

End-terrace stone house Nailsworth

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Case study 3



£635

Saving
on fuel bills

56%

Reduction
in carbon
emissions

Measures installed	Total cost	Annual CO ₂ saving (tonnes)	Annual fuel bill saving
Loft insulation top-up	£300	0.50	£100
Internal solid wall insulation	£7,074	0.75	£110
External solid wall insulation	£2,386	0.25	£37
Floor insulation	£1,818	0.90	£173
Replacement boiler	£5,155	1.30	£190
Solar hot water	£4,920	0.30	£25
Total package	£21,653	4.00	£635

The home

This home is a Cotswold stone end-terrace house built before 1900. There are three floors including “rooms in the roof” with sloping ceilings.

The walls and ground floor are solid, so prior to improvement there was considerable heat loss from all elements of the building fabric. To compound this further, the conservatory at the rear was open to the rest of the house and only had a thin polycarbonate roof. The gas central heating system was powered by an old ‘combi’ boiler providing both heating and instantaneous hot water.

What they did

Having lived in the property for 18 months the householder had found it impossible to get the house warm. The conservatory was noticeably drawing what little heat there was

from the rest of the house, and this was replaced with an extension, which is more thermally efficient, but has increased the heated area by about 50%. The replacement for the conservatory has a green roof.

Work then began on improving the insulation in the existing original walls and sloping ceiling areas of the house with a mix of internal and external wall insulation. The existing loft insulation was also topped up.

The heating system was upgraded to include a new efficient boiler with solar thermal hot water, sufficient to provide most of their hot water in the summer months.

All of the rear windows of the house were replaced with triple glazed units during the refurbishment work to further reduce heat loss from the home.

“Our home has been transformed: what used to be a cold and mouldy kitchen and conservatory is now the warm heart of the home”



asiantaeth ynni
SevernWye
energy agency



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Solid wall insulation

The outside appearance at the front of the property was to be preserved, and the front and side wall were insulated internally using 50mm phenolic foam insulation bonded to standard gauge plasterboard. Initially the householder was concerned that the living space would be noticeably reduced but this hasn't been the case. The window reveals are deeper and new internal sills were required but they feel this adds to the character of the home as it gives the impression of thicker walls.

External insulation was applied to a small area of wall on the first floor at the rear of the house. As this wall area was already rendered, a new Parex insulation layer that comprised polystyrene, mesh and render did not significantly change the existing appearance, but greatly reduced heat loss from this area.

Sloping ceiling insulation

The second floor of the home previously comprised one large room which was not heated. As this area was being renovated to provide two new bedrooms and a bathroom the heating system was extended to this floor. It was therefore imperative that this area, that comprised sloping ceilings and solid walls, be properly insulated. Using the same material that was used for internal insulation at the front and side of the house, a 50mm phenolic foam insulated plasterboard was attached to the sloping ceilings as well as the walls. The top floor of the house is now well heated and the householders can control any overheating with thermostatic radiator valves (TRV).

Heating improvements

Solar thermal panels were installed on the new rear extension, and the old gas boiler was replaced with an 'A' rated one that was relocated to a new cupboard on the second floor. This entailed adjustment to the hot and cold water pipework, and moving the gas pipe, and allowed for adding a new hot water cylinder, located close to the new solar water heating panels. This helps to ensure minimal



Well insulated and comfortable extension

heat loss, something that would not have been possible with the existing boiler on the ground floor. In 2010 the household used no gas to heat water between the end of March and the end of September.

Overall, the householder commented that although the work undertaken was a major upheaval, and required them to move out of their home for several months, it had definitely been worthwhile. Sifting through the options and developing the specifications for the project had been a challenge, but with the advice from Severn Wye Energy Agency, and by thinking through what their requirements were, they felt that they had found the right solutions to significantly improve the energy efficiency of their home.

Energy consumption	Total (kWh)	Per m ² floor area
Before improvement (2007)	34,800	355
After improvement (2010)	14,500	126
With all possible measures	13,700	119
UK average (2011)	19,800 ¹	217 ⁴

Running costs	Total	Per m ² floor area
Before improvement (2007)	£1,200	£12.23
After improvement (2010)	£565	£4.91
With all possible measures	£526	£4.57
UK average (2011)	£1,032 ³	£11.34 ⁴

¹Ofgem 2011

²English Housing Condition Survey 2011

CO ₂ emissions	Total (tonnes)	Kg per m ² floor area
Before improvement (2007)	7.10	72
After improvement (2010)	3.10	27
With all possible measures	2.70	23
UK average (2011)	6.00 ²	66 ⁴

Possible next steps	Annual CO ₂ saving (tonnes)	Annual fuel bill saving
Solar PV (1 kWp)	0.30	£39

³Ofgem 2011

⁴Based on 91m² from English Housing Condition Survey 2011