1900s semi-detached Stroud

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Case study 8

£1,278 Saving on fuel bills

51% Reduction in carbon emissions

Measures installed	Total cost	Annual CO_2 saving (tonnes)	Annual fuel bill saving
Internal solid wall insulation	£8,685	5.48	£817
Replacement double glazing	£10,016	0.77	£157
Replacement boiler + controls	£4,286	1.13	£196
Log burner in open fireplace	£2,000	0.72	£108
Total package	£24,987	8.10	£1,278

The home

This four storey semi-detached house was built around 1900 with solid brick walls, rendered on the side and rear. The lower ground floor is built into the side of the hill.

The top floor is a self contained flat, which was heated by electric night storage heaters. With no insulation in the sloping ceilings and solid walls, it was difficult to keep the flat warm in spite of the 200mm of insulation in the loft.

The main house was heated by an E-rated mains gas boiler, supplemented by a gas Aga and an open fire.

What they did

The householders were only too aware how energy inefficient their home was; the home office was "absolutely freezing" in winter and the house was generally chilly and draughty except for the kitchen which was kept warm by the Aga.

A particular area of concern was the windows. Although they were double glazed, they were installed some time ago so the air gap was narrow by today's standards and the aluminium frames were not insulated. There were also plans to refurbish the flat before re-letting it.

The render on the side and rear was cracked in several places, which was causing damp on the internal side wall. As the render needed replacing anyway, external wall insulation was considered but this was very expensive due to the size of the area and the scaffolding requirements. The render was repaired for a much lower cost and the insulation scheme changed to internal.

"I'm very pleased with the external temperature controller on the central heating as this keeps the house temperature sensible when there's warmer weather outside some days."

asiantaeth ynni SevernWye energy agency

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Internal wall insulation

External wall insulation was not an option for the front of the house with its period frontage, but it was relatively straightforward to insulate these walls internally. 50mm phenolic foam bonded to standard gauge plasterboard was applied to almost all the walls on the top three floors, plus the small areas of sloping ceiling on the top floor.

Part of the side wall had become damp as a result of the cracked render, but after the re-rendering was finished there was sufficient time for it to dry out and be included in the internal insulation. The only area excluded was a short wall return, exposed because the attached house is set slightly further back. Insulating this wall would have covered some original decorative plasterwork and reduced the depth of the alcove, making it asymmetrical with the alcove on the other side of the fireplace. The lower ground floor was not insulated at this time as the householder had future plans for this area.

Double glazing

All of the old, aluminium framed double glazing was replaced when the insulation was done. The same contractor was used for the glazing and insulation, which simplified the process, with the windows replaced first and the insulation fitted around them. The work was completed one room at a time, to minimise disruption. The extra wall depth means that things can now be put on the windowsills.

The new timber framed windows were chosen for their high performance and the lower environmental impact of timber over alternative frame materials, such as uPVC or aluminium.

Finished internal wall insulation and new high efficiency window

Heating improvements

The storage heaters in the flat were replaced with a small condensing combination boiler. The householders looked into various heating options for the main house, including a thermal store system with heat inputs from solar panels and a wood or wood pellet stove, with a small gas boiler as back-up. The quotes for this system proved expensive, so they opted for a modulating condensing gas boiler controlled by a digital thermostat and a weather compensator, which adjusts the heat output from the boiler in response to changes in the outdoor temperature. A new 300 litre twin coil hot water cylinder was installed, so solar water heating panels can easily be connected in future.

The Aga saga

The family was divided over the issue of whether to keep the gas Aga in the kitchen, so they had a separate gas meter installed to monitor consumption and were shocked to find that 63% of their annual gas use was due to the Aga. The Aga is now to be replaced with a radiator.

Energy consumption	Total (kWh)	Per m² floor area
Before improvement (2007)	84,900	376
After improvement (2010)	35,840	159
With all possible measures	26,900	119
UK average (2011)	19,800[1]	217[4]

CO_2 emissions	Total (tonnes)	Kg per m² floor area
Before improvement (2007)	15.93	70
After improvement (2010)	7.83	35
With all possible measures	6.89	30
UK average (2011)	6.00[2]	66[4]

Running costs	Total	Per m² floor area
Before improvement (2007)	£2,700	£11.95
After improvement (2010)	£1,422	£6.29
With all possible measures	£1,291	£5.71
UK average (2011)	£1,032[3]	£11.34[4]

Possible next steps	Annual CO_2 saving (tonnes)	Annual fuel bill saving
Insulation to solid concrete floors	0.34	£50
Solar water heating	0.29	£36
Solar PV (1kWp)	0.33	£39
Total	0.96	£125

[1] Ofgem 2011
[2] English Housing Condition Survey 2011
[3] Ofgem 2011
[4] Based on 91m² from English Housing Condition Survey 2011

Energy performance and carbon emissions in the Target 2050 exemplar homes have been modelled using the UK Standard Assessment Procedure (SAP). The savings data presented here is based on a standard occupancy pattern. This may not reflect actual usage by the building's current residents but is used to compare homes of different sizes and types in a way that assesses the building itself rather than the behaviour of any particular occupant.