

1970s timber frame house Chalford

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Case study 9

£1,214 Saving on fuel bills

48% Reduction in carbon emissions

Measures installed	Total cost	Annual CO ₂ saving (tonnes)	Annual fuel bill saving
Loft top-up	£350	0.33	£56
Internal wall insulation	£3,137	3.28	£554
Replace warm air heating with central heating	£9,690	1.63	£334
Floor insulation	£560	0.33	£50
Solar hot water	£3,000	0.40	£55
Log burner	£850	0.22	£105
Replace halogen bulbs with LED lighting	£430	0.23	£60
Total package	£18,017	6.42	£1,214

The home

This detached house of timber frame construction was built around 1970 and extended in the mid 1980s. The timber frame walls have no insulation in the original construction and a small amount in the extension, and there was approximately 100mm of insulation in the loft.

The house has a solid floor and the main heating was a ducted warm air system from an F-rated mains gas boiler.

emissions. Together with the home owners an action plan was developed to implement the improvements. Ideally this would have started with the insulation, but some time was needed to review the options for insulating the timber frame structure, so the first thing they did was to replace the warm air heating with a wet system, with an efficient boiler and incorporating solar hot water.

Two log burners were installed, providing extra warmth in the living and dining areas, and an alternative form of heat for times when the whole house heating is not needed.

This was followed by finding and implementing a solution for the wall insulation, as well as topping up the loft insulation and LED lighting in the kitchen/diner.

"We found the report very useful, it was great to be able to talk in detail to someone who was unbiased and helped us decide what was best for our home."

What they did

In spring 2008 the family applied to take part in the Target 2050 scheme. The resulting survey and report highlighted a number of actions that they could consider to enable them to improve the energy efficiency, comfort and warmth of the house, and to lower the associated running costs and CO₂

Heating improvements

The house was very difficult to keep warm with the old boiler and ducted warm air heating system. The owners decided to replace it with a new wet central heating system with an A-rated condensing boiler and radiators. A solar hot water system was installed at the same time, with panels on the roof and a new well insulated hot water cylinder to replace the existing poorly insulated one.

A log burner was installed in the open fireplace, to improve the efficiency of the secondary heating system in the living room and a second log burner installed in the new enlarged kitchen/dining room area.

Loft insulation

The householders decided to top up the loft insulation themselves, as a DIY job. They raised the level of insulation from 100mm to approximately 300mm.

Wall insulation

The external walls consisted of a timber frame sandwiched between timber cladding on the outside and plasterboard inside, and had very little mass or heat retention. As the frame is based on four foot squares and has many smaller areas it was not practical to blow insulating material into the cavities. One wall in the bathroom was DIY insulated with solid foam board, but this was found to be very time consuming, and the owners were aware of the importance of getting a good fit to prevent air movement around the insulation. After investigating the options, the final decision was to have spray foam insulation sprayed into all the cavities. The family did the preparatory work themselves, removing the plasterboard from the external walls so that the company could install the insulation to all the walls at once, without having to make repeat visits.

Having stripped the plasterboard to insulate these walls it was decided to take advantage of the disruption and to do other major work at the same time. They decided to rearrange the layout of some of the internal walls. The internal partitions



Spraying foam insulation into timber frame walls

between the kitchen, utility room and dining room were removed and the solid floor in this area dug up. This area was insulated and underfloor heating installed under the new floor screed.

LED lighting

LED lighting was chosen for the new kitchen/dining area. As the new ceiling was put up in this area, the wiring was put in place for recessed lighting using LED bulbs. These use only one tenth of the energy to give the same light output as halogen bulbs and the household were surprised to find how brightly this room was lit when they had finished.

Energy consumption	Total (kWh)	Per m ² floor area
Before improvement (2007)	69,120	343
After improvement (2010)	32,061	159
With all possible measures	29,561	147
UK average (2011)	19,800 ¹	217 ⁴

CO ₂ emissions	Total (tonnes)	Kg per m ² floor area
Before improvement (2007)	13.49	67
After improvement (2010)	7.07	35
With all possible measures	6.37	32
UK average (2011)	6.00 ²	66 ⁴

Running costs	Total	Per m ² floor area
Before improvement (2007)	£2,578	£12.79
After improvement	£1,364	£6.77
With all possible measures	£1,232	£6.11
UK average (2011)	£1,032 ³	£11.34 ⁴

Possible next steps	Annual CO ₂ saving (tonnes)	Annual fuel bill saving
Solar PV (1 kWp)	0.33	£71

¹Ofgem 2011

²English Housing Condition Survey 2011

³Ofgem 2011

⁴Based on 91m² from English Housing Condition Survey 2011