

# 1920s semi-detached Stroud

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connecting with local tradespeople

## Case study 11



£492

Saving  
on fuel bills

38%

Reduction  
in carbon  
emissions

Measures installed	Total cost	Annual CO <sub>2</sub> saving (tonnes)	Annual fuel bill saving
Internal solid wall insulation	£1,633	0.90	£118
Floor insulation	£1,822	0.30	£31
Replacement boiler and controls	£3,769	1.20	£151
Double glazing	£2,127	0.05	£16
Solar hot water	£3,882	0.30	£33
Solar PV (2.04 kWp)	£8,943	0.68	£143
<b>Total package</b>	<b>£22,176</b>	<b>3.43</b>	<b>£492</b>
Plus income from PV Feed-In Tariff (FIT)			£670

## The home

When purchased in 2005, this semi-detached 1920s family home was heated by gas central heating with an F-rated gas boiler. It had solid brick walls, a mix of suspended timber and solid concrete ground floors, large single glazed sash windows and open fireplaces. There was 150mm insulation in the loft.

## What they did

In 2007, the owners embarked on a programme of improvements to create more living space. This included a loft conversion and removal of a wall between the kitchen and dining room which contained a large fireplace.

The family were keen to include as many energy saving improvements as possible within the renovation. The planned alterations to the house offered an

opportunity to implement some of the more major measures such as internal wall insulation and floor insulation. Replacement double glazing was installed in all except the sash windows at the front, and LED lighting was fitted.

As well as the fabric improvements, a new under-floor heating system was planned. The initial aim was to integrate a log burner with a back boiler and solar water heating with a condensing gas boiler for back up, all feeding a single hot water cylinder, but in the end they decided to have the log burner as a separate source of supplementary heating.

“With the insulation our home is cosy and warm. The solar thermal gives us nearly all our hot water in summer, and the PV panels hit their annual generation target within 11 months.”

£670

Income  
from Feed-In  
Tariff (FIT)



asiantaeth ynni  
**SevernWye**  
energy agency

**STROUD**  
**DISTRICT**  
**COUNCIL**  
[www.stroud.gov.uk](http://www.stroud.gov.uk)

## Internal wall insulation

As the renovations involved removing an internal wall and chimney breast and raising the level of the kitchen floor to make a large kitchen/diner, there was an opportunity to incorporate internal wall insulation to the back and side walls. The floor boards were lifted and insulation installed along with under-floor heating pipes in the new extended room. These are measures which can cause a lot of disruption and are expensive on their own, so are ideally done as part of other refurbishment works. The new boiler was installed in the loft conversion, removing the old boiler from the kitchen wall, and allowing that whole wall to be insulated.

## Double glazing

Finishing touches to the kitchen/diner included replacing the large single glazed doors and windows with double glazing. To maintain the home's period character, the sash windows at the front were left as they were, but double glazing was installed at the back, where the windows were not original and were north facing, so providing a significant opportunity to improve comfort.

## LED lighting

New LED light fittings were installed in the kitchen with one switch per fitting, allowing the family to use only the lights they need. There are two fittings, each with five bulbs, however the LED bulbs available at the time were expensive at £20 each, so one fitting still has halogen lamps. Being aware of the difference in energy use, the family use the LED lights more.

## Loft conversion

The loft conversion included 50mm of phenolic foam insulation on all roofs and walls and has LED light fittings. The wall between the double bedroom and a small room which houses the boiler and hot water cylinder is insulated as the boiler room could get hot.



*Sloping ceiling insulation being installed between rafters*

## Heating system

A new heating system proved more complex. After struggling to get quotes for the whole system and conflicting advice from installers, they decided to have just the solar panels and boiler feeding the hot water cylinder. The log burner offers standalone secondary heating; about twice as efficient as the open fire. The system has two programmers – one for the under-floor heating and another for the rest of the house.

## Solar electricity

Finally, the family took out a Pay As You Save loan for a 2.04 kWp solar PV system. They moved the solar water heating panels nearer the chimney to make room for the solar PV, as even partial shading of a solar PV panel can result in a noticeable loss in performance. The rearrangement of the existing solar panels alongside the new ones was made easier by using the same contractor.

Energy consumption	Total (kWh)	Per m <sup>2</sup> floor area
Before improvement (2007)	39,800	294
After improvement (2010)	24,445	141
With all possible measures	20,102	116
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)	£1,458	£10.77
After improvement (2010) - excl FIT income	£966	£5.58
With all possible measures	£744	£4.30
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)	9.00	66
After improvement (2010)	5.57	32
With all possible measures	4.80	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
Further internal wall insulation	1.00	£130

<sup>3</sup>Ofgem 2011

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