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B U I L T E N V I R O N M E N T M A T T E R S

GREEN REFURB

Time to realise the value of existing stock





MAKING BETTER USE OF STOCK

► **Mark Elton, Associate Director and Head of Sustainability at ECD Architects, looks at how we can make the best use of existing assets to ensure they are 'fit for purpose' and energy efficient.**

There can be few people in the construction industry who question the importance of tackling the energy efficiency of our existing housing stock, for a variety of reasons. In the UK, just under half of our greenhouse-gas emissions are associated with our use of buildings – with the largest proportion of these coming from housing. Even at ambitious rates of demolition and replacement, zero-carbon housing developments of the future will only reduce current emissions by a fraction compared to an

80% reduction from our existing homes.

On the other hand, if you consider that tackling unemployment in our sector and kick-starting the economy are of more immediate concern, then, taking into account the UKGBC estimates that green retrofit represents an estimated worth of £3.5-6.5bn a year in business opportunities with the creation of tens of thousands of new 'green collar' jobs, eco-retrofit represents a significant opportunity to re-employ and retrain our construction workforce. Virtually eliminating emissions from housing, as the

Committee on Climate Change suggests is necessary, would also make a major contribution to the Government's objectives on both renewable-energy generation and reducing our reliance on imported fossil fuels. But to many ordinary homeowners, social landlords and their tenants, such benefits are too removed from their everyday circumstances to be the main motivation for green retrofit. For them, it is the need to address fuel poverty and simultaneously improve comfort and quality-of-life standards that is most pressing.

BASIC MEASURES

To date, Government initiatives on energy efficiency have focused on easy-to-install measures, with the primary aim of reducing fuel poverty. Despite early success however, and as fuel prices rise, the number of fuel-poor households is on the increase again and heading towards four million. The package of improvements offered under the Warm Front and Decent Homes Standard programmes often amounts to one or two basic measures, for example replacement boilers and double-glazed windows. Their impact on both the performance of the dwelling and their relative reductions in CO₂ emissions are rarely

Case Study 1: Edward Woods Estate, Hammersmith & Fulham

ECD Architects has been working with the Edward Woods Estate community for some time on proposals for a comprehensive low-carbon refurbishment of three 24-storey towers. A broad strategy for refurbishment was put together with H&F Homes and energy consultant ESD (now Camco), concentrating on energy efficiency and energy generation, inspired by the London Plan mantra of “be lean, be clean, be green”. This includes insulated overcladding with a Rockshield insulated render system that will reduce external wall U-values to around 0.18W/m²K. Double-glazed curtain walling to the stair slots and the introduction of automatic venting will reduce heat losses from the core of the building. On the window façades, cavity fill insulation and Rockpanel overcladding between column casings will address heat loss and degradation of the mosaic tiling. Studio flats at each level will be converted from electrical storage heaters to condensing boilers in line with the rest of the properties. Solar Technologies will be responsible for installing six roof-level Proven wind turbines in total and over 50kWp of polycrystalline photovoltaic cladding to the southernmost façade of each tower, making it the largest building-integrated photovoltaic and turbine project in London and providing the potential to generate 124,300kWh of electricity per year. Work starts on site this summer.



considered holistically.

A classic example is where new uPVC double-glazing replaces steel-framed windows in a poorly ventilated, solid-walled flat thus making the external walls become the coldest surface in the room, attracting condensation and subsequent mould growth. In the worst-case scenario, this can lead to mechanical extract ventilation being retrospectively installed, expelling warmed air direct to outside.

A WHOLE-HOUSE APPROACH

The deep cuts in CO₂ emissions now sought require a far more integrated or ‘whole-house’ approach. A hierarchy of retrofit targets will need to be established for each dwelling type: minimise heat losses from the building fabric; install an easily replicable, efficient form of space and water heating; reduce the energy requirements for lighting; utilise the most appropriate renewable forms of micro-generation.

Heat loss will have to be addressed through significantly improved insulation to floors, external walls and roofs, alongside replacement high-performance glazing to

windows and detailed consideration of insulation continuity, air-tightness improvements and control of moisture. This in turn may necessitate the installation of a mechanical ventilation system with heat recovery from the extract air.

Our recent ‘Retrofit & Replicate’ pilot for Hyde Housing Association (shortlisted in the **sustain’ Magazine Awards 2009**) employed super-insulation internally and externally, Passivhaus-standard window replacements, air-leakage reduction, retrofitted MVHR, boiler renewal, 100% LED lighting, solar thermal collection and 10sq m of photovoltaics in search of the target 80% reduction in emissions.

The Existing Homes Alliance Declaration endorses this strategy, arguing that it “brings greater economic savings to business and causes less disruption to households over time”. The assumption is that the package of improvements will be cheaper and better integrated when installed simultaneously – the other major benefit of this approach is that a significant reduction in fuel bills is achieved from the outset. This opens up the potential for Pay As You Save mechanisms of financing the

refurbishment, whereby both the retrofit investor and the householder benefit from the savings and the costs are spread over a substantial period of time and potentially across different owners.

COMFORT CONSIDERATIONS

As well as the obvious financial benefits of this approach, the improvement in quality of life can be considerable. Thermal comfort is fundamental to our wellbeing and best-practice insulation and draughtproofing standards can accomplish this with minimal reliance on costly fossil fuels for residual heating. Another potential benefit of such measures is an improved acoustic performance of the building fabric – privacy from neighbours and external noise-pollution sources are one of the most important comfort considerations in higher density properties.

Furthermore, improved ventilation and control of moisture, either through passive systems and breathable materials or filtered mechanical heat-recovery solutions, can go some way to address health issues such as asthma, where the UK has amongst the highest number of cases in the world.

It is worth noting also, the insulation of solid-walled properties, arguably the next “low-hanging fruit”, is going to have significant implications for the appearance of our homes, either through internal dry-lining or external cladding with render or rainscreen systems. The vast swathes of post-war estates and tower blocks owned by Local Authorities and social landlords are obvious candidates for this approach where, in many cases, CO₂ reduction could be seen as a welcome motivation to transform the appearance of the property. ▶



AN INDUSTRY-WIDE APPROACH

The scale of the retrofit challenge can appear overwhelming – in the region of 80% of our current dwellings will remain by 2050 which crudely translates to 11,000 whole-house refurbishments a week for the next 40 years. On this basis, the £100M allocated by the Treasury to the existing stock in the recent budget would last less than two days! Clearly an industry-wide approach is needed, encompassing a broad coalition of professionals: policy-makers and finance experts to establish a viable

UKGBC estimates that green retrofit represents an estimated worth of £3.5bn – £6.5bn a year in business opportunities

implementation framework; building surveyors capable of carrying out advanced energy audits; consultants experienced in green retrofit design and specification; multi-skilled retrofit contractors familiar with low-carbon measures and technologies.

The opportunity to trial such a collaborative approach has recently been invited through the Technology Strategy Board call, 'Retrofit for the Future'. This competition will look for demonstrator whole-house solutions to social-housing properties with 100% funding for each proposal being offered. It is hoped to complete at least 50 exemplar retrofitted properties "with radical solutions for real people" which will then be extensively monitored to provide evidence of in-use performance benefits and costs. By deliberately selecting as broad a range of low-rise housetypes and geographic locations as possible, it is hoped that an invaluable pattern book and database for green retrofitting across the UK will be developed.

Fifty properties may be a drop in the ocean in terms of the total UK stock, but as blueprints for the future of low-carbon refurbishment let's hope they can make a big splash ◻

Further information sources:

<http://www.innovateuk.org/content/sbri-competition/retrofit-for-the-future.aspx>
http://www.sustainablehomes.co.uk/refurb_for_real.aspx

Case Study 2: 'Retrofit and Replicate', Court Farm Road, Mottingham, SE9



ECD Architects, together with Hyde Housing Group, Mears contractor and Keegans cost consultant, undertook this exemplar retrofit project in 2008 – a three-bedroom mid-terrace house in Mottingham, south-east London, typical of its stock. The 'Retrofit and Replicate' strategy focused on carrying out the most straightforward improvements to reach an 80% CO₂ reduction target... and on

doing them well. The priorities were to minimise heat losses from the building fabric; to install an easily replicable, efficient form of space and water heating; to reduce the energy requirements for lighting; and to utilise the most appropriate renewable forms of micro-generation in reducing CO₂ emissions associated with the property. The project involved internal and external phenolic wall insulation to 0.15W/m²K, underfloor insulation, triple-glazed NorDan timber windows, retrofitted MVHR, 100% LED lighting east-west facing solar thermal collectors and 1.36kWp of photovoltaics to increase the SAP from 60 to 94. The property achieved an airtightness rating of 5.6 m³/hr/m² @ 50Pa and is now being extensively monitored, with tenants undergoing post-occupancy evaluation to find out the refurbishment's impact on their lifestyles. Water-conservation measures included gravity-fed rainwater harvesting, low-flush WCs, spray taps and showers, as well as the usual irrigation butt.