People Exploring Low Energy Homes

www.openecohomes.org
www.cambridgecarbonfootprint.org

Sherlock Road, CB3 0HR

Mark and Niki – Mark says:

The principal motivation for upgrading our house was to significantly improve the level of human comfort. With increasing energy costs we considered how conventional methods of providing energy could be challenged.

The project also investigated methods of reducing carbon omissions throughout the construction phase and more significantly throughout the lifetime running costs of the redevelopment.

Ground conditions adjacent to and under the property are not conductive to nature percolation due to high levels of impermeable clay. The ground conditions are susceptible to localized flooding and high levels of rising damp under the suspended floor and condensation within the old property.

Overview

Age, Type: **1930's, Detached**

Wall type, Floor area: **Solid brick (main house), cavity (extension, 185 sq m)**

Project timescale: **1 yr**

Cost of measures: **£120,000**

Energy usage – 2 adults

Not yet available

Key features

+ minimised heat loss, reduced air infiltration
+ exterior walls: internally insulated
+ insulated throughout: walls, loft, roofs, floors
+ windows: double glazed
+ passive solar gain: large south facing windows
+ air-sealed entrance lobby
+ under floor heating: running constantly, low level
+ three wood burners: Rayburn, Morso and Multi-fuel
+ solar thermal tubes, large thermal store
+ condensing boiler, high efficiency
+ monitoring: careful timing, whole house controls
+ lighting: low energy, LEDs throughout
+ water: softener, dual flush toilets, water butts
+ flooring: oak engineered boards, travetine tiles

Low Energy Measures

The key to reducing energy consumption is to design a base condition which **minimises heat loss** and **reduces air infiltration**. Therefore we considered all external surfaces that were directly adjacent to the perimeter envelope of the property.

We installed **high levels of insulation** within the roof space, **internally lined ALL exterior walls**, replaced the ventilated suspended floor with **insulation,** and installed **under floor heating**.

The poorly fitted metal windows which were the cause of high levels of infiltration and conduction of cold condensation into the house were replaced. New bespoke hard wood **double glazed windows** (not sustainable) replaced all original Crittall frames.

Having addressed the **thermal performance** and **air tightness** issues, we now turned our attention to **sustainable energy measures**. Our intention was to be able to run the home using a sustainable source; the **burning of timber (carbon neutral).**

We therefore built into the design three wood burning elements:

Firstly, the **solid fuel Rayburn** in the kitchen provides enough energy to run the **under floor heating** throughout the ground floor, **low level heating radiators upstairs,** and heat to the **large thermal store** which provides all our hot water. The chimney flue which feeds the Rayburn runs down the middle of the house. It was deliberately left un-insulated so that the surrounding brickwork would **hold the heat and radiate it into the walls** as it passes through the house.

Secondly, the 1970's flat roof extension, a space which is a large volume (6.4 x 5.4 m), is heated by a **very efficient Morso wood burner** (freestanding). It can provide up to 9 kW of energy.

And thirdly, a small steel encased **multi-fuel burner** located at the corner of the house provides localized heating.

We also introduced **Solar Thermal hot water tubes** on the 45 degree south facing roof pitch. These provide significant amounts of hot water into the **300 litre thermal store** in the roof void.

Future Plans

Recoup the project costs as quickly as possible. Monitor the energy consumption.

Improve the performance of the 1970's flat roof extension with new windows and further insulation.

Analyse how refinements to air tightness can improve the building energy consumption.

Professional Contacts

Architect: Mark Chandler, Vincent & Gorbing www.vincent-gorbing.co.uk 01438 316331

Builder and Heating Engineer: Bickers & Dodds Builders Ltd 01842 811342 / 01842 819725

Products and Costs

Insulation

Exterior walls: dry lined, 35mm Celotex & 12.5mm plasterboard

Cavity walls: cavities filled and internally insulated with 50mm insulated plasterboard

Under floor: 300 mm insulation

Flat roof extension: 250 mm Rockwool fibre

Windows and doors

Windows: 16mm double glazed sealed wood framed units

French doors: 16mm double glazed – bespoke – PB Joinery, Bluntisham

Heating

Wood burners: Rayburn 355 SFW. £4,405 and Morso Woodburner (supply only) £2,800

Condensing Boiler: Worcester Bosch Group. Natural Gas Greenstar 24Ri. £1,241

Under floor Heating: Maincor UFH System, £1,932
Water Softener: K5308244 Tapworks AD 11, £427

Solar Thermal Tubes: Kingspan Thermomax Vacuum. Tube panel solar heating kit. £3,412

Thermal Store: Kingspan Flow master Ultrasteel 300ltr twin coiled solar cylinder, £1,251