

Refurbishing Victorian housing

Guidance and assessment method for sustainable refurbishment

IP 9/06

Tim Yates

BRE Construction Division

This paper outlines a method of assessing the refurbishment of traditionally built houses dating from the period 1840–1919 similar to that used in BREEAM (BRE Environmental Assessment Method) EcoHomes. It looks at competing requirements for modern energy and acoustic standards, whole building performance and the effects of durability, reliability and maintainability of the building fabric. It will be of interest to construction professionals responsible for refurbishment of Victorian housing.

The paper summarises the economic, environmental and social costs and benefits of retaining this part of the building stock and sets out a methodology that can be used in the assessment process.

It is based on a recent BRE Trust Report Sustainable refurbishment of Victorian housing (FB14), which deals with the topic in much greater detail and includes several case studies.



Introduction

Over half the expenditure in the UK construction industry relates to the repair, refurbishment and maintenance of existing buildings, though much current practice and advice are primarily aimed at new build and modern building fabrics. With the growing emphasis on re-use and regeneration of the built heritage there is a need to evaluate the costs and benefits related to modern building

practice against the occupancy and use of Victorian and Edwardian housing in the light of requirements for materials, durability and whole building performance.

More than 4 million houses in the UK date from before 1919, so continued use, reuse, and restoration of these houses represent unique opportunities and associated risks.

The potential conflicts between requirements for modern houses and the performance of older



Figure 1 View of the Whitefield area of Nelson, Lancashire (by permission of Andrew Stringer)



bre press

houses have been highlighted in a number of high profile projects. An example is the redevelopment in Nelson, Lancashire (Figure 1) where the local authority's decision to demolish more than 400 19th century houses in the Whitefield area was successfully challenged. A second example occurred in 2005 when conservation groups raised concerns at the large scale demolition plans of the then Office of the Deputy Prime Minister, which seemed to indicate a lack of joined up thinking on sustainability and sustainable communities. These concerns were further highlighted by the publication in 2005 of the *40% House* report (Environmental Change Institute, 2005) which advocated the demolition of up to 8 million houses, including a very large proportion of those constructed before 1919. These figures need to be seen in the context that more than 80,000 dwellings per annum were demolished under slum clearance powers in the early 1970s, but this fell to some 4200 in 1992, an annual replacement rate of less than one in every 4750 dwellings.

The situation is clearly complex, with competing demands, and so it is essential to evaluate the various options and determine a way forward that produces the overall lowest environmental impact in that particular time and place. To be sustainable these need to be evaluated and considered alongside the whole life cost for each option, and the societal impacts and benefits of any proposed redevelopment, whether as new build or refurbishment.

The project summarised in this Information Paper builds on the work reported in BRE Information Paper IP9/02 on sustainable refurbishment (Anderson and Mills, 2002) which was developed as a methodology and tool (Office Scorer) for assessing the choice between refurbishing and redeveloping office buildings, and which concluded that, typically, refurbishment is lower in both environmental and whole life cost impacts than redevelopment. BREEAM EcoHomes XB (the environmental rating for existing housing) is an environmental assessment tool launched in June 2006 by BRE which can be applied to the refurbishment of domestic housing, and which enables decision making to take account of a wide range of key issues relating to the built environment.

The project aimed to formulate a method of assessing Victorian house refurbishment similar to that used in BREEAM EcoHomes 2005. This was seen as realistic because of the comparatively small number of typologies that housing of this era fits into – brick or stone-built terraced housing on two, three or four levels. The objectives of the project were to:

- evaluate the refurbishment/conversion of traditionally built housing dating from 1840–1919, looking specifically at competing requirements for modern energy and acoustic standards, whole building performance and the effects of durability, reliability and maintainability of the building fabric
- examine the economic, environmental and social costs and benefits of retaining this part of the building stock
- develop a methodology that can be used in the assessment process.

Background to refurbishing sustainable Victorian housing

Considerable redevelopment of urban housing in the UK has been carried out since the 1980s. In many cases the regeneration programmes have seen existing buildings demolished and replaced by new build housing. However, refurbishment may be a cost effective choice, and in many ways is a more desirable option. It can result in better quality housing with reduced heat losses and retains the fabric of the structure along with the traditional urban landscape.

In some locations, particularly in historic city centres, refurbishment is a well established feature of housing regeneration. Problems with some projects may have occurred because refurbishment work brings particular problems which are not encountered with new build, or it may involve problems unique to regeneration in urban areas.

Recent regeneration of waterfront locations such as in Liverpool, Cardiff and Belfast has involved the refurbishment of older buildings, particularly as luxury flats or in the leisure sector. A driver for this work has been to provide housing close to city centres but it does, to some extent, ignore the spatial and social patterns typical of inner city areas.

There are countless examples of Victorian housing converted from single family occupancies into multi-residential units that demonstrate the flexibility of this type of property to meet the demands of changing demographic patterns and the trend towards smaller households. There are also exemplary case studies of Victorian terraced housing that have been refurbished to high standards of energy efficiency. Achievable standards of sustainable refurbishment of the existing housing stock can be benchmarked against current Building Regulations and EcoHomes ratings for new build.

Refurbishment of solid walled houses can achieve Standard Assessment Procedure (SAP) ratings equal to or better than those of new build properties complying with building regulations by adopting such measures as:

- loft insulation
- insulated dry lining to external walls, or external insulating render
- ground floor insulation
- secondary glazing
- gas central heating with condensing boiler
- controlled ventilation system.

Other benefits not related to energy efficiency include:

- reduced maintenance costs due to fewer condensation problems
- higher rental income
- management costs savings
- increased property values.

A four-storey tenement in Greenock, Scotland was refurbished in 1996 and significant improvements in energy efficiency were achieved, which are summarised in Table 1. Annual space and water heating costs were estimated to have reduced by more than 60% and CO₂ emissions by more than

Table 1 Estimated SAP ratings, energy costs and CO₂ emissions of a four-storey tenement in Greenock before and after refurbishment

Item	Second floor 3-bed mid flat		Ground floor 2-bed gable flat	
	Before	After	Before	After
SAP rating	50	86	23	57
Annual space and water heating costs	£477	£173	£631	£241
CO ₂ emissions (tonnes/year)	5.5	4.4	6.7	4.9

20%.

Assessment methodology

In recent years the ideas and requirements associated with renovation have moved beyond the simple desire to reduce energy consumption and many other aspects of sustainability need to be taken into account. An assessment methodology has been developed which draws on relevant elements of EcoHomes 2005 and EcoHomes XB. It uses a scoring system similar to that in the EcoHomes' schemes to provide some guidance on the most beneficial actions in terms of impact and, in general terms, the economic cost.

EcoHomes XB

EcoHomes XB, an environmental assessment tool for the maintenance and small scale refurbishment of existing buildings, was launched in June 2006. It is based on EcoHomes, which expresses environmental performance on a four-point scale from pass to excellent, and is designed to operate on two levels:

- the basic level is for use as an inhouse, desktop operation drawing on data already held by the stockholder either in stock registers or other surveys, for assessing large areas of housing such as districts, postal areas etc
- the advanced level requires more information, some of which may necessitate site visits and SAP data. It is designed for groups of houses such as streets, small groups of a single house type or individual buildings.

EcoHomes XB is easy to use, and draws on data that is either already to hand or readily accessible from other surveys, requiring the minimum amount of additional work and data gathering. The scoring system is structured to allow improvements to be measured incrementally, so that even minor improvements are reflected in the score.

EcoHomes XB allows those responsible for buildings to:

- develop stock profiles in terms of the current environmental performance of their housing
- identify areas of housing that have a poor environmental performance
- target improvements to gain the most environmental benefit
- measure and monitor the progress of their stock.

The scheme allows building owners to identify stock which underperforms environmentally (basic level) then allows

them to consider measures to improve performance in more detail (advanced level).

These ideas can be directly extended to the built heritage and by the addition of a category to reflect the use of good practice conservation policy, EcoHomes XBC – the 'C' denoting conservation. EcoHomes XBC can identify the limits of improvement which allow the important aspects of the built heritage to be retained whilst maximising the improvements in environmental performance.

Developing EcoHomes XBC for the built heritage

EcoHomes XBC contains 28 categories which provide a total of 100 credits, covering management, energy, transport, pollution, water, ecology, heating, waste and materials. The selected areas and criteria for the awarding of credits emphasise the need to consider the regeneration of the locality and the management/governance of the areas and not just the changes to a single property. An additional category has been added to the management area giving an additional ten credits to emphasise the importance of applying good conservation principles, using appropriately qualified companies, and appropriate sustainable materials. It takes into account both the refurbishment stage and the performance of the properties in use. Environmental benefits must be considered against the costs and benefits to society, and the economic implications since these are all integral to sustainable regeneration.

EcoHomes XBC allows a number of options to be considered and the best combination of cost, sustainability and conservation to be determined. This compensates for the reduced ability to moderate factors affecting environmental performance in existing stock compared with new developments.

Four scenarios give an indication of the credits that can be gained through realistic improvements in the locality and the house(s). They are based on several adjacent streets of late Victorian terraced houses within an urban area:

Scenario 1: The house(s) and area as currently found

Scenario 2: The same house(s) with the area improved as part of a regeneration plan

Scenario 3: The house(s) refurbished but with no regeneration of the area

Scenario 4: The house(s) refurbished and the area improved as part of a regeneration plan.

Benchmarks for pre-1919 housing

The assessment system needs to be able to define benchmarks in terms of the actions taken, interventions made and the maximum EcoHomes credits for each and to identify a number of limits – that is the extent of changes that can be made or are required without compromising required regulations, principles or best practice. This concept is illustrated in Figure 2 with a number of actions (interventions) and defined limits.

Conservation limit

This is defined as the extent to which the building and locality can be changed or altered without compromising

conservation principles and best practice.

Regulatory limit

This is the score associated with the minimum changes required to ensure compliance with Building Regulations. It is possible to envisage a scenario where refurbishment is satisfactory in terms of conservation, environment and energy but not in relation to acoustics or fire, in which case the scheme would not be acceptable. However, it is not always clear when Building Regulations apply to heritage buildings.

Sustainability limit

This is more complex as the three components of sustainability – economy, environment, and society – each need to be considered.

Relationship between the limits

The position of the limits are likely to vary from location to location and in their relative positions. Their relative positions will identify potential conflicts. Three examples of potential conflicts are:

- The regulatory limit is beyond the conservation limit: to comply with Building Regulations some compromise will be required. In the case of a failure to comply with Part L (*Thermal performance*) there could be a 'relaxing' of the requirements on the basis that the built heritage is involved. However, in other cases regulations will dominate and more extensive work must be carried out
- The regulatory limit is beyond the economic limit: the proposed scheme is uneconomic

- The social limit is beyond the economic limit: the aspiration and needs of the community cannot be met within the economic scope of the project.

Actions and impacts

The refurbishment of buildings can be visualised as a series of actions each of which alters the performance of the building and has the potential to improve the EcoHomes XBC rating. In conservation terms the actions can be equated with interventions and in the case of conservation the number and extent of the interventions is kept to a minimum. Using the scoring system it is possible to establish a baseline and quantify the effect of different actions (see Figure 2).

Action 1

This first action involves only the regeneration of the locality. The actions envisaged are typical of those which would occur as part of a regeneration/renewal scheme within an urban environment. The actions include:

- provision and adoption of an energy policy and a commitment to a reduction in energy consumption
- an open tenant consultation on energy and environmental issues
- giving advice to the tenants/occupants on the purchasing of energy efficient white goods.

All of these actions can be undertaken as part of a renewal scheme and do not directly affect the buildings though they may well affect the appearance of the townscape and improve the sense of well being of those living in the area.

Action 2

This represents a very basic upgrading of the houses – initially to Decent Homes standard (ODPM, 2004). This standard requires the property to meet or exceed the

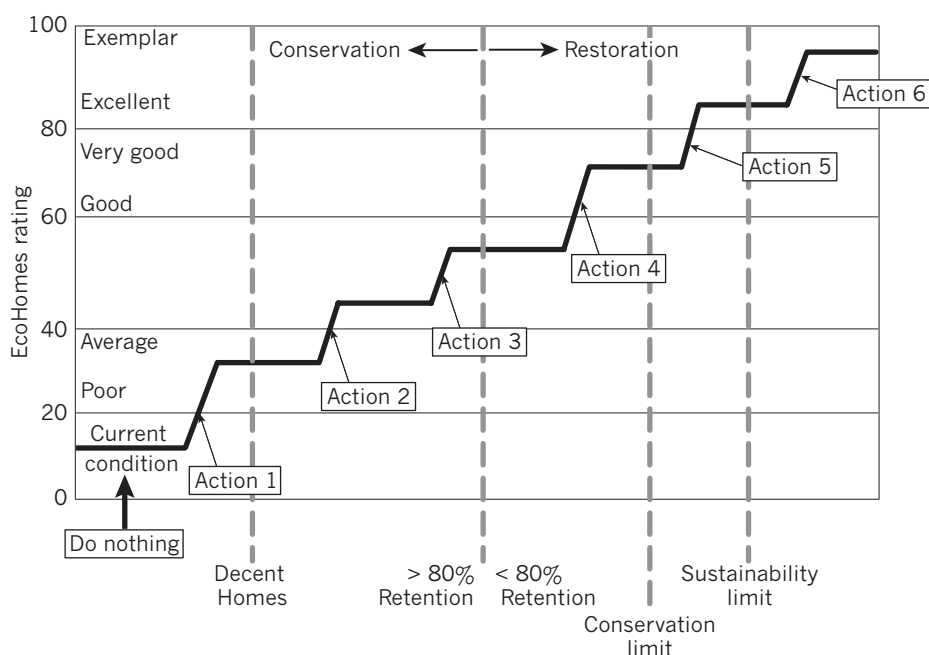


Figure 2 Consequences of actions in the refurbishment of buildings and the determination of limits of intervention showing the EcoHomes rating on the left

current statutory minimum requirements for the state of repair of the property, the facilities and services, and for a reasonable degree of thermal comfort. The commitment to the first three items will tend to improve the condition of the property and the overall appearance of the locality but it is only the last one – the provision of an efficient central heating system and some roof space insulation – which will have a direct effect on the EcoHomes rating.

Action 3

The important work for Action 3 will include:

- the provision of a conservation plan for the properties
- a commitment and implementation of policies for refurbishment, on the use of timber from sustainable sources or reuse of timber, and limitations on the impact of the other materials generated and used during the refurbishment.

It is not envisaged that it will include changes to the fabric and appearance of the property, for example the installation of replacement windows or external insulation systems.

It is important to note that these are all changes within the building and so they are unlikely to change the external appearance. The changes would be covered by Part L of the Building Regulations and so there is a requirement that the new heating system is at least as good as the one being replaced. Of course it would be sensible that the new system and any appliances should be better if possible and as efficient as is reasonable within cost and space constraints.

Action 4

The increased scale of the changes allows the EcoHomes rating to be improved beyond fair to good by the provision of a much greater range of energy and environmentally efficient fittings, for example:

- improvements in the energy efficiency of the properties by the use of more energy efficient appliances to reduce the emissions of carbon dioxide, such as the installation of a condensing boiler, and loft insulation, draught reduction measures and provision of new radiators
- provision of new bathroom fixtures and fittings, for example dual flush toilets and showers.

Some of these changes could have been carried out as part of Action 3 but in Action 4 the changes are likely to be more comprehensive.

The inclusion of structural alterations may allow improvement to be made in the thermal elements as defined in Part L – for example:

- the provision of 250 mm of insulation in the roof space
- the fitting of insulation between floor joists
- the dry lining/insulation of the internal face of external walls.

It is not envisaged that the work undertaken as conservation and that undertaken as restoration are exclusive but that the scope and extent of the work is much greater when the work is seen as restoration.

At some point the provision of segregated domestic recycling facilities should be included – either in each house or more likely in the external space.

Action 5

These are the actions and interventions that could take place beyond the conservation limit and so would include those described as unacceptable in the previous paragraph.

Action 6

This is restricted to actions above the sustainability limit and above the conservation limit which are seen as necessary for some particular reason or reasons. It is difficult to think of an example that might occur in the real world but it could include the retention of some building or the facade of the building for structural reasons when it is not sustainable in conservation or sustainability terms.

Conclusions

Renovating and refurbishing older housing stock involves complex decision making. As well as being economically viable to restore, preferably within conservation good practice, the resulting homes need to be energy efficient and easy to maintain. They need to be in areas where people want to live and where there are adequate transport links and social infrastructure such as shops and schools.

A methodology has been developed that can support decision making by establishing a benchmark from which the benefits of various actions can be objectively assessed using a scoring developed from EcoHomes XB. The methodology can also show that economic, environmental and social limits for conservation and sustainability can be defined beyond which actions become unacceptable in terms of damage to the built heritage or economically. Case studies in Nelson, Nottingham and London have shown that a range of refurbishment schemes can be successful in environmental and economic terms, but that in a market driven economy there are limits to what can be achieved. It is important to consider a range of schemes and to proceed with the most appropriate one for the location, with an overall regeneration programme that meets the needs of the local community.

Actions relating to individual houses need to be undertaken as part of a wider regeneration scheme, including not only improvements in the immediate environment but education and guidance on energy efficiency and water consumption measures, and the positive management of the built heritage.

The need for a wider programme of actions within the community raises problems relating to responsibility for the programme and the cost. If the houses are the responsibility of a housing association, registered social landlord or local authority, there can be a central responsibility for implementing the project. However, with houses in private ownership it is more difficult to achieve a coherent plan of internal and external improvements and it may take a number of years for the full benefits to be seen.

References

Anderson J and Mills, K (2002). Refurbishment or redevelopment of office buildings? Sustainability comparisons. BRE Information Paper IP9/02 Part 1. Garston, BRE Bookshop.

Anderson J. and Mills K (2002). Refurbishment or redevelopment of office buildings? Sustainability case histories. BRE Information Paper IP9/02 Part 2. Garston, BRE Bookshop.

Yates T (2006). Sustainable refurbishment of Victorian housing: Guidance, assessment method and case studies. FB14. BRE Trust. Garston, Watford, IHS BRE Press.

Environmental Change Institute (2005). The 40% House report. www.40percent.org.uk

ODPM (2004). A decent home – The definition and guidance for implementation.

Further reading

BRE. Improving sound insulation in homes (www.bre.co.uk/pdf/soundins_homes.pdf).

BRE (2006). EcoHomes XB: The environmental rating for existing housing. Assessment guidance notes. The guidance 2006. www.breeam.org.

English Heritage (2004). Building Regulations and historic buildings. Balancing the needs of energy conservation with those of building conservation: an interim guidance note on the application of Part L. www.english-heritage.org.uk/server/show/conWebDoc.3417.

English Heritage (2005). Conservation principles for the sustainable management of the historic environment. www.english-heritage.org.uk/upload/pdf/Conservation_Principles_A4%5B1%5D.pdf.

Historic Scotland (1998). The installation of sprinkler systems in historic buildings. Technical advice note 14.

ODPM (2004). Building Regulations explanatory booklet.

Demolish or refurbish?

This report shows that in many cases, refurbish is the answer

This report presents a method of assessing the refurbishment of traditionally built houses dating from the period 1840 – 1919 similar to that used in BREEAM EcoHomes. It looks specifically at competing requirements for modern energy and acoustic standards, whole building performance and the effects of durability, reliability and maintainability of the building fabric.

- Of direct value to construction professionals responsible for refurbishment of Victorian housing – housing managers, surveyors, architects, developers and planners, local authorities and owners.
- Examines the economic, environmental and social costs and benefits of retaining this part of the building stock and develops a methodology that can be used in the assessment process. It includes case studies that illustrate the practical application of this approach to individual houses and to larger areas of housing.
- Includes three case studies: The Nelson Housing Market Regeneration Scheme; The Flagship Home Project, Beaufort Gardens, London; and The Nottingham Ecohome.

FB14 can be purchased from www.ihsbrepres.com.



FB14 Sustainable refurbishment of Victorian housing. Tim Yates.

Published by IHS BRE Press.
ISBN-13: 978-1-86081-936-0
ISBN-10: 1-86081-936-2

Information Papers summarise recent BRE research findings, and give advice on how to apply this information in practice.

Digests, Good Building Guides, Good Repair Guides and Information Papers are available on subscription through BRE Connect. Details at: www.BREconnect.com

BRE is committed to providing impartial and authoritative information on all aspects of the built environment for clients, designers, contractors, engineers, manufacturers and owners. We make every effort to ensure the accuracy and quality of information and guidance when it is published. However, we can take no responsibility for the subsequent use of this information, nor for any errors or omissions it may contain.

BRE is the UK's leading centre of expertise on the built environment, construction, sustainability, energy, fire and many associated issues. Contact BRE for information about its services, or for technical advice: BRE, Garston, Watford WD25 9XX
Tel: 01923 664000
enquiries@bre.co.uk
www.bre.co.uk

BRE publications are available from www.ihsbrepres.com or IHS BRE Press
Willoughby Road
Bracknell RG12 8FB
Tel: 01344 328038
Fax: 01344 328005
Email: brepres@ihsatp.com

Requests to copy any part of this publication should be made to the publisher:
IHS BRE Press
Garston, Watford WD25 9XX
Tel: 01923 664761
Email: brepres@ihsatp.com

IP 9/06

© BRE 2006
October 2006
ISBN 13: 978-1-86081-941-4
ISBN 10: 1-86081-941-9

bre