

148 Hartington Road, Brighton BN2 3PB



Introduction and approach

This newly built house, completed in 2011, was constructed on an extraordinary steep, compact, triangular plot and is a single storey at the upper end and double storey at the lower. The site with outline plans was bought by lighting designer Jason, wife Sarah and two small children. Through much hard labour, ingenuity and skill on Jason's part and having spent a year on the build; costs for the house and plot have totalled an affordable £170K. It was recently filmed for the BBC's *To Build or Not To Build* (series 2 episode 16). In effect, Jason's design of the house has had to evolve to meet the constraints of the site, planning requirements, a fixed budget and an overriding ambition to produce a near zero carbon home.

Abundant natural light floods through homemade double glazed skylights, space and water heat is provided from renewable sources, and heat is recycled via heat recovery ventilation. Low energy lighting combined with the glazing approach reduces energy inputs for lighting.

In a similar vein, all electrical appliances were chosen for maximum efficiency, ranging from A+ to A+++.

A sustainable approach was one of the guiding principles. In the interests of water conservation, all fittings are designed to minimise

OVERVIEW

Type: Detached

Age: New Build

Beds: 2

Walls: Timber clad with masonry

Area: 80 m²

Cost: £170,000, incl. site.

Residents: 2 adults and 2 small children

use, and rainwater from the roof is harvested for re use in the WCs. Equally importantly, the extensive use of timber and other natural materials greatly reduced the environmental impact of construction.

The house has a highly insulated timber frame, and despite little opportunity for glazing on the south side, a passive solar design has been achieved, allowing the sun to contribute to heating. Insulation far exceeded building regulations and was easier to carry out, and much more cost effective, at the new build stage rather than retrofit. For a small additional cost, this house now has the benefit of ultra low heat loss, which means that it has no need for a conventional boiler. Occasional use of a woodburning stove is all that is required.

By not being reliant on gas, and anticipating progressively carbon free electricity, this house pioneers the way for fossil fuel free living in the future.

Energy efficiency measures

Heating and hot water

Space heating is solely via an efficient woodburning stove, which amply heats the space by using an impressively frugal 3–4 m³ of wood per winter.

Mechanical ventilation with heat recovery (MVHR) circulates warmth

FEATURES

- + Airtight construction
- + High performance double glazing
- + LED lighting
- + Low energy appliances
- + Mechanical ventilation with heat recovery (MVHR)
- + No boiler necessary
- + Passive solar gain
- + Rainwater harvesting
- + Solar thermal
- + Sustainable and low embodied energy materials
- + Timber frame and part cladding
- + Underfloor insulation
- + Water saving fittings
- + Woodburning stove

throughout the house and captures 90% of heat from outgoing air.

Water is mainly heated using solar thermal panels, topped up by a small immersion heater in winter.

Clothes are dried on a foldaway rack in the external living area.

Insulation

The roof is insulated using plywood/thermal laminate construction board.

Walls are timber framed and filled with 140mm of rigid foam insulation, plus a cavity, to deliver the very low u value of 0.18 W/m²K.

The underlying slab is overlaid with 120mm of rigid foam insulation, screeded with recycled material and finished with natural oak flooring.

Window construction is in timber, designed for minimal thermal bridging, with Argon filled double glazing. Double glazing rather than triple was chosen for the rooflights to achieve the best compromise between capturing solar heat in winter and maintaining good insulation.

Renewables and low carbon technology

Solar thermal hot water is provided by an Inox CPC 12 evacuated tube array feeding a Gledhill 210 litre solar thermal cylinder.

A room sealed, soapstone clad, Hwam Ravel woodburning stove provides all space heating.

Low energy LED lighting has been installed throughout, augmented by excellent natural lighting.

The house has A+ or A+++ low energy appliances throughout.

Other measures

Natural materials

Timber is used extensively, in the building frame, cladding, windows and floorcoverings, helping to store carbon and also reduce embodied energy.

Water conservation

Water conserving fittings are used throughout to conserve water and minimise use.

Rainwater harvested from the roof supplies the WCs.

Lessons learned

Cheap insulation was obtained as factory seconds from Secondsandco in Wales.

The rooflights were initially found to let in too much heat in summer, but this will be regulated by installing blinds. An alternative solution might have been to have had opening roof vents, albeit at greater cost.

Professionals

Design and lighting Luninair Creative Engineering Ltd
www.luminair.co.uk/

Building Tom Pike/ Ark Builders
www.arkbuilders.co.uk

Building Sean Avis/ Avis Lofts
www.avislofts.co.uk

Plasterer Ryan tel. 07766 762894.

Solar Thermal PlumbNation Ltd, Wirral
www.plumbnation.co.uk

Woodburning Stove Euroheat(HBS) Ltd, Worcs.
www.euroheat.co.uk

Ventilation EnviroVent Ltd, Harrogate
www.envirovent.com

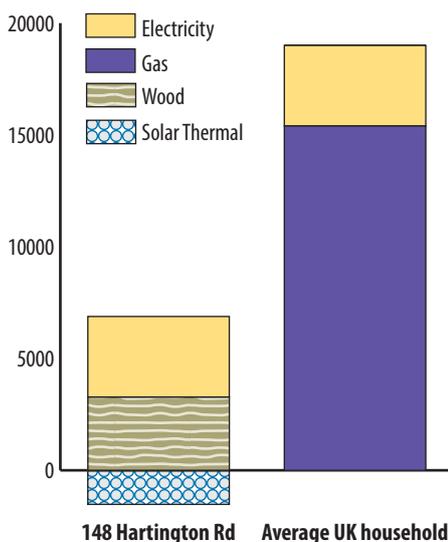
Larch cladding BSW Timber, Carlisle
www.bsw.co.uk

Foam insulation Secondsandco, Presteigne
www.secondsandco.co.uk

External rendering Eco-Rend South East Ltd, Hastings
www.eco-rend.co.uk

Energy and CO₂ performance

Energy performance kWh



Energy use (generation) kWh

	148 Hartington Rd	Average UK household ¹
Gas	0	15400
Electricity	3600	3600
Wood	3300	0
PV Electricity ²	0	0
Solar Thermal	-1500	0
Totals	5400	19000

¹ 15400 kWh average gas use (DECC Energy Trends March 2013), 3600 kWh average electricity use (EST 'Powering the Future' 2012)

² Total generation figure, of which 500 kWh is assumed used by household

CO₂ performance Tonnes CO₂



CO₂ emissions (tonnes)³

	148 Hartington Rd	Average UK household ⁴
	1.9	5.5

63% below average

³ CO₂ fuel emissions factors from SAP 2009

⁴ Average fuel emissions 0.233kg CO₂/kWh (from EHS 2009 fuel split)

Eco Open Houses is an annual collaborative project between Low Carbon Trust, Brighton Permaculture 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. The Green Deal strand of the project has been funded by the Department of Energy and Climate Change through the Local Authority Fund