



CIBSE **JOURNAL**

#Build2Perform

January 2021

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**TOM HOPTON ON THE
IMPORTANCE OF DATA**
**EMBODIED ENERGY
GUIDE TARGETS MEP**
**SCIENCE IN THE CITY AS
LABS MOVE INTO OFFICES**

ONE LAST CHANCE

**How building services engineers are
responding to the climate emergency**



LUX
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54%
of lighting is still yet
to switch to LED



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of the buildings that will
be occupied in 2050
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Time for action



Now is a good time for engineers to put their names to the Building Services Engineers Climate and Biodiversity Declaration. With Joe Biden becoming US President, there is now a global political will to reduce CO₂ emissions and, in the UK, there are legally binding net-zero targets that no company can ignore.

There is momentum for change – private and public organisations are setting themselves challenging net-zero carbon targets, and it's up to engineers to help them achieve these goals when it comes to the built environment.

Some clients and supply chains may take more persuading than others that urgent action is needed to avert a climate and biodiversity crisis, but building services engineers have the professional duty to do so – especially when you consider that the construction industry accounts for nearly 40% of energy-related carbon dioxide emissions.

On page 22, seven signatories of the declaration discuss the role engineers have in inspiring others to change. As Method Consulting's Natasha Fox explains, the time for talking has long passed: to meet climate goals, zero carbon buildings need to be designed now.

Embodied energy of MEP equipment is one area that needs to be tackled in 2021. With building becoming more efficient and operational energy use falling, emissions generated during the lifetime of a MEP system component become more significant. Until now, it has been very hard to calculate the embodied energy in building services products. Environmental Product Declarations (EPDs) are a standardised way of expressing embodied carbon, but there are few for MEP materials – not just because of their complexity, but also because neither the market nor regulators offer an incentive to provide this information.

This year, CIBSE is launching *TM65 Embodied energy in building services equipment*, which includes a methodology for calculating embodied carbon in MEP products. The idea, according is not to replace EPDs, but to provide a method of estimating embodied carbon for products until EPDs arrive.

Our round-up of Build2Perform (page 18) touches on some of the other big issues that will be at the top of the agenda in 2021, including building safety, Brexit and Covid-19. We also have an interview with Tom Hopton (page 20), CIBSE's reigning Engineer of the Year, who explains how data can unlock the potential of buildings, not only in terms of carbon and cost savings, but also in ways that will benefit the health and wellbeing of society at large.

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What the *Construction Playbook* says about how government should procure and deliver public works



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The new TM65 includes a methodology on calculating embodied energy in MEP products



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How LETI's new retrofit guidance will set out an energy use intensity target for retrofit buildings



Tim Dwyer

This month's CPD is on distributed residential heat pumps integrated with communal heat networks



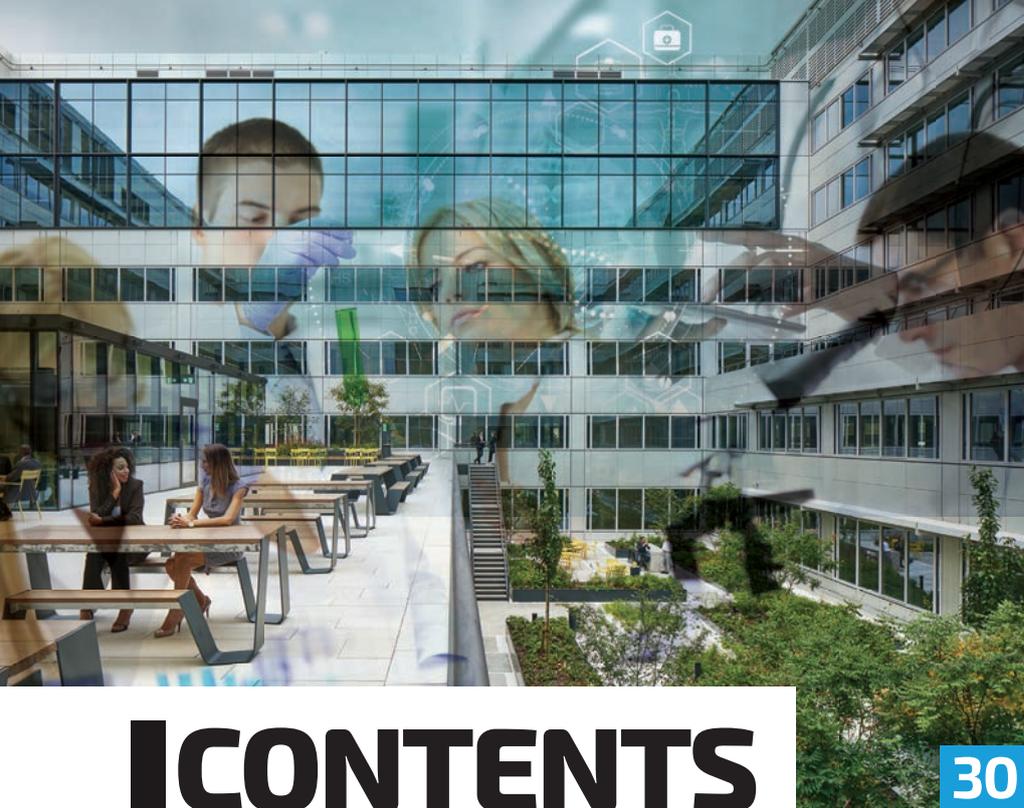
*Models shown KE+ and E+.

Greenstar HIU's now BESA registered. Heat Network CPD also available.

We are delighted to announce that our KE+ and E+ Heat Interface Units (HIU) are now registered to the Building Engineering Services Association (BESA) HIU test regime.

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To view our approved HIU's on BESA's test register visit www.thebesa.com/ukhiu.



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Breathe easy

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Insulation firm ‘rigged tests and lied’

Grenfell Tower Inquiry lawyers accuse Kingspan of ‘secretly perverting science for financial gain’

An insulation manufacturer that provided part of the Grenfell Tower cladding system rigged tests on a competitor’s product and lied about the properties of its own materials, the public inquiry into the tragedy has heard.

Kingspan Insulation hired a PR firm after the fire to lobby MPs and present doctored evidence that its own combustible PIR insulation was no more dangerous than a rival manufacturer’s non-combustible mineral wool product. The lobbying targeted senior ministers and the chair of the parliamentary housing committee, who were considering an immediate ban on combustible materials in high-rise buildings, the inquiry was told.

Kingspan was accused by the inquiry’s legal team of seeing the aftermath of the tragedy as a ‘commercial opportunity’ and ‘doing its best to ensure that the science was secretly perverted for financial gain’.

Head of technical and marketing Adrian Pargeter was confronted with evidence in the form of text messages between members of his team admitting that they lied about the materials used in a test to ensure

their Kooltherm K15 product, which formed a small part of the Grenfell cladding, would achieve a Class O rating, allowing it to be used on high-rise buildings.

Kingspan also threatened the NHBC with legal action if it prohibited the use of its K15



The Grenfell Tower fire in June 2017 killed 72 people

board on buildings above 18m, the inquiry was told.

An internal Kingspan email presented to the inquiry revealed that one of its technicians had rigged tests on the non-combustible mineral wool material, used by its competitor Rockwool, a year after the disaster, to show it in a poor light and suggest it could be equally dangerous in certain circumstances.

Earlier in the inquiry, another Kingspan employee apologised for angrily rejecting contractors’ concerns about the safety of K15 insulation. In emails, Philip Heath, Kingspan’s technical manager, said he was being mistaken for ‘someone who gives a damn’ and asked a friend to imagine ‘a fire running up this tower’.

One of the concerned firms, Bowmer and Kirkland, submitted its questions to the façade engineer, Wintech, which informed it that the Kingspan product should not be used in buildings over 18m. ‘Kingspan keep repeating that the product... is suitable for use in buildings over 18m. What they fail to say is that it is suitable only in the configuration tested,’ Wintech wrote.

The inquiry will resume on 11 January, after a Covid-positive test led to a suspension of the hearings. Transcriptions of the hearings can be found at bit.ly/CJJan20GTI

Manufacturers face ‘challenging questions’ and new Brexit rules

Construction product manufacturers will face increasingly searching questions about the performance data they publish following the public inquiry into the Grenfell Tower fire disaster, according to CIBSE technical director Hywel Davies.

Speaking at a webinar hosted by the CIBSE Patrons during the Build2Perform online conference, Davies said this should not prove to be a problem for companies ‘who have everything in order’, but that others may find it challenging and could be forced to repeat tests to satisfy the new regulatory authorities.

He told Patrons’ vice-chair Scott Mason that firms should also be preparing for the new post-Brexit regime. CE marking will continue to be accepted as evidence of legal compliance in the UK for the whole of 2021, but will be superseded by the new UK Conformity Assessed (UKCA) scheme from the start of 2022.

Companies will also have to use UK-registered certification bodies to achieve the UKCA mark and Davies warned that there could be a significant testing backlog if manufacturers do not move quickly to put plans in place for the change. This could be exacerbated by the Grenfell inquiry, which has raised questions about the safety and compliance of certain products.

‘If you are managing a project, you should be asking yourself now what equipment and materials you will need in the first few months of 2022,’ Davies told the webinar. ‘Imagine a building safety inspector turning up and asking to see evidence that the products you have on site are compliant.’

He also warned of the possibility of a ‘major hiatus’ towards the end of 2021, when specifiers may put pressure on manufacturers to supply them before the CE mark transition period ends.

For more information about CIBSE Patrons, visit www.cibse.org/patrons

Building safety bill ‘lacks detail’ on key new roles

The British Safety Council (BSC) has criticised the government’s proposed building safety legislation, saying it ‘lacks the requisite detail to demonstrate that the proposed measures would be effective in practice’.

The council said it supported independent oversight of the new roles of accountable person and building safety manager, but called for the government to clarify what the ‘precise responsibilities’ of these roles were and how specific professions will be affected. It added that the situation where leaseholders are being forced to pay for remediation work on unsafe buildings ‘must come to an end’. The way the proposed bill was worded, however, suggests that this ‘frankly unjust’ practice would continue, the BSC continued, and this should be changed before the legislation is enacted.

‘The government must commit to funding the cost of fire remediation and leaseholders should not have to foot the bill,’ said BSC chief executive Mike Robinson, who added that the new regulations needed to be transparent if they were to secure public confidence.

‘A good example is the testing of building material,’ he said. ‘The tests must be rigorous to prove fire safety, but the results must be publicly available, particularly where materials have failed to meet regulatory standards.’



Driving towards a **zero carbon future** and carrying the baggage of outmoded practices at the same time?

How real-time monitoring and product management can help us lose the baggage...

How is it possible to change design methodologies without real and meaningful data that allows us to think about buildings as individual, dynamic environments? The availability of information can often lead to issues over privacy. It is a common complaint amongst colleagues wrestling with this dilemma who find data is unavailable or lacking in context.

Gaining a good understanding of how buildings perform post occupancy is vital. There is a huge performance gap between how energy consumption is estimated and real consumption in use.

The selection and appropriate sizing of water booster sets continues to be a challenge as we move towards matching product to real-life demand.

Creating a system that promotes usable data visibility, improved service and maintenance efficiency and helps us to exceed customer expectations at the same time is possible.

DAB D.Connect supports all of these goals, providing real-time information through interaction with HVAC pumps, Water Booster Sets, Pressurisation Equipment and Controls. A full suite of parameters from power consumption to delivered flow is always available and quick to view anytime, anywhere. Rolling data retention and detailed reporting allows for forward planning and facilitates a constant improvement culture.

DAB D.Connect can be used to improve efficiency in multiple environments including heating, air conditioning, rain water management, irrigation, water boosting and waste water.

The internet of things, IOT, is growing fast, and for good reason. It makes things faster, more efficient and more comfortable. It supports convenience and feeds the need for information. Since its inception in 2009 the concept of connectivity has developed at a rapid rate. 2020 predicts in excess of 50 billion devices connected worldwide. There are many potential benefits of incorporating connectivity into building designs. Not least of all reducing the service and maintenance element of the lifecycle cost.



D.Connect allows the customer to automatically predict when equipment needs maintenance rather than relying on routine scheduling. Remote management allows for the optimization of equipment performance in real-time. A fully visible suite of parameters and remote adjustment allows for ongoing improvement and instantaneous problem solving. Adaptive remote alarms mean that true 24 hour maintenance and customer support is possible. D.Connect works alongside and compliments standard BMS systems, it also works in the absence of a BMS.

Due to the development of D.Connect, DAB have been able to implement extended warranty packages which include commissioning, system monitoring, alarm notification, reporting and data retention along with on-site system checks.



HEATING



CONDITIONING



RAIN WATER HARVESTING



GARDEN & IRRIGATION



WATER BOOSTING



WASTE WATER



Cyber security has been a prerequisite in the design of D.Connect. The system and components are tested to the most stringent international protocol.

To learn more about the way D.Connect can enhance a building design and to test a specific configuration requirement visit;

www.d-web.co.uk/dconnect

OFFSITE METHODS HELP DELIVER HOSPITAL EARLY



A £350m hospital built using offsite construction methods has opened four months ahead of schedule. The early delivery of Grange University Hospital, Gwent, is helping Aneurin Bevan University Health Board cope with winter pressures and Covid-19. Aecom was the building services engineer and director Richard Mann said: 'Our engineers' involvement from the outset of the project has resulted in modern methods of construction being at the heart of the design approach.' The project delivery team was a collaboration of Gleeds, Laing O'Rourke and BDP, with engineering services by Aecom and WSP. The NEC supervisor was Arup.

Government's new procurement guidance targets low tenders

Bids that are 10% below the average of all put forward will be referred to Cabinet Office

Public sector clients will have to refer some of the low-cost bids they receive for construction work to the Cabinet Office for extra scrutiny under new procurement guidelines coming into force this month.

The government's new 'Construction Playbook' advises public sector procurers to avoid awarding contracts that offer heavily discounted upfront costs. Any bid that is 10% below the average of all those put forward for a project will have to be referred to the Cabinet Office before being awarded. It also recommends that public projects make more use of standardised components and assemblies to ensure better lifetime performance.

The playbook was developed by the Cabinet Office in partnership with the industry and sets out how the government aims to achieve project delivery that is 'faster, better and greener'. It includes advice to make wider use of modern methods of construction and to engage with suppliers earlier in the procurement process. Social value will also make up 10% of awarding criteria from the start of 2021 and the Cabinet Office is working with the industry to develop a clear definition of whole-life value. This is set to be published later this year.

The playbook also addresses the issue of suppliers being forced to take on too much risk, and states: 'The fundamental principle is that contracts should be profitable.' It warns clients against issuing incomplete tender documents with poorly defined specifications, which increase the risk for bidders. It says clients should not expect suppliers to take on unlimited liabilities.

CCC: UK must match EU F-Gas rules

The Committee on Climate Change (CCC) has called on the government to match or exceed future changes to European F-Gas regulations to control emissions of global-warming gases used in refrigeration and air conditioning.

Its Sixth Carbon Budget also wants the government to improve enforcement of the regulations and ban sales of refrigerant gas to the general public.

The government advisory body notes that the EU is reviewing the F-Gas regulation with a view to strengthening measures, and it wants the

UK to keep pace with that ambition, even from outside the union. The committee is also calling for the Environment Agency to be 'sufficiently resourced' to carry out inspections and enforce the measures.

In addition, refrigerant-handling training should be improved, says the CCC. It recommends that the government consults with the industry to bring training up to date and ensure untrained individuals are not able to buy gas and carry out DIY work, such as topping up car air conditioning units.

Vaccine cold chain under attack

Hackers are targeting the 'cold chain' supply system being used to deliver the emerging Covid-19 vaccines, according to IBM's Security X-Force. Cold chains ensure vaccines are kept at the temperatures required to maintain their viability while moving around the globe.

IBM believes phishing activity started in September and has covered six countries. It is aimed at organisations with links to the Vaccine Alliance's Cold Chain Equipment Optimisation Platform (CCEOP) programme and the 'precision targeting of executives and key global organisations' suggests the hacking has 'nation state' support.

The US government's Cybersecurity and Infrastructure Security Agency has urged anyone associated with the storage and transportation of a vaccine to remain vigilant.

Last month, America acknowledged that it has been the target of a sophisticated months-long breach. The US energy, treasury and commerce departments were among those targeted.

Health infrastructure plan gets green light

The government's Health Infrastructure Plan – including six confirmed major hospital projects worth £2.7bn, due to be delivered by 2025 – is under way.

According to market analyst Glenigan, it is the biggest hospital-building programme in a generation. The projects aim to use more standardised design elements and make use of modular construction methods to speed up development.

Matt Hancock, Secretary of State for Health and Social Care, said: 'We are giving the green light to more than 40 new hospital projects across the country, six getting the go-ahead immediately, and more than 30 that could be built over the next decade.'

Fastest growth since 2014 for construction

November recorded the fastest growth rate in new construction orders for more than six years, according to the buyers' index IHS Markit/CIPS UK Construction Total Activity, which rose to 54.7, up from 53.1 in October.

Housebuilding was the best-performing sector, with an index of 59.2, while civil engineering returned to growth at 52.3 and commercial work rose to 51.9. Any figure above 50 in the index represents growth.

These were the fastest growth rates since October 2014 and were down to clients feeling more confident and releasing spending held back during the Covid-19 lockdowns, according to survey respondents.

However, this bounce pushed up demand for construction products and materials. This placed extra pressure on supply chains, leading to longer lead times, transport delays and shortages of stock, the buyers reported.

Covid-19 drives record drop in emissions

The Covid-19 pandemic has produced the biggest annual fall in CO₂ emissions since World War II, according to new analysis.

Overall, emissions are down by almost 7%, with the biggest falls reported by the UK and France because of their particularly tough lockdowns. China, on the other hand, is expected to record a rise in emissions because of the speed of its economic recovery after the first wave of pandemic measures.

The Global Carbon Project research says worldwide emissions will be down by 2.4 billion tonnes in 2020 – compared with just half a billion tonnes after the 2009 economic crash and one billion at the end of the war. UK emissions will have fallen by 13%, and French emissions by 15%, with average falls of 12% across Europe and the US.

More than 50 cities on target to help climate

With a total population of more than 200 million, 54 cities are meeting their targets to keep global warming below 1.5°C and tackle the climate crisis, according to new research.

The Deadline 2020 Programme, launched in 2016 by the C40 group, is working with cities to deliver objectives in line with the 2015 Paris Climate Agreement. These include the need to reduce greenhouse gas emissions, adapt to the impacts of climate change, and deliver wider social environmental and economic benefits.

C40's research reveals that the initiatives taken by the cities could prevent at least 1.9 gigatonnes of harmful emissions from being released this decade.

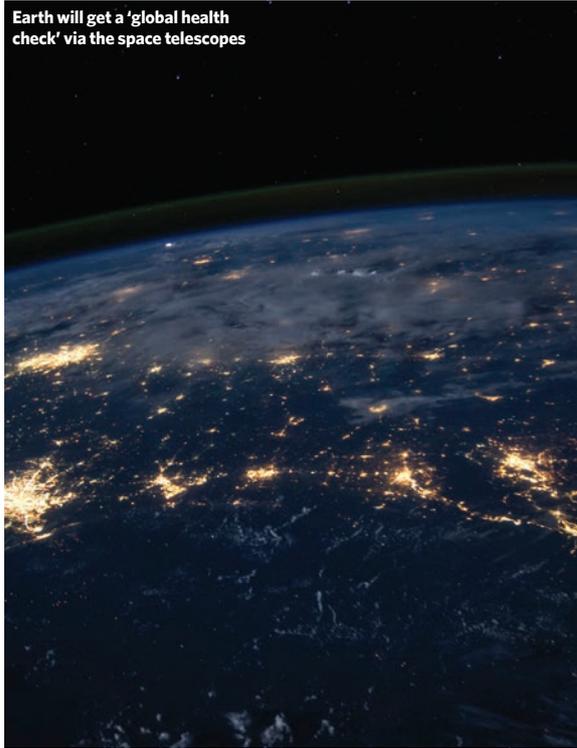
£65bn needed to pay for zero carbon heat

A report from more than 200 built environment organisations says around £65bn will have to be invested in low and zero carbon heating for the UK to meet its climate change goals.

The Coalition for the Energy Efficiency of Buildings says the investment is needed to get homes up to EPC rating C or above. It points out that massive investment will be needed in district and electric heating, as well as alternative fuels, while the replacement for the Renewable Heat Incentive should offer help towards upfront costs.

TELESCOPES TO MONITOR ENERGY EFFICIENCY

Earth will get a 'global health check' via the space telescopes



The University of Cambridge has received government funding to use space telescopes to monitor the energy output of buildings on Earth.

The Institute of Astronomy will focus high-resolution, thermal infrared telescopes in low Earth orbit to give buildings a 'global health check'. The technology can identify anything bigger than around five metres across that is using large amounts of energy, including buildings, aircraft, lorries and ships.

The University of Cambridge was one of 21 organisations awarded a share of more than £7m from the UK Space Agency's National Space Innovation Programme. 'This technology can... let us know if the world is on target to meet its carbon-emissions targets,' said the institute's Dr Ian Parry. 'It also makes it clear who needs to act, and what they have to do, if targets aren't being met.'

Carbon budget urges greater ambition from government

CCC's Sixth Carbon Budget says UK should aim for 78% emissions cut

The UK should be more ambitious and aim for a 78% cut in greenhouse gas emissions by 2035, according to the Committee on Climate Change (CCC).

In its latest advice to government, the independent parliamentary group said this accelerated goal was essential if the country was to achieve net zero by 2050. It represents a considerable step up from the original Climate Change Act, which only committed the country to reducing net emissions by 80% by 2050.

The new goal was the headline measure in the CCC's Sixth Carbon Budget, which covers the period between 2033 and 2037, and is the 'toughest yet', according to MPs. It states that the government will need to allocate £50bn more each year to decarbonisation by 2030 than it did in 2019.

Chief executive of the CCC Chris Stark said the UK would have to decarbonise at a faster pace in the next 30 years than it has in the past 30 to deliver its net-zero promise – including moving to net-zero heating systems

by the early 2030s as part of a major retrofit programme covering most of the country's 28 million existing homes.

Stark said decarbonisation needed to be 'front-loaded' with more being done in this decade and the first half of the carbon budget period than in later years, to reduce the cost of transition and provide technology incentives for investors through policy certainty.

The committee also revised down the cost of delivering net zero to between 0.5% and 1% of gross domestic product (GDP), from between 1% and 2% of GDP, because economies of scale were driving down the cost of certain technologies.

Stark said the UK economy would grow by just 3% less through to 2050 by aiming for the net-zero targets than it would under its original Climate Change Act Commitments.

'As we emerge from the Covid-19 pandemic, the Sixth Carbon Budget is a chance to jump-start the UK's economic recovery,' said CCC chair Lord Deben. 'Anything less would shut us out of new economic opportunities. It would also undermine our role as president of the next UN climate talks.'

It's good to stand out from the rest

Introducing the new

Titon Ultimate™ dMEV



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IN BRIEF

UK membership closing date looms

The closing date for UK-based Associate and Member applicants is 1 February.

You can now apply via our online portal on the website by uploading the following documents:

- Your CV – outline your work experience in chronological order
- Engineering Practice Report – 4,000-5,000 words on how you meet each relevant competence criteria. This should include an introduction and a list of projects on which you have worked
- Development Action Plan – identify your short-, medium-, and long-term professional goals
- Organisation Chart – demonstrate where you sit within your team/organisation
- A copy of your degree certificate, signed by your sponsor (if applying for IEng or CEng).

For further information on the application process, visit www.cibse.org/closingdate

Applicants based outside the UK can submit their application at any point throughout the year.

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If you are still to do so, simply log in to your MyCIBSE account to pay online, or call the membership team on +44(0)20 8772 3650 to make payment over the phone.

We look forward to helping you stay connected and up to date with the industry throughout 2021. Find out more at www.cibse.org/renew

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CIBSE and ASHRAE sign partnership agreement

A working group between the two organisations will enhance collaboration and communication

CIBSE has signed a refreshed strategic partnership agreement (SPA) with the American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) to further develop the organisations' working relationship and reinforce benefits to members and the society at large.

The SPA will create a roadmap to advance and promote the mutual interests of CIBSE and ASHRAE, with a practical commitment to work together on activities that serve their respective memberships and the wider public, and promote a more sustainable world. Joint initiatives will aim to accelerate the progression of digital technologies and virtual design and construction, to improve the resilience of buildings and occupants' health in an increasingly challenging climate.

The newly signed SPA has already created a working group between the two organisations to enhance collaboration

and communication, and to drive forward technological and sociological initiatives. This group will also examine measures to: mitigate against pandemic threats; deliver fair, universal access to safe and healthy built environments; and improve equality, diversity and opportunity in the building services industry.

In practical terms, the agreement strengthens the relationship between, and global reach of, the two organisations, improving the quality of services and output in the home markets, while reducing costs and overlap. More widely, the organisations can improve offerings through a coordinated approach.

Signing the agreement, CIBSE President Stuart MacPherson said: 'We are delighted to strengthen the long-standing relationship between our organisations. The increasing local and global challenges of maintaining safe, healthy and efficient built environments marks this as a particularly auspicious time to share knowledge and expertise.'

ASHRAE president, Charles E Gullledge III, said: 'Our continued collaboration with CIBSE provides a meaningful opportunity to coordinate efforts on innovative technologies and resources to advance the growth of the built environment. We value this partnership with CIBSE and are excited to leverage this collaboration to move the industry and buildings towards a more sustainable future.'

About CIBSE and ASHRAE

Founded in 1897, CIBSE is the professional body that supports the science, art and practice of building services engineering, for the public benefit, by providing members and the public with first-class information and education services, and promoting the spirit of fellowship that guides our work. Founded in 1894, ASHRAE, Atlanta, Georgia, advances the arts and sciences of heating ventilating, air conditioning and refrigeration to serve humanity and promote a sustainable world.





IN BRIEF

First winner of Alfred Leung Memorial Award announced

Tandzhu Isufov, of EECO2, has won the inaugural Alfred Leung Memorial Award, presented for outstanding achievement in promoting building services engineering across the community.

Isufov (below), who graduated with a distinction from the MSc building services engineering degree at Leeds Beckett University, was recognised for his work in creating a collaborative platform between the industry and the academic institution.

He will receive a cash prize and his name will be inscribed on a trophy that will be on display at the university when circumstances allow.

The award was inaugurated by the CIBSE Merseyside and North West Region, in honour of former regional chair Dr Alfred Leung, who died in 2020.



Call for symposium papers extended

The deadline to submit papers for the 2021 CIBSE Technical Symposium has been extended to 11 January.

The 2021 theme is 'Engineering the built environment for a new "normal" – delivering safe healthy and versatile buildings'.

Submissions should be in the form of a 250-word abstract for your proposed paper, review, case study or poster presentation.

The 2021 event – which encourages industry practitioners, researchers and building users to share experiences – will take place on 13-14 July. For details visit www.cibse.org/symposium

Mei wins inaugural Young Modeller prize

Atelier Ten's Meredith Davey won the Building Simulation Award for his presentation on Jewel Changi Airport

Awards event recognises creativity and innovation in building simulation

The CIBSE Building Simulation Awards 2020, which this year included the new Young Modeller Award, were announced as part of Build2Perform Live.

Weijun 'Allen' Mei, of Cyclone Energy Group, Chicago, was the recipient of the first Young Modeller Award, earning a £500 prize.

His submission included 140 models on which he had worked, and May was praised by the judges for his advocacy of performance-based compliance and modelling support design, and improving commercial software development. His work helping students to be more exposed to real-world modelling practices through universities and mentoring was also noted.

A high commendation was awarded to Nishesh Jain, PhD student researcher at the Institute of Environmental Design and Engineering at University College London, in recognition of his outstanding work on knowledge transfer and making building simulation design accessible.

The Young Modeller Award was launched in 2020 to recognise the outstanding contribution of young engineers, apprentices and sustainability consultants working with building simulation.

In the main Building Simulation Award, six entries were shortlisted to present their papers at the live event, with each then facing a Q&A with the judges.

Meredith Davey, from Atelier Ten, was announced the winner, for his presentation on Jewel Changi Airport. He received a £1,000 cash prize.

The project, which included the world's largest indoor waterfall, stood out to the judges for the attention to detail and the methods used to understand

the implications of the design desires, particularly in relation to the effect that aspects of the design would have on thermal comfort.

The two runners-up were: Shane Orme, of WSP, for his modelling of the world's tallest tower, which was commended for the representation of physics; and Adrien Dumolard, of E-nergy, for his innovative method to minimise simulation and analysis time.

Darren Coppins, chair of judges, said: 'Accurate modelling for real performance is an opportunity for our sector to rise to the challenge that the climate crisis presents. The six exceptional shortlisted entries set the bar for the rest of our community to follow.'

Judge Gabriella Costa added: 'What stood out was the potential for building simulation to move away from an energy-based simulation engine to a more holistic comfort, health and wellbeing tool.'

The annual awards, set up by the CIBSE Building Simulation Group, aim to encourage innovation in building simulation techniques.



Weijun 'Allen' Mei won the Young Modeller Award

IN BRIEF

CIBSE welcomes CCC report

The first carbon budget for a net-zero carbon UK, as well as a routemap to deliver it – at lower overall GDP costs than previously estimated – has been welcomed by CIBSE.

The Climate Change Committee (CCC) recommendations for the building sector align with what CIBSE has been advocating: reducing demand; energy efficiency; and the electrification, and building, of the supply chain for low carbon heat. Hydrogen cannot currently be relied on to play a significant role or reduce the need for all of these.

The next steps are clear: turning this routemap into a regulatory framework for safe, healthy and comfortable net-zero carbon buildings.

Register for awards' virtual ceremony

This year, for the first time, the CIBSE Building Performance Awards will be held virtually, on 25 February, so more people than ever will be able to attend.

This year's shortlist includes many international entries, with buildings from Japan, UAE, Hong Kong and Australia featuring in the five project categories. The buildings and projects demonstrate exemplary practice in engineering energy-efficient, high-performing buildings, and highlight the value in sharing knowledge globally.

The awards will also include the new Covid-19 Achievement Award, with the shortlist expected to be announced this month.

View the shortlist and book your free place at www.cibse.org/bpa

New members, fellows and associates

FELLOWS

Fernandez, Keith Gerard Jude
Greenford, United Kingdom

Mauthoor, Muhammad Taariq Hussein
Port Louis, Mauritius

Parmar, Shunil
Moorabin, Australia

Suthakaran, Felix Emmanuel
High Wycombe, United Kingdom

Wilson, Robin
Nottingham, United Kingdom

MEMBER

Al Balushi, Ibtihal
Muscat, Oman

Alam, Mohammad Mahtab
Dubai, United Arab Emirates

Ali, Syed Mustafa
Doha, Qatar

Barham, Bashir
London, United Kingdom

Branson, Warren
Burton-on-Trent, United Kingdom

Barden, Jason
Milton Keynes, United Kingdom

Bones, Joshua George
Brigg, United Kingdom

Chan, Man Sze
Tseung Kwan, Hong Kong

Craig, Thomas
Dubai, United Arab Emirates

Dickinson, Kristian
Knaresborough, United Kingdom

Gkritzapi, Evangelia
London, United Kingdom

Jonas, Jason Mario
Cape Town, South Africa

Kalua, Amos
Blacksburg, United States

Kennedy, Matthew
Dubai, United Arab Emirates

Lau, Ka Wah
Tokwawan, Hong Kong

Lo, Cheok Kuan Jebb
Tsuen Wan, Hong Kong

McCartan, Catherine Bridget
Newry, United Kingdom

Newnham, Paul
Sharjah, United Arab Emirates

Ng, Yee On
Kwun Tong, Hong Kong

Papantoni, Maria
London, United Kingdom

Rossi, Francesca
London, United Kingdom

Rowlatt, John
Nottingham, United Kingdom

Saleh, Mamoun
Abu Dhabi, United Arab Emirates

Sou, Cheng Ip
Macau, China

Stevens, Robert
Solihull, United Kingdom

Tester, Sean-Paul
Rowley Regis, United Kingdom

Tsui, Kwong Lam
Chai Wan, Hong Kong

Tu, Kin Man
Tuen Mun, Hong Kong

Walker, Jonathan Mark
Cashel, Ireland

Weir, Stephen
Ashbourne, Ireland

Wong, Pak Chuen
Kwun Ton, Hong Kong

Yeung, Man Keung
Kwun Tong, Hong Kong

ASSOCIATE

Cashmore, Ryan Liam
Leeds, United Kingdom

Marsh, Candice
Gibraltar, United Kingdom

Mumford, Bruce
Cockermouth, United Kingdom

Scott, David
Bromsgrove, United Kingdom

LICENTIATE

Ammon, Ciaran
London, United Kingdom

Biddle, Thomas
Reading, United Kingdom

Boone, Sam
Clacton-On-Sea, United Kingdom

Breslan, Lewis
Exeter, United Kingdom

Clark, Samuel
Hornchurch, United Kingdom

Clegg, Louis
St Albans, United Kingdom

Forde, Denisha Leah Sian
Isleworth, United Kingdom

Fowakes, Lamar
Banstead, United Kingdom

Graimes, Adam
Bexley, United Kingdom

Heppell, Bradley
Nairobi, Kenya

Hewitt, Thomas
Newcastle upon Tyne, United Kingdom

Hunter, Sean
Warwickshire, United Kingdom

Kelly, Liam
London, United Kingdom

Leathers, Harry
Hoddesdon, United Kingdom

Martin, Jesse
Upminster, United Kingdom

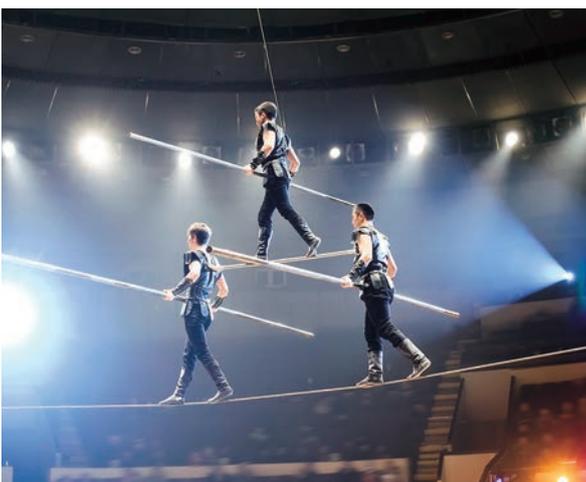
Osborne, James
Hertford, United Kingdom

Randhawa, Cameron
Hounslow, United Kingdom

Rolfe, Paul
Windsor, United Kingdom

Taylor, Ellis
Hessle, United Kingdom

Whiteside, Scott
Braintree, United Kingdom



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Anything but play

After the government announced measures to improve collaboration with industry, minimise greenhouse gas emissions and support the UK recovery from Covid-19, Hywel Davies considers the likely impact

On 8 December, the government, in partnership with the Construction Leadership Council, launched *The Construction Playbook*. Billed as a means to drive construction-sector productivity and innovation, and ‘deliver public sector works in a more modern and efficient way’, it sets out to capture commercial best practices and deliver sector specific reforms.

It outlines government’s expectations of how public contracting authorities and their suppliers, throughout the supply chain, should engage with each other to deliver public sector works faster, better, greener and more digitally.

The playbook sets out 14 key policies, detailing how government should assess, procure and deliver public works projects and programmes. It is supported by the simultaneous issue of a new Procurement Policy Note, which all central government departments and their arms’ length bodies are mandated to follow on a ‘comply or explain’ basis. The new arrangements will be assured through existing governance arrangements, including Cabinet Office spending controls.

The plans feature several ‘green initiatives’, including whole-life carbon assessments to understand and minimise the greenhouse gas (GHG) emissions footprint of projects. Other measures seek to minimise resource and energy use, cut waste and increase biodiversity.

All contracting authorities must develop an overarching sustainability framework, with systems and processes ‘to ensure their projects and programmes deliver on the targets set’. They should also set out how they will achieve net-zero GHG emissions by, or ahead of, 2050 for their entire estate or infrastructure portfolio. Crucially, and challengingly, that includes their existing buildings and assets. The aim is to harness the collective buying power of the public sector to drive change in the delivery of public works, reduce greenhouse gas (GHG) emissions, and achieve sustainable outcomes.

Digitalisation is prominent in the announcement, too. It seeks to embed digital technologies, including the adoption of the UK BIM Framework to standardise the approach to generating, classifying and exchanging data, all in a security-minded way. The plan supports adoption of modern methods of construction and digital



“There is a clear call for industry to learn from the Grenfell Tower tragedy and for the construction sector to put safety at the heart of everything it does”

ways of working as it seeks harmonisation, digitalisation and rationalisation across projects and programmes, and increased use of standard products and components.

In introductory remarks to the playbook, government chief commercial officer Gareth Rhys Williams and chief executive of the Infrastructure and Projects Authority Nick Smallwood emphasise the need for industry to support it. They call for ‘continuous improvement in building and workplace safety, cost, speed and quality of delivery, greater sharing of better data, investment in training the future workforce through upskilling and apprenticeships, and adoption of the UK BIM Framework’.

They describe the playbook as a ‘compact’ between government and industry on future working arrangements. ‘Only by acting together and aligning our efforts can we achieve enduring reform: improving the public works we deliver, meeting the everyday needs of the people that use them, and providing value for money for the taxpayer.’

It is perhaps unfortunate that such a serious and far-reaching drive to reform public sector procurement is called a ‘playbook’, with the connotations that brings. It is anything but playful, with phrases such as ‘comply or explain’ and ‘mandated’ alongside softer language about ‘providing greater certainty to industry through long term plans’, ‘building positive relationships’, and

‘incentivising industry to innovate by focusing on outcomes’. To underline the serious intent, Cabinet Office Minister Lord Agnew, said: ‘As the largest construction sector customer, government is in an ideal position to ensure that the industry is productive, professional and delivers value for money for taxpayers.’

There is also a clear call for industry to learn lessons from the Grenfell Tower tragedy, and for the construction sector to ‘put safety at the heart of everything it does’.

There is a clear and serious intent to *The Construction Playbook*. It may not be appropriate to put it under your Christmas tree, but perhaps serious readers of the *Journal* should unwrap it early in the new year and familiarise themselves with the content, especially if you are to work with the public sector in the months and years ahead.

● Read *The Construction Playbook* at bit.ly/CJJan21HD

DR HYWEL DAVIES
is technical
director at CIBSE
www.cibse.org

Thriving in the fourth industrial revolution

Automation of simple M&E tasks will free up engineers to develop innovative zero carbon designs, argue CIBSE's Carl Collins and Jagannatha Reddy

The current drive to digitise the construction industry corresponds to the automation of tasks that has been going on for thousands of years. This started in ancient history, with the advent, for example, of simple levers and wheels to lift stone or bring the harvest in on carts.

Mechanical automations reached a turning point in the middle of the last millennium with the introduction of the printing press and, later, the automatic loom. These inventions turned tasks that were previously human-centred into ones that could be done by fewer, less-skilled people, resulting in unemployment for the previously well-paid and highly skilled jobs of scribe and weaver.

The Luddite movement of the 19th century sought to protect the highly skilled jobs from the rise of the demonic machines. This concept is now refuted by the 'Luddite fallacy' – that automating tasks does not lead to less employment, but actually creates more jobs than it removes. As people can do more with less, we are free to pursue other tasks and pastimes, which, in turn, creates jobs to support these activities.

How is this reflected in the digitisation of the construction industry? We are all aware that many of the design and construction tasks previously done by skilled designers and contractors are now being done by machines, whether that be analysing building physics, sizing pipes or surveying progress on site, which can all be carried out with computers and their ancillary devices. So, what of the design engineer, the pipe fitter, and the surveyor? If machines are doing all the work, what do they do?

Well, the machine is only as good as the information it is fed. Take the experience of the pipe fitter, for example; they are required to make the machine perform at least as well, so the task moves from the site to the factory, where the pipe fitter can produce prefabricated sections more quickly, cleanly and accurately.



Who are the new Luddites?

In 2018, we were all discussing digitisation within the architecture, engineering and construction (AEC) industry, and a few of the key buzzwords were robotic process automation (RPA), digital twin, internet of things (IoT), and digital site survey.

In 2020, it all came into reality, with prototype and pilot projects on which we can see fixed-mindset engineers/supervisors (20th-century Luddites) opposed to digital initiatives. No technology will replace technical judgements, but it can help. Let's see how digitisation increases the job opportunities with the current Covid-19 situation.

RPA, for example, will help engineers to automate repeated tasks – it doesn't mean RPA will replace your job; you are still required to develop, validate and make sure RPA is working as it should.

Similarly, digital twin with IoT will help the facility management (FM) and operations and maintenance (O&M) teams predict issues/faults on site – even working from home during the pandemic. Digitisation secures your job and makes this 'business as usual'. Moreover, it has increased the demand of FM and O&M roles in the current Covid-19 situation.

Mechanical, electrical, public health, fire and security technicians, supervisors and engineers can diagnose and resolve issues remotely, with minimal physical presence. Asset management teams will get the bigger picture of asset performance, where the engineers can monitor and control assets remotely.

Developing the scripts for 3D modelling and automating the engineering calculations will not replace the BIM modellers' and design engineers'

jobs; it will increase the efficiency of individual tasks and improve overall performance. BIM modellers and engineers are still required to develop, run and validate the scripts and automated calculations.

Automation through digitisation allows the contractor/

"As Darwin showed, it is not the strongest or most intelligent of a species that survive, but the one that is most adaptable to change"

CARL COLLINS
head of digital engineering at CIBSE

JAGANNATHA REDDY
lead digital engineer at Arcadis

consultants/clients/business owners to run their business as usual, which contributes to the country's economy. There is no job threat as such with automation and digitisation. Embracing the technology increases the opportunities during this fourth industrial revolution (automation through digitisation). In fact, during the Covid-19 pandemic these have been the most demanded roles in the market.

Only those who do not allow technology to assist in what they do will be seen as the new Luddites. This is not intended to be a disparaging reference – it is a reflection of the parallels between where we were, where we are, and where we need to be.

As Charles Darwin showed, it is not the strongest or the most intelligent of a species that survives, but the one that is most adaptable to change.

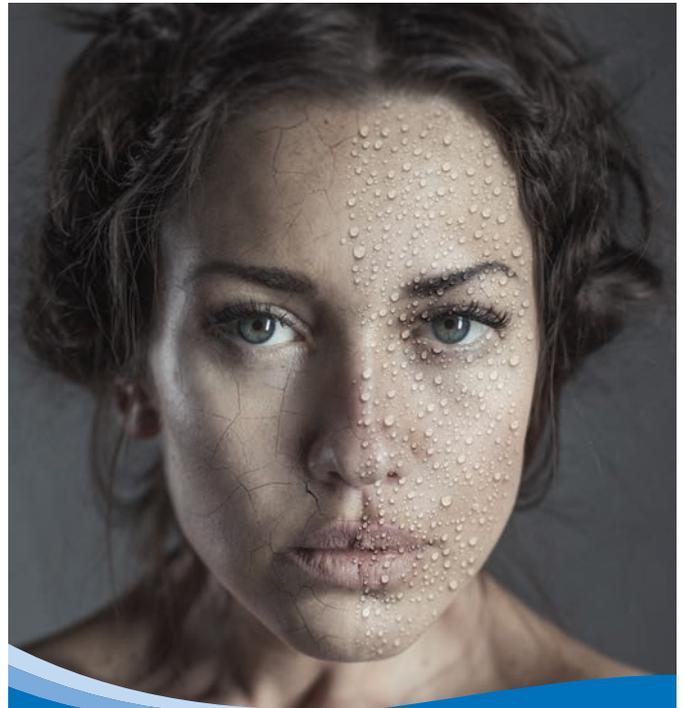
What future does our history point to?

As we have seen throughout history, every advance is met with resistance, because it is human nature to fear change. In almost all instances, however, the change has come to pass and those resisting it either change tack and embrace the change, or they become irrelevant to the mainstream economy.

Some traditional methods usually persist, but these are either curios or heritage industries. They will not support the bulk of construction jobs. Also, with the world changing at pace, we know there will be a lot of construction work to be done to refocus the ways we work, rest and play.

Automation through digitisation will be the key to unlocking the amount of work we need to do with a dwindling workforce. It will also leave the designer, the analyst and the contractor free to do the work that machines can't yet do: the artistry of engineering and construction, the innovative ideas that will help our low carbon future – basically, all the interesting stuff that we have no time to do now. Sounds good to me.

Engineers harnessed the power of digital tools at a recent 'one working day challenge', organised by the Society of Digital Engineering



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Achieving net-zero carbon was one of the key themes at the CIBSE Build2Perform online conference, alongside building safety, Brexit and minimising the risk of Covid-19. Alex Smith, Liza Young and Phil Lattimore hear how engineers are responding to a changing landscape



MOVEMENT FOR CHANGE

CIBSE's Build2Perform conference was virtual last year, but this did not stop industry speakers addressing some of the biggest issues likely to affect building services in 2021. These include Brexit, Covid-19, the Building Safety Bill, and the drive towards net-zero carbon.

As *CIBSE Journal* went to press, the UK and EU had not concluded a trade deal, but – even with a deal – the changes to trade and movement of people will have long-lasting consequences for industry.

Peter Raynham, professor of the lit environment at UCL and chair of the British Standards committee on light and lighting, discussed how the UK would no longer be able to influence European standards when it left the European technical standards organisations, such as CEN. Until the UK writes its own laws, he said, it will follow EU regulations and directives. It will remain a full member of the European technical standards organisations CEN and CENELEC until the end of 2021, but there could be divergence between the UK and Europe after this. He added the UK would no longer be able to block European standards, even though UK firms would have to comply with them if they trade in Europe.

The UK has a significant presence on standard committees, making up around 30% of the leadership. Raynham said there is a big question over whether this will continue. 'Why would the EU want to pay people to generate documents that they're not going to use themselves,' he asked.

Building-safety reforms

A session on building-safety reform outlined some of the major changes in regulations and responsibilities that the government's new Building Safety Bill will bring to the sector.

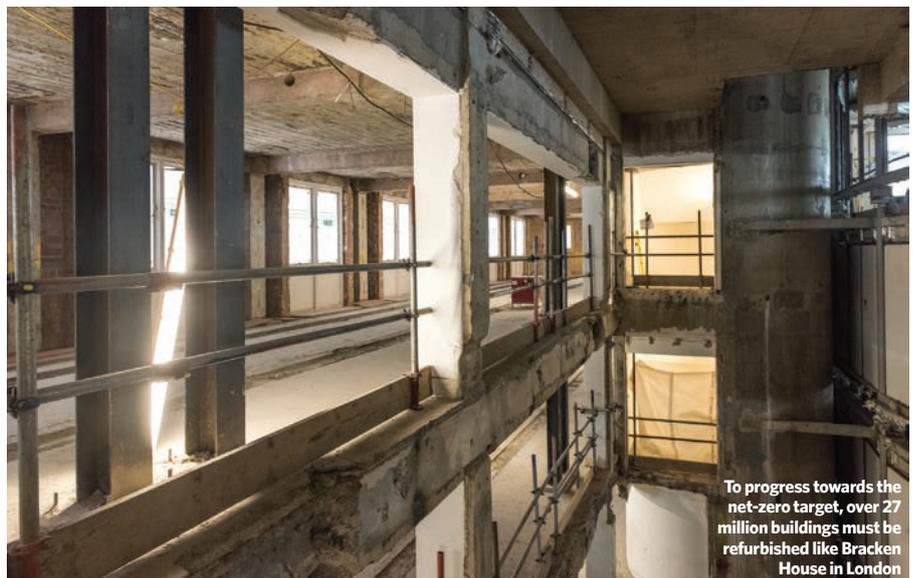
These include the establishment of a Building Safety Regulator (BSR), the creation of a new regulatory regime and building control system, and the introduction of new competence arrangements. The bill also demands a major change in industry culture and working practices, and a commitment from industry to embrace new standards.

Gillian Kiy, regulatory interventions lead, Building Safety Programme, at the MHCLG, said the new regime would put residents first. 'It's about establishing a culture

where individuals are encouraged to report occurrences to promote safety,' she said.

Dr Scott Steedman, BSI director of standards, discussed the institution's work developing a competency framework in response to the Hackitt report and draft legislation. BSI is developing competencies and standards against which firms can benchmark themselves, he said, adding: 'There has to be a culture of understanding the impact of your work on the work of others.'

In the session on Covid-19, Chris Iddon, CIBSE Natural Ventilation Group chair, looked at how buildings could be protected from the virus over winter. He reminded the audience that smaller droplets or aerosols containing the virus can remain airborne



To progress towards the net-zero target, over 27 million buildings must be refurbished like Bracken House in London



“There has to be a culture of understanding the impact of your work on the work of others”
 – Dr Scott Steedman

for several hours, and build up in a poorly ventilated room. Increasing ventilation rates helps dilute the virus, but other factors needed to be taken into account in colder months, Iddon added, such as occupant discomfort, excess heating energy and the risk that the ventilation system might be switched off. He said some HVAC systems would also struggle to temper air at high outdoor airflow rates.

Net-zero carbon

In the ‘net-zero carbon’ session, Simon Wyatt, partner at Cundall, said the UK’s legal target of net-zero carbon emissions by 2050 was hugely ambitious. ‘There’s nowhere left to hide – every sector in society has to decarbonise and rise to the challenge,’ he added.

Wyatt pointed out that 400 local authorities have launched climate emergencies and are aiming for net zero much sooner than 2050. Bristol and Inverness, for example, are aiming for 2025, while London and Manchester are targeting 2040 and 2038 respectively.

Over the past year, Wyatt said he had seen a large increase in ethical/green finance. This has been driven, in part, by the task force on financial-related disclosure set up by the Bank

Extinction Rebellion floated a replica of a British house on the Thames to draw attention to climate change

of England, which requires organisations and funds to report the risk of climate change to their business, and put adaptation and mitigation strategies in place. Pressure was coming from occupiers too, said Wyatt, adding: ‘We’ve had a number of tenants turn around and threaten to move out of buildings.’

To achieve net-zero carbon in buildings, he said, energy consumption would have to reduce by 60%, which equates to the building energy target of around 55KW per m² quoted by LETI and UKGBC. With lower operational carbon, embodied carbon becomes more important, said Wyatt, who cited CIBSE’s TM65 *Whole-life carbon of building services* for calculating embodied carbon in building services, and said a RICS framework could be used to calculate the structure and fabric.

Carbon offsetting should only be done once emissions from construction and operations had been cut, he added. ‘You’ll see a lot of greenwash, where people have paid a small amount of money to offset their carbon footprint, which is unacceptable.’

Universities’ green credentials are being assessed alongside their student experience and academic offering, said David Stevens, vice-chair of the CIBSE Facilities Management Group, who highlighted a great disparity in wealth across the sector. With Covid-19 accelerating the trend towards online learning, he said the sector should divest itself of poorly performing buildings and allow the private sector to improve performance.

In the retrofit session, it was highlighted that if we are to make any significant progress towards the net zero by 2050 target, over 27 million buildings must be refurbished – and one in five of these is a heritage building.

To retrofit the 20 million non-domestic premises in the UK, Passivhaus Trust’s John Palmer said demand needed to be balanced with generation on a regional – or even country – scale, rather than looking at individual buildings.

He said energy use would need to be a quarter of current usage. To achieve this, high fabric performance would be required and the cost, difficulty and risk of refurbishing heritage buildings would have to be reduced.

UCL’s Dr Peter Rickaby added that the performance gap was ‘an attention to detail deficit’, which, he said, *PAS 2038 Retrofitting non-domestic buildings for energy efficiency* will help to address.

The session on ‘Ventilation, energy efficiency and overheating, and the Building Regulations’ provided an update to Part L and Part F of the Building Regulations in England and the future development of SAP.

Speakers included Peter Rankin, from the MHCLG, who said it was important that compliance tools such as SAP and SBEM ‘were up to the job’. As buildings use less energy, he added, any quirks or shortcomings will become more apparent and significant.

CIBSE’s Julie Godefroy and Thomas Lefevre, of Etude, outlined the SAP and Reduced Data SAP (RdSAP) 11 scoping project, commissioned by BEIS. This will look at how the standards can improve to produce pertinent and comparable energy assessments of future homes. ‘Our aim is to identify key issues between SAP and the ecosystem, and outline 20 key recommendations for the improvement of SAP,’ said Lefevre. **C**

■ Access the 2020 Build2Perform Live session on-demand from £20 at www.build2perform.co.uk



Limiting Covid-19 risk is still vital, despite the vaccines



Post-Brexit trading rules and regulations are still evolving



THE NEW NORM MUST BE SMARTER

CIBSE Engineer of the Year **Tom Hopton** spent 2020 looking at how data could help building owners respond to the upheaval caused by Covid-19. He tells **Alex Smith** how analytics is boosting the performance of buildings while responding to the needs of occupants

When Buro Happold associate Tom Hopton was presented with the 2020 Engineer of the Year Award last February, it was just more than a month before the UK entered its first lockdown in the face of rising Covid-19 infection rates.

For many engineers the economic shutdown meant work was put on hold, but this wasn't the case for Hopton. As leader of Buro Happold's global smart buildings group, he was quick to deploy technology in response to the disruption caused by Covid-19.

'History shows us that, in difficult times, we have always looked to technology to find answers, and the Covid-19 pandemic is no different,' says Hopton.

'For all its disruption, we should reflect on the pandemic as an opportunity for positive change. Trends around agile working, healthy buildings and operational efficiency have accelerated during the pandemic, and we must build on this momentum as we face the global challenges of economic recession and climate emergency.'

Hopton believes smart technology can help create agile, productive and enriching environments that are necessary to tempt people back into buildings after the virus recedes.

'When people go back to work, they need to feel safe, but they should be in an environment where they can thrive,' he says. 'The vast amount of data generated by buildings should be optimising building performance in areas other than energy efficiency – such

as health, wellbeing and productivity, and maintenance.'

Post-Covid, Hopton predicts that staff will return to the workplace, but not five days a week. 'People recognise the need for an office, but they are no longer factories of production,' he says.

'Workplaces need to offer flexibility, with more facilities and concierge services. Rather than predominately being a place to "produce" they become a destination for 'collaboration.'

DATA-ENABLED DIAGNOSTICS

Unlocking a building's potential can be inexpensive if you can use existing data to reveal building issues, says Hopton. One common controls issue that can be quickly rectified is changing HVAC time schedules and control set points and programming, so that they correspond better to demand.

'We often see time schedules that have not been optimised,' says Hopton. 'By looking at lighting PIR sensors, we can see when buildings are occupied and, often, it reveals HVAC running when no-one is there.'

In one case, the building occupier was able to save £18,850 a year by changing the schedules, without affecting occupant comfort.

In another building, Buro Happold found that CO₂ levels – which are an indicator of outside air levels – were varying on every floor of a high-rise office. It suspected this was caused by the stack effect, resulting in energy loss through infiltration. The hypothesis was proven after Buro Happold studied data from differential pressure sensors in vertical riser ducts, and, after consulting the FM team, found that a motorised damper had not been installed. Fixing the issue saved £4,300/yr.

Unlocking performance

Hopton's smart building's group aims to unlock the performance potential within buildings by analysing data from a host of data-generating systems inside and outside a building. He says the focus is not just on energy, but also on improving space utilisation, health, wellbeing and productivity, and optimising the 'core output of a building', whether that be increasing a buildings' yield or reducing resource consumption.

By analysing data already generated by a building, Hopton says there are plenty of easy wins. 'I have yet to come across a building that is not long overdue a "service":' Hopton describes several levels of BMS 'serving' where his team diagnose problems to realise a beneficial outcome (see panel, 'Data-enabled diagnostics'). He believes new buildings should be designed to automatically find faults.

'Buildings deteriorate over time if they are not being monitored continuously against key performance indicators. As an industry, we need to put more thought into how we tailor control systems for our clients and pay greater attention to the stakeholder engagement process, design, specification, commissioning and curation of data sets withing systems.'

While it's not always possible to engage with the end users of buildings to understand their requirements, Hopton says designers can look at the wealth of lessons learned and best-practice documents on this discipline. At the recent CIBSE Build2Perform virtual conference, he demonstrated how a forensic analysis of data achieved cost, carbon and occupant benefits.

'The important lesson was that we didn't need to change any major physical attributes,' he says. 'We were using the technology we already had to expose the data, then we carried out diagnostics before fine-tuning the system to achieve significant carbon and costs savings.'

Another dashboard gave insights into environmental productivity. In his presentation, Hopton explained how Buro Happold collated academic research, unified it in a model, and exposed it to the BMS data. The team quantified the number of hours of productivity lost with different environmental conditions. 'It was an invaluable tool for FM to prioritise its limited resource to where it would have the greatest business impact,' says Hopton.

Social value

Hopton believes connecting buildings and collating data in an open, but anonymised, data-exchange platform has to be a priority for this industry. 'We have to catch up with other industries and find our place in the fourth digital revolution,' he says. 'Why? Because it has the potential to generate huge financial benefit for building and city infrastructure, fuel a growing building optimisation marketplace, and provide us with a much-needed roadmap toward a zero carbon future.'

Hopton says there are challenges – such as legacy systems, desperate buildings, data privacy and cyber security – but believes the reward warrants the effort to overcome these. New developments could benchmark design solutions using data from recently completed buildings. Energy aggregators would be able to work with

"We have to find our place in the fourth digital revolution because it has the potential to provide us with a much-needed roadmap toward a zero carbon future"

building owners on demand-response initiatives, providing resilience for both building owners and grid suppliers. These insights can be beneficial to broader society, too, says Hopton, who is passionate about using data analytics to give occupants an environment that allows them to thrive, and not be hindered. He has measured CO₂ readings of more than 5,000ppm in an existing further education building. 'The impact on the academic attainment of students – our social future – should not be overlooked,' says Hopton.

If building data could be collated and analysed at a national and granular level, Hopton says society could invest in evidence-based strategic policies. 'Our industry aim must to make data more accessible to all the stakeholders who can gain value from the insights it can reveal,' he adds.

Hopton may only be wearing the Engineer of the Year crown for another few weeks, but it's clear his field of expertise will be hugely influential as the building services industry continues to adapt to a data-driven future. **CJ**

■ Find out who takes the 2021 Engineer of the Year crown at the Building Performance Awards www.cibse.org/bpa



Tom Hopton at the CIBSE 2020 Building Performance Awards

LIFE-LONG LEARNING

A CIBSE fellow before his 40th birthday, Hopton's career is notable for his willingness to learn and share knowledge. He works with CIBSE and the Building Controls Industry Association (BCIA) to develop standards and guidance around controls ICT and technology, and finds time to teach at Bath College. Impressively, he first taught at Bath while he was still completing his degree.

'I feel it's important to contribute to the industry,' says Hopton. 'We can't move forward on our goals on our own. We need to make sure there is a succession of engineers moving into the industry who can pick up the baton.'

Hopton's prize-winning record is all the more impressive when you consider that he did not start a career in building services until he was 27. After school, he had a succession of jobs – some 'quite colourful' – before he decided to go back to college. He had average grades at GCSE, but always had an aptitude for maths and science. He found his calling when he enrolled on an engineering National Diploma at Bath College.

He came across Buro Happold during an engineering showcase at the college and completed a week's work experience with the company. Soon afterwards, he started working there as a trainee technician. Buro Happold then sponsored him through his HNC, HND and degree programmes – and he hasn't looked back since.

As more and more organisations sign up to Building Services Engineers Declare, seven signatories explain the movement's significance and meaning

ENGINEERS RESPOND TO THE EMERGENCY



More than 80 organisations have become signatories of the Building Services Engineers Climate and Biodiversity Declaration since it was established in 2019. This is an independent initiative for engineering consultants, specialists and academics to declare their intentions to do something about the climate and biodiversity emergency.

There are 11 principles, including raising awareness of the climate and biodiversity emergency, sharing knowledge, collaborating to improve resource efficiency, and accelerating the shift towards low-energy design.

Below, seven signatories explain why building services engineers need to take a lead in the movement, and describe what they are doing to tackle the climate crisis.

A steering group has been established for the Building Services Engineers Declaration, to advance the principles, share ideas and explore best practice. Organisations can sign up at bit.ly/CJJan20CE

Similar principles are contained in: Architects Declare (bit.ly/CJJan20CE1), Structural Engineers Declare (bit.ly/CJJan20CE2) and UK Contractors Declare (uk.buildersdeclare.com).

For more details, visit www.constructiondeclares.com

Ashley Bateson FCIBSE

Building Services Engineers Declare steering group chair and partner at Hoare Lea



Tackling climate change and protecting biodiversity are among the greatest challenges of our time. As population growth and industrialisation continue to depend on the combustion of fossil fuels and deforestation, we see the impacts on both a regional and global scale. Climate change is

leading to rising temperatures in the atmosphere and oceans, and increased frequency of flooding and heatwaves. Loss of green space, woods and forests is damaging biodiversity and accelerating species extinction.

Reduction in green infrastructure further exacerbates global warming by eliminating the capacity of vegetation to absorb carbon dioxide, the predominant greenhouse gas. The construction sector has a significant role to play in mitigating these environmental changes, and architects, engineers and other construction professionals are becoming more outspoken about the need to act collectively to tackle these challenges.

Andrew Leiper MCIBSE

Principal engineer and net-zero carbon lead at Max Fordham



At 38, I like to think I'm still quite young; however, to the children 'school striking for the climate', I'm sure my generation looks firmly part of the climate problem. The generation before me was talking about climate change; my generation has been talking about climate change; and, having young children myself, I know now is the time to act to end greenhouse gas emissions.

At Max Fordham, our partners and employees recognise that we are in the midst of a climate and biodiversity emergency. We signed the declaration as a public demonstration of our commitment to be part of the solution. We believe we can help start the transition to net zero carbon today by shifting a design team's focus beyond minimising regulated energy consumption and towards minimising actual energy consumption in use, and by always investigating the feasibility of non-combustion-based heat sources, such as heat pumps.

Even if you're not sure your organisation or client is taking active steps to lower their buildings' carbon emissions, start the conversation about the climate and biodiversity emergency, net-zero carbon, and the future. These discussions can spark ideas and inspiration in design



“The time for just talking about this has long passed, and initiatives such as the climate declaration movement can help to bring engineers together”
– **Natasha Fox**

teams, and help spread interest and understanding throughout industry and the wider public.

David Buick
Regional director, building engineering, at Aecom



My early career was strongly influenced by CIBSE past-president Terry Wyatt and his determination to help the planet by delivering low-energy buildings. In the early 2000s, I was asking clients to target Energy Performance Certificates of A and, latterly, I have worked

on school projects with some of the lowest Display Energy Certificates in Wales, as well as low-energy acute hospitals. I am a member of Aecom's UK and Ireland Zero Carbon Taskforce, leading our KPI group to support our zero-carbon commitment. Using the WWF carbon footprint calculator, I have reduced my personal carbon footprint by 60% in a year; there is more to do.

The principles of low-energy and carbon design have always been in the building services engineers' armoury. The 'be lean, be clean, be green' – and now 'be seen' – principles are still the same. A passive design approach is key, and this can only be achieved through close collaboration with all building partners, including clients and the end users of buildings. Also key is to set and agree operational energy/carbon (kWh and

kg/CO₂/m²) and embodied carbon (kg/CO₂/m²) targets that are challenging but deliverable. We know we can already deliver very low operational energy buildings, but it would be great to go back to a time when engineers fully inspect, witness and monitor building performance at post-occupancy stage to ensure design performance.

Our newest and most pressing challenge is to deliver zero embodied carbon buildings with building partners. One way to achieve this is by encompassing digital transformation to deliver the offsite and modern methods of construction. This approach will drive industry towards a time we probably all spent as kids making infinite 'lego' buildings that meet the 'holy grail' of a circular economy for reusable buildings that will minimise carbon footprints for future generations.

Marian Ferguson
Founding director of Energylab Consulting



As building services engineers, we have a huge impact on the environment around us. Yet our profession does not get the airtime that others do. We need to ensure we make our voices heard. No-one will do it for us – we need to action from within. That's what I hope this declaration will do, and why Energylab signed up.

As building services engineers, we can do a lot. We have input during every step of the process, from inception, through design, procurement, construction, handover and beyond. The decisions we make in the early stages of a building's development will be far reaching during its entire lifespan. We have the ability to exert influence in the decision-making process; we must use this influence wisely and make our intentions known. By signing up to the declaration, we can harness the power of the collective voice.

Engineers can do so much to transform our approach to designing low carbon buildings. However, I feel strongly about reuse, refurbish, repurpose. Sustainable design is much more than renewable energy and zero carbon buildings. It's about the circular economy and looking at what resources we already have. Together with other industry professionals, we should look much more at this as a viable alternative to demolition and new build.

Natasha Fox
Partner at Method Consulting



We have always had a focus on sustainability but, even so, we found the declaration a helpful way to pause and think about where we were currently. Before signing, we carefully considered each point and identified where we could improve and push things further. We then used this to create an action plan, which is something I recommend for anyone thinking of signing, so you

understand your strengths and weaknesses.

The visibility of the declaration renewed our focus of championing zero carbon with our clients and industry colleagues; it is encouraging to see other building services engineers doing the same.

The time for just talking about this has long passed, and initiatives such as the climate declaration movement can help to bring engineers together, as well as push zero carbon and the climate emergency further up the agenda. If we are to meet our climate goals, we need to be designing zero carbon buildings now.

Jonathan McMillan

Associate at Hulley & Kirkwood



The declaration is important because it raises awareness and, in time, will provide access to a community of designers with the experience and expertise to deliver designs in line with the declaration's ethos. We want to see the underlying principles become standard practice

rather than best practice. As the network grows, we hope it will provide the perspective, direction and support to drive change in the industry.

Energy and sustainability tend to be seen as bolt-on services that aren't part of the core building services offering. As a result, knowledge has become concentrated with specialists, who often come into a project after concepts have been developed. If practices are serious about addressing climate change, there needs to be a focus on making specialist knowledge more mainstream. Ultimately, we need to be bolder in our approach and improve how we promote the value of climate-focused design to clients early in the design stage.

To be successful, climate-focused design needs cross-discipline collaboration early in the design stage. We

must move beyond the 'compliance culture' that seems prevalent in the industry. The UK regional energy and carbon-focused building regulations revolutionised how we approached building design in 2006, but the pace has slowed to a standstill in recent years. As a result, there is little incentive to go much beyond a 'business as usual' approach.

Lee Hargreaves MCIBSE

Associate director at Buro Happold



The industry needs to do much more than meet minimum standards and targets. Climate and biodiversity breakdown is under way. This is, now, significantly more than a discussion on reducing energy and carbon. As engineers, we have a duty to act in accordance with the principles of sustainability and come up with innovative solutions that prevent avoidable adverse impact on the environment and society.

Those who sign up to the declaration will collectively generate a shared vision that can be communicated to clients to inform them of the true consequences of inaction – not just on their projects, but on the wider environment from a national and international perspective. The good news is that our sector is very well placed. We have appropriate knowledge, skills and capability; with professional responsible judgement and leadership, building services engineers can be at the forefront of solving this challenge. We can no longer waste time, the clock is ticking.

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HEART OF THE MATTER

Embodied carbon in MEP equipment makes up a large proportion of building emissions, but is hard to measure. Elementa Consulting's **Louise Hamot** and **Clara Bagenal George** explain how CIBSE's TM65 methodology estimates components' environmental impact



CIBSE's TM65 provides step-by-step guidance on calculation methods

Building services engineers have been at the forefront of efforts to reduce operational carbon emissions in buildings through improvements to the design, specification and optimisation of mechanical, electrical and public health (MEP) systems, and the performance of building skins.

But MEP equipment also has significant embodied carbon – the emissions associated with extraction of materials, production and transport of products, and their repair, replacement, disassembly and disposal. To drive down the whole-life environmental impact of the systems they design and the products they specify, engineers must improve their awareness of emissions as a result of embodied carbon.

MEP components are often mainly made of metals, which have high embodied carbon. Their supply chain is complex, and can involve many manufacturing processes and long transport distances. Large quantities are installed within buildings and replaced regularly. Environmental product declarations (EPDs) are a standardised way of expressing embodied carbon and other environmental impacts throughout the life-cycle of a product. Very few manufacturers of MEP products offer EPDs, however, mainly because of the complexity of MEP products and their supply chains, but also because incentives from the market and regulators are absent. As a result, the building services industry has had little access to vital data about the embodied carbon of MEP products.

Aims of TM65

This document sets out to provide:

- An introduction to whole-life carbon and embodied carbon within building services

- Guidance for engineers and consultants on actions to reduce the embodied carbon emissions of MEP equipment
- Guidance on EPDs, and how to use and create them
- Where no EPDs are available:
 - guidance on how to calculate embodied carbon of MEP products
 - a consistent approach for collecting the data required for the calculations
 - a consistent approach to the way embodied carbon calculations for MEP products are undertaken and reported (at product level).

MEP basic embodied carbon-reduction strategies

Embodied carbon emissions associated with building services design can be reduced without the need for complex calculations by implementing simple design strategies. The most effective way to reduce the embodied carbon of MEP systems is to 'design out', or at least reduce, the use and overall weight of the equipment. Once this has been done, the embodied carbon of MEP plant can be further reduced by specifying equipment with:

- Low refrigerant GWP and leakage rates
- Long lifetimes
- Materials with low embodied carbon
- Products and components that can be demounted and reused
- Products that can be disassembled, and whose materials can be recycled.

It should also be easily accessible for inspection, maintenance and replacement.

Embodied carbon calculation guidance when no EPD is available

There is a lack of easily accessible embodied carbon emissions data associated with MEP products, so CIBSE has created calculation methods to estimate embodied carbon at the product level based on specific information from manufacturers.

Two calculation methods are provided depending on the amount of information collected through a manufacturer form. Users of TM65 are encouraged to share the results of their calculations with CIBSE through a reporting form at the end of the process.

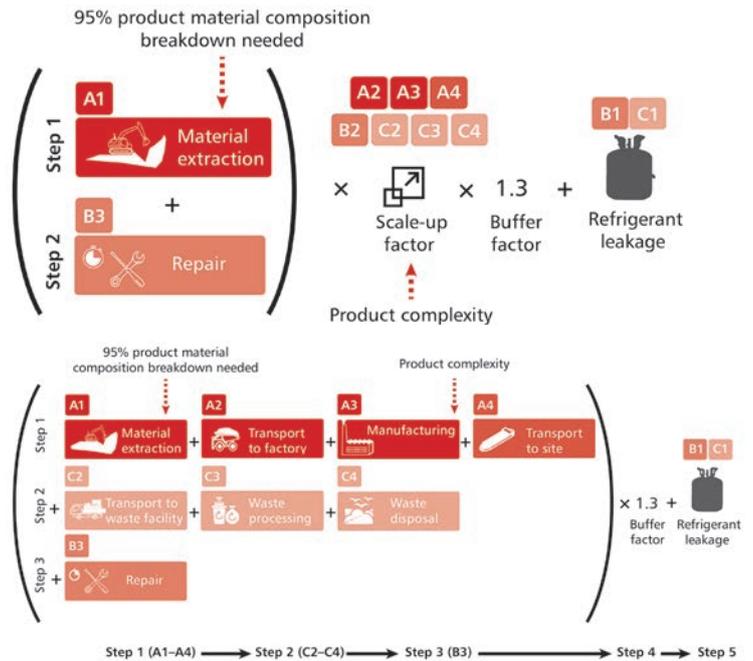
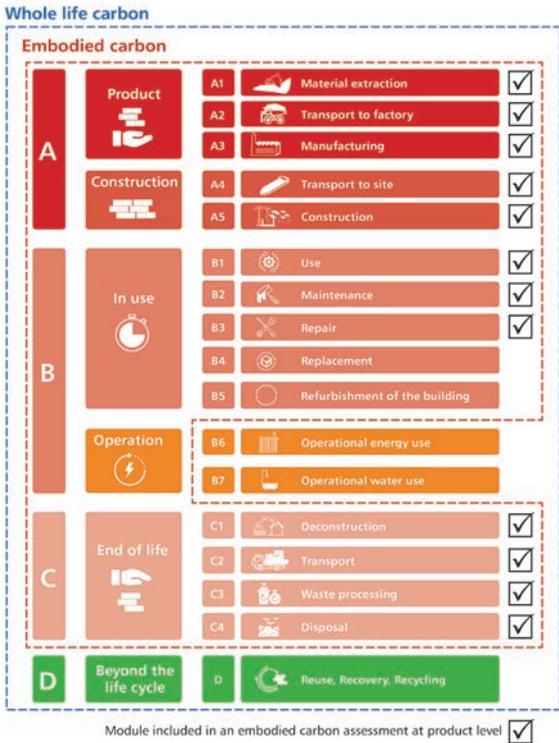


Diagram showing the life-cycle stage modules that are included in the calculation for each calculation method

“The building services industry has had little access to data about the embodied carbon of MEP products”

CIBSE TM65 provides step-by-step guidance on the calculation methods, with worked examples and a ‘pull out’ calculation steps guide. It has been developed with support and input from international experts, led by the co-authors of this article.

The guide is not aiming to replace EPDs, but rather allows initial conservative embodied carbon estimations for MEP products to be made, while waiting for EPDs to become available. It provides a consistent approach to facilitate research and increase understanding.

TM65 can accelerate the adoption of whole-life carbon thinking by engineers and manufacturers: Hopefully, this guidance will move the industry towards a greater awareness of the whole-life carbon impacts of MEP-related decisions and will incentivise more EPDs for MEP products.

Next steps: help CIBSE grow its knowledge base

The assumptions used in TM65 rely upon the data available at the time of its writing. The

intention is that these will be updated and improved in future iterations of the document.

CIBSE has developed the TM65 standard methodology for the assessment of embodied carbon so embodied carbon data calculated by different consultants and researchers can be brought together, compared, and ‘rules of thumb’ developed for embodied carbon of MEP systems. To make this possible, CIBSE encourages users of TM65 to submit calculation results to CIBSE using a standard reporting form, together with the form submitted by a product’s manufacturer.

Anastasia Mylona, head of research at CIBSE, sees TM65 as an important first step for the building services industry. ‘CIBSE now looks forward to facilitating the development of an embodied carbon database for MEP products, which will make it easier for CIBSE members to address this crucial challenge.’

■ CIBSE TM65: Embodied carbon of building services equipment will be available soon at the CIBSE Knowledge Portal cibse.org/knowledge

■ A webinar on whole-life carbon took place in November, and is available at bit.ly/CJJan21WLC If you have any questions, email embodiedcarbon@cibse.org

■ **LOUISE HAMOT** is global lead of life-cycle research, and **CLARA BAGENAL GEORGE** is associate at Elementa Consulting

RESEARCH STUDY ON EMBODIED CARBON OF RESIDENTIAL HEATING AND HOT-WATER SYSTEMS

CIBSE is looking for manufacturers to provide data on their equipment for a research study on embodied carbon in heating residential schemes. The study will use the methods developed in CIBSE TM65 to create rules of thumb for early decision-making by building services engineers and design teams looking to mitigate embodied carbon in MEP systems.

CIBSE is looking for widespread participation from manufacturers, and hopes they will seize an important and timely opportunity to show leadership in the field of embodied carbon. Manufacturers wishing to participate can do so by providing the material breakdown for each product as a starting point, and more detailed data where available. CIBSE is interested in any products relevant to residential heating systems. Email embodiedcarbon@cibse.org for details.

Many thanks to the manufacturers who have already submitted data, including: Klima-Therm; ACV; Cetetherm; Daikin; Danfoss; Flamco; Glen Dimplex Heating & Ventilation; Hamworthy; Ideal Heating; Kensa Heat Pumps; Kingspan; Lochinvar; Merriott; Mitsubishi; Nexgen; Recoup; Rhico District Heating Products; SL Services; Stelrad; Swegon; Vaillant; Warmafloor; and Zehnder.

EMBRACING THE BUILDING LIFE-CYCLE ASSESSMENT

BDP carries out life-cycle assessments of its designs, despite the current lack of information available on embodied energy in building services equipment. BDP's **Jon Hall** explains how it works

Undertaking a life-cycle assessment (LCA) of embodied carbon allows us to quantify the carbon impact of a building over its life. We have been doing these studies since 2018, and while we can quantify and provide support on where meaningful carbon reductions can be realised, we encounter challenges during assessments.

'How to' guides

There are numerous resources on embodied carbon, but few describe how to produce an effective and robust assessment. For example, Pomponi and Moncaster¹ note there is often considerable variability in the application methodology across studies. We have developed our own 'how to' guide for our internal digital designers and are acting as 'LCA coordinator' for an external team on an international project. Using our guide, the design teams have produced LCAs that we are peer reviewing.

Building services estimations

There are relatively few Environmental Product Declarations (EPDs) available to assess the embodied impact of building services. This is significant when it can account for 40-70% of embodied carbon for refurbishments and fit-outs, and 15-50% for new builds.² Estimations for building services impact is often necessary, and across our environmental design studio we have been encouraging this conversation during early design. As a result, we have identified where improvements and interventions can be made based on life-cycle considerations.

Refrigerant Impact

With the growth in heat-pump technology, the impact of refrigerants is a critical consideration when developing a heating and cooling strategy.

Refrigerant can be a large contributor to embodied impact because of the global warming potential (GWP) and leakage rates. So design engineers must have an appreciation of the life-cycle impacts of different refrigerants. A heat-pump strategy, for example, can have a higher environmental impact than a gas boiler one over its whole life when high GWP refrigerants are selected. Efficiency considerations also contribute to refrigerants type, and there are air quality benefits of non-combustion technologies, but all these parameters must be considered across the life of the component and development.

Biogenic carbon

Understanding the biogenic carbon benefit can be challenging; the recent LCA benchmark figures for embodied carbon provided by LETI³ exclude the benefit delivered by sequestration, whereas the UKGBC⁴ has shown that, in certain scenarios, the 2030 emissions target can only be achieved by including sequestration. We often exclude biogenic carbon in our studies to align with these LETI benchmarks. When testing elements during optioneering, however, we have struggled to demonstrate the benefit of using one structural solution over another, for example, where this figure isn't attached directly to the element. We are monitoring the research to provide informative studies.

EPDs for new elements

The lack of EPD data can be challenging. We researched technical and composite materials to determine what proportion could be replaced with a bio-based alternative. We had to explore a range of databases to find materials to use as proxies. By advocating the use of innovative materials on our projects, manufacturers are keen to support our analysis and their products, which is allowing us to test our proxy methodology.

Advice summary

- Bring cost consultants into the LCA process to support the best opportunities for optimising the design
- Build an argument around the wider benefits of bio-based materials, including health and wellbeing, indoor air quality and supporting local or national supply chains
- Design with circularity principles and identify opportunities for retaining the value of elements and materials over the life-cycle. **CJ**
- **JON HALL** is a sustainability consultant and materials and embodied carbon specialist at BDP

References:

- 1 Pomponi, F & Moncaster, A (2018). Scrutinising embodied carbon in buildings: the next performance gap made manifest. *Renewable and Sustainable Energy Reviews*, 81, 2431-2442.
- 2 Getting to grips with whole-life carbon, *CIBSE Journal*, December 2019, bit.ly/CJJan20JH1
- 3 *Climate emergency design guide*, LETI (2020), www.leti.london/cedg
- 4 *Building the case for net zero: a feasibility study into the design, delivery and cost of new net-zero carbon buildings*, UKGBC (2020), bit.ly/CJJan20JH2



Using cross-laminated decking on timber joists instead of a concrete or composite flooring system saved around 115 tonnes of CO₂e over the life-cycle of the University of Essex Business School



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FROM BBC TO BIO

In last month's *CIBSE Journal*, we highlighted how conventional office space in central London was being repurposed for teaching by academic institutions. This month, **Andy Pearson** looks at how offices are being repurposed as research laboratories for cutting-edge life-sciences businesses

Last autumn, the first scientists working for pioneering biotech company Engitix Therapeutics moved into their new laboratory in The WestWorks building, part of the White City Place development in West London.

The drug-discovery company's new 800m² headquarters includes tissue-culture rooms, decellularisation rooms (where cells are removed from organs), a fridge-freezer room, and an autoclave/utility room, plus write-up spaces and offices. 'Engitix is at the cutting edge of scientific endeavour; we're carrying out world-class science, so we need world-class facilities,' says Stephen Brindle, chief operating officer at Engitix.

Engitix joins other leading life-sciences businesses – including Synthace, GammaDelta and Mapletree – on the fourth floor of The WestWorks building. What makes this arrangement unusual is that this scientific endeavour is taking place in an office building that previously housed the BBC. More surprising still is that the other floors are occupied by more conventional office-based businesses.

'It looks like a grade A office when you enter on the ground floor but, if you go up to the fourth floor, you are entering a proper laboratory environment,' says Richard Beer, executive engineer at Sweco.

Sweco designed the building services for Engitix's new facilities. It was also the engineer responsible for The WestWorks base-build services design, following an extensive refurbishment in 2017 after the building was purchased from the BBC by developer Stanhope. In addition, Sweco designed the subsequent Cat A fit-out of the six floors of offices that circle the building's central courtyard.

Fit-out of the floors included removal of the suspended ceilings to reveal concrete soffits, and installation of an underfloor displacement ventilation system, with perimeter trench heating and cooling. The system is served by roof-mounted boilers, air handling units (AHUs) and air-cooled chillers.

'The displacement system is designed to provide cooling to the office floors, while the perimeter units temper conditions at the edge of the floors on both the outer and inner courtyard elevations,' explains Beer.

Stanhope anticipates growing demand for space from biotech firms

THE TENANT'S PERSPECTIVE

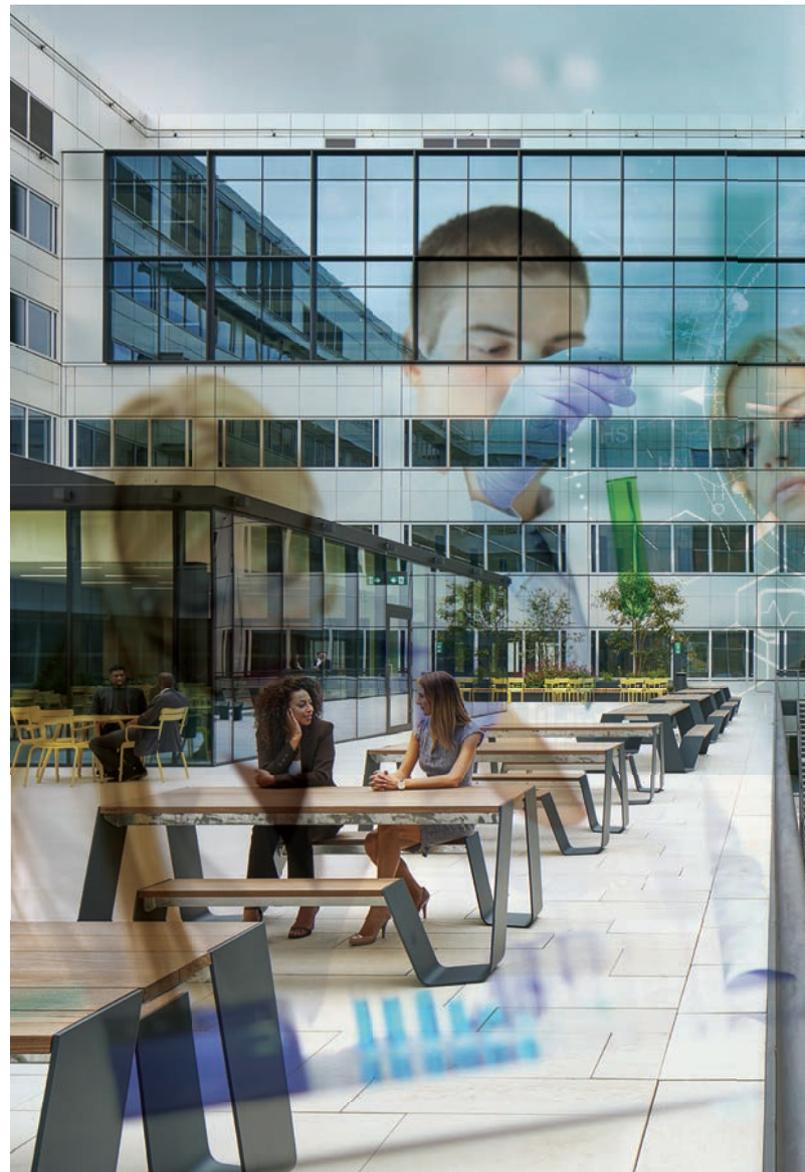
'Synthace is an interdisciplinary team of computer scientists, biologists and mathematicians pioneering new ways of working in biology,' says Adam Tozer, head of marketing at the company. 'It develops software to enable scientists to run powerful, automated experiments, generating datasets that are appropriate for sophisticated analysis.'

'The office and lab space on offer at The WestWorks were a big draw, and we were excited to become neighbours with other pioneering bioscience companies in White City, such as Novartis, Autolus and GammaDelta Therapeutics.'

'Despite being a software company, we also have a wet lab, where our team of scientists use our software platform, Antha, to automate sophisticated liquid-handling robots. Our lab contains everything you might see in the lab of a biotech firm, including a cell-culture facility. This requires us to run a lot of scientific equipment and specialist installations, such as fume hoods and ultra-low temperature freezers, as well as to have the capability to handle scientific material and waste.'

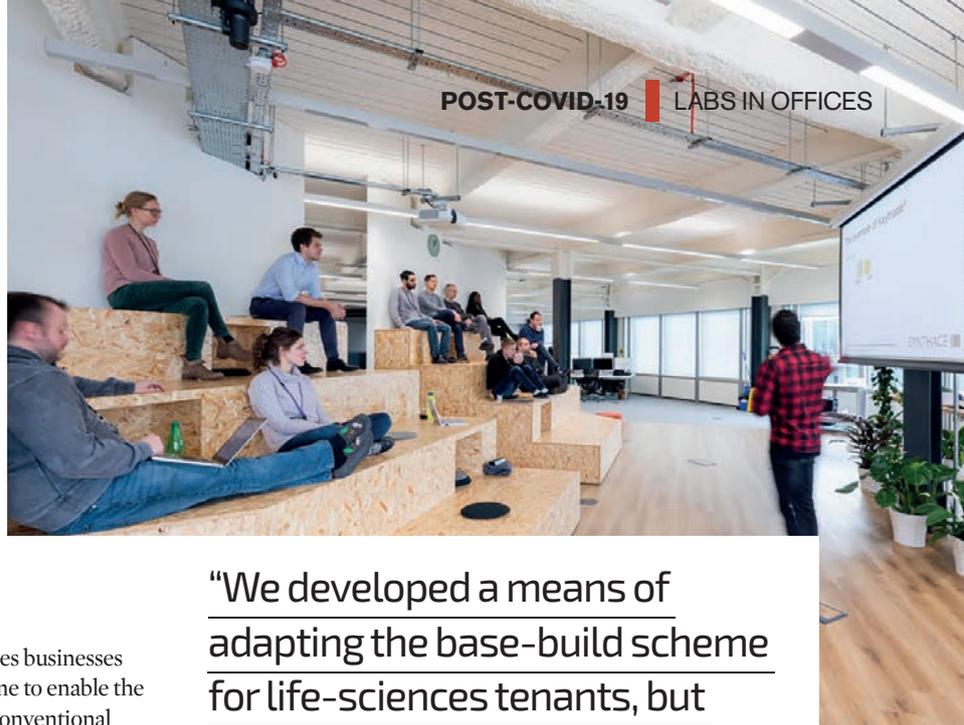
'Our labs are designed with total flexibility in mind, allowing us to draw on power and gas supplied from the ceiling, so we can create automation islands and recreate our clients' workstations. In specifying the lab, we needed to include three-phase power, a reinforced floor area for heavy equipment, and greatly enhanced air handling.'

'Safety systems are built into the lab, and we worked with the landlord to build in safe gas handling and storage and waste disposal routes.'





Synthace is one of several life-sciences firms at The WestWorks



eager to be part of the flourishing cluster of life-sciences businesses at White City. So it tasked Sweco with devising a scheme to enable the top two floors of The WestWorks to be adapted from conventional offices into Containment Level 2 laboratory spaces, making them suitable for biotech experiments. The engineer was helped by the floor-to-soffit height of 3.8m, which were high enough to allow ductwork and fume cupboard extracts to be routed at high level.

The solution involved stripping out the Cat A, and the tenants installed a new cleanroom-standard suspended ceiling. Sweco added a small, on-floor plantroom in each tenancy, to house the air handling plant required to keep the laboratories supplied with fresh air and fume-cupboard make-up air. The plantroom is connected to the outside by louvres set into the courtyard façade.

"We developed a means of adapting the base-build scheme for life-sciences tenants, but the adaptations were not applied until a tenant was on board, which meant we were able to incorporate their specific requirements"



The labs and office space circle a central courtyard at the former BBC building

'We developed a means of adapting the base-build scheme for life-sciences tenants, but the adaptations were not applied until a tenant was on board, which meant we were able to incorporate their specific requirements,' says Beer.

The on-floor AHUs are sized to deliver an air change rate of between six and 10 air changes per hour in the labs. They are supplied with heating and cooling from the landlord's system, with any additional cooling provision from tenant-installed cooling coils connected to a direct expansion system. This arrangement gives tenants the option of close control over their laboratory conditions, while the additional cooling provision ensures cooling is always available – including overnight, when the base-build chillers do not run.

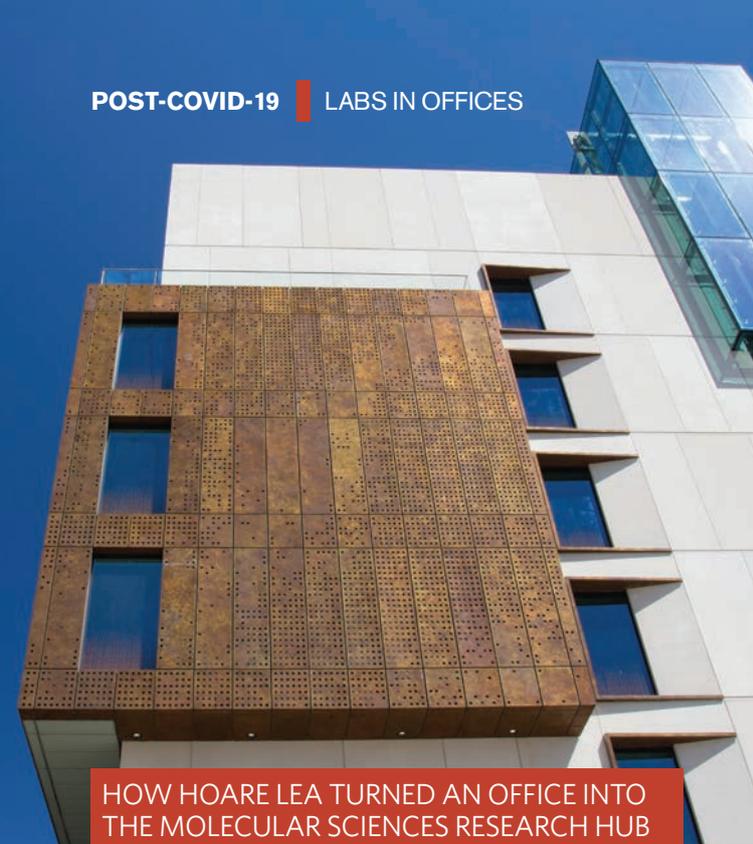
Some laboratories also need specialist gases, such as carbon dioxide and liquid nitrogen. 'The tenants' gas requirements differ, so it didn't make sense to pipe gases to the fourth floor,' says Beer. Instead, a secure bottle store has been created outside the building, along with modified controls to the goods lifts to enable it to run unmanned when delivering gas bottles to the fourth floor.

Other modifications include the addition of a dedicated Vulcathene chemical-resistant drainage system. This is linked to the mains drainage in the basement via a sampling hatch and dilution unit.

The drinking water supply has also had to be separated via a Category 5 separation tank, to eliminate the possibility of contamination. 'We did not want to mix drinking water and hand-washing sinks in a laboratory environment, so there is a break tank and booster pumps to provide a physical disconnect between the laboratories and other spaces in the building,' says Beer.

The electrical supply has been enhanced to serve the





HOW HOARE LEA TURNED AN OFFICE INTO THE MOLECULAR SCIENCES RESEARCH HUB

The Molecular Sciences Research Hub was fundamental to the creation of Imperial College's White City Campus. It was developed in 2018 to bring researchers and businesses together to turn scientific discoveries into commercial products, with the wider ambition that the area becomes a destination for bio-tech and digital industries.

The multi-storey building chosen to house the facility started life as a general office. Hoare Lea's task was to turn it into a world-leading science facility, complete with specialist laboratories for the college.

One of the biggest challenges with the transformation was in delivering outside air to the various laboratories to replace the air extracted by the building's 330 fume hoods. Their energy-efficient solution was to install a variable air volume system to supply the air needed, based on diversified loads, and then direct the supply to the laboratories based on demand.

Dedicated local cooling is provided in areas of high heat gain, while LED lighting helps reduce energy use, which contributed to the building achieving a Breeam Excellent rating.

» laboratories. 'Generally, we allow 25W·m⁻² for office small power but, in the lab space, we've allowed for 100W·m⁻² because of the amount and types of equipment used,' says Conor O'Donoghue, operations director at Sweco.

The WestWorks was an existing building with an existing electrical supply, so an additional power supply now serves the laboratory spaces.

'The existing energy centre serving the other White City Place buildings had spare capacity, so we took an HV [high-voltage] feed from that and used a separate transformer and feed to each tenancy,' says O'Donoghue, adding: 'As we had spare available power capacity in the energy centre that was supplied from an alternate UKPN primary substation, we used some of this spare capacity to meet the increased power demands of the lab spaces while providing diversity of supply for their critical operations.'

This additional feed has the benefit of adding electrical resilience by supplying each laboratory with power from two primary substations. It is a solution that will ensure the fridges and freezers in Engitix's new laboratory will operate come what may, so its scientists can continue with their pioneering drug-discovery work. **C**



Office spaces within Synthace's facility

THE LANDLORD'S PERSPECTIVE

When developer Stanhope purchased the BBC's Media Village in west London it set out to redevelop the site as a new business district. It rebranded the site White City Place and quickly refurbished two former BBC buildings - now renamed The WestWorks and The Media Works - to lease as office space.

At the same time, London's Imperial College was creating a new west London campus for its biomedical research and medical sciences facilities. This incorporated a new 'innovation district' and business start-up facilities to help foster the commercialisation of the innovative biotech developments being discovered at the university (see panel, 'How Hoare Lea turned an office building into the Molecular Sciences Research Hub').

These fledgling biotech businesses need space to grow. At the same time, other dynamic bio-tech business were being drawn to the area. 'We realised that there was a pent-up demand for space in London for life sciences that was not being provided,' says Charles Walford, property director at Stanhope.

Stanhope set about commercialising this demand by adapting unlet office floors in The WestWorks and The Media Works, to lease to start-up and established biotech businesses as 'lab-enabled office space'. There are currently five established life-sciences companies at White City Place, in addition to several start-ups.

'We were able to accommodate them primarily because we inherited some pretty robust buildings from the BBC, with an enhanced floor-to-ceiling height,' says Walford.

In addition to converting existing buildings, Stanhope is looking to develop lab-enabled new-build offices. Walford says there is currently no speculatively built space in central London suitable to lease to life-sciences businesses, although there are schemes in the pipeline 'because this sector is growing like mad', he says.

Such new developments, however, are not without risk: 'There is no transaction evidence at the moment, so the risk for investors is that they have to spend 30% more on an office building to make it lab-enabled that might end up with office occupiers - so you will have spent 30% more on your project, but without commanding the higher rent'.

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ACCOMMODATING CHANGE

The draft London Plan's commitment to circular economy principles and the London Energy Transformation Initiative's aim for a net-zero carbon built environment make refurbishment more appealing. Aecom's **Nichola Gradwell** and **Simon de la Cruz** explain the effect on engineering services

Office refurbishment



Reusing building elements such as the structure and existing fabric can reduce demolition work and waste, and save cost. The speed of a refurbishment means buildings can be brought to market much quicker than new builds.

A refurb can ensure a property is adapted to meet the changing needs of tenants that are driving towards smaller spaces, serviced offices and interconnection with other organisations within the building. Design trends need to be considered to ensure a functional space is produced that is flexible and can accommodate a range of fit-out options.

With more stringent minimum energy efficiency legislation, there is a need for existing buildings to implement new and efficient technology that will uplift their credentials, while addressing the demand for decarbonisation. Landlords are seeking to 'sweat their asset' to achieve energy savings without breaking the bank.

Refurbishment projects can range from minor upgrades of plant and superficial replacement of existing fit-out installations, to wholesale replanning and optimisation of the space, potentially increasing the net lettable floor area.

Minor refurbishments offer largely cosmetic upgrades, retaining much of the engineering installations where there is adequate remaining lifespan and capacity. The reuse of pipework risers, main plant and life-safety systems is assumed, with only light touches to landlord and toilet areas, and new Cat B fit-out provision.

Medium refurbishments aim to extend the life of the building and provide innovative spaces. They also offer an opportunity to enhance the energy and sustainability performance of a property. The retention of the façade often means the existing thermal properties of the envelope are fixed, so energy improvements will need to come largely through upgrades to the building engineering services. This includes the replacement of MEP central

plant and the addition of intelligent controls systems. Thermal and visual comfort will be reassessed to determine whether plant capacities need upgrading; however, in this type of scheme, no major structural alterations are envisaged and there are only minor repairs on the façade. The net lettable space will probably be stripped out and floor layouts replanned to make room for additional functional areas.

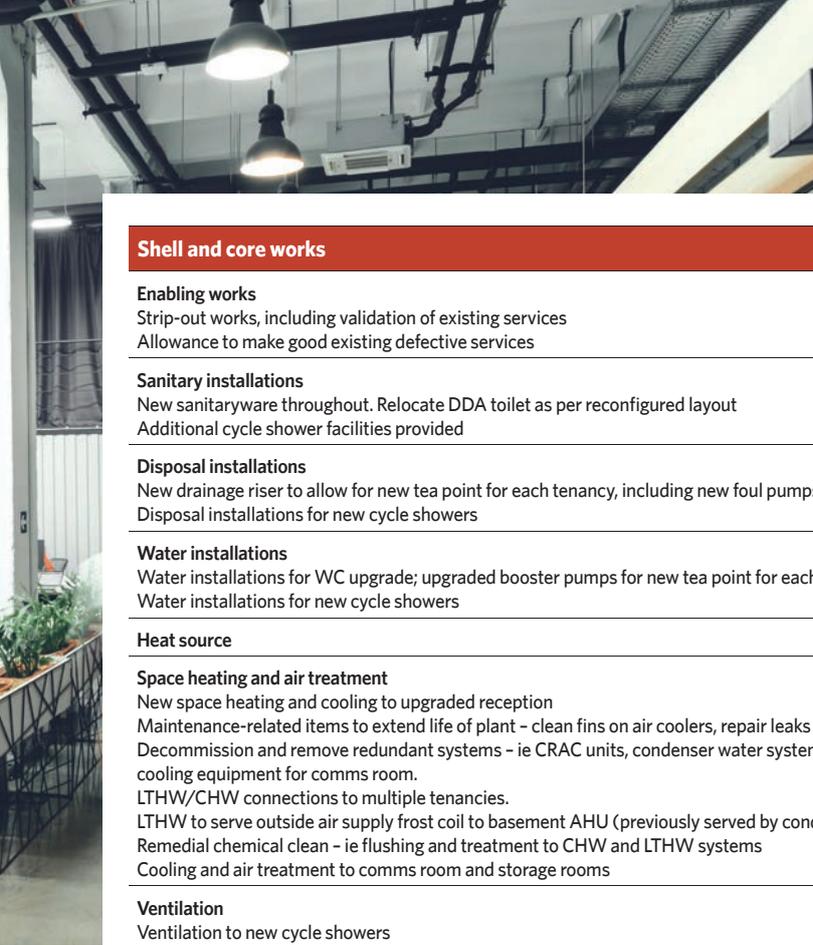
Refurb cost drivers

The retention of riser pipework requires intrusive surveys to understand their internal condition, and testing to determine water contamination risks, especially if any parts of the system are to remain operational during the project. Many systems – such as lighting control, building management and fire alarms – are often at their original design capacity, and either cannot be extended or the components are no longer manufactured to facilitate their maintenance. Existing buildings are usually based on a lower occupancy for ventilation, lifts, fresh air and cooling/power loads, so these systems need to be reviewed.

The introduction of energy efficient lighting, coupled with controls upgrades and lifts with destination control and regenerative drives, can have a big impact on energy in-use performance of the building, so the life-cycle cost of this type of upgrade indicates significant added value. In addition, the drive for energy efficiency, and legislation aimed at decarbonising the energy grid, have resulted in a sharp turn away from gas-fired boilers and district heating networks powered by gas-fired CHP. The favoured space-heating approach now uses ground, water or air source heat pump solutions. However, these are not easily introduced in refurbishments because of space and location restrictions.

The lack of sufficient external space for the heat-collection arrays required for ground source heat pumps means air source is a better option. However, noise needs to be balanced out against the desire for recreational space, usually most easily provisioned on rooftop terraces. Restricted floor-to-ceiling heights can often mean that four-pipe fan coil solutions are not feasible and VRF systems are necessary.

Having multiple tenants drives engineering services cost, as electrical panels, plate heat exchangers, riser design and metering increase as a factor of the number of tenancies. Converged networks to run voice, >>



Shell and core works	Unit	Rate £
Enabling works Strip-out works, including validation of existing services Allowance to make good existing defective services	m ²	20.74 0.53
Sanitary installations New sanitaryware throughout. Relocate DDA toilet as per reconfigured layout Additional cycle shower facilities provided	m ²	18.78 5.46
Disposal installations New drainage riser to allow for new tea point for each tenancy, including new foul pumps Disposal installations for new cycle showers	m ²	3.47 0.97
Water installations Water installations for WC upgrade; upgraded booster pumps for new tea point for each tenancy and water treatment Water installations for new cycle showers	m ²	3.96 1.80
Heat source	m ²	0.0
Space heating and air treatment New space heating and cooling to upgraded reception Maintenance-related items to extend life of plant – clean fins on air coolers, repair leaks on primary LTHW connection to PHX Decommission and remove redundant systems – ie CRAC units, condenser water system to make space for tenant cooling equipment for comms room. LTHW/CHW connections to multiple tenancies. LTHW to serve outside air supply frost coil to basement AHU (previously served by condenser water system) Remedial chemical clean – ie flushing and treatment to CHW and LTHW systems Cooling and air treatment to comms room and storage rooms	m ²	7.86 0.39 5.87 11.21 14.85 17.05 3.64
Ventilation Ventilation to new cycle showers Cleaning, rebalancing of existing installations, including grilles Storeroom ventilation added WC ventilation extended New air handling unit to reception area, including fresh air and extract ductwork	m ²	4.55 1.91 1.39 0.37 4.21
Electrical installations Modify DRUPS unit into a life-safety generator at reduced capacity of 400kVA, including cabling. Modify existing main LV switch panel to accommodate new life-safety switchboard, including recabling of life-safety loads Modify LV distribution for two tenants per floor, including reuse of tenant distribution boards to allow tenant metering in accordance with Part L Building Regulations Reconfiguration and enhancement of exposed soffit lighting New and replacement lighting to suit reconfigured office plan Relamping of existing lighting Feature lighting to new reception External lighting New lighting to lift lobbies and upgrades to WC areas Lighting to cycle shower facilities Lighting to basement storage	m ²	8.79 5.79 3.16 0.71 1.93 1.31 7.17 6.52 2.99 1.51 2.09
Gas installations	m ²	0.0
Protective installations Replace stainless steel sprinkler tanks (80m ³) Decommission and remove gas suppression to data centres and replace with pre-action sprinkler (assume 1nr pre-action valve) Reconfiguration of sprinklers to exposed soffit areas and extension to suit layouts New sprinklers to comms room and storage areas Make good existing installations	m ²	5.26 1.84 1.72 2.96 0.63
Communications New entrance CCTV and reception speed gates Fire and voice alarm to existing and new landlord spaces, including WC alarms New structure cabling network throughout, including wireless LAN, wireless voice Integrated communications network (ICN) with core switches in basement level B3 and distribution switches throughout the building New security system throughout Dual telecommunications intake rooms at basement level B3 (or an alternative position) to allow for tenant diverse communication services to their tenancies. One of the intake rooms to act as building main equipment room (MER)	m ²	3.95 1.72 3.42 2.63 6.48 6.32
Lift and conveyor installations – excluded Modernisation of lift car finishes	m ²	excl
Special installations Modifications to the BMS to suit modified systems Automatic metering and billing system	m ²	3.79 5.26
Builders work in connection with services		1.5%
MEP testing and commissioning		2.5%
MEP subcontract prelims		8.3%
Shell and core total cost		£223.33/m²

» data, security and management systems are becoming more common, but it has a capital-cost uplift. A decision to introduce hydraulic separation on a floor-by-floor basis is also a cost driver, but gives future flexibility and control. The IET Regulations require improved electrical protection on all designs after December 2018, which can result in an uplift for existing LV panels and local distribution boards. Refurbs now need to target Breeam Excellent as a minimum, and Well accreditation. One step further is the use of smart building design in which systems are connected and controlled via a single operating system.

Cost model

This cost model captures the engineering services costs of a medium refurbishment project within a central London location, and is based on a seven-storey building and basement level at 21,700m² GIA and 17,320m² NIA.

It assumes the retention of all existing plant and services where feasible, with extended Cat A installations to suit revised office space layout, enhanced reception and new cycle shower facilities. The rates are current in the second quarter of 2020, based on a central London location. Main contractor OHP and preliminaries, professional fees and VAT are excluded. The building is designed to meet BCO 2019 and Breeam Excellent standards.

Other considerations

Where projects need to go ahead in phases while maintaining operational continuity, considerations – which can add £2.20 to £5.70 per square foot GIA to the cost of services for refurbs – include:

- Design of temporary works to facilitate repurposing of space or replacement of critical plant during occupation
- Introduction of multiple phases that require isolations, drain downs and temporary services modifications
- Out-of-hours working for tight programmes and to do work that is impossible during working hours
- Preparatory surveys to identify and ratify existing installations, to ensure critical services are maintained
- Establishing the condition of existing pipework to ensure reuse is feasible and there is no internal pitting and corrosion.

Future considerations

As electric vehicles become more commonplace, air quality will improve in London and building design will start to incorporate more mixed-mode ventilation strategies.

As a consequence of Covid-19, a Building Council for Offices paper has recommended that short- and long-term changes are made to office design to ensure workspaces reduce the transmission of the virus. This is likely to affect the density of floorplates, a move away from hot desking, increased cycle parking, and strict limits on lift and meeting room use. HVAC systems will need to operate differently, including removal of thermal wheels and recirculation systems. Increased air supply and extract ventilation is likely, as is natural ventilation where practical.

Bathroom design will probably move towards individual pods with hands-free flush, washing facilities and door operation. Even the method of construction will be affected, with offsite manufacture helping to mitigate the impact of onsite social distancing. 

Category A fit-out works	Unit	Rate £
Enabling works Strip-out and allowance to make good existing defective services	m ²	5.71
Space heating and air treatment Allowance for replacing perimeter heating grilles Allowance to clean chilled beams and rebalance mechanical systems; modify pipework zones to suit new tenancy splits Chemical flushing and treatment	m ²	0.40 14.28 3.61
Ventilation On-floor storeroom ventilation added	m ²	1.00
Electrical installations Reconfiguration and enhancement of exposed soffit lighting New and replacement lighting to suit reconfigured office plan Relamping of existing lighting	m ²	6.17 10.73 6.05
Protective installations Modification to existing sprinkler system to suit CAT A fit-out space	m ²	6.93
Builder's work in connection with services		4.1%
MEP subcontract preliminaries		15%
MEP testing and commissioning		5%
Category A fit-out total cost		£87.80/m²

Notes: Assuming no occupation during the project.

Shell and core works	Unit	Extra over rate £
Sanitaryware Sensor taps in lieu of push button, including power supplies Sensor flush plates in lieu of manual, including power supplies	m ²	Included in model above
Space heating and air treatment Activated carbon filtration to air handling units Increase volume of air from 16L/s person to 20L/s per person from existing primary air handling plant	m ² GIA	10.00 to 15.00 3.00 to 5.00
UV lamps to AHUs (excluding lamp-replacement cost every 9,000 hours)	m ² GIA	3.00 to 5.00
Electrical installations Antimicrobial UV lights to WC and refuse stores	m ² GIA	3.50 to 4.50
Communications Air quality monitors installed in landlord core areas linked to BMS Full-body arch temperature scanner and associated EWIC Wall-mounted infrared laser temperature scanner and read-out screen Touchless intercom systems incorporating infrared beam to activate bell extra over	m ² Nr Nr Nr	1.00 10,000.00 500.00 to 750.00 500.00 to 1,000.00
Vertical transportation Lift-air purifiers Lift touchless app Lift touchless operating buttons (based on seven floors) Programming of doors to hold open when not in use, for improved ventilation	per lift	2,000.00 1,000.00 3,000.00 500.00
Fitout works		
Space heating and air treatment Enhanced filtration to fan coil units – activated carbon Enhanced filtration to fan coil units – glass fibre H11 HEPA filters	m ² NIA	14.50 to 15.00 7.00 to 9.00
Communications Air-quality monitors installed across all occupied spaces linked to BMS	m ²	2.00 to 2.50

Above are just a few examples of the more common type of approaches to dealing with Covid-19 and achieving Well standards, and are by no means an exhaustive list. There will no doubt be many refurbishment projects in the near and medium future that will need to ensure working environments adapt to the challenges that Covid-19 presents. It is vital engineering cost consultants are up to speed with how this can be achieved and the options available, and that they work with designers and clients to deliver solutions that are cost-effective and practical.



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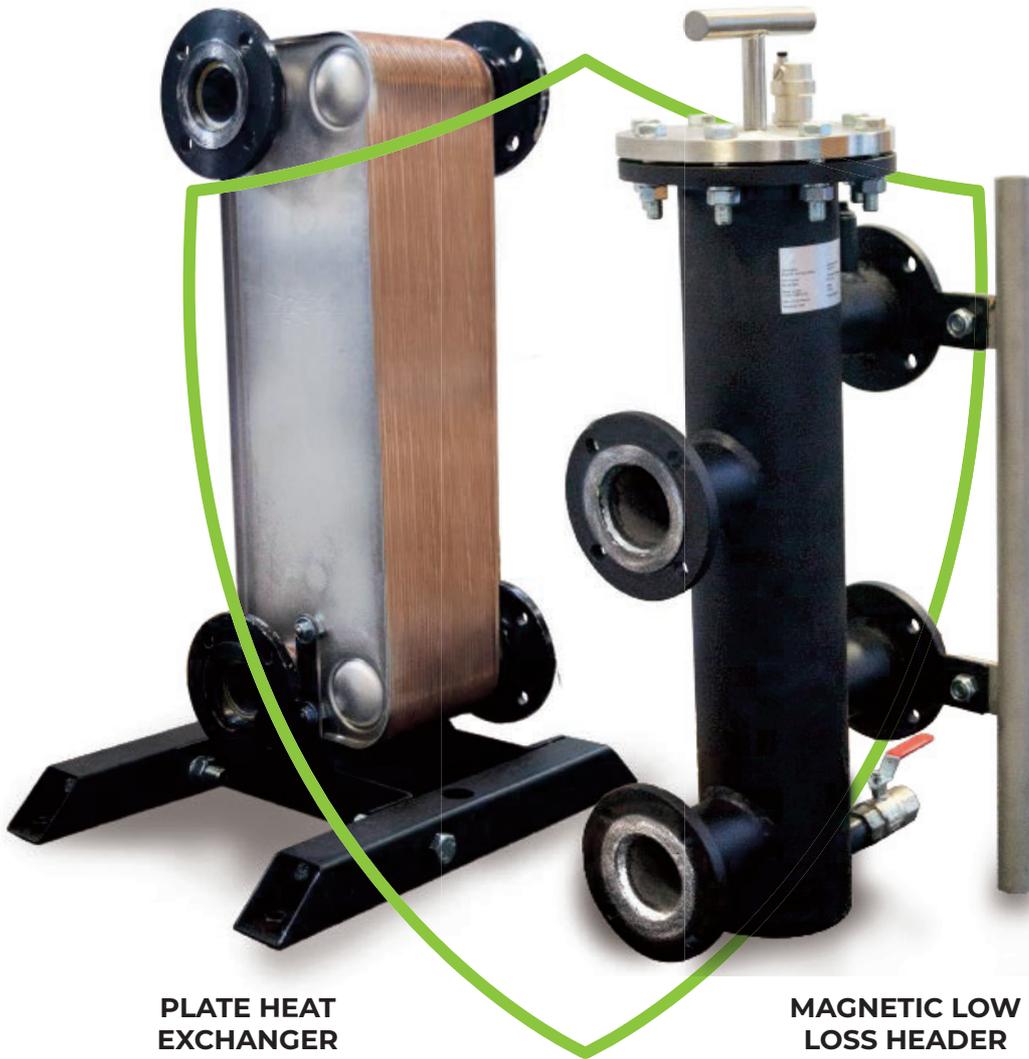
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Waste-crop PVs generate energy without sunlight

The material can harvest UV light and convert it into visible light

A new translucent solar panel – which combines organic luminescent particles and solar film to create solar panels that generate energy, even when the sun doesn't shine – has won the James Dyson Sustainability Award 2020.

AuREUS, invented by Carvey Ehren Maigue (pictured), from Mapúa University in Manila, the Philippines, is a material that can be attached to a pre-existing structure to harvest UV light and convert it into visible light.

The substrate that converts UV light into visible light contains organic luminescent particles, extracted from waste crops, that convert high-energy UV lightwaves to lower-energy visible lightwaves. The converted visible light is turned into electricity by photovoltaic films, which function in the same way as solar panels.

Whether the sun is shining or it is cloudy, the material will generate electricity because the particles in it absorb UV light, causing them to glow. As the particles 'rest', they remove excess energy and this 'bleeds' out of the material as visible light which can then be transformed into electricity.

AuREUS has the potential to turn more solar energy into renewable energy than traditional solar panels, and

it can function fully even when not in direct sunlight. Testing suggests it can produce electricity 48% of the time, compared with 10-25% in conventional photovoltaic cells.

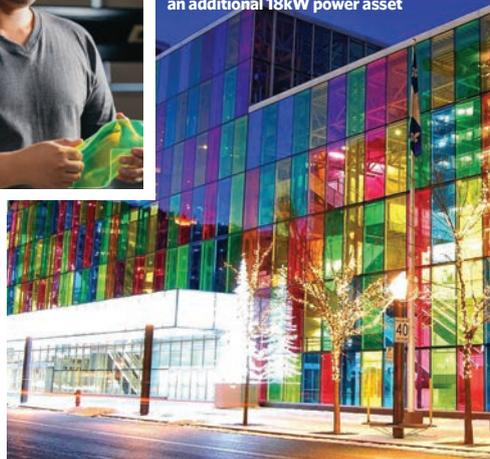
'Compared to conventional claddings that deflect UV light, the device can absorb UV light instead. I like to call it an inclusive design because it is capable of protecting people from UV, both indoors and outdoors,' said Maigue.

The material allows for the creation of vertical solar farms in urban areas, as the device doesn't need direct exposure to the sun to catch UV light. Maigue is looking to develop it for use beyond windows and walls, such as fabrics and

embedded into cars, boats and planes.



Conversion to AuREUS tech at the Montreal Convention Centre will unlock an additional 18kW power asset



Scottish homes take lead on hydrogen use

Hundreds of homes in Scotland will become the first in the world to rely completely on hydrogen for heating and cooking.

The 300 homes, in Fife, will be fitted with free hydrogen boilers, heaters, and cooking appliances for four years in a test project that could then be rolled out across the UK. They will begin to receive green gas from the end of 2022, at no extra charge, and up to 1,000 homes could eventually be included, depending on how this first phase goes.

The trial is supported by the energy regulator Ofgem, which has awarded £18m to the gas distribution company SGN to develop the project, with a further grant of £6.9m from the Scottish government. Ofgem will also fund a £12.7m project by the National Grid to carry out 'offline' hydrogen trials using old gas-grid pipes, to test the safety of transporting hydrogen gas across the UK.

Heat-pump plan needs training boost

The Prime Minister's hugely ambitious plans for heat pumps must be backed by a major training programme and comprehensive technical support, according to manufacturer Lochinvar.

Heat pumps were highlighted by Boris Johnson as a key technology for delivering many of the government's decarbonisation goals, and he wants the industry to be installing 600,000 a year by 2028.

The Committee on Climate Change had already set a target of one million a year by the 2030s, towards an eventual total of 19 million, to achieve the government's 2050 net-zero target.

According to the Heat Pump Association (HPA), however, just 30,000 were installed in 2020, with 70,000 expected in 2021. Industry estimates suggest more than 17,000 new heat-pump installers will be needed over the next decade if the government's targets are to be met.

'The Prime Minister's faith in heat-pump technology is a huge morale boost for the industry,' said Lochinvar's sales director, Liam Elmore. 'However, we are going to have to scale up very fast to turn vision into reality.'

As well as recruiting more people, there will need to be much better awareness of how the technology works, to ensure installations continue to achieve high performance and reduced carbon emissions throughout their operating life, Elmore added.

Rural heat network gets go-ahead

Planning permission has been granted to build England's first rural heat network and local renewable energy centre in a Cambridgeshire village.

The project, at Swaffham Prior – which currently has 300 homes that are reliant on oil heating – aims to save more than 47,000 tonnes of carbon emissions over the lifetime of the energy centre.

It will deliver hot water around the village in a 7km network of pipes, heated by 135 ground source heat pumps. A large air source heat pump will supplement the energy extracted from the ground, and solar panels will provide renewable electricity to run the heat pumps at the energy centre.

More than 160 homes have signed up and installation costs will be covered by a government grant, with bills expected to be similar to paying for oil. Work is anticipated to start by summer.

TARGETING RETROFITS

The energy demand of our homes must be reduced significantly to make a net-zero future viable, but for a high proportion of existing buildings this will be challenging. Passivhaus Trust's **John Palmer** says upcoming LETI guidance will show professionals what is possible



Retrofit and refurbishment – difficult, expensive, messy. Do we really need to do this? Maybe we can get away with a bit more loft insulation, turn our thermostats down by a degree and fit some heat pumps. Wouldn't that be good enough?

The problem is, our homes in the UK are some of the oldest in Europe, so are poorly insulated and draughty. Overall, they use 480TWh of energy annually, with the vast majority of this being thermal energy for heating and hot water, provided by natural gas. This is a huge amount of heat and much of it is wasted. In a net-zero future, we simply won't be able to combust all that natural gas to produce heat.

So, what does our future net-zero building look like? This is a complicated question, but – looking at operational emissions only – we need to match the energy use associated with the building with the same amount of renewable energy. The generation of this renewable energy doesn't necessarily need to happen within the footprint of the building, but it needs to happen somewhere – we can't just hope that there's enough out there to make it all work.

And this is where it gets interesting. Renewable energy is almost infinite – enough solar energy reaches Earth every hour to power humanity for a year. Similarly, there is 40 times more wind energy in the atmosphere than our current global energy use. However, the

practicalities of deploying technologies to harvest this energy mean that it is actually finite. Wind farms, solar arrays and tidal barrages cost money, result in their own embodied carbon emissions and will, typically, need to be replaced every 20 years.

How much renewable energy we will have is difficult to predict – it depends heavily on future government policy and long-term investment. The most optimistic figures from the National Grid's Future Energy Scenarios, however, are showing that we might have around 580TWh of renewable generation by 2050. That's a lot of energy – but it will also, by that point, be our main source of energy. This means that all sectors – industry, transport, agriculture and buildings – will want their fair share of renewable energy. As we move our buildings away from natural gas to electrified heating, the National Grid's figures show that we will need to reduce the thermal energy demand of our homes by up to 75% to make the demand-v-supply equation balance (see Figure 1).

That's a big change. Just to put it into context, adding 300mm of loft insulation to a previously uninsulated loft will result in only a 7% reduction in heat demand. There is some good news, in that we will get a significant reduction from the coefficient of performance that heat pumps offer. However, this won't get us all the way – and we need to remember that heat pumps will only be viable in most of our existing homes if the building's fabric is upgraded to reduce the heat demand to a level that can be delivered at the lower flow temperatures needed by heat pumps to work efficiently.

But what about hydrogen? Surely a re-purposed gas grid and hydrogen boilers in every home would mean we can carry on being as wasteful as before and not bother trying to reduce demand?

Whether hydrogen could become the primary energy supply for domestic buildings is a big question. One way of doing this would be to produce hydrogen from natural

“The guidance will set out a target for a series of building types, alongside some practical guidance about how to achieve a best-practice retrofit”

gas and capture the associated carbon emissions. Carbon capture at scale is not yet proven, however, and would be a massive infrastructure project. We would also still be using a finite fossil fuel.

Alternatively, we could produce hydrogen using hydrolysis powered by renewable energy – but this is five to six times less efficient than simply using the same renewable energy to power heat pumps directly. Even the National Grid's hydrogen-heavy scenario (System Transformation) shows that residential thermal energy demand would need to almost halve. Put simply, even if you think hydrogen is the answer, it is still a finite resource and you need to reduce thermal demand for the numbers to work.

It would seem clear that we need to reduce the energy demand of our homes significantly to make a net-zero future viable – but how far do we go? For some buildings, a 75% or more reduction in energy consumption might be feasible. For others, however, it will be much more difficult. Many of our buildings have heritage aspects that will constrain what we can achieve. So, what is realistic, and what should we be aiming for with a particular type of building?

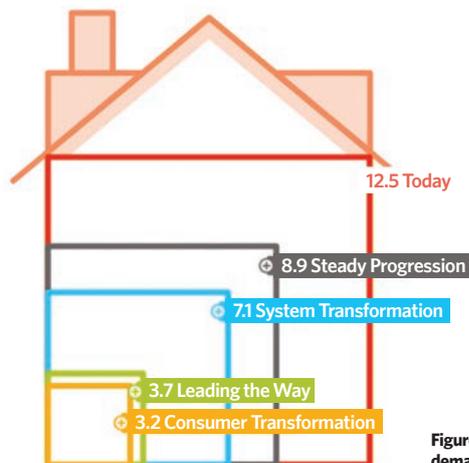
The LETI retrofit group has been looking at this over the past year and is intending to publish some guidance early in 2021. We have looked at the UK housing stock and at what a good retrofit might look like. Despite the vast amount of complexity and different housing types, the end result would appear to be determined by just three factors – the form/shape of the building, the construction type, and whether the external appearance of the building is constrained (see Figure 2).

Using this methodology, the guidance will set out a kWh-m² per year energy use intensity (EUI) target for a series of building types,

alongside some practical guidance about how to achieve a best-practice retrofit, and illustrated by several real-world exemplar case studies.

Rather than carry on hoping that a bit of loft insulation will be enough, LETI hopes that this guidance will provide industry professionals with some tangible evidence of what is possible and some clear targets to support a net-zero future. **C**

JOHN PALMER is research and policy director at the Passivhaus Trust and leading the LETI retrofit workstream



Average heating and hot-water demand per home (MWh/year)

Source: National Grid, Future Energy Scenarios 2020

Figure 1: Reductions in heating and hot-water demand required in homes for different scenarios

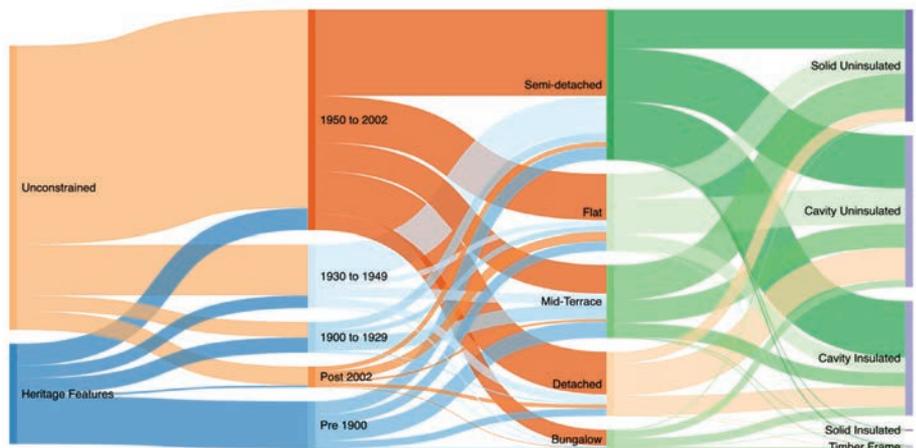


Figure 2: Breakdown of UK housing stock by age, heritage constraints and construction type

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PITCH PERFECT

The option to upgrade to hydrogen boilers in the future was one of the reasons a London housing association opted to install gas boilers in the retrofit of a residential block next to Charlton Athletic's football stadium. Baxi Heating's **Ian Lock** describes how prefabrication of utility units saved time and labour on the 17-storey tower

Just a stone's throw from Charlton Athletic FC's Valley stadium is Valiant House, a 17-storey residential block run by housing association Charlton Triangle Homes (CTH), part of the Peabody Group.

Ensuring the building services for the 93 flats are well maintained and monitored is the responsibility of Peabody's electrical and mechanical services department. So, when the CTH board reported signs of deterioration in 2019, the team undertook a rigorous inspection. The existing heating plant consisted of non-condensing gas boilers, located in a roof-top plantroom, that supplied heating and hot-water services to the individual properties. A few years earlier, the team had carried out improvement work to optimise boiler performance, but the current survey revealed the boilers were beginning to operate less efficiently and economically.

A second issue was the gas main feeding the boilers – with thinning pipe walls, this was at the end of its 50-year life and needed replacing to comply with new regulations and Health and Safety Executive (HSE) requirements. SGN, which supplies the gas to Valiant House, was also preparing to replace its pipes in the building.

Achieving an efficient long-term solution for the residents while ensuring uninterrupted continued use of the building were the dual goals for CTH and Peabody, who brought in an external consultant to review the findings and present a series of options.

Ground source heat pumps (GSHPs) were the first consideration, in line with CTH and Peabody's wider environmental commitments to reduce their carbon footprint. A potential obstacle, however, was the proximity of the property to The Valley stadium.

Ian Winterflood, head of electrical and mechanical services at Peabody, said the housing association was keen to explore the feasibility of applying low carbon technologies, but concluded that it was not technically feasible as there wasn't enough space around the building for the underground services.

Another option, to replace the gas main and pipe risers to the building, also had to be



“Achieving an efficient long-term solution for the residents while ensuring uninterrupted continued use of the building were the goals”

rejected. It would have required the removal of concrete through floors to access the existing pipework – creating extra work to protect the building structure – and running a gas main up the side of the building would have added scaffold costs because of the size and weight of the pipe.

A third option was to move the plantroom from the rooftop and create a new centralised plantroom, capable of meeting the demand of the building, in a larger, unoccupied space at the rear of the building, on the ground floor. This proposal involved the installation of high-efficiency condensing boilers to supply new heat interface units (HIU), indirect cylinders with electric backup, and individual heat meters in each property. Included in this last option was the replacement of

BENEFITS OF PREFABRICATION

- Time and labour savings, on and off site
- Cost savings – 13.4% on average, according to CIBSE
- Quality control – clean, controlled environment with end-of-line testing
- Reduced material waste – reduced environmental impact
- Improved asset management – ‘golden thread’ of building
- Easier to prioritise health and safety – reduced activity on site and fewer hot works
- Faster, simpler installation – reduced need for onsite specialist trades
- Reduced risk for all stakeholders.



Left: Charlton Athletic's Valley stadium and Valiant House

cold-water tanks with new, cost-effective sprinkler tanks and fire-precaution upgrades.

A key benefit of relocating the plantroom to the ground floor was that it removed the need to run gas pipework up the building. This, in turn, would minimise works on the floors and avoid disruption to residents.

Replacing the ageing, inefficient boilers with new, more energy-efficient condensing boilers – with a life expectancy of 20 years plus – also met the requirement for long-term improved reliability and efficiency, and an immediate reduction in carbon emissions.

Once this option had been agreed by the CTH, Milverdene was appointed as project contractor, while heating and hot-water manufacturer Baxi Heating was asked to support with a heating and hot-water solution.

'Involving the manufacturer from the outset paid dividends,' said Winterflood. 'Consulting with them at the early stages meant they were able to propose a tailor-made, prefabricated design that would achieve all of our project requirements and reduce the embodied carbon footprint of the refurbishment works.'

Baxi Heating and its subsidiary, Packaged Plant Solutions, recommended installing six 104kW, natural gas condensing boilers, with ErP gross efficiency of 87.5%/97.3% at 10005/30% load, on an off-site prefabricated skid, complete with pipework, pumps and plate heat exchangers.

To enable rapid installation of the heating and hot-water element in each property, PPS provided the new compact 125-litre hot water cylinders pre-assembled with the associated pipework. Supplying the HIU unit, together with controls and a heat meter, the pre-plumbed cylinders and first-fix rails, meant that equipment would slide easily into the existing utility cupboard spaces.

The thermal store, located in the utility cupboard of each apartment, incorporates an HIU to provide both heating and, working in conjunction with an unvented indirect cylinder, hot water to the individual properties. The cylinder can was selected from a range of 600mm diameter, pre-insulated, double skin stainless steel vessels. The 1,102mm-high fast recovery cylinder with nominal capacity of 125 litres would be able to supply up to 300 litres of 60°C hot water per hour. An integral pressure reducing valve can accept incoming cold water feed pressure up to 16 bar (1.6 MPa). The whole unit was supplied with factory-fitted

pipework and mounted on a prefabricated frame saving time, and cost, on installation.

'The major advantage for us was the time saved on site,' said Winterflood. 'The works began at the start of the year, so – with Covid-19 restrictions in place a few months later – we were running a little behind.'

'Thanks to the solution provided, however, the changeover was completed in just one day and then five properties were refurbished each day, putting us firmly back on schedule.'

'We also didn't have to worry about multiple deliveries or materials being left on site, as the solutions arrived pre-assembled.'

With the electrics, radiator sizing and valves checked, and a new sprinkler pipe and sprinkler heads fitted, the project was completed on time and budget in June 2020.

'The Charlton board are delighted,' said Winterflood. 'It's a fantastic result and we are anticipating considerable energy and carbon savings from our energy-efficient services.'

'Projecting forward, we will be investigating hydrogen boilers as a non-disruptive route to low carbon heating when the boilers reach the end of their life.' □

■ In memory of **GEORGINA WAGSTAFF** who was involved in this project at the outset.

■ **IAN LOCK** is director of sales (newbuild and multi-occupancy) at Baxi Heating

PROJECT IN NUMBERS

- 93** - flats at Valiant House
- 6** - boilers on the prefabricated skid
- 1** - days required to change over the system
- 5** - utility cupboards retrofitted in one day
- 3** - number of hot works reduced on site through use of prefabrication

BAXI HEATING SUSTAINABILITY PLEDGE

Baxi Heating says it has committed to net-zero operations by 2030 and to ensuring that every product it makes from 2025 will work with low carbon energy. The heating and hot-water solutions provider has been working closely with government to trial hydrogen, and is developing and testing one of the UK's first hydrogen boilers. It has also introduced a comprehensive range of high-performance heat pumps, which will be targeted towards a wide range of markets, including new-build and rural properties.





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Distributed residential heat pumps integrated with communal heat networks

This module explores the application of residential water source heat pumps in conjunction with communal ambient heat networks

In November 2020, UK Prime Minister Boris Johnson outlined a 'Ten-point plan for a green industrial revolution', which included an increasingly decarbonised electrical supply grid and the 'ambition' for an additional 600,000 heat-pump installations by 2028, plus a desire to implement the Future Homes Standard in 'the shortest possible time'. This CPD will consider the application of packaged residential water source heat pumps in conjunction with communal ambient heat networks, for energy-efficient future homes.

Heating and hot-water production in UK homes are responsible for around 13% of the nation's carbon emissions.¹ As part of the effort to reduce greenhouse gas emissions to net zero by 2050, the draft Future Homes Standard anticipates that an average home will have 75-80% fewer carbon emissions than a home constructed to current standards. The plan is to realise this by introducing very high fabric-efficiency standards, combined with low carbon heating systems. There will be a variety of systems and solutions that will depend not only on the type of application – for example, single- or multi-residence; low- or high-rise; town or country – but also on the most appropriate source of energy for the specific use and location.

As reported in 2015 by the Department of Energy and Climate Change (DECC),² UK heat-network schemes – including district heating and communal heating – are thought to serve 200,000 dwellings and 2,000 commercial and public buildings. District heating serves more than one building (and more than one customer), while communal heating refers to a single building served that has more than one customer. Although the largest heat-network schemes are predominantly found in cities and on university campuses, there are also a large number of smaller schemes in the domestic sector, often linking communally heated blocks of apartments (flats). Benefits from the increased use of heat networks can include energy cost and CO₂ emissions reductions, by allowing the exploitation of lower CO₂ and higher-efficiency forms of centralised heat generation. This has traditionally included combined heat

and power (CHP), biomass, heat pumps, waste heat and low-grade heat sources.

Heat networks are typically described in terms of 'generations', as described in the boxout. As explained by Phil Jones,³ current UK district-heating heat networks are often second- to third-generation, supplying water at approximately 85°C to meet the needs of existing buildings. Any cooling is typically provided by separate systems, often employing local chillers rather than a district cooling system. Much of the UK sector has been CHP-based, as the high value of electricity and relatively low cost of gas often made it an economic solution. However, decarbonisation of the electricity grid means CHP is increasingly hard to justify based on carbon savings, as shown by the indicative CO₂ content of different sources of heat for buildings in Figure 1.

As discussed in the conference paper⁴ by Boissieux and Betz, an oft-used alternative in new urban, multi-residential buildings – particularly where there is no access to a wider district heat network – is communal heating. This would typically consist of a main plantroom with heat generators delivering



» a heating water loop under the control of a building management system (BMS). This heating loop then feeds individual heat interface units (HIUs) in each dwelling, which provide heating and hot water on demand. The HIU includes a plate heat exchanger with accompanying valves and pumps to distribute the heat to the heating system in each dwelling, or to heat the hot water, as required.

The design of such systems apply diversity to the size and mix of the heat generators in the plantroom to ensure that there is always sufficient heat available while also meeting the local statutory requirements for system efficiency. This – as with all diversity calculations – is subject to degrees of uncertainty, which inevitably leads to some oversizing to ensure no deterioration in service.

The 2015 DECC report² indicated that the losses for schemes that deliver heat to the individual customer (each dwelling or apartment) were significant, with one scheme – from the selection of 14 existing large heat-network schemes selected as representative of UK installations – recording losses of 43% (with the overall sample average being 28%). 'Evidence suggests that high losses can be experienced through internal distribution pipework within buildings,' the report stated. These 'losses' will not only reduce the overall efficiency of the systems, but are also likely to add to overheating problems in summer, as building heat networks operate to meet the need of individual apartment HIUs to deliver domestic hot water (DHW). Such overheating is, reportedly, particularly prevalent in communal areas - such as corridors, where heat-network pipework traditionally runs in ceiling voids – which can require separate ventilation measures or temporary fans and comfort air conditioning to deal with the issue.

The DECC report noted that, although operation costs associated with the heat network appear to be low, there are higher operation costs associated with other elements of the heat-network scheme, such as heat sources and energy-centre buildings. The highest operation costs appear to be associated with the HIU and heat-meter maintenance, as well as meter reading and billing activities.

The recently published London Energy Transformation Initiative (LETI) *Climate Emergency Design Guide*⁵ illustrates indicative opportunities for reducing energy consumption in new residential developments to transform energy use – in terms of energy use index (EUI) kWhm²y⁻¹ – from current practice to one that delivers a low-energy

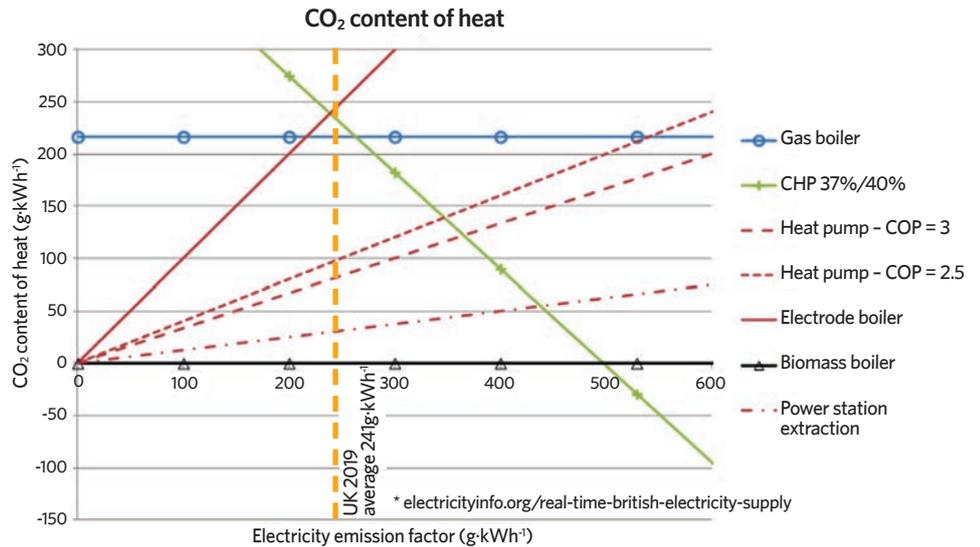


Figure 1: CO₂ content of heat (Source: DECC²)

design, as shown in Figure 2. Among the basket of measures – most of them associated with good building practices – approximately 40% of EUI reduction could potentially be from the application of heat pumps and, to a smaller extent, mechanical ventilation and heat recovery (MVHR) and hot-water efficiency.

Among several other feasible options, LETI⁵ identifies water source heat pumps in apartments that are connected to a tempered ambient loop as having the potential for zero carbon once the electricity supply grid is decarbonised (or if the systems are powered by onsite renewables).

The promise of the Future Homes Standard, together with established methodologies such as CIBSE TM59⁶, and tools such as those developed by the Good Homes Alliance,⁷ all aim to identify and mitigate overheating risks in new homes using passive means before mechanical cooling solutions are considered. However, homes – particularly those in urban, densely occupied areas – may require active cooling systems to maintain the comfort, health and wellbeing of occupants. Without appropriate system design at the planning stage, this will inevitably lead to the further proliferation of the 'portable air conditioner', which is increasingly promoted as a 'standard' home appliance in the UK.^{8,9,10} Residential heat pumps, together with whole-home ventilation systems employing heat recovery, may be designed to effectively provide cooling (as well as heating and DHW). Employing a water source heat pump for each residential unit, exchanging heat with an appropriately designed and controlled ambient communal water loop, can provide heat recycling within a building – for example, between heat pumps that are providing space cooling and those that are generating DHW) – and can connect to district heat networks so that heat rejected from cooling systems is redistributed to buildings with heat demands. The use of an ambient network (as opposed to fourth-generation) provides greater opportunity to recover waste and employ renewable heat sources, such as solar water heating, seasonal thermal storage and heat recovered from sewage.

In a system such as that illustrated in Figure 3, the individual heat pumps are connected to a single communal ambient heat loop, nominally maintained at 25°C

THE MATURATION OF HEAT NETWORKS

Heat networks are typically categorised in terms of 'generations', which are necessarily broad-brush descriptions:

First- and second-generation networks were popular until the mid-20th century – employing steam and, latterly, high-pressure hot water – and were notable for high heat losses. Beyond large, managed sites, such as hospitals and institutional estates, these are rarely used today.

Third-generation networks have been the prevalent system in recent years, circulating hot water 70°C to <100°C, but many reportedly¹³ suffered from poor control. Most existing UK heat networks use this technology.

Fourth-generation networks operate at lower temperatures of around 40°C to 60°C. These are more able to use low carbon heat sources and result in lower heat losses.

Fifth-generation, or 'ambient', heat networks employ water at, or close to, ambient temperature, reducing or eliminating heat loss and reducing the reliance on pipe insulation significantly. These are used in conjunction with heat pumps to raise temperature to deliver heating and hot water.

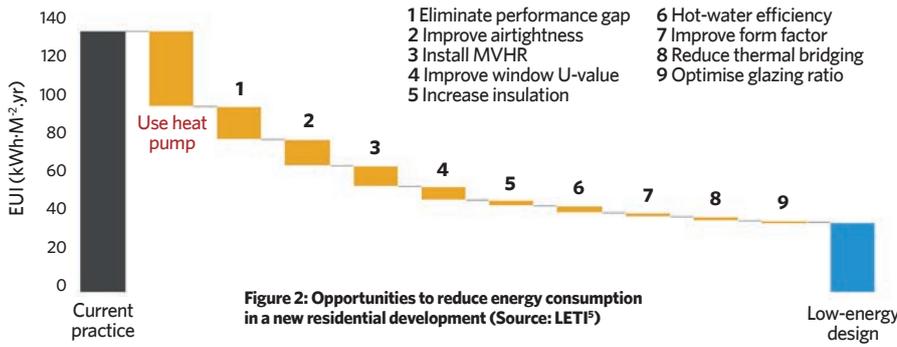


Figure 2: Opportunities to reduce energy consumption in a new residential development (Source: LETI[®])

flow temperature and 15°C return water temperature. This flow temperature was chosen for this system as an effective mid value, so that the R410A-charged heat pumps can perform consistently at high heating coefficient of performance (COP) and cooling energy efficiency ratio (EER), while also reducing the potential for heat transfer between the insulated loop pipework and the air within the building.

The heat pump in each apartment can be indirectly connected to a range of emitters, including air coils, radiators, underfloor heating and fan convectors. DHW is provided by an indirect hot-water cylinder, packaged within the modular unit, which is charged by the heat pump. An optimised legionella protection cycle employs a direct electric immersion heater to provide top-up heat to stored DHW beyond the 55°C economically attainable from the heat pump. The heating systems within the space are limited to a flow temperature of 55°C for applications such as underfloor heating, air coils and low-temperature radiators. A 6kW heating/4kW cooling unit, such as that shown in Figure 4, has a heating COP of between 3.5 and 4.1 when producing water up to 55°C, with ambient loop temperatures between 15°C and 25°C. To provide chilled water at 10°C the EER is 5.1, with an ambient loop temperature of 25°C. The unit produces a sound power of 36dBA (similar to a domestic refrigerator/freezer).

The insulated ambient loop design is optimised to ensure the best compromise between maintaining a low pressure drop and minimising heat transfer to the adjacent air. The water flowrate and temperature is controlled to ensure the most effective operating conditions while satisfying the load requirements of the individual heat pumps. The ambient loop flow temperature can be maintained with centralised heating and cooling plant, or may be connected to renewable sources or a wider area heat network (which may benefit from ‘waste’ heat from district network resources). These systems can be readily included in the calculation of Standard Assessment

Procedure (SAP) evaluations through specific methodologies,¹¹ such as that developed by BRE for the illustrated system. Capital costs¹² (produced by the manufacturer) of an example single communal ambient loop used to provide heating and cooling through residential heat pumps were compared with those of a system comprising a gas boiler, CHP and chiller system, using both chilled and hot water HIUs and fan coils for cooling for a building with 125 apartments. The cost of the single communal ambient loop and heat pump system indicates a significant saving.

Such systems can satisfy year-round health and comfort needs within apartments and reduce overheating in communal areas, as there are practically insignificant heat gains from the single communal ambient loop. Heating and cooling is in the control of the individual residents, so the principal cost of heating and cooling is also directly under their control, without the need for heat metering. As the electricity grid decarbonises, their carbon emissions reduce. The operating costs for both resident and building operator are likely to be reduced compared with more traditional third- and fourth-generation systems.

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Turn to page 48 for references.

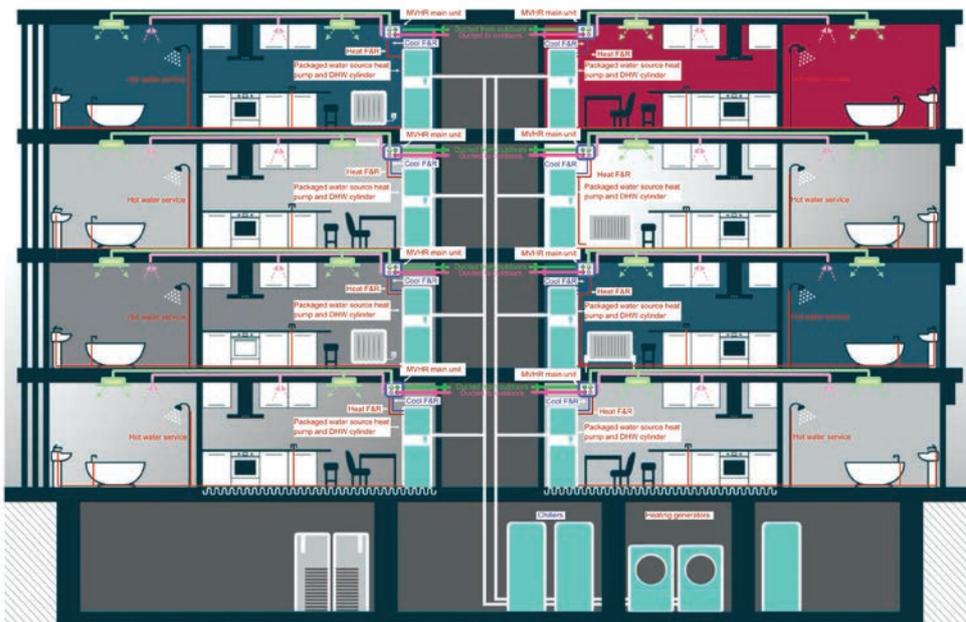


Figure 3: Communal ambient temperature heat network and residential water source heat pumps to supply space heating, cooling and DHW (developed from GDHV sketch)



- 1 Top – Heating and cooling system expansion vessels, valves and connections out to heating, cooling and DHW circuits
- Mid – Indirect, domestic hot-water cylinder
- Bottom – Heat pump and heat exchangers
- 2 MVHR main unit, including plate heat exchanger, heating/cooling coils and fans
- 3 Local controller

Figure 4: Example of installed 6kW heating/4kW cooling residential package incorporating reversible water source vapour compression heat pump, heat exchangers, 172 litres domestic hot water storage, expansion vessels and controls (Source: GDHV)

Module 174

January 2021

» **1. Prime Minister Boris Johnson's stated ambition is to see how many heat pump installations in the UK by 2028?**

- A 300,000
- B 400,000
- C 500,000
- D 600,000
- E 700,000

2. What percentage of UK carbon emissions are thought to be associated with heating and hot-water production in homes?

- A Less than 5%
- B 6–10%
- C 11–15%
- D 16–20%
- E More than 20%

3. In the DECC report, what were the average losses for the 14 existing large heat networks?

- A Less than 10%
- B 11–20%
- C 21–30%
- D 31–40%
- E 41–50%

4. Which one of these was not identified in the LETI example as a means of reducing energy consumption in new residential developments?

- A Heat pump
- B High-efficiency portable air conditioner
- C Hot-water efficiency
- D Improved airtightness
- E MVHR

5. In the example of the ambient loop system with residential water source heat pumps, what flow water temperature was generally used?

- A 10°C
- B 15°C
- C 20°C
- D 25°C
- E 30°C

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References:

- 1 *Next steps for UK heat policy*, UK Committee on Climate Change, Chapter 1a, October 2016.
- 2 *Assessment of the costs, performance, and characteristics of UK heat networks*, UK DECC, 2015.
- 3 Jones, P *et al*, *5th-generation heat networks – a major step forward for decarbonising heat in the UK*, CIBSE Technical Symposium 2019.
- 4 Boissieux, X and Betz, M, *Low carbon solution for heating and cooling in multi-family buildings*, 12th IEA Heat Pump Conference, Rotterdam 2017.
- 5 London Energy Transformation Initiative, *Climate Emergency Design Guide*, 2020.
- 6 *CIBSE TMS9: Design methodology for the assessment of overheating risk in homes*, CIBSE 2017.
- 7 goodhomes.org.uk/overheating-in-new-homes – accessed 4 December 2020.
- 8 www.telegraph.co.uk/interiors/home/best-portable-air-conditioners – accessed 4 December 2020.
- 9 www.t3.com/features/best-portable-air-conditioner – accessed 4 December 2020.
- 10 www.theguardian.com/technology/2020/dec/06/best-tech-of-2020-an-eco-vacuum-electric-car-and-a-12-kettle – accessed 6 December 2020.
- 11 *Technical Note regarding the recognition of the GDC Group Ltd – Zeroth Energy System within SAP 2009 and 2012 assessments*, BRE, 2019.
- 12 *Cost implications – Zeroth (AD/SD/0003 Version 2)*, Glen Dimplex Heating & Ventilation.
- 13 www.icax.co.uk/Fifth_Generation_District_Heating_Networks.html – accessed 4 December 2020.

› Products of the month

Rinnai to set up hydrogen information hub for consultants, specifiers and end-users

The hub will be available online and will offer webinars and digital or onsite meetings

Rinnai, manufacturer of hot water heating units and delivery systems for all commercial sites, is to create a comprehensive information hub dedicated to the subject of hydrogen as a low carbon energy for the future.

The Rinnai Hydrogen Information Hub will be aimed at building services consultants, engineers, specifiers and end-users. It will be available online and will offer webinars and digital or onsite meetings.

'Rinnai welcomes the UK government's recent Ten Point Plan, in particular the drive to decarbonisation through the use of hydrogen,' said Rinnai's Chris Goggin, who is also a board member of the ICOM Energy Association.

The UK, along with many other countries, faces an energy trilemma - the pressing need for decarbonisation, which means a shift in energy pathways; security and longevity of supply; and long-term affordability to the industrial and end consumer.



The UK's housing stock is more than 24 million units and the country saw total energy consumption increase by 1.1% in 2018 to reach 143 million tonnes of oil equivalent (mtoe), the highest level since 2013.

Government funding of £500m is available for trials for homes using hydrogen, starting with a hydrogen neighbourhood in 2023, moving to a hydrogen village by 2025, with an aim for a hydrogen town before the end of the decade.

Of this funding, £240m will be for hydrogen-production facilities.

Rinnai has made data and information contributions, and had close consultations with the lead research agency primed with advising the UK government.

'All questions and queries on the growing consensus on the suitability of hydrogen as the replacement for all fossil fuels will be answered by the hub,' said Goggin. 'Hydrogen can make a major contribution to decarbonising the UK energy grid, while also providing a sustainable answer to the political and societal questions of the energy trilemma.'

'The distribution of hydrogen creates a resolution to the trilemma questions and the very necessary decarbonisation of the UK energy grid. Hydrogen can be potentially combusted through existing in situ appliances, complete with smart controls and cost-effective hardware and software upgrades as demonstrated by proprietary technology in hot water heating units.'

■ **Call 01928 531 870,**
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Rinnai continuous-flow hot water system installed at training centre

New N Series arrangement has controls so each appliance is addressable on BMS

Transport for London (TfL) has installed the total Rinnai water heating system solution at its Ashfield House Training Centre in west London.

The system supplied comprises four N Series Sensei 1600i units on cascade frames with an additional 500L buffer vessel. The solution includes continuous-flow water heaters, BMS controls, remote monitoring facilities, Nexus electrolytic scale inhibitors, flexible flueing systems and more ancillaries, all underscored by continuing energy and carbon analysis of comparative product systems.

Provided there are constant supplies of water and gas, Rinnai continuous-flow hot water systems will deliver a constant flow of temperature-controlled hot water throughout the building.

The system also includes multiple valve kits and unvented cylinders to support compliance and enable best practice in system design. The



innate technology offers high efficiencies and remote-monitoring capabilities by the seamless integration and monitoring with the onsite BMS.

The new N Series arrangement incorporates connectivity controls to ensure each appliance is visual and addressable on the BMS system.

'We chose to install a cascade of Rinnai's N Series water heaters to provide a robust and resilient system, able to cope with periods of high hot-water demand in this nine-storey building,'

said Theodore Jones, infrastructure manager for TfL. 'The N series units are compact and lightweight, affording ease of transportation to the ninth-floor plant room. The inherent modularity of this solution allowed for a rapid installation, and the finished system exhibits a smaller floor footprint than traditional HWS plant.'

The Rinnai Sensei N Series is the first continuous-flow hot water heating unit manufactured with stainless steel heat exchangers to be available in the UK - this gives a greatly extended working life at optimum performance to each of the four models in the range.

'This installation contains many facets of our total product offering, all of which is aimed at maximum efficiency in both engineering and financial terms,' said Rinnai's Chris Goggin. 'On-demand limitless hot water with precise, controlled temperature is the cornerstone of our offering today to all sites of any size or use.'

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Wilson FlowGrids prove measurement is key

If the economy is going to get back on track, staff and customers need to be confident that buildings have the right levels of ventilation. Accurate air-flow measurement and a proactive strategy are crucial.

All Wilson FlowGrids generate enhanced differential pressure signals that directly relate to volume flow within the duct and, when used with a pressure transmitter, produce an instrument with real-time flow-measurement accuracy, usually associated with clean rooms and data centres. In general, HVAC applications, they will greatly improve the effectiveness of building management systems, enhancing energy efficiency and IAQ. Providing such levels of accuracy also helps avoid under ventilation, which potentially reduces IAQ and impacts the health and performance of building occupants.

The grids are maintenance free, and the time required to commission the HVAC system is shorter.

■ Visit www.sensing-precision.com



Altipeak goes for gold with Condair



Altitude training specialist Altipeak has selected Condair humidifiers to control the humidity in its new Altipeak Mobile Altitude Pod. The training chamber can simulate any climate, enabling athletes to train under the conditions in which they will ultimately be competing.

The Condair EL steam humidifier can deliver humidity either directly to a room or to an air handling unit or duct. It is available in capacities from 5 to 180kg/hr and incorporates steam cylinders that last up to three times longer than similar models.

■ Visit www.condair.co.uk

Rockwool delivers specialist fire protection for Grange University Hospital

A combination of Rockwool's non-combustible stone wool insulation and certified Firepro products have been specified to ensure the Grange University Hospital, a new specialist healthcare facility in Wales, can achieve the highest levels of fire protection.

Rockwool worked with main contractor Laing O'Rourke and passive fire protection contractor Optimum, to ensure effective firestopping throughout the critical care centre. Approximately 25,000 penetration seals were installed throughout the scheme using certified products from the Rockwool Firepro range.

Opening its doors ahead of schedule in November 2020, Rockwool supported Central Roofing South Wales in delivering non-combustible insulation for critical areas of the external envelope. While the façade benefited from the installation of Rockwool Rainscreen Duo Slab in the through-wall build up, Rockwool Hardrock Multi-Fix Dual Density was laid on the metal deck roof areas to ensure regulation compliance.

With a factory in south Wales and more than 500 employees across the UK, the Rockwool Group offers a full range of high-performing and sustainable insulation products for the construction industry.

■ Visit www.rockwool.co.uk/sccc



Panasonic's Aquarea heat pumps awarded Keymark certification

Panasonic Heating and Cooling Solutions has announced that several units from its Aquarea range have been granted a Keymark certification, recognising the high standard of the heat pumps.

The Keymark is an independent, voluntary certification mark supporting the quality of heat pumps in the European market. It is based on impartial, third-party testing.

Aquarea J Generation R32 Monobloc, Bi-bloc and All-in-One have received Keymark certification along with the Aquarea T-CAP H generation (R410a) Monobloc single phase.

■ Visit www.aircon.panasonic.eu



Adveco air source heat pumps with 70% less CO₂

Adveco extends its range of commercial air source heat pumps with the Adveco L70, a high-capacity 70 kW rated air-to-water monobloc heat pump. Designed for the UK climate, the L70 will dramatically lower CO₂ emissions by around 70% compared with gas-based systems, supplying working flow temperatures up to 60°C to preheat hybrid DHW and heating applications.

Bill Sinclair, technical director at Adveco, said: 'In conjunction with Adveco's bespoke application design, the L70 offers a comprehensive response for sustainable heating and hot water.'

■ Visit www.adveco.com



Waterloo's ventilation design strikes the right balance between the new and the old

A range of diffusers and grilles from Waterloo Air Products, manufacturer of air management solutions, has helped Peterborough City Council create a modern workplace in a development combining the restoration of a redundant rail shed with a new-build extension. The company's innovative products have shown how they blend into both new and old environments, while ensuring optimum performance.

Waterloo worked with Derry Building Services on the ventilation design to ensure the specification met both buildings' aesthetic requirements while ensuring efficient airflow.

Visit www.waterloo.co.uk

Grundfos aids testing times at Glasgow hospital

Fast, accurate testing plays an important role in the attempt to contain the Covid-19 pandemic. Throughout the UK, the demand for testing continues to outstrip the available laboratory capacity, so the new testing facility at NHS Gartnavel Hospital in Glasgow is very welcome news.

With a tight turnaround time to achieve the required opening, Grundfos worked collaboratively with specifiers, contractors, and distributions partners to get this site up and running. The facility is now fully operational and benefits from a full range of Grundfos solutions including circulators, a booster set and a pressurisation unit.

This is just another example of Grundfos going the extra mile and giving its support to a number of high-profile Covid-19-related projects, up and down the country. As a national solutions provider, Grundfos is very pleased to have played its part in answering the demands that have arisen from this extraordinary situation.

Visit www.grundfos.co.uk



Condair releases Making Buildings Healthier white paper

Humidity specialist Condair is releasing a white paper - *Making Buildings Healthier* - showing how building managers can protect occupant health with a holistic approach to controlling their indoor environments.

The SARS-CoV-2 pandemic has focused attention on the risks posed by viral transmission in buildings and the influence of elements such as fresh air, temperature and minimum relative humidity.

Condair's white paper aims to promote dialogue between facility managers, users, and health and safety officers, enabling the right package of health protection measures to be considered.

Visit www.condair.co.uk/healthy-building



Underfloor air conditioning system brings increased design freedom to 77 Coleman Street

An AET Flexible Space underfloor air conditioning system has allowed Buckley Gray Yeoman architects to highlight key architectural features during a refurbishment London's 77 Coleman Street development.

AET's system makes use of the void within the building's raised-access floor, removing the need for traditional ceiling-based services and suspended ceilings. By using the 270mm void, the design team was able to preserve and highlight a unique terrazzo-patterned soffit.

Moving away from conventional ceiling-based services has allowed 77 Coleman Street to boast unusually high floor-to-ceiling heights, creating a brighter office environment. The CAM-V underfloor systems have been installed across all seven floors, each of which is served by four units, and the conditioned air is delivered into the space via 48 floor-recessed fan tile units. These induce conditioned air into the space, eliminating cold draughts, while giving the end-user control over temperature and airflow.

Call 01342 310400 or email Abigail@flexiblespace.com

Elco revisits care home to upgrade boilers and deliver impressive energy savings >

Elco Heating Solutions has returned to Alban Manor care home in St Albans to upgrade its commercial heating plant with the latest floor standing boiler technology on the market. The installation of two Trigon L Plus 170kW units was part of the complete refurbishment of the heating and hot water system at the Hertfordshire care home, which has dramatically reduced NO_x emissions by 86%, CO₂ emissions by more than 28%, and gas consumption by 26%.

■ Visit www.elco.co.uk



Vent-Axia wins domestic ventilation product of the year at H&V News Awards >

Ventilation expert Vent-Axia won the 'Domestic Ventilation Product of the Year' award at the H&V News Awards. Scooping the prize for its pioneering Lo-Carbon PoziDry Compact Pro - which offers a solution for combating condensation and mould in properties without a loft - the Sussex-based company received the accolade at a virtual awards ceremony on 25 November 2020. In addition, Vent-Axia's PureAir Sense was also highly commended in the 'Air Movement Product of the Year' category at the awards.

■ Visit www.vent-axia.com



< Draka launches new connectivity range in environmentally friendly packaging

Draka, a brand of Prysmian Group - a power and telecommunications cables and systems manufacturer - is pleased to launch a new, improved connectivity range of products for use with its copper Draka Universal Cabling System. The new connectivity products are supplied in plastic-free, environmentally friendly packaging.

The new Draka Cat5e and Cat6 unshielded copper connectivity range has been completely revised and updated for increased quality and performance, and is designed with the installer in mind.

■ Visit mms.drakauk.com

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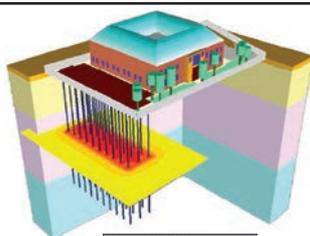
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More than 95% of British Standards published each year have their origins in international work



Dr Scott Steedman

Standard bearing

BSI's Dr Scott Steedman explains the role of standards and how their use might change after Brexit

Dr Scott Steedman, director of standards at BSI, joined the group in January 2012 and was appointed to the board in October 2012. He has a background in engineering, and started his career at the University of Cambridge before moving to industry, where he spent more than 20 years as a consultant in the built environment sector. He served as vice-president (policy) for the European Committee for Standardization (CEN) from 2013-17, and is currently vice-president (policy) of the International Organization for Standardization (ISO).

What is the role of standards?

BSI is appointed by the UK government as the national standards body, and coordinates UK economic, policy and social interests in the development of standards. Our role is to help improve trust in products, services and systems through the development and maintenance of best-practice standards. A standard – whether a specification, a code of practice or a set of principles – is an agreed way of making a product, managing a process, delivering a service or supplying materials.

BSI manages the catalogue of national standards – British Standards (BS) – that underpin the UK economy. These are technology agnostic, patent free and periodically subject to open public consultation. Around 15% of BS are used by government to support the delivery of regulatory conformity. More than 95% of BS have their origins in international work, with UK experts agreeing the standards' content in their sectors with international peers. These experts form technical committees to develop standards at international level through the ISO and International Electrotechnical Commission, and in their independent European regional counterparts, CEN, European Committee for Electrotechnical Standardization (CENELEC) and European Telecommunication Standards Institute.

Will Britain's use of international standards change after Brexit?

The UK's exit from the EU requires no immediate change to standards published by BSI. We will continue as a member of the independent European standards organisations – CEN, CENELEC and ETSI – after the end of the transition period on 31 December 2020. This will ensure our national stakeholders will continue to have the opportunity to influence at this level.

EU exit also means that the official citation of voluntary standards to support regulatory conformity, a process carried out by the European Commission, will transfer to the UK government from January 2021, in a new UK-managed process.

'Harmonised standards' – which support EU regulation and CE marking through citation in the *Official Journal of the EU* and are adopted in the UK as British Standards (BS EN) – will be referenced by the UK government as 'designated standards'. They will also support the new UKCA marking for regulatory conformity in Great Britain.

How can international standards help industry?

International standards play an important role in innovation and trade, underpinning and facilitating the terms of trade globally. UK experts take part in more international (ISO) committees than any other country. Together with active UK participation in the IEC and European regional organisations, developing, adopting and using international standards helps UK industry: build trust with clients and governments; increase resilience through enabling agile and diverse supply chains; and secure improved market access by using common standards modelled on UK best practices.

International standards are a key strategic tool for innovators to get to market faster. Standards accelerate innovation by providing a common language and framework for companies to do better business, increasing trust with investors, enabling rapid scale-up and avoiding the need to reinvent the wheel.

What might happen with other international trade deals?

We are working with UK government – through the departments for Business, Energy and Industrial Strategy and for International Trade (DIT) – to ensure that text referring to standards in UK trade agreements will create opportunities that build on the leading role currently played by UK stakeholders in shaping, adopting and maintaining international standards. BSI's position is that trade deals should benefit UK stakeholders through opportunity for reciprocal market access linked to our coherent and consistent set of national standards, fully aligned with international standards.

I was recently reappointed as a member of the DIT Strategic Trade Advisory Group, and we have been helping government to develop its policies on trade and standards so that global market access barriers are reduced for UK businesses. We have encouraged the creation of a DIT advisory group on technical barriers to trade, and look forward to the formation of that group in the coming weeks.

EVENTS

Event details are correct at the time of going to print, but as a result of the ongoing coronavirus (Covid-19) situation, they may be subject to change. For updates, please check cibse.org/training for training and cibse.org/events for CIBSE groups and regional events. CIBSE has a range of online learning courses available to support your learning. visit cibse.org/training-events/online-learning



BUILDING PERFORMANCE AWARDS

25 February 2021

The CIBSE Building Performance Awards 2021 will take place online, for the first time. The shortlist has been announced, so join us to find out who wins, and to celebrate the industry's talent and achievements.

www.cibse.org/bpa



CIBSE REGIONS AND GROUP EVENTS

For up-to-date information on regions and groups meetings, webinars and podcasts, visit cibse.org/events

NEW LIVE ONLINE TRAINING COURSES

CIBSE training courses have been reformatted to work online, with a live trainer, so you can expect the same interaction and participation as you would in a classroom setting. For details and the full programme, visit www.cibse.org/training

Heat networks code of practice

18-19 January

Mechanical services explained

18-19 January

Fire safety in purpose-built blocks of flats

19 January

Energy efficiency building regulations: Part L2 2020

20 January

Fundamentals of drainage

22 January



CIBSE JOURNAL WEBINARS

CIBSE Journal hosts regular, sponsored webinars covering a wide range of building services-related topics. All webinars are available on demand on the Journal website at www.cibsejournal.com/cpd/webinars

Most recent webinars include:

- Staying in control of design-to-value pumping solutions, sponsored by Grundfos
- R32 VRF and F-Gas phase down, sponsored by Dakin
- A case for change: setting new UK standards for high rise drainage, sponsored by Geberit.

Power system harmonics

25 January

Heat networks (CP1 2020) half-day update

26 January

Building services explained

26-28 January

Overview of current fire legislation and guidance

27 January

Below-ground building drainage

29 January

Introduction to Heat networks: code of practice (CP1 2020)

2 February

Energy Savings Opportunity Scheme (ESOS)

4 February

Heat networks (CP1 2020) half-day update

9 February

Electrical services explained

9-11 February

CIBSE Membership

CIBSE membership closing-date surgery

■ 6 January

Event for those applying for ACIBSE or MCIBSE in 2021, offering the opportunity to speak to a professional CIBSE interviewer for advice on how to complete the Engineering Practice Report. 30-minute slots to be allocated on a first-come basis.

CIBSE membership webinars

CIBSE Membership is hosting free webinars to support members with applications for the Associate and Member grades and registration with the Engineering Council at Incorporated Engineer and Chartered Engineer levels. The series includes two separate webinars, with session one covering routes to membership, and session two focusing on how to write the Engineering Practice Report. Register at www.cibse.org/webinars

Upcoming webinars:

- 12 and 26 January
- 16 and 23 February
- 9 and 23 March



ONLINE LEARNING

CIBSE has a portfolio of online learning courses, which contain interactive content, with quizzes and additional resources to support your learning. www.cibse.org/training

WEBINARS

#Growyourknowledge

CIBSE's free webinar series continues in January. Taking place every Thursday at 11am, the webinars are designed to support the CIBSE community in maintaining their CPD remotely.

To register for the webinars, visit cibse.org/growyourknowledge

All previous webinars are available on the #GrowYourKnowledge GoToWebinar channel.

To register for the webinars, visit cibse.org/growyourknowledge

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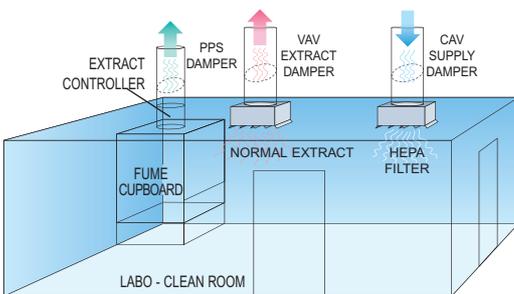


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