

# 1900s detached house Stonehouse

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## Case study 4



£2,144

Saving on fuel bills

64%

Reduction in carbon emissions

Measures installed	Total cost	Annual CO <sub>2</sub> saving (tonnes)	Annual fuel bill saving
Cavity wall insulation	£422	9.00	£1,088
Loft insulation top-up	£2,650	0.14	£17
Internal solid wall insulation	included in above	0.72	£87
Sloping ceiling insulation	included in above	1.77	£213
Floor insulation	included in above	0.35	£42
Gas central heating	£9,172	5.25	£664
Closed log burner in open fireplace	£2,295	0.41	£33
<b>Total package</b>	<b>£14,539</b>	<b>17.64</b>	<b>£2,144</b>

## The home

This detached house was built around 1900 and unusually for its age, it has cavity walls.

The large attic room has extensive areas of sloping ceilings, so that although there was 100mm of insulation in the loft space, this had limited benefit overall as it covered a relatively small area.

Many of the original windows had already been replaced with double glazing.

The only heating in this five bedroom home was four electric night storage heaters and a wood burning stove in the kitchen, although the property is in the town and has access to the mains gas network.

## What they did

The current owners purchased the house in 2009 with the intention of refurbishing it to provide a family home. They intended to install gas central heating but had not really considered insulation, and it was a complete surprise when the Target 2050 survey revealed they had cavity walls. The survey also identified the benefits of insulating the attic room, and various smaller wall and floor areas. A modern efficient gas central heating system was installed, to be supplemented by a wood burning stove replacing the open fire in the living room.

The householders had a limited budget for their improvements but were able to do more due to being offered the opportunity to take out a Pay As You Save (PAYS) interest-free loan.

“The insulation has made our house a much nicer place to live. Plus our heating bills have been considerably lower than we expected, so it’s been a win all round!”



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## Cavity wall insulation

A free survey from the cavity wall insulation contractor, including a visual inspection of the cavities, confirmed that they could be insulated. This is not always the case with older homes as there are a number of reasons why cavities can't be insulated, for example if they are too narrow or contain rubble. The total cost would have been £880 but with a discount through the Gloucestershire Warm and Well scheme this was reduced to £422.

## Attic room insulation

The householders say that the attic room was pretty much unusable until it was insulated, with the lack of insulation making it too hot in the summer and too cold in winter. To minimise the loss of headroom, phenolic foam insulation was used as this achieves the best insulation value for its thickness. A "multifoil" insulation was considered, as this material is much thinner, but depending on which multifoil product is used, a substantial air gap and/or a layer of another material are required to achieve a satisfactory insulation value, so there is no space-saving benefit. The contractor also topped up the existing loft insulation to 300mm and carried out two further insulation jobs, described below.

## Further insulation work

Phenolic foam was also used to internally insulate a small area of solid wall in the extension. The same material was used underneath the suspended timber floor in the study. As there is no cellar, the floor boards were lifted and the insulation boards were fitted tightly between the floor joists with wooden battens underneath for support. This has produced a real benefit for the householder, who works from home regularly.

## Gas central heating

The gas supply had to be brought to the house and is not included in the cost stated for the central heating. A complete system was installed, with a condensing boiler, all pipe work



*Installing insulation below floor boards*

and radiators with thermostatic radiator valves. Overall control of the system includes a weather compensator which adjusts the heat output from the boiler according to the outside temperature. The householders considered installing solar water heating but could not stretch their budget at that time, however the hot water cylinder installed has a second input coil which can easily be connected to solar panels in future.

## Wood burning stove

Finally, the householders installed a wood burning stove in place of the open fire in the living room, getting rid of the draught from the open chimney as well as providing a more efficient use of wood fuel.

## Next steps

The next step is to insulate the living room floor, having felt the benefits of a warm floor in the study.

Energy consumption	Total (kWh)	Per m <sup>2</sup> floor area
Before improvement (2007)	65,232	278
After improvement (2010)	35,907	153
With all possible measures	27,742	118
UK average (2011)	19,800 <sup>1</sup>	217 <sup>4</sup>

Running costs	Total	Per m <sup>2</sup> floor area
Before improvement (2007)	£4,022	£17.16
After improvement (2010)	£1,878	£8.01
With all possible measures	£1,450	£6.19
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 (2007)	27.54	117
After improvement (2010)	9.90	42
With all possible measures	6.77	29
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 hot water	0.27	£38

<sup>3</sup>Ofgem 2011

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