



## Eco-renovation of an Edwardian family home 29 Stapleton Road, Oxford

Online blog: <http://climatex.org/users/tina/blog/>

We have improved the energy efficiency of our home over a number of years, with the latest changes being the most extensive – the installation of internal and external solid wall and under-floor insulation in late 2009, using ‘eco’ materials. Other eco features include: condensing gas boiler, extensive loft insulation, double glazed sash and casement windows, solar water heating, light pipe, low energy lights and appliances, wood-burning stove, some use of eco paints and finishes.

### Solid wall insulation

External: Pavatex ‘Diffutherm’, 100mm – woodfibre boards, made from 95% waste soft wood. This was fitted to the side wall of our semi, which has no windows or other features. When added to 215mm brick, this insulation gives a U value of 0.33 W/m<sup>2</sup>K (0.37 also quoted in spec). This is similar to the new build standard in 2002.



Internal: Pavatex ‘Pavadentro’ – 60mm, woodfibre boards, made from 95% waste soft wood. This was fitted to the internal walls front and back downstairs, with an overlap on side walls. When this insulation is added to 215mm brick, it gives a U value of 0.54 W/m<sup>2</sup>K.

### Under-floor insulation

Hemp batts – 150mm in areas with new joists and 100mm in areas with old, retained joists. U value of 150mm = 0.26 W/m<sup>2</sup>K, but value for whole floor will be greater than this (i.e. not as resistant to heat loss), due to losses around edges of floor. Hemp was chosen in preference to paper based insulation because of damp conditions. The perimeter of the floor presented some complications as the 150mm deep insulation would have touched the damp foundations. To resolve this and keep adequate under-floor ventilation a higher performance and therefore thinner insulation – Celotex – was used. This also ensures that there is a consistent U-value over the whole floor area with no cold spots that could attract surface condensation.

### Approximate costs (including VAT)

#### External insulation

Cost element	Sub Cost (£)	Cost (£)
Materials		2,800
Traditional labour		1,865
Scaffolding	600	
Roofing	1265	
Specialist labour		2,700
TOTAL		7,365

Around 50m<sup>2</sup> of external insulation, so costs work out at £150/m<sup>2</sup>.

Costs of removing and replacing side passage roof and supports not included.

## Internal and under-floor insulation

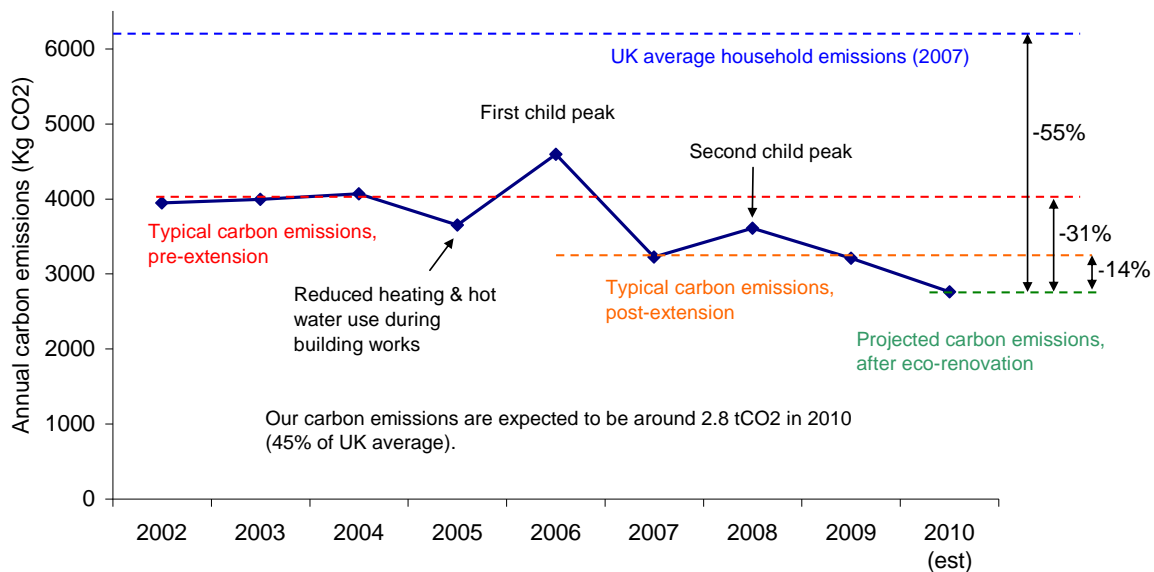
Cost element	Sub Cost (£)	Cost (£)
Materials		2,700
Traditional labour		1,300
Ventilation advice	276	
Electrician	340	
Building control	437	
New cornice	250	
Specialist labour		6,000
TOTAL		10,000

The 'specialist labour' element of this costing is very much a guesstimate as a lot of non-eco-renovation work was carried out by the same people at the same time. If these figures are about right, the costs of internal wall insulation worked out at around £300/m<sup>2</sup>. Retention of period features, and the novelty of the work, contributed to the high cost – which hopefully could be lower in other homes.

## How energy use and carbon emissions have changed

As a result of the solid wall and under-floor insulation, gas usage was 20% lower in the first two months of 2010 compared with 2009 (which works out at a 14% reduction in carbon emissions from gas and electricity together, as shown in the graph below). Given that around one third of gas use is for water heating, this suggests the insulation work has resulted in about a 30% saving of heating energy.

### Annual carbon emissions from household use of gas and electricity



## Other benefits

Beyond the energy and carbon savings, there have been other important benefits: warmer inside walls have resolved condensation and mould problems; more thermally comfortable space; no slugs! Our home now smells faintly of new wood rather than depressing damp. Lovely.

## Contacts

Environmental building consultant / Project manager / green builder: Dan Browne, dan@williamsandbrowne.co.uk, 07989 171784

Specialist installer of external insulation: Merl Cunliffe, merl.c@virgin.net, 01934 519781

Main material supplier: NBT (Natural Building Technologies), www.natural-building.co.uk, 01844 338338

Window supplier: Ladymead Joinery Ltd., www.ladymeadjoinery.co.uk, 01296 655770

Damp and ventilation consultant: Oxley Conservation, 01491 414191, www.oxleyconservation.co.uk