



People Exploring Low Energy Homes

## Gilbert Rd, CB4 3PE

Neil and Catherine:

Neil says: We moved into this house in October of 2008. I have never been so cold as I was that first winter. The house leaked heat in every direction. In mid-winter, the central heating system took eight hours to heat the house up to 17°C. It was unable to maintain any higher temperature against outside temperatures around freezing.

Something had to be done. Inspired by Anne Cooper's earlier projects, we retained AC Architects to work on energy-efficiency and insulation improvements. This expanded to providing more room in the house and better-organised living space. The design phase took eighteen months. The building work, by R W Dixon & Son, took a further eight.



### The Building Process

The solid brick walls lost heat rapidly. They had no cavity. The solution was to insulate on the inside. The rooms that had particular problems were the two large front rooms, which have external walls on three sides. The north-west wall became an internal wall after the extension work. The other two walls required internal insulation. Insulation was also added to the inside of the front wall in the ground-floor hallway and to the inside of the existing back wall in the third bedroom. We chose not to insulate the back wall of the second bedroom as there is little exposed wall in this room: most of the wall is taken up by window or abuts the rear extension's roof space.

**Insulation:** The insulation comprises Celotex, with a studwork frame in front to hold plasterboard. The curved wall in the living room required an imaginative alternative: an insulation board that had the insulation already attached to plasterboard was carefully cut to allow the plasterboard to bend to fit the curve. This was then plastered to make a smoothly curved surface, with the old curved radiator re-installed.

### Low Energy Measures

**Solar water heating:** We installed a solar water heating system. The water tank provides main's pressure hot water to the house. It has two coils: the lower coil heats the entire cylinder with solar-generated heat. The upper coil heats only the top half of the cylinder from the gas boiler. On sunny winter days, the solar system gets the water up from 0°C to about 30°C, with an hour's worth of gas

#### Overview

Age, Type: **Built in 1930. Semi-detached, two-storey, Arts and Crafts style.**  
 Wall type, Floor area: **Original walls: solid brick. After extension floor area: 150m<sup>2</sup>**  
 Project timescale: **18 months architectural planning, build time 8 months**  
 Cost of build: **£150,000 for full extension; insulation and solar water heating only: £12,000**

	Energy		Carbon		3 people
	kWh/m <sup>2</sup> /yr		kgCO <sub>2</sub> /yr		
	Elec	Gas	/m <sup>2</sup>	/person	Notes
<b>Before</b>	<b>33</b>	<b>150</b>	<b>53</b>	<b>1762</b>	Old house
<b>After</b>	<b>19</b>	<b>60</b>	<b>29</b>	<b>975</b>	

#### Key features

- Internal and external solid wall insulation
- Internal brick wall - thermal mass
- Loft insulation
- Reclaimed bricks used in construction
- Underfloor insulation in extension
- Double glazing on all new windows
- Secondary glazing on other windows
- Thermal-lined curtains and blinds
- Water-harvesting butts
- Solar water heating
- Enclosed wood burning fire
- Bike shed, wood store
- Behavioural changes

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heating, in the evening, raising this to 55°C. In summer, only solar heating is needed.

**Rain water recycling:** We installed two small (200 litres each) rain water tanks for garden water. We considered installing a much larger (thousands of litres) water tank underground in the back garden, which would have supplied rainwater to toilets and washing machine. We chose not to do this, owing to the expense both of the tank and of digging the hole. Unfortunately, this is something that cannot be retrofitted easily, as it requires a third set of water pipes running throughout the house in addition to hot and cold mains.



## Performance

The house is much warmer and much faster to heat, and stays warm for much longer. Per square meter, our gas consumption has gone down by almost 60% and our electricity consumption has gone down by just over 40%.

Before renovation, in mid-winter, the living room took all day (eight hours) to heat up to a reasonable temperature. After renovation, in mid-winter, this room requires only one hour's heating *from the same radiator* to heat up to that reasonable temperature.

We are able to turn off the gas water heating for three months in the summer and rely entirely on the solar water heating for those summer months. For the rest of the year, the solar water heating provides about half the heat needed for the water.



## Future Plans

With regard to lifestyle, we are considering getting rid of our car, or providing a space for a car-sharing scheme. We have no plans to change the house further. The building project was three projects in one (insulate existing house, side extension, rear extension) and the house is now as we want it.

## Professional Contacts

**Architect:** AC Architects Cambridge Ltd, 33-35 Victoria Road, Cambridge CB4 3PE. Tel 01223 576315  
 Web: <http://www.acarchitects.com>

**Structural Engineer:** Andrew Firebrace Partnership, Stable Barn, Park End, Swaffam Bulbeck, Cambridge CB5 0NA. Tel 01223 811572. Web: <http://www.afp-cc.co.uk>

**Builder:** R W Dixon and Son Builders, 118b Victoria Street, Littleport, Ely, Cambs CB26 1LZ. Web: <http://www.rwdbuildersltd.com>

## Products and Costs

All suppliers were sub-contracted by the builders, so we have no personal experience of any of them.

**External solid wall insulation:** 75mm thick Celotex tuff-R zero GA3000Z series insulation board. Cost for two large rooms: about £1000 including labour and VAT plus extra for the electrician to rewire the power and light switches on the affected walls.

**Insulation of loft space:** £250. Contractor: Aran Services, Ltd.

**Solar water heating system and new hot water cylinder** were supplied and fitted by Solarworks.

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