SETTING THE STANDARD



ISSUE 01 | SUMMER 2022

A MOVEMENT FOR CHANGE

AECB is growing thanks to you!

AECB CARBONLITE™ TRAINING CENTRE

Why retrofit uptake is urgent



TECHNICAL SOLUTIONS

Building Regs Part L Airtightness – must aim higher

INVESTMENT

The finance sector wakes up to sustainability

LEADERS IN INNOVATION

Digital solutions transforming Scotland's tenements

NEW!

Unique AECB PHribbon exclusively in our shop

Join the AECB

A movement for change

Become a member of AECB or upgrade your membership. We focus on:

- Supporting and guiding members in improving knowledge and practice of environmentally-conscious design and construction.
- Influencing the national and local agendas as a movement for change.
- Capturing experience, insights, exemplar practice and hard data on building performance from pioneers, early adopters and expert practitioners in our community.
- Communicating with members, wider industry and the public through publications, events, training courses, the AECB Knowledgebase.
- Providing guidance on the use of the AECB Building Standard and the AECB Retrofit Standard.

Membership Benefits

- Access to industry experts, technical authors, technical webinars, discounts on cutting edge designer software and events with strategic partners.
- Join as a company and key employees become members. •
- Join as an educational establishment and staff and students become members.
- Passivhaus Trust Members get 20% off.

Optional upgrade to Patron Package. For further details and the 'Patron Pack' please email <u>contactus@aecb.net</u>

Download the membership leaflet 'Be part of something bigger'

DOWNLOAD

AECB

building knowledge

AECB Annual Fees (prices include VAT)

Full time student (No website listing)	£39
Supporting Individual (No company membership or website listing)	£60
Sole trader	£84
Small company (Up to £250k turnover)	£168
Medium company (Between £250k - £1m turnover)	£312
Large company (Up to £10m turnover)	£498
Largest company (Over £10m turnover)	£948
Local Authority/Housing Association	£480
Educational Institutions	£480

Join the AECB

JOIN



CEO welcome

AECB IS GROWING THANKS TO YOU!

AECB's membership has grown by 20% over the past 10 months and we are gaining traction with self-builders, individual practitioners plus large-scale design, architecture and multi-service consultancies who share our commitment to accelerate the UK's journey to net zero, reports Andrew Simmonds, CEO AECB.



Our growing community brings together diverse voices, interests, skills and campaigners who shape the consensus that AECB is indeed 'A movement for change whose time has come'. This is what we aim to articulate in 'AECB - Setting the Standard' the new quarterly publication we are launching as part of the AECB online webinar conference being held on Tuesday 21st June.

Performance standards are important

The theme of 'Setting the Standard' and our online conference is that to be effective, environmental policy must deploy performance standards. Clear and specific criteria are particularly crucial in the construction sectors, as is quality control. AECB is in accord with the approach articulated by San Francisco based veteran energy analyst Hal Harvey. Hal is CEO at Energy Innovation: Policy and Technology LLC and says: "When you design performance standards, there are a few characteristics that make them work really well. The first, which I emphasize again and again, is continuous improvement. Don't set a quantitative target, set a rate of improvement."

Continuous improvement underlies AE-CB's early three-step energy performance standards – originally Bronze, Silver and Gold. These have now evolved to two-steps: AECB Building Standard and Passivhaus. Both are voluntary standards that have been enthusiastically adopted by AECB members and non-members across the UK. They are supported by the AECB Carbon-Lite[™] Training Programme with access to the Passivhaus Planning Package (PHPP) modelling software and self-certification via our Low Energy Buildings platform. AECB and its members remain firmly 'ahead of the curve'.

The AECB Retrofit Standard published in March 2021 is supported by comprehensive online training in effective and moisture-robust retrofit. My article on page 44 explains how the AECB is currently reviewing and extending the AECB Retrofit Standard to allow 'lighter' insulation and airtightness measures when installing a well-designed heat pump system. We will formally launch the revised standard at the AECB conference in the Autumn - dates to be confirmed. We aim to make it available to AECB members for comment ahead of the conference for feedback. You can get a flavour of our thinking on this from my industry engagement webinar presentation for Insulate Britain! https://youtu.be/ H4i3LLYiJvc

We are proactively building AECB's influence

As CEO I can report on activity across a range of our workstreams. Here are just a few highlights. We are:

 Carrying out R&D into extending the AECB Retrofit Standard into a 'Light Fabric + Heat Pump' option.

- Working with the Scottish Government on exploring its retrofit standard development
- Sitting on the BSI retrofit assessment working group.
- Researching decarbonised materials of the future and publishing a new commissioned report 'Building Construction and Materials Post-Fossil Fuel' by David Olivier, Principal Energy Advisory Associates.
- Developing the AECB Low Energy Buildings Database with the support of Everything is User Experience (EIUX) and Jeff Colley, Editor and Publisher of Passive House Plus magazine. This has been supported by generous funding from the MCS Foundation, the Ecology Building Society and Tinytag Data Loggers.
- Continuing the development and roll-out of the unique lifetime carbon accounting tool, PHribbon.
- Running the new AECB CarbonLite[™] Retrofit Coordination Course (CLRrc) designed to upskill industry professionals with the understanding and capabilities to support projects under the PAS 2035 process.
- Updating the original CarbonLite[™] Retrofit Foundation course set up in 2016.
- Consolidating our collaboration with Built Environment-Smarter Transformation (BE-ST- formerly Construction Scotland Innovation Centre), launching the AECB CarbonLite[™] Retrofit Foundation (CLRf) course in Scotland and writing two bespoke short courses.
- Planning a hands-on themed AECB conference with educational partners the New Model Institute for Technology and Engineering (NMiTE) for the autumn, in the Centre for Advanced Timber Technology in Hereford.

Our members are at the heart of all that we do and we welcome your input especially from our local groups on the ground where change can really happen.





We are contributing something that has not been done before.



IN THIS ISSUE

SHAPING THE BIG PICTURE

We need competent government and climate policies that work. Climate policies need standards. This is where the AECB comes into its own says Andrew Simmonds, CEO.

THE SILENT TREATMENT

Kwasi Kwarteng is the latest in a long line of cabinet ministers overseeing energy policy to remain silent on subject says Andrew Warren, chairman of BEEF.

AECB NEWS

Our online webinar conference on 21st June featured six expert webinars with 10 speakers. Members can access these now.

AECB CARBONLITE™ TRAINING CENTRE Immediate retrofit uptake is urgent

AECB is collaborating with the Built Environment- Smarter Transformation BE-ST (formerly Construction Scotland Innovation Centre) with the launch of the AECB Foundation CarbonLite[™] Retrofit Foundation Course in Scotland plus two bespoke modules.



POLICY INFLUENCERS Can we make a virtue of a crisis?

Elizabeth Leighton, Director, Existing Homes Alliance Scotland calls for the Scottish Government to introduce standards to guarantee warm homes and clean heat.

MEET THE EXPERTS Tim Martel

Tim Martel, AECB software R&D lead has developed the AECB PHribbon add on making using PHPP easier plus the AECB Standalone Embodied Carbon Calculator.

INVESTMENT

Sustainable finance, retrofit and energy security

The finance sector has finally woken up to sustainability says Dr Steven Fawkes, founder and chair of the EP Group.

TECHNICAL SOLUTIONS Airtightness

Gervase Mangwana looks at changes to Building Regulations coming into effect this month but says we need to aim higher in reducing space heat demand.

UK BUSINESS

Andy Michell, new MD of the Green Building Store looks forward to seizing the opportunity to move from early adopter to early majority mainstream.



28 MATERIALS A road map to increased uptake of Mass Timber in the UK

Defining a common approach to risk mitigation in mass timber buildings with the insurance sector is vital says Joe Giddings, author of the report 'Mass Timber: Challenges & Potential Solutions' published by the ASBP this month.

30 LEADERS IN INNOVATION Transforming Scotland's tenements, one at a time

Louis Daillencourt, Business Development Director, Novoville is applying digital solutions to improving home repairs and maintenance in Scotland.

32 world changers

Jessica Grove-Smith, senior scientist and member of the Board of Directors, Passive House Institute (PHI), Germany on how the war in Ukraine brings global attention to the urgency of moving away from gas and fossil fuel dependencies.

35 CAMPAIGNS Insulate Britain

The Insulate Britain campaign brings together the worlds of retrofit industry technical experts and climate activists and is making inroads with the Insulate Britain Industry Group.

36 TECHNICAL SOLUTIONS Condensation risk analysis

Dara McGowan, a Director of Partel UK on his approach to condensation risk analysis using WUFI® Pro.

1 NETWORKING

LETI demonstrates the influence and power of networking

The Low Energy Transformation Initiative (LETI) is making a global impact. The Climate Emergency Design Guide had over 60,000 downloads in 100 countries. Dr Joe Jack Williams on useful lessons learned.

AECB CHAMPIONS STANDARDS Why performance standards are important

We need to control the design of retrofit solutions through professionals such as architects and engineers says Duncan Smith, COO AECB.

48 LAST WORDS #DemandReduction

To be effective, environment policy should deploy wellresearched and practicable performance standards says Andrew Simmonds, CEO AECB.





Airtightness is now considered a normal part of any design and build.





SHAPING THE BIG PICTURE

ANDREW SIMMONDS, CEO AECB

We need competent government and climate policies that work. Climate policies need standards. This is where the AECB comes into its own

We reject false narratives on the dangers of 'big government' - of course we need government – we can't rely on the 'magic of the market' alone to keep us safe in the face of the greatest challenge probably ever faced by modern humans, nor is there any room for corruption or a singular focus on staying in power at all cost.

We desperately need proactive, competent, public service-inspired, and agile government - financially, climate-and equity-literate government - that doesn't abuse the mechanism of divide and rule to cling to power, polarising and corroding cohesive society. However, even better-functioning governments are likely to find conventional policy approaches too slow and cumbersome for the terrifying biodiversity and climate emergency we are facing.

Politicians, policy makers, government departments, financial and professional institutions need to work much more closely together. Policies with weak to non-existent feedback and improvement mechanisms demonstrably aren't delivering the progress needed. New thinking, new ways to develop and deploy science-based policy and fast, open, and effective feedback to monitor and improve policy outcomes is needed. Seen from outside of government and institutions it doesn't seem such a great challenge - vet it is resisted. We look forward to cross party collaboration and the rapid emergence of a responsible and effective government in Westminster.

We all need to become 'systems thinkers', a way of making sense of the complexity of the world by looking at it in terms of wholes and relationships rather than by splitting it down into its parts to explore and develop effective action in complex contexts.

THE SILENT TREATMENT

Kwasi Kwarteng is the latest in a long line of cabinet ministers overseeing energy policy to remain silent on the subject says Andrew Warren, chairman of BEEF.

am the current chair of the British Energy Efficiency Federation. Founded 25 years ago by the then Secretary of State for the Environment, John Gummer (now Lord Deben, chair of the Committee on Climate Change), it brings together the leading trade and business associations involved with delivering energy efficiency, as an advisory body to government. We meet on a quarterly basis at the HQ of our sponsoring ministry, currently the Department for Business, Energy and Industrial Strategy.

The very first column I ever published concerning energy efficiency policy was written in the far-off days when Lord Lawson of Blaby was the energy secretary. It was called 'Silent Nigel.'

In it, I castigated him not for running the climate change denying pressure group the Global Warming Policy Foundation (that came much later!). My grouse with him then was simply that, as energy secretary, he had nothing whatsoever to say about the merits of saving energy. Or indeed the demerits.

When I was finally on a public platform with him, I challenged him for ignoring what we then called "The fifth fuel." He dismissed the whole concept of regarding energy efficiency as a positive concept. "I can't run my car on the fifth fuel, can I?' he scoffed. To which I recall retorting "Perhaps not, but surely you won't need to fill it up so often if you pay attention to the fifth fuel?"

Since Lawson, by my calculation there have been 21 different cabinet ministers overseeing energy policy. Twenty of these have approached energy efficiency policy in a rather more positive way. Some have even genuinely regarded it as the "First fuel" – their top priority. And that is certainly how the International Energy Agency now bills it, in the fight to combat the threat of climate change. It reckons that energy saving will need to deliver at least half of the carbon savings required to deliver net zero worldwide.

Taking a leaf out of the Lawson playbook

Silent Nigel's 21st successor seems be taking a leaf out of the Lawson playbook. Surprisingly. Given the net zero agenda. Given the enormous hikes in energy costs. Given the exponential growth of households in fuel poverty. Given the concerns about gas availability caused by Putin's war in Ukraine. Given all these factors, it might have been expected that the strategic case for energy efficiency would be made, publicly and regularly, by the cabinet minister officially in charge of this policy area.

There has been almost complete official silence from Kwasi Kwarteng, Secretary of

State at the Department of Business, Energy and Industrial Strategy about the potential role that reducing demand in a purposeful fashion can achieve regarding lessening all these pressures. Inevitably there are disparaging comparisons being made with the positive and innovative initiatives, emerged and emerging, from not just the European Commission, but practically every other western European government.



The International Energy Agency reckons that energy saving will need to deliver at least half of the carbon savings required to deliver net zero worldwide.

Kwarteng's sole publicity to date has come via a tweet, intended entirely to disparage the Labour Party's past record. When they left office in 2010, Kwarteng stated they had only ensured that 10% of homes had achieved an energy performance certificate rating of C or above. Not so. Had he bothered to check the English Housing Condition Survey covering 2010, para 2.14 would have told him the correct figure was not 10%. But 16.2%.

The energy policy strategy entirely ignores the demand side of the energy equation

Apart from that? Last month, the UK managed to have the first ever energy policy strategy published in the past 50 years which entirely ignores the demand side of the energy equation. So, Silent Kwasi? Certainly, true to date. But since that time, things have looked up elsewhere in government.

"The best way to cut fuel bills is to focus on energy efficiency." That is the firm view of an unexpected champion of the demand side, Treasury minister Helen Whately. The Conservative MP for Faversham issued the tweet when announcing that "today I brought energy leaders together". She concluded that "now is the time to go faster and further on home energy efficiency."

This is reckoned to be the first time that one of Boris Johnson's senior ministers has publicised such a positive statement in favour of energy saving, let alone convened a meeting deliberately intended to consider how much more could be done to stimulate investment. Organised by the Treasury, that event was undoubtedly precipitated by that universal chorus of criticism of the Government's new energy security strategy, mainly because it did completely ignore anything to do with improving energy efficiency.

Mrs Whately's tweet gave rise to many comments, 43 'likes' and 9 retweets. Inevitably some were of a more general political nature, plus a few designed to sell specific energy saving technologies. Amongst the more pertinent ones were several asking why, given her priorities, were protestors from the Insulate Britain campaign being prosecuted? Another wondering why "Arts and social science graduates were determining energy and environment stuff?" Finally, one commented on the accompanying Microsoft Teams photoshoot that those attending "Don't look very impressed." As I featured in that shot, I can gladly rebut that accusation. At the time I am confident my eyes were only shut simply because I was concentrating so hard upon the minister's golden words.

It is not known whether Helen Whately intends to convene any further 'summits' covering the energy efficiency agenda. Meanwhile her colleague is being heavily criticised for failing to confirm his timetable to upgrade minimum energy standards for rental properties.

The government has remained silent for 16 months since outlining plans to ban landlords from letting energy-inefficient properties below an EPC C rating. This inaction could mean property investors will be unable to complete works ahead of the anticipated 2025 deadline, owing to an insufficient number of trained installers being available.

Hopefully, well before my next column, I shall be able to report some positive action on that front – probably stirred on by Treasury ministers.

ABOUT BEEF

The AECB formally became a member of BEEF in May 2021. The British Energy Efficiency Federation (BEEF) has four formal plenaries annually hosted by a sponsoring department, currently the Department for Business, Energy & Industrial Strategy (BEIS). BEEF has published a 'Cunning Plan' to serve as a blueprint for successful delivery of UK major refurbishment programmes. BEEF calls on the Government to publish a UK buildings retrofit plan, with policies and programmes to at least 2030 with realistic timescales for implementation at the heart of policy design, placing energy efficiency as the priority of the UK's net zero target.

STANDARD AECB



AECB News

AECB ran a successful webinar conference on Tuesday June 21st with free access open to all on the theme 'Setting the Standard'.

CHOICE OF SIX EXPERT WEBINARS WITH 10 LEADING INDUSTRY SPEAKERS

Free for AECB members and non-members. If you are a member of the AECB you can access all these webinars plus over 40 others. Check out our membership page **here**.

The conference showcased six webinars and featured 10 guest speakers from across the industry. It covered the AECB Retrofit Standard and AECB Building Standard, this month's changes to the Building Regulations, a tutorial on the latest PHPP Version 10, the unique AECB PHribbon launched in the AECB shop and more. There were Q&A's at each session and we will be sharing these with members.

Please see below a summary of each session and details on registering for FREE!

Please note that these are separate sessions and you will need to register for each individually if you wish to attend more than one. Become a member of AECB to access this webinar programme plus 40 other expert webinars - <u>click here</u>.

SESSION 1: 0 9.15AM - 10.15AM

Retrofit projects and programmes need to start by adopting an appropriate – and adaptable – retrofit standard

A discussion around the AECB Retrofit and Building Standards with particular reference to adoption for social housing.

Speakers: Andy Simmonds AECB CEO, Duncan Smith AECB COO; Jeff Colley Editor/Publisher Passive House Plus Magazine and Sara Edmonds, architect and ACAN campaigner.

SESSION 3: () 12.30PM - 1.30PM

The new Building Regulations come into force this month with uplifts to Approved Document L but we still need additional Standards.

The role of the AECB and Passivhaus standards in the new Building Regulations.

Speakers: Dr Sarah Price, Technical Director QODA and Tim Wilcockson, Senior Building Physics Consultant, Qoda.

SESSION 5: () 3.00PM - 3.30PM

Condensation Risk Analysis – What WUFI® Pro software can do for you

Speakers: Hugh Whiriskey founder and Technical Director of Partel.

SESSION 2: 🕔 10.30AM - 12NOON

AECB launches the AECB PHribbon add on to PHPP followed by an introduction to PHPP Version 10

An introduction to and tutorial on AECB PHribbon software (an add on to PHPP). From 11.30am a tutorial on the latest PHPP version 10 introduced by Jürgen Schneiders of the Passivhaus Institut, Germany

Speakers: Tim Martel, AECB software R&D lead and developer with Jürgen Schnieders, Managing Director, Passivhaus Institut, Germany. SESSION 4: 🕔 2.00PM – 2.30PM

The new Building Regs and technical solutions to airtightness

Speakers: Gervase Mangwana, Director Waxwing Energy.

SESSION 6: 🕚 4.00PM - 4.30PM

Transforming Scotland's tenements, one at a time

Novoville is applying digital solutions to improve people's experience of home repairs, maintenance and improvements to deliver crucial energy renovations at scale. A discussion on the revolutionary end-to-end solution to shared repairs launched in Edinburgh that will help decarbonise housing in Scotland.

Speakers: Louis Daillencourt, Business Development Director at Novoville.

We hope you will enjoy this thought-provoking series of AECB webinars which will be recorded and added to our members only **Webinar Recordings page** after the event to join the existing library of over 40 previous webinars.





AECB CarbonLite Training Centre

Helping accelerate the UK's journey to zero carbon

AECB CarbonLite[™] Retrofit Foundation Course (CLRf)

This cutting-edge course is designed to provide practical solutions addressing the challenge that our homes currently use 35% of all energy in the UK and emit 20% of the carbon emissions. All year-round access. 130-hours learning time over 12-months.



Click the button below to become a member of AECB and take the course.

Benefits

- Established in 2016 and recognised by the Department for Business, Energy & Industrial Strategy (BEIS) in the Heat and buildings strategy (October 2021) for providing deep knowledge on low energy building retrofit and methodology.
- PHI awards 35 credit points towards PHI Certification Renewal on completion.
- Springboard to achieving the benchmark AECB Retrofit Standard certification for retrofit projects. Apply separately for project certification via the Low Energy Buildings Database (LEBD).
- AECB Membership required to take this course.
 Membership provides access to the AECB Knowledgebase, watch-again webinars, links to national and international reading material and networking opportunities.

Sign up for the AECB CarbonLite[™] Retrofit Foundation Course (CLRf)





AECB CARBONLITE™ TRAINING CENTRE

IMMEDIATE RETROFIT UPTAKE IS URGENT

AECB consolidated its collaboration with Built Environment-Smarter Transformation (BE-ST- formerly Construction Scotland Innovation Centre) with the launch of fully funded places on the AECB CarbonLite™ Retrofit Foundation (CLRf) course in Scotland in March 2022. AECB was invited by BE-ST to write two bespoke short courses that will feature in their Low Carbon Learning Programme from this month, explains AECB Training Manager, Trish Andrews.

There's no doubt that energy and carbon savings are the main drivers for good retrofit. The AECB CarbonLite[™] Retrofit Foundation (CLRf) course is the UK industry-leading course for advanced deep low carbon retrofit training aimed at construction professionals, contractors and those whose role involves decision making around improving the design of low energy retrofit projects and/ or energy efficiency of buildings. The focus is on practical solutions to addressing the challenge that our homes currently use 35% of all energy in the UK and emit 20% of the carbon emissions (<u>CLC, 2021</u>).

BE-ST and The Scottish Construction Leadership Forum recently hosted a 90-minute-long online webinar module introduction to taking a fabric first approach to retrofit co-authored by the AECB Training Team and Sara Edmonds, Director at Studio seARCH, Coordinator at Architects Climate Action Network, Podcast Host of Zero Ambitions.

This module is an introduction to the fabric first approach in construction. It seeks to set the context from the global to the local and to increase knowledge around the fundamental principles of good passive design. It is aimed at anyone in or interested in the built environment seeking to increase awareness and learning around a truly sustainable approach to construction that starts with a fully optimised building fabric.

Training Manager, Trish Andrews says: "As we know, the UK has the oldest and leak-

iest housing in Europe, with many new builds being insufficiently constructed. There are 28 million existing homes in the UK, 2.5 million in Scotland alone, needing retrofitting by 2050/2045, the respective national targets. to be a just one. The good news is that there is a wealth of knowledge and information in the construction industry and it is our responsibility to ensure that this knowledge reaches the widest range of people possible. That means



When energy bills hit £2000 a year there will be over 6.5 million UK households in fuel poverty. Analysts suggest the war in Ukraine could drive average bills up to £3,000 per year. This could leave 8.5 million UK households in fuel poverty denied a warm safe home. This is a disaster and inevitably, will lead to more needless winter deaths. Adam Scorer, Chief Executive of fuel poverty charity National Energy Action

There is a clear need to begin a rapid and broad reaching programme of low carbon domestic retrofit training across the UK to allow us to reach these net zero goals. As such, we at the AECB are delighted to be working alongside BE-ST through their Low Carbon Learning Programme to teach low carbon retrofit skills to make this a reality."

Sara Edmonds, Director at Studio seARCH, Coordinator at Architects Climate Action Network, Podcast Host of Zero Ambitions says: "Accelerating to zero carbon is an immense challenge and the transition needs collaboration, and it's why I am delighted to be working with BE-ST and the AECB to help amplify the work of many across the built environment."

Highlights of the AECB Introduction to Retrofit module

The first introductory module written for the Built Environment-Smarter Transformation (BE-ST), Low Carbon Learning Programme analyses the key rationales and drivers behind the need for retrofit now, discusses the impacts





© United Nations Environment Programme (2021). 2021 Global Status Report for Buildings and Construction: Towards a Zero-emission, Efficient and Resilient Buildings and Construction Sector. Nairobi

of climate change and the scale of the retrofit challenge. It explores the patterns of domestic energy use, the need to introduce effective energy efficiency measures to the building fabric to cost effectively reduce space heat demand and domestic CO_2 emissions.

It considers the wider issues of energy security, fuel poverty and the multiple benefits of retrofit. Lastly it offers best practice case studies and introduces the AECB Retrofit Standard as a crucial step to decarbonising the UK's energy systems and achieving our net-zero commitments. It analyses the key rationales and drivers for the need for retrofit now, discusses the impacts of climate change and the scale of the retrofit challenge. It explores the patterns of domestic energy use, the need to introduce effective energy efficiency measures to the building fabric to cost effectively reduce space heat demand and domestic CO2 emissions. It considers the wider issues of energy security, fuel poverty and the multiple benefits of retrofit. Lastly it offers best practice case studies and introduces the AECB Retrofit Standard as a crucial step to decarbonising the UK's energy systems and achieving our net-zero commitments.

Drivers behind the current urgency

Energy security is the ability of a system's energy supply to continue serving energy demand throughout disruptive events that impact fuel delivery systems or the availability of energy over extended periods of time. In order to maintain a secure supply of energy in the face of climate change we need to decarbonise rapidly to using a mix of clean low carbon energy fuels instead of fossil fuels. We also need to become nationally self-sufficient in those fuels. The recent conflicts and energy price hikes



https://www.ofgem.gov.uk/publications/price-cap-increase-ps693-april

highlight the vulnerability for relying on global importing of fuel supplies to the UK. Energy efficiency is an extremely powerful and cost-effective tool to reduce exposure to volatile fuel markets and build in resilience while also reducing carbon emissions.

Fuel poverty in a household is determined by three factors

- Household income;
- Household energy requirements. Energy efficiency is a key driver of fuel poverty, as high-

er energy efficiency reduces a household's fuel costs for a particular size of property;

 Fuel prices – the energy price cap (which rose by 54% in April 2022) keeps suppliers from setting their default tariff higher than a set amount, is largely determined by global wholesale energy prices.

The graph above shows the breakdown of costs in the energy price cap for April 2022 for a typical dual fuel customer paying by direct debit, with the typical energy use in pounds.

Any successful retrofit should ideally bring bills down and increase warmth and comfort

"

There are many solutions to tackling climate change and specifically within the built environment, energy efficiency and the retrofit of buildings are part of the solution to reducing our global emissions by half by 2030.

Climate Change 2022: Mitigation of Climate Change IPCC 2022

in the home and reduce overheating, thus helping to reduce health costs amongst people in fuel poverty due to warmer homes in winter and allowing for cooler homes in summer by reducing overheating.

The performance gap

Energy, comfort and moisture gaps result when there is a difference between anticipated and actual performance in a retrofit, this is known as the performance gap. In low energy retrofit. Some key factors that contribute to this gap include:

- Cold bridges at poorly designed junctions / areas left uninsulated or not fully insulated during a retrofit
- Thermal bypass (air movement over and through insulation)
- Draughts around poorly installed doors or windows

Some of the key features of Scottish Governments' <u>Heat in Buildings Strategy</u>, look at demand reduction options and demand and supply measures.

Assessing Building Physics

- History and condition of the building
- Any testing and investigation which may be needed
- Moisture risk and ventilation
 adequacy
- Thermal efficiency
- Occupancy pattern and use

Decide the approach to Retrofit

- The Performance targets
- Agreeing an improvement plan (step- by-step or whole house approach)
- Considerations relevant to retrofit at scale and /or significance
- A Fabric First approach
- Concentrating on the interfaces and junctions







Managing Risks is key to a good retrofit

The AECB Retrofit Standard also includes management of risks around moisture, flood, radon and fire, as well as requiring a deep retrofit survey that ensures that the building is fit for retrofit in the first place.

Dwelling specific benefits of retrofit

Below are the direct benefits to homeowners and tenants who live in retrofitted properties.

- High levels of comfort
- Healthy indoor environment
- Low energy bills
- A building that cools down slowly if the heating goes off (or the boiler breaks down)
- Low risk, low maintenance, healthy building
- A more attractive building in the longer term - as the energy and comfort benefits are built-in and provide benefits for the lifetime of the building
- For some dwellings, there will be aesthetic improvements after the retrofit
- Improve the asset value of the dwelling, especially as more people become aware of the importance of thermally comfortable homes.

Wider benefits of retrofit

The wider benefits include higher levels of energy security - resulting from lower energy demand and corresponding lower reliance on both imported energy or fuel import. There will improved public health and a lower carbon UK to help mitigate risks from climate change. Homes that have been adapted to be more resilient to climate change. Economic benefits include future jobs from widespread retrofit work.

Risks of not retrofitting now

Updated energy and emissions projections: 2019 Projections of greenhouse gas emissions and energy demand from 2019 to 2040. (BEIS, last updated 23 December 2020) analysis suggests that emissions from the residential sector are currently projected to increase between 2018 and 2040. Therefore, momentum needs to gather to drive the low carbon retrofit of our housing stock, and create a positive transition towards low energy demand, energy efficient and healthy homes.

Otherwise:

- Energy bills remain high.
- Risk of deterioration because of lack of adequate maintenance.
- Not finding the cause for different problems (especially moisture) so treating the symptoms rather than the cause.
- Redecorating without being aware of existing issues.
- Installing stand-alone measures which can affect the thermal and moisture balance of the dwelling and negatively impact the fabric long-term e.g. a poorly installed DPC, which can contribute to damp and salt issues becoming worse and making wall insulation harder to install.



Built Environment – Smarter Transformation (BE-ST), formerly Construction Scotland Innovation Centre, has announced a new strategic focus prioritising the built environment's transition to zero carbon and improving the sector's contribution to the fight against climate change.

The new brand and mission for the innovation centre underlines its core purpose: to accelerate the move to a more sustainable, energy-efficient and more circular built environment. The refreshed ambition also reflects its growing partner base beyond the construction sector, including organisations right across the wider built environment ecosystem, and its expanding geographical reach beyond Scotland.

READ MORE

The AECB CarbonLite™ Training Programme We currently offer three main e-learning training courses

- We currently offer three main e-learning training courses • AECB CarbonLite™ Retrofit Foundation Course
- (CLRf) available all year round. Please <u>click here</u>.
 NEW AECB CarbonLite[™] Retrofit Coordination Course (CLRrc) available all year round. Designed to upskill industry professionals with the
- to upskill industry professionals with the understanding and capabilities to support projects under the PAS 2035 process. Please <u>click here</u>.
 CPD Cert. Building Energy Modelling using PHPP
- in collaboration with TU Dublin starts in November 2022. Please **click here**.

To become a member of AECB to take the AECB CarbonLite[™] Retrofit Foundation Course (CLRf) or the AECB CarbonLite[™] Retrofit Coordination Course (CLRrc) please <u>click here</u>.

For further details of all courses and technical support contact the AECB Training Team **training@aecb.net**.

"

Domestic energy efficiency is one of the most underappreciated opportunities in the UK's efforts to tackle climate change.

Scaling up retrofit 2050 IET 2020



Can we make a virtue of a crisis?

Existing Homes Alliance (EHA) Scotland's latest report calls for the Scottish Government to introduce standards to guarantee warm homes and clean heat. Homeowners and the supply chain need to know what to do and when – a minimum standard of energy efficiency, sufficient to make the home 'ready for renewable heat' gives that certainty for planning and investment says EHA Director, Elizabeth Leighton.

Lizabeth Leighton is no stranger to a major international crisis that leaves global ramifications. In 1988 she was in the US State Department Foreign Service posted as a Vice Consul in Edinburgh, a job that she loved. Elizabeth was first in line to help manage the US local diplomatic response to the Lockerbie bombing. "This was the first time that the US diplomatic service had to deal with a terrorist incident like that and we worked round the clock with the police and people of Lockerbie to help the American families – it was hard but – at the same time rewarding because of the way everybody pulled together to help."

Ask Elizabeth for her response to the current energy crisis and she draws the big picture. "We're faced with huge increases in the price of energy – which is likely to stay high for some time to come. At the same time, we face a climate emergency, with the window closing on our chance to avoid catastrophic climate change."

"Can we make a virtue of the energy crisis by simply insulating our homes?" she asks. "If all our homes were of a good energy efficiency standard, we would save, on average, £500 every year on our energy bills (based on current prices). At the same time, our homes would be healthier, and we would cut our climate emissions. The energy that we don't use is the cheapest energy of all the 'negawatt'. The technology is there with tried and tested methods so what's holding us back?"

Cross sector engagement

Elizabeth Leighton has served as Director of the EHA since 2014. The Alliance is a coalition of housing, environmental, fuel poverty, consumer and industry organisations calling for action to make Scotland's homes fit for the 21st century.

EHA works with all sectors and government at all levels to shape policy so that it delivers the scale of retrofit needed to ensure Scotland meets climate change and fuel poverty targets.

"Scotland has some excellent energy efficiency programmes which need to be rapidly scaled up to meet the challenges of this decade. Standards, alongside expanded advice and support will literally insulate households from volatile prices of fossil fuels – everyone should be able to live in a warm, healthy home with clean heat," she says.

Standards for energy efficient homes with zero emissions heating

On 9th May EHA published the report: 'Owning the Future: A framework of regulations for decarbonising owner-occupied homes in Scotland' by Dr Catrin Maby and Louise Sunderland.

The report supports the Scottish Government's intention to introduce mandatory standards from 2025 to upgrade the energy efficiency of Scotland's homes and calls for a 'backstop' of 2030 so everyone can enjoy the benefits of warm and cosy homes by the end of this decade. The report also supports plans for a phase out of fossil fuel boilers from 2025 by enabling and encouraging homeowners to install zero emissions heating at the point of boiler replacement with a backstop of 2035 for off-gas grid homes and 2045 for on-gas grid homes.

The EHA view is that reducing energy use, strengthening energy security and increasing investment and jobs in clean energy sectors are clear economic wins. Energy price hikes are already crippling many households' finances, pushing over 200,000 more households in Scotland into fuel poverty and energy efficiency offers im-

mediate help.

Energy efficient homes are necessary to tackle the climate emergency. Heating buildings make up 13% of Scotland's climate emissions. The Scottish Government has set a target for half of Scotland's homes to be converted to zero emissions heating by 2030. This means Scotland needs to more than double the rate of home energy upgrades per year, and double year-on-year the number of zero emissions heat installations.

Elizabeth reinforces the EHA overview: "Homeowners and the supply chain want to know what to do and when – a minimum standard of energy efficiency, sufficient to make the home 'ready for renewable heat' gives that certainty for planning and investment."

The Alliance is calling for standards to be introduced as soon as possible, to give ample time for planning and investment before coming into effect from 2025. The introduction of standards should be supported with a major programme of advice and generous incentives. Fuel poor households should be fully funded to comply with standards.

Elizabeth quotes co-author Dr Catrin Maby: "The Scottish Government are pioneering in facing up to the challenge of how to achieve this in owner-occupied existing homes, taking this out of the 'too difficult' box and working through the detail of how to do it effectively and fairly."

Looking to provide end-to-end support

The Alliance is well-respected for its experience and practical recommendations on existing homes. "In our 2018 report 'Pathway to Net Zero Homes by 2045' we set out the policies and programmes required to meet our climate targets. We were pleased to see some of our proposals, including on standards, reflected in the Scottish Government's 'Heat in Buildings Strategy - achieving net zero emissions in Scotland's buildings' published in 2021," says Elizabeth.

"Next up we will be publishing the findings of research on exemplar customer journeys for home energy upgrades" says Elizabeth. "Providing 'end-to-end' support from the point of expressing interest, through to satisfaction with how the new heating and efficiency systems work. This is how we give immediate help to all households who are facing the most dramatic energy crisis any of us have experienced.

Elizabeth Leighton - a career building consensus www.linkedin.com/in/elizabethleightonscotland

- Director of the Existing Homes Alliance (EHA).
 Provides the secretariat to the Climate Emergency Response Group, a group of business and civic leaders who have come together to use their insights and influence to urge the Scottish Government to put in place an appropriate response to the climate emergency. Director of Heartland Community Wind, community benefit society which owns/operates two
- medium-sized turbines near Aberfeldy. Chaired the Climate Challenge Fund Grants Panel providing independent recommendations to ministers on community projects acting on climate change.
- Policy advisor to the Scottish Fuel Poverty Strategic Working Group (2016 - 2017), tasked with setting out a vision for the eradication of fuel poverty in Scotland.
 Served with the US Foreign Service, with postings in
- Moscow, Sofia, Edinburgh and Alaska. Elizabeth lives in Highland Perthshire with her family.

READ MORE

To find out more about the Existing Homes Alliance (EHA) Scotland please **<u>click here</u>**.

Energy efficient homes are necessary to tackle the climate emergency. Heating buildings make up 13% of Scotland's climate emissions. The Scottish Government has set a target for half of Scotland's homes to be converted to zero emissions heating by 2030. This means Scotland needs to more than double the rate of home energy upgrades per year, and double year on year the numbers of zero emissions heat installations.





Visit the AECB one-stop-shop to accelerate the UK's journey to net zero carbon

Visit the AECB one-stop-shop to accelerate the UK's journey to Net Zero carbon

The shop includes the AECB CarbonLite[™] Training Centre's flexible e-learning retrofit courses, membership packages, sophisticated modelling software for real world accuracy and AECB commissioned reports. AECB members and Passivhaus Trust members can enjoy discounts.

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- AECB CarbonLite[™] Retrofit Foundation Course (CLRf) Standard cost: £410 + VAT for AECB members Extend access for a further year for an annual fee of £55 + VAT Please <u>click here</u>.
- AECB CarbonLite[™] Retrofit Coordination Course (CLRrc) Standard cost: £449 + VAT. Individual purchase.
 Employer purchase. AECB CarbonLite[™] Graduate course cost £250 + VAT. Individual purchase. Employer purchase. Please <u>click here</u>.

Sophisticated modelling software for real world accuracy

- AECB is the sole UK reseller for the Passive House Planning Package (PHPP) including the latest PHPP Version 10 that contains innovative new features for balancing the energy of highly efficient buildings. PHPP10 £170.00 + VAT - SKU 21030. Discounts available for members of AECB and UK Passivhaus Trust. To order PHPP10 please <u>click here</u>.
- The unique bespoke AECB PHribbon makes calculation of the embodied carbon of buildings speedy, transparent and inexpensive. £200 + VAT for AECB members, £250 +VAT for non-members. Price includes first year's annual renewal license fee £50 +VAT for members, £70 + VAT for non-members. For the complete package please <u>click here</u>.
 - Purchase the AECB PHribbon Costing Module separately for £50 + VAT. Members get £10 off the full price. Please <u>click here</u>.
 - Purchase the AECB PHribbon Daylight Factor Module separately for £85 + VAT. Members get £10 off the full price. Please <u>click here</u>.
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- DesignPH 2.1 the new interactive and graphically oriented input interface for PHPP £350.00 + VAT. Discounts: AECB member discount of £20 off full price of £350. Log in to receive your discount. To order please <u>click here</u>.

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SHOP

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Tim Martel, Certified Passivhaus Designer, Chartered Architectural Technologist, course tutor for the AECB CarbonLite™ Retrofit course, AECB software R&D lead, developer.



MEET THE EXPERTS

AECB launches the PHribbon exclusively in the AECB shop

After launching the US version of PHribbon in the North American market earlier this year, Tim has refined the UK PHribbon as a unique add on that makes using PHPP quicker and easier while using existing information beyond energy. He also developed and launched the AECB Standalone Embodied Carbon Calculator (AECB CO₂ Calc) last year using the same system.

Why PHribbon provides a unique solution

We are contributing something that has not been done before. There are embodied carbon calculations elsewhere. There are tools elsewhere. We've never had it integrated into the PHPP software before and that's what's new.

Opening up the US market for PHribbon has accelerated the UK development

At the start of the year AECB collaborated with Building Transparency and The Passive House Network (PHN) for the launch of the US specific version of PHN PHribbon, a toolbar add-on for Excel. The US version is integrated with the Embodied Carbon in Construction Calculator (EC3), PHribbon gives users unparalleled power to forecast the impact of carbon emissions of their designs.

PHribbon works with PHPP to allow users to take ownership

It's good to start using it at an early design stage when you are considering what materials you might use. As you build your Passive House Planning Package (PHPP) energy model it calculates the embodied CO₂ and can offer alternatives. Additionally, as it is working in PHPP, the energy calculation is already in there, and that is used by PHribbon to work out the operational CO₂. You can be working in one package while you revise your ideas. If you have finished your calculations and want to go back to adjust material areas or thicknesses in PHPP, those changes automatically feed through to the PHribbon side because the links are formulas. To get feedback at that early stage is useful and it is where you have most flexibility about making decisions.

PHribbon shows the data so it can be modified by the user

Generally, an add-in to Excel has no data, it's just software code behind a button. You can't see any spreadsheet. The difference with PHribbon is that I wanted to show the actual data. Not only for transparency, but to allow it to be modified and updated by the user. That is why PHribbon is created the way it is.

The next hurdle was that the US/Canadian data was only available via an API computer-to-computer interface. It turns out API can be handled within the software language that I'm using but requires a separate process. We had 40,000 records on the first version a year ago. We've now got 80,000. There's a manual part of that that has to take account of the oddities in the data, and I've worked through this to create their versions of PHribbon.

PHribbon is a valuable tool for communicating with clients early in the design process

You need to be able to give clients feedback straightaway as soon as the energy model is being built. It's also useful that the software shows embodied and operational combined, as it is easy to get carried away focusing on embodied CO_2 calculations when very often it is operational CO_2 that dominates.

Who benefits from the use of PHribbon?

There are multiple benefits. Part of PHribbon enables you to build the PHPP faster, the designer/consultant doing the PHPP would primarily benefit from that. CO_2 calculations benefit both the designer/consultant and client by making it an easier, quicker process within the PHPP. That may mean it's more likely to be done, and more affordable. Some materials could be immediately dismissed. The latest version of PHribbon gives the carbon impact of materials before you have picked them. Then, as the project matures, costs become important, and the impact of substitution of materials can be seen very quickly.

AECB Standalone Embodied Carbon Calculator (AECB CO₂ Calc)

Tim has also developed and written the AECB Standalone Embodied Carbon Calculator (AECB CO_2 Calc) using the same cutting-edge modelling as PHribbon. The AECB CO_2 Calc calculates Whole Life Carbon, that is Embodied CO_2 from Cradle to Grave.

The AECB CO_2 Calc has become an important feature in the suite of PHribbon. There's nothing else that is doing this to RICS level in PHPP. It follows the RICS guidelines closely. The AECB CO_2 Calc calculated embodied CO_2 . It does not calculate operational CO_2 .

Tim Martel says: "The AECB Embodied Carbon Calculator is rigorous and detailed software following the RICS methodology* which involves some quite complex end of life calculations. It has a built-in library of materials and you can add your own. It also includes many services including heat pumps and the refrigerant gases used, according to the guidance in CIB- SE's TM65, and we will be adding more."

"It has the latest RIBA 2030 Challenge v2 update, provides LETI Embodied CO_2 results and is aligned to latest PHribbon, version 4.18 for Embodied CO_2 . If you'd like to have Operational CO_2 results as well, you could use PHribbon instead which works with the energy software PHPP to produce Whole Life Carbon graphs."

To use the AECB CO_2 Calc you need: A Windows (PC) computer. If you have a Mac you will need to run a PC emulator (it works with Parallels, VMware fusion 11 with the PC version of Excel installed). Microsoft Office 2019 or later.

* RICS professional standards and guidance, UK Whole life carbon assessment for the built environment (1st edition November 2017) Effective from 1st May 2018. <u>Click here</u>.





Jessica Grove-Smith, senior scientist and member of the Board of Directors, Passive House Institute (PHI), Darmstadt, Germany says there is a fundamental alignment between AECB and PHI

PHPP developed with a strong scientific basis

PHPP was developed very early on in the Passive House development. It was created to provide architects, engineers and energy consultants with an easy-to-use, robust and reliable design tool, to get a clear idea of energy demand and efficiency of a planned project throughout the optimisation process and various design stages.

The tool was carefully developed with a strong scientific basis and compared and validated with monitoring data from numerous built projects. Performance monitoring is the best available proof of concept. It's very impressive to see how PHPP energy modelling aligns with the data of real-life projects. It shows how PHPP fulfils its purpose of reliably calculating the energy demand of a building design and preventing a performance gap.

PHPP is Excel-based, making it fully transparent. This also means that users can easily create add-on calculations, as needed. PHPP is not about ticking boxes to meet specific component qualities or sustainability requirements. It is a design tool focused on reliably calculating the energy demand of the building in question. This sets it apart from other tools and assessment methods, making it globally applicable, simply by choosing the regional climate data as boundary condition

PHPP Version V10 in English will have a range of new and improved features

PHI is about to release PHPP Version 10 in English with a range of new and improved features. For example, a new "summer comfort stress-test", addresses an increasingly important aspect of building design in the light of warming summer conditions. The other tool we're working on and about to release is an update to designPH, the very popular 3D sketch-up add on to PHPP.

AECB PHribbon - Easy to use software to help with PHPP calculations

Users of the PHPP energy software will know it is a leader in accurate calculations for Passivhauses and low energy buildings including retrofits. AECB PHribbon makes using PHPP quicker, easier and it uses the existing information beyond just energy. It's written by Tim Martel, an AECB expert who is also a course tutor for Carbon-Lite[™] Retrofit Foundation (CLRf) course.

AECB PHribbon makes the same changes to your PHPP that you could have made by hand. It works from an extra ribbon tab in Excel, just like 'Insert' or 'Page Layout' and uses macros (macros are already part of some PHPP v9 products). It includes a manual, support and training through videos.

Our main area of direct cooperation, which has been ongoing for many years, concerns AECB reselling the Passive House Planning Package, PHPP.



EMBODIED CO₂

Is increasingly important, PHribbon makes this quick to calculate using the material quantities in PHPP.



DATA ENTRY Helps with the trickier parts of data entry for any PHPP, e.g., windows and lambda values.



DAYLIGHT FACTOR

Since windows are modelled in PHPP, over half the information is already there for daylight factor, which ensures windows are large enough without over-provision.



For retrofits, early indication of the cost of the design is critical in ensuring the project is affordable, this can be done in the retrofit costing module.

COSTS

STANDARD AECB 19



CPD Cert

Building Energy Modelling using PHPP in collaboration with TU Dublin

Single self-contained 6-week part time accumulated 100 hours e-learning module. Starts November 2022. AECB collaborates with Ireland's leading Technological University, TU Dublin delivering this professional level academic CPD Cert. Building Energy Modelling using PHPP established in 2021. The module is part of TU Dublin's MSc in Building Performance (Energy Efficiency in Design) programme.

Standard cost **£870 + VAT** SKU 41007

Benefits

- Enables building design professionals to develop and apply international PHPP modelling and design software to determine the performance of existing and new buildings, residential and non-residential, in temperate climatic zones.
- PHI awards 50 credits points towards PHI Certification renewal.
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AECB

Register for the CPD Cert. Building Energy Modelling using PHPP in collaboration with TU Dublin starting in November 2022



SUSTAINABLE FINANCE, RETROFIT & ENERGY SECURITY

It's happening. The finance sector has finally woken up to sustainability, and there are signs that this may actually unlock the en masse uptake of sustainable building across new and existing buildings. Dr Steven Fawkes, founder and chair of the EP Group, sheds light on an extraordinary and promising situation.

Given the terrible situation in Ukraine, there is a blindingly obvious need to reduce Europe's dependence on oil and gas in order to attempt to curtail Russia's aggression. This situation, added to the overarching need to tackle the climate crisis means there should be no doubt that energy efficiency should be front and centre. In the words of the EU policy our response should be 'Energy Efficiency First' but that is far from the reality.

The UK response, and even responses in those European countries most dependent on imported gas and most at risk from future Russian aggression, is still energy efficiency last – with the emphasis being on supply side options including more nuclear power, more renewables and more oil and gas production, including fracking. This is very much an oldschool, supply-led energy policy response that ignores the resource that has provided more energy services over the last thirty years than anything else – improved efficiency.

The potential for improving energy efficiency has been studied ad nauseum. Many case studies covering all sectors and geographies show that even the cost-effective potential is significant, perhaps 30%. The technical potential is far greater. Members of AECB will be aware of, and have demonstrated many times, the radical reductions in energy usage that can be achieved by applying Passivhaus principles to both new build and retrofit. Retrofit is where the real opportunity lies – as well as the very real problems of how we make retrofit happen at scale.

Recognition of physical and financial risks that climate change introduces

The emerging force in driving retrofit at scale is the finance industry itself. The last few years have seen a massive trend in the finance sector towards sustainability, ESG (Environmental, Social & Governance), and impact investing. This trend has been accelerated by a raft of regulation in the UK, the EU and globally, all aimed at increasing the flow of capital into more sustainable assets of all types. This has been driven by recognition of the very real physical and financial risks that climate change introduces and an accelerating trend that capital should be a force for positive impact, that non-financial aspects are as important as financial ones when considering an investment.

PwC described ESG as the 'growth opportunity of the century' and 'nothing less than an all-encompassing shift in the investment landscape, placing financial and non-financial performance criteria on a level playing field'.

Yes of course there are questions about what is truly sustainable, and yes of course there is ESG-washing, just like green-washing, and of course there are leaders and laggards, but the movement is clear and money flows are changing direction on the back of it. PwC expect ESG funds to account for more than 50% of all Assets under Management in Europe by 2025, reflecting a staggering 28.8% Compound Annual Growth Rate from 2019. means there is an opportunity that needs to be responded to.

The opportunity is to recognise the alignment of interests that now exist between designers and suppliers, building users and the financial sector. We need to combine physical and organisational design with financial design - and ask ourselves how do we design retrofits at scale that work for the occupants, delivering greater comfort and greatly reduced energy bills, as well as creating sustainable finance products for the financial institutions that fund them? This alignment of interests created by the rise of sustainable finance, is likely to have a far bigger effect on real energy security, the cost of energy services, comfort and health, than any measure in the government's energy security policy designed to increase energy supply.



From the board to the lending desks, performance and bonuses are being measured on sustainability criteria. What does this mean for sustainable building practitioners? It means there is an opportunity that needs to be responded to.

Combining physical and organisational design with financial design

What new systems and regulations like the EU Taxonomy and the Taskforce on Climate related Financial Disclosures mean in practice is that all financial institutions, from your pension fund to your High Street bank (perhaps no longer an appropriate term given the rate of branch closures) and your building society, are all trying to work out how 'sustainable' or 'green' their investments and loan portfolios are and how to fulfil their legal obligations to report this. Furthermore, they are all scrabbling to find sustainable assets. From the board to the lending desks performance and bonuses are being measured on sustainability criteria. What does this mean for sustainable building practitioners? It

Dr Steven Fawkes has over 30 years' experience in energy efficiency. He founded EP Group in 2012 to accelerate investment into energy productivity. The company advises corporates, investors, governments and multi-lateral institutions on energy services, investing in energy efficiency and net zero. He has written for over 350 publications including three books. In 2013 he launched his 'Only Eleven Percent' blog and has written 200,000 words across 200 blogs focused on energy efficiency and the problems of financing efficiency.

RFAD MO

<u>Click here</u> to read his 'Only Eleven Percent' blog. To find out more about the EP Group <u>click here</u>. AIRTIGHTNESS

IS THE REVOLUTION HERE? NEW BUILDING REGULATIONS COME INTO EFFECT THIS MONTH

19 17

Photo: Renfrewshire Council is embarking on a major new social housing retrofit programme that will see up to 3,500 local authority dwellings renovated to either <u>Enerphit</u> or the AECB Retrofit Standard over the next four years. The council is leading by example and trialling a well-structured, standardsbased approach to retrofit that could be replicated at scale across the UK. The challenge for the UK is how to scale up retrofit solutions that are ambitious and effective yet flexible enough to be appropriate for individual homeowners as well as the social housing sector.



Gervase Mangwana, Director of Waxwing Energy looks at changes to Building Regulations coming into effect this month but says we need to aim higher in reducing space heat demand. Testing all buildings is a fantastic first step. However, we need to aim higher in our goal to reduce space heat demand and he argues that more attention should be paid to the backstop for permeability for compliance only dropping from 10 m³/m².h to 8 m³/m².h and the "notional house" level remaining at 5m³/m².h.

On June 15th when the new Part L comes into effect, the industry will go through a revolution. There are two big headlines. Firstly, every new building (and extensions) will be required to have a pressure test although there are some exceptions. Secondly, the new development of pulse testing has become an acceptable accredited compliance route.

There's another change that isn't grabbing headlines. The backstop for permeability for compliance is dropping from 10 m³/ m².h to 8 m³/m².h. In practice it will be hard if not impossible for SAP compliance at that level. Instead, the 'notional house' value of 5 m³/m².h is likely the best practice as it has been considered for many years. This seems unambitious.

As a regular tester of existing housing stock, I'm familiar with the range of draughty buildings. In the last 12 months I've been pre-testing archetypes in Social Housing Decarbonisation Fund (closed) projects around the UK. Of 22 properties tested, 60% had permeability of under 8 m³/ m².h. Four were 5 m³/m².h or less. Built in the 1920s they are generally poorly maintained. 5 were over 10 m³/m².h. Mostly these had obvious defects you would not see in a new build and in some cases, it was not possible to seal all intentional penetrations.

The industry and the public need a better understanding

Leading up to the Domestic Renewable Heat Incentive (RHI) closing at the end of March, I had a flurry of enquiries to do tests for people not realising they would need one for MCS certified installer for their Air Source Heat Pump install.

Two of these were modern standard builds. One had an MVHR and the self-builder had made some efforts towards air tightness. The other was a timber frame where the builder had not (and it had not been





specified). Both achieved about 3 m^3/m^2 .h. Both buildings were close to completion with no opportunity for remediation to the airtightness layer.

In another test in a property with high levels of insulation and premium triple glazed windows, the air test achieved was a 9 m³/m².h! None of the windows had been sealed in. This shows where the new 'test all' regulation will pay dividends. I still argue that 5 m³/m².h is too high.

Infiltration is the biggest single loss

A SAP model of a 'notional house' with all the associated U-values and permeability of 5 m³/m².h (Fig 1) shows that infiltration is the biggest single loss (graphic courtesy of People Powered Retrofit HRP tool). Combined with the ventilation losses (a decen-

In practice it will be hard if not impossible for SAP compliance at that level. Instead, the 'notional house' value of $5 \text{ m}^3/\text{m}^2$.h is likely the best practice as it has been considered for many years. This seems unambitious.

tralised MEV system) it accounts for 40% of all losses. This seems disproportionate. The effort and cost of insulation is bypassed by leaky fabric invoking the classic 'leaving your fleece jacket unzipped' analogy. That is before you consider potential moisture concerns.

Airtightness of 3 m³/m².h can be achieved without great effort. I regularly test Passive houses where simple detailing sees results <0.2 m³/m².h. With a little attention we could aim at 2 m³/m².h or lower. This is not hard in a new build.

Two further graphics show the effect of (Fig 2) improving air tightness to 2 m^3/m^2 .h and (Fig 3) 1 m^3/m^2 .h in conjunction with a good quality MVHR. In the latter case infiltration and ventilation losses combined now make up only 11% of total losses which have dropped by nearly 30%. These numbers will all come out slightly different in PHPP but since SAP is still the compliance route for building regs it seems appropriate to show them here.

Back to retrofit

After doing interim tests on the social housing highlighted earlier, it is clear that despite significant measures (EWI and windows plus loft insulation) there is little if any im-





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We are still building with easily avoidable but very hard to remedy energy sapping defects. At a time when energy is becoming ever more on everyone's radar not just for carbon but now arguably for many more for cost.

provement in the permeability. Some were considerably worse. This was in part due to poor implementation of details around window installs. Achieving good levels of air tightness in mass retrofit will be very challenging without decanting and in social housing that is probably a challenge too far although ideas of temporary mobile storage units have been mooted.

Issues with cavity walls or walls with voids, inter floor voids, suspended timber ground floors and the difficulty of introducing a membrane above ceiling level make it unlikely that the big wins will be achieved.

Introduction of pulse testing

My concerns with pulse testing are twofold. Firstly, it does not provide a diagnostic tool. I believe that interim testing is a vital part of the process. I appreciate it increases the cost. If we are testing every building - and we absolutely should - we may be in for a bit of a shock.

In the case of the mass testing of random properties, by the time it comes to compliance testing it's too late to do anything. My overriding feeling leaving those RHI tests was of missed opportunities. We are still building with easily avoidable but very hard to remedy energy sapping defects. At a time when energy is becoming ever more on everyone's radar not just for carbon but now arguably more for cost.

The second issue I have is one of comparison. I understand that there are 'work in progress' factors applied to Q4 pulse test results to get them to equivalent Q50. I've read differing opinions and research results on the equivalence. Those social housing properties blower door tested before retrofit will likely get pulse tested at completion. How will we be truly sure of what improvement was made?

It is a good thing if easier mass scale testing can be done but it is important that we can be confident of the results. I am quietly excited about the revolution ahead. Testing all buildings seems a fantastic first step. But I think we need to be aiming higher in our goal to reduce space heat demand. Especially as we look to decarbonise heating. Perhaps Parts L1b and 2b will be able to address the tricky problem of airtightness targets in the existing housing stock.

Gervase Mangwana - based in Herefordshire, Gervase has a Master's degree in Renewable Energy and the Built Environment. He has done AECB CarbonLite™ Retrofit training, CEPH (Passivhaus) and is a trained Thermographer. He has specialised in existing housing retrofit and very air-tight new builds including for Passivhaus certification for over 10 years. He is a fully accredited IATS Blower door tester and has done assessments and proposed whole house plan measures for the deep retrofit of around 100 homes. He is an assessor and modeller for Carbon Co-op on the People Powered Retrofit scheme. He works independently using both People Powered Retrofit's HRP SAP model and PHPP.

READ MORE For further information go to **info@waxwingenergy.co.uk**

What the UK can learn from Ireland

Dara McGowan, a Director of Partel reflects on lessons to be learned from the Nearly Zero Energy Building Standard (NZEB) regulations (updated version of part L) introduced in 2019 by the Sustainable Energy Authority in Ireland.

With the updated version of Part L for new dwellings coming into effect in England in June 2022, airtightness requirements have changed. While the limiting backstop for air permeability will be $8 \text{ m}^3/\text{h.m}^2$ @ 50pa, the reference value is $5 \text{ m}^3/\text{h.m}^2$.

In Ireland, the NZEB regulations (updated version of part L) were introduced in 2019, which require an air permeability of 5 $m^3/h.m^2$ or below. Since then, the average air permeability figure for new dwellings has fallen to below 3 $m^3/h.m^2$ (evident from the blower door results).

As a result, airtightness is now considered a normal part of any design and build. Thousands of contractors have been upskilled in this area in Ireland, many of whom availed of government funded training which was supported by Partel. This also impacts the ventilation industry, as new Part F requirements state that any dwelling with an air permeability below 3 $m^3/h.m^2$ must install a continuous mechanical ventilation system of some sort (same requirement now exists in UK regulations).

In summary, I think England can learn a lot from Irelands response to Part L and Part F regulation updates. The English and Irish regs have lots of similarities. Ireland has been implementing the new regulations for approximately 2.5 years, and so can give some indication as to the industry response to such regulation change.



Airtightness is now considered a normal part of any design and build.



AECB short courses at Built Environment-Smarter Transformation (BE-ST)

AECB has written two short courses for Built Environment-Smarter Transformation (BE-ST- formerly Construction Scotland Innovation Centre) that feature in their Low Carbon Learning Programme. This training is funded and completely free to those living and working in Scotland

The Fabric First Approach AECB Module

This module is an introduction to the fabric first approach in construction. It seeks to set the context and increase knowledge around the fundamental principles of well-considered building and retrofit design. It is aimed at anyone in, or interested in, the built environment seeking to increase awareness and understanding about a truly sustainable approach to construction that starts with a fully optimised building fabric.

For the opportunity to be awarded a place on the Fabric First Approach AECB module register your interest

CLICK HERE

Benefits

- Develop a general overview of the context and key processes and practices involved in delivering a fabric first approach.
- Expand knowledge about the opportunities, benefits and drivers as well as considering the barriers, challenges and risks in prioritising a fabric first approach.
- Discover how the key processes and practices can provide appropriate solutions in addressing the needs for a zero carbon approach to building.
- Develop an improved understanding of the need to transition to a fabric first approach in construction projects.

For further details of all courses and technical support contact the AECB Training Team

CONTACT



UK BUSINESS

green

ANDY MITCHELL, MD GREEN BUILDING STORE

Andy Mitchell is looking forward to seizing the opportunity to move from early adopter to early majority mainstream.

Q You studied 3D Design at Sheffield Hallam University. Do you still think in 3D?

A Yes. I am passionate about design. What I mean by design is taking the resources that are available to you and applying them in the round. At university the debate was: Does form follow function or function follow form? I believe the answer is neither because you are missing one. There are three: Form as in what it looks like – the aesthetic - a pleasing visual object; Function in what an object does and there's Resource that went into producing it.

Q As the new MD of GBS, what do you see are the opportunities for business?

A The market is at a tipping point. Over the last 10 to 20 years there have been champions and early adopters with various companies, enterprises and policies addressing energy use.

At a certain point you move over from early adopters to early majority which is where there's a large uptake. The drivers right now in the UK are the cost of living and people becoming more aware of climate change. There's a desire to do something about it. The opportunity is to bring what has been an early adopter area into the mainstream.

The important thing is recognising that the way people engage is different. Early adopters are more information hungry and prepared to take risks. They take more risks because they are more informed. Whereas early majority are less interested in information and as a result are less likely to take risks. They want somebody else to have proved it's safe. They swim slightly inshore in case there are sharks.

Q So, customers need to trust a brand in a complex area such as retrofit?

A Absolutely. Delivering a low energy built environment is complex. You need a solu-

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GBS is about joining up the dots so that you don't have to worry about the interface. We can provide simple roadmaps and directing tools so that people understand they don't have to worry about X, Y and Z, we've worried about that for them.



tion rather than a single product. This requires services as well as supply chains. For example, GBS's MVHR. It's not a case of if you want MVHR here's some kit and find an installer to put it in, it's more complex. Firstly, we provide a charged for design service to make sure that you get a solution that's fit for purpose for your property. Secondly, once installed, we offer a commission service to make sure that it is calibrated properly so that the flow rates are right, the filters are OK and there is no sound attenuation coming through.

We're about to launch a new MVHR servicing package. We're not aware that any currently exist and that's what people need particularly the early majority because they are relying on confidence in a brand and less so in their knowledge of all those details that is necessary.

Q Who are your key customers?

A GBS was built on a b2c (business to consumer) model. We will develop our interconnected network of architects who de-

liver self-build projects. Self-builds make up 10% of the new build market. The average value of self-build is twice the value of an average new home built by mainstream developers. There's a lot more value in the house and it makes sense to follow that market.

GBS is about joining up the dots so that you don't have to worry about the interface. We can provide simple roadmaps and directing tools so that people understand they don't have to worry about XY and Z, we've worried about that for them. All they need is to appoint a Building Control Officer and we supply the information.

Q What new markets are you investigating?

A We are investigating b2b (business to business) markets looking at areas where we believe people are ready for our kinds of solutions. We think that social housing is key. The way we will operate with that is to work with the end users' local authorities or City Councils and build a supply chain.

Q Are you investigating new product areas?

A Very much so. One of the big gaps in GBS is the rest of the envelope. We provide windows, doors and airtightness products and thermal bridging products such as the Compacfoam 200. We don't go in for a wholescale solution with regards to insulation on a big scale. We're in early discussions to look at rolling out a solution for retrofit with a partner.

Q Collaborating with strategic partnerships is key to your business approach?

A We look at our supply chain, as partners we collaborate with, not as people we buy stuff from. Take MVHR, we work with companies who know we provide a full service of design through to commission. MVHR is a relatively new solution in the UK. You can guarantee anything new that doesn't go well gets bad press and people write the whole thing off. Partnering with GBS is a good move for them and in return we have continuity of supply, quality product and reliability of product.

Q Retrofit Standard and PHT standards? Do you refer to the AECB Retrofit Standard?

A Customers either mention Passivhaus or AECB Standards or we use these standards to illustrate the standards they can target for themselves. People need to be in a position where they can make an informed decision. By saying here's a bar, this is what the bar means, this is how we define it, it helps people make informed decisions.

Q What do you want GBS want to be known for?

A We don't want to lose our pioneer value. We can aim towards becoming a market leader by volume not just by reputation in terms of setting standards and pioneering



By 2026/2027 we want to be seen as a major contributor to delivering healthy, ultra-low energy efficient building structure within the social housing sector.

as market leaders in sectors and markets within the construction industry based around delivering our brand strapline: Making buildings better.

Q How does the energy crisis impact on GBS?

A I'm hoping it will significantly raise awareness of the need to deliver an alternative solution. I am hoping that people will recognise this is the starting point for the most cost-effective solutions not a piece of bolt on kit. It is dealing with your building fabric. Heat pumps and PV have their place for sure - and I would not ignore those - but bang for buck and arguably sustainability measured in terms of embodied energy is in your building envelope that is going to really deliver.

Q Where do you see GBS by 2030?

A We want to be somewhere by 2026/27! I would say that by 2026/2027 we want to be seen as a major contributor to delivering healthy, ultra-low energy efficient building structure within the social housing sector.

<u>Green Building Store (GBS)</u> offers products and support for energy efficient homes and buildings. Founded in 1995, GBS has been at the at the forefront of sustainable, low energy building, offering product innovations and services to helping to support the uptake of Passivhaus in the UK.

Products include triple glazed timber and alu-clad windows and doors, advanced MVHR heat recovery ventilation, specialist airtightness and insulation products. GBS offers consultancy and building services.

A strong proponent of Passivhaus design, GBS offers a comprehensive range of Passivhaus products and services for the UK, and its in-house building team have constructed numerous Passivhaus buildings including the pioneering Denby Dale Passivhaus, Golcar Passivhaus and Stirley Farm EnerPHit projects. It has offices in Huddersfield and Gillingham. GBS is an <u>Efficient Building Solutions</u> (EBS) business. EBS acquired GBS in 2020.

READ MORE For further information go to <u>www.greenbuildingstore.co.uk</u>



MASS TIMBER

A **ROAD MAP** TO INCREASED UPTAKE OF MASS TIMBER IN THE UK

Defining a common approach to risk mitigation in mass timber buildings with the insurance sector is vital says Joe Giddings, author of the report '**Mass Timber: Challenges & Potential Solutions**' published by the ASBP this month.



It's beginning to feel like there is a way forward for the timber transformation of the UK built environment after five years of understandable challenges for bio-based materials following the awful tragedy at Grenfell Tower in 2017. The shockwaves this sent through the industry were significant. Mass Timber is central to this transformation and has faced particularly acute challenges. Now there appears to be a consensus emerging about what needs to happen to unlock its much wider use.

The group of engineered solid wood products known in the UK as 'Mass Timber' is comprised of multiple timber layers glued or fixed together to form solid structural elements. They have been shown to demonstrate enormous potential for carbon reductions in major developments, due to their structural strength, versatility, lightness, high degrees of precision and low-carbon manufacturing. Mass timber products are demonstrably and technically suitable for structural use in medium and high-rise buildings.

A leading UK example is Dalston Works in London at 10 storeys, completed in 2017. The structure of the 121-unit development is made entirely of CLT, from the external, party and core walls, through to the floors and stairs, weighing a fifth of a concrete building of this size. It reduced deliveries during construction by 80%. <u>https://waughthistleton.</u> <u>com/dalston-works</u>

Examples outside the UK include Hoho, a 24-storey building in Vienna completed in 2019, Mjøstårnet an 18-storey building in Norway completed in 2019, and Brock Commons an 18- storey building in Vancouver, Canada completed in 2017. These are just three amongst many other tall timber buildings popping up around the world.

Acute challenges in the UK

The Grenfell Tower fire killed 72 people and destroyed Grenfell Tower on 14 June 2017. It highlighted the tragic consequences of wilfully neglecting building safety. Given the scale of fatalities, the onus remains on the timber industry, the construction industry and the Government to demonstrate clearly what many of us in the industry know well: That this group of combustible mass timber products are safe to use.

Use of mass timber construction fell dramatically in the residential sector, falling almost to none. The obstacles shared across the industry by private developers, Local Authorities and Government alike are: Severe difficulties obtaining affordable construction and property insurance; a prohibitive regulatory environment precluding the use of combustible materials in certain building types; prevailing uncertainty around fire performance causing doubt amongst industry stakeholders.

The insurance sector is clear about its concerns

The greatest challenge is insurance. Costs of insurance for a completed building using mass timber for its primary structure are up to 800%

higher than conventional construction methods. Insurers also refuse cover due to questions around susceptibility to fire and moisture damage, durability and repairability; concerns over quality of design and construction; concerns over competency of professionals.

The RISCAuthority published the 'Insurance Challenges of Massive Timber Construction and a possible way forward' white paper in February 2022 with input from 24 major UK insurers. It describes the insurance industry's perception of massive timber construction focusing on the perils of fire and water but offers a hint of optimism.' If embraced at the point of design, it is hoped that it will result in buildings that are both sustainable and insurable, satisfying the requirements of all stakeholders.'

Engagement with the insurance sector towards addressing a common approach to risk mitigation in mass timber buildings is underway. This should be the priority for all stakeholders aspiring to reduce the carbon footprint of construction through use of mass timber products.

In addition to this, the mantra in the coming years must be: Test. Test. Test. Test evidence

often remains out of the public domain, having been produced on a project-by-project basis for a client. This piecemeal approach will not overcome systemic barriers and negative perceptions. Industry-wide collaboration and coordination should be a priority to unlock mass timber for all.

Policy shift towards net zero

Since 2017 there has been a policy shift with the UK legally committed to net zero emissions by 2050. Ministers speak publicly about the need to reduce embodied carbon emissions; the Conservative MP Duncan Baker has introduced a private member's bill for embodied carbon regulation to Parliament; the Government has kickstarted a policy process to increase timber use; the UK's largest private developers are working together to unlock mass timber for their projects. Crucially, insurance brokers and underwriters are taking note and beginning to respond.

Mass Timber is an incredibly useful tool in the fight to mitigate climate change, but it is a tool which is currently unattainable for many. We must change this.

The mantra in the coming years must be: Test. Test. Test. Test evidence often remains out of the public domain, having been produced on a project-by-project basis for a client. This piecemeal approach will not overcome systemic barriers and negative perceptions. Industry-wide collaboration and coordination should be a priority to unlock mass timber for all.



Joe Giddings is UK Networks Lead at Built By Nature and was Project Director of the Timber Accelerator Hub at the ASBP from March '21 to March '22. He is a coordinator of Architects Climate Action Network (ACAN), the organisation he co-founded in 2019 to address the climate emergency in the built environment sector. Joe has been a central coordinator of ACAN's campaign for the regulation of embodied carbon emissions.

The Timber Accelerator Hub (TAH) was established by the ASBP, with funding from the Laudes Foundation, Timber Development UK and Swedish Wood, to work with a network of key construction industry stakeholders to investigate current barriers and explore potential solutions.

AD MORE

<u>Click here</u> to find out more on ACAN. To download the white paper 'Mass Timber: Challenges & Potential Solutions. Summary report of the ASBP's Timber Accelerator Hub' please <u>click here.</u>



Transforming Scotland's tenements, one at a time

Louis Daillencourt, Business Development Director, Novoville is applying digital solutions to improving home repairs and maintenance in Scotland.



Novoville has worked with the City of Edinburgh Council since November 2019, applying tech innovation to streamline the maintenance and repairs of shared areas in tenements with a current focus on private ownership. The initiative was part of the Scottish Government-backed CivTech Accelerator programme, which matches enNo retrofitting can happen before the building you're upgrading has been repaired, is wind and watertight, well-maintained, and enjoys a basic sense of community. It's a prerequisite to live in a building in good condition, and one where owners have some level of engagement with each other, before you can think about decarbonising it."

"

"Novoville Shared Repairs' technology has been assisting proprietors around Edinburgh to carry out all important common repairs. With about 5,000 properties being managed through the app, this innovative scheme, which was supported by the council, is a real success. We're looking forward to seeing it expand to other councils this year".

Jackie Timmons, Shared Repairs Service Manager, the City of Edinburgh Council

trepreneurial tech start-ups and SMEs with public sector organisations seeking digital solutions. In April 2020, the council agreed to fund the development of the <u>Novoville Shared Repairs app</u>, an offshoot of Novoville's civic engagement platform.

The tech innovator behind this revolutionary app is 32-year-old Louis Daillencourt. With an academic background studying International Relations and History at the London School of Economics and European Literature in Cambridge, Louis joined the Europe-wide company in January 2019 and spotted an ad on LinkedIn for the CivTech Accelerator. "I was interested in tackling the subject matter - bricks and mortar - from the angle of tech. On a personal level, I love Edinburgh and getting a chance to work on its built environment one of its most prized assets - was a key motivator. On top of that, the app is all about improving people's lives, and down the line, contributing to the green revolution that housing and buildings will play such a big part in. In Scotland, 15% of all carbon emissions come from domestic buildings, and domestic carbon emissions must be reduced by 68% in less than a decade. We have our work cut out for us."

Louis developed the game-changing Novoville Shared Repairs app to integrate the market for repairs, maintenance and upgrades, starting in Edinburgh. It provides homeowners, factors (property managers), tradespeople and the council with a dedicated streamlined ecosystem where each can play their part. The app is used by private owners of a flat or a shop in a tenement to collaboratively plan, procure, decide upon and pay for repairs in accordance with local rules and regulations. It's inclusive by design and doesn't require all owners, who can sometimes be elderly, to join it in order to be useful.

Louis believes the app will play a vital role in helping decarbonise housing in Scotland. He says: "We're building a platform which addresses the complexities of the legislation and the multi-stakeholder process at scale. Beyond Edinburgh, the company is currently working on rolling out the app with East Ayrshire and Perth & Kinross Councils. Novoville has partnered with Under One Roof, an independent charity, and The Royal Incorporation of Chartered Surveyors (RICS). Both organisations recognise that every building and every group of owners is unique, as are their problems.

Looking at developing the market for the app, Louis says: "Our ambition is that every self-factoring tenement in Scotland will use

USER TESTIMONIALS

"The best thing about the app is it helped us avoids long e-mail chains, simplified the admin side of repairs and we received great support throughout." Alan, EH3

"I started using this to make repairs

easier to organise and it's great. What is even better is the support you get from the help desk." Penny, EH6

"I started using the app for one property in a tenement block for which I'm the landlord, and now I've got all three of mine in there. It's easier to look after the condition of the tenements and the app helps create a community feel. I recommend it to any proprietor. This app is easy to use."

Elizabeth, EH1

"I needed to make shared repairs. I needed to gain the trust of owners/ landlords I had never met before. The Novoville app gave me that transparency as they knew I wasn't doing anything untoward. The ease and transparency were the best thing about it". User, EH12 this app (or close!) as it has so much to bring to proprietors. Over time, we will expand beyond repairs and maintenance to be the dedicated marketplace for many types of building services, including the purchase of condition surveys, building insurance, professional factoring, and the big one - retrofitting."

"Beyond consumers self-factoring, we want to bring the comfort and transparency the app brings to professionally factored blocks. In Scotland, property factors and housing associations manage between a half to two-thirds of tenements in the country. They see our technology as a game-changer to better communicate and engage with customers and offer more transparent and reactive services. We are talking to a number of factors and housing associations to deploy the app with their client base."

Based on the measurable success of the app, the company ambitions to go further, as Louis says: "For us, the goal is clear: create a European champion at the intersection of PropTech and GreenTech. By enabling building owners to carry out essential upgrades, we will make a major contribution towards Scotland's net-zero ambitions, and provide a replicable model to be deployed elsewhere, starting with the rest of the UK."

"Great consumer technology in itself is not enough, but it will be a necessary step to achieving the scale we need to reduce domestic carbon emissions to more sustainable levels."

SHARED REPAIRS, FIXED!

- 480 tenements signed up, making up 6% of the self-factoring private proprietor market in Edinburgh
- **4,800 properties** managed (a tenement contains 10 properties on average)
- **130 repairs** in progress / completed from £70 stair lighting jobs to £45,000 re-roofing
- Can also be used to purchase condition surveys

Novoville Shared Repairs now counts almost 500 tenement self-factoring on their platform



READ MORE

To find out more about Novoville please <u>click here</u>. The City of Edinburgh Council has set the target to become a net-zero carbon city by 2030 which will require an 8% yearly reduction in emissions. Novoville undertook a large-scale consultation on the issue, gathering responses from 2,000 Scottish homeowners. Check out the Novoville COP26 white paper <u>here</u>. Check out the COP26 YouTube presentation of Novoville's plan <u>here</u>. To find out more about Under One Roof please <u>click here</u>.



WORLD CHANGERS

JESSICA GROVE-SMITH SENIOR SCIENTIST AND MEMBER OF THE BOARD OF DIRECTORS, PASSIVE HOUSE INSTITUTE (PHI), DARMSTADT, GERMANY

The war in Ukraine has brought greater global attention to the urgency of moving away from gas and fossil fuel dependencies. The Passive House Institute has been promoting this topic for over 25 years. "It's what we do" says Jessica.

Q How do you frame the relationship between iPHA, PHI and the AECB?

A PHI and iPHA represent the Passivhaus standard, which we have developed and promoted for over 25 years. We do this out of motivation for addressing climate change, reducing carbon emissions, and creating better, healthier buildings.

AECB as an organisation has different building standards but it has similar goals and methods focused on high energy efficiency. That is a fundamental alignment, and there are certain areas of overlap and room for collaboration between our organisations. Our main area of direct cooperation, which has been ongoing for many years, concerns AECB reselling the Passive House Planning Package, PHPP. The AECB also played an essential role in founding and supporting the Passivhaus Trust 10 years ago, which is now our direct affiliate partner.

Q What was your original discipline?

A During my physics degree, it became very clear to me that I wanted to put my knowledge to meaningful use. I looked at areas I wanted to work in, completed several in-



The public understands the importance of energy efficiency and reducing demand, which is where our campaigns come in. For a sustainable solution we need efficiency first and ramping up renewable energy supply.

ternships and quickly moved into the field of sustainability. I learnt about renewable energy and energy efficiency. Through that I came across the Passive House Institute and I got hooked. I started as an intern in 2008. The concept convinced me entirely and I've been here ever since.

The first Passive House is celebrated its 30th birthday last year, and the PHI itself is 25! Credit for this pioneering project belongs to by Professor Wolfgang Feist. At a time when only very few people thought about climate protection, the development of the Passivhaus Standard paved the way for highly energy efficient buildings.

Q Your latest campaign #EfficiencyNow reaches out to a broad international

audience of individuals and organisations

Institute

A We launched #EfficiencyNow in Germany as an immediate reaction to the war crisis in Ukraine. The war has brought attention to the urgency of moving away from gas and fossil fuel dependencies. We work on this topic all the time - it's what we do.

There's a lot of enthusiasm for energy efficiency in buildings, with people saying they want to do something and engage. We have expanded the campaign to the UK and the wider globe to help people channel that enthusiasm into effective action.

The current discourse on reducing our fossil fuel dependency covers a multitude of approaches, often with a focus on in-

stalling PV in one's home. Adding renewable energy is essential but it is not the whole story. The public understands the importance of energy efficiency and reducing demand, which is where our campaigns come in. For a sustainable solution we need efficiency first and ramping up renewable energy supply.

With the initiative #EfficiencyNow, we aim to show how everybody can engage and make a difference. There's a variety of things that people can get engaged with and immediately make minor improvements in their homes to reduce energy demand - ranging e.g. from lighting and household equipment efficiency to water saving taps. But for a significant overall impact, more extensive measures are needed to improve the efficiency of buildings themselves. This is where refurbishment with Passivhaus components comes into play, which can be implemented step-by-step, one component at a time - or in one go. Now is the time if you've been thinking about improving vour home.

Q Is the Construction Industry responding to your work?

A There is certainly a lot of interest from the construction industry, but the dynamics are complex. Builders are in very high demand and they often don't have the time or need to take on specialised education for energy efficiency or to look at solutions on how to do things differently. As part of the #EfficiencyNow initiative we provide short, crash courses for builders. These crash courses will provide information about the requirements for a high-performance quality of the building envelope and building services technology.

Of course, we encourage anyone who is able to take part in the more detailed Passive House Designer or Passive House Tradesperson courses, which are also being offered by partners in the UK.

Q How successful has the international iPHA affiliates information campaign been?

A 2021 was the first time we ran an international campaign with over 20 affiliate organisations worldwide. The hashtag #EfficiencyFirst and the title "Efficiency: The First Renewable Energy" aim to raise awareness of the vital role energy-efficient buildings play in meeting climate goals and how to provide a comfortable, healthy and sustainable built environment.

Information was rolled out in different languages and distributed via the local affiliate organisations. It included various introductory information on energy efficiency and Passivhaus, and a summary connecting Passivhaus with global aims of the Sustainable Development Goals (SDGs). We successfully presented the message of #EfficiencyFirst at COP26 in Glasgow and the campaign has been well-received by the public.

In 2022, we are expanding on the campaign's 2021 success, preparing materials and activities for youth, the future stewards of the built environment. iPHA is currently working with a consortium of university lecturers to support the creation of a series of Passive House informational materials for universities, especially for the architecture and environmental engineering departments.

Q How does the International Passive House Association (iPHA) relate to PHI?

A The Passive House Institute itself focuses on technical research and quality assurance. the membership based International Passive House Association (iPHA) has over 20 affiliate independent organisations worldwide and is the global network of Passive House professionals and enthusiasts alike. It encourages the exchange of Passive House knowledge across borders and stakeholders, advocating for Passive House in policy, the media, the general public and construction professionals.

Our affiliate organisations play a significant role in promoting and communicating Passive House as a concept and solution within their regions and countries. Affiliate members automatically become part of the international network. iPHA interconnects the global Passive House community and creates a platform where everybody can exchange experiences, so we don't reinvent the wheel. The Passivhaus Trust in the UK is a very successful affiliate and is doing exemplary work to advance and scale Passive House locally.





The Passivhaus Trust in the UK is a very successful affiliate and is doing exemplary work to advance and scale Passive House locally.

READ MORE

For more information on the Passive House Institute <u>click here</u>. All information relating to <u>#EfficiencyNOW</u> is published on the Passive House resource knowledge database, Passipedia. Please send your suggestions to <u>JETZT@passiv.de</u>. For details of the Passivhaus Trust (PHT) in the UK please <u>click here</u>.

WHAT IS PASSIVHAUS?

Passivhaus is a leading international design standard providing high levels of comfort and occupant health AND reducing energy use and carbon emissions from buildings. Backed with over 30 years of building performance evidence and a rigourous independent quality assurance process, Passivhaus is a tried & tested solution that champions efficiency first. Thousands of buildings spanning multiple climates, both new build & retrofit, have been certified to this standard worldwide.

We are in a climate crisis; buildings are a big culprit. We believe Passivhaus enables a meaningful transition to zero-carbon buildings now. The Passivhaus Trust is an independent, non-profit organisation that provides leadership in the UK for adoption of the Passivhaus standard and methodology. The Trust is part of a global Passivhaus movement and the official UK affiliate of the Passivhaus Institut through the International Passive House Association. Joining the Trust also provides membership of iPHA.

www.passivhaustrust.org.uk



The UK Passive House Organisation



iPHA Affiliate



CAMPAIGNS

INSULATE BRITAIN

WHAT INSULATE BRITAIN HAS ACHIEVED BEYOND THE HEADLINES

The Insulate Britain campaign brings together the worlds of retrofit industry technical experts and climate activists and is making inroads with the Insulate Britain Industry Group.

L ast September a group of ordinary citizens did something extraordinary. With their large red and blue banners they took non-violent direct action (NVDA) by walking out onto the M25 the UK's most potent symbol of our carbon intensive way of life, and stayed there making the simple demand that the Government INSULATE BRITAIN.

They included architects and builders, scientists, young people, health and education professionals, academics, parents and grandparents. The demand to 'Insulate Britain', comprised of two insulation and retrofit demands addressing social housing by 2025 and all homes by 2030 had been delivered to the Government in the preceding weeks.

The <u>Insulating Britain</u> report calling for urgent action to retrofit homes was shaped with the help of retrofit organisations, including the AECB. It sets out key agreements for action, namely addressing the climate crisis, the resultant health benefits, the contribution to a just transition to a low carbon economy and energy security.

The impact of the protests was immediate. The disruption brought widespread news coverage, vilification of protestors, but critically the discussion about the need to address the quality of our leaky homes, which the industry had been attempting to drive forward for decades, was headline news.

With COP26 imminent Government left it to the police to arrest, charge, release, repeat. There was no willingness to respond to the demands or to jail climate protestors whilst hosting the UN Climate Change Conference.

COP26 closed and the first nine Insulate Britain protestors were taken to court and jailed, the youngest on his 21st birthday. The rolling process of taking 117 Insulate Britain climate protestors through the judicial system is underway.

Successful industry engagement

Engagement with industrybrings together the worlds of retrofit industry technical experts and climate activists.

The Insulate Britain Industry Group engages with retrofit organisations, academics, business, the industry press and all those interested in the potential of retrofit to address the climate emergency as set out in the Intergovernmental Panel on Climate Change (IPCC) Working Group III report <u>Mitigation of Climate Change</u>.

Engagement involves:

Insulate Britain's NVDA opened up the debate within the industry press in October 2021 in <u>Homebuilding & Renovating</u> with the article 'We need to talk about Insulate Britain's Demands for our homes'. Retrofit expert Paul Testa wrote: 'I need to start by saying that I completely agree with Insulate Britain's core aims and demands. They are incredibly brave; sacrificing their freedom to raise awareness of the increasing urgency of improving our housing stock.'

It also enhanced the mainstream media visibility of other retrofit campaigns e.g. <u>The New Economics Foundation Great Homes</u> <u>Upgrade</u>.

Recent months have highlighted the arguments in the IB report:

- Winter arrived, bringing with it storms including Storms Arwen & Eunice leaving 1.4 million people without power, in freezing homes.
- The energy price cap increased 54% plunging a quarter of UK households into fuel poverty (Friends of the Earth) whilst oil company profits soar.
- Russia invaded Ukraine highlighting the question of energy security and dependence on fossil fuels.

The mood towards the activists in the media and the public consciousness has begun to shift with Times columnist Alice Thomson conceding on 16th March: 'Insulate Britain, best known for its activists gluing their cheeks to the M25, looks prescient'."

Pledges to fund the retrofitting of homes are increasing putting pressure on the campaign to go further and faster. E.g., Reacting to the bumper profits announced by Shell earlier this month, <u>Friends of the Earth</u> called for a tax on these excessive profits to help pay for a nationwide free insulation programme, rolled out street by street, focussing on those most in need first. Almost 8 million homes could benefit and at could be carried out quickly.

The legal cases roll on with Insulate Britain activists speaking powerfully from the dock, pushing the judiciary to acknowledge the rightness of the demand. Presiding District Judge Stephen Leake at Crawley Magistrates' Court in April commented: "I have heard your voices. They have inspired me and personally I intend to do what I can to reduce my own impact on the planet, so to that extent your voices are certainly heard."

Insulate Britain have expanded their protests to 'disobey in the dock' demanding that members of the criminal justice system refuse to criminalise peaceful members of the public who are desperately trying to save the lives of their families, of their local communities and the global community.

In February Insulate Britain joined <u>Just</u> <u>Stop Oil (JSO)</u> - a coalition of groups demanding that the Government immediately halt all future licensing and consents for the exploration, development and production of fossil fuels in the UK.

History shows that NVDA works, from the suffragettes to the civil rights movement and with time perilously short to make necessary change such direct action is both legitimate and an duty.

"History will vindicate the people putting their liberty on the line to try to stop the collapse of our life support systems."

George Monbiot, Author & Columnist#





A Project Specific Approach to Condensation Risk Analysis

WHAT WUFI® PRO SOFTWARE CAN DO FOR YOU

Dara McGowan, a Director of Partel UK explains his approach to condensation risk analysis which is vital when exploring retrofit solutions. He explains how WUFI® Pro works, what information is needed to help customers and shares a case study on the use of a WUFI® Pro analysis prior to proceeding with a retrofit measure.



My approach to condensation risk analysis

It is important to gather as much project specific information as possible to use in WUFI® Pro software to get a bespoke understanding of the moisture management properties of a building element. Information includes wall/roof details, proposed materials, building location and building use.

With retrofit projects there are unknown factors. Assumptions must sometimes be made. Where required, I adopt the 'worst-case-scenario' with WUFI®Pro outputs that are conservative. The more we rely on assumptions, the less bespoke the model becomes and so assumptions should be used sparingly.

I start by closely modelling the proposed retrofit approach before making recommendations on how the approach could be refined to minimise interstitial condensation risk. I show the architect or designer key inputs and demonstrate types of outputs generated. The process becomes streamlined once they understand what information is required.

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In Partel we believe building physics should drive retrofit solutions. As such, our services go far beyond supplying materials – we are keen to support our customers in reaching an optimized solution as you can see in this case study.

Dara McGowan has a background in sustainable building design. He completed an Architectural Science Masters in the University College Dublin 'Sustainable Building Design and Performance'. He is a certified Passive House Designer, certified Passive House Tradesperson and Building Energy Rating Assessor (The Irish version of a SAP assessor).

He has worked with the Irish Department of Housing developing and delivering training courses for contractors and designers helping them understand the new building regulations introduced in 2019 that are similar to the new Part F and Part L being introduced in England. The courses focus on insulation, thermal bridging, airtightness and ventilation. He has written many questions for the Passive House Institute examinations and has lectured at the University College Dublin, Technical University Shannon and the Munster Technological University. Dara was recently made a Director of Partel UK. WUFI® Pro is the standard program for evaluating moisture conditions in building envelopes. WUFI® Pro performs one-dimensional hygrothermal calculations on building component cross-sections taking into account (where appropriate) built-in moisture. driving rain, solar radiation, longwave radiation, capillary transport, and summer condensation. WUFI® Pro determines the hygrothermal performance of building components under real climate conditions. Comprehensive dynamic hygrothermal analysis is needed for accurate design and is required by the DIN EN 15026 standard. For further detail click here. Dara has no affiliation to WUFI® Pro but uses it regularly to analyse moisture management of building elements.

CASE STUDY

London apartment block retrofit

Ross Ellmore works as an Associate at London based Neil Davies Architects LLP. He specialises in delivering environmentally responsible projects. He is Passivhaus certified and focusses on buildings of low embodied carbon and operational carbon, renewable materials and the role the building industry has on the environment.

Ross was tasked with designing a retrofit approach for a seven storey, 23-unit apartment block on behalf of Neil Davies Architects LLP. Ross requested a WU-FI*Pro analysis on the building's front and rear elevations. These elevations were solid brick, and for conservation reasons could not be rendered externally. Image 1 shows Ross's proposed retrofit approach, which he believed could be refined.

Assembly/Monitor Position

To create this wall within the WUFI®Pro software, an assembly is created layer by layer. A thickness is applied to each layer and a material from the data base is allocated. If some materials are not available the solution is to choose a material with

1. Existing solid brick wall

- 2. Sand + cement render (M20/110)
- 3. Studwork GYP frame (K10/TBC)
- 4. 50mm Insulation (E30/155)
- 5. 2 no. layers of 12.5mm plasterboard
- with 3mm skim finish (K10/115)

similar properties. Selecting appropriate materials is a crucial step as each material carries important information such as the density, porosity, thermal conductivity and vapour resistance.

A soft brick type was selected as a conservative assumption due to lack of available information about the existing brick wall. It is possible to test water penetration into brick using a testing apparatus called a Karsten Tube (not requested on this project).

The air cavity in this case was unventilated. Defining how airtight the wall may be is important because it impacts the amount of moisture that can pass through the structure. Given this is a retrofit project with no airtight membranes specified at this point, the air permeability was defined as 7 m³/ (m².h) at 50 Pa pressure difference.

Ross advised that a balanced mechanical ventilation system was to be installed, which is accounted for in WUFI®Pro. The final input when building the assembly was to place additional monitors at locations to look at in more detail. Ideally monitors are placed in locations with the highest potential risk of mould or condensation. The assembly shown in Image 2 looks quite simple but carries lots of important information.

External Wall

30 50 40 30





Image 1 Architects Proposed Retrofit Solution for Solid Brick Wall



laterials	:	
	Solid Brick, historical	0.3 m
	Cement Plaster (stucco, A-value: 0.51 kg/m2h0.5)	0.03 m
	Air Layer 25mm; without additional moisture capacity	0.025 m
	ROCKWOOL Masterrock GF (without lamination)	0.05 m
	Gypsum Board	0.013 m
	Gypsum Board	0.013 m

Image 2

WUFI Assembly of Architects Proposed Retrofit Solution

CASE STUDY: LONDON APARTMENT BLOCK RETROFIT



Climate Date from London Weather File



Image 4 Choosing the Most Conservative Orientation



Image 5

Temperature and Relative Humidity at Internal Surface of Plaster (in initially proposed solution)

Exterior Interior

The Ventilated Cavity Approach

Orientation

The orientation of the wall was important as this determines the amount of sunlight and driving rain it is exposed to. This can have a significant impact on the walls' ability to manage moisture. In this case I modelled the proposed retrofit solution in three orientations to determine whether driving rain or lack of sunlight had more impact on results. The highest level of driving rain is South, while the lowest solar radiation is North (Image 3). In this case, North was the most conservative orientation (Image 4), and so I used it for all models. Where I know the orientation of the element in question, I use that. In most cases the agreed retrofit approach is applied to multiple sides of the building, so the conservative approach works well.

Calculation Period

The duration of the study is input under the controls tab. In this case, the simulation ran from 2022 to 2027. Required duration can vary depending on various factors. Ultimately the goal is to reach a state of equilibrium in the results. This means that the element reaches a state in which it is not getting any wetter, or any dryer year-on-year. This happens quicker in light weight structures than in masonry ones. The five-year simulation reached equilibrium.

Climate

Under the climate tab indoor and outdoor conditions must be defined. Outdoor conditions are defined by weather data files, which should be as close to the project as possible – I used a London file in this case. Indoor conditions are determined by selecting an appropriate standard within WUFI. I used EN 15026 Hygrothermal Performance of Building Components and Building Elements – Assessment of Moisture Transfer by Numerical Simulation standard, which links indoor conditions to external weather data. This

Materials:		
	Solid Brick, historical	0.3 m
	Air Layer 50mm	0.05 m
	*PARTEL EXOPERM 150	0.001 m
	ROCKWOOL Masterrock GF (without lamination)	0.05 m
	VARA PLUS	0.001 m
	Gypsum Board	0.013 m
	Gypsum Board	0.013 m

CASE STUDY: LONDON APARTMENT BLOCK RETROFIT



Image 7

Temperature and Relative Humidity at Outer Surface of Rockwool (in the ventilated cavity solution)

is also where the building use is accounted for, as internal humidity can be set as low, medium, or high. As this building was an apartment block, the internal humidity was set at medium.

The Results

WUFI[®]Pro does not provide a simple pass/fail output. The outputs must be interpreted.

I examined the monitors placed in high-risk locations first. These showed the temperature and relative humidity at the selected location. Image 5 shows the temperature and relative humidity at the internal surface of the cement plaster. There was a six-month period during which the built-in moisture of the plaster dried out, after which a state of equilibrium was reached.

The relative humidity fluctuates between approximately 67% and 85% throughout the year. While such Winter/ Summer variations in relative humidity are not a problem in themselves, the long initial drying period (RH exceeding 90% for six months) and the humidity peaks exceeding 80% do cause concern. Where relative humidity exceeds 80% for prolonged periods mould can occur, which means the wall is at risk even without any unforeseen stress factors such as a higher air permeability than assumed. Exploring safer options with the designer was the preferred course of action.

Why it doesn't work

Bricks are very porous. As a result, the exposed brick in this project absorbed a lot of moisture, which means the moisture content in the brick, and adjacent plaster, were relatively high. Installing insulation at this location means the internal surface of the brick wall is no longer exposed to the rooms heat source and becomes colder. With a drop in temperature comes an increase in relative humidity, which exceeds the mould thresh-

old during colder periods in this location. Simply put, a combination of high absorption and a low surface temperature created mould risk.

The safer options

Retrofits are complex. They need to take lots of factors into account including thermal performance, conservation, fire safety, and budget to name but a few. My primary role here, however, is to suggest solutions that pose a low risk of interstitial condensation or mould. Having modelled lots of solid brick walls in the past, I know that two general approaches can work well; 1) ventilate the cavity between the insulated studs and the brick, or 2) use of a vapour open, hygroscopic insulating material, such as a calcium-silicate (Ca-Si) board.

The ventilated cavity approach

Creating a ventilated cavity between the internal insulation layer and the brick wall can be a good approach for such a project. The build-up for this project is shown in Image 6.

By adequately ventilating the cavity you create a path for humidity to escape easily. Even during colder periods, when relative humidity starts to climb in the cavity, it is removed regularly, preventing mould from forming. In this case 20 air changes per hour were applied to the cavity, a figure which is generally accepted as reasonable.

It is difficult to advise how many air bricks would be needed to achieve this air change rate as they vary widely. I have included Partel's EXOPERM MONO 150 windtight membrane, which ensures the performance of the Rockwool is not compromised by moisture or wind. However, with a super low SD value of 0.07m, this membrane will allow internal moisture to pass into the ventilated cavity where necessary.



SETTING THE STANDARD AECB 39

CASE STUDY: LONDON APARTMENT BLOCK RETROFIT

I have specified Partel's VARA PLUS vapour control layer on the warm side of the insulation. This membrane has an adaptive SD value of 0.4m to 60m, which increases the walls drying capacity. In Image 7 you will see that the initial drying out period is greatly reduced and even once equilibrium is reached the relative humidity at the external face of the

insulation layer does not exceed 80% RH. I consider this a low-risk build-up provided it is constructed to a high standard.

The Ca-Si approach

As an alternative to a ventilated cavity, calcium-silicate insulations boards can be adhered directly to the masonry wall (Image 8). Ca-Si boards work well with tricky wall types



Temperature and Relative Humidity at Inner Surface of Brick (Ca-Si solution)



Image 10 Relative Humidity of all 3 Approaches



"Collaborating with Dara has been really useful on this project. We have bounced several ideas off each other in an attempt to find a solution that works well from a moisture management perspective, but that can also meet all of our other requirements. Working with Dara has provided great peace of mind".

Ross Ellmore, Associate at Neil Davies Architects LLP like this one as their high PH value prevents mould growth, even where relative humidity is higher than 80%. In addition, the boards are vapour permeable and hygroscopic, which ensures the internal surface of the brick wall remain as similar to the original, uninsulated state as possible. To help minimise moisture ingress, I have also included a water repellant treatment for the brick façade. This is a clear product from Epatherm, and so it will not impact the aesthetic of the building. Given Ca-Si boards can manage higher levels of relative humidity very well and the fact that the relative humidity in this case does not exceed 76% (see Image 9), this solution would be considered low risk.

Conclusion

Comparing the three approaches on one graph is useful for the designer (Image 10). Ross was provided with this information, along with the list of assumptions and conclusions. I advised him that the initially proposed solution did not work well from a mould risk perspective, and that I would not recommend proceeding with this approach in its current form. The ventilated cavity solution works well and can be used with a low risk of mould. This system can improve the u-value of the wall significantly, but there may be difficulty providing ventilation to the cavity given the external façade of the building is listed. Finally, I mentioned that the Ca-Si solution works well from a moisture management point of view but advised Ross that the thermal conductivity of this product is relatively high (0.059 W/mK) when compared to Rockwool insulation (0.035 W/mK).

Learnings

The final retrofit solution is ultimately the architect or designer's decision. There are other retrofit measures that could work in this project, as well as additional features in WUFI[®] Pro. Retrofitting is diverse by nature so it is crucial to design a solution that is suitable for each individual project and that will not have unintentional negative consequences.

Partel is one of the leading developers and suppliers of high-performance systems and materials for the low-energy building sector. They combine their knowledge in architecture and engineering with technical expertise and a unique building physics approach to build up bespoke solutions for every specific project. They make the built environment more energy-efficient, safer, and healthier, by providing the industry with smart sustainable solutions for air and wind tightness, thermal bridging, air sealing, and ventilation. For further detail please click here.



Helping accelerate the UK's journey to zero carbon

AECB CarbonLite™ Retrofit Coordination Course (CLRrc)

Standard cost: **£449 +VAT.** Two routes to purchase:

Individual purchase SKU 31015 Employer purchase SKU 31016 The AECB CarbonLite™ Graduate course cost **£250 +VAT.** Two routes to purchase:

Individual purchase SKU 31017 Employer purchase SKU 31022 This course equips your organisation with an understanding of providing PAS 2035 aligned retrofit services to clients with 105 hours self-directed e-learning over 12-months with 15 module topics + 100 lessons.

Benefits

- Provides the technical detail and working knowledge of the PAS 2035 process and framework (required for publicly funded projects) which can be used to inform privately funded retrofit projects.
- Enables professionals familiar with retrofit and project management to learn and apply best practice, risk management and a sustainable approach to projects.

SIGN UP

Sign up for the AECB CarbonLite[™] Retrofit Coordination Course (CLRrc)



NETWORKING

The Low Energy Transformation Initiative (LETI)

Over 1,000 built environment professionals give their time to support the organisation. LETI produces independent, fact-based, non-commercially aligned guides that are making a global impact. The <u>Climate</u> <u>Emergency Design Guide</u> has had over 60,000 downloads in 100+ countries with several buildings adopting LETI targets. Dr Joe Jack Williams has been a member since 2017.



L ETI began in 2017 as a network of professionals working together to drive London's built environment towards net zero carbon, initially focusing on creating an evidence base for the update of <u>The London</u> <u>Plan</u>. This focus underpinned our original name London Energy Transformation Initiative (LETI). As the network has expanded, it has grown to be a nationwide initiative. We have changed our name to the Low Energy Transformation Initiative.

This recognises that the issues within London are the same all over the country and are just as important in achieving our necessary carbon reductions. We support and encourage responses to consultations, such as those for the updates to the Part L and Future Homes Standard, providing indepth analysis of the questions to enable a broader response.

As an organisation, we are committed to supporting and accelerating the transition of the built environment to zero carbon, with key publications sharing knowledge of low and zero carbon approaches widely. These guides provide advice that is independent, fact-based, and non-commercially aligned, ranging from in-depth discussions on a subject, such as embodied carbon, to focused short pieces, such as the paper "Hydrogen: A decarbonisation route for heat in buildings?"

Setting defined targets that are clear, intelligible and transparent

Perhaps the most widely read of the publications is the <u>Climate Emergency Design</u> <u>Guide</u>, released in early 2020 alongside the <u>Embodied Carbon Primer</u>. It sets out the approaches required for new buildings to respond to the climate crisis, covering five key areas: Operational energy, embodied carbon, the future of heat, demand response, and data disclosure. Each of these aspects is addressed in a broad, open discussion, enabling those new to these topics to get up to speed quickly. However, the real success of the guide is that it moves beyond discussion to setting defined targets that are clear, intelligible, and transparent.

Each of the building sectors covered in the guide (housing, schools, and offices) is summarised in a simple one-page diagram that includes the performance targets, but also indicative design parameters to meet those targets. For those finding their feet with this approach to low carbon buildings, these design parameters are a perfect starting point for discussion, whether trying to simply identify the glazing ratios, or set out a metering strategy. It is this approach that has made the guide so successful, with over 60,000 downloads 100+ countries since the release, with a number of buildings adopting these

LETI targets for their project.

While the Climate Emergency Design Guide acts as a self-contained guide for low impact development, the work of LETI is on-going, exploring the broader and emerging aspects of the built environment. Recent publications include the Climate Emergency Retrofit guide, Client Guide for Net Zero Carbon Buildings, Embodied Carbon Primer, and the recent LETI-CIBSE Net Zero FAQs. Current workstreams include further retrofit guidance, operational energy modelling, specification and procurement of low carbon buildings, and the on-going work of assembling case studies to support the guidance. Each guide and workstream brings greater context and resolution to the urgent need to create truly sustainable buildings.

Each guide can have over 100 volunteers supporting its development

However, LETI is more than just appealing publications, it is the process of engagement, consensus building, and knowledge sharing to generate these outputs that truly furthers the industry. Within LETI there are over 1,000 built environment professionals who give their time to support the organisation. Each guide can have over 100 volunteers supporting its development, from providing knowledge/expertise, case studies, and peer reviewing, to writing, project management, graphic design support, and wider industry promotion. There is also a hub of people behind the scenes, driving forward the group, supporting industry events, ensuring consistency and robustness of the guides, and balancing the workload across the volunteers.

The sheer quantity of time and expertise given to LETI over the past five years is both humbling and encouraging, reflecting the passion of the industry to bring everyone onboard with low and zero carbon construction.



The sheer quantity of time and expertise given to LETI over the past five years is both humbling and encouraging, reflecting the passion of the industry to bring everyone onboard with low and zero carbon construction. Dr Joe Jack Williams is an Associate and researcher at FCBStudios co-leading environmental research at the practice, His specialism is the influence of the school building on the students studying within, measuring perceptions, environmental performance and building forms as well as predicting, measuring and mitigating carbon impacts of architecture. Joe has been a member of LETI since 2017, and continues to work across many of the workstreams, particularly on embodied carbon and benchmarking.

READ MOR

think that you are able to support LETI, we'd encourage you to join our mailing list and keep an eye out for volunteer calls. You'll be invited to our events and workshops, and we'll keep you up to date with news, LETI publications and initiatives.

To join the LETI mailing please <u>click here</u>.



Why performance standards are important

As I mentioned in my CEO Welcome, performance standards are important. To be effective, environmental policy should deploy well-researched and practicable performance standards. Clear and specific criteria are particularly crucial in the construction sectors, as is quality control.

Imagining the near future

Avoiding making the UK retrofit challenge even more difficult, new buildings will be built to higher performance standards such as the AECB Building Standard and the Passivhaus Standard. In time, I would like to see designers and certifiers able to use either PHPP or SAP for certification/compliance as a result of these tools becoming better aligned with each other - and with the MCS software for heat pump system design and sizing. EPCs will be improved, giving policy makers more control of retrofit programmes, with better outcomes.

Design and construction professionals and trades will increasingly close the 'performance gaps' afflicting energy performance and heating costs as well as reducing moisture-related risk in retrofit. Less unintended consequences, more intended outcomes. Design and specification decisions will become heavily influenced by assessing both operational and embodied carbon emissions together: 'lifetime carbon' calculation tools, such as the AECB CarbonLite[™] PHribbon (and the standalone AECB Embodied CO₂ calculator) backed up by ever more environmental product declarations will steer us towards less carbon intensive building.

Local and regional centres will develop, perhaps centred around existing educational facilities - providing for high quality demonstration, meeting, events and a mixture of online and face to face, hands-on trades training, R&D and innovation.

The wave of retrofit at scale will be based on 'heat pumpification' or district heating strategies - perhaps relying mainly on lighter fabric measures such as loft insulation top up, improved airtightness and in solid-walled properties (without the benefit of cavity wall insulation), increased radiator capacity. Installed heat pump size will be increasingly downsized as the heat pump industry gains confidence and avoids oversizing, and performance standards and government support programmes will quickly require 'recommissioning as standard' after 12 months to ensure excellent efficiency and running costs no greater than the fossil fuel systems they replace. The number of deeper fabric retrofits, particularly in the social housing sector, as well as for many in the able to pay sector will continue to increase in number, quality, and innovation. The non-energy benefits of deeper retrofit will be increasingly valued, and innovations in decarbonised materials and methods will help further make the case for further fabric improvements.

Subsequent waves of retrofit work will perhaps be required on previously 'lightly' treated buildings – as part of a planned climate and energy 'insurance policy'. As more homes move away from fossil fuels - by electrifying their heating demand (and also charging electric cars) increased electricity demand during colder winters becomes

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Once we get going with carefully considered national retrofit programmes, we expect to see several 'waves of retrofit', working to a range of flexible, deliverable and continuously improving performance standards – such as the forthcoming revised AECB CarbonLite[™] Retrofit Standard.

more of a supply issue for some low carbon heating suppliers as well as the national electricity grid. Deeper fabric retrofit of previously 'heat-pumpified' light retrofits helps here - the benefits of whole house plans that avoided locking out future, deeper fabric measures will become evident!

Integrated government policies

Increasingly integrated government policies will also attribute real value to the non-energy benefits of building fabric improvement: reduced peak heating and cooling demand; lower running costs; avoiding fuel poverty; occupant health and wellbeing; improved public health from warmer homes with better air quality; community health improvements from reduced air pollution; and increased energy security in a period of increasing global conflict. In time, working towards higher performance buildings becomes a natural part of the UK's £multi-billion 'home improvement' market, and ethically and morally just 'the right thing to do'.

The waves of retrofit programmes however experience ongoing and significant delivery challenges as a result of historic lack of foresight and long-term planning by past governments. Severe materials, skills and labour shortages in the construction sector force innovation and investment in unprecedented large scale training programmes. Despite the retrofit and heat decarbonisation programmes, the building sector's climate targets are inevitably missed, with many houses remaining on fossil gas and/ or underheated in winter - increasing numbers overheat in more frequent heatwaves. Other sectors are asked to further reduce emissions to compensate, but struggle to do so. A two-degree plus world quickly becomes inevitable and more adaptation programmes rapidly move up the UK political agenda.

Good news from the energy supply side – but we don't neglect the demand side

The graph to the right shows the current carbon intensity of the UK electricity supply and different decarbonisation scenarios for the future (FES, are Future Energy Scenarios produced by the UK National Grid modelling team). Note how the different idealised projections compare to reality (as measured), although we can take comfort from the likelihood that as the electricity supply becomes increasingly fossil fuel free the 'performance gap' between idealised and measured should reduce. However, as with all climate policies we need to aim to overachieve wherever possible to insure against policy outcome performance gaps.

Avoiding dogmatism

As UK climate and energy security action continues to lag behind what is required, AECB continues to review its thinking, and we have recently been questioning past assumptions relating to our retrofit standard. This has been prompted by the increasing enthusiasm, and members' experiences relating to heat pump technology, as well as the ongoing decarbonisation of UK electricity supply. This is illustrated by examples of pragmatic 'save the planet' approaches such as argued here by @Essaysconcern https:// essaysconcerning.com/. You can get a flavour of our recent thinking and research on this from my industry engagement presentation for Insulate Britain! https://youtu.be/ H4i3LLYiJvc.

What might an AECB Heat Pump Retrofit look like?

Below: looking at a 'typical' UK semi-detached, cavity walled house we have used PHribbon and PHPP to model the space heating operational emissions – in tonnes of CO_2e /year - for the unimproved house with a gas boiler, and after a 'light' retrofit and after a deeper retrofit. This is just a snapshot of recent AECB work modelling various house types with solid or cavity walls. Space heating CO_2 emissions for five years are shown in purple by way of comparison with emissions after the retrofits. This simply represents one of many scenarios.





Phase 1 is a 'light' retrofit carried in year 5: embodied CO_2 emissions for a 'light fabric' retrofit with a heat pump are shown in orange and the subsequent annual emissions from the electricity used to run the heat pump are shown in grey. Phase 2 illustrates a deeper' fabric retrofit carried out in year 22 to secure mainly non-energy benefits



from the improvements. This includes renewal of the original heat pump. Just to note, the 'Household CO_2 budget' is based on the standardised 2.4 occupants if they were to live with a 1 tonne personal CO_2 emissions budget. It is not a criterion of the revised AECB standard! It does show however that using fossil gas for space heating alone takes a large bite out of it, whereas both retrofits create more space in the budget.

To better understand the situation, it is useful to look at cumulative carbon emissions over a longer period, say 60 years.

The Phase1 'light retrofit' incurs a carbon burp of just under 2.5 tonnes of CO_2 and as a result operational heating emissions are slashed compared to previous years' fossil fuel gas emissions - these emissions decline over time as the grid further decarbonises, leading to dramatically reduced cumulative emissions from this house over 60 years.

If a deeper fabric retrofit is carried out in later years, operational emissions are further reduced, but not as dramatically, they also continue to reduce as the grid decarbonises. Cumulative lifetime emissions from the deeper retrofit are slightly increased but



still dramatically lower than 'business as usual' (BAU) - thus it seems reasonable to say that both light and deep retrofits using a heat pump are equally valid options for policy makers to include in retrofit programmes, nuanced with a better understanding of both the energy and non-energy benefits of retrofit, as discussed at length in our retrofit training courses.

This is just the beginning

Adopting effective building standards to reduce CO_2 emissions and manage energy demand, combined with more low carbon heat and power is a necessary start. This is only the beginning of the transition to the 'ecological society' we need to become where we don't just survive but thrive – and equitably. It is increasingly clear to many, particularly younger people that what we need to do next does not sit well with the current – dysfunctional - version of capitalism that currently strangles our thinking and threatens all our futures.

These issues are touched on in the AECB article: <u>Seeing the Wood for the Trees</u> - placing ecology at the heart of construction, by Lenny Antonelli & myself.

"In recent years, as energy efficiency targets for new buildings have tightened, attention has turned to cutting the embodied carbon of buildings by switching from materials like concrete and steel to lower carbon alternatives like timber. But if we are serious about solving the ecological emergency as well as stabilising the climate, we must look even further than embodied carbon, and think more deeply about the core values we apply to materials and buildings, and the manner in which we use them."

Why Do We Make Everything So Complicated?

AECB colleague, Architect and teacher, Lloyd Alter in the US asks: "Why Do We Make Everything So Complicated?" and "Instead of Asking How We Build, We Should Be Asking Why?". Lloyd is convinced "we need radical Sufficiency, Simplicity and Efficiency!"

We agree that we must "move beyond embodied carbon and seriously discuss avoided carbon". Lloyd engages and challenges his students with these four statements:

Radical Efficiency – everything we build should use as little energy as possible.

Radical Decarbonization – why we need to build out of natural, low carbon materials and electrify everything.

Radical Sufficiency – what do we actually need? What is the least that will do the job? What is enough?

Radical Simplicity – everything we build should be as simple as possible.

Sufficiency

We have written on this before: "Before building something, we should start by asking if it is really needed, and if there are any strategic alternatives to the brief."

We need to think how we might change our business models to make, rather than lose, money advising clients in this way. Lloyd has been trying for years to convince readers that sufficiency is more important than efficiency: "It's a hard sell; dryers are more convenient than clotheslines."

Simplicity

AECB has recommended, "Designing and building as simply as possible — employing true value engineering or 'integrated design."

Lloyd illustrates this by praising buildings that base their approach on that of 'dumb boxes'. Nick Grant of Elemental Solutions, a proponent of 'proper' Value Engineering', sent me this quote from author Andrew Saint, from his book Image of an Architect:

"Finally, can architecture survive as a special and unique profession if the 'imaginative' element is curbed? That is possible only if some such goal as sound building', in itself an uncharismatic target, can be raised to the level of ideology still enjoyed in the schools by the endless debate about styles. Otherwise, duller people will dominate, and the profession will become indistinguishable from others serving the construction industry. If a generation's imagination can be fixed upon something above the game of styles, novelty of appearance, and paper projects, and remain equally resolute in the face of the allurements of commerce, we may at last get a profession worthy of the claim of leadership in that industry."

Circular Economy

The AECB has always taken a longer-term view. Much more thought needs to be given to the 'end of life' stage of buildings, encouraging members to "Explore circular design approaches. Design realistically for reuse and disassembly, be open about your assumptions for the end-of-life stage of buildings and products, to facilitate wider discussion and development."

Efficiency (of the design)

AECB promotes a resource efficient approach to design and construction:

"Use natural resources extracted from our shared biosphere respectfully and efficiently to substitute for higher embodied carbon materials. Use as few materials as possible to achieve the design. Using a "renewable" material inefficiently, whether to 'develop the market' or 'store carbon' is wrongheaded – efficient use of the same quantity of material, substituting for higher carbon options across many projects, makes far more sense."

Conclusion

We need a well-structured, standards-based approach to retrofit designed to be replicated at scale across the UK. The challenge for the UK is how to scale up retrofit solutions that are ambitious and effective yet flexible enough to be appropriate for individual homeowners as well as the social housing sector. Solutions need to be pragmatic, appropriate for the UK, fair and affordable. They should provide a range of not only energy and fuel bill related benefits, but also important non-energy benefits such as climate change resilience, comfort, health and well-being, reduced local pollution and climate change emissions and of course energy security.

Adopting an appropriate and adaptable retrofit standard

Retrofit projects and programmes need to start by adopting an appropriate - and adaptable - retrofit standard. Certification to the AECB Retrofit Standard requires submission of a whole house plan and other key items of design and as-built evidence. It offers a moisture-robust route to a successful building retrofit. This standard is based on the Passivhaus Institute's Passivhaus methodology (as used for its own Passivhaus retrofit standard, 'EnerPHit'). However, the current version of the AECB Retrofit Standard responds to the type of housing typically found across the UK and sets a more relaxed space heating demand target of 50 kWh/m²/ vr, as opposed to 25 kWh/m²/vr for Enerphit. The AECB standard also includes an exemption for some specific situations of up to $100\,$ kWh/m²/yr.

We are currently researching extending the standard to also allow certification for projects where capital funds are more limited and a heat pump is being installed: under the 'light fabric measures/heat pump' version of the standard, less fabric-related efficiency measures can be balanced with excellent heat pump system efficiency and rigorous attention to minimising 'performance gap' issues. The whole house plan required for certification will ensure that deeper retrofit measures - if required later - will not be blocked or made unduly expensive. The revised standard will be attractive to retrofitters who are in interested in making significant CO2 emissions reductions whilst not paying more (cost parity) for their heating energy after they have removed fossil fuels from their homes.



Use natural resources extracted from our shared biosphere respectfully and efficiently to substitute for higher embodied carbon materials. Use as few materials as possible to achieve the design.



AECB Building Standard:

Aimed at those wishing to create high-performance new buildings using widely available technology. We estimate that this low-risk option will reduce overall CO_2 emissions by 70% compared to the UK average for buildings of each type.

AECB Retrofit Standard:

Effective retrofit is crucial to decarbonising the UK's energy systems and is a major step toward achieving net zero. The AECB Retrofit Standard tackles our historic underperformance when upgrading buildings. UK construction must deliver better energy efficiency for a low carbon future.

AECB Water Standard:

For domestic buildings achieving Passivhaus levels of thermal performance, the energy required to heat hot water is greater than for space heating. For these reasons, the AECB Water Standard prioritises hot water savings.

AECB Daylighting Standard:

Whilst recognising that the amount of daylight available within a building is constrained by the amount of useful daylight outside, the aim of the AECB Daylight Standard is to provide adequate daylight between 9am and 5pm for 70% of the year and acceptable daylight 80% of the year between 10am and 2pm.

AECB Lifetime Carbon Standard:

The aim of the AECB Lifetime Carbon Standard is to encourage the use of simple operational and embodied carbon calculations as part of the design process in UK construction projects.



LAST WORDS

#DemandReduction

We need to control the design of retrofit solutions through professionals such as architects and engineers. This work is too important to leave to the market's interpretation of sustainability, a narrow prism that might not fit with the wider lens of social housing says **Duncan Smith**, Chief Operating Officer of AECB.

The recent increase in Ofgem's energy cap, the rise in inflation and the cost of living crisis will impact millions of people over the coming year in a way that will see less money in their pocket and less heat in their homes

These factors are going to disproportionately affect those living in social housing. Many of whom are on low incomes. As many as 2 million more households may fall into fuel poverty later this year, bringing the total to over 5 million.

The very nature of what social housing was intended to be used for will be undermined if we can't provide warm, healthy homes in an environmentally sustainable way, as will be the broader impact on our society and our health service. The consequences could be catastrophic if we don't.

It's hard not to use emotive language to describe this modern-day tragedy and the broader issues that still loom large of climate change and environmental breakdown. But language won't address the root cause and help those most at risk of fuel poverty and climate breakdown. Only action will. As a body of housing professionals we need to be galvanized to achieve this.

Decarbonising heating and eradicating fuel poverty for tenants are the twin challenges social landlords face over the coming decade. They are immediate and urgent, and we can't address one without the other. Nor is there a silver bullet in technology that exists or is to be found. Whilst heat networks and heat pumps will be part of the solution; their implementation needs to be managed carefully, as their design requires careful planning.

Eradicating fuel poverty and addressing climate change requires commitment

We need resources, innovation and forward planning. Fundamentally, we need a commitment to two critical things. The first is a commitment to reducing the energy our homes need for heating- not just switching things off or turning things down. We need a commitment to Demand Reduction through fabric improvements.

The second is a commitment to the technical understanding of how buildings work and building physics by those making investment decisions and who need to know how to achieve Demand Reduction.

We don't need you to undertake a master's degree, spend thousands of pounds, or go to a retreat to achieve enlightenment. The foundations of an understanding of how buildings work, how they lose heat and retain it, can be gained in a relatively short time. As can the dangers of getting it wrong. So, a little knowledge can be a very good thing.

With retrofit and social housing, knowledge is power. As professionals, we can effectively manage the measures we need to put in place to improve lives. To do this, we need to control the design of retrofit solutions through professionals such as architects and engineers. This work is too important to leave to the market's interpretation of sustainability, a narrow prism that might not fit with the wider lens of social housing.

We need to reduce our homes' demand for energy to heat their occupants or the KWh pm2 per annum that dictates how much energy is needed for a home. Energy is money. Many don't have enough of the latter to afford the former.

What's good and what's bad?

The energy demand of 160 KWh p2 for a home would see the household at risk of fuel poverty depending on their income. One with 15 to 30 KWh pm2 would provide the same household with a warm and comfortable home regardless of their income. Sustainable, both socially and environmentally.

Within this simple equation is where fuel poverty exists and where our focus needs to be. We need to Demand a Reduction for the energy our homes need from our designers, contractors, suppliers, and manufacturers working on retrofitting our homes. Only if we do this can we both understand, address and eradicate fuel poverty.

Insulation is critical

From a practical perspective, to reduce the energy demand, what do we need to do, and how do we do it? Insulation is critical. It has to be designed and fitted correctly to ensure its effectiveness. Just like a leaky bucket, a house won't hold heat any better than the bucket can water if there are holes and gaps on the outside. Insulation on its own isn't enough. Regardless of how much insulation we put on a building, it won't reduce the heating demand as much as we need it to.

Often misunderstood or ignored is statistic that up to 40% of a building's energy can be lost through air leakage or drafts. We use air changes per hour, abbreviated to ACH, to demonstrate how good or bad this can be. Air changes per hour are simply the number of times all the air in a room is replaced with entirely new air from outside within an hour. A value of five air changes per hour means a room's entire air volume is replaced by colder air from outside five times in one hour. Even if they had the same insulation, a home with a rating of 10 ACH will require more energy for heating and cost significantly more to heat than the one with 1 or 2 ACH. 7. So to drive down the KWh mp2, we need to think about how to insulate our homes effectively when we retrofit them. But also how we reduce the warm air escaping from those homes, taking our heat, our money and our comfort with it. At the same time how we introduce warm fresh air through mechanical ventilation to promote a healthy internal environment.

Doing all of this is complex and not without risk. But if we accept the work is necessary and essential, and it is, then we have to accept that it has to have professionals such as architects, engineers and surveyors at the heart of good assessment and design to mitigate that risk. However, only if social landlords first understand the fundamentals of building physics and what is required to be delivered to decarbonize our homes will we succeed in addressing fuel poverty and climate change within our sector.

The investment decisions housing professionals will make over the coming years will impact the quality-of-life tenants enjoy.

We need to Demand a Reduction for the energy our homes need from our designers, contractors, suppliers, and manufacturers working on retrofitting our homes. Only if we do this can we both understand, address and eradicate fuel poverty.



Setting the Standard | Issue 01 | Summer 2022

Cover photo: Renfrewshire Council is embarking on a major new social housing retrofit programme that will see up to 3,500 local authority dwellings renovated to either <u>Enerphit</u> or the AECB Retrofit Standard over the next four years. The council is leading by example and trialling a well-structured, standards-based approach to retrofit that could be replicated at scale across the UK. The challenge for the UK is how to scale up retrofit solutions that are ambitious and effective yet flexible enough to be appropriate for individual homeowners as well as the social housing sector.



Editor: Sue Garland | sue@aecb.net Design: Aoife O'Hara | aoife@evekudesign.com Editorial Consultant: Jeff Colley, Editor/Publisher Passive House + Magazine

- w www.aecb.net
- e contactus@aecb.net
- t 0845 4569773
- a PO Box 32 Llandysul SA44 5ZA



w www.aecb.net e contactus@aecb.net

t 0845 4569773

a PO Box 32 Llandysul SA44 5ZA