

Retrofitting the UK's Housing Stock

A Conversation Starter

An ACE publication

2010



Executive Summary

Retrofitting the UK housing stock is important if we wish to achieve our target of an 80 per cent reduction in the level of CO₂ emissions by 2050.

This paper is intended to review existing models and solutions gauging their benefits and potential flaws. By looking at the bigger picture it is hoped that this paper will generate debate within the industry, ultimately leading to the formation of new ideas and innovative models that will deliver the housing stock of the future.

David Bott, director of innovation programmes at the Technology Strategy Board, suggests that: “At least 60 per cent of the houses we’ll be living in by 2050 have already been built. So it is critical that we look at ways to dramatically improve the performance of our existing housing stock. ‘Retrofit for the Future’¹ provides the testbeds we need to ensure the development of long term, mass solutions.”

Current measures of housing stock performance

For retrofitting costs and benefits to be calculated in an accurate manner a reliable form of efficiency measurement is required. Currently such activities are undertaken as part of the Home Information Pack requirements (HIPs). For further details regarding HIPs and the subsequent Energy Performance Certificates (EPC) please see appendix A.

Looking forward

Given the review undertaken in this paper ACE suggests that further exploratory work could be undertaken in the following areas, with the possibility of implementing a range of measures to encourage retrofitting activity:

- Local authorities should be encouraged to engage in retrofitting schemes, providing services that will allow for lower negotiated prices and improved efficiency.
- Improving and refining existing regulations regarding efficiency, building and energy consumption standards is an effective way of encouraging investment in socially beneficial technologies during any retrofitting work.

¹ Source: Technology Strategy Board - <http://www.innovateuk.org/content/news/press-release-10m-grand-challenge-to-make-housing-.ashx>



- We would urge that such schemes are monitored to ensure that their effectiveness and a continuing effort to ensure that alternative methods of funding be considered.
- Technological improvements will have a significant role to play in energy efficiency, and in the creation of smarter green homes. For this reason it is important that both existing and new installations encourage the purchase of the most efficient products.
- Accurate monitoring of energy usage should play a key role in any retrofitting regime, for this reason ACE would like to see the government speed up the installation of smart metering.
- The exploration of a variety of Insurance lead options, including the possibility of schemes/policies that could cover the 'gap' in funding for newer energy efficient technologies in the event of damage to a property.

The challenge now is to look at the above measures, innovative ideas and the context in which they all operate to generate conducive economic conditions to stimulate retrofitting activities.



Commercial retrofitting and refurbishment

Commercial and professional organisations buy properties and refit or upgrade the stock for resale. This means that profit margins will be one of their primary concerns.

The profit motive within commercial retrofitting activities does cause a conflict of interest, given that any expensive technologies and innovations (that are not required by regulation) will erode the profit levels of the company. This disincentivises the use of such technologies, unless consumers are prepared to pay a premium for such products – which does currently occur at the higher end of the market e.g. the lottery winners £4m eco home.

Should government regulate standards more aggressively?

If the government was to tighten the regulation on commercial retrofitting activity - such as requiring retrofitted developments to achieve grade A on HIPS/EPC pack, contractors would effectively be forced to incur additional cost, reducing profit and potentially limiting activity within the retrofitting market. Developers may decide to raise the price of the completed properties to compensate for such requirements. In addition to this, as refitted houses are more efficient and outperform the existing stock their prices will rise, but non-refitted homes are unlikely to see a relative fall in value to encourage efficiency because of the inelastic nature of the UK housing stock. This would have the knock on effect of reducing affordability within the market, squeezing both existing and first-time buyers.

Another issue regarding the retrofitting of properties is that the marginal costs of achieving each incremental increase in grade will rise as efficiencies are harder to enforce. The cost of retrofitting houses to this extent may result in retrofitting costs approaching the cost of demolition and rebuild. As a result rebuilding may well be a more cost-effective option allowing for houses to embrace a range of new technologies that may not have been suitable for the existing structure. However, the environmental impact of such activity is likely to be greater than that of retrofitting an existing property.

Where should the incentives lie?

Given the above, incentives such as an interest-free loan, for private/commercial developers should initially target energy and efficiency savings that will not



substantially impact upon the level of return. For example, simple measures such as adequate insulation, energy efficient lighting, double glazing and ensuring seals are adequate would all make a substantial difference and should be within developers remits. As price reductions occur on technological innovations, measures could be extended to include CHP/fuelcell boilers, ground source heating, heat recovery systems and intelligent appliance controls.



Consumer/homeowner retrofitting

Consumer/homeowner retrofitting is different given that it is generally reactive to circumstances and that any investment in green technology should provide not only capital/house price increases but also save incremental costs over a period, following the initial capital outlay.

In theory, the above should provide a sufficient incentive to invest in such technology. However, the costs attributable to green technologies remains high, and credit conditions are tight. We could wait for the market to re-align over time as the cost of technologies falls. Implementation may rise in a similar way to the uptake of central heating over the last century, but this would significantly slow progress regarding the UK's 80 per cent CO₂ reduction target. For this reason, the government has proposed and started implementing a number of measures to support and deliver retrofitting improvements in a timely manner.

Measures to encourage efficiency

Interest free loans

An interest free loan effectively allows the initial capital cost of energy efficiency improvements to be spread over a period of time. Currently these loans are more popular when looking at improvements in efficiency for businesses rather than households but there is no reason why such a scheme could not be extended. The details of the current Carbon Trust² scheme that businesses can apply for is outlined below:

- Between £3,000 and £500,000 borrowed interest free.
- Anticipated energy savings offset the loan repayments. So new equipment should pay for itself and savings should be made year on year.
- The loans are government funded and unsecured.
- The application process is straight forward and fast, with no arrangement fees.
- A conditional offer will be made within 24 hours of an application being processed.

² Source: Carbon Trust - <http://www.carbontrust.co.uk/>



- Loans can be repaid over a period of up to 4 years

Assessment of government schemes and funding

The government currently have a number of schemes aimed at the replacement of old boilers, a winter fuel allowance and the fitting of loft insulation. We would urge that such schemes are monitored to ensure that their effectiveness and a continuing effort to ensure that alternative methods of funding be considered. For example it may turn out to be beneficial to redirect funds from schemes such as the winter fuel allowance which aid current consumption towards efforts of energy efficiency that improve longer term performance and ultimately lower the burden of energy bills.

Pay As You Save scheme (PAYS)

Another recent announcement by the Department of Energy and Climate Change is their Home Energy Pay As You Save scheme (PAYS), as part of their wider Warm Homes, Greener Homes initiative³.

The PAYS scheme amounts to a homeowner being provided with the funds (loan) to make retrofitting/improvements on their property. Once finished the improvement will increase the home energy efficiency and subsequently their energy bills will fall. Given this reduction on their bill, a repayment rate is calculated that can then be added to each bill over a period of years to pay for the financing of the improvements. The consumer in theory should also benefit from lower bills as the scale of the repayment should not be as great as that of the saving.

Due to the likelihood of people moving home before the repayments are complete, the government has proposed that the repayments stay attributable to that property, applying to its energy bills irrespective of changes in ownership.

Currently, pilot projects are taking place. We have yet to know how consumers will react to such projects. Another dynamic, which will be of interest, is the effect of such schemes on house prices. If consumers view the inbuilt proportion of bills being used to replay a loan as a burden, they will factor this into the initial property purchase price by lowering its value. On the other hand, if consumers consider the

³ Source: DECC - http://www.decc.gov.uk/en/content/cms/what_we_do/consumers/saving_energy/hem/hem.aspx



improvement in efficiency as a positive and the repayments as manageable, then properties that undertake such improvements would attract a premium.

Although differing in methodology and implementation across the political parties there is a general consensus that the UK has the ability to position itself as a global leader in respect to low carbon technologies.

A recent paper by the Conservative Party entitled 'The low carbon economy: security, stability and green growth'⁴ highlights a variety of measures, including a similar system to that of the PAYS that could be taken by government to encourage the development of a low carbon economy, some of which encourage the retrofitting and improvement of the UK's current housing stock.

- "Introduce a new entitlement for every home to be fitted immediately with up to £6,500 of approved energy efficiency improvements, the cost to be repaid through fuel bills over a period of up to 25 years but delivering immediate reductions in the gas and electricity bills of participating households."

Households meeting businesses carbon reduction requirements

Another idea within the Conservatives' low carbon paper is that of allowing businesses to meet their carbon reduction commitments by investing and improving their employees' homes.

This is an interesting proposal and could potentially fund significant retrofitting within households. For example, within the Emissions Trading Scheme (ETS), companies are currently allowed to fund part of their reduction by purchasing Certified Emission Reductions (CERs) for projects that occur outside the EU under the Clean Development Mechanism (CDM). However, this has meant that a large majority of companies' emissions reduction has occurred via projects outside the EU. In phase 3 of ETS, the level to which companies can use CERs is to be capped at 50 per cent (current use is approximately 80-90 per cent). This cap will encourage firms to invest within carbon reduction schemes within the EU, and the Conservative proposal provides another possible avenue of investment.

⁴ Source : The conservatives - http://www.conservatives.com/Policy/Where_we_stand/Climate_Change_and_Energy.aspx



In terms of viability, investment within an employee's home would depend upon the cost of the improvement versus the reduction achieved and attributable to the business.

Taking a simple example, if the cost of improving an employee's house is cheaper than implementing alternative forms of energy efficiency within a company given the same carbon reduction, it is likely the business would view this as a potentially sound investment. Theoretically, this is a virtuous idea but there are problems with it. Factoring in aspects such as ownership of the asset, employment flexibility and movement, and potential capital and revenue return (such as the sale of electricity to the grid from investment in a micro generation source), then business are unlikely to invest in an asset they do not own, and will not derive benefit from.

Scrappage schemes

Following the success of the car scrappage scheme in supporting the car industry, the government announced a similar initiative for household boilers, providing an incentive to replace old inefficient equipment. These schemes are generally supported given that they rely on government, private companies and consumers part funding the improvement. This spreads the cost of the investment, allowing parties that could not have afforded the up front capital cost of replacement the ability to do so. The key to the success of scrappage schemes is the setting of the contribution from government and private sector. It would be economically inefficient for government to subsidise individuals that would have paid privately to replace their systems. Finally, there is the underlying conflict of interest that exists within these schemes for the energy providers, given that they are helping customers lower their energy bills and thereby reducing their income potential.

Regional and local initiatives

Regional or local financing could be utilised to help fund retrofitting improvements, utilising investment panels, or local authorities providing an increase in buying power and allowing them to negotiate favourable costs for homeowners involved.

Councils should be encouraged to improve communication and aid with regards to easy win scenarios such as the fitting of insulation, sealing round doors and windows, sufficient pipe and boiler insulation, attitudes to energy and water use and the use of more efficient products. There is a significant amount of information on improving efficiencies in new homes whilst undertaking the construction



process, but there is very little detailed information surrounding existing home refits. Programmes that operate in conjunction with energy providers are most likely to succeed given that they utilise the expertise of the energy provider, minimise the administrative burden on the council and provide an extensive customer base to which the products can be targeted.

The advent of feed in tariffs may also help to facilitate micro generation not only on a household basis but also on a level whereby the costs and benefits are shared by a group of households or local properties.

A study into such schemes by the Energy Savings Trust entitled “Power in numbers the benefits and potential of distributed energy generation at the small community scale⁵” concluded that “65% of household CO₂ emissions could be saved by community distributed generation if a Feed-in Tariff and a Renewable Heat Incentive were put in place”

Altering planning and standards regulations

Improving standards within planning regulations is probably one of the best ways of implementing change, requiring households to upgrade existing systems when they undertake any significant work upon their home. This would then be factored into project costs and house prices in a direct manor. These improved standards should be introduced and amended incrementally so that whilst they improve standards they do not place excess burden upon consumers. Price differentials within the housing stock should therefore reflect the differing types and stages of improvement within the housing stock.

Supporting efficiency, innovation and technological improvement

Technological improvement will endeavour to make homes more efficient, promoting R&D: implementing energy standards on items such as TVs and electronic goods (such as the EU have outlined) will reduce energy consumption without the large capital outlay of some of the items discussed above. For example, the European Commission has taken steps to implement measures to improve the ‘eco-design’⁶ of electrical goods such as television sets in terms of energy

⁵ Source: Energy Savings Trust - <http://www.energysavingtrust.org.uk/corporate/Global-Data/Publications/Power-in-numbers-summary-report>

⁶ Source: EC - http://www.energy.eu/directives/l_19120050722en00290058.pdf



efficiency and power usage.⁷ Given data on efficiency differentials such as that provided by CNET⁸ within product reviews there is potential for significant improvement within the EU utilising regulatory standards and provision of relevant information to consumers.

In terms of retrofitting one technological advance that may make a significant difference to consumer behaviour is that of smart metering. This is likely to demonstrate the extent of appliances “normal” energy usage, and will potentially surprise many consumers. It is important here that information is easy to interpret and provides estimated/real time cost implications. Given that accurate and transparent information will be essential in changing consumer’s behaviour, it is felt that the urgency of the smart metering programme and the speed of their installation should be increased.

Innovation and technological process also features within the Conservatives’ low carbon economy report and, potentially, questions their necessity.

- “Mandate energy suppliers to ensure that every gas and electricity bill contains energy use comparison information.”
- “Establish a new ‘top runner’ scheme to highlight the most energy-efficient household goods.”

If the implementation of smart metering occurred sooner and provided data in a simple transparent manner, with online access, and analysed energy usage, energy suppliers would not need to invest money in billing systems that provide comparison information, only to find that the ‘online’ smart meters make the systems redundant a few years later.

The top runner scheme is one that consumers may potentially find useful. However, the expansion of the EU Energy Star programme may be a better option, given that it currently includes office equipment, could be linked closely to EC directives and follows an agreement between the Government of the US and the European Community (EU) to co-ordinate energy labelling (office equipment).

⁷ Source: EC - <http://ec.europa.eu/energy/efficiency/ecodesign/doc/committee/2009-03-30-tv.pdf>

⁸ Source: CNET - <http://reviews.cnet.com/green-tech/tv-power-efficiency/?tag=more>



Such a scheme should also report data in a consistent manner to that of smart meters in the future so consumers can make a direct comparison between their 'old' products against the energy usage of future replacements.

Insurance product reforms

Another way to encourage retrofitting and improve the housing stock may be to encourage insurance companies to replace/repair houses when they are damaged to a standard above that of the 'like for like' or 'non improvement methodology' that is currently in place.

The above would have implications on cost, and insurers are unlikely to agree to meet this without raising premiums, however some of the following may help address cost issues or encourage such insurers to meet such costs;

- The government could subsidise a proportion of the increased cost to encourage insurers to undertake such activities.
- The government could tighten regulations with regards to refurbishing and rebuilding of existing properties to ensure insurance companies utilise energy efficient building methods and materials. Although initially increasing the cost to insurers, as new standards became considered normal, efficiency and technological improvements would occur helping to reduce the average cost.
- Finally, homeowners could be presented with the option to purchase 'gap' insurance on their premium such is the case for new cars. This would meet the cost gap between replacing your home as it is for like with like to that of an increased standard. In the event of something such as a flood the home would be refurbished with an agreed amount being released contributing the marginal cost of purchasing of goods and services that provide additional benefits in terms of energy efficiency products such as more efficient TVs, insulation, double glazing, and possibly even micro generation. The attraction to this system is that it is funded entirely by private capital, with no financial intervention from government. Before such policies and systems could be put in place further market testing would be required by the insurance industry to ensure its effectiveness and possible cost implications.



Appendix A

Measuring Housing Stock performance

Information on the contents of both Home Information Packs (HIPs) and Energy Performance Certificates can be found on the Direct Gov website⁹,

Home Information Packs (HIPs)

The following is a summary of the documents that must be included in your HIP:

Freehold properties

- Home Information Pack Index
- The new Property Information Questionnaire (PIQ) (as of 6 April 2009)
- Energy Performance Certificate (EPC) or Predicted Energy Assessment (PEA)
- Sustainability information (required for newly built homes)
- Sale statement
- Evidence of title
- Standard searches (local authority and drainage and water)

Leasehold properties

- All the compulsory documents above
- A copy of the lease

Optional documents

Other documents can be included within your HIP, but these are optional. If they are included, it could help to speed up the sale and ensure that the process goes more smoothly. These include:

- Home Condition Report
- Legal summary
- Home use/contents form

⁹ Source: DirectGov - <http://www.direct.gov.uk/>



- Other documents like specialist searches (for example, the seller may choose to include a mining search in a mining area)

Energy Performance Certificates (EPC)

Of particular interest when considering a low carbon economy and the retrofitting of existing houses is the contents of EPCs, which is as follows:

- Information on your home's energy use and carbon dioxide emissions
- A recommendation report with suggestions to reduce energy use and carbon dioxide emissions

“If you are buying or selling a home you now need a certificate by law. From October 2008 EPCs will be required whenever a building is built, sold or rented out. The certificate provides 'A' to 'G' ratings for the building, with 'A' being the most energy efficient and 'G' being the least, with the average up to now being 'D' ¹⁰.”

¹⁰ Source: DirectGov - <http://epc.direct.gov.uk/index.html>