

THE FUTURE IS RETRO-FIT

Bringing the housing stock up to scratch



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Introduction

The government's commitment to cutting the carbon dioxide emissions of Britain's homes has galvanised the house-building industry into action. Requiring all new-build housing to meet zero-carbon standards by 2016 is a great statement of intent. But, in all honesty, new build is the low-hanging fruit in policy terms. And that's what is in the spotlight – while upgrading the existing housing stock is the unmentioned elephant in the room.

We have to get new-build right, of course, and there are a number of issues that need to be addressed, from defining what zero-carbon actually means, and clarifying how we monitor and enforce the standards, to researching low-carbon solutions and skilling up the supply chain. But the stark truth is that 80% of the homes we'll be living in by 2050 are already standing today.

By that same date, the scientific consensus is that we need to cut carbon emissions in the UK by 80% by 2050 in order to avoid dangerous climate change. When you consider that our existing homes are responsible for 27% of the UK's current carbon emissions, you start to get a sense of the challenge ahead. Throw into the mix the fact that nearly three quarters of these homes are in private ownership, and you can appreciate the difficulties government is facing. It will have to come up with a robust response pretty soon.

Reaching these tough goals will depend on getting a lot of players onside – including local and regional authorities, housing associations, energy and technology companies, and mortgage providers, as well as communities and individual homeowners. This special publication highlights the issues that need to be addressed, and showcases current areas of best practice, research and innovation.

There is no doubt that we need joined up policy interventions to ensure effective local strategies on all-too-familiar issues such as fuel poverty and urban regeneration. But we must also recognise that the current focus of such strategies falls well short of the level of carbon reduction required. In short, the UK requires strong political leadership, with well-resourced schemes to encourage private energy-efficient refurbishment and retrofitting of suitable technologies on a massive scale.

Business has a vital role to play; ensuring that we have the skills, knowledge and capacity to deliver low-carbon solutions. There are great opportunities and rewards out there for early movers and those with the right goods and services. But only fiscal incentives and consistent messages from government can provide certainty in the marketplace and stimulate the innovation required.

Further work is also required to establish the links between more sustainable homes and the concepts of improved quality, and added value. This will in turn encourage the providers of services to homeowners, including estate agents, surveyors and mortgage lenders, to develop more sustainable products and services. The technical solutions are either emerging or already available. What we now need is a much better policy framework and far greater delivery capacity. Then, and only then, we will start to get the kind of carbon reductions we need from our existing housing stock.



*Martin Hunt leads
Forum for the Future's
work on the built environment*

Where the action is

Matt Ross on the scope for a patchwork of refurb programmes to join up around the sustainability theme.

Britain's frenetic, 15-year property boom may be fading now, but it's leaving quite a legacy. Fuelled by spiralling prices, our towns and cities have sprouted gleaming new apartments, iconic buildings and fashionable urban quarters. And our existing housing stock has also seen dramatic change. TV programmes such as *Changing Rooms* and *Property Ladder* have turned us on to the scope for high-profile (and high-value) housing makeovers; home improvers have extended, upgraded and refurbished for both pleasure and profit; and an assortment of government-funded programmes have supported efforts to raise standards in the homes of council tenants and poorer owner-occupiers.

Since 2001, the government's £40 billion Decent Homes (DH) programme has refurbished nearly a million social properties, while much of the £1.2 billion handed to nine 'housing market renewal pathfinders' to tackle housing blackspots has been spent refurbishing the homes of poor owner-occupiers. Meanwhile, councils have been tasked with cutting residential energy consumption by 30% between 1996 and 2011, while the government's Warm Front, Warm Zone and Energy Efficiency Commitment schemes have channelled billions into insulating vulnerable people's homes.

Unfortunately, however, we don't have the happiest history of concerted action on refurbishing, insulating and

improving the sustainability of our built environment. There's a long legacy of activity divided by separate funding streams and management structures, with the various actors tasked with hitting different targets by uncoordinated government departments, and local programmes left to operate in less-than-glorious isolation. "We're not joining up," says Alan Slater, head of housing services at Stoke-on-Trent City Council. "We've got the national Warm Front scheme here, plus our own Warm Zone and the DH programme. But they're never brought to bear in an integrated way on an estate level or on individual properties."

Indeed, there are precious few examples of councils actively promoting sustainability through refurbishment – though they do exist. In the rural northeast, Wear Valley District Council's environment officer Ian Bloomfield match-funds the government's Low Carbon Buildings Programme with council cash to subsidise solar thermal and wind turbine installations for isolated private households. "People don't take the risk unless the incentive is there, but we're willing to heavily subsidise them, and with those incentives people come on board," he says. By working with industry body National Energy Action, Bloomfield attracts further funding from utility companies keen to trial new technologies.

"All we have to do is find the properties," he says. "We



David Hoffman/John Birdsall Photo Library

*The outlook is good
with solar skills*

want to be the lead authority in trialling these products.”

Most councils, however, lack the cash and capacity to champion renewables so actively. “I am obliged to meet DH standards by 2010, and if I fail on that but do some really innovative work then I won’t be thanked for it,” says Slater. He’s also concerned that the government is cutting refurbishment budgets to boost funding for new affordable housing. His worry, he says, is “that I won’t have the financial flexibility to deal with poor housing and carbon footprint issues in the private sector”.

In Sheffield, the city council’s sustainable housing and affordable warmth manager, Robert Almond, is encountering similar problems. All the city’s sheltered housing schemes are set to be refurbished, and he’d like to install ground source heat pumps – but he may miss his chance. “The difficulty is whether we can find the extra cost within the DH programme, because it’s an opportunity rather than an encouragement on these issues,” he says. “We have the policy – but when the crunch comes, we’ve got to find the money.”

Council officers tend to talk wistfully of the freedoms enjoyed by those nine ‘housing market renewal pathfinders’ – Transform South Yorkshire in Sheffield, for instance, or Renew North Staffordshire in Stoke. But so far the mission for these pathfinders has been to tackle failing housing

*“Refurbishment is
the Cinderella of the
housing industry”*

markets, not sustainability. Only now are some of them beginning sustainable refurbishment demonstration projects, joining up with the Building Research Establishment to carry out much-needed research. “There’s no proper reference model, no collated information. We’re going to put best practice scenarios together, to tell people what to do in different situations,” says project manager Kate Symons. “Refurbishment is the Cinderella of the housing industry,” adds press officer Ursula Garner. “We want to show how important a role it can play in reducing CO₂ emissions.”

Rob Marston, programme manager at Transform South Yorkshire, says that the pilots will test refurbishment techniques and offer training opportunities. And Hardial Bhogal, chief executive of Renew North Staffordshire, goes a step further: after the pilot, he says, he expects to fund

sustainability work within his mainstream refurbishment programme. "The legacy that we leave will change people's expectations in terms of sustainable living," he says.

Such training projects are important in fostering the skills for sustainable refurbishment. In the Wear Valley, the council has found partners to train local engineers. "As we've raised awareness, mechanical and electrical engineers have come out of the woodwork," says Bloomfield. "Now we can draw on five or six specialist companies." Equally rapid skills development is required among planners, he adds: "We're training planners so they fully understand the new technologies, and that's helped with planning consents."

Refurbishment and sustainability experts agree that, while some renewables equipment is in short supply, we can quickly develop the workforce to carry out sustainability-oriented refurbishments. Before private householders rush to use their services, though, we'll need further changes in attitude. "People need to understand that it isn't about building windmills around the coast; that they can do something," says Mitesh Dhanak, associate director for group strategic development at the Eaga Partnership, which runs government insulation schemes. "Cavity wall insulation isn't expensive, but people don't recognise its value."

In Stoke, Alan Slater sees brighter times ahead: "After the DH programme ends in 2010, we'll have the flexibility to think where we take our investments," he says; Slater hopes

*“Balance trading’
could allow developers
who miss zero-carbon
new-build standards to
offset emissions by
improving the
sustainability of
existing nearby homes”*

to exploit the relationships he's built with power companies to follow in the Wear Valley's footsteps. Meanwhile, the pathfinders will have completed their pilot refurbishments – and some, at least, look set to subsidise sustainability work. Add to that spiralling energy prices, a maturing renewables industry and a solidifying political consensus on climate change issues, and progress looks set to accelerate. The 2008–2011 scheme for energy suppliers to fund home efficiency measures, the Carbon Emissions Reduction Target [see page 17], is much bigger than its predecessors, putting an extra £1.5 billion into play, while Warm Front has been allocated £800 million.

And if we end up struggling to meet the government's sustainable new-build ambitions (which require all new homes to be zero-carbon by 2016), this itself could even provide a paradoxical boost for refurbishment instead. Mike Gibson, emeritus professor of planning at London South Bank University and an associate director of JVM Consultants, is researching 'balance trading': the idea that developers who miss zero-carbon standards could offset emissions by improving the sustainability of existing nearby homes. If economic problems slow progress towards zero-carbon homes, he suggests, "the government could take on board the idea of balance trading, and meet its carbon emission reduction targets even without reaching the 2016 zero-carbon target." That would be very late for the Cinderella of refurbishment to arrive at the low-carbon ball. But we already know that the shoe fits: it's just a matter of trying it on.

Matt Ross is the features editor of 'Regeneration & Renewal'.

Renew North Staffordshire, www.renewnorthstaffs.gov.uk

National Energy Action, www.nea.org.uk

Transform South Yorkshire, www.transformsouthyorkshire.org.uk

Grey towers go green

Time to bring the sun and the wind into the energy equation at Shepherd's Bush? Three tower blocks that dominate the local scene, each containing 176 homes, are set to become a showcase of green retrofitting. Energy efficiency will get a major boost from high-spec insulating cladding, while microgeneration technologies will be represented across the range from building-integrated wind turbines to solar heating and electricity. Subject to the proposals getting through the final stages of the planning approval process, solar thermal panels will provide hot water for much of the year, and the London Borough of Hammersmith and Fulham will also become the proud home of what Mark Elton at project architects ECD describes as the capital's largest solar photovoltaic array. Specialist suppliers Solar Century calculate its peak electricity output at 150kWp. www.ecda.co.uk



ECDA



The challenges facing the housing industry should centre on adaptation to climate change as well as helping to mitigate its causes, says Jon de Souza

Getting better by design

The government's high-profile Code for Sustainable Homes, ratcheting up to require level six (zero carbon) for newbuild by 2016, rightly looks at more than just fuel costs and heating and lighting. It takes a more holistic approach. "Building sustainable homes", it states, "is about more than just carbon dioxide. We also need to build and use our homes in a way that minimises their other environmental impacts, such as the water they use, the waste they generate, and the materials they are built from."

The same considerations should apply to existing homes, which comprise the overwhelming majority of the housing stock. The housing industry is in a powerful position to deliver practical changes in response to the sustainability agenda, but it is important that the signals it receives are both clear and consistent.

Decisive actions to mitigate climate change on the housing front notably include designing-in or retrofitting high standards of insulation, energy-saving and energy generating technologies (for example ground source heat pumps) and maximising the potential for rainwater harvesting.

Equally important, however – and too often relegated to a back seat in the climate change debate – is the issue of adaptation. This involves finding ways to adapt existing buildings so they cope better with the already-changing climate. Constructing Excellence's members recognise that the two approaches need to work in conjunction with each other. You need only think back to the heatwave summer of 2003, or the bitter cold of 2005 and the devastating impact of flooding last year, to recognise the importance of making our communities more flood proof and our buildings more adaptable to higher or lower temperatures.

An exemplar in tackling such issues is the refurbishment of Stevenage Borough Council's offices at Daneshill House, showing that a 1960s building can be refurbished to provide good high density office accommodation without the need to resort to full air conditioning. The innovative 'Cooldeck' night cooling system uses the hidden mass of the building for night time summer cooling without removing the suspended ceiling. It also demonstrates how to increase the 'virtual mass' of the building by the inclusion of 'phase change material' into the cooling system.

Building up a portfolio of Demonstration Projects, of which Daneshill House is just one, is an important element in the work of Constructing Excellence, helping to share knowledge and experience across the industry. Demonstrations are live construction projects that are innovating or applying an element of best practice, which can lead to a step-change in performance for the participating organisations. Essentially, they are projects from which the industry can learn.

In the housing sector specifically, the Housing Forum provides a network of innovators who share knowledge and experience through its demonstration portfolio and its member working groups. Its April conference in London was the occasion for the delivery of an important report from the working group on sustainable improvements to the existing stock, chaired by Ian Burnett, managing director of Wates Living Space.

The working group concentrated on three broad areas, advocating

- 1 a sustainability standard for the existing housing stock – in essence a refurbishment version of the Code for Sustainable Homes
- 1 a greater focus on the role of a whole life costing model when repairs, maintenance and improvement work is undertaken; and
- 1 raising the game for the remaining Decent Homes programme and giving proper consideration now to what will happen after it comes to an end.

Shelagh Grant, chief executive of the Housing Forum, summed up the significance of the report with the words: "Sustainability in existing stock is just too important to not deal with." And, far from being a theoretical consideration, sustainability in practice is best served by consistent messaging and a practical attitude to working together across the housing sector.

Jon de Souza is director of sustainability, regions, and demonstrations at Constructing Excellence

Details of events marking the 10th anniversary of the Egan Report can be found on Constructing Excellence's website at www.constructingexcellence.org.uk

Building Change

A newly formed Existing Homes Alliance has come together behind a set of proposals that add up to a radical low carbon refurbishment programme.

"We cannot afford to wait; we must start now." That's the urgent message from the Existing Homes Alliance. Its Declaration on the Future of Existing Housing, due to be launched in June, makes no bones about the long-term objective – to cut the carbon emissions from the UK's existing housing stock by 80% by 2050.

Outlining the essential measures to get us there, the Declaration is equally unequivocal about what's needed: a coherent plan, and bold and concerted action - from government, business, the housing sector and individuals.

"While the new build housing sector has enjoyed a raft of targets and initiatives in recent years", it says, "existing housing lacks an equivalent level of policy and industry ambition. Policies are piecemeal, supply chains fragmented, industry lacks skills, and consumers lack access to the services they need. It is time to recognise the scale of the challenge presented by our existing homes."

If many of its action points seem clearly aimed at the government's in-tray, the Alliance is keen to stress that its programme relies on all sectors working together to deliver solutions. There's a corresponding emphasis on common interests too. "As practitioners we want to help government develop effective policies," says the Alliance's acting chair, Paul Ruysevelt of ESD, "and demonstrate the benefits these can deliver. We need to be radically refurbishing over half a million homes a year between now and 2050 if our carbon targets are to be met. Key to this is a whole-house approach that encourages packages of resource efficient improvements rather than individual measures."

Saving carbon, creating jobs, stimulating new business, reducing energy bills, protecting asset values and creating warm and healthy environments - it all adds up to a menu of massive opportunities. Hence the Alliance's confidence that the necessary investment "can be unlocked from existing sectors" (currently £23 billion is spent annually on home renovation, maintenance and repair) if the incentives are right. "We want to show", says John Duggart of the Sustainable Energy Academy, "that there is a very wide constituency of support for this level of concerted action on our existing homes."

Turning the plan into reality involves showing that it really can be done. Which is why the Declaration calls for a major programme of exemplar low energy refurbishments, targeting 100,000 homes within 3 years and 500,000 homes within 5 years - to help kick start the development of a supply chain, stimulate innovation and skills development, inspire action and encourage substantial investment.

As an initial action this should include:

- 1 1,000 exemplar houses (within 20 minutes of nearly everyone in the country), showing homeowners that transformed houses will be attractive, feasible and aspirational;
- 1 a programme of 'whole street' refurbishment projects, covering at least 5,000 properties and targeting areas of high fuel poverty concentration.

"We need a whole-house approach to encourage packages of resource efficient improvements, rather than individual measures"

"For property managers, the equation is simple: if we fail to deliver on climate, we fail our customers and our businesses. Existing homes are being woefully neglected in the climate change debate. The government and the housing industry must act urgently to bring this pressing issue to the centre of the debate and ensure that UK's 26 million existing homes are made fit for the 21st Century."

Nicholas Doyle of Places for People, the UK's largest housing association



WHAT'S IN THE PLAN?

A coherent strategy and action plan to deliver 80% carbon emissions reductions across the whole housing sector should include:

- 1 Firm targets for the number of households to be transformed each year and the scale of annual energy savings to be delivered.
- 1 A clear regulation timetable, backed by market incentives and recognising key trigger points such as the sale of a property or re-letting.
- 1 Minimum standards for household energy performance, using the opportunity provided by energy performance certificates, backed by enhanced building regulations and strengthened revisions to the Decent Home Standard.
- 1 More financial incentives - to encourage homeowners, landlords and housing managers to invest in energy efficiency and renewable generation. These to include tax incentives (such as stamp duty or council tax rebates), VAT reform on

refurbishment, low interest loans, feed in tariffs, grants and energy services to make low carbon choices possible and even pay.

- 1 New service offerings, products and packages - including one-stop-shop services for installing and financing home energy improvements, energy service company offerings, green mortgage products linked to energy improvements, and revised utility tariff structures.
- 1 Greater access to information and advice, including real time carbon use information. " There is a clear role for energy suppliers, builders, DIY merchants, local authorities, estate agents, and other independent advice providers to inform and encourage homeowners in improving the resource efficiency of their homes. "
- 1 Mandatory training and up-skilling in energy and resource efficient techniques for every building trade professional, backed by badging to make the public aware of these skills, and registers of trusted installers.

" The UK has a long way to go to make low-carbon refurbishment mainstream. What is needed is a much more ambitious programme of work to upgrade the entire housing stock (targeting the affluent as well as the poor) to a much higher standard. The truth is that current programmes are doing too little for the most deprived households and will do next to nothing to combat climate change."

Gavin Killip, senior researcher at Oxford University's Environmental Change Institute

The Existing Homes Alliance was formed out of a partnership between ESD (Energy for Sustainable Development), the Sustainable Energy Academy, the Energy Efficiency Partnership for Homes, Oxford University's Environmental Change Institute, Places for People, the Housing Corporation, the Sustainable Development Commission, AECB, ACE (the Association for the Conservation of Energy), the Chartered Institute of Housing, and WWF-UK. The network has now grown to encompass a wide range of organisations, including both experts and practitioners. Details of the launch of the Declaration on June 3 are available at www.existinghomesalliance.org

Action plans set clear standards for existing homes – and shining examples show how to make them measure up.

Getting there

There's a growing sense of urgency in sustainable housing circles about tackling the low-carbon challenge in a coherent way. 2020 is not so very far away, and the Climate Change Bill stipulates a 26% to 32% reduction in domestic carbon dioxide emissions by then. Even if we meet all the targets for new houses between now and then, the pressure is still well and truly on to give proper prominence to upgrading existing buildings. And a new report on the West Midlands region [see box] does just that – with clear implications for what a scaled-up national action plan might contain.

Its assessments revolve around something called the Standard Assessment Procedure (SAP). Already part of the

everyday language of building professionals, SAP ratings are now becoming more widely known through the inclusion of Energy Performance Certificates (EPCs) in Home Information Packs – which anyone selling a house now has to provide. The SAP rating determines what band the house falls into, from A (best) to G (worst), and, arcane as it might sound, it's just a way of scoring any property between 0 (appalling) and 100+ (so good it has surplus energy to sell to the grid), according to its space heating, water heating and lighting energy requirements per square metre.

The trouble is that so many existing homes get such low scores. The average was 48 in the West Midlands research,



while BRE (the former Building Research Establishment) uses a nationwide average of 52. Both of those fall within band E on the EPC (the 39-54 band), but the government reckons that about a fifth of existing homes are actually worse than that, in band F or even G. Anyone buying or selling one of those should qualify for free or discounted help on improving energy efficiency from the Green Homes Service, one of the environmental initiatives which Alistair Darling bigged up in his recent budget.

Now some are proposing that every household should have its SAP at its fingertips – and that meeting a minimum standard should become mandatory. The recent report *Home Truths*, by Brenda Boardman at the University of Oxford's Environmental Change Institute, advocates making EPCs a universal requirement – and insisting that anyone buying or letting out a property should be required to upgrade it to a specified standard before they could re-sell or re-let it.

Home Truths also argues that current policies will get us no more than half way to the 2020 domestic carbon target. Boardman reckons that the government needs to spend £12.9 billion a year for each of the next ten years to get back on track. The incentives she advocates include grants, low-interest loans, stamp duty rebates, lower VAT on the

cost of energy efficiency improvements, and the introduction of a 'feed-in tariff' system, paying premium prices for domestic-scale renewable energy output – as used so successfully in Germany to stimulate a solar power revolution there. Meanwhile, BRE's 'rethinking housing refurbishment' project – a Constructing Excellence demonstration scheme – is out to show what can be achieved in practical terms. The team is working on exemplars of how different types of house (back-to-backs, terraces, Victorian villas and so on) can be refurbished to the highest performance standards. One of these, a disused 150-year-old century stable block converted into three energy efficient homes, will also house an information and training centre on a site next to BRE's Innovation Park in Watford.

The stable block refurb involves tackling many of the typical problems of older buildings – solid brick walls, single glazed sash windows, a clay tile roof, dampness, disrepair, poor thermal performance, and even the legal rights of the resident bats. The three homes which should emerge at the end of the process next year [see main picture for architects' impression] are expected to demonstrate energy savings greater than 60%, produce at least 10% of their own energy from on-site renewables – and boost the SAP rating right up to a highly commendable 80. – Roger East

Retro-fitting a region

Of the 2.3 million existing homes in the West Midlands, the majority fall into Energy Performance Certificate bands of E, F or G, with an average SAP rating of 48. The target adopted in the report is to raise all domestic property into band C, with a SAP rating of at least 70, within 20 years of the government's 'zero-carbon new-build' deadline of 2016. The report's authors at URBED and Forum for the Future work out that this will require the refurbishment of at least 20,000 properties a year by 2011 (1% of homes), rising to at least 80,000 (3.5%) by 2016, and maintaining that for a minimum of 20 years. Their costings, based on a combination of improving the fabric of the houses, and retro-fitting low-carbon energy technology, come out at between £15,000 and £25,000 per home.

No one measure will achieve this, the report emphasises, and a co-ordinated approach by public and private sector is necessary. To be effective in targeting the 70% of homes that are owner-occupied, it is vital that improving energy efficiency is both easy and convenient, maximising all opportunities to get this work to coincide with other major refurbishment. A clear, structured and consistent approach will also be most effective in terms of presenting huge opportunities for community-based social enterprise and the business community. – Ben Ross

West Midlands: A Framework for a low carbon housing market is based on three years of research conducted by Sustainability West Midlands (SWM, a regional partnership of public and private stakeholders) through the Sustainable Housing Action Programme. Published in March, it can be downloaded from SWM's website at www.swm.org.uk or from Forum for the Future (www.forumforthefuture.org.uk). Ben Ross is senior sustainability adviser in the Forum's built environment team.

Rethinking refurb in Watford: BRE opens the stable doors to inspiration



*Taking the bull by
the horns demands
single-minded
concentration*

Tony Allen-Mills, www.tampen.org

The governing principle

The government says it is right behind the effort to put our homes on a lower carbon track. But what about leading from the front? Roger East looks for direction on some pertinent questions.

The pressure is mounting for a more decisive policy steer from government on upgrading the performance of the existing housing stock. As recently as April the parliamentary Communities and Local Government Committee added its voice to the chorus, with a critical report warning that the government would otherwise fail to meet its overall emissions reductions targets. Committee chair Phyllis Starkey did not mince her words, calling for measures that would "go further and do much more to help householders radically

cut carbon emissions from their homes, whether they were built in 2007 or 1707."

The big issue that faces our policy-makers on this front is not 'whether', but 'how'. As Housing Minister Caroline Flint told *Green Futures*: "Across government we are committed to improving the energy performance of all existing homes in the most cost-effective way possible."

"We have launched the Act on CO₂ Advice Line", she added, "to give homeowners free, impartial, tailored advice

on reducing their carbon footprint, but we also need concerted action from all of those involved across the housing sector. This is where the Existing Homes Alliance can make a real contribution [see pp 8-9], and I look forward to working with them to improve the energy performance of our homes."

A statement of commitment, an advice line, an expression of support for concerted industry action – and a 'Green Neighbourhoods' exemplar programme due to start next year [see panel]; it's all good stuff, but still seems to fall some way short of taking the bull by the horns.

As any rodeo rider would tell you, single-minded concentration is critical to that task. Yet the responsibility for housing refurb falls into a bit of a grey area between government departments. It's still Defra (wearing its Environment hat rather than in its Food and Rural Affairs roles) that holds the brief to improve energy efficiency, even though housing policy comes under Communities and Local Government. And Defra's approach to driving change in what we do with our homes is very much built on the voluntary principle – with government exhorting, supporting and providing information rather than laying down the law. "It is up to individuals and communities to take action," the department told *Green Futures*, "with the government providing guidance and removing any regulatory barriers."

In the forefront of "helping take the fight against climate change to the living room intention" are the Act on CO₂ campaign, backed up by the new advice line and Green Homes Service – so that anyone can call in "to access a one stop shop for free, tailored, impartial advice from the Energy Saving Trust on how to reduce their carbon footprint."

So the advice side of things is coming together – but what about incentives for action? We've yet to see anything really decisive from central government on using financial instruments in this way, beyond the cut in VAT to 5% on the installation of energy saving materials such as draught insulation, although Gordon Brown has proposed that the EU change its VAT rules to allow a more general rate cut for energy-saving materials and products. More radical suggestions, however, such as stamp duty exemptions for energy-efficient homes – endorsed by the Communities and Local Government committee's report – seem so far to have fallen on stony ground. The main channel for funding

improvements will continue to be the energy companies (and their work with those local authorities that are prepared to offer council tax cuts), via the enhanced CERT (Carbon Emissions Reduction Target) scheme. This came into effect on April 1 and should provide total investment estimated at around £1 billion a year for the next three years.

Nor does there seem to be any imminent prospect of specific government targets for stage-by-stage reductions in the carbon emissions of the entire housing stock. When *Green Futures* asked Defra for its view on the question of an annual target, the response was short and to the point: "Given the diverse nature of existing housing stock," said a spokesman, "it would be inappropriate to set yearly targets for reducing carbon emissions. Furthermore it is difficult to see how any such targets could be enforced."

Indeed it is – given that the government's whole approach is based on making the case for action, and helping the willing householder, with never a suggestion of obligation or compulsion. An Englishman's home is, after all, his castle.

Perish the thought, for instance, of a mandatory minimum whole-house standard which existing homes would have to reach before they could be bought, sold or rented. "This approach would have a profound impact on the housing market," Defra told us, "and risk trapping homeowners who live in houses that don't meet the prescribed standard without the support to make improvements. The government's priority instead is to provide more information and highlight environmental issues in the house-buying process. Energy Performance Certificates provide a simple rating for the energy efficiency of houses, and advice on action to tackle carbon dioxide emissions tailored for each home. All home buyers now get an EPC, and from later this year all tenants will also get EPCs when they rent new homes."

It's true that we do all need to 'know the score' on the energy performance of our homes. And it may be the case that this information will drive us to seek better performance, whether we're staying put or moving house. We'll have to wait and see to what extent this does come to pass. But 'wait and see' isn't always the most prudent course – when there's no time to wait.

Cutting down with the Joneses

Under a new government initiative, 100 communities across Britain could become shining examples of what's possible – and achievable by ordinary people in 'bog standard' homes. Promoting local cooperation, the Green Neighbourhoods scheme will encourage communities to come forward with proposals whereby householders, community groups, local authorities, energy suppliers, private companies and banks can combine their efforts to reduce the environmental impact of their local area. On the carbon front, they'll be expected to match up to a demanding target, achieving CO₂ emissions cuts of 60% in line with the government's sector-wide long term objectives.

By way of incentive, the 100 successful bidders will be able to tap into a pot of potentially more than £10 million over three years, with the first successful projects being funded

from April 2009. The Energy Saving Trust is aiming to launch a competition for funding proposals by the end of the year, and will be on hand to help these beacon communities achieve the necessary reduction, offering practical advice on suitable steps to cut back their emissions.

There are currently no concrete guidelines for entrants, and bids from communities of all sizes are welcomed. Successful bidders will almost certainly need a strategy for greening notoriously hard to treat homes such as Victorian terraces and poorly insulated tower blocks. Properties that use oil or coal for heating and have no connection to the gas network will also be a priority. Outside the home, other actions to reduce environmental impacts will be encouraged, including efficient street lighting and community energy projects, better water efficiency and more recycling.

Time to stop tinkering

What's going to give us a sustainable housing stock?

Paul King, chief executive of the UK Green Building Council, tells *Green Futures* that the technical solutions are to hand, but the real problems are all about money.



GF: Are we on track for the kinds of improvement we need to see to take our existing housing stock to sustainability, in the kind of timeframe we need to see it?

PK: Absolutely not. It's true that we're getting a welcome ramping up of funding into the relatively easy targets – filling cavity walls, loft insulation and so forth – as we move from the Energy Efficiency Commitment (EEC) programme to the Carbon Emissions Reduction Target (CERT) scheme [see sidebar overleaf]. So we're making some good progress on the easy stuff, and will make more through CERT, but on the big shift of achieving a 60-80% reduction in emissions from existing housing, we haven't made anywhere near enough progress. You can't help feeling that we're just fiddling round the edges.

The next stage is made up of more costly improvements: installing super-efficient boilers and glazing, and for buildings without cavities, more challenging solid wall insulation techniques. And obviously if we're serious about getting close to zero-carbon homes, there will ultimately be a residual energy need which will have to be met from renewable sources – the whole array of technologies, which at the moment are relatively expensive.

It will be interesting to see what becomes of the Green Homes Forum, which was announced in the 2008 budget and will take place this autumn. Government needs to respond to the setting of the Carbon Budgets by this time next year and therefore have a clear strategy for reducing emissions in the existing stock. It's going to take a monumental effort – across government, across the relevant industry sectors and other stakeholders - but we don't have a choice but to succeed.

GF: We've recently seen the introduction of home information packs [HIPs, which house sellers must now provide to prospective buyers] – albeit in watered down form. Are they having the kind of impact the government hoped?

PK: It's very early days. Unfortunately, the water has been muddied for energy performance certificates [EPCs – an element in the home information pack which provides advice on how to cut CO₂ emissions and fuel bills] because they have been entangled in other negativity surrounding HIPs. It will take time for them to emerge as an important driver in the market. But I think it will happen. Look at how CO₂ emissions of cars have begun to creep into people's consciousness, crucially aided by the banding of road tax in relation to emissions.

GF: Refurbishment of housing is a pretty unsexy market dominated by small building companies. What needs to be done to build their capacity to do these upgrades?

PK: It's a real issue. If I was living in a draughty Victorian house and was even remotely interested in improving the energy efficiency of that home, I would be put off by not knowing where to get reliable help. I can't see that changing until we have some form of accreditation for advisers and suppliers. Lots of people have come forward wishing to become accredited EPC providers and Code for Sustainable Homes assessors, so I think with the right framework we could see a new wave of both accredited installers and impartial advisers, helping householders save energy and invest in the right renewable energy kit.

I also think there's an important potential for mortgage



FOR SALE

“Buying and selling is the main time when enough money is changing hands for people to contemplate the more expensive upgrades”

lenders here. People go to them to talk about borrowing large sums of money over 25 years, so they're in a pivotal position to highlight the benefits of upgrading a home in terms of its running costs and the affordability of a mortgage, and to recommend suppliers and installers of kit. I think it will come. The Energy Saving Trust are interested in doing more certification, and the Co-op Bank already has an offer of this sort [see box below] connected to moving house.

GF: Are there any magic bullets in terms of new technology?

PK: The cheapest energy is no energy, so energy saving is always the priority – turning things off, insulation and so forth. But for most properties there will be a residual energy demand that has to be met somewhere, and in an emerging market there are bound to be lots of competing technologies appearing to meet that need. Many will fall by the wayside, but that doesn't mean there's not a place for small-scale renewables. Solar thermal is now a well-proven technology wherever there's reasonable sun, whereas we're beginning to realise small wind turbines are not always effective in urban locations. We're hearing more about ground, and even air, source heat pumps, but it's horses for courses and I don't want to back any particular technology.

GF: As the market slows and we head for a recession, is it going to get easier or harder?

PK: A slower market will probably mean people staying put for longer. People are also increasingly concerned about the rate at which energy bills are going up – and they'll probably go up another 20% at least in the coming year. So there may be more of an incentive for householders to improve the house they're in. In that context there are lots of opportunities to stimulate action – for financial institutions to offer preferential home improvement loans, for the DIY market to be promoting energy-efficient products, and for government to be doing its bit by reducing VAT on efficient products to enable householders to future-proof their homes. That said, the utility companies have identified the buying and selling of houses as the only points at which the sums of money changing hands are large enough for people to contemplate the more expensive upgrades. So those incentives – or energy price rises, or both – are going to have to be significant to prompt uptake of more radical measures.

Smart metering: the Wattson puts your savings up in lights



BT: Is there any appetite in government for pushing energy prices up that high?

PK: It's very hard for politicians to talk about pushing up the price of energy because it forces people to save it. It's about as palatable as telling everyone flying should be more expensive. That's why I think we are going to need a fundamental shift in the way we regulate the energy supply industry. The EEC and now CERT are fine but the industry sees them principally as a tax, working against the grain of a business that is still predicated on selling as much energy as it can to as many people as possible. We need to create a market where profitability comes from selling as little power as possible, via efficient energy services, incentivising the industry to upgrade the efficiency of homes. That's why the UK Green Building Council is advocating a system in which the government sets a cap on the amount of energy that can be supplied. It's an idea that's gaining some support: we've talked to the main political parties about this, and they're all giving it consideration as a possible next step after CERT. If we're going to make this kind of move, industry needs to know now that that's what will be coming in 2011. I believe it could be done, particularly at a time when we are looking to reduce our dependency on foreign energy imports.

GF: Social housing providers are sitting on a large proportion of the existing stock. Are they showing the way?

PK: Some people in the social housing sector are quite unhappy about being placed on a fast track to zero-carbon homes [for new-build housing]. They've been asked to go

More scope for green lending?

Can mortgage lenders help prime the pump for low-carb refurb in Britain's existing homes? A new Campaign For Green Finance, launched in Parliament this January by the All Party Parliamentary Climate Change Group, is certainly looking to the financial services sector to do more to back both energy efficiency improvements and domestic power generation.

Solar water heating, photovoltaic panels or the latest home-scale combined heat and power units come with initial capital costs that can be pretty daunting. Favourable interest rates on 'green' loans can make a crucial difference in this equation.

The Ecology Building Society is the kind of lender you'd surely expect to be sympathetic, and indeed, says the society's Paul Ellis, "we'll reward borrowers with 1% off the Ecology's Standard Variable Rate on mortgage funds used to equip their homes with energy saving solutions and renewable energy generation". There's a similar scheme on offer at the Co-operative Bank, where Catherine Turner reports "a steady level of interest... showing that there is a genuine enthusiasm from consumers in making their homes greener". Both these pioneering products are cash advances available to existing borrowers only. But if we're getting stuck in an economic downturn, it might be one place to start nurturing those green shoots of recovery.

straight to level three of the Code for Sustainable Homes faster than the private sector, and they claim they are having to meet costs on products and technologies without the economies of scale which they argue would be there if everybody were going at the same pace.

The irony is that when the Code was introduced, people said that government should go further faster, and this is one of the ways it did so. But I think that more could be done via the Housing Corporation to upgrade the existing stock. The Corporation has been ahead of the game in recognising that upfront investment in energy efficiency would have long-term gains for people living in the homes they fund: there hasn't been the value gap seen in the private market where the people selling the homes are not going to see the benefit of reduced bills. The Corporation also supported the introduction of the Ecohomes XB environmental assessment tool for improvements to existing buildings, which was specifically designed for social housing. Now we'd like to see it made mandatory for the registered social landlords it funds to use this assessment tool, and to introduce systematic upgrades.

GF: What else should government be doing?

PK: We tend to forget that, at the same time as he announced the 2016 target for zero-carbon new homes, Gordon Brown also announced that we should have *all* homes low-carbon in the same timeframe. So the first thing we need is a clear articulation from government about what that means. Then there are plenty of ideas around that could bring change. What about stamp duty rebates for people who make significant improvements to their new homes within the first six months? What about getting local authorities to link energy efficiency to council tax bandings? It proved very popular when they tried this in Braintree, with the council working with the utility company (British Gas) to offer cash back on council tax bills. We'd like to see the roll out of smart metering, to get people engaged in their own energy consumption. And let's have a premium paid for energy sold back to the grid, to encourage people to invest in micro-generation. Exporting power back to the grid attracts a fraction of what it costs to consume, whereas in Germany it's the other way round – the feed-in rate is five times the price to the consumer.

GF: Do you think government is ready to face the possibility that the lifestyle of middle England just doesn't work?

PK: I think the tendency to look for silver bullets is a fatal flaw in the drive for more sustainable homes. We see lots of different initiatives, with varying levels of ambition, but they don't really add up to a lifestyle package. We need to tackle behaviour change in the round, and create a context in which people think about their carbon footprint in its entirety. But it will continue to be very difficult for government to do this when its own approach – to building regs, planning, transport and so on – is so resolutely not joined up. How the internal structure of government can be made to work more effectively to join these issues up is perhaps the biggest challenge of all.

Paul King was talking to Ben Tuxworth, director of communications at Forum for the Future.

A CERT FOR THE FUTURE

Where once we had the EEC, now we have the CERT. It's arcane language outside the industry, but these bits of acronym jargon actually represent the major plank of current government policy for targeting investment on cutting existing household carbon.

CERT is the one that counts now. It's the Carbon Emissions Reduction Target, and it sets government-approved targets for the energy supply companies to meet, by actions to help their customers consume less fossil fuel. Kicking in from this April, it's expected to stimulate some £2.8 billion worth of activity over its three-year lifetime to 2011 (at least 40% of that being aimed at vulnerable households including those in fuel poverty). This means it broadly doubles the investment targets of the previous scheme (the old Energy Efficiency Commitment – EEC)

CERT is broader, too, in the measures it encourages – now including not just energy efficiency measures and consumption cuts, but renewable microgeneration in the home too, and the use of wood for domestic heating.

So will CERT suffice to get all the suppliers focused on carbon-efficient service provision rather than fuel sales? The government will be looking to leader businesses to show the way.

First off the mark with a CERT proposition to stimulate consumer interest in carbon cutting has been British Gas. They're already the pioneers of working with local authorities to incentivise beneficial change through council tax systems: their innovative scheme to subsidise loft and cavity wall insulation with Braintree Council has been rolled out nationwide, to the extent that they had worked with 70 councils by the beginning of this tax year. The track record to date, with the company funding tax rebates in some cases as high as £125 per household, is 16,000 completed installations. Survey work in Braintree suggests that 82% of respondents first heard about it through their local authority, while 78% of the takers confirmed that the council tax refund was the clincher in getting them on board.

Building on this experience, British Gas's latest proposition involves a £400 subsidy for its solar water heating package (which otherwise costs £4,200 in a typical house). In a neat reinforcement of the 'first things first' message, it's a precondition that householders should already have taken up the subsidised insulation scheme. Apart from that, it works in much the same way: the local authority is responsible for promoting the offer (typically in tandem with its council tax notices), there's no need to be a British Gas energy customer, and you get your rebate once the work is completed. Thereafter, of course the savings – in cash and carbon – should run and run.

The UK Green Building Council is the recently born sibling of a global network of such bodies, all committed in their different ways to campaigning for a sustainable built environment. Its 250+ members include some of the biggest players in the industry, alongside a diverse mix of developers, engineers, architects, NGOs and public sector organisations. www.ukgbc.org

aspiration, aspiration, aspiration...

Role models matter. High-profile projects can fire the imagination. As for property prices... Kevin Telfer taps into the sources of inspiration for eco-refurbishment.

The prime time TV show *Grand Designs* is both popular, and highly aspirational. And presenter Kevin McCloud's architectural odyssey has been full of insight into different aspects of sustainability in architecture. McCloud himself has always been wary of died-in-the-wool environmentalists, and even suspicious of the term 'sustainable' – often used, he argues, in the vaguest possible way. But his move to found his own development company, HAB, which is "committed to creating communities which are a pleasure to live in and sustainable", is a perfect example of how eco-architecture is moving into the mainstream.

Grand Designs, by its nature, focuses more often on the blank canvas – or the major rebuild – than on what most of us would understand by such terms as 'refurb' and 'retrofit'. And it's not hard to understand the appeal of the clean and gleaming zero-carbon new-build home. But there aren't too many of those around at the moment, as the building industry's steep learning curve is still in its early stages.

This is where eco-refurbishment comes in. It's becoming an increasingly popular option – not just an effort by well-meaning people to 'do their bit', but also because it's seen as a smart route to decreasing domestic running costs, future-proofing homeowners against energy price increases. What's more, the world of eco-refurb is getting seriously trendy – casting off its hitherto common epithet of 'dull but worthy'. And being trendy may well mean profits for the enterprising owners of newly greened homes.

For the embodiment of eco-chic, take a look at the work – and the client list – of architects Michaelis Boyd. Based in Notting Hill, they are responsible for a raft of

highly fashionable projects including the Electric Cinema on Portobello Road, high-end bars and restaurants, and the minimalist pads of a number of celebrities including Michelin-starred chefs and supermodels. But they are perhaps now most well known for the eco-refurb of that famous, though it must be said, rather less trendy, resident of Notting Hill, David Cameron. In Cameron's house, as well as significant structural works, they revamped the insulation and installed rainwater harvesting along with solar panels and (notoriously) a micro-wind turbine.

Among other notably high-profile and exemplary projects in expensive, fashionable areas of London are a refurbishment in Primrose Hill, and the Royal Borough of Kensington and Chelsea's 'Flagship Home' at 36 Beaufort Gardens [right], just around the corner from Harrods.

The Primrose Hill project, in Berkley Road, is the work of Bill Dunster Architects' ZEDfactory. Most famous for their new-build work including BedZED and BowZED, they have also been extremely active in the field of refurbishment. Their concept of 'ZEDUP' aims to provide an economic way of improving a home's performance to carbon-neutral level. What they've been doing in Berkley Road, now nearing completion, is a high-budget and high-specification refurbishment for a wealthy client, featuring numerous sustainable elements that not only relate to energy efficiency, but other resource use too, particularly water. The approach is similar to that seen in ZEDfactory's new-builds: decreasing the energy requirements by making the building as airtight, insulated and thermally efficient as possible, and supplying the remaining energy requirement from renewable sources – in this case, solar hot water, solar



Refurb gives a touch of class to Knightsbridge

Beeston's 'carbon negative' Greenhouse

The bold refurbishment of a former workers' hostel in deprived Beeston, Leeds, is the kind of project that's raising the bar for sustainable redevelopment. Rebranded as 'Greenhouse', the Art Deco building formerly known as Shaftesbury House should actually be using so little energy, and generating so much from on-site renewables, that it will end up as not just zero-carbon but 'carbon negative'.

Between now and its scheduled re-opening in the middle of next year, the Greenhouse [below] will be undergoing some very visible changes to justify its name change. Roof-mounted mini-turbines will supply power to light communal areas, while an altogether heavier duty 100-metre wind turbine, set to be the tallest structure in the whole of Leeds, will capture energy from its position on a junction of the nearby M621. When combined with photovoltaics and high specification insulation, these measures together will make the building a net exporter of electricity back to the National Grid, says Chris Thompson of developers Citu.

That's especially significant because the redevelopment of old sites tends to face more problems than the innovative low-carbon new-builds – like BedZED, the Sherwood Energy Village

and Great Bow Yard – which we've got used to seeing held up as the great exemplars. Architect Bill Dunster, of BedZED fame, expresses this point with characteristic forcefulness. "In our experience," he says, "planning authorities have consistently blocked low-carbon thinking being applied to existing buildings, and local residents object to anything that they perceive to devalue their property."

As for the crucial test of commercial success, Citu claims to have sold 75% of the units at Greenhouse off-plan in the first week of launch in 2007. Previous attempts to create sustainable living from old buildings have not always found everything plain sailing on the marketing side. Even an impressive project like the Titanic Mill conversion in Huddersfield [near right], complete with a wood-fired combined heat and power unit, photovoltaics, high spec double glazing and insulation, has 12 unsold apartments three years after its launch. It's an important reminder that, even as sustainability becomes increasingly important to home buyers, an eco-development will still stand or fall by those age-old equations of price and location. – *Alex Johnson*
www.greenhouseweb.org

From Deco to eco



electrical panels, a wind turbine and a wood pellet boiler using sustainably sourced fuel.

Whereas the Berkley Road house will command a market price in the millions, the Flagship Home in Knightsbridge has a different flavour. This is a six-storey, multi-occupancy nineteenth-century terraced building containing a two-bedroom flat and 18 bedsits – four of them allocated as keyworker accommodation with lower rents. Owned by the borough, it is located within a conservation area, but the entire building had fallen into disrepair. The decision was then taken to use it as a showcase for a low-carbon approach to regeneration, aiming to achieve a 60% cut in building-related emissions. Working to a design by ECD (Energy Conscious Design) Architects, the building was given greater airtightness, more insulation, low-energy appliances and solar heating which supplies an estimated 60% of hot water demand. Monitoring so far reveals that carbon emissions have been more than halved.

Just a few years ago, in terms of public perception at least, if not in reality, 'ecological architecture' conjured up an image of camping in the woods and wearing socks and sandals. Yet these examples and many more indicate that, along with other low-carbon economy ideas, eco-refurb is

Villa gets a makeover – and a warm sweetchestnut coat



being ardently adopted by urbanites and city-based architects. And its popularity is clearly not just evident in our major cities but across the country.

Although this development may seem entirely positive, there are also potential difficulties with the phenomenon – and particularly with the notion of eco-refurbishment as a kind of fashion accessory. Are eco-makeovers in danger of being just another consumer must-have – or an ‘offset’ for those holidays to Thailand and the school-run SUV – rather than something that is integrated within an overall sustainable way of life?

Not according to Duncan Baker-Brown, director of Lewes-based BBM Sustainable Design, who won the *Daily Telegraph's* Eco-house of the year award in 2006. He says that homeowners are attracted to the idea of eco-refurbishment not just because it is worthy – or trendy – but because it makes a building perform efficiently, improving the quality of life for its occupants at the same time as reducing running costs. “The last three years have seen an enormous rise in eco-refurb,” says Baker-Brown. “We now have almost too much of this kind of work for us to keep up with.”

Before 1975, extraordinary as it might seem, new houses did not have to conform to any energy performance criteria. Even then, the standards which were introduced began from such a low base, and levels of enforcement

significantly reduced.

Pointing to the fact that Germany's impressive retrofitting culture is a long way ahead of the UK, Harris lays part of the blame at the door of government. “At the moment government incentives are rubbish,” he says, “and there are simple measures that could bring payback times down to five years instead of 15.” Two obvious incentives would be the removal of VAT on eco-refurbishment, and lower council tax bands for high-performance homes. Above all, though, he stresses the “necessity to develop a robust market case for refurbishment, as reliance on government handouts can create a culture of passive dependence.” To this end, ZEDfactory is working on a government-sponsored initiative called T-Zero, which has assembled a wide range of expertise to try and find a market-based solution to making eco-refurb a much more widespread phenomenon.

In the end, might our widespread obsession with house prices be the paradoxical key to progress on this front? That's how it looks to Zoltan Zavody, the Energy Saving Trust's building strategy manager. While he's blunt about the need for government to offer more encouragement for refurbishment – “there's no policy framework at all at the moment,” he says – he points to resale value as one way in which the market is already beginning to recognise the benefits of high performance buildings. And he argues that

High spec, low carbon



Refurb brings a healthy glow to Brighton



Above: Lowry Homes, Right: BBM Architects

were so questionable, that a culture of energy-inefficient housing remained endemic. This has left a legacy which is a huge problem, both in terms of emissions and energy costs – particularly with energy prices as prone to sharp increases as they have been in recent years. So there would seem to be an obvious benefit in the kind of low-carbon refurbishment that offers some protection against further hikes in fuel prices.

But the key question for homeowners is whether a capital investment in increased energy efficiency, or in generating their own power, will pay for itself within a reasonable period of time. And the answers vary. “It is so hard to generalise,” says Steve Harris, a senior architect at ZEDfactory, “because there are so many different types of building.” Solar photovoltaic panels, for instance, are one form of microgeneration that many might want to consider. A study done at ZEDfactory suggests that the payback time would be approximately 15 years for an average 100m² house with 20 solar PV panels, if the surplus energy were to be sold back to the grid on the most preferential utility contract currently available. Of course, if fuel prices really went through the roof, that 15-year figure would be

this effect should become more tangible with time. “Very soon an un-insulated, energy-inefficient Victorian semi is going to look an extremely unattractive proposition to buyers when you could buy a highly efficient home with low running costs instead.”

One thing is for certain – there are millions of inefficient homes out there, waiting to be greened. In terms of making any kind of meaningful impact across the board, eco-refurbishment is still in its early stages. Architects, high-profile clients and television shows can all help fuel a widening aspiration towards greener living, as awareness of the threat of climate change translates increasingly into behaviour change. Link that to the aspirations that the British have come to associate with house prices, and it could really spell a change in the carbon footprint of the existing housing stock.

Kevin Telfer is a freelance journalist and co-author of 'Earthships: building a zero carbon future for homes'.

BBM Sustainable Design, www.bbm-architects.co.uk
Energy Conscious Design, www.ecda.co.uk
ZEDfactory, www.zedfactory.com

insulation, insulation, insulation...

Tell your friends that you're doing an eco-renovation, and they'll expect something... interesting. Beware, says **Martin Wright: they'll be more impressed by gizmos than energy savings.**



Exeter terrace on the road to Damascus

On the surface, our newly acquired terraced house in Exeter looked lovely. Weathered red brick and tiles, a lattice of small windowpanes, all those semi-Arts and Crafts details typical of the early 1900s.

But in energy terms, it was hideous. Leaky windows, rising damp, a creaky old boiler, and an attic with too much natural light – via the gaps between the tiles. What we had on our hands was something with serious... potential.

We wanted to open it all up, let in the light, keep out the draughts and keep in the heat. In as ecological a fashion as our limited budget could buy.

Some basic research soon ticked off the three essentials – huge wads of insulation in every conceivable nook and cranny, a super-efficient condensing gas boiler and some (safely rewired) low-energy lighting. Add double glazing where we could afford it, and some finely placed draught proofing where we couldn't, and it added up to a decent, if unspectacular, eco-refurb job.

But it was all about ways of consuming less, rather than generating more. And that, as far as our friends were concerned, definitely fell into the 'worthy but dull' category. "What, no little wind turbine on the roof? David Cameron's got one you know... [Yes, it had been mentioned. Several thousand times.] No solar wotsits? And what about a ground-source thingy...?" When it comes to exciting people about clever green gizmos, those home makeover programmes have got a lot to answer for.

Sad to say, for the renovator-on-a-budget, most of these simply didn't add up.

Micro-wind turbines – little spinning badges of commitment up on the roofline – spin too sluggishly and

infrequently to generate more than a smidgeon of power; maybe 10% of your needs if you're lucky, unless you're perched on a cliff or a hilltop. Future models may well do better, but meanwhile, Exeter sits in a bowl. 'Nuff said.

Solar photovoltaics are a lot more promising. We were tempted, but the upfront costs are punishing – even with such paltry grant funding as is on offer. For family reasons, we expect to stay here for five or six years at most – around a third of the time needed to recoup our investment. We could bet on electricity prices going through the roof, or power cuts throwing us back on our own devices, but for now it's a cost too far. Insulation, by contrast, boring and unglamorous as it is, should pay for itself in a couple of winters.

We're converts, too, to energy-efficient lights. They've vastly improved since their early incarnation as clunky not-very-compact-at-all fluorescents casting a brutal and unforgiving white light. The new breed come in all shapes and shades, from tasteful uplighters to dimmable ceiling lamps, and, best of all, tiny spotlights, some of them even using LEDs – that most energy-miserly of lighting technologies. The watts we're saving in lighting alone far outweigh anything we could have hoped to generate from a micro-turbine.

Of course, the most urgently needed refurbishment of all isn't of our homes, but our behaviour inside them. The most efficient light on the market isn't really so clever if it's left blazing in an empty room. But try telling that to my stepson...

And what did our builders make of it all? They were sympathetic in theory, but surprisingly sceptical in practice – even on something as simple as insulation. Such is our cheap fuel culture that the idea of spending a couple of hundred quid extra to give the house the full tea cosy treatment still drew mildly puzzled looks. I found myself padding round after them, pointing out bits they'd missed, trying to explain why I wanted twice the 'usual' thickness.

We're all too aware that there's so much more we could have done – solar water heating, greywater recycling, sun pipes into the en-suite, even. But the combination of costs and aesthetics deterred us. We take some satisfaction from the fact that it looks like a nicely spruced-up Edwardian house: it doesn't shout ecology from the rooftop, in other words, nor offend the sensibilities of our Conservation Area neighbours.

Our *next* house, we tell each other, will be a no-holds-barred eco-self-build. Honest... Meanwhile, the proof of this particular pudding lies in the metering. Our energy bills are now less than we paid for space heating alone in our previous (much smaller) rented cottage.

The nicest surprise of all came in the middle of a December night, a couple of weeks after we moved in. Something of a sporadic sleeper, I'd woken, got up, cocooned myself in fleeces as per long-established habit and was bashing away at the laptop at 3am – when I realised I was perspiring. Now, we'd had some teething problems with the timer, which meant the heating came on occasionally when it shouldn't. So I stumped crossly upstairs to deal with it – and discovered it was already off. Not only that, but the radiators were stone cold...

It was my very own Road to Damascus moment. Insulation. It works.

Martin Wright is editor (at large) of *Green Futures*.

“The most urgently needed refurbishment of all isn't of our homes, but our behaviour inside them. The best efficient light on the market isn't really so clever if it's left blazing in an empty room”



Russell Sadur/ Dorling Kindersley/Getty

A connoisseur's delight

The multi-million makeover menu

Looking beyond the lowest-hanging fruit, Matt Ross weighs up solid wall insulation and boiler benefits – and gets excited about fuel cell CHP.



SuperStock/ThinkStock

The mixed heritage of our housing stock – those millions of Victorian terraces, the inter-war suburbs and post-war estates – is here to stay. So there's no way round the fact that, to make our housing stock more sustainable, we must refurbish our existing homes. And there's not much argument about where to start. The first priority is to improve standards of insulation.

Recent government figures indicate that there are over ten million existing homes with cavity walls that could easily be filled with insulating foam. This straightforward retro-fitting operation can cut annual carbon dioxide emissions in a typical three-bed semi by 600kg or more – taking a hefty 10% off the average UK home's emissions.

Then there's loft insulation – hand in glove, as it were, with the filling of cavity walls. A report by BRE (formerly the Building Research Establishment) for Defra reveals that more than 17 million homes have less than 150mm of loft insulation. Getting that brought up to scratch costs a few hundred pounds at most, and can save some 300kg of CO₂ emissions annually.

Other relatively simple retro-fitting includes draught proofing and the proper lagging of older hot water tanks. After that, though, making further progress on the insulation front becomes much more complicated. Upgrading to modern, double-glazed windows would certainly cut emissions and energy costs, but does not come nearly so cheap. The BRE report also finds that about ten million homes lack underfloor insulation, although here again it would take a long time to recoup the cost – unless the floor was being relaid in any case.

Then there's solid wall insulation. There are 4.6 million older British homes without cavity walls, and retro-fitting solid insulation could make a massive impact on their emissions, potentially saving two tonnes or more of CO₂ per house per

year. It would come with a price tag, however, of more than £3,000. In terms of cost effectiveness, says John Henderson, the BRE report's author, this puts it "on the outer bounds of what one would consider to be worthwhile".

And there are other drawbacks. Sheffield City Council architect Jim Breakey, who runs a pilot sustainable refurbishment scheme for housing market renewal pathfinder Transform South Yorkshire, has rejected the idea of fitting solid wall insulation to the front of his demonstration home. "It would stick 75mm over the pavement – a public highway – and we'd have to extend the roof to cover it," he explains.

There is no national planning guidance on solid insulation, notes eco-homes assessor and chartered planner John Kettlewell, who fears that householders could find themselves in "complicated arguments" with their council. "It would be nice if the government took the opportunity of creating a new regime for all this, because we need to encourage people to insulate the existing stock," he adds. Mitesh Dhanak of the Eaga Partnership, which runs government insulation schemes, argues that "at some point, we have to persuade people to fit

"Fuel cell CHP plus cavity and loft insulation could halve a three-bed semi's CO₂"

solid insulation. It's a big chunk of the housing stock." But, as yet, the technology is too intrusive, too untested and too expensive to attract most homeowners.

Solid wall insulation also has few fans among the guardians of our historic built environment. But there are other ways of making protected buildings more sustainable. Ben Stubbs, whose sustainability team at Constructing Excellence developed the Heritage and Lottery Fund's recently-published 'Planning Greener Heritage Project' guidance, points to the huge efficiencies that can be gained via roof insulation and tackling chronic draughtiness – whereas some historic buildings (if not Victorian terraces) have plenty of thermal mass in their thick walls already. Stubbs cites the long derelict late 17th century Valentine's Mansions at Gant's Hill in Redbridge as a prime example of sustainable restoration, featuring a biomass boiler, high spec roof insulation and low energy lighting – plus real community involvement and a focus on biodiversity in the surrounding park. Another success story is a listed Georgian tenement in Edinburgh where the marriage of the building conservation agenda with contemporary energy saving technologies (secondary glazing, loft insulation and new boilers) is now saving around one tonne of CO₂ per home.

The microgen route

Paradoxically, perhaps, renewable power generation technologies may prove more popular. "Renewables aren't anything like as cost-effective as insulation," says Henderson. "But people tend to put them in for other reasons, even though on paper it looks like a crazy thing to do." A quick set of calculations (using figures from government research for the new Carbon Emissions Reduction Target scheme) shows that, in terms of CO₂ saved per pound, heat pumps are more than three times more expensive than cavity wall insulation, while mini-wind turbines are six times pricier and photovoltaic cells cost 14 times as much.

Prices may tumble as demand grows, particularly with the 2016 deadline for new homes to achieve zero-carbon ratings. Then the more reliable technologies – such as heat pumps, which can save three to four tonnes of CO₂ emissions a year but currently cost the best part of £10,000 – could look economic. But the danger, says Henderson, is "that we get close and everybody says: 'Uh oh, this is going to be really expensive,' and they dumb down the regulations."

Renewables aside, there are still 16 million old style boilers in UK homes. Replacing them all with condensing models, which trap exhaust heat, could save over 350kg of CO₂ per unit annually. Or, looking just a little further ahead, there's the prospect of widespread take-up of domestic-scale combined heat and power (CHP) systems, which generate electricity while heating the home.

One significant problem to date has been that gas CHP systems generate about seven times more heat than power – a particularly inappropriate ratio for the well-insulated homes which prospective 'early adopters' tend to live in. There's a real prospect, however, of fuel cell technology changing that equation. And mass-market commercialisation of a fuel cell-powered CHP, developed by specialist firm Ceres Power, came a big step closer in January this year when British Gas signed an agreement with Ceres securing exclusive distribution rights.

"With fuel cell devices, the ratio of heat to power produced is more like 1:1," says Ceres' commercial director Bob Flint. "For a typical British Gas customer, we'd expect to see savings of up to 670kg of carbon [i.e. almost 2.5 tonnes of CO₂], and about 25% of their total energy costs." While the system – which is expected to cost £1–2,000 more than a condensing boiler – will initially run on hydrogen extracted from natural gas, it could also run on carbon-neutral fuels such as waste methane or biofuels. Indeed, given that boilers have their own natural replacement cycle, this may be the best way forward. "There are 1.5 million boilers sold in the UK each year," says Flint, "and this unit is designed to plug into the same space."

In a poorly insulated three-bed semi whose boiler needs replacing, fitting a fuel cell CHP alongside cavity and loft insulation could cut carbon emissions by more than half, without inflating the refurb bill by more than £2,000. Over a decade or so, that kind of refurbishment looks realistic on a national scale – particularly because householders would recoup their investment over a few years in lower fuel bills.

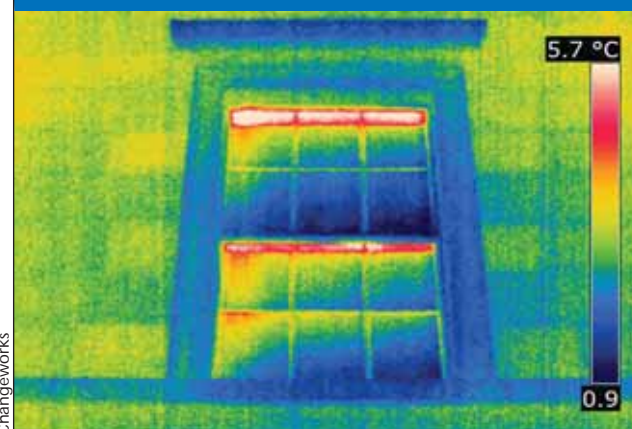
Matt Ross is features editor of 'Regeneration and Renewal', BRE, www.bre.co.uk

Ceres Power, www.cerespower.com

Changeworks, www.changeworks.org.uk

Eaga Partnership, www.eaga.com

Window buying made transparent



Should your refurb run to replacing all the windows? The price tag can make it hard to count that as 'low hanging fruit'.

As for its effectiveness, in the past, the notorious blandishments of dodgy double-glazing salesmen 'helped' muddy the waters. Replacement windows became a subject where lack of clear guidance was a real barrier to effective action. Not any more. The nicely named British Fenestration Society has now introduced a standardised ratings system. Choosing the best carbon-cutting windows should be no harder than picking an energy-efficient kitchen appliance – you just look for the A-G energy rating label, or search the options at www.bfrc.org

Do try this at home

Who's raising the banner for lower carbon refurb? Roger East is encouraged by efforts to show what can be done.

Take eight streets, spread across Britain's major cities. Pick eight homes in each of these streets, and put up £30,000 per street to see which group of residents does the best job of improving their energy efficiency and cutting their carbon emissions. Oh yes, and each street, road or lane must have the word *green* in the title.

It sounds like a reality show, but there are no annoying pundits or TV cameras to ruin this piece of audacious research by British Gas. The energy company devised the Green Streets competition and social experiment to gauge the energy consumption habits and aspirations of the nation.

Chosen to represent a wide cross-section as possible, the 64 homes did not all have to be British Gas customers. Each street does, however, have its own British Gas expert on hand

to help find the best technological and behavioural solutions. Residents have to come together and make decisions collectively. The participants are competing to see which street can realise the greatest reduction in carbon emissions. Some could achieve more than 25% savings.

The winners won't just get more efficient homes and civic pride; there's a prize of £50,000 too, to be spent on a local energy-saving project. To monitor the outcomes, British Gas is relying on the steady hand of the Institute for Public Policy Research. The think tank expects that lessons learned in the experiment will help it formulate proposals to put to government. As IPPR's Matt Jackson puts it: "There's no better way to highlight the real problems and issues than getting people involved."

Low carb chocolate box?



MSPs make an example of themselves

Five members of the Scottish Parliament (MSPs) are halfway through a Home Energy Challenge posed by Friends of the Earth Scotland. Rob Gibson (SNP), Robin Harper (Green), Jim Hume (Liberal Democrats), Jack McConnell (Labour) and Mary Scanlon (Conservative) are competing with one another to make their homes more environmentally friendly over the course of a year.

A wind turbine is on its way to power Rob Gibson's home in Inverness, while Jim Hume plans to use local wood fuel for heat and power. And where micro-renewables are less practical, such as at Robin Harper's Victorian terrace in Edinburgh, the emphasis has been on making a number of smaller changes – including improving his insulation and

draught-proofing, fitting a high-efficiency boiler, and switching from a dishwasher to old-fashioned washing up. "It has been well worth putting ourselves under scrutiny and we feel the benefits already," he said. The winner receives a £500 donation to a charity of their choice, but the real aim is to promote improvements in carbon efficiency in Scottish homes. www.foe-scotland.org.uk



Friends of the Earth, Scotland



Construction Photography/Corbis

Voting with our wallets

UK households are investing an average of £2,572 on home improvements to enhance sustainability, according to a recent study by engineering consultancy Hyder. This may not yet rival the £4,641 we apparently spend on traditional decoration and design improvements, but it's certainly enough to confirm that we're no longer talking about a 'green niche'; this is mainstream demand.

The Hyder research even found that 48% of UK adults would be 'likely' to pay a premium for houses fitted with the latest environmental technology to reduce its carbon footprint – and a mere 18% thought they definitely wouldn't.



www.glendell.co.uk

Brighton's not one of the chosen Green Street cities, and anyway Southdown Avenue has no 'green' in its name – but if you'd been there on Mothers' Day this spring, you could have popped into a Victorian house with a great deal to offer on the subject of low-energy, low-carbon retro-fit. Its roof, wall and floor insulation, wall pipe heating and a solar water heating system combine to cut CO₂ emissions by 72%. The owners opened its doors to inspire the public as part of the Old Home SuperHome initiative, recently launched by the Sustainable Energy Academy and the National Energy Foundation. The idea is to build up a network of demonstration homes across the country to show what can be achieved in a pre-1919 building without cavity walls.

Feedback from projects like these could be just what's needed to prod the government into getting its incentive strategies right. So far, policymakers have found it relatively straightforward to help vulnerable groups such as the elderly and disabled with basics like free insulation under fuel poverty programmes. What they've found trickier is identifying the best form of pump priming to encourage the so-called 'able to pay group' to invest in energy saving.

There's good reason to believe, however, that loud and clear messaging would meet a ready response. Already an astonishing 68% of UK homeowners claim to have made ecological improvements to their homes in the last year – according to research carried out for the Co-operative Bank. An impressive 60% said they'd put in at least some low-energy lightbulbs, while 26% had added loft insulation, 25% had installed some double glazing, 15% had draught-proofed their home and 13% had invested in cavity wall insulation.

The research identified interest in less conventional technologies too, with 7% considering the use of solar

photovoltaics to generate at least some electricity of their own. Expressing interest, of course, is not quite the same as putting your money down – but part of the reason for people paying more attention is the improvement and ready availability of such technologies, says Charlotte Webster at specialist suppliers Solarcentury. "For instance the solar market is more mature and you can now buy reactive roof tiles in many ordinary builders' merchants."

As from March this year, you can also get a special low-interest 'solar mortgage' to pay for the cost of having these tiles installed – if you live in Northern Ireland. The innovative financing scheme, concocted by Solarcentury and Ulster Bank, lends the necessary funds to homeowners at half the bank's usual rate for three years, and it's being piloted in the province ahead of a possible wider rollout later this year [see p12 for more on mortgages for carbon-cutting retro-fits].

Cathy Hough of ESD, consultants on energy for sustainable development, is convinced of the need for a really ambitious demonstration programme on refurbishment and retro-fitting. Germany's Zukunftshaus ('House of the future') programme has seen thousands of existing properties refurbished to a standard well above current new-build standards. Something similar in this country, she believes, could fire the public imagination, help kickstart the development of a supply chain, and stimulate further innovation and skills development. "Whatever we do," says Hough, "we need to be bold, and we need to begin now."

Roger East is editor of Green Futures. Additional material by Alex Johnson and Jon Wallace. Green Streets, www.britishgas.co.uk/greestreet Old Home, SuperHome, s-ea.org.uk

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