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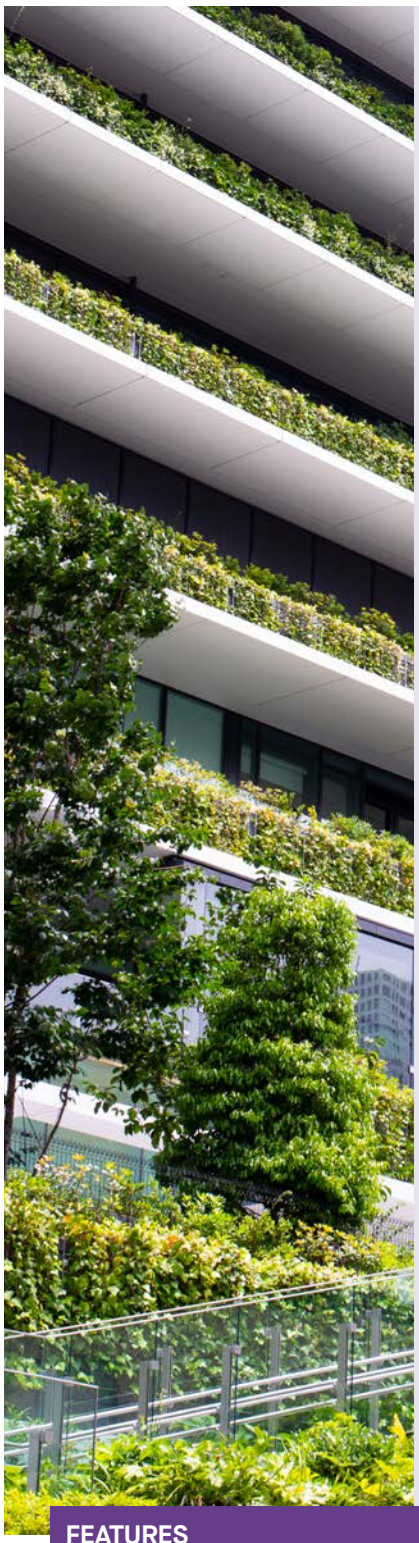

CIAT

Here comes summer, as I write this on what, we are told, is to be the hottest day of the year so far!

I enjoyed an immersive experience at the Kit Kat Club last night as the Playhouse Theatre, in London, has been repurposed to showcase a production of Kander & Ebb's musical, *Cabaret*. The remodeling of the internal space has meant changing an existing traditional stage set-up to one that is in the round with an audience encircling it – I am sure that an Architectural Technology professional must have been at the helm to make this feat possible!

Back in the winter issue, we featured an article by Professor Steve Scaysbrook FCIAT tracing the history of Mitchell's construction books. I am pleased to announce that the book are now available and copies of the books and drawings can be obtained via the Routledge website with the following links:

- routledge.com/Mitchells-Building-Construction-and-Drawing-1906/Mitchell-Scaysbrook/p/book/9781032199047 (ISBN for both Volumes 1 & 2: 978-1-032-19904-7)
- routledge.com/Building-Construction-and-Drawing-1906-A-Textbook-on-the-Principles-and/Mitchell-Scaysbrook/p/book/9781032199061 (Ebook iSBN: 978-1-003-26147-6)
- routledge.com/Building-Construction-and-Drawing-1906-A-Textbook-on-the-Principles-and/Mitchell-Scaysbrook/p/book/9781032199641 (Ebook iSBN: 978-1-003-26167-4)

I would like to encourage you to consider entering the AT Awards which opened on 1 February. There is a variety of categories for all to apply for and you can find all the information you need at: architecturaltechnology.com/awards/atawards.html.

Until autumn.

Adam Endacott
Editor

With thanks to Anthony Walsh FCIAT, we bring you a short quiz to enjoy and it even adds to your own CPD! The rules are simple, no Googling! (Answers are at the bottom of the page)

1. **Which document provides guidance for managing health and safety in construction?**
   A. L153
   B. L154
   C. L155
2. **How many metric bricks are needed to build a 1m² panel, one brick thick?**
   A. 60
   B. 90
   C. 120
3. **Surface spread of flame classification Class 0 equates to what European Classification?**
   A. A2-s1,d0
   B. B-s3,d2
   C. D-s2,d0
4. **Which grade of stainless steel is appropriate for use in harsh and marine environments?**
   A. 304
   B. 308
   C. 316
5. **At what height do sprinklers become a mandatory requirement in an office building?**
   A. 18m
   B. 30m
   C. sprinklers are not mandatory in an office
6. **Which document provides guidance on the scale of provision for sanitary installations?**
   A. BS.6399-1
   B. BS.6465-1
   C. BS.5838-1
7. **BRE 187 gives guidance on building separation and boundary distances. Other than the enclosing rectangle method, which other method does this guide describe?**
   A. the slide rule method
   B. the set square method
   C. the protractor method
8. **What is the minimum separating distance CIBSE recommend between intake and extract ducts from an MVHR system?**
   A. 1.8m
   B. 2.0m
   C. 2.2m
9. **What does Approved Document R relate to?**
   A. It doesn't exist
   B. Security in dwellings
   C. Physical building infrastructure
10. **NBS Building references the CAWS system. What does CAWS stand for?**
    A. Common Arrangement of Work Sections
    B. Complete Advice for Writing Specifications
    C. Computer Aided Work Specifications
11. **In the current edition of Approved Document L2A, what is the maximum air permeability given in Table 3?**
    A. 10m³/(hr.m²) at 50 Pa
    B. 10m²/(hr.m³) at 50 Pa
    C. 10m³/(hr. m³) at 50 Pa
12. **BSi publish guidance on carrying out fire risk assessments which is known as what?**
    A. PAS 999
    B. PAS 911
    C. PAS 79
13. **Approved Document J is relevant to what?**
    A. Sanitation, hot water safety and water efficiency
    B. Drainage and waste disposal
    C. Combustion appliances and fuel storage systems
14. **Using BS.9999:2017 what is the maximum travel distance in more than one direction for a building with an A2 risk profile, fitted with sprinklers, L1 fire alarm, with a ceiling height of 5.5m?**
    A. 75m
    B. 84.5m
    C. 90m
15. **Which version of the Uniclass classification system is used by the UK Construction Industry?**
    A. Uniclass 2
    B. Uniclass 2015
    C. Uniclass 2019

Answers
1:A, 2:C, 3:B, 4:C, 5:B, 6:B, 7:C, 8:B, 9:C, 10:A, 11:A, 12:C, 13:C, 14:B, 15:B

Building Safety Act 2022 receives Royal Assent

Commentary by CIAT

The Building Safety Act, which is a culmination of the activities that have taken place since the Grenfell disaster in 2017, received Royal Assent on 28 April 2022. CIAT has been working with Government, CIC and other bodies on various aspects of the Act to contribute to making necessary changes. It is critical that Industry works together to raise competence across the board and instil integrity and responsibility across teams working together to construct, develop and maintain structures.

Many of the proposals are excellent and once the secondary legislation is drafted, we will be able to comment in more detail on the implementation in a proportionate and balanced way.

Golden Thread
The Act is far reaching and lays the foundation for the new building safety regime. The Golden Thread enables building users to understand the building and keep it safe. It includes the need for accountability, and the currency, maintenance and retention of records. This is a positive outcome and one where we know much work is currently being undertaken on its workability.

HSE as Regulator
We support the Health and Safety Executive as the Regulator to ensure that there is a clear, joined up approach across all health, safety and welfare issues and that the Act will sit alongside the CDM Regulations rather than in conflict with them.

Product Testing
We were also pleased to see the Government sponsored review on product testing and certification; the results of which should frame the secondary legislation on this subject.

Construction Products Regulations
We are particularly supportive of the cohesive approach to standardise information in relation to construction products. We are in the process of liaising with providers to encourage more transparency and are pleased to be working with the Department for Levelling Up, Housing and Communities on the draft Regulations. We are supportive of the work that the Construction Product Association (CPA) has commenced with the Voluntary Code and the Construction Leadership Council (CLC) in attempting to address various issues in respect of Goods and Materials. We welcome clarity for manufacturers, designers and installers as to the products they are specifying and using to construct buildings.

Having clear requirements as to the information to be provided will assist both manufacturers and specifiers in ensuring that the technical performance of buildings is achieved.

Should product substitution be necessary, it should be easier to discern like for like, not only in terms of compliance with standards, but also the performance and availability of such products, in addition to ensuring sustainability.

Principal Designer
Chartered Architectural Technologists are well equipped to navigate the changes and take on the duty holders' role of Principal Designer under the Building Safety Act. Chartered Architectural Technologists operate within design already, and work within the current regulatory framework to ensure compliance and performance for building safety of occupants and users.

As the detail of the new regime continues to develop and there is clarity of secondary legislation, CIAT will regularly assess and amend procedures and practice as and if necessary, and avail and facilitate the tools to support its members and affiliates. The Institute is well prepared and has the mechanisms in place to prepare for the new regime and is working closely with government and others to ensure that this is implemented positively as a proactive lead in these activities

Amendments to Defective Premises Act and Limitation Act
The Institute has expressed its ongoing concerns in relation to the amendments to the Defective Premises Act (DPA) and Limitation Act, as included within the Building Safety Act. By seeking to extend the period within which legal action can be brought from six to thirty years on a retrospective basis, it will likely create new exposures on long completed projects overnight. This will include, possibly unintentionally, claims unrelated to fire safety aspects.

Whilst CIAT agrees that culpability should be accepted by and apportioned to those responsible, there is potential that innocent parties will be targeted. Defending such claims is likely to be problematic where records older than six years may have been destroyed in line with GDPR obligations and/or relevant employees long left the businesses. Some businesses will have ceased to trade and may be uninsured for such claims.

The proposed changes to the DPA also broaden the risks which insurers will be asked to cover and may force them to take commercial decisions on their appetite to cover claims under the DPA and Section 38 of the Building Act 1984. This in turn may result in further policy

Continued on page 50

How are UK Government guidelines for insulation changing?

Words by Simon Ayres, Managing Director, Lime Green Products Ltd

Building standards are changing, and it is impacting insulation choice, shifting the way we think about insulation in different kinds of buildings and walls. This article discusses the new guidelines, what they mean for designers and explains the importance of design choice in avoiding common insulation pitfalls

Changing how we think about insulation

Insulation has a crucial role to play in ensuring a building and its occupants remain healthy. Although, often, properties are not built with this in mind, and as a result, many buildings with solid masonry walls in the UK don't have effective insulation installed.

Until recently, it was thought that, for retrofit projects with solid masonry walls, impenetrable, vapour-tight barriers were the most suitable solution for controlling internal condensation.

However, recent research published by the Brick Development Association records that a large volume of the moisture present in solid masonry walls is caused by driving rain and leaks, which can lead to further problems for the building. It also found that when moisture builds up in this way, in warmer weather, it is likely to be driven inwards against the impenetrable, vapour-tight barriers. Over time, this can cause the moisture to accumulate in the building, with no means of escape, leading to eventual rot in lintels and joist ends.

Recognising the risk of this insulation solution, British Standards BS 5250:2021 for the management of moisture in buildings now prohibits the use of dew point calculations for solid-walled properties. Instead, it advocates for breathable insulation on both sides of the wall, ensuring any moisture has a means of escape once the wall dries out.

Presence of moisture

The recent changes to building standards promotes an alternative perspective on moisture and insulation in solid-walled properties.

Previously, moisture was often thought of as something that needs to be eliminated from a building in its design phase. However, in reality, moisture will always be present. That is why BS 5250:2021 now suggests it should be seen as an interactive matter, and focus should instead be placed on moisture management, ensuring any moisture present has a way to escape through the building's fibres.

Moving beyond U-values

When insulating a building, it is important to think beyond the U-values of individual materials in isolation.

Although considering heat transfer is important in reducing overall heat loss, the lowest U-value alone will not necessarily equal optimal thermal performance in reality. Instead, it is important to think about how the insulation materials will work together as a whole system.

Installing insulation

When selecting the most suitable methods and materials for retrofitting internal insulation to solid masonry walls, there are four main steps to consider: assess, design, install and maintain.

1. Assess

When installing insulation as part of a retrofit project, regardless of size, it is first important to understand the building itself. Think about the amount of energy the building is losing through its walls, floors and ceilings, for example, and consider how much insulation can help you to save.

Ultimately, your insulation will change the physics of your solid wall, and there is no one-size-fits-all answer about the 'correct' way to do this. Your decision should be informed by a number of different factors, such as:

- **Wall type and build-up:**
  - What materials is your wall made from?
  - Is it a solid wall or cavity wall?
  - How thick is it?
  - What condition is the wall in?
- **Mortar type**
  - Is the wall's mortar lime or cement-based?
  - This will affect how the wall absorbs and deals with moisture.
- **Existing internal lining**
  - Is there any existing internal lining?
  - If there is, is it plasterboard, lime, gypsum or something else?
  - This is important as you need to ensure your insulation can bond successfully to the existing wall. In some cases, you may need to remove internal lining before installing internal insulation.
- **Existing internal finish**
  - Is the wall finished with paint, wallpaper or another material?
  - You will need to remove wallpaper or impermeable paint before installing insulation to retain breathability and ensure the insulation performs effectively.
- **Existing external finish**
  - Is your external finish cement render, lime render or paint finished?
  - Understanding how moisture can escape from the wall externally is key to ensure it does not become saturated following periods of heavy rainfall.
- **External condition**
  - Consider the overall condition of your building – for example, is there any maintenance needed?
  - Look at any water pipework, window frames, wall penetrations and ground conditions, for example.
- **Internal condition**
  - Are there any damp patches, mould or stains that could indicate internal condensation?

2. Design

Once you understand the building in more detail, you can start to think about the most suitable materials for your insulation.

It is important to keep three things in mind when designing your insulation solution:

- Thermal performance
- Potential risks
- Spatial impact.

It is also important to minimise thermal bridging to reduce risk of mould growth, as well as considering insulation for joists and floors, as well as walls, to minimise risk of condensation.

3. Install

How you install your internal wall insulation will vary depending on the materials you are using. However, generally, when installing insulation it is essential to fit it without gaps or cavities, as these can encourage cold air travel and the growth of damp or mould.

It is also important to consider the different properties of different insulation products. For example, some materials, such as lime, have high-alkaline properties, making them antibacterial, which reduces the risk of damp in the wall.

4. Maintain

When you take the time to assess, design and install insulation based on the needs of your individual building, there is often very little maintenance required on an ongoing basis.

When your insulation does not match your wall, it can result in serious maintenance issues further down the line, with BS 5250:2021 noting how non-breathable insulation can cause extreme issues in solid-walled properties, such as rot.

For more information, or to understand the most suitable insulation solution for your retrofit project, explore Lime Green's insulation guides. ■

Shedding some light on the new Part L Building Regulations

Words by Paul Trace, Director, Stella Rooflight

Why the need for new Regulations?
A major part of the UK's commitment to meeting its targets for carbon reduction is being driven by a tightening of the Building Regulations surrounding energy efficiency standards for homes.

The Ministry of Housing, Communities and Local Government (MHCLG) argues that by making our buildings more energy efficient and embracing smart technologies, we can cut energy bills, reduce demand for energy, and boost economic growth while meeting our targets for carbon reduction and maintaining healthy environments. As such, it has introduced *The Future Homes Standard* to ensure all new homes achieve a 30% improvement in energy efficiency standards by 2025.

The new Building Regulations aimed at achieving these targets will comprise five new Approved Documents, which will come into effect in June 2022.

Manufacturers, designers, specifiers and customers looking to install rooflights and roof windows will be most interested in uplifts to the *Approved Document L, Conservation of fuel and power Vol 1: Dwellings*.[1]

What do the new Regulations state?
For rooflights, skylights and roof windows (of which the definition is crucially important), the relevant consideration is the thermal transmittance. This is measured as a U-value in units of W/m^2K, which stands for Watts/meter square Kelvin. The lower the U-value the more efficient the construction is at keeping heat flow through the structure to a minimum.

The new Regulations deem the worst acceptable U-values to be $2.2W/(m^2K)$ for rooflights and $1.6\ W(m^2K)$ for roof windows.

Rooflights vs roof windows – what is the difference?
To correctly assess whether an element meets the new limiting U-value figure, the U-value must be calculated for the element in the appropriate plane – either horizontal or vertical. Now this makes a big difference, as testing the same product in either a horizontal or vertical position will make a significant difference to the resulting U-value figure. With the vertical position providing a much lower (better) U-value figure.

This is where the definition of the terms and roof window prove crucial in determining how they should be tested and what the relevant U-value should be for each.

According to the approved document the following definitions apply:

Rooflight: A glazed unit installed out of plane with the surface of the roof on a kerb or upstand. Also sometimes referred to as a skylight.

Roof window: A window installed in the same orientation as, and in plane with, the surrounding roof.

Therefore, while we might refer to our product as a rooflight or skylight, the official terminology for a conservation rooflight, which is designed to sit flush within a roof line, should be a roof window.

According to the approved document, the U-values for roof windows should be calculated based on a vertical position. For rooflights, U-values should be calculated based on a horizontal position.

Further guidance in the Building Research Establishment's *BR 443*[2] tells us that U-values for roof windows and rooflights are usually quoted for the in the vertical plane. This allows comparison of different products that could be used at different inclinations. However, for the purposes for calculating heat losses from buildings, U-values should relate to the plane of the component as installed in the building.

This can be done by calculating the U-value of rooflights and roof windows, allowing for the angle of the roof in respect of both surface resistances and gas space resistances. Alternatively, the following adjustments can be made to U-values assessed for the component in the vertical plane:

Inclination of roof	U-value adjustment (W/m2K)	
	Twin skin or double glazed	Triple skin or triple glazed
70° or more (treated as verticle)	0.0	0.0
<70° and >60°	+ 0.2	+ 0.1
≤60° and >40°	+ 0.3	+ 0.2
≤40° and >20°	+ 0.4	+ 0.2
≤20° (treated as horizontal)	+ 0.5	+ 0.3

Figure 1 U-value adjustment table Conventions for U-value calculations (2006 Edition) Brian Anderson BRE Scotland

What is the best U-value that you are likely to achieve?

It is important to understand that there is much ambiguity surrounding rooflights, skylights and roof windows and the U-values quoted by various manufacturers. The much-coveted U-value figure has become a powerful sales tool for those claiming to be 'the best performing' or 'most thermally efficient' rooflight on the market and you will often see figures advertised that are misleading at best, at worst, completely untrue! Some companies might even try and confuse you by quoting the centre pane figure for the glass, rather than a whole frame U-value, which is the legal requirement. In any case, caution is advised when researching the various products available and you should always request evidence to support the thermal performance claims made.

U-value calculations for roof windows and rooflights must be undertaken by an approved UKAS accredited product certification agency, who will calculate accurate thermal performance figures based on the individual make up of components in the product's construction.

Given that Stella use only the finest quality materials in our manufacturing process, from the highest specification glazing, to our high quality handmade hardwood liners, through to the best quality rubbers and seals, we are confident in claiming that our roof windows are among the best performing on the market, with our triple glazed, fixed product achieving a U-value of 1.1 W(m^2K).

A huge caveat for conservation properties – exemptions for historic and traditional dwellings

While it is not always the case, it stands to reason that the majority of conservation rooflights are installed in traditional properties, barn conversions, and Listed buildings. If your project involves such a property, you may find that there are exemptions to these new regulations.

The approved document states that the energy efficiency of historic and traditional dwellings should be improved only if doing so will not cause long-term deterioration of the building's fabric or fittings.

New extensions to historical and traditional dwellings should comply fully with the energy efficiency standards, unless there is a need to match the external appearance or character of the extension to that of the host building. In which case, the work should comply with standards in the approved document to the extent that it is reasonably practicable.

In determining whether full energy efficiency improvements should be made, the building control body should consider the advice of the local authority's conservation officer.

Additional guidance is available in Historic England's *Energy Efficiency and Historic Buildings: Application of Part L of the Building Regulations to Historic and Traditionally Constructed Buildings.*[3]

If you would like to know more about the rooflights, roof windows and thermal performance contact Stella Rooflight by visiting stellarooflight.co.uk ■

1 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1057372/ADL1.pdf
2 https://www.bre.co.uk/filelibrary/rpts/uvalue/BR_443_(2006_Edition).pdf
3 https://historicengland.org.uk/images-books/publications/energy-efficiency-historic-buildings-ptl/heag014-energy-efficiency-partII/

An in-depth look at EPDs

Words by Rob Firman, Technical and Specification Manager, Polyfoam XPS

Environmental product declarations, or EPDs, are documents that communicate environmental impact. They can be created for products and services of all types, but this article specifically deals with EPDs as they relate to construction products.

Within the construction industry, there is more demand for product manufacturers to make EPDs available. Design professionals increasingly want to select products with EPDs for the projects they are working on.

However, there is a danger that simply specifying a product with an EPD is seen as making a 'sustainable' choice.

Is that actually the case? What life cycle data are EPDs based on? How do you compare EPDs, and how can EPDs contribute to certification schemes like BREEAM? In this article, we'll try to answer all of those questions.

How does EN 15804 relate to construction product EPDs?

An EPD is an internationally-recognised document that is created in accordance with applicable standards – and should be independently verified to confirm it meets those standards.

EN 15804:2012 *Sustainability of construction works. Environmental product declarations. Core rules for the product category of construction products* describes the reporting of environmental impact for construction products. The standard's most recent amendment was in 2019.

The contents of EN 15804 are extensive, but some of its key aspects are: it defines parameters that should be declared and how they should be reported; it describes the life cycle stages that can be assessed; and it specifies the quality of data required for reporting.

The full title for an EPD is a 'Type III environmental product declaration', which means the EPD's environmental data has been quantified in accordance with the ISO 14040 series of standards. An EPD reports on the following six environmental impacts.

- Global warming potential.
- Depletion of the stratospheric ozone layer.
- Acidification potential of soil and water.
- Eutrophication potential.
- Formation potential of tropospheric ozone.
- Abiotic depletion potential.

What is life cycle assessment in EPDs?

Life cycle assessment (LCA) makes assumptions about the environmental impact at different stages of a product's life cycle. An EPD then describes and reports the conclusions of the LCA in a standard format, so designers, specifiers and other construction professionals can make informed decisions.

LCA is done across five stages, which are reported in four modules from A to D. The five stages are: product, construction process (these two make up module A together), use (module B), end of life (module C), and the circular economy (module D).

Each module contains numbered sub-categories, and manufacturers currently choose the scope of a product's LCA reporting.

By covering product manufacturing and construction on site, Module A encompasses activities up to a building's practical completion. As the name 'use' suggests, module B deals with the operation of a building, including the maintenance, repair, replacement and refurbishment of products.

Module C, the 'end of life' stage, addresses what happens to products when a building is no longer required. It assesses impacts relating to deconstruction and demolition, and the processing of waste for reuse, recovery or recycling, or disposal.

The full title of module D is 'Benefits and loads beyond the system boundary', which reflects a shift to the circular economy from the linear economy. When materials and products can have their useful life extended across multiple projects then the positive impact of that can be reported here.

Does having an EPD make a product sustainable?

An EPD does not describe whether a product is 'sustainable' or not. In fact, it is important to remember that there is no such thing as a 'most sustainable' product. EPDs are simply a tool, allowing the environmental impact of products to be compared so that choices can be made

in support of a construction project's sustainability goals.

Processing raw materials, manufacturing products, and constructing and maintaining buildings, all adds to environmental impact. Minimising the impact of construction starts with the efficient use of resources, so that we simply consume less.

This is why it has become more common for people to say that the most sustainable building is the one that doesn't need to be built. Questioning whether new construction is necessary, or if a client's needs can be met through the reuse of an existing building, means the use of raw materials and new products can be prioritised for where they are most needed.

The number of available EPDs has grown substantially in the last ten years, but the scope of reporting across different EPDs is not consistent. When data is reported for more stages, the picture of a product's environmental impact becomes more complete.

Product choices can then be made which prioritise the efficient use of resources over the long term. The focus, arguably, should therefore be on making assessment and reporting are as comprehensive as possible, from module A through to module D.

What are the different types of EPD?

The scope of LCA reporting in EPDs is just one way in which comparing EPDs from different manufacturers is tricky. It is only through comparing EPDs for different products that an assessment can be made as to which ones contribute to a project's sustainability goals.

To make a proper comparison between EPDs, it is necessary to look for, and understand, the similarities and differences between them.

Generic EPDs are typically offered by trade associations and feature data for similar products, produced by a range of manufacturers. A trade association gathers data from its member companies, then reports the environmental impact of the averaged data in an EPD.

It is therefore possible to request an EPD from multiple manufacturers, and be provided with the same document.

A generic EPD can be broadly representative of the environmental impact of your product specification. There will always be a question as to exactly how accurate it is, however, especially if a project is unique in a way that isn't captured by an average.

The preference should be for a manufacturer-specific EPD or, even better, a product-specific EPD.

A manufacturer-specific EPD can apply to more than one product (within a specific category of products) produced by a single manufacturer. A product-specific EPD applies to a single product from a single manufacturer.

In seeking to be transparent about the environmental impact of construction projects, the more specific the data the better.

What are some of the other differences between EPDs?

The environmental impact of a construction product is reported for a 'unit size' of that product. The EPDs that Polyfoam XPS makes available, for example, are based on one cubic metre of our extruded polystyrene insulation.

This unit size is called the 'functional equivalence', and it's important to check whether different EPDs are using the same one. Two products can have a similar environmental impact, but a difference in functional equivalence results in very different figures reported by the EPDs.

It is also important to check which stages or modules of life cycle assessment have been included in an EPD's reporting.

'Cradle to gate' refers to the processes involved with manufacturing a product and it leaving the factory. 'Cradle to practical completion' also deals with the installation of the product on site, being covered by modules A1 to A5. 'Cradle to grave' spans the complete life cycle of a product, including its use and what happens to it at the end of life.

The scope of reporting for similar types of products might be different, and that difference should be taken into account when assessing environmental impact. As EPDs continue to mature, consistent reporting across all modules will be increasingly desirable to give the fullest possible picture.

Claiming credits for EPDs in BREEAM and LEED

Certification schemes make credits available if construction products have EPDs. The number of credits depends on the type of EPD and whether the EPD has been externally verified.

BREEAM requires EPDs to be verified by a third-party. For the Mat 02 category, it awards points based on whether EPDs are generic (0.5 points), manufacturer-specific (0.75 points) or product-specific (1.5 points). However, if an EPD is not externally verified to EN 15804 then it cannot contribute to claiming points.

Increased recognition of EPDs has come at the expense of Green Guide to Specification ratings. Green Guide ratings were removed from the 2018 BREEAM New Construction standard and, as older versions of BREEAM fall out of use, will eventually become completely redundant.

The LEED certification scheme also recognises the importance of externally verified EPDs, and then places different values on different EPD types. It awards 0.25 points for generic EPDs, up to a full point for product-specific EPDs.

EPDs will only become more important and relevant

Regardless of whether voluntary certification is being sought, EPDs are being requested to support carbon emissions reductions and net zero carbon targets.

EPDs report a variety of environmental impacts, including global warming potential (GWP) and ozone depletion potential (ODP). Declarations of GWP are starting to become a requirement of centrally-funded government projects.

Like other mandates that have come before, such as BIM, once these things become the norm on public projects, a trickle-down effect tends to occur as different parties get used to asking for, seeing and sharing the information. EPDs are therefore going to be an ever-present part of construction product specification. ■

Project 80: Homes for the Future

Words by Dr Tony Hopkin CEng FCABE FCIOB MSFPE,
Head of Construction, Quality and Innovation, Midland Heart

Climate change and what we can do to address it, both individually and collectively, has become the defining issue of our age. The expectation from Government, consumers and future generations alike will be for organisations to significantly reduce their impact on the environment, reducing their carbon footprint and creating less waste. This is an expectation enshrined in the UK's legal requirement to bring *all* greenhouse gas emissions to net zero by 2050.

The Future Homes Standard

The UK's housing stock accounts for about 15% of the UK's annual greenhouse gas emissions. Because of this significant contribution the new-build housing sector is seeing a changing landscape in relation to the energy performance of the homes we produce in the future. The foremost challenge we face is The Future Homes Standard (FHS), which will become a Building Regulation requirement from 2025.

The FHS will see the introduction of tougher low-carbon regulation for new homes built from 2025. New homes will generally emit 75-80% less carbon than homes built under current regulations. This 75-80% reduction is to be achieved through a need to: meet more stringent building fabric requirements; utilise a low-carbon form of heating and hot water (including the probable introduction of a ban on gas boilers in new-build homes).

Indicative FHS specification	
Floor U-value (W/m².K)	0.11
External wall U-value (W/m².K)	0.15
Roof U-value (W/m².K)	0.11
Window U-value (W/m².K)	0.8
Door U-value (W/m².K)	1.0
Air permeability at 50 Pa	5.0 m3/(h.m²)
Heating appliance	Low-carbon heating (e.g. Heat pump)
Heat Emitter type	Low temperature heating
Ventilation System type	Natural (with extract fans)
PV	None
Wastewater heat recovery	No
y value (W/m².K)	0.05

Challenges of FHS

Due to the tougher building fabric requirements and introduction of low-carbon forms of heating and hot water in Future Homes we (who act as a landlord, asset manager, and developer of homes) are conscious that many of our residents will not be familiar with the technologies that will be used within properties built to the FHS, nor the wider way of living in them to maximize the benefit of their home's performance. The combination of change for us (in the way we design, build and maintain these homes) and our residents (in the way they use and interact with these homes) is something we need to better understand to ensure success come 2025.

Project 80

To understand the Future Homes challenge, we have created 'Project 80' which is a research and development programme in conjunction with Birmingham City University (BCU), key product manufacturers and industry bodies, and contractors. Together, we will develop, monitor and understand over 50 homes that meet the FHS before 2025. Project 80 will generate a significant body of knowledge to enable us to understand what works for us and our residents, including:

- Identifying the information requirements of our residents along with the most suitable method of disseminating that information,
- Evaluating the performance of different products and technologies (both technically and from a user perspective),
- Understanding design principles that that work well and should be adopted as standard,
- Limiting any problems to a controlled environment and establishing what changes need to be made to overcome them, to avoid them becoming the norm in 2025,
- Establishing methods to ensure value for money whilst maintaining performance,
- Allowing us to make Future Homes decisions based on rigorous empirical evidence.

General methodology

As the FHS is not fully defined and software to model it is not available, we developed an approach to modelling the FHS based on known information. This started with us establishing a baseline. To establish this baseline, we modelled the plots to meet the current Building Regulations, which gave us our 'Maximum Kg CO_2/yr'. We then re-modelled the units in SAP 10 and adopted two principles: a) we incorporated low carbon forms of heating and hot water generation; and b) we aimed for an 80% CO_2 emissions reduction – this enabled us to determine the performance and design criteria for the particular plots. The table outlines the difference in FHS spec and 2013 Building Regulation requirement for plot 5 on Eco Drive.

Plot 5	SAP 2012	SAP 10
Floor U-value	0.13	0.11
External wall U-value	0.18	0.13
Roof U-value	0.14	0.1
Window U-value	1.4	1.2
Door U-value	1.4	1.2
Air permeability	5.12	5.0
Heating	Gas boiler	ASHP
Ventilation	Natural	Natural
PV	None	Yes
WWHR	No	Yes
y value	0.05	0.028
Maximum Kg CO_2/yr	1626.71	~313.52

Phase 1: Eco Drive – Handsworth

The first homes that modelled the FHS are our 12 homes on Eco Drive in Handsworth, designed by Oakley Architects and developed by Tricas Construction. The homes on Eco Drive were designed to provide superior insulation, as well as incorporating low and zero carbon technologies.

In general, the combination of fabric improvements, low-carbon heating systems and other low and zero carbon technologies means that this development has achieved a CO_2 emission reduction of between 80% and 90% compared to current Building Regulation requirements – based on the SAP calculations. For example, plot 1's CO_2 emissions have reduced from 16Kg/m^2/yr to just 2.4 Kg/m^2/yr, plot 3 has reduced from 18Kg/m^2/yr to 3.7Kg/m^2/yr; and, plot 5 has reduced from 17Kg/m^2/yr to 1.7 Kg/m^2/yr. This reduction has significantly reduced the operational impact of these homes on the environment. In addition, the heating loads have reduced by approximately 60%, which has contributed to an anticipated reduction of 65% to the overall running cost of the properties. This anticipated reduction in running cost presents a significant cost saving for our residents.

As this was our first FHS project, and because there are multiple ways to model the FHS we incorporated different specifications to maximise the research benefit. The majority of the specification remained consistent such as u-values of the fabric, and the utilisation of technologies such as PV, and WWHR. however, on specific plots we altered the block density; incorporated differing airtightness levels (and ventilation strategies); and utilised various heating and hot water approaches provided by differing manufacturers for each system. These approaches are discussed in more detail, against the individual plots.

Plots 1-2

These plots are 4-bedroom 3 storey houses and have been designed to achieve a high airtightness. Because of this airtightness we have incorporated mechanical ventilation with heat recovery (MVHR) to ensure the homes are ventilated property. The reason for making the homes so airtight is to understand how our residents interact with a highly airtight home which utilises a mechanical ventilation system. For heating and hot water, we are using Baxi air source heat pumps and hot water cylinders to explore different products and how they perform.

Summary specification for plots 1-2 (~ 85% CO_2/annum reduction)		
Floor U-value	0.11	75mm screed, 150mm Xtratherm Thin-R, 150mm beam and block floor
External wall U-value	0.13	Ibstock facing brick, 150mm CavityTherm, H+H Aircrete block, airtight polymer spray, plasterboard on dabs and skim
Roof U-value	0.1	150mm Xtratherm Thin-R between rafters, 90mm Xtratherm Thin-R below rafters, 2 layers of plasterboard, and skim
Window U-value	1.2	Munster double glazed unit, with 0.45 g value
Door U-value	1.2	Munster GRP front door, and rear glazed doors
Air permeability	1.5	-
Heating	ASHP	Baxi Assure 7kW ASHP, Baxi Assure 210L Unvented Cylinder, Stel Rad Vita Compact Radiators
Ventilation	MVHR	Envirovent energiSava 250
PV	Yes	Q.Peak duo blk-g9 cell 2.2kW
WWHR	Yes	Showersave, QB1-21 WWHR
y value	0.028	Calculated details by Xtratherm

Construction Timeline – Started on site in March 21, handed over in May 22

Plots 3-4

These plots are 2-bedroom 2 storey houses, they have the same airtightness and ventilation strategy as plots 1-2. Where these plots differ is that they incorporate GlenDimplex panel heaters and hot water heat pumps, which is aimed at understanding residents' views on their useability and performance when compared to air source heat pumps. The other difference with these plots is the 'g value' of the windows, which was changed from 0.45 to 0.37 to overcome a potential overheating risk identified by the TM59 overheating analysis.

Plots 5-12

These plots are 3-bedroom 2½ storey houses and have been designed to achieve a lower airtightness in conjunction with 'natural ventilation', with the logic being to explore whether our residents interact differently (or better) with a less airtight home which utilises a natural ventilation system – to inform our thinking come 2025. For heating and hot water, we are using Vaillant air source heat pumps and hot water cylinders to explore different products and how they perform.

Summary specification for plots 3-4 (~ 80% CO_2/annum reduction)		
Floor U-value	0.11	75mm screed, 150mm Xtratherm Thin-R, 150mm beam and block floor.
External wall U-value	0.13	Ibstock facing brick, 150mm CavityTherm, H+H Aircrete block, airtight polymer spray, plasterboard on dabs, and skim
Roof U-value	0.1	400mm Knauf Earthwoll Loftroll 40
Window U-value	1.2	Munster double glazed unit, with 0.37 g value
Door U-value	1.2	Munster GRP front door, and rear glazed doors
Air permeability	1.5	-
Heating	Panel Heater HWHP	GlenDimplex Panel Heaters and 200L Edel Hot Water Heat Pump
Ventilation	MVHR	Envirovent energiSava 250
PV	Yes	Q.Peak duo blk-g9 cell 2.2kW
WWHR	Yes	Showersave, QB1-21 WWHR
y value	0.0274	Calculated details by Xtratherm

Summary specification for plots 5-12 (~ 90% CO_2/annum reduction)		
Floor U-value	0.11	75mm screed, 150mm Xtratherm Thin-R, 150mm beam and block floor
External wall U-value	0.13	Ibstock facing brick, 150mm CavityTherm, Besblock Star Performer, plasterboard on dabs and skim
Roof U-value	0.1	150mm Xtratherm Thin-R between rafters, 90mm Xtratherm Thin-R below rafters, 2 layers of plasterboard, and skim
Window U-value	1.2	Munster double glazed unit, with 0.45 g value
Door U-value	1.2	Munster GRP front door, and rear glazed doors
Air permeability	5.0	-
Heating	ASHP	Vaillant Arotherm 5kW, Vaillant Unistore 200L, Stel Rad Vita Compact Radiators
Ventilation	Natural	Envirovent Filterless Infinity Extract Fan
PV	Yes	Q.Peak duo blk-g9 cell 2.2kW
WWHR	Yes	Showersave, QB1-21 WWHR
y value	0.028	Calculated details by Xtratherm

Increase in build cost

The cost analysis shows that the total cost of the FHS scheme is 13% more than if it had been delivered to meet current the Building Regulations only, this cost analysis takes into account the recent cost increases across our sector. There are several elements that have contributed to the cost increase, including: the change in insulation type, the transition from combi boilers to heat pumps and hot water cylinders, better performing windows with different g-values, and additional technologies such as PV, MVHR, and WWHR.

The change from blown fibre to PIR insulation there was a cost increase of 79% (in the insulation price) taking it from a typical 0.5% of the contract sum, to 2.2%. We also saw a 21% increase in the cost of bricklayers to install the PIR system. With regards to the transition away from gas combi boilers we saw the cost of the M&E package (in relation to these elements) increase by 38% taking it from 7% under current Building Regulations to 9% under the FHS specification. Because of the increased u-values and change in g-value for the windows, we again saw a 38% cost increase, with windows (and doors) normally accounting for 2.4% of contract sum, but now accounting for 3.4%. In addition to these costs, we also encountered a significant rise in the cost of the electrical connection to the site – due to the higher electrical demand. Historically, a gas and electrical connection to a site of this size has cost circa 0.8% of the contract sum respectively (1.6% collectively). Whilst we benefitted from a cost saving in relation to having no gas connection to the site, we saw an overall increase in the electrical connection of 72%, taking the cost to 2.4% of the contract sum (and more than we would have expected to have paid for a gas and electrical connection combined).

Data capture and documentation

In addition to the design and specification changes, there is also the introduction of a requirement to document and demonstrate that the as-built version of the dwelling concords with the details that form the SAP calculation. To explore how we will achieve this; we have worked with Captego to trial their inspection and data recording app. The Captego app has enabled us to set-up a 'digital project' for the site, upload the relevant site details including the site layout, specific plot details and drawings. In addition to plans, we can upload pictures of critical details such as the calculated thermal bridging details we have used in the SAP calcs, as well as specification details. By uploading all this information, we can take time and location stamped photos of the construction work to demonstrate compliance with the design and specification for the specific plots. In addition to using the Captego app to document specification items and critical details, we are also using the app to document progress on-site and as a site inspection tool to monitor quality. The reason for using it to capture progress of the plots, is so we can get an end-to-end view of the construction of the plots and check whether work is on track with the programme. The benefit of using the app as part of the site inspection and quality control process is that it enables you to clearly mark on the site plan where the picture is taken of and assign the non-conformance/ defect to the relevant party who needs to rectify it. Upon rectification of the work, the defect can be closed out and an additional photo of the rectified problem uploaded.

Research and Monitoring

Both us (Midland Heart) and researchers at Birmingham City University (BCU) are working closely with our customers to understand how easy the homes are to live in – given the new technology, how energy efficient the properties are – in reality, how cost effective they are, and the living environment in terms of indoor air quality and temperature.

- *Pre-move in workshops with residents:* as our residents will be using many of the technologies in the home for the first time, we understand the need to provide them with a detailed induction to the home. This was done via a workshop with the contractor and system manufacturers. The workshops demonstrated the technologies and provided details of how to use them and key items of consideration. The M&E contractor recorded instructional videos for the residents for them to refer to and refresh themselves on as and when needed.
- *POEs of resident experience:* with the residents using the technologies for the first time, we are keen to understand how they are interacting with the property for the first-year post-completion, how they are living in the properties, any concerns they have or questions that are raised, and anything that we could have done better with both the property and the pre-move in experience.
- *Energy use and cost monitoring; indoor air-quality monitoring; and, temperature monitoring:* prior to occupation of the plots, they were monitored to establish a baseline of performance. During the first year of occupancy, we will continue to monitor the plots to verify how they perform compared to the design calculations as well as the baseline monitoring. Where there are differences, we will seek to understand why they have happened and develop strategies to overcome them.
- *Thermal imaging:* when the temperature conditions are suitable, we will undertake a thermal imaging survey, so we can establish whether there are any problematic areas, or areas that aren't performing how they should be, so we can develop strategies to reduce or eliminate their occurrence on our future Project 80 developments.

All the evidence we gather will help to inform future policy on how we build new homes in a way that's good for the environment and useable for our residents.

Elvetham Road – Edgbaston

The second homes to model the FHS are our 12 maisonettes at Elvetham Road in Edgbaston, designed by BM3 and being developed by Tricas Construction. This scheme is due for handover in Summer 2022. This scheme allowed us to explore different solutions to model the FHS along with a block compliance approach. In general, the combination of fabric improvements, low-carbon heating systems and other low and zero carbon technologies means that this development has achieved a SAP calculation CO_2 emission reduction of 80% compared to current Building Regulation requirements. Across the blocks the CO_2 emissions have reduced from an average of 27Kg/m^2/yr to just 5.4 Kg/m^2/yr.

The initial calculated cost increase on Elvetham Road is approximately 14%, for similar reasons as noted on Eco Drive. However, upon completion we will undertake a detailed cost analysis.

Summary specification for blocks A & B (~ 80% CO_2/annum reduction)		
Floor U-value	0.11	75mm screed, 150mm Xtratherm Thin-R, 150mm beam and block floor
External wall U-value	0.15	Ibstock facing brick, 100mm KoolTherm, Besblock Star Performer, plasterboard on dabs and skim
Roof U-value	0.1	400mm Knauf Earthroll Loftroll 40
Window U-value	1.2	Munster double glazed unit
Door U-value	1.2	Munster GRP front door, and rear glazed doors
Air permeability	5.0	-
Heating & Ventilation	EAHP	5kW Joule Victorum EAHP Compact with 180L Cyclone Cylinder, and underfloor heating
Ventilation	Natural	Envirovent Filterless Infinity Extract Fan
PV	Yes	Q.Peak duo blk-g9 cell 2.2kW

Project partners

We have been working with key manufacturers and contributors during the project and have had an industry steering group. By utilising manufacturers and other contributors, we have been able to tap into their expertise of their products and work together to bounce ideas off of each other when specifying the site(s), and tap into the wider capabilities of the organisations to ensure the homes model the FHS correctly and give Project 80 the best chance of Succeeding. For example, Besblock have undertaken sense check SAP calculations and provided a complimentary air test service; Baxi have provided training to subcontractors; and, Xtratherm have provided bespoke thermal bridging values.

Summary

There are multiple ways of modelling the FHS, and the Eco Drive project has provided valuable learning so far and will continue to provide more crucial data over the next year when we monitor the properties. The 12 Future Homes maisonettes on Elvetham Road in Edgbaston have given us a further chance to explore different methods of achieving the FHS and understand different approaches and technologies. We will continue to run Project 80 to model different approaches and methodologies to model the FHS for different property types between now and 2025, and we are looking at some framed buildings on a scheme due to start on site shortly. ■

Progress Pictures

How the design of flat roofs will change to meet the net zero future

Words by Alok Sharma, President for COP26

Environmental The built environment is estimated to contribute approximately 40% of the UK's carbon emissions. Early consideration for design, construction, refurbishment, building management and maintenance will be essential as the industry works to achieve the ambitious targets that have been set.

In 2019 the UK became the first major economy to pass a net zero emissions law, with a target of net zero by 2050 and interim emissions reduction targets of 68% by 2030 and 78% by 2035.

There is now a plethora of strategies, guides, policies, and initiatives that designers and builders can utilise to ensure the buildings they construct and manage are either net zero, or at least net zero ready. Whether new build or retrofit, the importance of placing net zero at the heart of all our decision-making processes is critical if we are to help achieve the UK's ambitious targets.

Equally, when considering what products and systems are best suited to deliver net zero, we need to understand not just how they help the built environment to decarbonise, but also how they can mitigate against the worst effects of climate change as we experience ever more extreme weather conditions.

What does all this mean for the design and functionality of flat roofs?

According to the Energy Savings Trust, the average home in the UK loses 25% of its heat through the roof. Taking a fabric first approach to reduce this heat loss is one of the key pillars of any decarbonisation strategy.

Insulating well, with robust detailing to eliminate cold bridging, is fundamental to the design of any project. This will lead to thicker insulation depths to achieve the increased U-values which could also have an impact on other elements of the buildings design such as upstands and thresholds.

> **Net zero is one of the clearest economic trends there has ever been.**

Using materials and systems that are circular in design, with as low embodied carbon as possible will help to decarbonise the built environment. However, it is important to understand what impact this may have on durability and other elements of the building. For example, using a lower embodied carbon insulant in a flat roof scenario may on the face of it be the obvious choice, however if this product is significantly heavier or thicker what impact will that have on the buildings structure? Does the additional material required negate the initial benefit of the lower embodied carbon solution? Will the roof system meet fire regulations and withstand imposed loads?

Equally, a standalone product may be 'circular' in that it can be fully recycled in its initial state, but once it has been embedded as part of a system, it may not be possible to practically recycle or repurpose at the end of its usable life.

In a flat roof scenario, the primary function should always be to keep the building watertight and secure. It is therefore vital to ensure that any materials and systems chosen for their circular or net zero properties do not detract from this and that any systems will meet the required standards.

A flat roof is also a useful platform for other technologies such as green and blue roofs, and solar technologies that can provide a wide range of benefits to our built environment. A flat roof can provide carbon sequestration, biodiversity enhancement, stormwater attenuation and renewable energy generation. This makes flat roofs unique as it is possible to combine all of these environmental solutions from a single, often underutilised building element.

Green roofs also help to keep urban areas cooler, limiting the urban heat island effect and reducing the use of energy intensive technologies such as air conditioning. When combined, green roofs and photovoltaic arrays (biosolar roofs) work together to provide increased energy generation from the solar (circa 6% compared to a standard flat roof system) and a more varied habitat across the green roof, magnifying the benefits of each technology.

A well designed and installed flat roof can not only help to decarbonise our building stock, but also provide numerous climate mitigation solutions. As the recent document from the NFRC 'Building resilience of roofing technologies in a changing climate' report points out, 'almost every roof has the opportunity to tackle the climate emergency—whether that be through electricity generation through built-in solar PV, water harvesting through a blue roof, or reducing overheating through a cool roof, our industry has a solution.'

To understand further how your flat roof can be designed to meet net zero initiatives, book CPD with your local Bauder Technical Manager on 01473 257671. ■

Building for tomorrow: Brick by greener brick

Words by Gabriela Medero, Professor of Geotechnical and Geoenvironmental Engineering, Heriot-Watt University and co-founder of Kenoteq

The last few years have seen an exponential rise in awareness about over consumption, with a consistent focus on sustainability and the impact our behaviours can have on the health of our planet. With the built environment responsible for approximately 39% of global CO2 emissions[1], the construction industry can play a central role in mitigating the environmental crisis that we face.

To minimise the effects of climate change, our industry, alongside many others, must reassess all elements of its approach – from raw materials and machinery to manufacturing and building practices. Architectural Technology professionals are uniquely placed to lead this conversation as the world strives to meet its ambitious net zero targets.

COP26's theme 'Cities, Regions and Built Environment' late last year called for more sustainable technologies to be developed to tackle the ever-growing emissions from construction. The day focused on how the building industry's impact is wide ranging with little consideration of circular economy approaches. The vast energy consumption used in the creation of building materials, the construction process itself and, once erected, the unsustainable quantities of energy required to run buildings were all highlighted as crucial areas that designers need to consider when developing new innovations and design. COP26 reignited interest and awareness of the challenges faced by the construction sector but we must continue this momentum and start implementing change now if it is to have a beneficial impact.

In 2019, buildings accounted for close to 30% of energy-related CO2 emissions[2] Over the next 10 years, the sector's energy consumption must reduce five times more quickly to meet net zero goals. This means that the energy consumed in 2030 will need to be 45% less than was consumed in 2020. Sustainability advisor for the RIBA, Jess Hrvinak, has called on designers to take action and reduce the already unsustainable emissions created by the built environment. She has also placed emphasis on designers to explore technologies that can significantly reduce the industry's carbon footprint.

So, if net-zero-energy buildings are a key step on the path to a greener future, where can designers begin to find more impactful solutions?

Appetite for transformational, circular economy technologies and practices, which can be implemented in the construction sector without damaging timescales and profits, is high. However, the challenges are many and wide ranging. One of the biggest barriers is the lack of space in our cities which is restricting the development of more sustainable urban architecture.

There currently exists a vast number of structures in cities across the globe which have been poorly designed and are leading to huge amounts of unnecessary CO2 being released annually. It is not possible simply to demolish these buildings and start again so designers must consider what technologies are available to improve existing structures and increase their energy efficiency credentials.

For many years, solar design was adopted. Designers took steps to minimise the amount of energy that new buildings used and photovoltaic technology was viewed as an essential tool to reduce the built environment's environmental impact. However, what has become increasingly apparent is that, while creating more energy-efficient buildings, the design features that can decrease energy consumption can simultaneously increase the energy-intensive materials required to build them. Many designers remain concerned that solar panels will never generate enough power to offset the energy that is consumed in their manufacture.

Another approach has seen designers use existing building stock to improve wall insulation as heat loss is one of the main reasons why buildings use so much energy. Some solutions have included adding green walls to existing buildings to help with both pollution and insulation. However, designers should not be limited to merely adding plants and greenery to buildings. Rather, sustainability should be a crucial integration into the entire design process from the outset. Designers should be encouraged to adopt a circular economy approach when considering what sustainable building materials can be used in construction.

One solution is to reconsider the raw materials that are used in construction from the outset, embedding cleaner, more efficient circular economy processes before the first brick is laid. The humble brick still remains central to construction practices globally and yet the bricks we use have not changed significantly despite the many technological advances experienced across other areas of the built environment.

It requires an incredible amount of energy to produce a single brick. Fossil fuels are burned to ensure kiln temperatures reach more than 1,000°C. This process generates both carbon monoxide and sulphur oxides, and the fine dust generated during production adds a further layer of pollution to our air. Meanwhile, the UK's construction industry produces over 100 million waste tonnes annually, over a third of the UK's total, which needs to be repurposed.

Brick houses are widely considered to be more energy efficient than glass homes, which tend to lose heat more quickly and are more susceptible to cracks as a result of extreme weather patterns. Brick buildings retain heat for longer thereby reducing the energy required to keep them warm.

While bricks certainly offer many benefits, we must also ask ourselves where our raw materials for bricks are coming from, and what precious finite resources they are using up during their manufacture.

My team and I have spent more than a decade trying to answer these questions and several others. We have worked with engineers, designers, chemists and geologists to develop an eco-friendly alternative to traditional bricks.

Our innovation, the K-Briq, is made from over 90% recycled demolition and construction waste materials and produces a tenth of the CO2 emissions of a traditional fired brick and requires less than a tenth of the energy in its manufacture. While clay bricks take 10-40 hours to produce, K-Briqs take minutes.

Choosing materials that naturally regulate building temperatures to minimise energy requirements is vital. That's why the K-Briq has been developed with a high thermal mass which retains heat in the winter and keeps buildings cool in the warmer summer months, so heat and air conditioning costs are reduced in the eventual structure.

By streamlining manufacturing processes in this way, the construction industry could produce more materials domestically, reducing its current reliance on imports. However, it is essential that we all work together, supporting manufacturers such as brick makers to find new, more sustainable processes while remaining competitive in the marketplace.

For good intentions and ideas to succeed and lead to meaningful change, they must be underpinned by support and guidance. To allow the construction industry to adopt more innovative, low-carbon alternatives, we need to see action from Government, such as changes in policy coupled with incentives and consultation.

These initiatives, combined with further research and development into new concepts and ideas, will help accelerate their introduction. Architectural Technology professionals can help to lead this charge.

At Kenoteq, we are developing a blueprint for how these changes can be achieved with brick manufacturing. Later this year, we will be scaling production from our existing pilot plant to industrial-scale manufacture at a waste handling facility in Scotland. By producing K-Briqs onsite at the point where construction and demolition waste is processed for recycling, we are reducing travel miles and removing additional lorries from the road. We hope that waste handling facilities around the UK will replicate this circular economy approach, eventually removing the need for imported bricks altogether. This presents a unique opportunity for the construction sector to make a significant contribution towards meeting its net zero goals.

We are all up against the clock when it comes to implementing climate change mitigation strategies, so researchers working on new architectural technologies and design should consider the value of basing their innovations on pre-existing materials. Some innovations end up costing our environment more in the long run which is why a circular economy approach is so important and will make a difference now by using existing materials that would otherwise go to waste.

The path to net zero will not be smooth for the construction sector. But, as governments around the world place the circular economy at the heart of their net zero goals, the construction sector has an opportunity to take the lead, to innovate and evolve to meet these challenges. We must make bold choices and work together in partnership to preserve our planet for generations to come. ■

1 Report from the World Green Building Council: The building and construction sector can reach net zero carbon emissions by 2050.
2 Climate Change Committee Report: Buildings sector – The CCC's Sixth Carbon Budget Advice, Methodology and Policy reports

Fabric first paves the way to net zero

Words by Chris Cowley, National Specification Manager, Keystine Lintels

The importance of a fabric first approach and how choosing the correct lintel specification can have a positive impact on the SAP calculation.

Faced with stricter Building Regulations and the UK's ambitious commitment to bring carbon emissions to net zero by 2050, designers are under increasing pressure to consider the long term energy efficiency of all buildings from the earliest stage of the design process. All new housing in 2025 is expected to produce 75-80% less carbon emissions compared to current standards under the Future Homes Standard and will therefore require low carbon heating technologies.

However, it is clear that a fabric first approach within SAP will be crucial to comply with new Part L regulations and is a critical first step to reaching the performance levels required and future-proofing UK homes. It is why the specification of thermally efficient lintels is one of the most cost effective ways to address thermal bridging at non-repeating junctions and keep us on the critical path to net zero.

The Government is committed to bringing in the Future Homes Standard (FHS) in 2025, which will see a new build house have 75% lower CO2 emissions than one built to today's standards. This will be achieved by having very high standards of energy efficiency and low carbon heating (i.e. heat pump). Part L 2020 will be an important stepping stone to the FHS, but to put things into context the previous Part L uplift in 2013 was 6%. Therefore, the 31% uplift this time around will require some fairly significant changes for housebuilders, as ultimately we need our homes to be zero carbon ready to meet future legislation.

Fabric first approach to design

What will this mean for new homes and how will designers meet these rigorous standards? One key area will be addressing the thermal performance of a building envelope through a fabric first approach to building design. If we get the fabric right and we build as designed, we will go a long way to meeting our targets. It is an approach that will enable us to meet and even exceed regulatory performance criteria, whether it is for large scale social housing or a much smaller residential property.

Whilst a reduction in CO2 emissions is one consideration when designing thermally-efficient housing,

an improvement in thermal comfort can also have a positive impact on occupants – adding to their thermal comfort, productivity and wellbeing.

Eliminate thermal bridging

A critical element of the fabric first approach will be addressing the issue of thermal bridging, which can be responsible for up to 30% of a home's heat loss. Eliminating thermal bridging through good design and correct product specification will be essential if we are to ensure we meet these ambitious new regulations.

Whilst there are some design, measurement and calculation issues, the other concern in terms of thermal bridging is that we are neither building consistently what we design, nor detailing the right products in the right places. There are also issues with site skills and workmanship; when you fail to build correctly it undermines the good work carried out in the first instance. This can lead to a performance gap between as-designed and as-built building performance. It is why these weak spots can significantly impact a building's heat loss and have a detrimental affect on the overall fabric effiency of the external wall.

Thermally efficient lintel

Often overlooked when it comes to thermal efficiency due to a focus on insulation, window and doors, is that traditional steel lintels can create a significant thermal bridge in homes. This is due to the high thermal conductivity of steel and because they span over long lengths in a typical build. However, there are solutions to address this.

For instance, Hi-therm+ has set a new standard for thermal efficiency in steel lintels. It incorporates a thermal break and is up to five times more thermally efficient than a standard lintel. Hi-therm+ is a very cost-effective solution, particularly if we look beyond the unit price, as getting the fabric right will save energy throughout the entire life span of the house.

The Hi-therm+ lintel has made a significant impact on the thermal efficiency of homes and is specified on many housebuilder projects around the UK due to its low cost and improved performance in lowering carbon emissions within the Standard Assessment Procedure (SAP).

The importance of lintels should not be understated. The Hi-therm+ lintel has a positive impact on the SAP calculation due to its impressively low thermal conductivity performance, which contributes towards its Psi value of between 0.03 & 0.06 W/m.K. This makes it the ideal low cost and sustainable solution for specifiers aiming to achieve building regulations with the fabric first approach. When you consider the BRE has found that thermal bridging can account for up to 30% of heat loss from buildings, then paying close attention to the details and structural elements such as lintels can have a huge impact on the overall thermal performance of a building.

At a time of spiralling energy costs and the current energy crisis showing no signs of abating, making homes more energy efficient through a fabric first approach will go some way to locking in savings for the lifetime of a building and achieving our climate change target.

So with changes on the horizon for the design of our new build houses, it will be incredibly important for architects to specify materials and components which deliver where others cannot – as this can be the difference between a sustainable and an inefficient home. ■

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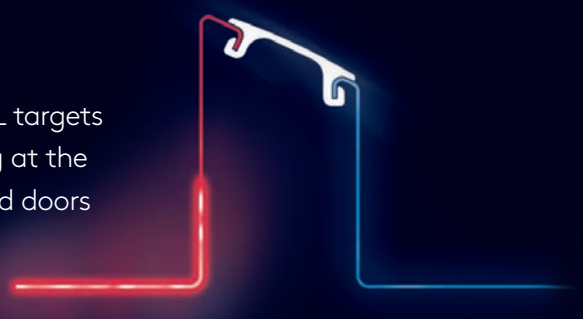

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NBS Sustainable Futures Report 2022: An Architectural Technology professional's perspective

Words by Jenny Archer, Senior Research Executive, NBS

Climate change is a global issue of the utmost importance, and one that is important to us here at NBS. It is a topic that we have investigated before: we last explored the industry's perceptions of sustainability in 2014. As we approached the COP26 conference, we wanted to ask members of the construction industry about their current views on sustainability.

Between September and December 2021, we conducted our Sustainable Futures survey, looking at: what sustainability means to construction professionals; drivers and barriers to sustainability; and construction professionals' attitudes towards sustainability. It was distributed widely using various channels and supported by industry bodies, including CIAT. We are very grateful for this support, which helps us to represent professionals from across the industry. In total, 608 people completed the survey. Many (74%) described their main project role as consultant, but we also had responses from the other main project roles (suppliers, constructors and clients).

35 respondents (6%) described themselves as Architectural Technologists. The Architectural Technologists responding to the survey generally considered their main project role as consultant, with many working in a larger organisation employing over 51 people. Three quarters of Architectural Technologists (26 respondents) told us that they were personally based in the UK. The rest of this article provides an indicative picture of their views on sustainability, and how they compare to those of the wider industry.

What is sustainability?

We were keen to understand what sustainability means to professionals in the construction industry. Many described sustainability as an attempt to achieve a balance between the resources that we use to live our lives and the welfare of the environment. One Architectural Technologist commented:

> **'[Sustainability] means meeting our own needs without compromising the ability of future generations to meet their own needs'.**

Another Architectural Technologist described sustainability as:

> **'Prioritising environmental choices and solutions on a project. Preserving existing built environment and assessing specified products and systems through their cradle-to-cradle carbon footprint. Understanding of our role in protecting natural habitats and promoting healthy and well-balanced environments for people'.**

There are common misconceptions though, particularly that sustainability is too costly to achieve. As one architectural technologist acknowledged, sustainable solutions can provide savings whilst a building is in use.

> **'[A common misconception is] that lifecycle costs are less important than the building costs'.**

What influences sustainability?

In the research, we discovered that sustainability is increasingly driven by an individual's commitment to it. Overall, nearly all respondents (97%) describe sustainability as being very or quite important to them personally, with eight out of ten telling us that it is very important. Architectural Technologists are among those who believe that sustainability is important to them personally: 97% believe that it is very or quite important.

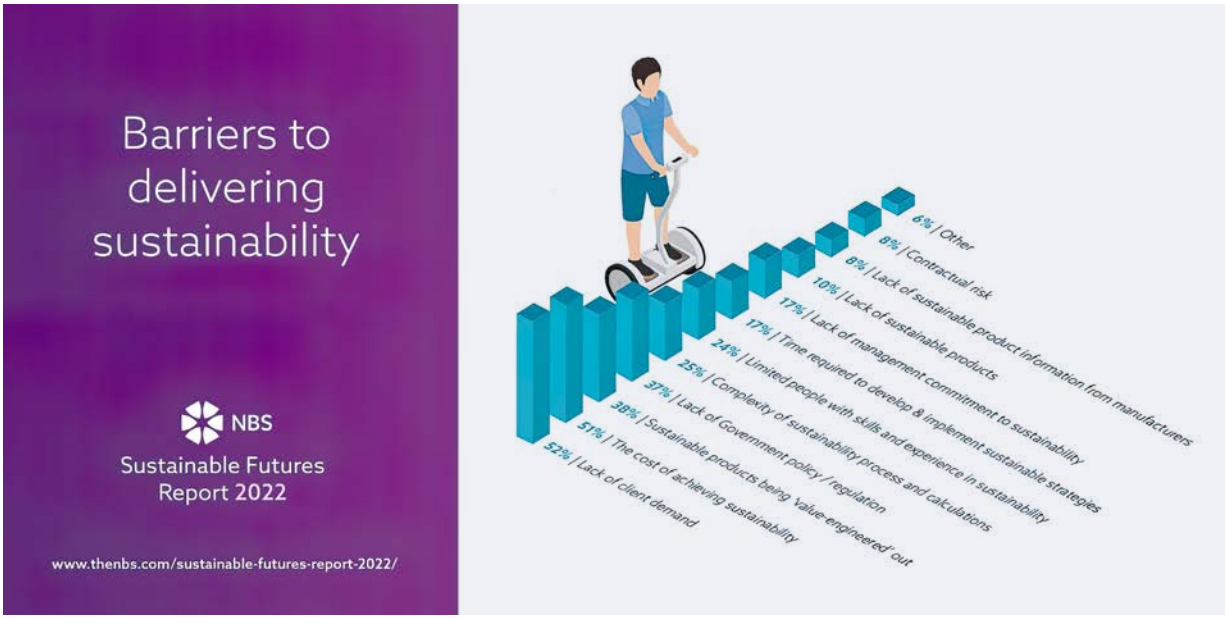
The primary reason that respondents personally think about sustainability is because of their own beliefs and values (87%), followed by wanting to lead by example with sustainability. Amongst Architectural Technologists, a similar proportion told us that they think about sustainability for these reasons (89% due to their personal beliefs and values, and 51% because they like to lead by example with a sustainable approach).

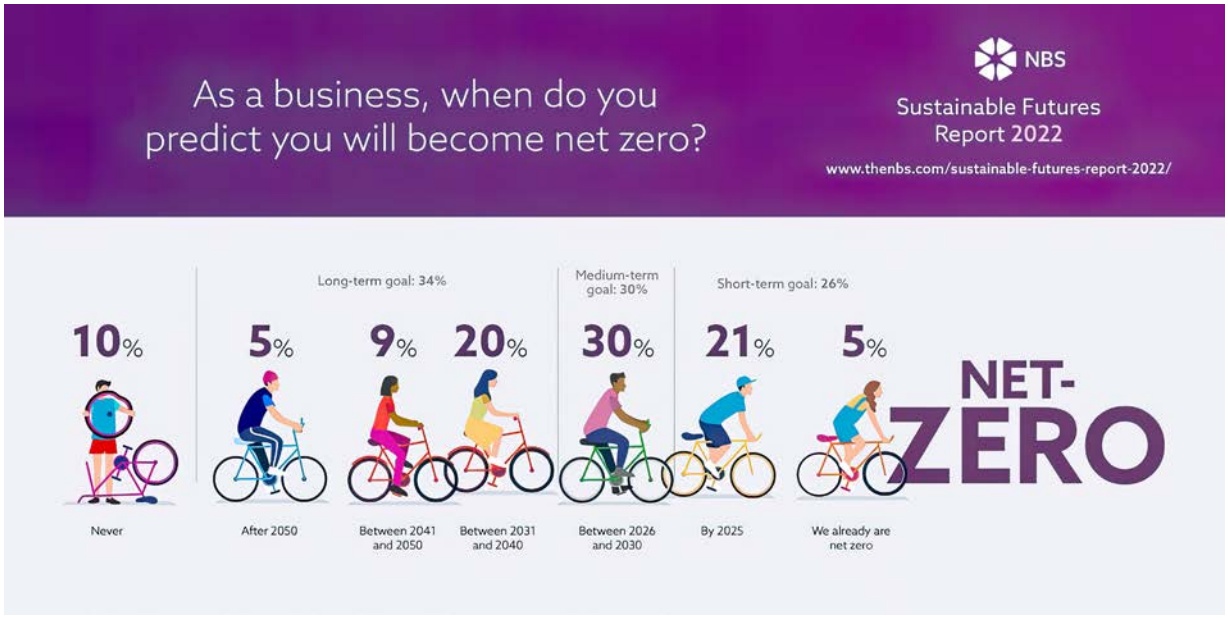
There are barriers to achieving sustainability. Respondents identified the three main barriers to sustainability as: a lack of client demand (52%); the cost of achieving sustainability (51%); and sustainable products being value-engineered out (38%). The same three barriers were identified by Architectural Technologists, with a similar proportion citing a lack of client demand and the cost of achieving sustainability (54% each). Data suggests that Architectural Technologists appear more likely to see sustainable products being value-engineered out (46%). Architectural Technologists also seem more likely to see limited people having the relevant skills and experience in sustainability as a barrier: 40% of Architectural Technologists cite this as a barrier, compared to 24% overall.

Achieving sustainability and net-zero predictions

How often is sustainability achieved on construction projects? A third of respondents (33%) tell us that they usually or always do achieve sustainability on their projects, with a further 24% telling us that they achieve it about half the time. Amongst Architectural Technologists, slightly more (39%) tell us that they usually or always achieve sustainability. Looking to the future, we need more projects to achieve it.

In the UK, the Government has set a target to reach





net-zero emissions by 2050. We wanted to understand how the industry was progressing towards this target and gain some understanding of when individual organisations predicted that they would become net-zero. Concerningly, many respondents told us that they did not know, or chose not to make a prediction. Of the 368 respondents who did make a prediction, the most common answer was between 2026 and 2030: 30% predict that they will become net-zero between these years. However, there are 15% who do not think that they will achieve the Government target: 5% think that they will achieve it after 2050, and one in ten think that they will never be net-zero.

Amongst Architectural Technologists, only 18 people were able to make a prediction. Positively, all 18 respondents predict they will achieve the 2050 target, with just under half of them (44%) predicting that they will do so between 2026 and 2030.

These findings suggest that built environment professionals, including Architectural Technologists, hold strong views about sustainability, often driven by their own beliefs and values. However, there are clear barriers to achieving sustainability. Becoming net-zero is something that many are working towards, with those Architectural Technologists who felt able to make a prediction appearing quite confident in their ability to achieve the 2050 government target.

You can read the full report here: thenbs.com/sustainable-futures-report-2022. ■

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Why aren't more building projects achieving sustainability goals?

Words by Lee Jones, Head of Manufacturer Solutions, NBS and Acting Head of Sustainability at Byggfakta Group

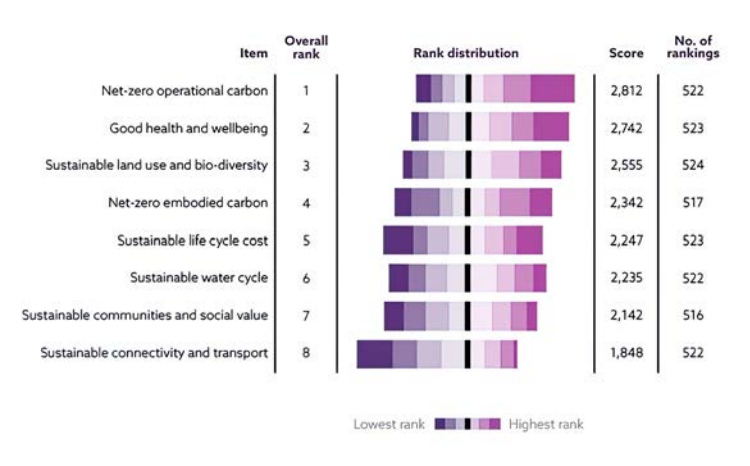
For designers, sustainability is a top priority, equal only to that of building safety. But despite concentrated efforts over the past few years to improve lower carbon outcomes, only a third of all construction projects manage to reach their sustainability targets. So, what are the reasons for this and what barriers must designers and wider construction professionals overcome if this number is to increase?

Understanding the big picture

When RIBA produced its set of eight sustainable outcomes as part of its RIBA 2030 Climate Challenge, its objective was to show how sustainability can be introduced throughout a building project. Yet for designers in the working world, there's some disparity around how these outcomes are being prioritised.

Disappointingly, the number of projects achieving sustainability has dropped.

In NBS' Sustainable Futures Report [thenbs.com/sustainable-futures-report-2022/] – a study aimed at understanding sustainability attitudes and protocols within the construction sector, we found that whilst 'Net zero operational carbon' ranked as the most important outcome, indicating that to the specifier, ensuring that the built asset performs sustainably for their client in the in-use phase of the project is of highest importance. Closely followed by 'good health and wellbeing' this further strengthens the picture that the in-use phase gets the most consideration.



Whilst there is no denying that each of RIBA's outcomes are essential to a wider sustainability goal in their own right, with our respondents some command more weight than others. These results could suggest that designers are overlooking the impact that the initial design and specifying of construction products and materials can have on the sustainability of project. 'Net-zero embodied carbon' for example ranked mid place. In an industry that is responsible for circa 40% of all generated carbon emissions globally, having an equal focus on embodied carbon alongside operational carbon emissions could significantly reduce the sector's impact.

Sustainability in the building lifecycle

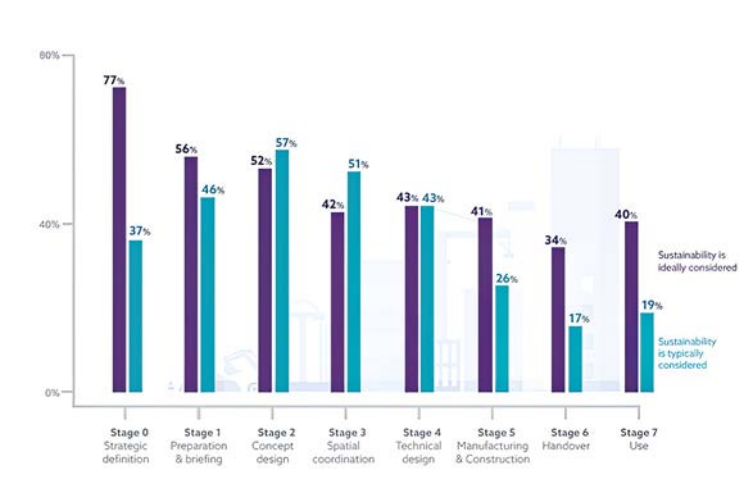
The reality of sustainable considerations can be explained when we look at where sustainability is happening within a building's lifecycle. Using RIBA's Plan of Work 2020 Overview as a guide[architecture.com/knowledge-and-resources/resources-landing-page/riba-plan-of-work] we can see differences between where designers believe sustainability should be considered and where it actually is considered.

The main difference can be seen at 'Stage 0 – strategic definition'. RIBA guidance states that this is the optimum stage to introduce sustainability measures. The feeling is reflected in the NBS study – 77% of respondents say that they would like to consider sustainability at this point, however in reality, just over a third (37%) in fact do. For the most effective sustainable outcomes on any project, consideration should be given as early as possible in the project and carried through every stage.

Stage 4 is typically where the written specification is finalised and it is great to see that sustainability is being considered equal to practice here, after all much of the embodied carbon sits within the materials chosen, often at this stage. However, 'Stage 5 – Manufacturing and construction'. 41% believe sustainability should be considered here yet just 26% manage it. This result may be reflective of the contractor having more control this stage but it is a concern given that at Stage 5, sustainability can be achieved through 'logistical means, materials and components, and through the management of supply chain partners'[1].

The influences

So, what influences the level of sustainability introduced into a project? Overwhelmingly, it is clear that personal views are a driving force. Nearly all (97%) said that sustainability is either important or quite important to them personally. Beliefs and values also topped the list of main sustainability drivers (87%). Interestingly, third on the list was legislation – a clear sign of the influence Government intervention can have on the wider industry. A lack of drive from the UK Government to prioritise sustainability in construction could be the reason for this sentiment. However, more recent efforts have begun to develop in the form of the 0% VAT cut on specific energy-saving products for home improvements. There is also a lot of discussion around the UK Green Building Councils Net Zero carbon roadmap. As with any legislation, the timescales involved to implement are a barrier and time is not a luxury within sustainability considerations. We must all consider sustainability within the core of everything we do.



Measurement and results

Measuring and reporting on sustainability metrics is an essential part of improving the picture. Promisingly, NBS found that a large chunk of companies are reporting on these metrics – 38% for most projects and 42% for some projects – showing that overall, companies are committed to sustainability. Whilst it is encouraging that measurement is taking place, what are the results on the ground?

Disappointingly, the number of projects achieving sustainability has dropped. In 2014 as part of a similar study, 13% were achieving sustainability, all of the time. In 2021, the figure is less than half that (6%). Why this is the case may be due to how people define sustainability – as understanding has increased, people now recognise the nuances to achieve it.

Another reason could be the result of goal setting, or lack thereof. Seven out of ten have worked on projects with sustainability targets, at least some of the time. Just 14% had seen targets all of the time and only a quarter (25%) most of the time. Most worrying of all was that over half had not worked on a single net-zero project in the last twelve months. Given that there are important targets to reach within the next eight years, it is clear the industry will need to deliver marked improvements if it is to reach its goals.

Overcoming obstacles

Other barriers to sustainability success also exist. NBS' Sustainable Futures Report found that for over half of respondents (52%), a lack of client demand was the most common cause – just 1% more than the cost of achieving sustainability (51%). Another concern was the view that sustainable products are being 'value engineered' (38%), suggesting that a short-term focus remains with the upfront cost being considered above the lifetime value.

37% also stated that lack of government policy and regulation was another reason for a lack of take up of sustainable practices – another nod to the power that Government intervention can have on delivering change.

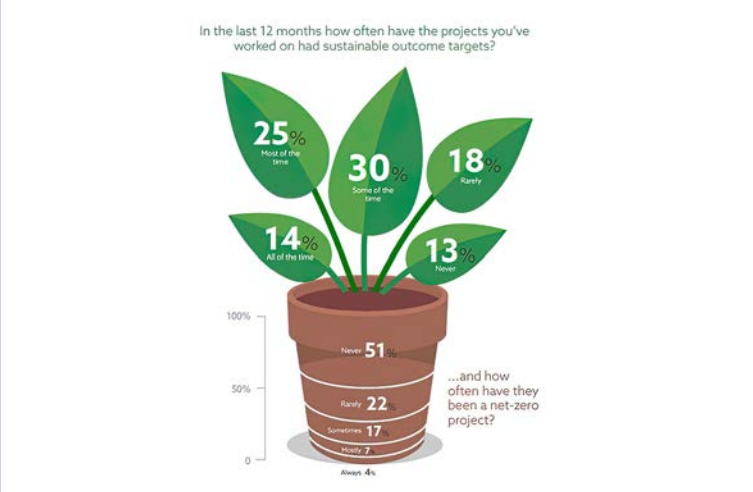
The responsibility of project roles also provided variation in how sustainability is perceived, with answers varying depending on the participant in question.

For contractors, contractual risks were a main barrier to achieving sustainability. Given the on-going issues with supply chains and squeezed profit margins, it's clear that contractors remain cautious when it comes to needing specialist products which could cause projects to overrun. From a supplier standpoint, they are more likely to view sustainable products as being 'value-engineered' as a barrier, perhaps showing a need for further education with client and contractor stakeholders.

From a client perspective, a lack of management commitment and a lack of sustainable performance information were marked as a major barrier – showing that more determined efforts are needed by suppliers to provide this information for their products, and by client organisations to make sustainability happen.

It is clear from the results that the construction industry has some hurdles to overcome if it's to deliver the levels of sustainability that are needed. Further goal setting and more direction around project responsibility are two areas in particular. Perceptions and myths around sustainability that are preventing progress also need to be addressed – specifically around cost and the wider understanding of carbon within a building's lifecycle.

As with building safety, end clients need to be educated on the subject of sustainability and as the professionals entrusted with the design process, they will surely take note of any recommendations from the architectural profession. What's important now is that we recognise these areas of improvement so that we are able to act and move the needle before it is too late. ■



1 https://www.architecture.com/knowledge-and-resources/resources-landing-page/riba-plan-of-work

Is it time to swap sentimentality for sustainability in the refurb sector?

Words by Christian Hale, Director, Hale

Every generation tries to improve on what went before, often by denigrating the past as old fashioned and out-dated. In the construction sector, that axiom has led to some tragic destruction of our architectural heritage. Crafted features, such as joinery, fireplaces, architraves and tiling, have been covered over or ripped out, to be replaced with alternatives that have not stood the test of time well in terms of either quality or aesthetics.

It is a sad history of allowing transient trends to damage our architectural heritage that has now, thankfully, been addressed both by designers and construction professionals who respect the artisan builders of the past; and by heritage and conservation rules. Where a building is listed or located in a conservation area, there are strict limits on what changes can be made, which vary depending on the type of listing and local heritage stipulations. This, quite rightly, protects features that are unique or unusual; but not everything that is being protected in the name of heritage really warrants such vociferous protection. Sometimes, keeping an original feature or material, or being required to replace it on a like-for-like basis, actually conflicts with the aim of extending the lifespan of the building and fails to consider the net carbon zero agenda.

Onerous heritage requirements often mean potential refurbishment projects fall at the first hurdle because they are simply not viable.

Preventing sympathetic refurbishment

There are 350,000 Grade II listed buildings in the UK, which, along with the conditions of local conservation areas, means we have a huge volume of properties that cannot benefit from upgrades to the building fabric in order to become more energy efficient, more comfortable, more robust and more suited to the needs of today's occupiers.

In an effort to rectify the mistakes of the past and prevent any further loss of our architectural heritage, has the pendulum now swung too far in the opposite direction? Are we at risk of actively discouraging the sympathetic refurbishment of heritage buildings?

Sadly, the answer to that question is sometimes yes. Onerous heritage requirements often mean potential refurbishment projects fall at the first hurdle because they are simply not viable. The costs can escalate, materials can be difficult to source, and, in some cases, the required outcome is simply not achievable because of restrictions on remodelling and upgrades to thermal performance. The designer, the developer and the construction company may want to do everything they can to protect the building's original design and building fabric, but,

the project also has to work commercially, otherwise a developer simply cannot take it on.

And alongside the properties that are slowly slipping into dereliction because heritage-compliant restoration is too complex and expensive, there is also an issue of developers choosing to side-step the system. With just a little more pragmatism on the part of heritage officers and conservation regulations, we would be able to avoid both of these scenarios by encouraging collaboration between design and construction professionals and the heritage community to deliver commercially viable outcomes that are best for both the building and the environment.

Pragmatism in practice

So how would a more pragmatic approach to refurbishing old buildings work in practice? If the rules were applied as principles rather than with a monochrome approach to permitted or not permitted, perhaps we'd be better able to do what's right for each project and each building, rather than aiming for a tick in a box.

Hale's own offices in Surrey provide a useful example. A Grade II listed building, our offices have undergone various modifications down the decades when the property was owned by others and before the heritage requirements were put in place. As a result, many of the original features have already been removed and the interior bears little resemblance to what the building would have looked like when first constructed.

As part of a recent refurbishment, we needed to replace an existing staircase and the heritage officer was pragmatic in allowing us to install a new replacement rather than rebuilding the old staircase. However, he stipulated that the stairs needed to start and end in the same location within the building, making it impossible for us to remodel the space in a more efficient and user-friendly way for our business.

More frustratingly was the stipulation that we would need to change the sliding sash windows that were replaced by the previous occupier. Whilst these were traditionally-made timber sliding sash windows, they were double glazed and we were instructed to replace them with single glazed, using putty. This seems ridiculous given the current climate crisis – and also that the windows are good quality and no more than 10 years old. Single glazing not only encourages heat to escape during the winter, driving up our heating bills and carbon footprint, it also leads to condensation, which could result in issues with damp and mould.

As a construction company with a considerable track record in heritage refurbishment, we know that it is possible to achieve an installation that looks virtually identical to the original, while enhancing the building for the future – but cumbersome heritage rules do not allow for this.

Streetscapes without compromise

Heritage is not only about protecting individual features and buildings; it is also about protecting traditional streetscapes. We are very fortunate in the UK to have such a wealth of architectural heritage and many of our high streets are very geo-specific, articulating the history of a town and how, where and why it was built. But maintaining the streetscape does not have to mean keeping the buildings exactly as they have always been. The important factor is preserving the appearance from the street, what lies behind should have the potential for modification to meet the needs of new occupiers, new technologies and the climate crisis.

For example, if the building has limited headroom on the ground floor, why should we not be permitted to lower the floor to provide more suitable accommodation? This would also allow insulation to be installed as part of the floor build-up, alongside suitable interior wall insulation and aesthetically appropriate double or triple glazing. All of this could be done in a manner that allows the building to look the same from the outside, and very similar from the inside, but instead of being pokey and draughty, the ground floor would become user-friendly and thermally efficient, preserving it for a new generation of use.

Living history

We have historic buildings that need to be protected as museum pieces due to their importance, but most heritage buildings are simply remnants of a bygone era, and our goal should be to ensure they remain in use. We might want to keep every tile and every cornice, but if the tiles are laid on uninsulated floors and the cornices decorate lathe and plaster walls that were never built to last this long, we are not really protecting the building; we're allowing it to decay.

To be functional in the 21st Century, buildings need electrics, lighting and data, and the irregularity of old walls and joists is often incompatible with those services because they simply did not exist when the property was built. So, instead of hanging on to sentimental ideas of heritage, lets ensure that our architectural heritage survives by updating it and working with it, rather than being a slave to the past. ■

St Sidwell's Point: Reflections on the UK's first Passivhaus leisure centre

Words by Giles Boon MCIAT, Chartered Architectural Technologist, Gale & Snowden Architects

We are celebrating news of an excellent air permeability test result at St Sidwell's Point, the world's first multi-zoned Passivhaus leisure centre, as it opened this month, but two questions we often get asked are: why do we air test buildings? and, how significant is Exeter's new state-of-the-art leisure centre? Before we answer these questions, let us address some basics first...

What is air permeability?
Air permeability is the air volume leakage rate per hour through the area of the envelope of a given building. The units for this metric are cubic metres per hour per square metre ($m^3/h/m^2$) and are standard practice in the UK. Passivhaus buildings typically use the alternative metric of air changes per hour, which could be described as the air volume leakage rate per hour per net building air volume ($m^3/h/m^3$). The units for air changes per hour can be abbreviated to h-1, and often stated as 'ach'.

Why is airtightness important?
Heat energy is lost from our building through uncontrolled air 'infiltration', or leakage when air is forced through our building envelope by the difference in air pressure. The air pressure is caused by wind and the buoyancy of warm air. A higher rate of uncontrolled air infiltration through our building envelope means a higher rate of heat loss from our building. This is different to the air controlled through ventilation systems, which circulate air to provide an acceptable quality of indoor air for us to breathe!

How is air permeability measured?
Air permeability and air changes per hour are measured by pressurising the building to 50 pascals and then measuring the rate of airflow needed to maintain the building at a constant pressure. The result of the test is then factored by using the building envelope area or net building air volume according to which metric is needed to determine compliance with the relevant standard.

What are the airtightness targets at St Sidwell's Point?
The limiting fabric parametres in the 2016 edition of Approved Document Part L require an air permeability of $10.0m^3/h/m^2$, with a welcome but meagre improvement in the 2021 edition. As part of the certification procedure for St Sidwell's Point, the Passivhaus Institute requested an air permeability target of $0.2m^3/h/m^2$, with a threshold of $0.4m^3/h/m^2$ required for certification. Our final airtightness test result was $0.3m^3/h/m^2$, testament to the exceptional efforts of the whole project team. For our building's net floor area, shape and form, this equates to 0.1 air changes per hour.

So just how significant is Exeter's new state-of-the-art leisure centre?
St Sidwell's Point is the world's first Passivhaus-certified multi-zoned leisure centre, following on from two predecessor swimming pools, in Bamberg and Lünen, Germany. In Exeter, our community can be proud to have a comfortable, healthy and low-energy facility available for use by the whole community. With the final

airtightness test complete, we are thrilled to have reached practical completion. From our dual role on St Sidwell's Point as Architect of the Building Fabric and Passivhaus Consultant, we at Gale & Snowden are already applying our lessons learnt to other Passivhaus leisure centres in the UK. Watch this space!

What technical design strategy did Gale & Snowden employ for airtightness?
Pre-tender, our technical design was based on Gale & Snowden's 25-years' experience as architects and mechanical engineers undertaking design and consultancy appointments on award winning projects. Projects used various external envelope assemblies on schools, flats and other housing schemes, and in many cases, this resulted in plastered clay or concrete blocks as a robust airtightness layer. This is because, in a plastered or rendered wall, an airtightness perforation is clearly visible and can be accessed late into construction. This is particularly important should an on-site air test reveal a perforation that needs addressing.

St Sidwell's Point makes use of an in-situ concrete primary frame, shear walls, ground floor slabs and retaining walls, and the original design included for internally rendered autoclaved aerated concrete blockwork walls. The areas of concrete frame are inherently 'airtight', but the areas of infill wall also required a level of airtightness to meet our targets. Post-tender, the contractor wanted to swap out areas of rendered blockwork, a wet, resource-hungry trade, for the much faster (and drier!) steel framing system (or SFS) and adhesive membrane-lined cement particle board. This assembly was already present on the building over a few isolated wall areas, but we were apprehensive to accept an amendment to the design where the risk of airtightness failure could significantly increase. After a period of investigation, redesign and on-site mock-up testing, the feasibility of this method of construction in achieving Passivhaus levels of airtightness was determined. We amended our design to increase the use of SFS to 70% of the external wall area.

What measures were put in place to reduce the risk of airtightness failure?
Ever wondered that failure might not be an option? On a £44m leisure centre, airtightness failure is definitely not an option we wish to choose, but it is a real possibility without the correct design, planning, preparation and workmanship. The following critical factors can be employed to manage this risk and ensure the successful implementation of an airtightness design.

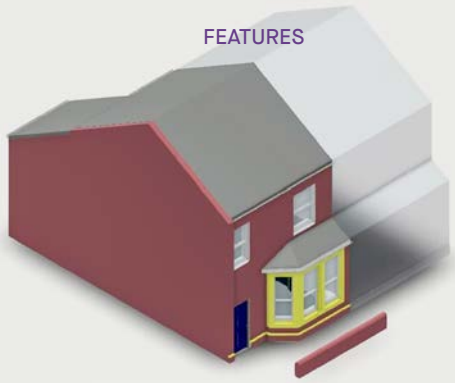
1. A design that considers the sequence of construction and the need to leave airtightness elements exposed for airtightness testing;
2. An airtightness testing strategy that includes interim, sectional and mock-up airtightness testing;
3. Coordination between the airtightness design and airtightness testing strategy as a whole;
4. Meticulous site control to capture penetrations caused by follow-on works; and,
5. An integrated approach to airtightness as part of the construction programme.

What were the greatest challenges in achieving an airtight design?
Challenges were faced by the whole project team, within different works packages and of different perspectives. It is easy to understate the amount of human and material resources needed to install an extensive envelope to such low levels of air permeability. For example, to achieve an 'airtight' installation of a double door, the door should meet a specified air permeability class to EN12270 and the connection between the door and each of the adjacent elements must be sealed. If the door is glazed into a curtain wall, then similar attention to detail is needed at the transition between the curtain wall mullion and the threshold of the door, and then there is door closer fixings! At St Sidwell's Point, much of this was subjected to product changes, critique, review, consultation, testing and so on...

So what were the lessons learned during the works?
We will try to briefly list and explain a handful of the many lessons learned that relate specifically to detailed design and construction of the airtight envelope at St Sidwell's Point.

- **Partial air testing:** Works progress differently across large commercial sites than they do across typical domestic or residential projects. At predetermined points during the construction, the envelope should be available for air testing and leak finding. On a large building, it simply is not practical to carry out interim air tests on the whole building. A building designed for partial air testing, with logical places for internal airtightness zoning provides the contractor with convenient pockets to preliminarily test in stages as works progresses.
- **Fixings through sheathing boards:** The type of fixing, type of substrate and number of fixings of each type across the envelope are all critical factors in the total air leakage resulting from the fixings overall. Facade brackets, insulation, secondary structure, signage, and electrical items all result in fixings through an airtightness layer or component in our building. Imagine realising that standard insulation fixings could potentially result in a gross failure of the airtightness test, by design! Seriously, watch out for this one... this actually happened to us post-tender, and resulted in us requesting the submission of every fixing in the building envelope for our approval.
- **Material wastage:** One estimate from site was that 40% of adhesive airtight membranes needed replacing. This was for a variety of reasons, including damage by follow-on works and temporary works. With such a tight target, it is understandable why a contractor would rather replace so much membrane to control the risk of failing the airtightness test. Perhaps buildability of the airtightness around temporary works can be considered by the design team pre-tender, possibly using BIM and early contractor input, and perhaps this could minimise the impact of the works on material wastage?
- **Complex building geometry:** Consider this the curse of the curvy building. Put simply, simplicity in building form reduces cost, reduces variations in interfaces between elements and can still be designed, aesthetically, to fit within the context. Reduced variations between interfaces simplifies the airtightness design.

Concluding thoughts...
So why is not more being done to reduce energy losses through infiltration? The team at St Sidwell's Point have this month demonstrated that it is possible to build to exceptional levels of airtightness in large, complex, multi-zoned buildings. The techniques developed by the design team and contractor can now be taken forward into future projects, and we commend everyone involved in accomplishing one of the most significant Passivhaus challenges to date. ■



There's no BIM like home Part 15

Words by Dan Rossiter FCIAT, Chartered Architectural Technologist

AT Journal continues its exclusive access to serialise Dan's blog on how he used BIM to produce an information model of his home.

After giving my attic some attic-tion, I wanted to talk to you about an issue I am having. This issue is not directly related to production of my graphical models or information, but it is having a big impact on both of these; it is language.

Our language(s) are incredibly analogue, making it difficult to fit what we say into our logical, cold, and uncompromising digital world; with English it is particularly difficult. As a quilt of a language, English has inherited many inconsistencies such as: strange pronunciations and inconsistent terms etymology. Languages like Welsh on the other-hand are phonetic, and use consistent terms. The follies of trying to digitise information using the analogue method of communicating and structuring information known as language.

Classification

Our world is not black and white, so it is easy to misclassify (or overclassify) objects. From the tree of life to Uniclass 2015 it is not an easy job to provide order to this chaos; leading to difficulties when trying to classify.

I have written about my Nest Thermostat previously, but I did not mention its classification. My thermostat, being a clever tool, functions as many things and therefore could be classed under Uniclass 2015 as a: ***Pr_70_70_47_21: Daylight Sensor, Pr_75_50_76_73: Room Temperature Sensor, Pr_80_51_85_21: Data Logger, Pr_40_30_25_23: Display Screen*** and many others. Its primarily function however is as a thermostat, with the closest classification I can find being **Pr_75_50: Mechanical Services Control Product**. This means that while everyone on a project might be using a single classification system, there is to guarantee that they will use it consistently.

Naming

Just like classification, we are also terrible when it comes to naming. For example, due to the fact that radiators emit 80% of their heat as convection, and 20% of the week as radiation; radiators are actually convectors.
In addition: models are not federated, federation is for federal unions; they are really integrated models; gargoyle have water spouts; without spouts they are grotesques; and BIM barely has any acronyms. Acronyms are spoken as words, meaning that terms like **EIR, DRM, TIDP, MIDP, IFC, IDM, bSDD** and **BCF** are actually initialisms.

This means that while everyone on a project might be following the same object standard, and even using the IFC Schema to limit their choice of relevant types and sub-types, there is no guarantee that they will use them consistently.

Distances

In mathematics, numbers have an order for numbers. We have:

- Cardinal numbers, the principle set of numbers;
- Ordinal numbers, used to provide a ranking; and
- Nominal numbers, used to identify (not necessarily by rank).

The same can also be applied to directions for both cardinal or ordinal, but what about nominal? Well as nominal numbers are used to identify, then top, bottom, front, back, left and right can be considered nominal directions; but how to measure these distances?

If I wanted you to measure the distance across the front of a cube, what are you measuring its length, width, breadth or depth? The answer will differ depending who you ask as there is no consistency on how we name these distances.

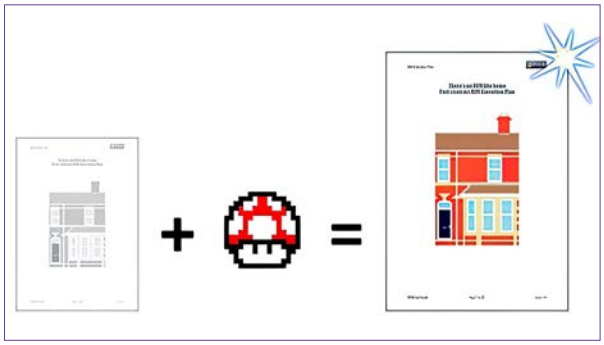
This is not a new topic, many have discussed it previously such as practical BIM when considering 'Which Direction is Depth?', and more recently Keith Wilkinson is conducting a survey to gain a consensus on what to call these directions.

In many commercially available authoring tools, you are able to name these distances anything you like. So, while we might instinctively know what to measure when asked how tall a door is, when we are asked how wide a cabinet is; there is plenty of room for varying interpretation.

This means while everyone might be using the same language, variation in how it is used can change the values recorded against attribute data such as height, width, depth and length; all of which are required by COBie.

On this project I have specified Uniclass 2015, BS8541-1, COBie and additional EIR attributes, so I have a consistent method of classifying, naming and attributing data. However, it is one thing to specify their use, and quite another to ensure that they are being used consistently and appropriately.

The only way to ensure that the application of this information correctly is to further qualify their use within my BIM Execution Plan, it looks like a revision is in order. The reason for this is because my BIM Execution Plan is the guidebook being used to create my information model; the clearer it is, the better quality the information contained within the information model will be. So, it is time for an upgrade.



Going through my BIM Execution Plan now that I have started to create content, I have noticed a few items and headings that I should have included which can be summarised as:

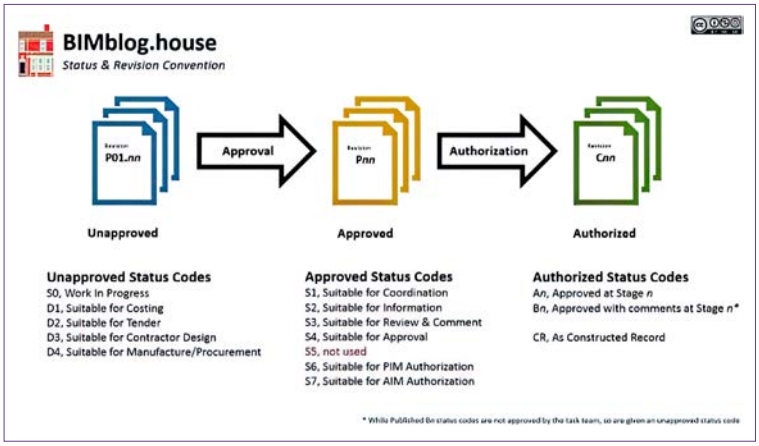
- *Revision and Status Code Details;*
- *Classification;*
- *Object Naming; and*
- *Attribute Data Conventions*

Now the great thing about a BIM Execution Plan is that it is a live and evolving project document, meaning that there is no issue with revisions to the document so long as the impact of those changes have been fully considered.

Revision and status code details

While I have previously specified compliance to BS1192, in reality that is not good enough, as it is possible to misinterpret the use of these codes. So, I have included the following diagram as an aid:

For example, many believe that if they were issuing information to an estimator that they would use the status code D1; this is incorrect. As you can see from BS1192, table 5 'suitable for costing' relates to unapproved information. The intention is that this code allows information to be given to someone to get a unit rate cost to then be used as part of generating the cost estimate. To enforce this, I have included the following clause within my BIM Execution Plan:



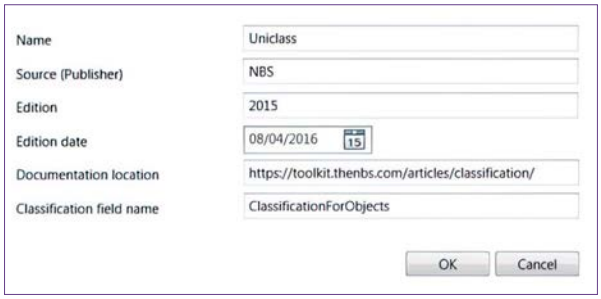
D codes shall be exclusively for unapproved information exchanged to aid in at-risk preparatory work. Information with a D code status shall not be referenced to generate any deliverables.

In summary, if you see a D code, think 'D, do not use'. As you cannot rely on the information within, as it has not necessarily been approved by the authors task team.

Classification

In order to ensure a simple application of class, objects will need be classified by a single classification code. This means that while some might have a Swiss army knife of functions, they will be classified by their primary function. For example, my phone is a computer, camera and sensor but is marketed as a phone; so my Nest Thermostat will be classified as a thermostat* and nothing more.

To enforce this I have modified by BIM Execution Plan to include the following clause under 5.8, and amended Appendix E to suit:
Only a single classification code shall be included on each object which describes its primary function. Classification shall be included in the Attribute ClassificationForObjects included within ***Appendix E****.*

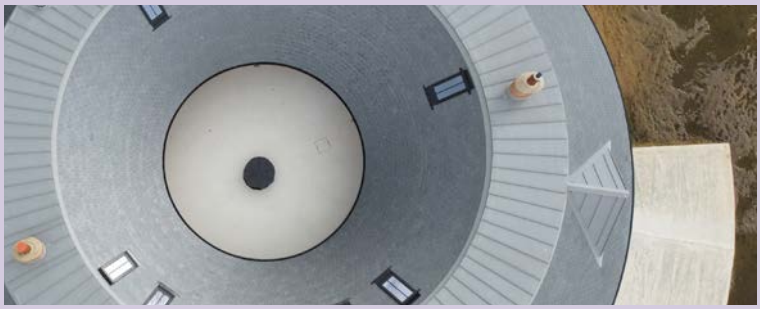


N.B. There is no thermostat in Uniclass 2015, so I have had to default to Mechanical Services Control Product. ■

To be continued in the winter issue.
@DRossiter87

The future is here. And it is aluminium.

CIAT is delighted to announce that ARP is a headline sponsor for the AT Awards.



What makes aluminium a perfect material for modern construction?

When it was first discovered, aluminium was, pound for pound, more valuable than gold. But since industrial production of aluminium began in the 19th Century, it has been used extensively in construction and industry, prized for its superb weight/strength ratio. In the 21st Century it has become an archetype of modern architectural design.

But what makes it so perfect for modern architecture projects?

Because it is so light weight yet strong it can be used to create large structures like long span roofs that rely on its high mechanical strength to create contemporary structures that push the boundaries of modern architectural design.

Malleable: because it is so malleable, aluminium can be formed onto almost any shape so that bespoke designs, like circular angled radiuses, can be created as unique one offs at our manufacturing facility in Leicester.

Energy efficient: aluminium reflects heat and light making it ideal for facades and structures that can reduce the need for air conditioning and heating, saving energy organically. Both of these features enable the attainment of LEED (Leadership in Energy and Environmental Design) and BREEAM (Building Research Establishment Environmental Assessment Method), accreditations for the future of green buildings and circular architecture.

Sustainable: As one of the most widely available elements in the world aluminium is the perfect material for today's circular construction cycle: it can be easily and efficiently 100% recycled over and over once it reaches the end of its useful life with no loss of properties. Of course, the real cost savings are seen over the whole life of any product, from cradle to grave. While PVC building products need to be discarded after 15-20 years, aluminium is still going strong with very little maintenance.

Beautiful: with an infinitely varied colours and finishes when coated, aluminium can even mimic other less hardwearing metals. When raw aluminium anodises it creates a timelessly modern finish that is durable and corrosion, UV, and fire resistant.

Aluminium is the ultimate material for architectural projects. To find out how we can help bring a project to life with our wide range of aluminium guttering, fascias, soffits, copings, and architectural cladding, call us on 0116 289 4400 or visit arp-ltd.com

ARP goes round the houses

Some projects offer more of a challenge than others and Oaklands, a completely round new residential property in Yorkshire, certainly sent our design team around the houses! The house has an interior core which presented us with a challenge to produce guttering for both the internal and external curved roofline.

Following a full site survey, ARP designed the radiuses guttering as a bespoke one-off within a tight four-week timeframe. The company designed the system from scratch based on its Legacy system, to the exact slate grey colour specified (RAL7015) with a fine finish to add texture. ARP produced a special template and bespoke mould for the project and several samples to ensure a perfect fit. This was achieved on the first attempt to within a 2mm tolerance for the full radius, internal and external.

Despite its striking modern design, the client nevertheless wanted to achieve a traditional style for the new-build property and ARP's Legacy cast aluminium gutters provide the perfect combination of modern manufacturing techniques and materials with traditional style and durability. Manufactured using traditional castings as a perfect alternative to cast iron, even on conservation, heritage and listed properties, Legacy is produced in five gutter designs and many sizes to replicate traditional case iron profiles. During its long 40+ year lifespan, ARP Legacy gutter systems require little or no maintenance. On this project, Legacy guttering was matched with ARP Colonnade cast collared downpipes, giving the house exterior a traditional design twist whilst retaining its modern aesthetic.

The rise and rise of grey

Colour plays a big part in our work here at ARP. One of the advantages of aluminium guttering is that it can be powder coated to match exactly any colour possible. That is usually to match to soffits, brick, windows, doors, roofs or any other element of the building. We are also often asked to produce gutters, soffits, fascias and copings in a corporate colour for commercial projects.

By far the most in-demand colour in recent years is anthracite grey (RAL7016) which Architectural Technology professionals are choosing for its modern, smart looks and to match other build elements. On refurbishment projects, this sturdy colour can transform the look and feel of any building and pull a tired-looking property straight into modernity.

But colour does not have to stop with grey. One of the beauties of aluminium guttering is that it can be powder coated to match exactly any conceivable colour: the only limit is imagination. ■

ARP | The Natural Partner For Aluminium Roofline

Innovative roofline systems that offer sustainable and effective construction solutions

All our systems are backed with technical support, design assistance, and a full bespoke manufacturing capability.

CIAT ARP

sales@arp-ltd.com | Tel: 0116 289 4400 | www.arp-ltd.com

Landscape 2022

LANDSCAPE - the UK's premier landscaping exhibition, looks to showcase the industry more than ever before by bringing more exhibitors, more visitors and even more features to Hall 3 at the NEC - National Exhibition Centre in Birmingham on 28-29 September 2022.

Welcoming over 250 exhibitors with a vast collection of industry-leading products, services and innovations for the design, build and management of exterior and interior landscaping projects, LANDSCAPE 2022 is the trade event you will not want to miss, and the best part is – it is all FREE! The LANDSCAPE Show is the chance of the year to network with professionals at the top of their game at the largest event the industry has ever seen!

LANDSCAPE is proud to say that 86% of visitors are very likely to recommend and use an exhibitor for a future project, and the exhibitor list continues to go from strength to strength, year on year. The extensive exhibitor list ensures that when they say that there is "something for everyone", they really do mean it!

This year alongside the highly anticipated CPD accredited seminar programme, LANDSCAPE will be introducing some brand-new features including a Student Showcase by London College of Garden Design, and an additional programme of 'How to' seminars for anyone in the industry to learn, be inspired and expand their skills. Back again at the central bar area, LANDSCAPE will be hosting the incredibly popular PechaKucha 20x20 and Meet the Designer programme. LANDSCAPE's Women in the Industry Day was so well received in 2021 that it is back with an additional Networking Morning running in conjunction with #Yes She Can. Also back this year is the highly anticipated design competition, which will be focused on Wildlife Friendly designs and supported by the Warwickshire Wildlife Trust and Birmingham and Black Country Wildlife Trust.

Both the exhibition and all seminar sessions are free to attend. For more information or to register to attend the show, simply visit the registration page online. Expect the biggest names in landscaping to feature in the 2022 line-up and be sure to keep an eye on LANDSCAPE's social media channels for the latest updates and be the first to hear about even more reasons why LANDSCAPE 2022 is the show you do not want to miss.

See you there!

Further information can be found online:
LandscapeShow.co.uk
Twitter: @LandscapeEvent #LANDSCAPE2022
Instagram: @Landscape.show #LANDSCAPE2022

CIAT and the Contamination & Geotech Expo: working together to educate and connect the industry

The UK's leading event for contaminated land, air and water takes place on 14-15 September 2022 at the NEC, Birmingham for an unmissable two-day event which will provide a platform for professionals across sectors to connect.

The Contamination & Geotech Expo will welcome 3000+ visitors to the NEC with the opportunity to see live demonstrations, engage with expert speakers, participate in a range of exclusive free to attend networking events, and enjoy the buzz and festival atmosphere of the on-site pub, street food market and live music.

Learning and knowledge sharing

Over the course of the two days, the event will play host to more than 100 expert speakers, across 60 CPD accredited session, covering key topics within land remediation, brownfield regeneration, air quality, waste and contaminated water and hazardous materials.

The broad programme is split across four theatres, which provides unrivalled insight for: local authorities, government agencies, civil engineering firms, the construction and demolitions sectors, hazardous removal and treatment, compliance and much more. Dedicated theatres include Land Remediation & Geotech, Wastewater and Clean Air, Hazardous Materials, and the Keynote.

One of the themes for this year's event is and remediation, designed to further the diagnosis, management, and remediation of contaminated land. The area gives environmental, remediation, planning and development professionals the opportunity to connect with suppliers showcasing new technology, innovations, and cost-effective solutions to help improve business operations.

Innovation

With innovation at the heart of the exhibition, the revamped layout of the exhibition floor provides space for ground-breaking suppliers to showcase their solutions in a live environment. This year, the event welcomes new features such as the Drilling Zone, engaging with the drilling industry and associations and visitors can discover the latest industry innovations and technologies from the likes of Mick George, Brown and Mason, CTS Group and Euro Demolition & Dismantling.

The UK's largest environmental event
The Expo is free to attend and runs alongside the Flood Expo, RWM and Letsrecycle Live, which combine to form the UK's largest event for the environmental sector. The co-located events will welcome more than 12,000 environmental professionals and over 800 exhibitors over the course of the two days.

Social and networking events
But the events are more than just an exhibition. In addition to the seminars, exhibits and demonstrations, visitors can enjoy the festival atmosphere of the on-site pub, street food market and take part in a host of exclusive, free to attend networking events.

This year also sees the introduction of the Local Authority & Agency Lounge allowing visitors to network with colleagues and discuss challenges and innovative schemes being implemented in their local areas and beyond. As well as the Water Pollution Prevention Award, celebrating the latest innovations in water pollution prevention. Join us to connect and meet industry leaders such as RSK Group, Arcadis, Kier Group, Arup Group, Royal BAM Group and WSP Global at this unmissable event for anyone connected contaminated land, air, water and materials.

To find out more and register your interest visit contaminationexpo.com ■

How technology can take the bureaucracy out of payments

Words by Payapps

Albert Einstein once said, “Bureaucracy is the death of any achievement”, whilst author Frank Herbert wrote, ‘There is little that bureaucrats hate more than innovation, especially innovation that produces better results than the old routines.’

It would be a fair assumption that their sentiments are widely shared. You only have to look at the construction sector to find a place where bureaucracy is still rife, and innovation can be hard to come by.

Usually, technology can offer a solution to almost any complex issue, but could it hold the key to unlocking the bureaucracy issue plaguing payments?

Red tape

As businesses in most industries can attest, bureaucracy is thriving. Whilst it is not an issue exclusive to the construction sector, the sheer level of labour-intensive payment application processing in this industry means it is becoming more of a problem.

Much gets made of legislation that organisations in the construction sector need to follow to remain compliant and continue operating. So in a space where late payments and disputes are already substantial issues, red tape can quickly be a highway to further problems.

Bureaucracy can lead to slower payments, which can drag out projects for extra weeks or months at a time - and at a higher cost. But the issues can start even earlier. The tendering process can become drawn out, and work can become a challenge. Remaining compliant can - for companies reliant on spreadsheets and manual payment processes - become a headache.

Recently, we outlined how contractual issues are the most prominent cause of construction disputes in the sector - typically, these disputes stem from a misunderstanding of legal and contractual obligations.

Missing deadlines

Nobody who has ever worked on a construction project has ever craved more delays - but missing payment deadlines is a sure-fire way to get some.

As the sector is high risk and highly pressured, deadlines are considerably more rigid than other industries. When bureaucracy gets factored in, remaining on schedule and ensuring compliance can quickly become a challenge.

Alongside this, poor planning, miscommunication and failure to stick to payment schedules lead to increased frustration and disputes, which loop around and adds more issues and further construction project delays.

A core pocket of the construction industry relies on archaic practices involving paper trails, spreadsheets and maintaining physical copies of payments.

However, as many contractors and suppliers adapt to digital solutions, these outdated practices no longer cut it. Late payments, delays and disputes are too costly.

Afterall, time is money.

Digitising payments

So, how do you ensure compliance, transparency and efficiency when it comes to payments?

Digitising your payment process is a way that removes obstacles and keeps your deadlines realistic.

Not only do cloud-based payment solutions such as Payapps help streamline this process, but they also keep all the critical documentation together, ensuring transparency for all parties.

The industry may continue to be slower than most others when adopting new technologies or working methods, but the COVID-19 pandemic forced a re-think for many of us. Globally, digital transformation strategies took on a new focus for organisations, and when new technologies can offer faster deliveries of projects, it’s easy to see why.

In recent construction industry research, we found that 63% of time allocated to a project gets wasted due to poor planning and communication. Simply put, this no longer has to be the case.

By providing automated reminders of payment applications and payment notices due to be issued, as well as ensuring compliance at all levels, those who turn to digital solutions benefit from supply chain stability across all their projects.

Payapps

As a cloud collaboration solution, Payapps is an online platform that simplifies the management of construction applications for payment in a single outlet.

Working to streamline processes and enable transparent, compliant and timely payments, Payapps is an indispensable solution used by contractors and subcontractors globally, making lives easier, bureaucracy less of an issue, and transactions simpler.

Arrange a demo now to join the growing number of organisations that rely on Payapps to stay compliant and on track.

uk.payapps.com ■

Connect and broaden your organisation's engagement with the Architectural Technology community by joining CIAT

Your organisation is invited to become a part of the Architectural Technology world by joining the Institute's Affiliate Group Body Corporate (AGBC) scheme. This new scheme allows your organisation to support and engage with the discipline and profession of Architectural Technology in collaboration with the Chartered Institute of Architectural Technologists (CIAT), as the regulatory and professional body for the discipline.

The AGBC will allow you to create a new business-to-business relationship, or take your existing relationship, with the regulatory and lead body in Architectural Technology to the next level!

Why be part of the AGBC Scheme?
Being part of the AGBC Scheme will demonstrate your body corporate's commitment to the highest professional and ethical standards in Architectural Technology – an additional promotional tool for your organisation. It will also allow you to connect and develop through access to the AT CPD Register, a subscription to AT Journal, the My CIAT portal and much more.

Can my body corporate be part of the AGBC Scheme?
The AGBC is inclusive and accessible to all who wish to join, engage with and support the discipline, profession and Institute. This is a great opportunity for your body corporate to grow your relationship with CIAT – and to develop your legal entity with our support and resources.

How do I register our interest?
The AGBC Scheme launches in summer 2022. In preparation for the launch, we invite you to register your interest by emailing our Membership Department – membership@ciat.global

Costs
There is a £100 application fee for all packages. Subscription packages for 2022/23, which run from 1 May to 30 April, are:

Size of organisation	Bronze package	Silver package	Gold package
10 employees or less	£250	£550	£750
11-249 employees	£300	£600	£800
250+ employees	£400	£700	£1,150

Find out more by visiting architecturaltechnology.com/joining/agbc.html

How construction businesses can spot their next tech upgrade

Words by Ibrahim Imam, Chief Executive, PlanRadar

The digitisation of the construction industry has flourished in recent years, signalling a surge in new and exciting tech. But with so many different applications now available on the market, how can construction professionals recognise the tools that are 'nice-to-haves' and those that truly enhance their business processes?

The past few years have seen the construction industry embrace digitisation on an unprecedented level. The pandemic proved to be the perfect catalyst for innovation as the need for remote working became instant. As a result, we have seen the construction industry flooded with new technology – designed to improve every stage of the construction journey – anything from specification platforms at the design stages of a build, down to project management tools for 'hands on' site workers.

Yet with such a wide range of tech to choose from, how can construction professionals 'spot gold' when searching for their next problem-solving platform?

Balancing the tech 'ecosystem'

One of the key elements that construction professionals should look for in technologies is the ability to work with other programmes. It is no longer enough for apps and tools to work well in a silo – now 'interoperability' credentials are essential if you want to make a significant impact on the efficiency and accuracy of your business.

It is not uncommon for construction companies to ignore this point, resulting in time-consuming reporting measures and large gaps in data collection, which lead to inaccuracies and a limited overview of business performance. The most successful tools – and the ones that are fast becoming market leaders, are those that can work alongside and in tandem with other applications.

By investing in tools that bring balance to your tech 'ecosystem', you will gain access to extensive levels of data, which offer a deeper understanding of how your business is performing. For example, when reporting, can the programme or platform incorporate word processing or spreadsheet files and can information be shared easily across teams? It is important to keep this way of thinking front of mind.

Easy uptake

The best types of tech are those that are the most intuitive to use, designed by people in the industry for people in the industry. Do not overlook functionality – the easier it is for your workforce to use, the higher your rate of success in the long term.

'Phygital' tools - those that bridge the digital world with the physical world - are becoming particularly popular. These can dramatically improve the user-experience over outdated methods of reporting, such as paper worksheets, which can be easily misplaced or lost. They also require little training to get users started, as they are often accessed using existing hardware such as phones or handheld devices.

Improving lines of communication

Communication is the beating heart of any business and tools which enhance this area are invaluable. For designers, knowing that builds have been completed to the right specification is a constant concern. The latest apps are now helping to solve that problem – by allowing users to record and store information digitally, specifiers can be sure that work has been carried out to the proper standard. The ability to instant message, assign tasks and send pictures and video in-app is another example of how information sharing is helping to keep teams 'in the loop' on building progress.

Avoiding 'change for the sake of change'

Often businesses feel the pressure to switch up their digital offering in line with industry changes – a case of 'keeping up with the Jones'. Whilst it is true that businesses should be wary of being left behind, it doesn't mean that just any tool is right for the job. It is important to identify the right tools before making a decision – make a list of what is important to the business and what you want to achieve. Equally, understanding what you do not want from your tech is also an important part of the process.

What is to be gained?

The many elements that go into decision-making should not deter businesses from embracing a more digitally-focused way of working. At their core, digital tools have the power to enhance business efficiency, accuracy and ultimately the profitability of businesses. In today's market, where profit margins are tighter than ever and building accuracy is high on the Government agenda, having tools that can improve these areas should be fully embraced.

Central to achieving this goal will be improving collaboration between teams – be it in-house or further afield. The ability to view design plans in-app, for example, means that teams can access the latest version when changes need to be made quickly, saving time and money. Greater communication also improves building accuracy, which negates the need for expensive reworks and helps to keep projects on time and budget.

With so many companies still relying on outdated technology, now could be the time to revolutionise your business. What's needed is a greater awareness around the capabilities of digitals tools and a solid plan of action for those looking to make the leap. ■

1 https://constructionexec.com/article/solve-historic-construction-challenges-with-the-technologies-of-2022

A new chapter in the Active House journey

In April, the UK chapter of Active House was launched, just over ten years after the Active House concept came into being. What is Active House and why should we consider it? We caught up with the new Active House UK Chair, Professor Steve Scaysbrook FCIAT, to find out more.

What is Active House?
Active House is a vision for designing buildings holistically that looks beyond just energy performance and puts residents' health and wellbeing - as well as the environment - at the core. This means considering indoor comfort aspects or indoor environment quality (IEQ) which considers factors like air quality, natural lighting, acoustics and thermal comfort, as well as energy consumption.

Recently, Active House has expanded to include freshwater consumption and embodied carbon. It can be used for both residential and commercial buildings.

Why is Active House important?
We spend around 90% of our time indoors, and over the past few years with the COVID-19 pandemic, this has been more acutely felt. There is rightly a focus on the energy performance of buildings as we seek to tackle climate change, but it is important that we consider other aspects too. We should endeavour to design houses that are not only non-detrimental to our health and wellbeing, but also enhance it.

How do you go about designing an Active House?
The Active House approach is set out in two guides. The *Active House Vision* outlines the principles for Active House and why they are important, and then the Active House Specifications look at the specific criterion, both quantitative and qualitative for the design and assessment stages. These guides are both freely available and provide a great starting point for when having a discussion with a client about their aspirations. You can apply Active House to new builds and to renovations.

Can you tell us more about how Active House compares with just designing to current building regulations?

At the heart of an Active House is what we call the radar, containing nine parameters. This is divided into three sections. Comfort, which covers daylight, thermal environment and acoustics; energy, which includes, energy demand, energy supply and primary energy performance and then environment, which is for environmental load, freshwater consumption and sustainable construction. There is a much more holistic approach than just building to the minimum legal requirements.

How will you know if a building is an Active House?
Following the design or build phase, the building is then scored (1 to 4) against each criterion. Then, using a special software tool. a radar chart can be generated which shows this performance. You can also include an additional benchmark in the radar which illustrates, for example, how it would look if just built to legal minimums. Even if a building has not been designed expressly to the Active House Specification, it is still possible to produce a radar and see how it performs and where improvements might be made, provided you have access to the necessary data.

Is there any form of validation for an Active House?
Once a building is finished, you can also apply for third party verification and receive an Active House label. Although it is not a pass or fail as such (although there are minimum requirements to be awarded the label) the radar allows you to show how well a building performs against the Active House Specification. This may vary between the needs and wishes of each client, but as practitioners we have the opportunity, using the Active House Vision, to advise on the importance of all these aspects.

Example of an Ac5ve House Radar

Why are you launching Active House in the UK?
The global Active House Alliance is non-for-profit organisation and celebrated its tenth anniversary in 2021. It has really taken off in a number of countries including the Netherlands, China, Ukraine, Italy and Canada, and I think there is a huge appetite for it in the UK. The more Active Houses that are built in the UK then it will be beneficial for people and the planet. There is currently no holistic design specification which is so readily accessible for designers, specifiers and builders and so Active House can fill that gap.

How can members find out more or get involved?
If you would like to join Active House UK then please visit the website to get in touch. You can also freely download the Active House Specification and Vision from the UK or global website.

Global Active House Alliance: ActiveHouse.info
Active House UK: ActiveHouseUK.org ■

ABS Trustee opportunities

Volunteering is a rewarding experience and allows you to give back to the sector and network with others. The Institute is proud of its relationship with ABS and now is your chance to become involved with the ABS as a volunteer. Aled Rees FCIAT represents the Institute as a Trustee and a number of members and affiliates act as ABS Ambassadors.

Architects' Benevolent Society (ABS) is a charity dedicated to helping past and present members of the architectural community and their families. Our support includes confidential advice, help with physical and psychological difficulties and financial assistance, allowing more people within our community to live rewarding and fulfilling lives.

If you would like to use your unique skills and experience to help ABS achieve its aims at a very exciting time for the charity, please read on.

We are currently looking for volunteers to join our Board of Trustees:

1-2 Trustees to join our Board

Our Trustees currently meet three times a year (online/in person/hybrid) for Board meetings and are there to respond to ad-hoc strategic matters as and when they arise.

They are responsible for providing strategic direction and making key decisions which fully reflect our core values and ensure we're delivering on our objectives.

Some of the vital things you'd be doing include:

- Making sure our charity is fulfilling its mission and purposes for the communities we support
- Checking that we are always following the law, as well as our own governing document
- Ensuring our resources are managed effectively
- Using your unique skills and experience to help us meet our objectives
- Seeing that we are accountable in what we set out to do

This is an unpaid role, but we reimburse expenses, for example childcare costs and travel costs so you can attend meetings.

We are committed to having a diverse Board of Trustees, and we encourage applications from those who are currently underrepresented on our Board. Please visit our website for our recruitment packs and more information absnet.org.uk/about-us/careers/

We are currently looking for volunteers to join our Welfare Committee and Development & Engagement Committee.

Committee Members for the Welfare Committee

Our Welfare Committee meets four times a year (online/in person/hybrid)). Their prime responsibility is oversight and review of ABS' Grant Giving Policy, to ensure it is being applied consistently, transparently and efficiently, and advising the Board on the adequacy and effectiveness of its implementation.

We are looking for individuals with strategic knowledge in the following areas:

- Relief and prevention of poverty
- Impact reporting
- Mental health and wellbeing

Committee Members for the Development & Engagement Committee

Our Development & Engagement Committee meets three times a year (online/in person/hybrid). Their prime responsibility is to maintain oversight of ABS' development and engagement activities, to look at creating opportunities and to encourage Board engagement with fundraising, communications and awareness raising activities.

We are looking for individuals with strategic knowledge in the following areas:

- Fundraising and GDPR compliance
- Charity communications and marketing
- Strategy Review

This is an unpaid role, but we reimburse expenses, for example childcare costs and travel costs so you can attend meetings.

We are committed to diversity at ABS, and we encourage applications from those who are currently underrepresented on our committees. Please visit our website for our recruitment packs and more information absnet.org.uk/about-us/careers/ ■

AGM 2022

Notice of the Annual General Meeting 2022
Notice is given that the Annual General Meeting of the Chartered Institute of Architectural Technologists will take place on Saturday 26 November 2022 for the following purposes:

- To consider the Annual Review.
- To consider the accounts and balance sheet as at 30 April 2022.
- To re-appoint the Auditors and authorise Council to fix their remuneration.
- To receive and debate the Resolution(s).
- To announce the results of the election of members to the Council and Regional and Centre Committees.

Francesca Berriman MBE HonDTech
Chief Executive
May 2022
CIAT, 397 City Road, London, EC1V 1NH, UK

FAQs

What is the AGM?
The Annual General Meeting (AGM) is the yearly business meeting for the Institute, which is required to comply with the Laws of the Institute (please see the formal notice published here).

Where is the AGM being held?
The AGM will take place at the Bristol Marriott Royal Hotel which is within easy travel of Bristol Temple Meads Rail Station and Bristol Airport. The provisional start time is 10:30, however, the AGM agenda and actual timings for the day will be confirmed in September, following the Council meeting (once the business for the AGM is known).
The AGM business will be conducted in the morning. A conference is provisionally scheduled for the afternoon with more details to be confirmed.

Friday evening social charity evening, hosted by the Wessex Region
The Wessex Region is in the process of arrange a social charity evening. All members and affiliates (whether they are delegates or not) can choose to attend at their own cost. This is event is self-funding, including the hotel accommodation for the Friday night.

Who attends the AGM?
The meeting is Chaired by the President who is supported by the Honorary Secretary, Honorary Treasurer and Vice-Presidents. Each Region/Centre has representation at the AGM, which is its Councillor and Voting Delegates, who have been elected to represent the membership by the Regional/Centre Committee. Non-members who attend are the Auditor, to present the accounts, the Chief Executive and support staff.

Can I attend the AGM?
Any member or affiliate can attend the AGM but you must register your attendance. As a member or an affiliate you may take part in any debate but cannot vote. The vote has been delegated to the Voting Delegate from the Region/Centre.

How do I register to attend?
Please register your attendance by emailing j.rowlands@ciat.global

If I am a Past Chairman or President, do I still need to register to attend?
Yes, Past Chairmen and Presidents will be invited and will need to register to attend the AGM.

Will I receive papers for the meeting?
All members who have registered to attend the AGM will receive a set of papers electronically before the meeting takes place.

How is the vote taken?
Only Voting Delegates can vote and they are voting on behalf of their Region/Centre, as delegated by the Regional/Centre Committee. The vote will be via an online platform to ensure that the vote is recorded fairly and correctly.

How is my vote represented?
Your vote is delegated to your Regional/Centre Committee. You will need to contact them directly and details can be found here: ciat.org.uk/membership/regions-centres-aspiration.html

How are the Voting Delegates elected for my Region?

In the first quarter of each year, the Chief Executive advises Regions on the number of Voting Delegates they are entitled to elect to represent the view of their Region. All Voting Delegates must be Chartered Members and all Chartered Members in the Region must be informed of the election of Voting Delegates to ensure fairness.

As agreed by Council, the breakdown is based on membership as at 1 March in any year. A Region is entitled to:

Member numbers	Voting Delegates
100	1
100+	2
350+	3
700+	4

How are Voting Delegates elected for my Centre?

In the first quarter of each year, the Chief Executive advises Centres on the number of Voting Delegates they are entitled to elect to represent the view of their Centre. All Voting Delegates must be Chartered Members and all Chartered Members in the Centre must be informed of the election of Voting Delegates to ensure fairness.

Centres 01 and 03-07 elect one Chartered Member who will have the necessary number of votes according to the Centre's membership, with, where appropriate, multiple votes.

The Republic of Ireland Centre's number of votes is based on the Regional model and will have its number of Voting Delegates based on the member number in the Centre.

What are the Resolution(s)?

The AGM will receive and debate the Resolution(s) put forward, these are typically changes to the Laws of the Institute.

What is the process for Resolution(s) for consideration at an AGM?

Regions/Centres who wish to table a Resolution(s) for consideration at the AGM must submit their Resolution(s) in the prescribed format to the Chief Executive in line with the timetable issued to the Region/Centres in the first quarter of each year. For this year, the deadline is 5 September 2022. For further information please contact the Chief Executive's Office, j.rowlands@ciat.global.

The Chief Executive will receive and present the necessary papers for Council's consideration, in consultation with the Regional/Centre Councillor, and the Council will take a decision on whether to place the matter before the AGM, as an Institute Resolution and handled in the same way as any other Council recommended Resolution.

Individual members, other than members of the Regional/Centre Committee, also have the right to put a proposal to be considered at the AGM. Any such member may approach their Regional/Centre Committee for consideration of their views. The member should be invited to the Committee meeting for that specific item of business. If endorsed by the Region/Centre Committee, the proposal would then become a Region/Centre submission. This must also be on the prescribed format.

Alternatively, the member may approach the Chief Executive direct with a request for a proposal to be considered. The Chief Executive issues the notice of an AGM together with the timeframe for submitting Resolution(s) for an AGM in line with the Laws of the Institute.

When are the Resolution(s) published?

The Resolution(s) are published in September following the autumn Council meeting. These are circulated to all members and affiliates, with the autumn issue of *AT Journal*.

If your question has not been answered please contact the Chief Executive's Office by emailing j.rowlands@ciat.global ■

Elections in September – nominees standing

In the spring issue of *AT Journal*, we showcased the manifestos for those standing for election at Council in September.

Here is a reminder of the positions and the candidates standing:

President Elect
Eddie Weir PPCIAT MCIAT

President Elect
Nicola West MCIAT

Honorary Treasurer
Doug Fewkes MCIAT

Vice-President Technical
Dan Rossiter FCIAT

Vice-President Technical
Gareth Sewell FCIAT

Candidates gave a presentation at the Council meeting held on 12 March to Regional and Centre Councillors to support their manifestos and to allow the opportunity for questions. We encourage you to liaise with your local Region, Centre or aspirATion about these.
The full manifestos can be read on the website at: architecturaltechnology.com/about/honorary-officer-elections/about-the-honorary-officer-elections.html

If you would like to pose your own questions to the candidates or would like to find out more from them, there are two Hustings to be hosted by the Institute on 16 June and 14 July – you can register for either or both events here:

- **Thursday 16 June 2022** – 11:00 - eventbrite.co.uk/e/ciat-hustings-honorary-officer-elections-2022-tickets-324085467357
- **Thursday 14 July 2022** – 18:00 - eventbrite.co.uk/e/ciat-hustings-honorary-officer-elections-2022-tickets-324105627657

N.B. These events can only be attended by CIAT members and affiliates, and you must register in advance. The full protocol for attendance will be provided in advance of the event.

The campaign trail continues and here is a summary of the key dates:

Campaigning by candidates including hustings:
Election at Council:
10 September 2022

Assumption of position:
26 November 2022, close of 2022 AGM

Membership news

Chartered Architectural Technologists

We would like to congratulate the following who successfully attended their Professional Interview and are now Chartered Architectural Technologists, MCIAT:

024138	Christopher Smith	Northern, 01
018711	Tim Cox	Yorkshire, 02
033350	Daniel Keeton	Yorkshire, 02
029186	Martyn Riches	Yorkshire, 02
033932	John Tehrani	Yorkshire, 02
023069	Shane York	Yorkshire, 02
034792	Jonathan Ng	North West, 03
021070	James Huckerby	East Midlands, 04
030351	Karrie Loydall	East Midlands, 04
023141	Sandeep Sian	East Midlands, 04
029597	Joseph Bateman	West Midlands, 05
027069	Matthew Hindley	West Midlands, 05
032565	Akinola Oladosu-Famutimi	West Midlands, 05
015829	Dale Burton	Wessex, 06
023739	Adam Griffiths	East Anglia, 07
021803	Christopher Wragg	East Anglia, 07
020097	Amna Shibeika	Central, 08
035882	D'ondre Brooks	Greater London, 09
024402	Ali Husnain	Greater London, 09
036811	Sergei Lutsenko	Greater London, 09
027540	Andrew Sanders	Greater London, 09
033538	Karl Baker	South East, 10
030319	Scott Wells	South East, 10
030020	Lauren Winfield	Western, 12
035754	Keith Hogg	Scotland East, 14
027928	Joseph McGuigan	Scotland East, 14
026676	Kimberley Morrison	Scotland East, 14
034723	Owen Morrison	Scotland East, 14
027253	David Murray	Northern Ireland, 15
028634	Henry Beddoes	Wales, 16
014041	Daniel Keane	Republic of Ireland, C2
019935	Barry McCarron	Republic of Ireland, C2
035806	Ashok Iyer	Middle East & Africa, C7

Welcome back

We would like to welcome back the following Chartered Architectural Technologists:

018015	Martin Ludlow	Yorkshire, 02
015952	John Hallam	Central, 08
030100	David Moar	Scotland East, 14

Fellow Members

We would like to congratulate the following Chartered Architectural Technologists who successfully completed their application and are now Fellow Members, FCIAT:

016692	Dr Matthew Brooke-Peat	Yorkshire, 02
027110	Ann Vanner	North West, 03
021735	Mark Wildish	West Midlands, 05
007298	Ian Begg	Central, 08
019601	James Daniel	Central, 08
008702	Stuart Fall	Central, 08

In memoriam

We regret to announce the death of the following members and affiliates:

002210	Gordon Clarke	South East, 10
005451	Keith Ellis	South East, 10
014670	Thomas Burke	Western, 12

Logos and emblems now available for members and affiliates

The Institute is delighted to announce that a full suite of logos and emblems are now available for use by:

- Chartered Architectural Technologists
- Chartered Environmentalists
- CIAT-Accredited Conservationists
- Associate members
- student members
- affiliates

If you would like to make use of the appropriate logo or emblem, then please email communications@ciat.global and you will be issued with the logo or emblem, along with its conditions of use - these act as your licence. All use of the logos and emblems must be approved before use, as detailed in the conditions.

Continued from page 5

exclusions or cover written on a more restrictive basis and higher premiums. This may also result in those professionals or former professionals faced with claims under the DPA having to pay those claims themselves, possibly without the means or documentation to do so. In some instances, this could result in insolvencies.

Commenting on the Enactment of the Building Safety Bill, Kevin Crawford PCIAT, said "CIAT wholeheartedly supports the principles behind the Building Safety Act and what it is trying to achieve; and as such is a key player in the response to the Hackitt Review and the changes necessary to protect life. This legislation will have an impact on every sector of the construction industry for many years to come. We do, however, consider that there are areas of the Act that will result in unintended consequences, that will need to be addressed going forward. We have made and will continue to make representation to Government in these areas." ■

Conduct Hearings | Disciplinary Sanctions

Registration no. 031539 - Patrick Clarke

At a Conduct hearing, Patrick Clarke was found in breach of Clause A1b) from the *Code of Conduct* effective 1 September 2020.

Clause A1: Professional Conduct

The members shall at all times:

b) act faithfully and honourably in their professional responsibilities.

Disciplinary action:

In accordance with the *Conduct & Disciplinary Procedures* effective 1 January 2021, Schedule of Disciplinary Sanctions, Section A, Item 1a), the Conduct Committee determined that Patrick Clarke to be reprimanded in respect of the breach of Clause A1b) from the *Code of Conduct* effective 1 September 2020.

Registration no. 019953 – Alex Rayner

At a Conduct hearing, Alex Rayner was found in breach of Clause 1f), Clause 1g) and Clause 5)2c) from the *Code of Conduct* effective 1 May 2014.

Clause 1: Professional Conduct

The members shall at all times:

f) not knowingly misrepresent their professional qualification;

g) describe themselves factually and/or in good faith.

Clause 5: Offering and/or Providing Services Directly to a Client

2) Chartered Members and profile candidates acting as principals of a practice shall:

c) endeavour to ensure that the services offered and/or provided by their practice are appropriate to their client's requirements

Disciplinary action:

In accordance with the *Conduct & Disciplinary Procedures* effective 1 January 2021, Schedule of Disciplinary Sanctions, Section B, Item 2b), the Conduct Committee determined that Alex Rayner to be excluded from the Institute for a period of two years in respect of the breach of Clause 1f) from the *Code of Conduct* effective 1 May 2014.

In accordance with the *Conduct & Disciplinary Procedures* effective 1 January 2021, Schedule of Disciplinary Sanctions, Section B, Item 2b), the Conduct Committee determined that Alex Rayner to be excluded from the Institute for a period of two years in respect of the breach of Clause 1g) from the *Code of Conduct* effective 1 May 2014.

In accordance with the *Conduct & Disciplinary Procedures* effective 1 January 2021, Schedule of Disciplinary Sanctions, Section B, Item 2b), the Conduct Committee determined that Alex Rayner to be excluded from the Institute for a period of two years in respect of the breach of Clause 5)2c) from the *Code of Conduct* effective 1 May 2014.

The three periods of exclusion will run concurrently, and the total period of exclusion is two years.

Denise Germaine MCIAT receives Lifetime Achievement Award

On a very wet Tuesday in April, representatives from the Republic of Ireland Centre Committee met with their great colleague and friend, Denise Germaine MCIAT. Denise and her partner Des thought they were meeting Paul Condron MCIAT and his wife Mary for a quiet lunch in The Old Stand, a very famous and old pub in Dublin City Centre. However, Denise did not know that this event had been arranged and rearranged many times since her retirement was announced in June 2021. COVID19 and the ever changing restrictions had sabotaged the Committee's wish to have a large social event and presentation to Denise to celebrate her career and endless work with CIAT over the decades. Patricia Mulvey MCIAT arrived and before Denise's suspicions were aroused, Paul presented her with the new Republic of Ireland Centre Lifetime Achievement Award! Some long overdue handshakes were made and Denise and Paul reminisced about the great times they have had over the years. Denise told us that The Old Stand had a special place in her heart as she met her Dad there for lunch when they both worked in the city. Denise's Dad was an architect and she said he would have been thrilled for her to receive such an award! In her own words Denise was "overwhelmed and totally gobsmacked!"

AT Awards 2022 close in June and July

The AT Awards opened for submissions on 1 February 2022 for the following Awards:

- Excellence in Architectural Technology
- Student Awards for Excellence in Architectural Technology
- Emerging Talent in the Technology of Architecture
- The Chartered Architectural Technologist of the Year
- Gold Award

Full details and application forms can be found on the website. Winners will be announced and presented at the AT Awards event on 21 October 2022.

The AT Awards are recognised as the premier accolades that demonstrate outstanding achievement in Architectural Technology and celebrate the technology of architecture.

AT AWARDS

ciat.org.uk/awards.html
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