



Innovative companies are not shying away from the challenge of retrofitting older housing stock to meet current and future sustainable standards.

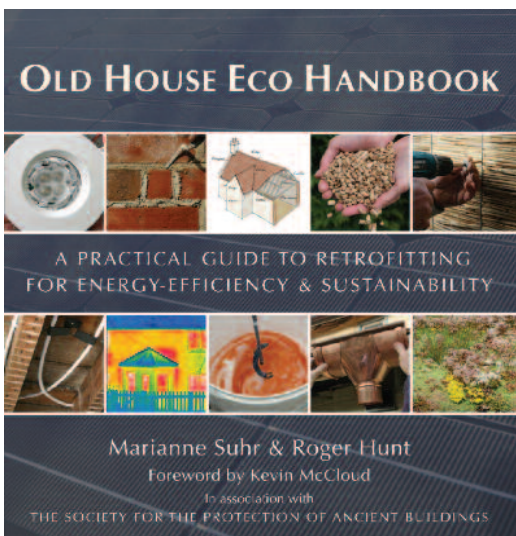
ROGER HUNT reports on the latest solutions



This ole HOUSE



IMAGE CREDIT: ROGER HUNT



ABOVE RIGHT A variety of natural insulation materials that offer 'breathability' are available including wood fibre, hemp fibre and sheep's wool

ABOVE TOP Over the past two years Hastoe has retrofitted 300 homes with a mix of technologies including solar photovoltaic panels and ground and air source heat pumps

ABOVE MIDDLE Saint-Gobain Weber's external wall insulation system has been applied to Victorian solid-wall properties and finished with a brick-effect render to match neighbouring homes

ABOVE Old House Eco Handbook – a practical guide to retrofitting for energy-efficiency and sustainability by Roger Hunt and Marianne Suhr, in association with the Society for the Protection of Ancient Buildings

For the last few years much of my time has been spent thinking about how solid-walled homes can be retrofitted to cut energy use and reduce carbon emissions. I've talked to builders, architects and product manufacturers, read lengthy reports and visited projects on site. The culmination of this effort is the publication this month of Old House Eco Handbook, a practical guide to retrofitting for energy efficiency and sustainability that I've co-authored with Marianne Suhr.

When Old House Handbook, our previous book, was published in 2008, retrofitting was still in its infancy. How times have changed. Now the pressure is on as we seek to meet the UK's 2050 target date for an 80% reduction in greenhouse gas emissions relative to 1990 levels. In his foreword to the book, Kevin McCloud puts the issue in context. "There are some 26 million homes in Britain, most of them as well insulated as a rabbit hutch, most of which will still be in existence in 2050... very roughly, one fifth of our dwellings were built before 1919. Collectively, the buildings we live in are responsible for more or less 26% of Britain's carbon emissions."

These facts, together with rising fuel poverty, health and resource issues, have spurred the retrofit agenda. The problem is that there is no quick-fix, one-size-fits-all solution. Every property is different and, importantly, most built before 1919 are of traditional solid walled construction. How to insulate solid walls, and indeed whether we should insulate them, is a much debated and divisive issue, with some believing that inappropriate measures pose a significant risk to our housing stock and the health of occupants.

Traditional buildings, of which there are around six million in the UK, have long been vilified as 'carbon

villains' for their poor thermal performance but, according to experts such as Neil May, managing director of Natural Building Technologies, this isn't necessarily the case. "Recent research has shown that such buildings actually perform better than is predicted by standard U-value calculations under BR443, and certainly much better than RdSAP default values. The risks to traditional buildings are mainly to do with altering the 'breathability' of the building fabric, something which is now acknowledged in Part L1b 2010 where one definition of a traditional building is a 'construction with permeable fabric that both absorbs and readily allows the evaporation of moisture'."

This is not the place to delve into the intricacies of dew points and interstitial condensation. Suffice it to say, concerns about moisture and the resultant potential problems of decay within the structure of traditional solid walled buildings are frequently raised. I asked Celotex and Kingspan, two of the leading suppliers of rigid foam insulants, whether they were aware that their insulation products at any time have been linked to interstitial condensation, timber rot, decay or other moisture-related issues when used in a solid-walled building.

Rob Warren, technical manager at Celotex, says: "As our insulation is supplied through distribution we are not able to track all the product or ensure that each installation has been carried out in line with our best practice guidance in all instances. However, through the contacts that we do have with our customers we are not aware of any problems along the lines you describe."

Similarly, Tony Millichap, head of technical services at Kingspan, says: "We have not been made aware of any issues with our insulation products, nor during the 30 years of manufacturing this product have we had any complaints relating to



IMAGE CREDIT: PRP ARCHITECTS

LEFT Aerogel internal wall insulation was specified by PRP Architects at Follett Street in Tower Hamlets, London.

BELOW BOTTOM Solar panels at the PRP Architects scheme at Follett Street in Tower Hamlets, London.

BELOW MIDDLE Octavia Housing undertook a Passivhaus retrofit of an 1860s property in Princedale Road, Holland Park

BELOW Thermal insulation is a key aspect of the retrofit process.



IMAGE CREDIT: ROGER HUNT

Technically, external wall insulation is usually reckoned to be the best solution but it can throw up practical, legal and aesthetic problems



IMAGE CREDIT: PRP ARCHITECTS

your question.” Both manufactures point to the fact that insulation products should be installed with due consideration to detailing, wall construction and best practice.

Neil May believes there is a wider issue to consider. “Unfortunately the standards used to assess thermal and moisture performance in traditional buildings, in particular BR443, RdSAP and BS5250, are inadequate and in many cases misleading. This is now acknowledged by academics, industry and government. Until these standards are amended, certification and assessment of systems for retrofit is being undertaken on the wrong basis, with potentially harmful consequences for building fabric and human health, as well as waste of resources and effort.”

These issues have been highlighted by the Sustainable Traditional Buildings Alliance through its DECC-funded Responsible Retrofit of Traditional Buildings report.

Another fundamental consideration with wall insulation is whether it should be installed internally or externally. Technically, external wall insulation is usually reckoned to be the best solution but it throws up its share of problems both practical (dealing with drain pipe, roof and window details) and legal (party wall issues). The other not insignificant concern is aesthetics. The local street scene might be devalued both visually and financially, and regional identity lost, when stone or brickwork, and the associated detailing, is hidden beneath insulated render.

Manufacturers such as Saint-Gobain Weber have sought to address these concerns. In Leicester, the company’s external wall insulation (EWI) system has been applied to Victorian solid-wall properties and finished with a brick-effect render to match neighbouring homes. The system uses a combination of two polymer modified mortars and

the brick pattern is achieved by cutting through the face coat to expose the contrasting base render.

Internal insulation poses an entirely different set of issues to EWI in terms of technical considerations, aesthetics, disruption to occupants, quality of workmanship and loss of space. When it comes to technical issues, breathability and thermal bridging are key. In smaller properties, the thickness of added insulation can be problematic especially in hallways and on staircases. Just as with EWI, loss of historic character is a concern as details such as cornices, architraves and skirting boards all have to be removed.

These were issues addressed at a solid wall, Victorian terrace house retrofit at Follett Street in Tower Hamlets, London. This scheme by PRP Architects was one of a number of projects I’ve visited that have been undertaken as part of the Retrofit for the Future competition run by the Technology Strategy Board. A key feature of the project was the use of aerogel internal wall insulation, which, although expensive, offers very high thermal performance, helping to minimise loss of space within the home. Sensors in the timber joist ends within the solid brick walls are providing ongoing monitoring for signs of interstitial condensation.

To show that deep-energy cuts are possible with social housing stock, Bere Architects used Passivhaus as the guiding light at two Retrofit for the Future schemes in London: Passfield Drive in Tower Hamlets and Grove Road in Hounslow. Measures included Passivhaus levels of insulation and triple-glazed windows.

Octavia Housing’s Princedale Road Passivhaus retrofit of a 1860s terraced house in Holland Park involved substantial work to the building. The project underlines the potential costs involved: ▶



IMAGE CREDIT: PRP ARCHITECTS



IMAGE CREDIT: ROGER HUNT

materials and labour totalled £178,290, of which the energy saving measures were £87,477.

Balancing this are the rewards. A study conducted on Princedale Road, examined the performance of three houses, each refurbished to a different standard: Passivhaus, Decent Homes Plus and 'typical'. The Passivhaus outperformed the others in a number of ways. The final energy demand was reduced by 83% in the Passivhaus and 46% in the Decent Homes Plus scheme, which took insulation and airtightness considerations into account, in comparison with the typical house, designed to meet current building regulations.

Retrofitting is not just about building fabric. Over the past two years Hastoe has retrofitted 300 homes with a mix of technologies including solar photovoltaic panels and ground and air source heat pumps. To date, this programme is saving residents on average £200 per annum on energy bills.

For successes such as this to be achieved it's vital that the industry engages with householders from the start and, importantly, that residents like living in the properties that result. Multi-skilled teams, who are capable of delivering retrofits of the highest quality, are vital and ongoing monitoring of completed projects is crucial.

Looking forward, the Technology Strategy Board is investing up to £4.5m in its Scaling up Retrofit of the Nation's Homes competition for collaborative R&D funding. In addition, the Energy Technologies Institute has launched a £3m research project led by PRP which will lead to a comprehensive behavioural study involving householders. It will focus on heat and energy consumption as part of the Smart Systems and Heat technology programme. The solutions developed will inform the development of future energy products and services for retrofitting existing homes. [sh](#)

CONTACTS

Bere Architects www.bere.co.uk

Celotex www.celotex.co.uk

Kingspan www.kingspaninsulation.co.uk

Natural Building Technologies

www.natural-building.co.uk

PRP www.prparchitects.co.uk

Saint-Gobain Weber www.netweber.co.uk

Sustainable Traditional Buildings Alliance

www.stbauk.org

Old House Eco Handbook – a practical guide to retrofitting for energy-efficiency and sustainability by Roger Hunt and Marianne Suhr, in association with the Society for the Protection of Ancient Buildings, is published by Frances Lincoln, £30.

Read Roger Hunt's blog: www.huntwriter.com
or follow him: www.twitter.com/huntwriter

TOP Solar panels at the PRP Architects scheme at Follett Street in Tower Hamlets, London

ABOVE Roughly one fifth of our dwellings were built before 1919

THIS PIC Multi-skilled teams, who are capable of delivering retrofits of the highest quality, are vital



IMAGE CREDIT: BERE ARCHITECTS