

Oxford Road – CB4 3PH

Extension and renovation of 1920's detached house by eco-architect

Meet your hosts, Margaret and David

Margaret is an architect specialising in low-carbon design. David a Cambridge University professor. Margaret says:

'We've worked on improving insulation since we moved here in 1983. After attending Cambridge Carbon Footprint's 'Carbon Conversations' meetings in 2009-10 we made lifestyle changes to save energy. Our green concerns and desire for greater comfort as we approach retirement has prompted the current works. We aimed both to create a larger house and carry out an 'eco-retrofit.'

When we built extensions in 1989 and 2004 we added energy-saving works to the contracts. Later on we found the information we needed for further improvements through my professional studies and by attending Carbon Conversations (no longer running) and Open Eco Homes. We listed what we wanted, researched each item, made drawings and weighed up the benefit for the money spent.

Insulation

Making your house energy efficient can take a LONG TIME. It's taken us a few years to complete a range of insulation measures, starting with the cavity walls on previous extensions, a loft conversion roof, and finally in 2015 under floor and external wall insulation.

Heating and renewable energy

We installed a condensing boiler in 2004, and a 3kWp solar PV system in 2011. We keep the heating level low and are careful to switch appliances off overnight. We installed under floor heating with zone control (underneath ceramic floor tiles on cement hardboard); we find this very comfortable. Even though we now have a solar diverter for the hot water, our gas usage never seems to go down, so we expect to install an air source heat pump to replace the 15 year old condensing boiler.

Appliances and lifestyle changes

We now use a smaller A+ fridge, switching on a second fridge only when needed. Mostly CFL and LED lighting throughout.

We've adjusted our lifestyle to minimise energy use, turning the thermostat down and wearing warmer clothes. We also walk to the local shops instead of a weekly drive to the supermarket and run, walk or cycle most days. It's possible that we've saved more energy through lifestyle changes and installing solar PV than we will have when all costly renovations are complete.

Performance

Most improvements have been worthwhile; after each building campaign, we have solved problems such as:

- Kitchen mysteriously cold – we discovered the



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radiator was only half-working & the SVP vertical duct was sucking out heat like a chimney.

- Air gap left around new windows in 2004 (a common problem/check them with thermal imaging) – now airtight.
- Air conditioning was not needed in the loft conversion – but it's always warm enough there to dry laundry.
- Underfloor heating is much more comfortable but the gas usage has increased.
- We now have heat recovery ventilators in the bathrooms.

Future plans

- We plan to replace our 13-year-old car with a leased electric vehicle.
- Water-saving toilets. Our water usage is going up!

What would you have done differently?

Installed under floor heating in the kitchen extension in 2004 and not been put off by the cost.

What is your top energy-saving tip for householders?

Put your lifestyle under scrutiny. Go to the Transition Cambridge Energy Group and other meetings held by green groups to find out more – and don't rush!

Best place to get information?

We found our suppliers through recommendations made at EcoBuild seminars and through our architects, builders, Cambridge Carbon Footprint and Transition Cambridge Energy Group. Retrofitters should also get their designers/builders to study the PAS 2035 (Publicly Available Specification for domestic retrofit).

Products and costs

- External wall insulation: £10.5k (including £6k Cambridgeshire [Action on Energy](#) grant)
- Preparation for external insulation: Roofing £5.2K, guttering 4K, solar panel removal and reinstatement £144
- Windows: [Rationel](#) £12k + VAT for whole house (2004)
- Solar PV system: Panels Enecsys 3kWp £11.5k (No longer in business) Installation [Midsummer Energy](#) £1.5k
- Solar immersion diverter: info@intelligent-immersion.co.uk £344 including VAT
- Ventilation: [Vent Axia](#) £300 each
- Underfloor heating: approx. £700 per room (£1254 for hall and front room), plus £3000 to alter system to suit. Bird Heating (Shane Bird).
- Woodburning stove: [Carl Cox Fireplace Installations](#) (01353 648233) – flue £3k, stove £720
- Air tightness testing: Alex Rice (07540-370493)

Overview

Property age: Built 1927

Type: Detached

Wall type: Solid wall original house with cavity wall extensions in 1989 and 2004.

Floor area: 171m² in 2004 (original: 86m², with 1989 extension: 118m²)

Cost of retrofit: Extension 1989: £36K, Loft and extension 2004: £85K, Eco Retrofit: £56K so far (including small extension)

Occupants: 3 people before, 2 people after

	Energy kWh/m ² /yr		Carbon tn CO ₂ /yr	
	Elec	Gas	/m ²	/person
Before	24kWh	93kWh	0.008	0.715
After	-582 kWh	103kWh	0.009	0.77

Key features

Insulation and glazing

- Cavity wall insulation of extensions
- Floor insulation on ground floor
- Roof insulation of loft conversion
- External wall insulation completed in 2015
- All windows low energy double-glazed in 2015

Heating/energy

- Solar PV 3kWp
- Under floor heating with zoned controls
- Wood burning stove

Contacts

- Architects: [M Reynolds RIBA](#), [Bland Brown & Cole](#), Archimage Architects Ltd, Wilburton Ely 01353 741711
- Structural engineers: [Andrew Firebrace Partnership](#)
- Building contractors: [Green Hat Construction](#), [Salmons Brothers](#), [Martin Cadman](#)
- External wall insulation: Thrift Energy, originally Climate Energy (no longer in business)
- Lighting: [TES Total Electrical Solutions](#) (Dan Grace)
- Advice from: [Cernunnos](#), [Transition Cambridge Energy Group](#), [Association for Environment Conscious Building \(AECB\)](#): [CarbonLite Retrofit Course](#), [PassivHaus Trust](#)