

Refurbishing homes in Bristol

This project looks at the opportunities and barriers, in terms of finance and energy efficiency, for the refurbishment of private housing in large-scale contracts. The project uses Bristol as a case study. The intended audience for this work is investors, contractors and local authorities interested in the economies of scale for large refurbishment contracts.

Why existing homes? By 2050, over 80% of the housing stock in the UK will be made up of the homes that we live in today. The housing sector as a whole represents 28.6% of total emissions in the Greater Bristol area and achieving deep carbon cuts in this sector is imperative.

Why private homes? Action has been very slow moving in the private sector (both amongst homeowners and private landlords) and refurbishment has only really taken place at the level of individual homes. Private housing accounts for 93% of Bristol City housing and thus represents a significant part of the carbon challenge.

What next? When dealing with the existing housing stock, buildings range in age, materials, design and state, which complicates how improvements can be implemented. In addition, there are only broad estimates of how much this would cost and what impact any improvements would have on carbon reduction with no clearly established funding routes.

The approach

A model was developed to demonstrate the carbon and cost savings that could be achieved by retrofitting generic types that broadly represent the housing stock of Bristol. The method encompassed developing baseline house types; selecting the most appropriate refit options available; modelling the energy and carbon savings using NHER SAP software; and feeding in cost estimates provided by partners.

Packages of measures were used for ease of implementation, these were:

Package 1

- Energy saving lighting
- Draught proofing
- Roof insulation
- Cavity wall insulation

Package 2

- New windows
- New boiler and controls

Package 3

- Internal wall insulation
- Floor Insulation

Package 4

- External wall insulation
- Floor insulation
- Solar thermal
- Solar PV

The model

The model compares cost, energy and carbon savings. Users can enter the number of each house type to be upgraded and specify any existing refit measures already in place and the packages of measures to be installed.

The model then calculates the SAP rating, CO₂ reduction and cost per house (or group of houses), as well as a cost per kg of CO₂. For groups of houses, a 'clustered' (within walking distance) or 'dispersed' scenario can be selected. Contractors can make considerable savings when they can work from one base and share equipment and skills.

The results

Selected results are displayed in the table below as an example.

	Intended Refits Packages				Results per house							
	# Homes	Cluster?	1	2	3	4	SAP before	SAP after	Cost/ house	CO ₂ saving (Kg/yr)	% CO ₂ improvement	£/kg CO ₂
3-bed Semi, Victorian	50	Y	I				G	F	£1,461	3869	24.90%	£0.38
4-bed detached, post 1980	20	N	I	I			E	C	£6,053	3356	48.50%	£1.80
2-bed flats, 1945-1980 (converted)	1	Y	I	I	I		G	C	£8,114	4422	76.40%	£1.83
3-bed detached, 1945 - 1980	1	Y	I	I		I	F	C	£14,698	7048	74.70%	£2.09

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A retrofit project carried out at scale in local neighbourhoods will save money and help local authorities to reach carbon reduction targets.

Some key findings:

- Using the £/kg CO₂ metric, at 38p per kg, the best value for money is achieved by implementing Package 1 on 50 or more clustered Victorian three-bed semis.
- The cost of retrofitting an individual three-bed detached home 1945-1980 is £10,757.60, which is almost £4,500 more than the cost per house when 20 are installed.
- Installing packages 1 and 2 on 55% of all homes in the West of England would result in a reduction of up to 9% of the area's total carbon emissions;
- Installing retrofit measures on over 20 homes can produce savings of over 55% per home (this can be up to £11,000 per house when they are clustered).

The results of this research will feed into Forum for the Future's Refit West Project, which is aiming to retrofit 1000 private homes in the West of England by 2011.

The model produced for this project features the predominant housing types in the West of England, but could easily be adapted to other areas of the country.

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