

People Exploring Low Energy Homes

New Street, CB1 2QT

John Connett – John says:

I bought my house from new in 1996. As a non-driver by choice, I was motivated by being able to walk to work and easy access to public transport. In recent years I have become more interested in the environment. As the original boiler approached the end of its life I began considering a **low energy renovation**.

My aims were to improve the efficiency of my home and make it more comfortable for my retirement. I wasn't interested in short term economic returns.

During my lifetime there have been many threats to mankind and so far we have been lucky to dodge them. We may not be so lucky with climate change. Adapting my house and lifestyle to use less energy is a step towards doing my bit.

My house has three floors with the top floor in the roof space. Heating and hot water were provided by a gas combi-boiler. Sash windows with minimum thickness double-glazing. It was comfortable in the winter, but overheated in the summer.



Low Energy Measures

The **roof insulation** was greatly improved with *Celotex FR4000* both **between and below the rafters**, which lowered the height of the sloping ceilings without significant loss of useful space.

Two cold loft spaces, one previously inaccessible, were included in the **insulation envelope** for a modest gain in storage space. And **Insulation was added between the floors** using **wood fibre**. The builders love it – much less itchy than mineral wool!

The windows and back door were replaced with **high performance wood and aluminium**, either **triple-glazed** or with an **integral blind** between the **external pane and internal triple-glazing**.

The external appearance was similar to the original windows without compromising performance.

The flimsy unglazed front door was replaced by a **high performance, half-glazed timber door**.

Two of the **roof windows** were **upgraded using conversion kits** and the third, in the shower room, was **replaced with a larger unit** providing both more light and better headroom.

With the **insulation and air tightness** much improved, a **whole house Mechanical Ventilation with Heat Recovery (MVHR)** system was installed.

Careful routing of the ventilation ducting through built-in cupboards ensured that it is almost invisible. The system has a **humidistat** to automatically boost performance and there is also a manual boost switch linked to the cooker hood.

I considered various heating and hot water systems, including one based on an **Air Source Heat Pump (ASHP)** using CO₂ as its refrigerant. I rejected this approach because of the limited level of technical support that was available for a new product to the UK market.

Overview

Age, Type: **1995, Terraced**

Wall type, Floor area: **Cavity, 84 sq m**

Project timescale: **2 yrs**

Cost of measures: **£50,000**

Energy usage – 1 adult

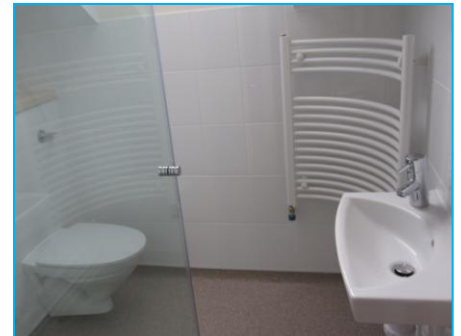
After: **36 kWh** per sq m pa electricity
42 kWh per sq m pa gas

Before: **51 kWh** per sq m pa electricity
91 kWh per sq m pa gas

Key features

- + insulation: roof, lofts, between floors
- + windows & doors: high performance, triple-glazed
- + roof lights: upgraded, conversion kits
- + mechanical ventilation with heat recovery (MVHR)
- + solar thermal collectors
- + thermal store
- + condensing boiler, heat exchanger
- + thermostatic valves, high efficiency pumps
- + low water shower, toilet, taps
- + highly reflective paints
- + high efficiency appliances

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Instead of an ASHP I opted for a **high efficiency gas condensing boiler**, although many features of the earlier design were retained including a **thermal store to store heat for both space heating and domestic hot water**.

Finding the space and a **thermal store** to fit was difficult in a house designed for a gas combi-boiler! I found one that would just fit in the understairs cupboard. Using a **thermal store** rather than **solar domestic hot water** should give greater flexibility.

When I'm the only occupant any **surplus solar heat** can be used for space heating during spring and autumn. The **350 litre thermal store and boiler** should be able to provide enough hot water for a house full when required.

Two **flat plate solar thermal collectors** completed the solar thermal part of the system with an electric **immersion heater** to provide emergency hot water.

When solar thermal isn't available a **condensing boiler** heats the thermal store. Domestic hot water is supplied on demand via a plate **heat exchanger**.

Space heating is supplied via radiators with **thermostatic valves** on a separate heating circuit with a high efficiency **circulation pump**.

The shower room was refitted with a **low water use shower, toilet and washbasin tap**.

Interior walls were decorated with **highly reflective paints** to make best use of natural light.

When major appliances need replacement I choose those with **high efficiency A rating** or higher. For example my fridge-freezer is A++ but for other appliances the highest rating appears to be A.

Professional Contacts

Architect: Anne Cooper of A C Architects Cambridge Ltd. www.acarchitectscambridge.com

Builder: Richard Dixon & Son www.rwdbuilders.com

Plumber: Kelvin J. Webb www.cambridgeplumbers.com

Installers

MVHR: ADM Systems www.admsystems.co.uk

Windows & Door: Internorm www.internorm.co.uk

Products

Insulation

Floors: STEICOflex *Woof Fibre batts*, www.steico.com/en

Roof: Celotex *FR4000* www.celotex.co.uk

Windows and doors

Windows and back door: Internorm, *EDITION 4* and *EDITION* www.internorm.co.uk

Front Door: Greensteps *Ultra High Performance Timber Triple-Glazed Door* www.greensteps.co.uk

Roof Window Conversion Kits: Velux www.velux.co.uk

Flooring

Bathroom, Kitchen: Polyflor *Polysafe Vogue Ultra*, www.polyflor.com

Shower Room: Polyflor *Polysafe Hydro* www.polyflor.com

Heating and lighting

MVHR: Vent-Axia *Sentinel Kinentic BH* www.vent-axia.com

Solar thermal system: Sonnenkraft *PSR350 thermal store and 2 x SK500 flat plate solar thermal collectors* www.sonnenkraft.co.uk

Gas Condensing Boiler: Viessmann *Vitodens 200-W* www.viessmann.co.uk/en

Circulation Pump: Wilo *Stratos PICO* www.wilo.co.uk

LED Light Units: PhotonStar *EcoStar6*, <http://www.photonstarlighting.co.uk>

Kitchen and bathroom

Induction Hob: ZUG *GK36TI* www.vzug.com/uk/en

Cooker Hood: Berbel *Firstline*, www.berbel.de

Fridge/Freezer: ZUG *Futura eco* www.vzug.com/uk

Low water shower & taps: Grohe www.grohe.co.uk

Low water toilet: Ifö www.ifosanitar.com

Other

Wiring Accessories: Busch-Jaeger *alpha bs* www.busch-jaeger.de/en

Paint: Dulux *Light & Space* www.dulux.co.uk