



LEFT: Bere:Architects' thermal image shows their project behind scaffolding and the heat loss from single glazed windows to the left.

IT'S A BIG DEAL

One of the trickiest aspects of sustainable housing is the **existing building stock**, but a scheme to involve small businesses in retrofitting and boost skills has thrown up some interesting techniques. Now the Green Deal needs to deploy this knowledge

Words Eleanor Young

SQUEEZED INTO A SMALL Victorian terraced house in west London are half a dozen architects with one question on their minds: 'How did you get the air tight seal?' Five or six inquiries on the topic are dealt with in detail by Marion Baeli from Paul Davis and Partners, the architect on the Princedale Road Retrofit for the Future project. She knows it is difficult to achieve air tightness and those in her tour group are coming to appreciate the difficulties, and some of the answers. It is a steep learning curve.

In a way that is the point. Princedale Road is one of 87 projects involved in a £17m government scheme intended to kick-start the retrofitting of the UK's social housing stock. Under the

Technology Strategy Board's (TSB) Retrofit for the Future scheme, councils and social housing organisations submitted projects that matched its target CO₂ reductions of 50%-80% – down to 17kg-20kg CO₂/m².yr. All the occupancy data is being collated online and interrogated by the Energy

Saving Trust to see what works. A major aim was to get small businesses – from architects and joiners to green plumbers and manufacturers – to gear up to improving our housing.

Most of the projects concentrate on the mainly proven big moves. The biggest is to get the building envelope performing. That means insulation, and usually significant overcladding. Windows are also key with most teams opting for triple glazing where possible. PassivHaus principles are strongly visible with the use of mechanical ventilation and heat recovery.

Some fairly new products have been trialled. Retrofit for the Future is creating a fledgling UK market in areas like mechanical ventilation

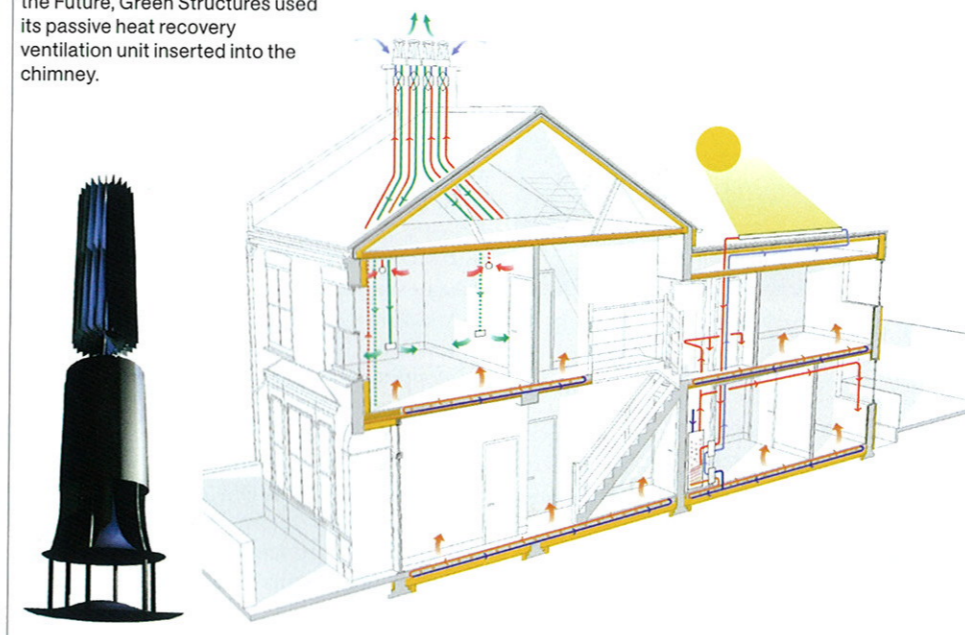
and heat recovery. White Design specified Shower-Save, which recovers heat from spent shower water – a product which manufacturers claim is in 20% of new homes in Holland. The initial boost of funds has also given the excuse for firms like joiners to work out how to design triple-glazed windows that can at least pass themselves off as sash windows in conservation areas. A neat hinge on triple-glazed, argon-filled tilt and turn windows aiming for 0.8 u value has been developed for Princedale Road.

Prewett Bizley Architects used the expensive but highly insulating Aerogel around a semi-bay window where space was tight. It found that, apart from the cost, working with it on site was the real barrier to use: when cut with a circular saw as directed, the dust made it impossible to stick anything on top of whatever it touched. Buro Happold, meanwhile, has designed a solar warm air collector for Fraser Brown MacKenna Architects' Thamesmead Estate project in east London: sun shines through the translucent layer of Nanogel and warms the cavity between it and the original concrete wall to preheat fresh air via a heat exchanger.

For architects, gearing up has included

PASSIVE VENTILATING BY CHIMNEY

RIGHT: On its Brixton Retrofit for the Future, Green Structures used its passive heat recovery ventilation unit inserted into the chimney.



perfecting how to work with the PassivHaus Planning Package and SAP, honing cold bridging spotting skills and, for Bere:Architects, forking out on a thermal imaging camera which has proved a revelation. It is clear that the project has brought out the best in architects who, though many are well versed in designing sustainable homes, have really stretched themselves to come up with solutions that deal with some of the big problems of this new paradigm of massive sustainable retrofitting.

Prewett Bizley has tried to find a fix for gutters over projecting insulation (see over), working in great detail through fixings, run-off points, air circulation and splashing to find a visibly elegant solution. Narrow Victorian eaves and a foot of insulation made it quite a struggle. 'Halfway through I thought, there's a reason we haven't seen a solution for this before,' says Prewett. He hopes to get the design disseminated more widely through a standard book of suppliers of rendered insulation.

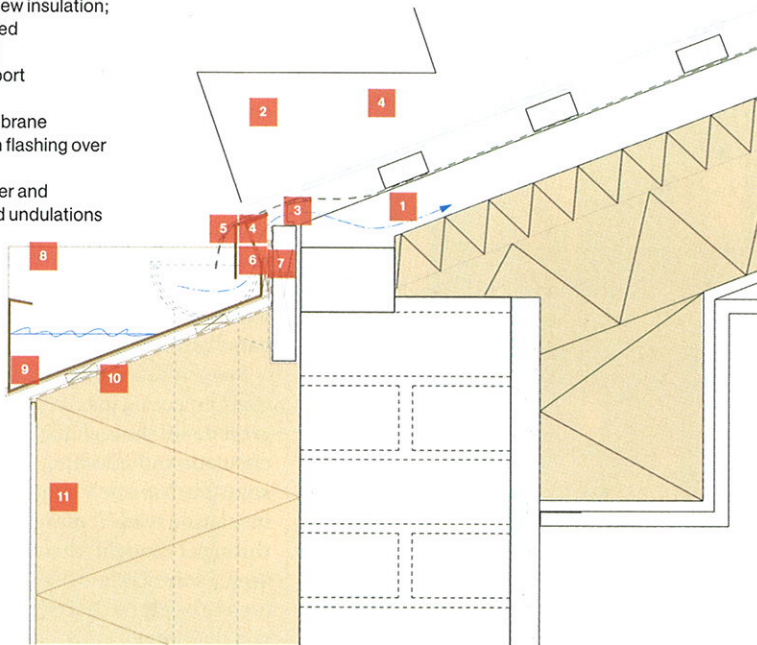
Ductwork associated with heat recovery and ventilation systems has proved another major test. This is where a good design can fall down, as Baeli from Paul Davis Architects attests: 'It was a massive job co-ordinating the ductwork, especially as the wet and dry rooms changed at the last minute.' And it's sensitive: these objects take up a lot of space. Bere:Architects' end users temporarily halted the job when they saw the ducts going in, fearful of losing storage – a situation that took some careful negotiation.

Green Structures architect Thomas Lipinski, rejecting disruptive and unreliable mechanical ventilation, uses the chimney to exhaust stale air by stack effect and wind, capturing heat at the chimney cowl. Dropping a liner down the chimney and drilling holes in each room to connect the passive ventilation units is far simpler than fitting continuous ductwork.

Lipinski is also using his three Retrofit for the Future projects to try out increasingly sophisticated levels of thermal storage: another response to PassivHaus which he says does not guarantee the sort of warmth most people now expect. He calls it a mass thermal accumulator. In the first project, in Brent, the phase change materials should store heat from the solar thermal panel and release it over a number of days. His Haringey project is planned to have an interseasonal thermal store which will collect

KEY TO DRAINAGE DETAIL**Roof eaves detail**

- 1: Existing rafters with new insulation; ventilation gap retained
- 2: Existing lead flashing
- 3: Existing vent tile support
- 4: Ventilation holes
- 5: Existing sarking membrane
- 6: Gutter end piece with flashing over
- 7: Splash protection
- 8: Spacer between gutter and bracket to make good undulations in eaves board
- 9: New eaves gutter 2mm aluminium
- 10: DPM between gutter and insulation and ventilation gap
- 11: New 280mm rigid insulation with render



RIGHT: Prewett Bizley's bespoke drainage detail, sealing the top face of the external insulation and (BELOW) as installed.

enough warmth in the summer (600kWh) to release it throughout the winter. Both vent units and thermal stores are still very much at the prototyping stage and need mass production to bring costs down, but he has already won Green Apple and Ecobuild awards for them.

Getting things built and built well is at the crux of retrofitting homes. The two biggest challenges are working with old buildings that are not straight and true and creating a culture and understanding on site of what 'airtight' means – and that it will be tested. This has to be built in from the beginning with drawings clearly showing airtightness lines and can mean being prepared to put on a show and take examples of what you mean to site, as well as extreme vigilance. Prewett found that acting as a contractor (an accident of form filling for funding) gave the practice a bit more clout, and made them very aware of the importance of sequencing the works to get a good performance.

Dealing with builders and contractors is one thing but there were also valuable lessons about working with tenants. PRP Architects worked on five projects of different ages and construction techniques, all with tenants in situ. PRP's director of environmental services Andrew Mellor preferred it this way. 'I don't believe you can decant people if retrofitting is to be on a major scale,' he says. But even so the



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level of interaction required was extremely high – updates were almost daily, taking into account everything from the continuity of TV to keeping a constant hot water supply.

Will all this valuable experience add up to anything at a national scale? The obvious vehicle for government funding is the Green Deal. It looks like this will target individuals who will take out loans for improvement works that will be paid back through energy bills which remain attached to the home, even after a householder moves on. It is due to roll out in autumn next year. Its name may sound like Roosevelt's depression spending plan but it seems more Deal or No Deal than the New Deal. Figures being bandied around suggest about £6,000 per loan – which will not go very far. Mellor questions the point: 'Will it just pick off the low hanging fruit of loft and cavity wall insulation?' With this option, and budget, it seems there would be little room for architects.

But while householders may think of retrofitting on a room by room scale, perhaps as they extend a home anyway, most architects on Retrofit for the Future agree that any mass, cost-efficient roll-out needs to look at working at street or community scale. Birmingham City Council is already said to be trying to get ahead of the curve by looking at options for thousands of homes, and other cities are likely to follow. Mellor's suggestion is for a shopfitting method, of a big team with all the skills that can do everything needed (including, say, re-siting the gas meter) in one hit.

Exactly how delivery will work is up for grabs. The government is already hinting that supermarkets might be certified Green Deal providers, while it identifies installers as being another way of marketing it. There is a certain wariness following the Australian experience, where an insulation and solar rebate programme resulted in the death of four installers, roof fires and 1,000 electrically live homes of the million that had undergone a retrofit (the scheme was cancelled last year).

And Mellor raises the spectre of damage to the housing stock, both aesthetically and economically. Overclad insulation and ductwork installed by poorly regulated groups could ravage streetscape and building structures alike. Retrofit for the Future, along with other TSB initiatives, has provided one alternative delivery model and given some of the industry's best people the chance to build up their skills. Let's hope those skills get a chance to be used. ■

www.retrofitforthefuture.org, <http://tinyurl.com/22s9jxf>