospheres Regulations (DSEAR), which designate all refrigerants as 'dangerous substances'. He has also pointed out that a 'near miss' could also be grounds for prosecution by the HSE.

'The wider building services industry has been ignoring this issue for years,' said Fox. 'So far, it hasn't been a big problem, but that is changing and the risks are intensifying, as more and more flammable alternative gases are coming onto the market because of the F-Gas phasedown.'

'Manufacturers have done a good job in making training available, but this is mainly product-specific. The industry needs to take advantage of the provision, now newly available from industry bodies, that delivers the wider knowledge needed to carry out complete installations safely.'

The employer of anyone working on a non-domestic refrigeration system must carry out a DSEAR risk assessment as part of standard health and safety procedures. This should include: information about the nature of the gas used; safety data; the process of installing, commissioning and maintaining the equipment; the amount of gas and its possible combination with other hazardous chemicals; and handling, storage and transport – all of which should be shared with the end user.

An inquest in Australia into the deaths of two workers in a refrigerant gas explosion has also brought this issue to the attention of regulators around the world. The coroner ruled that the fatalities could have been prevented if the men had been properly trained and made aware of the risks. Neither were qualified refrigeration engineers and one – a motor mechanic – had used hydrocarbon (HC) gas to top up a leaking compressor.

'The explosion could have been averted through correct maintenance, correct use and labelling of

refrigerants, and correct dismantling and removal processes,' according to the coroner, Paresa Spanos.

'[These] deaths highlight the dangers of unqualified people doing work that requires qualifications or, at least, a solid understanding of the substances and risks involved.'

She concluded there was 'ample evidence' that the refrigeration industry was facing challenges because of the move to low global warming potential (GWP) refrigerants, 'because the low-GWP refrigerants are flammable and the vast majority of refrigeration mechanics/technicians were not trained in the use of such refrigerants'.

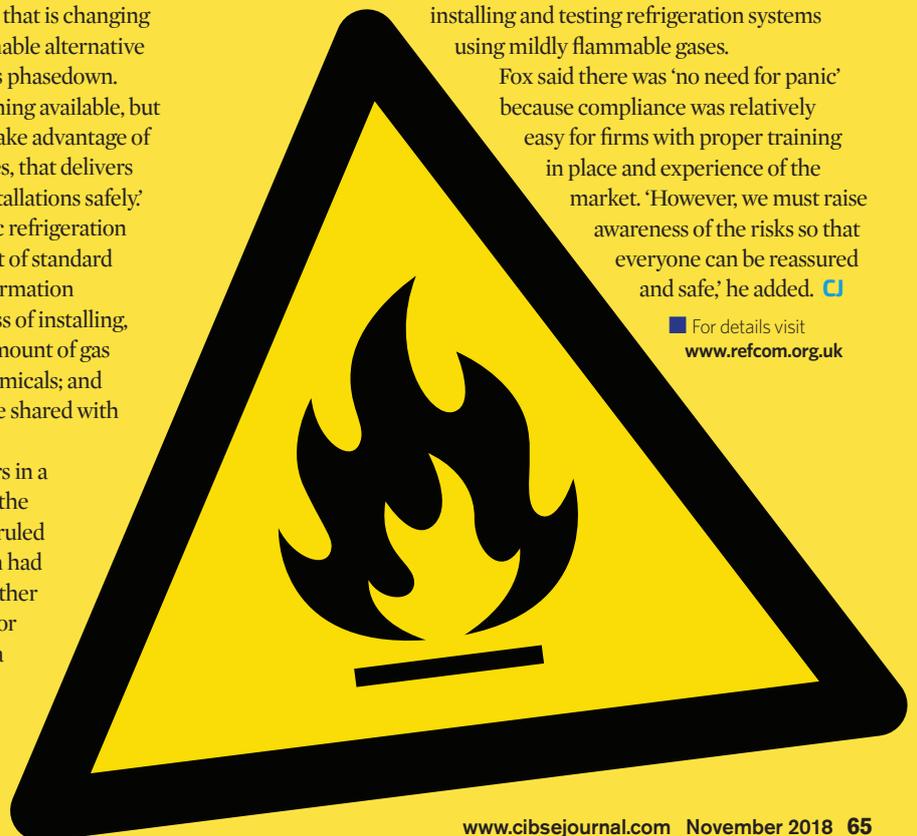
Australian industry bodies urgently revised their training provision after the accident and the UK is now following suit with the Air Conditioning and Refrigeration Industry Board (ACRIB) identifying a clear requirement for specialised training in the handling of all flammable refrigerants.

The ACRIB Education group – including employers, professional institutes, trade bodies and training/assessment organisations – has developed training for 'experienced refrigeration engineers', who must already hold a recognised F-Gas qualification, such as BESA Training F-Gas Cat I or II, City & Guilds 2079 Cat 1 or 2, or CITB J11 or J12.

The ACRIB course covers: understanding different classes of flammability as recognised by legislation and safety standards; the legislative and organisational procedures for installation, servicing, maintaining and decommissioning flammable refrigerants; and requirements for installing and testing refrigeration systems using mildly flammable gases.

Fox said there was 'no need for panic' because compliance was relatively easy for firms with proper training in place and experience of the market. 'However, we must raise awareness of the risks so that everyone can be reassured and safe,' he added. 

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Figure 1: The ElfoPack heat pump and air distribution system in a 70m<sup>2</sup> flat

# DEMAND RESPONSE

Lower carbon factors will soon make heat pumps attractive for housing. **Alex Smith** speaks to a manufacturer working with Fife College to raise awareness for installers

**M**ainstream adoption of heat pumps came a step closer in the summer, when the government and the BRE proposed new carbon emissions factors for electricity in dwellings. The figure published in draft standard assessment procedure 10 (SAP 10) represents a 55% reduction in carbon factors compared with the current SAP, and will reduce carbon emissions for electric heating when the figures are included in new Building Regulations in 2019/2020.

SAP will be adopted even sooner in London: the GLA's new Energy Assessment Guidance requires that designers adhere to SAP 10 from January (see page 7, news).

Around 22,000 heat pumps were installed in the UK in 2017, a year-on-year increase of 18%, but this figure is below the 100,000 industry

needs to be supported without subsidies.<sup>1</sup> One of the barriers to adoption of heat pumps is the lack of installers who have microgeneration certification (MCS) and, according to BSRIA, the number is falling.<sup>1</sup> Part of the issue is that there is no government programme to incentivise installer training, so it is left to suppliers to fill the gap.

Clivet is one air conditioning manufacturer that is keen to encourage heating engineers to become trained heat pump installers. It is supplying a domestic heat pump to a low-energy test house at Fife College in Scotland. The aim is to give students the opportunity to understand real-world issues around the installation and operation of the technology.

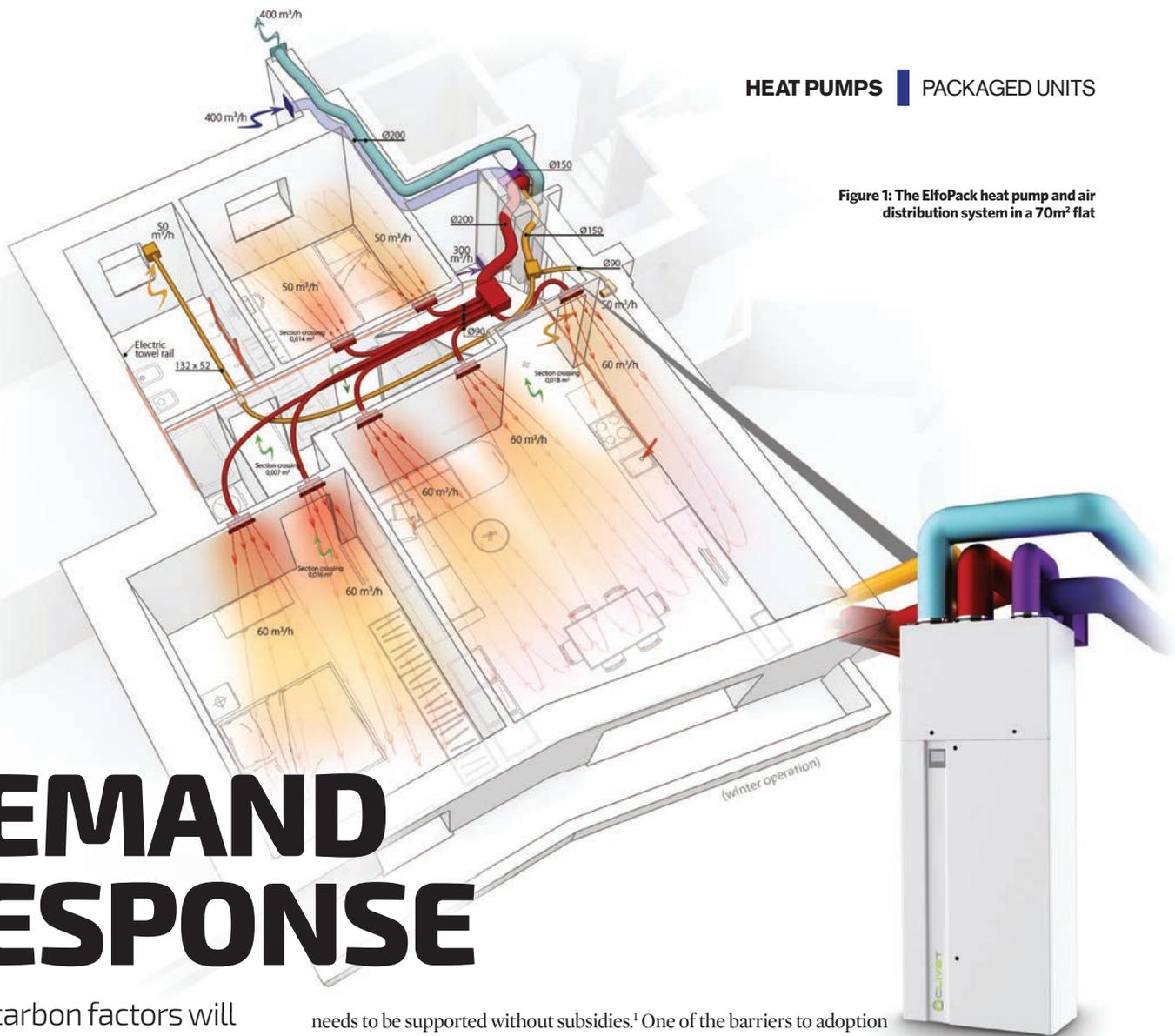
The system to be installed in December is an air source heat pump with heat recovery. It combines heating, cooling, heat recovery, filtration, and hot-water production in one package, so does not require an outdoor unit (air is ducted to and from the system).

'What is key for us is that the staff and students are actively involved in the installation of the unit,' says Graham Evans, residential heat pump and light commercial business development manager, Clivet Group.

'It's really important to get involved with the next generation of heating and cooling engineers, and show them the technology isn't just for the future. It's available now.'

The fresh air supply and exhaust are moved to and from the unit via ductwork: there are no refrigerant pipes ducting through the home. When fresh supply enters the heat pump, it passes through an electronic filter to ensure particulate matter (down to PM10) is captured. In the lower part of the unit are two 90-litre hot-water cylinders, which supply bathrooms, kitchens and showers. Water is supplied up to 60°C and there is a back-up heater for legionella sterilisation.

If there is no need for domestic hot water, the water stored in the cylinder can be used for heating. The stored heat warms the air, which is supplied into apartment rooms through circular ductwork and air diffusers (see Figure 1). 'Instead of operating compressors and pumps, >>



## Key to diagram

- Exhaust
- Stale air ejection
- External air intake
- Indoor air recirculation intake
- Fresh air supply
- Domestic hot water

» we're reusing that stored energy. As soon as someone turns on the tap, it will heat the hot-water cylinder again,' says Evans.

Heat recovered from the exhaust air preheats fresh supply air before being circulated in the home. In the summer, the heat pump works in cooling mode and the heat taken from cooling the intake air is recovered and transferred to produce domestic hot water. It will automatically work in heating or cooling to ensure that the setpoint is achieved.

CIBSE technical editor Tim Dwyer says the availability of cooling in heat pumps must not stop designers from minimising cooling requirements in buildings. 'Units providing cooling need careful consideration to make sure we don't end up with air conditioned buildings when previously you would look to techniques such as those in CIBSE TM59<sup>2</sup> to reduce the need for cooling. There is a risk that people don't look at the design so critically,' he says.

The LGA's new Energy Assessment Guidance, released last month, has requirements that should prevent this from happening in London. It requires an estimate of the heating and/or cooling energy an ASHP would supply and the electricity used for this purpose.

It also asks for evidence that the risk of overheating has been mitigated through passive design, and it states that where the use of ASHPs is considered appropriate, 'a high specification of energy efficiency will be expected to ensure the system operates efficiently and to reduce peak electricity demand'.

The unit can be placed inside an apartment, or in a lobby or stairwell, which has the advantage of giving maintenance engineers access to the control panel and air filter without having to enter someone's home. There is also a dehumidifier, usually located in the bathroom. The system

is currently being tested by BRE to verify the coefficient of performance figures quoted by the manufacturer. Once the performance has been modelled by BRE, it can be used in SAP.

Clivet claims a seasonal coefficient of performance of 3.83. It says the heat pump meets 75% of typical heating, cooling and hot water needs for a home up to 120m<sup>2</sup> in size and can be integrated with PVs and/or batteries to become self-sufficient in energy. 'We are making the investment to get the system into SAP,' says Evans. 'For units containing a compressor, heat recovery and heat exchangers, the testing has not been done, and the methodology is not there.'

Evans says the system is well suited to factory-built homes, where airtight, well-insulated modules are built offsite. 'We think developers will be adopting the lower carbon factors well before the final SAP figures are published,' he adds. **C**

**References:**

- 1 Heat pump market is growing again, Open Access Government, April 2018 [bit.ly/CJheatpump](https://bit.ly/CJheatpump)
- 2 TM59 Design methodology for the assessment of overheating risk in homes, May 2017 [bit.ly/CJNov18heatpump2](https://bit.ly/CJNov18heatpump2)



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## BIM evolution to enhance delivery and operation of buildings

This module explores the evolution of BIM working practices and the standardisation that is driving a more consistent – and effective – adoption of it within the building services sector

Building information modelling (BIM) is increasingly integrated into the procedures for the design and operation of buildings. Since the UK government's 2011 Construction Strategy spurred on the implementation of BIM working practices, awareness and the processes have permeated into many of the larger UK building services consultants, contractors and operators. This article will consider the evolution of BIM and the standardisation that is enabling more uniform adoption, which will further increase its effectiveness.

The work undertaken at the turn of the century by the UK Department of Trade and Industry's (DTI's) Avanti information, communications and technology project<sup>1</sup> devised approaches for collaborative working that laid the foundation for the UK BIM processes of today. However, the concept of BIM is not based on a fixed construct, and various aspects of 'building information modelling' have been commonplace – within the construction sector and other manufacturing industries – for many years.

There are many definitions of BIM, but an early interpretation by the Construction Industry Council provided a characterisation and an enthusiastic anticipation of the integration of BIM as 'an innovative and collaborative way of working that is underpinned by digital technologies which support more efficient methods of designing, creating and maintaining the built environment... It has been described as a game-changing technological and cultural process for the construction sector.'

The recent work<sup>2</sup> undertaken on behalf of Innovate UK to create evaluation methods for BIM identified eight specific benefits associated with properly integrated BIM practices:

**Time savings:** BIM has the potential to result in time savings at both the construction and operational stages of the building's life-cycle, through collaboration and information availability.

Access to consistent, reliable data supports the use of offsite prefabricated heating equipment, such as bespoke prefabricated modules for multiple boiler installations – reducing onsite time.

**Materials savings:** There is potential for materials savings across the building life-cycle, by optimising the materials required and reducing waste through improved holistic understanding of current and future requirements.

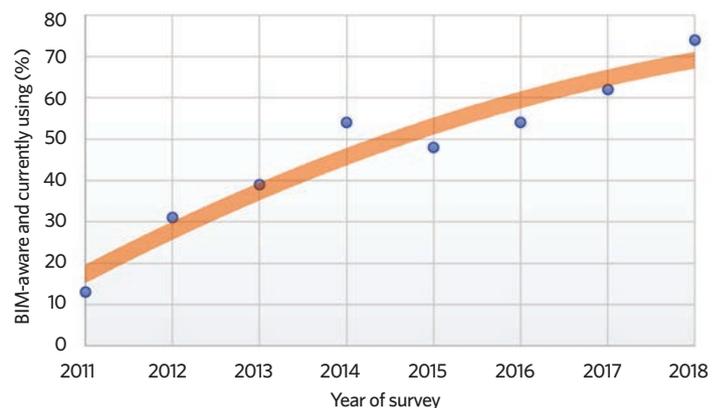


Figure 1: Practitioners who were aware of, and currently using, BIM in their project activities, as reported by the NBS National BIM Report 2018<sup>5</sup>

» **Cost savings:** Cost-saving opportunities arise, for example, from fewer changes, better clash detection, and improved resolution in facilities management and maintenance. For ongoing operation and refurbishment, BIM can provide detailed, linked, up-to-date data that may be used to define offsite prefabricated equipment – such as bespoke pre-assembled multiple boiler installations – reducing onsite labour and lowering cost significantly.

**Health and safety improvement:** This will be experienced throughout the whole building life-cycle. For example, this could include 3D models for improved staff training; live BIM-linked alerts from manufacturers and suppliers; and 4D simulations to optimise and assure health and safety in the construction, operation and demolition activities. (The recently published, freely downloadable, PAS 1192:6<sup>3</sup> gives extensive information in this area.)

**Risk reduction:** Increased accuracy of information about a project or building – and improved visibility about associated costs, delivery timeline and risks – potentially reduce the variability of costs and time required for delivery and operation.

**Improved asset utilisation:** Enhanced information – both pre- and post-construction – that can potentially be used more productively over its lifetime, such as: better space utilisation planning; faster maintenance and refurbishment, through use of an asset information model; and faster BIM-enabled response to incidents. Early visualisation can also help flag issues such as restricted access to a plantroom or limited access to equipment, allowing early plantroom relocation or size alteration as plant selections become better defined.

**Improved quality:** Better oversight in design and construction can deliver increased quality for end users, such as 3D and 4D visualisation, which can lead to improved building and plant layout, or simply produce a more appropriate built environment. Early engagement at the design stage can have a positive impact on the building outcome. For example, manufacturers – with their specialist knowledge and expertise – can advise on where best the HVAC equipment can sit within an overall design.

**Improved reputation:** The insight and operational effectiveness BIM gives can generate enhanced standing for construction clients, asset owners and the supply chains, by improving the experience of those associated with building and service delivery.

The Heathrow Terminal 5 development (2002-08) is widely considered to be one of the key collaborative teamworking projects

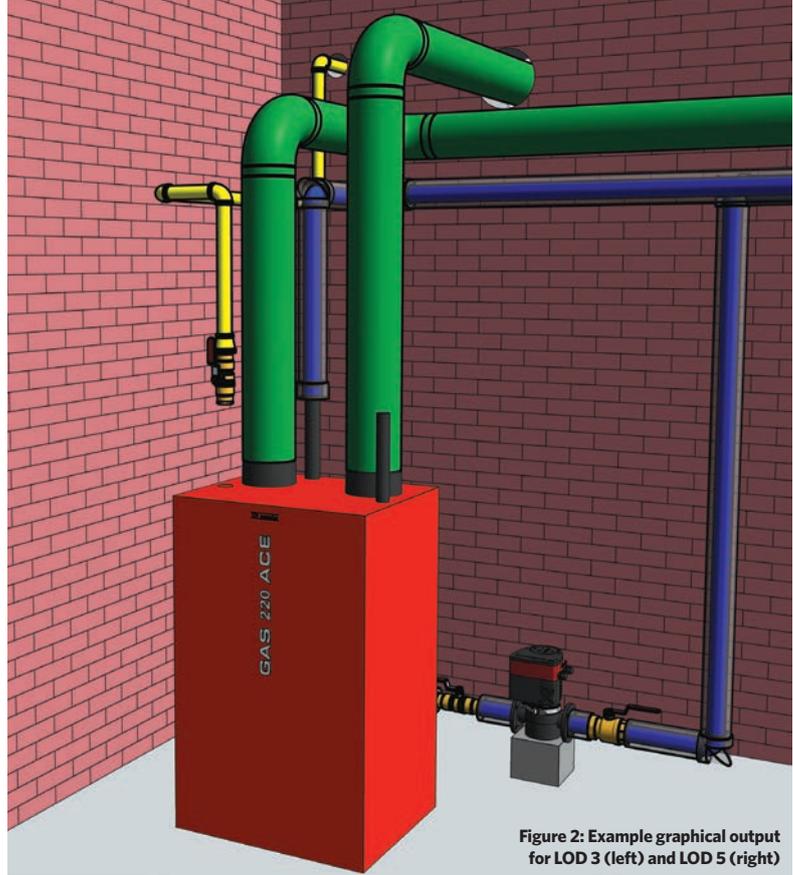


Figure 2: Example graphical output for LOD 3 (left) and LOD 5 (right)

that set the pace for BIM, with a 4D planning tool linking CAD data to schedules, helping to identify potential clashes between contractors – which, it was claimed,<sup>4</sup> saved £2.5m in the first nine months of use. It was around that time that BIM terminology started to gain popular use.

Recent research (Figure 1) indicates that the active uptake of BIM in the building professions has steadily increased since 2011, with more than 70% of respondents to the 2018 NBS National BIM Report<sup>5</sup> saying that they were BIM-aware and applying the processes in their project activities. However, what individuals recognise as ‘BIM’ will vary greatly – from a 3D visualisation (regardless of the ‘richness’ of the embedded or associated parameters), right the way through to intelligently linked, cloud-based building models that draw on connected distributed information for optimisation of integrated multidisciplinary building design, operation and maintenance. The expectations of clients and practitioners can also vary widely.

Around the time of the development of the UK government’s milestone 2011 Construction Strategy,<sup>6</sup> the March 2011 Strategy Paper for the Government Construction Client Group, from the BIM Industry Working Group, was fundamental to corralling the expectations in terms of BIM ‘maturity levels’. The maturity levels (below) have subsequently provided a more clearly defined interpretation for the degrees of integration, and the aspects of BIM and associated information technologies that should be included in projects. The subsequent Construction Strategy 2016-2020<sup>7</sup> has maintained the focus, with UK government projects currently expected to be delivered with maturity level 2 BIM.

### Information sharing

At the core of BIM is collaboration and exchange of information, including contracts, schedules, plans, specifications, layouts, visualisations, construction details, products,

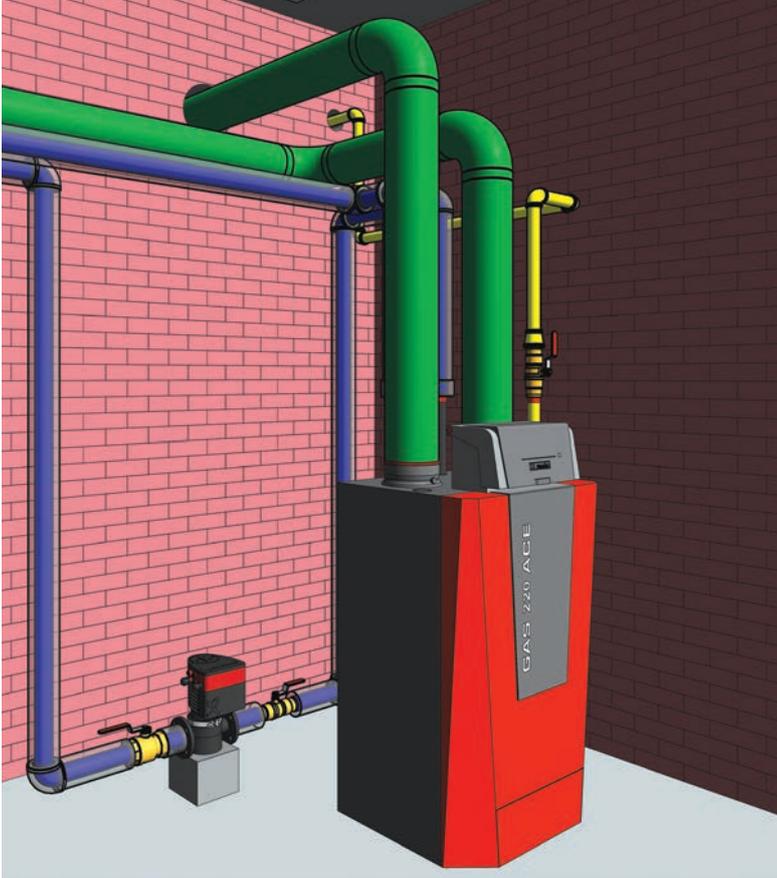
### UK BIM MATURITY LEVELS

**Level 0** – use of 2D CAD drafting with paper-based or electronic print information and data exchange. This was the typical state of the industry in 2011 (and in many cases, still is).

**Level 1** – use of a mixture of 2D or 3D CAD backed by a common data environment for electronic sharing of drawings and data, with a standardised data structure and format. The key standard is BS 1192:2007 + A2:2016. Not all project team members may be sharing models.

**Level 2** – collaborative working across disciplines, with all using managed 3D BIM environments, integrated but not necessarily directly shared and likely to be created in separate discipline-based modelling environments. These models join together to form a federated model, but still maintain their independent integrity. They are likely to include linked cost and scheduling information. This is supported by a plethora of standards, most significantly BS1192:2007 + A2:2016, BS1192:4, PAS1192:2, 3 and 5 and BS8536-1 and 2.

**Level 3** – fully collaborative working across all disciplines using a single, shared project model held centrally and accessible to all to modify and share data.



instructions, manual and more. BS1192 defines the concept of the ‘common data environment’ (CDE) that allows the whole community to access securely appropriate information. This is formalised in four functional sections, delimited with appropriate – and important – sign-off (review and approval process) procedures, which allow data/information to pass between the sections:

**Work in progress** – unapproved information for each organisational role, such as building services designer and architect.

**Shared** – information that has been approved for sharing with other organisations for use as reference material for their own design development.

**Published documentation** – information, such as coordination and validated design outputs, for use by the total project team, including information suitable for tender or construction.

**Archive** – stores a record of the project history, including all transaction and change orders.

Aside from accessibility, the key attribute of the CDE is to ensure ‘information is only generated once and is then reused as necessary by all members of the supply chain... constantly updated and enriched for final delivery as part of the facilities management document’<sup>8</sup>

As well as consistent digital file organisation and drawing conventions – typically as defined in BS 1192 – BIM application requires standardised formatting, typing and granularity for shared information. The depth and detail of the information are discussed in PAS 1192:2. Although these will be project- and component-dependent, the terms ‘level of (model) information (LOI)’ for non-graphical information and ‘level of (model) detail (LOD)’ for graphical information are used to give some reference to information providers at points in the project. For instance, Figure 2 illustrates a simple example of practical difference between a gas-fired hot-water boiler at LOD 3 and LOD 5. The associated LOI 3 is likely to provide a simple requirement of the basic heating load requirement (with approximate physical parameters) for the boiler, and at LOI 5 there would be full information that is product- and manufacturer-specific. Although some indicative guides link LOI and LOD to project stages, the current practice is to define these on a project-by-project basis. The expected minimum levels for each work stage are defined for each project in the BIM Master Information Delivery Plan – which schedules the delivery of information during the project – as described in PAS 1192-2.

For manufacturers and suppliers, the information required will be dependent on the requirements of the specific project. To ease the process of servicing multiple and disparate information requests throughout the whole project life-cycle, a number of information ‘schema’ have been developed to standardise the digital

provision of data from manufacturers and suppliers. For example, the product data template (PDT) – as developed by a cross-industry group led by CIBSE – is a standard ‘questionnaire’ for each equipment type. Each PDT aims to anticipate the information sought by every party – from specification through operations to decommissioning and replacement. The information is produced just once for a manufacturer’s product and will then feed many BIM needs, including consultant, contractor, COBie (post-construction asset information), commissioning engineer and building operator. PDTs are in a universal XML format – and may be viewed as Excel spreadsheets – so are readable by both humans and digital systems, and usable with all BIM platforms.

PDTs are available for many building systems components (as listed at, and freely available from, [bimhawk.co.uk](http://bimhawk.co.uk)). When a manufacturer completes a PDT, it becomes a product data sheet (PDS) – a ‘digital’ description of the product that can be freely distributed. This standard format enables users to automate data operations that extract as much, or as little, information as is needed.

### Changing BIM standards

Standards have continued to develop in the UK’s 1192 series, as they have also evolved in European and international standards documents. The release is imminent of ISO 19650 *Organization of information about construction works – Information management using building information modelling – Part 1: Concepts and principles* and Part 2: *Delivery phase of the assets*, together with a UK National Annex to Part 2 and transitional guidance to move across from the current UK standards. Further international standards are in development to replace the remaining PAS 1192 documents (PAS 1192 – 3, 5 and 6). The change in standards will require a number of fairly minor changes in the way BIM is implemented in the UK. The main principles remain, but some of the descriptors have altered to provide a more universally understood ‘jargon’.

The integration of BIM is no longer a minority activity, and will simply become a normal part of the building construction and building operation process – as have CAD and CDM over the past quarter-century. However, with the growth in distributed digital information services, it is likely that common data environments will become cheaper and more accessible, allowing accelerated integration of BIM into both large and small enterprises.

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■ Turn to page 74 for references.



# Module 134

November 2018

» 1. What proportion of practitioners were reported to be aware of, and currently using, BIM in their project activities?

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

2. Which part of PAS 1192 provides extensive information on health and safety?

- A PAS 1192:2
- B PAS 1192:3
- C PAS 1192:4
- D PAS 1192:5
- E PAS 1192:6

3. Which UK BIM maturity level, for which not all project team members may be sharing models, is defined by 2D or 3D CAD backed by a common data environment?

- A 0
- B 1
- C 2
- D 3
- E 4

4. What does the abbreviation 'PDT' stand for?

- A Product data template
- B Product development template
- C Product digital template
- D Product direct template
- E Product duty template

5. Which soon-to-be-released ISO standard will take over from many of the current BIM standards?

- A ISO 19550
- B ISO 19650
- C ISO 19750
- D ISO 19850
- E ISO 19950

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### Further reading:

A huge amount of material is available on the web. Good places to start include the Scottish Futures Trust website, [bimportal.scottishfuturestrust.org.uk](http://bimportal.scottishfuturestrust.org.uk), and [BIMTalk.co.uk](http://BIMTalk.co.uk)

The collection of relevant current UK BIM standards can be freely downloaded specifically through the link [bim-level2.org/standards](http://bim-level2.org/standards)

### References:

- 1 *The Construction Research Programme - Project Showcase*, UK Department of Trade and Industry, 2007.
- 2 *BIM Level 2 Benefits Measurement*, [www.cdbs.cam.ac.uk/BIMLevels/BBM](http://www.cdbs.cam.ac.uk/BIMLevels/BBM) - accessed 21 September 2018.
- 3 *PAS 1192-6:2018 Specification for collaborative sharing and use of structured Health and Safety information using BIM*, BSI 2018.
- 4 [www.arup.com/projects/heathrow-terminal-5](http://www.arup.com/projects/heathrow-terminal-5) - accessed 21 September 2018.
- 5 *The National BIM Report 2018*, NBS [www.thenbs.com/knowledge/the-national-bim-report-2018](http://www.thenbs.com/knowledge/the-national-bim-report-2018) - accessed 21 September 2018.
- 6 *Government Construction Strategy*, UK Cabinet Office, May 2011.
- 7 *Government Construction Strategy 2016-20*, UK Infrastructure and Projects Authority, March 2016.
- 8 *PAS 1192-2:2013 Specification for information management for the capital/delivery phase of construction projects using building information modelling*, BSI 2013.

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# PRODUCTS & SERVICES

## Vent-Axia shortlisted in Building Awards 2018 with floating home project >

Vent-Axia's Sentinel Kinetic BH MVHR unit is providing energy efficient and effective ventilation to the innovative and exciting 'floating home' project, which has been shortlisted in the Building Awards 2018.

Product marketing manager Ian Mitchell said: 'The Sentinel Kinetic MVHR fits the home's eco credentials perfectly and accommodates good comfort levels throughout the year.'

The pioneering Sentinel Kinetic BH MVHR unit is designed specifically for new-build and low-permeability properties.

■ Call 0844 856 0590 or visit [www.vent-axia.com](http://www.vent-axia.com) and [www.building-awards.com](http://www.building-awards.com)



## Luceco lights the way at Seaton tramway station >

Luceco has lit a new tourist attraction on the Devon coastline. Seaton Tramway operates 14 narrow-gauge heritage trams between Seaton, Colyford and Colyton in the picturesque Axe Valley. Seaton is the gateway town to the Jurassic Coast, a Unesco World Heritage site, and a new £3m building and visitor centre were opened at its award-winning tourist attraction.

A compact highbay was chosen to light four new platforms within the tram station. Installed by REF Electrics, based in Taunton, the IP65-rated Ceres benefits from a computer-designed, die-cast aluminium housing with vortex cooling for maximum LED chip performance. The highbay produces more than 50,000 hours of operational life and a luminaire efficacy of up to 115 Llm/cW.

Available with on/off presence-detection options, Ceres offers 60-, 90- and 120-degree lens variations. The range also includes the Ceres Extra, boasting an efficacy of 140Llm/cW and 70,000 hours of operational life, and Ceres Ultra, with 100,000 hours of working life.

■ Call 01952 238 100, email [uk\\_sales@luceco.com](mailto:uk_sales@luceco.com) or visit [www.luceco.com](http://www.luceco.com)



## > Grundfos helping to rebuild Mosul

Mosul is attempting to rebuild itself after suffering many years of constant bombardment and shelling. The second largest city in Iraq experienced some of the most violent clashes during the recent conflict, which has left the area virtually without infrastructure or access to basic resources.

Grundfos Pumps has been working with the United Nations Development Programme to supply pump solutions and help restore a stable and uninterrupted water supply for half of the three million citizens of Mosul. Grundfos has supplied 50 pumps, including 12 submersible 400kW ones - being used to support a river intake pumping station - and 12 split-case pumps, which are part of a high lift pumping station.



Water is a commodity often taken for granted until the supply is interrupted. Being able to re-establish a reliable water supply to Mosul is going a long way to giving this city back a sense of normality.

■ Visit [www.grundfos.co.uk](http://www.grundfos.co.uk)

## New dehumidifier sales manager at Condair >

Condair has appointed Julien Taschot as business development manager for its range of industrial and commercial dehumidifiers. His role will be to develop sales of Condair's dehumidification systems. 'I am delighted to be joining Condair's UK sales team and to be playing a central part in its focus on dehumidification systems,' said Taschot. 'Condair is largely known for adding moisture to the atmosphere with its range of humidifiers, so this newly created role within the company highlights Condair's commitment to this sector.'

■ Visit [www.condair.co.uk](http://www.condair.co.uk)



## < Riello introduces Condexa Pro

Vokèra by Riello has introduced the Condexa Pro, a high-power condensing, wall-hung boiler, designed with compact dimensions to allow installation flexibility. Luca Pesenti, product manager at Riello Group, said: 'Space-saving design, flexibility and efficient electronic management distinguish the Condexa Pro.' The range extends from 35kW to 131kW, in different configurations. The circulator is on board for models up to 70kW, while the higher-power models can be equipped with a circulator or - in multiple cascades - a two-way cut-off valve.

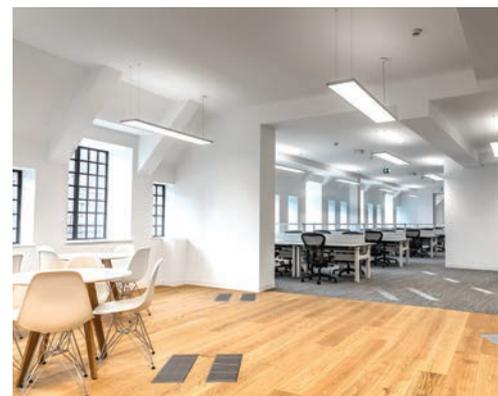
■ Visit [www.vokera.co.uk](http://www.vokera.co.uk)

## AET helps make the most of stunning 33 Glasshouse Street >

AET Flexible Space has returned to 33 Glasshouse Street in London to complete Cat-B fit-out works on the second, third and fifth floors.

Space-saving underfloor air conditioning was specified, helping to maximise headroom in the restricted space, creating a floor-to-ceiling height of 3.3m and large open-plan floor plates for the Cat-A space on floors three to seven. AET engineers carried out additional fit-out works, including the supply and installation of additional fan tiles, return air grilles and underfloor air baffle.

■ Call 01342 310 400 or email [aet@flexiblespace.com](mailto:aet@flexiblespace.com)





Get round to exposed ceilings

Gilberts Blackpool now makes circular plenum chambers to interface with its range of circular swirl diffusers. The zinc-plated plenum boasts enhanced distribution of warm air, so saving energy. 'The trend towards designing an open ceiling with exposed ductwork has meant designers are more aware of the aesthetics of all components of the ventilation system,' said Gilberts' technical director Roy Jones. 'Round, swirl diffusers are being chosen because of the synergy with round ductwork.'

Call 01253 766 911 or email info@gilbertsblackpool.com



Major new launch for control system front-end

Resource Data Management (RDM) has announced a major software upgrade for its control system front-end DMTouch. Set for release in early 2019, Data Manager Software v3.0 will be its biggest development in recent years.

The Data Manager will build on its position as the ultimate gateway to interface with a number of standard and proprietary HVACR and BEMS devices through exciting new additions.

Users can expect major internal changes and a sleek new graphical interface, as well as lots of new demand-driven functions and features, including: additional third-party protocols; build options for either HVAC or refrigeration system layouts; more energy-saving features and tools; and unparalleled accessibility and data export.

The DMTouch is based on open communications and will communicate with multiple third-party protocols and devices. This will give users the option to employ existing HVACR infrastructure that still operates effectively, reducing the time and cost required to retrofit as part of an energy-reduction initiative.

Email hello@resourcedm.com or visit www.resourcedm.com

Upgraded cast-iron condensing boiler available from Hamworthy



Hamworthy Heating has launched the upgraded version of the ErP-compliant Purewell Variheat cast-iron condensing boiler. The Purewell Variheat mk2 features the advanced Siemens LMS controls platform - already used in all condensing, pre-mix Hamworthy boilers. It allows easy cascade options, controlling multiple boilers and hot water at the same time, offering energy-saving benefits, and allowing flexible control regimes for an extended product lifespan.

The new version is also equipped with full-spark ignition, updated from the previous hot-surface ignitor. The core of the Purewell Variheat mk2 remains the same: a proven cast-iron heat exchanger with large waterways, making it tolerant of older heating systems.

A 6-bar pressure rating makes the boiler suitable for high-rise buildings. Product manager at Hamworthy Heating Andrew Dabin said: 'We drew on customer experience to improve access for maintenance and handling. The now full-spark ignitor is easier to service without the need to remove the complete burner.'

Call 01202 662 500, email sales@hamworthy-heating.com or visit www.hamworthy-heating.com

ErP - We are ready

Nortek's ErP-compliant range includes the highly efficient RHeco series of energy-saving, condensing gas, red unit heaters, which has been ErP compliant for years. The Heco range delivers the highest efficiency levels and substantially reduced CO<sub>2</sub> and NO<sub>x</sub> emissions (less than 25ppm). The units exceed the requirements of current Building Regulations L2, with thermal efficiencies up to 109% to provide exceptional levels of seasonal efficiency. The extremely low NO<sub>x</sub> modulating pre-mix burner also enables Breeam points to be claimed, when applicable.

Email erp@nortek.com or visit www.nortek-erp.com



Pumping below a floor void

In situations where there is a long horizontal, open discharge pipe running under a floor void, with no gravity fall, Pump Technology offers the self-contained systems of DrainMinor or DrainMajor. With no obvious static head and an open discharge, however, there is a real chance that the discharge pipework will act as a syphon. This can be avoided by calculating the friction loss in the discharge pipework, then selecting a suitably sized pump, the performance curve of which will cross over the drawn system.

Visit www.pumptechnology.co.uk or follow @PumpTechLtd on Twitter



Rinnai: the 1200i continuous-flow hot-water heating unit - for every commercial site

The HDC 1200i, from Rinnai UK, is now available as a continuous model for use on high-demand commercial sites. The water-heating unit is capable of delivering more than 1,560 litres per hour and can be combined as multiple units into one single, easy-to-handle module, incorporating cascade frames and a common flue. The HDC 1200i gives end users 105.5% net efficiency as the condensing process delivers up to 95% thermal efficiency.

Visit www.rinnaiuk.com



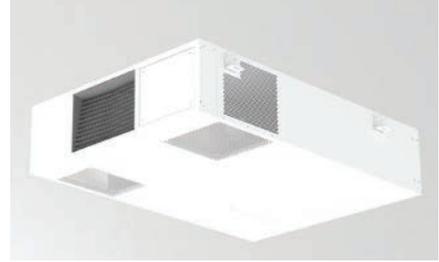
### ◀ New product line launch builds on Mitsubishi Electric's acquisition

Mitsubishi Electric is making further inroads into the IT cooling market with the launch of its new i-NEXT range. The i-NEXT direct expansion (DX) computer room air conditioning range uses advanced inverter technology designed to maximise energy efficiency and help reduce operating costs.

It is the latest edition from the Mitsubishi Electric hydronics and IT cooling systems (MEHITS) portfolio. The high-precision air conditioners are ideal for applications where high sensible cooling and close control of temperature and humidity are required – as is critical in temperature-sensitive data centre environments.

The launch of the i-NEXT DX range establishes a strong position for the company's products within the UK market. Deane Flint, sales director for Mitsubishi Electric, said: 'With the demands for faster, more powerful IT infrastructure only increasing, cooling equipment has never been more important. A critical commercial requirement for data centre managers is to ensure a low overall operating cost.'

■ Visit [gb.mitsubishielectric.com/en/index.page](http://gb.mitsubishielectric.com/en/index.page)



### ▶ Breathing Buildings in double awards shortlisting

Cambridge-based company Breathing Buildings is up for two awards for its new energy efficient, natural ventilation with heat recycling (NVHR) hybrid ventilation system.

Designed specifically to meet the robust ventilation criteria set out for schools, the system is a finalist in the Energy Efficient Product of the Year HVAC&R category at The Energy Awards 2018 and in the Commercial/Industrial Ventilation Product of the Year in the HVR Awards 2018.

Breathing Buildings' new NVHR offers almost 50% reduction in energy savings and so operating costs, and boasts the highest energy efficiency and air flow within the acoustic limits required for its school application.

■ Visit [www.breathingbuildings.com](http://www.breathingbuildings.com)



### ◀ Market survey shows Rinnai is top for quality product in continuous-flow water heating

Plumbing and heating engineers have rated Rinnai continuous-flow units and systems as having 'superior quality' to competitor products. For the survey, Gas Safe-registered engineers answered questions regarding overall satisfaction, brand awareness and product quality. Rinnai's Chris Goggin said: 'We believe our range represents the best value-for-money commercial hot water solution on the market today, and it can be delivered direct to site in one complete, easy-to-manage package.'

■ Visit [www.rinnaiuk.com](http://www.rinnaiuk.com)



### ▶ Precision and process steam humidification with FlexLine Plus and Process

Humidification equipment manufacturer HygroMatik has developed FlexLine Plus and Process heater steam humidifiers, for use in sensitive areas of industrial production and for the stabilisation of the relative air humidity in laboratories and research facilities. Available in one size, FlexLine Plus and Process units offer seven output classes, from 5 to 50kg/h steam output. In hospitals and other medical areas, the units are available with stainless steel cylinders to generate hygienic and mineral-free steam.

■ Visit [www.hygromatik.com](http://www.hygromatik.com)



### ◀ Mikrofill equipment at Shipston High School

In 2017, work began to construct a two-storey block, featuring nine new classrooms, office space and an improved reception, at Shipston High School, in Warwickshire. The stand-alone block, adjacent to the existing building, has been designed to allow staff and students to move around the site safely and easily.

Building services engineers selected Mikrofill equipment for the project. Two Ethos 90kW condensing boilers with a Mikrovent low loss header and pressurisation package serve a radiant panel system and LST radiators. Installed by a long-standing Warwickshire contractor, the stainless steel boilers have a combined modulation of 20 > 1 (180 > 9 kW) and NO<sub>x</sub> levels of 33mg/kW, which ensures the Ethos range far exceeds legislative requirements.

The buildings' hot water requirement is covered by the installation of a single Extreme 200l 'loading cylinder' (pictured, right), which is designed to maximise condensing boiler efficiency by operating at a Δt of 30°C. Coupled with an unvented kit, the Extreme can produce more than 2,000L per hour at 60°C.

■ Call 03452 606 020 or visit [www.mikrofill.com](http://www.mikrofill.com)



The Extreme 200l loading cylinder

**Dormakaba launches new RIBA-approved fire door CPD >**

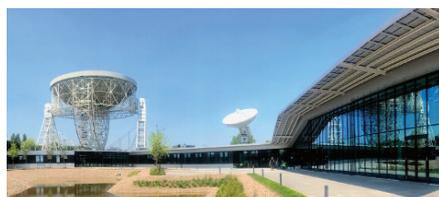
Access and security solutions provider Dormakaba has released a CPD on the requirements for hardware on fire doors. The seminar discusses the legal requirements, the types of certification for fire-door hardware, and the correct application for fire doors. The launch of this CPD coincided with Fire Door Safety Week (24-30 September). Product marketing manager Graham Holland said: 'An understanding of compliance is essential to supply the protection needed for the building and its occupants.'

■ Visit [www.dormakaba.co.uk](http://www.dormakaba.co.uk)



**> Dunham-Bush helps scientists reach for the stars**

Dunham-Bush Panther fan coil units have been installed in the new Square Kilometre Array HQ at Jodrell Bank in Cheshire. The building will be home to the inter-governmental organisation set up to build, manage and monitor the world's largest telescope. The Panther range of horizontal chassis, waterside control units incorporate EC motors for optimal controllability and energy efficiency, and have inlet and discharge plenums with sound attenuators, to meet the building's stringent low-level noise requirements.



■ Call 023 9247 7700, email [info@dunham-bush.co.uk](mailto:info@dunham-bush.co.uk) or visit [www.dunham-bush.co.uk](http://www.dunham-bush.co.uk)

**> Taking heating to new heights with Myson**

Myson's new LST Vertical is designed with safety in mind, and is an ideal heating solution for hospitals, care homes and schools.

It comes equipped with a round steel casing that ensures pipework is concealed. The LST Vertical has a 10-year warranty for both the emitter and casing, and the radiator - which fully complies with NHS guidance notes 1998 - is now protected with anti-bacterial paint.

The new LST Vertical is the slimmest and widest panel low surface temperature radiator on the UK market, with widths ranging between 420mm and 870mm. It joins the rest of the LST family, creating a total range of 94 stocked sizes.

■ Visit [www.myson.co.uk](http://www.myson.co.uk)



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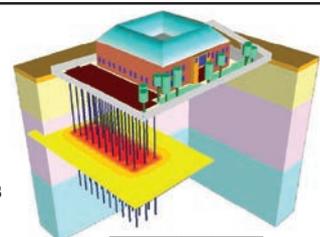
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January 2019	Heat Pumps Renewables Battery storage
February 2019	Industrial and commercial heating and cooling <a href="#">Careers Supplement</a>
March 2019	BIM/digital engineering Air conditioning Chilled beams
April 2019	Datacentres Water heaters <a href="#">Schools &amp; education buildings Supplement</a>
May 2019	Air movement and ventilation Air conditioning <a href="#">Commercial heating Supplement</a>
June 2019	Women in engineering Chillers and air handling units Air conditioning <a href="#">Health and wellbeing Supplement</a>

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Send to: [editor@cibsejournal.com](mailto:editor@cibsejournal.com).

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### **Contract Mechanical Engineer**

**Berkshire, £37p/h**

I have a requirement for a mechanical engineer to work on a temporary contract in Berkshire. You will provide designs from conception through to completion on a large education masterplan in London. The work is predominantly conceptual and detailed on HVAC systems and you must be proficient using Revit. This is a long-term contract. Ref: 5224

### **Intermediate/Senior Revit Coordinator**

**London, to £40k + bens**

International consultancy responsible for London's biggest and most innovative projects across several specialist sectors, urgently seeks an MEP Revit Coordinator with at least 3 years Revit experience to join a rapidly growing team. Fantastic package, progression, and technical development offered within this extremely forward thinking company. Ref: 5210

### **Intermediate – Senior Electrical Design Engineer**

**Surrey, £35k - £50k + bens**

Electrical Design Engineer required for a well-established privately-owned consultancy in Surrey with a technically engaging portfolio of work. My client has been established for over 10 years and are part of an international group who have delivered a draw dropping portfolio of projects in London and across the globe. They have impressive and structured plans to grow the Surrey office over the next 12 – 18 months. The company can offer exposure to full life cycle of projects, career progression, and technical development. Ref: 5155

### **Senior Public Health Design Engineer**

**London, £50k + bens**

With an impressive portfolio of projects completed and a big order book of work they are well established as one of the top engineering companies in the UK with an expanding reach across Europe and Asia. There is now a requirement for a Senior Public Health Engineer to join their London team. Ref: 5229

### **Intermediate to Senior Mechanical Design Engineer**

**London, £50k - £60k + bens**

A national MEP consultancy are urgently seeking a client facing & technically excellent engineer to lead their two flagship projects – one of the largest residential developments in Europe and a confidential aviation project. This role will be split between their London office and on-site. You can expect great project & client exposure in a very flexible environment with scope to progress to Associate. Ref: 5162

### **Contract Electrical Engineer**

**Berkshire, £36p/h**

An Electrical Engineer is required to work on a long-term contract in Berkshire. You will provide designs for Low voltage, lighting, Electrical power distribution and alarm system designs on a large Education masterplan in London. You must be proficient using Revit, Amtech and Dialux software as well as being client facing. Immediate start. Ref: 5223



Reanna Evans

## North star

After winning the CIBSE ASHRAE Graduate of the Year title, NG Bailey's Reanna Evans explains her path into the building services profession

Reanna Evans joined NG Bailey as a first-year building services engineering apprentice in 2011. After completing her apprenticeship, she was sponsored to do a degree in building services engineering, during which time she was asked to be lead electrical engineer on a large logistics and manufacturing centre project in Warrington. After gaining a first-class honours degree from Leeds Beckett University, Evans is now the lead mechanical engineer on a project in Manchester city centre, and is aiming for CEng status. She won the Building Engineering Services Association (BESA) Chairman's Choice Award, and was elected to be a member of the BESA Future Leaders group.

As a STEM Ambassador for the North West, Evans arranges work experience placements for students who have finished college – or are still at school – to give them a better understanding of the building services industry.

### What was it like to win the award?

It's an amazing achievement – and that's an understatement. It's the one accolade of my career I will never forget; the opportunities the award has already presented are invaluable, and I look forward to having more opportunities throughout the year. Not only has it allowed me to be part of the ASHRAE Winter Conference, which I very much look forward to, it has also enabled me to expand my connections further.

### What inspired you to become an engineer?

Throughout my younger years, I was good at STEM-related subjects; I was fascinated by how things worked. I didn't fully understand the roles available within engineering, but I know I wanted to be in the big world, earning a living while attaining a career. I came across the apprenticeship with NG Bailey, and applied. It became apparent the company was working on some of the most prestigious projects the North West had to offer at that time. These projects inspired me to pursue a role within engineering so I could work on buildings that help to make a difference to people's lives, such as hospitals and schools.

### What message do you have for the apprentices you're mentoring?

Take ownership – the work you're given is your responsibility. Challenge yourself; ask what else you can be responsible for, but be responsible, and remember the

reason you're doing your work. It's often for the public, so have these people at the forefront of your mind and be proud of what you do.

Often, engineers can focus on the commercial aspects of a project, but buildings are more than just the bottom line – considering your work ethic, integrity and accountability is also important. If you feel something isn't right, be willing to challenge it and share and discuss your thoughts and beliefs with your colleagues. Don't rely on the reputation of your company to carry you through because, ultimately, it's your name that goes on the drawing. Be proud of this so you can finish the project knowing you've created a safe environment for the people who will occupy that building.

### How did you balance a degree while working at a big M&E contractor?

It wasn't easy, and my social life was sacrificed a little. But it's all about balancing and managing your time. I would dedicate Sunday afternoons to studying, whereas this time would usually be spent out on the family farm. I'd wake up earlier on Sundays to make sure I could fulfill my duties with the livestock, before settling down to study. I'd use a further hour every evening to make sure I was on top of my reading material and note taking.

### What was it like being a young woman on site?

It is challenging, but fun. Being a female on site has shaped who I am, and strengthened me as a person. I've seen a real culture change on site; people seem to be much more aware of diversity, which is great. No two days are the same, and that's what I love about being site-based.

### What was the most challenging project you have worked on?

I was lead engineer on a 16.6-hectare logistics and manufacturing centre for an online retailer, in Warrington. This was a nine-month project that had an M&E value of circa £5m. The timescales given for partial handovers were very tight, which meant efficient planning was paramount with just-in-time deliveries. There were a number of operatives on site to coordinate, so ensuring all safety information was communicated effectively was integral.

**REANNA EVANS** is a senior project engineer at NG Bailey

## NATIONAL EVENTS AND CONFERENCES

**Build2Perform Live**  
27-28 November, London

**SLL LightBytes**  
18 October, Birmingham  
29 November, Belfast  
The 2018-19 series, in collaboration with CIBSE Facilities Management Group.

**CIBSE TRAINING**  
For details, visit [www.cibse.org/training](http://www.cibse.org/training) or call 020 8772 3640

**Overview of IET wiring regulations**  
5 November, London

**Energy surveys**  
6 November, London

**Mechanical services explained**  
6-8 November, London

**High voltage (11kV) distribution & protection**  
9 November, London

**Fundamentals of digital engineering**  
12 November, London

**Air conditioning inspection for buildings**  
13 November, Manchester

**Design of ductwork systems**  
14 November, London

**Building services explained**  
14-16 November, Manchester

**Fire smoke control: matching the method to the building**  
15 November, London

**Practical approach to LV fault analysis**  
16 November, London

**The New London Plan**  
16 November, London

**Variable-flow water system design**  
20 November, London

**Low carbon consultant design training**  
20-21 November, London

**Heat networks code of practice**  
20-21 November, London

**Practical project management**  
22 November, London

**Fire risk management system: PAS 7 2013**  
22 November, London

**Low and zero carbon energy technologies**  
22 November, London

**Introduction to combined heat and power**  
23 November, London

**Practical controls for HVAC systems**  
23 November, London

**Electrical services explained**  
27-29 November, Manchester

**ISO 50001: 2011 Energy management systems/ Low carbon consultant training**  
27-29 November, London

**Fire safety building regulations: Part B**  
30 November, London

**Understanding and application of psychrometric charts**  
30 November, London

**Energy Saving Opportunity Scheme**  
4 December, London

**Energy monitoring and targeting**  
4 December, London

**Energy strategy reports**  
5 December, London

**Air conditioning and cooling systems**  
5 December, London

**Low carbon consultant design training**  
5-6 December, Manchester

**Building services explained**  
5-7 December, London

**Fire safety in the design management and use of buildings: BS 9999**  
6 December, London

## CIBSE GROUPS, SOCIETIES AND REGIONS

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

**Southern: Battery/hybrid home energy storage**  
8 November, Brighton

**CIBSE application workshop**  
12 November, London  
Workshop to help with the Engineering Practice Report for Associate and Member applications.

## Scotland: Servicing historical buildings

13 November, Glasgow  
With speakers Dr Nina Baker and Prof Stuart MacPherson.

## Western Australia: Revised AS 3000 wiring rules

13 November, Perth  
Technical session presented by Don Saunders, of the Building and Energy Division of Western Australia's Department of Mines, Industry Regulation and Safety.

## East Anglia: Heating and cooling trench design

14 November, Cambridge  
Presentation by Verano.

## Southern: Computer-aided facilities management

15 November, Southampton  
Presentation by Mark Turner, head of maintenance, University of Southampton.

## South West: Site visit - The Box

15 November, Plymouth  
Site visit to the Plymouth history centre, The Box.

## Yorkshire: CIBSE Yorkshire Awards

16 November, Leeds  
Celebrating the industry's achievements in the region over the past year.

## Scotland: Annual dinner

23 November, Glasgow  
Annual dinner with networking opportunities and entertainment.

## Republic of Ireland: 50th anniversary dinner and awards

30 November, Dublin  
Celebrating 50 years of CIBSE Ireland with awards, recognising the work of building services engineers in Ireland.

## CIBSE application workshop

3 December, London  
Workshop to help with the Engineering Practice Report for Associate and Member applications.

## HIGHLIGHTS



Clara Bagenal George (top) and Jon Belfield will speak at Build2Perform

## The New London Plan

16 November, London

CIBSE is holding a half-day briefing to introduce the policy proposed in the draft New London Plan for the energy performance of new buildings in the UK capital, and to discuss how this might affect the design and costs of delivering compliance.

Delivered by Matthew Turner, regional director at Aecom and an experienced CIBSE trainer, the morning briefing will cover the proposed changes to energy policy within the draft plan to assist in advising clients.

It will cover the significance of this for the design and specification of fabric and efficiency measures, and the new requirements for the selection of heating systems, and what this means for building design. It will also clarify the changes to the carbon offset costs and give an overview of other energy policy implications.

CIBSE members receive a preferential rate on the cost of the event. For information and to book, visit [www.cibse.org/londonplan](http://www.cibse.org/londonplan)

The new training programme for 2019 has now been released. You can view the full 2019 schedule and book at [www.cibse.org/training](http://www.cibse.org/training)





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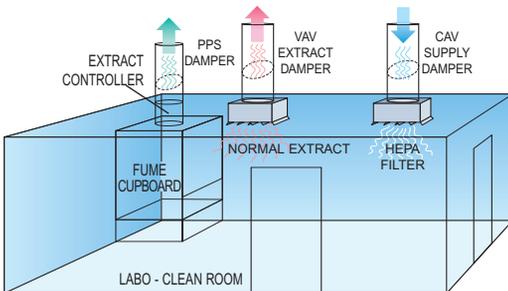


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