

# Grade II listed farmhouse Cirencester

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## Case study 26



£838

Saving  
on fuel bills

25%

Reduction  
in carbon  
emissions

Measures installed	Total cost	Annual CO <sub>2</sub> saving (tonnes)	Annual fuel bill saving
Loft insulation	£882	1.8	£334
Sloping ceiling insulation	£1,870	0.1	£23
Internal wall insulation	£1,345	0.4	£81
Replacement boiler	£1,900	2.37	£400
Total package	£5,997	4.69	£838

## The home

This home is a Grade II listed, detached house built in the 1730s. The walls of the house are constructed of two skins of cut Cotswold stone, with the gap between filled with stone rubble, as was customary at the time.

The rubble leaves sufficient gaps for a significant draught to flow around inside the wall, but it is not suitable for any form of cavity wall insulation. The house has three floors plus a basement area and the upper floor has a number of rooms with sloping ceilings. Heating is provided by gas central heating and a wood burning stove in the main living area. There are several open chimneys elsewhere in the house.

## What they did

The current owners have lived in the property for 14 years, and have always found the house difficult to keep warm. They were keen to investigate methods by which they could insulate the walls and roof as well as reducing their overall environmental impact. As it had been ascertained that cavity wall insulation was not possible, and external insulation would not be feasible because the house is listed, internal wall insulation options were investigated. Several rooms on the first floor and the walls and sloping ceiling areas on the second floor were subsequently lined with insulation backed plasterboard. The loft area insulation was also improved to current recommendations, and the main boiler, originally installed in 1994 was replaced with a new high efficiency version.

“Although it is a difficult house to insulate and keep warm, we feel it is well worth improving this sort of property.”



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**SevernWye**  
energy agency



**COTSWOLD**  
DISTRICT COUNCIL

## Solid wall and sloping ceiling insulation

Listed building consent was required for all the proposed internal changes to the property. The owners consulted with planners, and the vast majority of the changes were approved. Apart from being a legal requirement, it is beneficial to obtain listed building consent as this allows the cost of improvements to be zero rated for VAT.

A bedroom and bathroom on the first floor of the house and the walls on the second floor were lined with insulation backed plasterboard. Listed building consent was granted on the basis that no damage would be caused to the structure of the original walls, so the boards were fixed with adhesive rather than being screwed to the walls. While the work was in progress any gaps between the floorboards and walls were also filled with an adhesive sealant to help prevent the previously noticeable draughts.

The sloping ceilings on the second floor of the house were also insulated with the same insulation boarding and plasterboard. Here the insulation panels were screwed into the existing timber boards as they are not classed as part of the original structure.

## Loft Insulation

Above the second floor rooms is an accessible loft area. There was little insulation in this area, and this was covered with plastic sheeting as the loft was used as a summer roosting area by bats. To ensure that the bats were not disturbed, mineral wool insulation was fitted into the loft area before they returned for the summer. In some areas of the loft, the level of the joists was raised to allow the recommended 270mm of insulation to be laid before adding a storage deck.

Since completing these insulation improvements, the owners have commented that 'the house does feel warmer already'. They expect that the second floor room which got very cold in the winter will now be a far more comfortable area to spend time in.



*Insulation applied to walls, sloping ceilings and around windows of top floor*

## Replacement Gas Boiler

As the house was primarily heated with two gas boilers installed in 1994, the householders looked into updating them with a more efficient replacement. A local Gas Safe installer was commissioned to fit one new condensing gas boiler. This should provide sufficient space heating and hot water for the majority of the year. The householders decided not to replace the second boiler as this should only be required as a back up when the weather is particularly cold, which did not justify the cost.

To reduce draughts around the house, permission was also gained to temporarily block three open chimneys using tough rubber balloons, which can be removed in winter should the family wish to use the fireplaces.

Energy consumption	Total (kWh)	Per m <sup>2</sup> floor area
Before improvement (2010)	94,902	277
After improvement (2011)	69,636	203
With all possible measures	44,638	130
UK average (2011)	19,800 <sup>1</sup>	217 <sup>4</sup>

Running costs	Total	Per m <sup>2</sup> floor area
Before improvement (2010)	£4,117	£12.00
After improvement (2011)	£3,279	£9.56
With all possible measures	£2,387	£6.96
UK average (2011)	£1,032 <sup>3</sup>	£11.34 <sup>4</sup>

<sup>1</sup>Ofgem 2011

<sup>2</sup>English Housing Condition Survey 2011

CO <sub>2</sub> emissions	Total (tonnes)	Kg per m <sup>2</sup> floor area
Before improvement (2010)	18.88	55
After improvement (2011)	14.19	41
With all possible measures	9.50	28
UK average (2011)	6.00 <sup>2</sup>	66 <sup>4</sup>

Possible next steps	Annual CO <sub>2</sub> saving (tonnes)	Annual fuel bill saving
Solar thermal	0.28	£46

<sup>3</sup>Ofgem 2011

<sup>4</sup>Based on 91m<sup>2</sup> from English Housing Condition Survey 2011