

People Exploring Low Energy Homes

Cheney Way, CB4 1UD

Simon and Jan Mentha – Simon says:

Our house is a semi-detached built in 1958. We bought it in 1988, and over the years the number of repairs needed was starting to build up, for example need of a new boiler, re-wiring, a dilapidated extension.

So rather than tackle these piecemeal, we decided to go for wholesale renovation and improvement.

This has involved the demolition of a single-storey extension, and its replacement with a two-storey extension and 'upgrading' the resulting property, incorporating various "green" features, energy efficient measures and low-maintenance attributes.



Overview

Age, Type: **1958, Semi-detached**

Wall type, Floor area: **Block cavity, 187 sq m**

Project timescale: **Planning 1 yr, Building 2 yrs**

Cost of measures: **not disclosed**

Energy usage – 2 adults

After: **37 kWh** per sq m pa electricity (projection)

Before: **30 kWh** per sq m pa electricity
103 kWh per sq m pa gas

Key features

- + principles: sustainable, low maintenance materials
- + insulation: walls, floors, roofs, loft
- + exterior walls: cavities filled, surfaces lined
- + windows: high performance double-glazed
- + underfloor heating
- + woodburner with back boiler
- + solar thermal panels, thermal store
- + condensing boiler, weather compensating controls
- _ solar thermal plates, large thermal store
- + photovoltaic (PV) cells
- + mechanical ventilation heat recovery (MHVR)
- + sunpipes: toilet, landing, dining area
- + high-efficiency appliances
- + lighting: LEDs, passive infra-red motion detectors
- + water softener, dual low flush toilets
- + rainwater harvesting: for toilets, clothes, gardening

Low Energy Measures

Replaced gutters with **powder-coated aluminium**, and softwood fascias with **acetylated timber**.
Double glazed windows throughout.

Loft topped by **permeable roofing felt**, allowing the dropped eaves to be **filled with insulation**, rather than leaving a draughty air gap, plus a **sealed and insulated loft hatch**.

Exterior walls, main house: **Cavities insulated** and lined with **super insulated plasterboard**. Extension walls: inner skin **Fibolite blocks** for high thermal efficiency, **cavities filled with rockwool batts**.

Window reveals: faced with **insulated board**.

Ground floors, all laid on concrete slab: main house, **floor insulated**; extension, **insulation and underfloor heating** throughout, on the ground floor embedded in gypsum screed.

First floor: timber joists infilled with **mineral wool as thermal and acoustic insulation**. Base board overlaid with **underfloor heating** clipped to aluminium heatspreaders topped with gypsum ScreedBoard to provide **thermal mass**.

We have **solid wood flooring** downstairs, **carpeting** upstairs, and **rubber tiles** in the utility room, all compatible with the **underfloor heating**.

Mechanical ventilation heat recovery (MVHR) throughout the house; **recovering 90% heat** from stale air, rather than opening windows! Allied to this, we are aiming for a Design Air Permeability of $3\text{m}^3/(\text{m}^2.\text{hr})$, difficult to attain in a refit project.

Photovoltaic (PV) cells which generated 3100kWh in the first year.

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Domestic hot water and space heating (underfloor), in order of priority, is provided by a combination of:

- 1 woodburner with back boiler
- 2 solar thermal panels
- 3 condensing boiler with controller for fine-tuning.

Hot water is supplied by a **thermal store** accumulating heat from all these sources.

A large **rainwater harvesting tank** is sunk into the back garden. Our neighbours have agreed to let us collect the rainwater from their roof, giving a **collection area of 150m²**. The water will be used for toilets, clothes washing and garden watering.

In addition we have a **water softener** to stop the thermal store from furring up, and reducing detergent usage.

We have installed **LED lighting** throughout – some dimmable, supplemented with **sunpipes** in the downstairs toilet (which otherwise would have no natural light), landing (low on natural light) and dining area. Porch and approach lights are switched by **passive infra-red motion detectors**.

Professional Contacts

Architect: Nicholas Ray, NRAP www.nrap.co.uk

Building Contractor: John Doyle, 59 High Street, Dry Drayton, Cambridge, CB23 8BS

Eco Consultant: Peter Pope peter.pope@cantab.net

Electrician: Ian Hall ian.hall916@ntlworld.com

Plumber : David Lowe lowe.heat@totalise.co.uk

Structural Engineer: John Bowstead, Peter Dann Ltd www.peterdann.co.uk

Products

Exterior

Aluminium gutters/downpipes: Alumasc powder-coated aluminium, maintenance free, avoids PVC.

Fascias: Accoya acetylated wood www.accoya.com maintenance free except for occasional painting.

Insulation

Main house, exterior walls: 50mm cavity-filled, lined with 70mm Thermaline Super insulated plasterboard

Extension, exterior walls: inner skin 140mm Fibolite blocks, 120mm cavity filled with rockwool

Ground floor: Celotex, 70mm & 160mm (extension)

Plasterboard: 70mm & 40mm Thermaline Super insulation.

Loft hatch: Titan MidMade Deluxe.

Roofing felt: Kløber Permo® forte www.kloeber.biz

Window reveals: all faced with 10mm Spacetherm "ultrathin" aerogel insulated board.



Windows

Double glazed: Argon-filled Rationel Aldus +22+33.2 thermofloat U_g=1.16Ar, aluminium clad, timber framed www.rationel.co.uk

Flooring

Rubber : The Rubber Flooring Company www.therubberflooringcompany.co.uk

Wooden: Junckers Dark Ash Wide Board Classic 20.5mm, ultra matt lacquer finish; underlay QuickTherm

Ground floor screed: 50mm poured liquid Lafarge gypsum with superior thermal conductivity.

First floor screed: 20mm Cellacta ScreedBoard - www.cellacta.co.uk/tag/screedboard/

Heating

MHVR: Service Vent www.servicevent.co.uk

Condensing boiler: Vaillant Ecotec plus 415 and Heatmiser network-accessible controller

Photovoltaic cells: 14 x 2.35W kWp, Powerglaz, Midsummer Energy www.midsummerenergy.co.uk

Solar thermal panels: 2 x 3m² Viridian V30 Clearline - www.viridiansolar.co.uk

Thermal Store: 300 litre open-vented, Eco-equipped www.eco-equipped.com

Woodburning stove: 5kW Dunsley Highlander, 2kW back boiler, Cut Maple www.fireplacesetc.co.uk (supply/install)

Underfloor heating: Uponor

Lighting

Sunpipes: Monodraught 2 x 230mm and 300mm

LEDs: Halers H2 7.9W and Toshiba 8.5W E-core LED dimmable

Ventilation: Vent-Axia Air Sentinel Kinetic Plus

Water

Water softener: Atlantis 210 - www.atlantis-uk.com

Rainwater harvesting: 4500 litre tank, Kingspan gravity-fed system www.kingspanwater.com