

# 111 Ditchling Rise, Brighton BN1 4QP

## Overview

Period / age of house: Victorian
Type: Mid-terrace maisonette
No of rooms: 3 bedrooms, 3 other rooms
No of floors: 3
Floor area: 124m <sup>2</sup>
Cost of improvements: £80,000 including loft conversion, new roof and PV array
Wall: Solid wall

## Features

- + internal wall insulation
- + airtight loft extension
- + double glazing
- + wood burning stove
- + low energy lighting
- + energy monitoring
- + photovoltaic panels

## Introduction and approach

Maria Hawton-Mead bought her Victorian terraced house in 1999 and as her interest in sustainability grew she decided to eco renovate her home as a demonstration project. Maria's aim was to transform the house from leaky, cold and expensive to run into a low energy home which is warmer in winter and cheaper to run.

One thing led to another. A leaky and sagging roof, and the need to reinforce the structure to take the weight of photovoltaic panels, led to the decision to replace the roof and convert the loft space into a room.

It took five months to complete the work and Maria found it a real learning curve being faced with the the difficulties and compromises of improving an old house. The house is now much warmer and incredible cheap to run. Gas bills have been significantly reduced thanks to insulation work and the wood burner. The PV panels have freed her from electricity bills and she now makes a profit by selling back to the grid. Carbon emissions were initially reduced by at least 80%. Since Maria adopted a little girl in October 2011, energy use has crept up slightly as Maria keeps the house warmer and is in for longer. Her emissions are now a 63% reduction on previous years rather than 80% showing what an impact different occupancy or heating levels can have.

During the eco renovation Maria maintained the original character of the house. For example she installed new double glazed sashes with slim glazing units just like the old windows without the draughts and restored



the original Victorian cornices over the new internal wall insulation.

Glasgow Caledonian University and Knauff insulation are monitoring the new wall insulation for two years to see how it performs.

## Energy efficiency measures

Local planning constraints would not allow external wall insulation. A package of insulation measures was designed to include the internal walls, roof and floor and double glazing combined with improved air tightness to reduce heat loss. These are outlined below:

**Internal wall insulation** – 90mm recycled glass mineral wool and insulated extruded polystyrene studs funded by Knauff insulation. Return walls into fireplaces were insulated with 27mm foam backed plasterboard to reduce heat loss from the party walls. Lime render was applied to exposed brick work where on the first floor blown plaster was removed. U-value: 0.29 W/(m<sup>2</sup>K)

**Roof insulation** – 150mm recycled glass mineral wool between the rafters. This was overlaid with orientated strand board (OSB) and sealed with air tightness tape to create an airtight layer. Plasterboard with 40mm of foam backing was then applied. U-value: 0.19 W/(m<sup>2</sup>K)

**Floor insulation** – recycled glass mineral wool was placed between the joists 400mm into the rooms from the external walls. Elsewhere insulation was installed where floor boards were lifted.

**Improved glazing** – new double glazed sashes with slim glazing units fitted throughout with draught proofing to improve airtightness. U-value: 1.5 W/(m<sup>2</sup>K)

**Increased airtightness** – continuous airtight layer on external walls to reduce air leakage using a combination of orientated strand board (OSB) and plastering.

## Energy and electricity systems

There are plans to replace the 8 year old combination boiler when it comes to the end of its life. Replacement with a more energy efficient boiler before that time does not make economic sense now that the gas use is so low. Mechanical ventilation will be maintained in the bathroom and kitchen.

**Wood stove** – 5kW Morso wood stove installed.

**Photovoltaic array** – installation of 12 Sharp 175 W Monocrystalline panels on the south facing roof facing the road to supply all the electricity required by the current occupier. An interest free loan from British Gas

funded the installation. The feed in tariff of 41.3p will be paid for every kWh of electricity produced and 3p more for any electricity exported. The array has produced 2230kWh in the first year, more than expected.

**Insulated pipe work** – all hot water pipes accessible during works were insulated.

**Lighting** – Halogen down lights will be replaced with GU10 fittings to take LED lighting, a low energy form of lighting.

**Appliances** – New A++ rated fridge and freezer will be part of the works planned to extend the kitchen.

**Decorating** – Auro natural paint and oils were used.

**Rainwater harvesting and home composting** – there is already home composting and further rainwater collection is planned.

## Monitoring

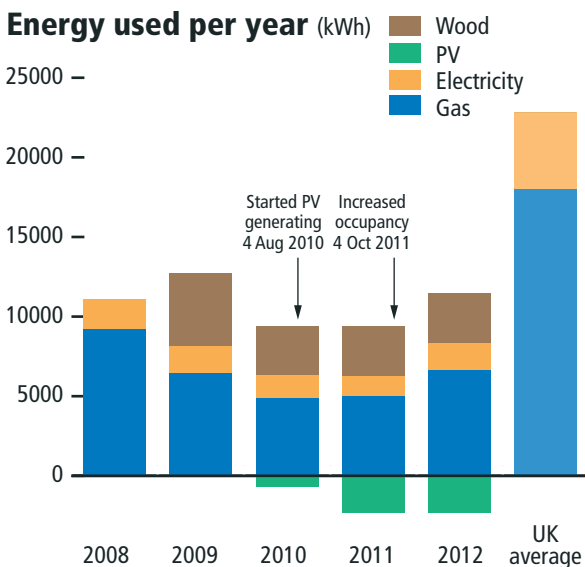
Temperature and humidity levels are being measured continuously. Gas, electricity, water and Microtricity (PV) readings taken twice a month.

Sensors have been fitted inside the walls to see how they perform. An energy monitor is used to check the base load for electricity use.

## Energy use and carbon emissions

SAP 2010 conversion factors used: Gas 0.198, Electricity 0.517, Wood logs 0.008.

Carbon trust conversion factor for tonnes of wood to kWh used of 3084 kWh per tonne.



## Lessons learnt

The project has had a steep learning curve and the lessons learnt are:

- Fitting internal wall insulation is very disruptive and it is not recommended that occupiers stay in the house during the work.
- External wall insulation is more effective and less disruptive and recommended if there are no planning constraints.
- If internal wall insulation is fitted extreme care must be taken to make sure no air can enter into the wall to avoid internal condensation leading to degradation.
- Make sure your roof is structurally sound to take the weight of solar panels.
- The exact location of rafters must be recorded before they are covered up so that the support brackets for photovoltaic panels can be fixed to them.

## Professional contacts

Sustainability Consultant – Maria Hawton-Mead [www.hawtonmead.co.uk](http://www.hawtonmead.co.uk)

Building, joinery, new box sash windows, double glazed windows – Paddock Homes Sussex Ltd 01273 833112

Detailed drawings – [www.ecotecture.co.uk](http://www.ecotecture.co.uk)

Insulation/monitoring – [www.knaufinsulation.co.uk](http://www.knaufinsulation.co.uk)

Photovoltaic panels – [www.solartechnologies.co.uk](http://www.solartechnologies.co.uk) part of British Gas

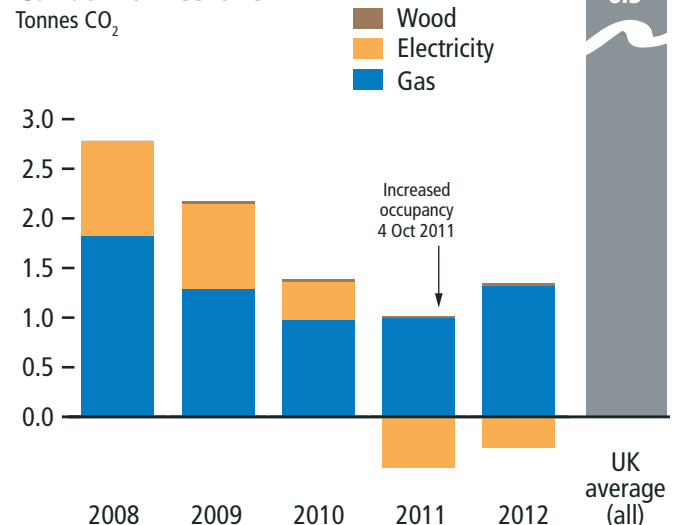
Natural paints & finishes – [www.auro.co.uk](http://www.auro.co.uk)

Air tightness tape – [www.siga.ch](http://www.siga.ch)

Monitoring – Paul Baker, Glasgow Caledonian University [pba3@gcal.ac.uk](mailto:pba3@gcal.ac.uk)

Wood stove – [www.agreeneralternative.co.uk](http://www.agreeneralternative.co.uk)

## Carbon emissions



Eco Open Houses is an annual collaborative project between Brighton Permaculture Trust, Low Carbon Trust and Brighton & Hove City Council. This year the event is run as part of the EcoFab 2 project and has been selected within the scope of the INTERREG IV A France (Channel) – England cross-border European cooperation programme and is co-financed by the ERDF

