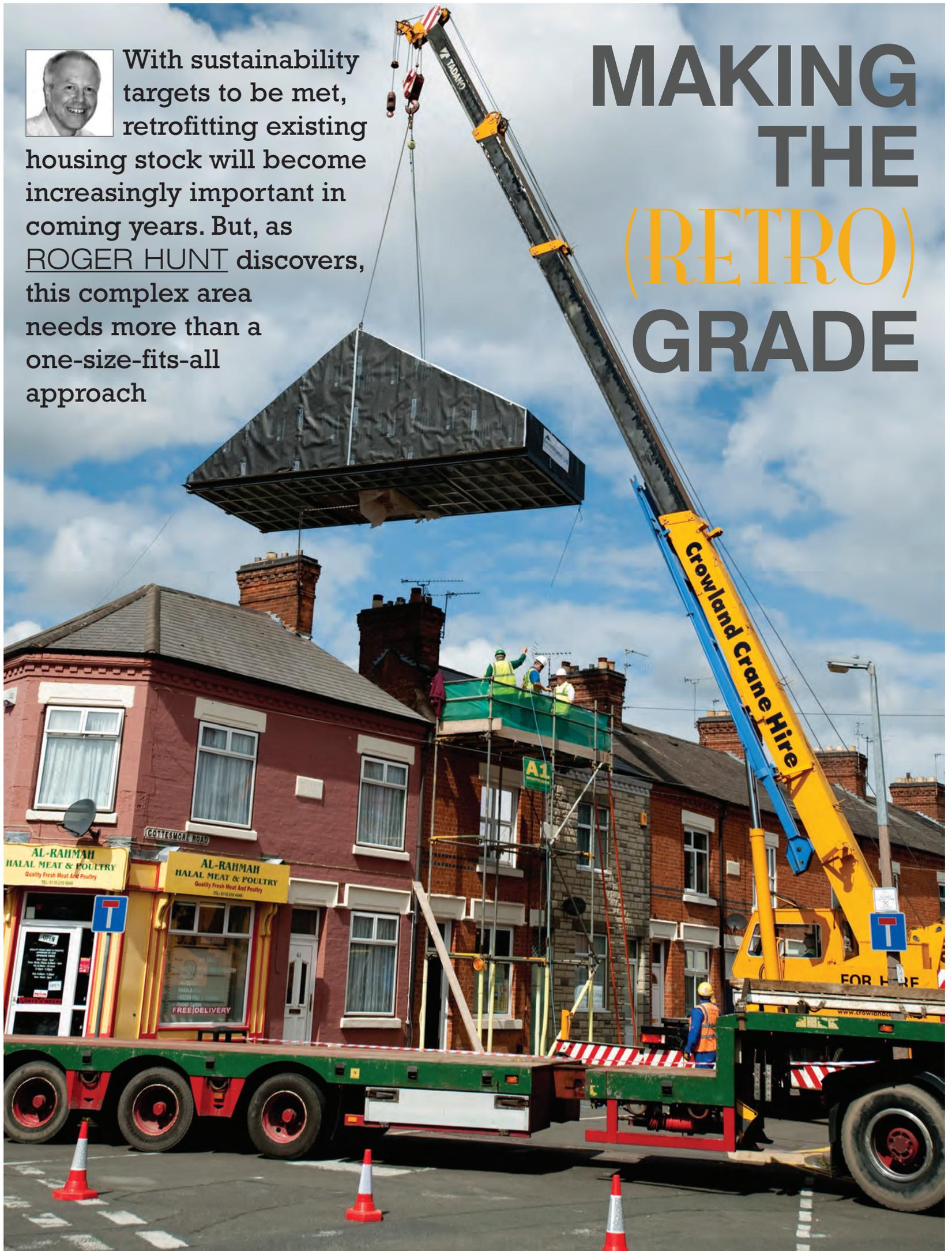




With sustainability targets to be met, retrofitting existing housing stock will become increasingly important in coming years. But, as ROGER HUNT discovers, this complex area needs more than a one-size-fits-all approach

MAKING THE (RETRO) GRADE



Prefabricated top floor and roof craned into position during a retrofit for East Midlands Housing Association by architect Gordon White & Hood. From Residential Retrofit: 20 Case Studies, by Marion Baeli



Over two-thirds of the 2050 housing stock has already been built so there is an undoubted need to look to retrofitting solutions to extend its life and improve its energy efficiency and sustainability. How this is done successfully and economically is another question, and one that is only now beginning to be answered. Even then, it must be recognised that every building – even in the same terraced street – is potentially different and consequently requires a bespoke solution.

The diversity of building types that needs to be understood and addressed is illustrated in *Residential Retrofit: 20 Case Studies*, by Marion Baeli. All but two of the projects in this recently published book were drawn from the Retrofit for the Future programme initiated by the Technology Strategy Board in 2009. This had the aim of demonstrating innovative approaches to deep retrofitting of the UK's social housing stock.

Although Baeli acknowledges that not every home is suitable for retrofit, she believes that, in general terms, studies on embodied carbon have shown that the process of retrofitting is more advantageous than demolition.

Baeli can speak with authority on retrofit. As an architect and associate at Paul Davis + Partners, she helped deliver the award-winning Princedale Road project, near Holland Park in London, the first certified Passivhaus retrofit in the UK. She sees simplicity as key. "The fabric-first approach is the priority, addressing the efficiency of the thermal envelope. The airtightness strategy in Princedale – a continuous layer of OSB – is a simple measure yet extremely effective."

The growing acceptance of the fabric-first approach is underlined by Rod Leigh, Jewson's sustainability

director: "While several years ago renewable technologies were the hot topic, it seems that now the practicalities of a fabric-first approach have won through. This is fundamentally viewed by the wider construction industry as today's best practice approach to refurbishment and retrofit, with renewable systems considered once the fabric has been made good."

As Baeli points out, all the examples given in her book are exemplars. "The case studies are, at the moment, prototypes that tested many combinations of measures at a rather high cost, not replicable for the mainstream. However, the high cost was also partly due to the unskilled labour that mostly implemented these measures for the first time. So there's a premium paid for the learning curve. Materials could also become cheaper as competition increases in the market; for example, the price of MVHR. One can hope that prices will reduce as these projects are being rolled out across the country."

Maintaining good practice within the retrofit industry is essential. Andrew Orriss, SIG360's head of business development, believes that this is, in many ways, dictated by the many layers of compliance that have been introduced for Green Deal and ECO retrofit installations but he highlights a key problem. "We've found that on large schemes, where there are several teams of installers moving around the site, it can be a real challenge for suppliers to maintain control of the skill level of the workforce, and therefore to ensure a consistent level of installation quality across the site."

Systems designed to simplify and enhance the installation of wall insulation include Brickshield manufactured by Ibstock in partnership with

RIGHT Hastoe worked with ECD Architects on the retrofit of No.4 Gaymer Memorial Cottages, Attleborough, using £150,000 funding from the Technology Strategy Board. Technology included Spacetherm insulation, an air source heat pump and solar panels, which have cut carbon emissions by 92%

BELOW RIGHT During a retrofit designed by PRP of a Victorian terrace
BELOW WHISCERS: install

BOTTOM LEFT The finished retrofit for Cambridge City Council by PRP Architects at Byron Square of a 1947 house of light gauge steel frame construction. External wall insulation and other measures were employed

BOTTOM RIGHT New sash lookalike casement window at Princedale Road Passivhaus retrofit. From Residential Retrofit: 20 Case Studies, by Marion Baeli

OPPOSITE PAGE

FAR LEFT TOP TO BOTTOM Ibstock's Brickshield used on 1940s bungalows: before, insulation, slips on, completed

LEFT WHISCERS: laser scanner and board cutting



Rockwool. This external cladding system, which combines high durability insulation boards with clay brick slips, was used by Plus Dane Housing Association and Cheshire West and Chester Council during the staged refurbishment of 104 prefabricated 1940s metal-clad bungalows in Ellesmere Port. The first phase of 41 bungalows was completed in four months. Overall project cost savings as a result of using Brickshield enabled the housing association to complete the transformation of an additional seven properties within the original budget.

As an internal insulation solution, United House continues to roll out its WHISCERS (Whole House In-Situ Carbon and Energy Reduction Solution) concept across London and the south and aims to be installing the insulation in 10,000 properties per year by 2016. Developed in conjunction with the Sustainable Energy Academy, this uses laser scanning to measure the dimensions of a room, allowing insulation boards to be cut off-site and installed quickly within homes.

United House undertook the first mass roll-out of WHISCERS on behalf of Mole Valley Housing Association in two tower blocks on the Goodwyns Estate in Dorking, Surrey. "The overall carbon efficiency of the building has improved by 80%, which is very positive news, with fuel bills cut by around £445 each for the tenants," explains Chris Cheshire, business leader for innovation at United House.

One of the concerns with retrofitting the so-called hard-to-treat category of, generally pre-1919, solid-wall properties is the risk of interstitial condensation associated with internal wall insulation. Baeli explains that there are many views among professionals and this topic is still not yet well enough researched. "UCL

is carrying out testing and I look forward to hearing evidence from thorough research. There are so many factors affecting this, such as orientation, quality and porosity of the brick and so on, that this is an issue to be assessed pretty much on each project. There are several options that one can take, which are illustrated in the book."

With the aim of addressing risk in retrofit, the Sustainable Traditional Buildings Alliance (STBA) and Department of Energy and Climate Change have released the Responsible Retrofit Guidance Wheel and Knowledge Centre.

The Guidance Wheel is an online tool that highlights heritage, technical and energy issues to be considered when planning retrofit strategies. It takes into account the location, context and type of user. For any selected measure, it identifies areas of risk to

occupants or building fabric and displays the links to other aspects of the building that need to be considered at the same time. Once the user has completed the investigation, a report can be downloaded that sets out all the context and user information together with the measures selected and the concerns raised.

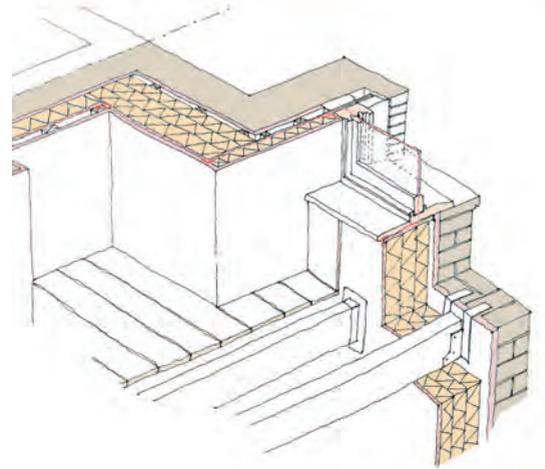
The Knowledge Centre is directly linked to the Guidance Wheel and is an interactive database that will be constantly updated as new research becomes available and further case studies are added.

All sectors of the industry, including housing associations and end users, are still learning about retrofit. Darren Cruice, investment manager at Hastoe, says: "As we do more works, we're getting better at understanding the advantages and disadvantages of new technologies, which are ►





ALL PICS ON THIS PAGE
Retrofit of pre-1919 house for Family
Mosaic by Prewett Bizley Architects:
front and rear post retrofit, prototype
gutter to fit over external insulation,
detail of internal insulation to front
facade. From Residential Retrofit: 20
Case Studies by Marion Baeli



“While several years ago renewable technologies were the hot topic, it seems that now the practicalities of a fabric-first approach have won through. This is viewed by the wider construction industry as today’s best practice approach to refurbishment and retrofit”

constantly changing. We’re also gaining a greater understanding of resident liaison and education issues, which is a key area.”

The need to persuade residents to accept new technology and move away from existing heating systems such as open fires is vital, explains Cruice. “A lot of people overheat their homes with existing heating systems whereas new systems such as heat pumps work on a whole house basis. It means that people don’t always make savings on their bills, although many do. The other issue is that the works can sometimes be very intrusive and need to be managed carefully.”

PRP Architects has recently begun work on Scaling up Retrofit, a project to build on residential retrofit desktop research undertaken for the Energy Technologies Institute with the primary aim of demonstrating the viability of the technical, process and commercial models.

“A detailed development process will be followed by demonstration trials on 10 homes in order to refine the solutions. We wish to prove that, as in one example, a three-bedroom semi-detached house can undergo a full thermal retrofit for around £15,000 in less than 10 working days, achieving typical carbon dioxide emission reduction savings of 50%,” explains Andrew Mellor, a partner at PRP

“The project keeps the householders’ needs for good value, trusted suppliers and minimal disruption at the heart of our approach to delivering mass-scale residential retrofit. We anticipate achieving significant reductions in the capital cost per home

and installation programme while maximising ‘in-use’ energy savings. The completed demonstration homes will be monitored for at least a full winter period and real-time displays will be provided in homes pre retrofit to provide information to residents and project partners before, during and after the retrofit installation.”

Monitoring has already provided essential data on which to judge the success of a wide variety of retrofits and is informing future projects. Interestingly, Baeli identifies comfort as the biggest gain through retrofit. “The graphs speak for themselves. Generally the houses are offering extremely good levels of comfort and this and energy reductions represent the biggest wins.” ⁵¹

Residential Retrofit: 20 Case Studies, by Marion Baeli, is published by RIBA Publishing, £29.99.

CONTACTS

Ibstock www.brickshield.com
Jewson www.jewson.co.uk
PRP www.prparchitects.co.uk
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