

People exploring low energy homes

## Topcliffe Way, CB1 8SJ

Rob and Anne

The Leedhams bought their house in 2000; Rob is an electronics design engineer, and Anne a biologist. They've since created a low-carbon home for themselves and their two children.

*Rob says: 'Our aim was to lower the family's carbon footprint. I started measuring the gas and electricity we used, and decided to take control rather than ignore it. I identified each significant energy use, and researched how to reduce it.'*

*Most of the insulation and airtightness work has been DIY, which I've enjoyed doing – it's practical work making a nice contrast to my day job'*

### Overview

**Date built:** 1963    **Type:** Detached  
**Wall type:** Cavity wall  
**Floor area:** 120 m<sup>2</sup>  
**Cost of retrofit:** £20k  
**Occupants:** 2 adults, 2 children

	Energy kWh/m <sup>2</sup> /yr		Carbon kg CO <sub>2</sub> /yr		Water m <sup>3</sup> /yr
	Elec	Gas	/m <sup>2</sup>	/person	
<b>Before</b>	33.3	175	49.8	1494	110
<b>After</b>	16.7	58.3	20	599	60

### Key features

#### Insulation

Cavity wall insulation

DIY insulation works:

- External wall
- Loft
- Hot water tank
- Door

#### Glazing

DIY double-glazing

#### Heating/energy

Condensing boiler  
 Woodburning stove  
 Mechanical ventilation heat recovery system  
 DIY solar thermal system for hot water  
 Solar PV

#### Lighting/appliances

LED lighting throughout



### Low Energy Measures

#### Insulation

*'Big' insulation works:* The cavity wall was insulated in 2005 using blown glass wool. We've insulated the loft in stages, with Celotex overhead, and glasswool, XPS (extruded polystyrene), Celotex and boarding underfoot.

For the perimeter wall insulation there was lots of digging by hand! I put in foamglass from the damp proof course to the top of the foundations footers – around 800mm deep, 100mm thick.

#### *Low-cost insulation:*

We poured in polystyrene insulation beads behind the (already insulated) hot water tank and sealed them in for extra insulation.

I used a panel of Aerogel on one external door to thermally improve a flimsy wooden panel, and a can of squirty foam. Plus draughtproofing to get the air infiltration down from 6 air changes per hour to 2.7 – I measured this with a DIY airtesting device made from an old car radiator fan (pictured below).



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### Glazing

When we bought the house it had uPVC windows throughout which are now 25 years old. I replaced the glass units with new Argon fill, warm edge units with a Uw value of 1.1. It was surprisingly easy; the hardest part was measuring!

### Lighting and appliances

We replaced all the traditional lightbulbs with CFLs, and are slowly replacing them with warm LED. We've replaced white goods and TV as needed the most energy-efficient models, and use PC 'standby busters' and auto switch-off for the DVD and Wii.

### Heating and renewables

We've installed a new condensing boiler, retaining the original 1963 radiators and pipes. We had a woodburning stove fitted professionally.

The DIY-fitted mechanical ventilation heat recovery (MVHR) unit in the loft keeps the house comfortable. The ducting is mainly in the loft, with a few vents throughout the house for distribution.

A solar thermal system, also fitted DIY, provides hot water for 5 months of the year. In 2013 we had a solar PV system professionally fitted – it generates around 3500kWh/year electricity.

### Water management

We harvest rainwater for gardening – or more likely kids' water fights! The greywater system routes all shower water into the downstairs toilet cistern. The very large cistern (see in photo below) holds around 50 litres of water, so doesn't run out – and its use is entirely 'free'. Every few weeks I drop in a chlorine tablet to keep it clean-smelling.



### Performance

The MVHR works silently and perfectly – it's an unsung hero allowing indoor clothes-drying, so avoiding the need for a tumble dryer, and giving fresh air whatever the weather. It automatically increases speed if it's humid, or there's a higher carbon dioxide level from gas cooking or lots of people in the house.

The perimeter wall insulation makes the floor much warmer in winter, so it's now much more comfortable, especially as we often walk about barefoot.

The solar thermal system had quite a few teething problems, largely as it was DIY and I forgot some verbal advice I'd been given by a plumber. It was fine in the end though!

### Future plans

Maybe insulating the garage with an 'inverted roof' approach (insulating layer above the waterproofing layer), and improving the windows and lintels. Also possibly insulating the top of the cavity wall.

### Professional contacts

Solar PV system - [Navitron](#) £6,5k  
Woodburning stove - [Anglia](#) £3k

### Products and costs

#### Insulation

[Celotex](#) – from ebay £400  
[Aerogel](#) – ebay (small quantities) £50  
Foamglass - £400

#### Heating and renewables

MVHR - from [Dealec](#) £1.4k  
Ducting – from [isells.co.uk](#)  
Solar thermal system - from [Navitron](#) £1.5k  
Hot water tank for system - from [Navitron](#) £500

### What we would have done differently

- Taken the external wall insulation up a bit higher; it stops 2 bricks below the damp proof course.
- Fitted more than the standard 4kWp of solar PV.
- Installed internal wall insulation before we decorated on moving in.

### Top energy-saving tips for householders

Monitor your energy usage regularly. Take ownership of it – recognise you are using the energy, and that it doesn't have to be that way.