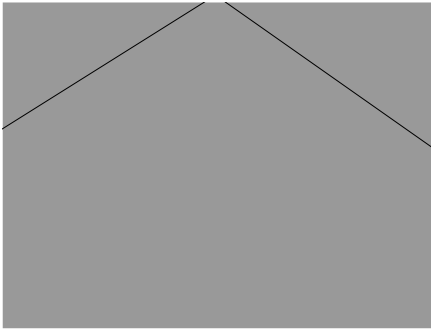


27 Roundway, Coldean, Brighton BN1 9AQ



Introduction and approach

Tom is a woodworker who has creatively transformed his semi detached post war house in Coldean. In the process he has created a house that can be heated virtually exclusively by renewable fuels, just using the sun and wood fuel.

Having completely gutted the house two years ago, Tom made the ground floor open plan, bringing light and space into the main living area. Solar thermal panels provide hot water in summer and a wood burning stove the house and provides hot water in winter. It can be used for cooking too! Tom is currently building a timber frame shed, which when finished will feature a green roof.

Materials have been used ingeniously, with an emphasis on reuse and second hand sourcing for affordability. Rather than use masonry that has a high embodied energy, Tom prefers to use timber that is local or from certified sustainable sources.

OVERVIEW

When built	1947
Type	Semi-detached
Years in residence	1
No of residents	1 adult
No of bedrooms	2
No of other rooms	3
No of floors	2
Wall type	Cavity

FEATURES

- + Green roof (on shed)
- + Grey water recycling
- + Triple glazing (DIY)
- + Loft Insulation
- + Recycled materials
- + Solar Thermal
- + Sustainable Materials
- + Woodburning Stove

Thermal improvements

The house walls have a cavity but this has not been filled yet though when this is done it will significantly reduce heat loss. Tom is hoping to knock through and create an extension in future so is waiting until this has been completed. Loft insulation has been installed.

Glazing throughout is pre-existing aluminium frame double glazing. Only the glazing upstairs has been replaced as the units had failed in both bedrooms. Tom has made his own triple glazed windows to replace these.

Energy saving

A porch has been built to shelter the front door and provide a thermal barrier.

Tom has an old Potterton gas boiler which is used very seldom. He sees this as providing auxiliary heat, rather than being the main source of heat as it is for most households. Instead primary heating is provided via a combination of solar hot water in summer months when there are consistently high levels of solar, and heat from the wood burner installed downstairs in the open plan kitchen/main room during the winter.

When the existing hot water tank broke during the renovation, this triggered looking at more efficient heating solutions and introducing renewable technologies for heat. Tom sourced reduced price 'evacuated tubes' for just

£700. These are a solar hot water technology which captures solar radiation more efficiently than flat plates. A large solar hot water tank was installed into the roof space. The solar hot water system is a pressurised system with an expansion tank.

To provide space and water heat in winter, Tom installed a wood burner. This is a large 11kW stove, Hunter Herald 14 built in Devon. This heats the downstairs area directly and feeds the radiators upstairs using a gravity feed/ vented system. The system required careful planning with a heating engineer.

Because the hot water and space heating systems maximise use of renewable heat, the carbon emissions for the house are remarkably low at 1.3 tonnes CO₂ per year. Tom's gas bills average £3 a month.

There is an induction hob in the kitchen.

Use of materials

Tom's approach to materials is to recycle and reuse, to source locally, to search out cheap deals, and to use the most sustainable materials possible. This has led to extensive use of timber and timber products throughout the renovation.

When the downstairs living space was opened up, the chimney breast and two masonry walls were also removed from the upstairs floor. Tom replaced this with a lightweight stud wall. This was built

using Forest Stewardship Council (FSC) Spruce plywood instead of plasterboard and plaster, as timber has a lower embedded energy and carbon and is therefore much more sustainable.

Because of its low impact and low cost Tom has opted for plywood in flooring, walls, and storage units. Much of this is spruce ply. Spruce is a softwood and therefore faster to grow and easily available. Tom sees this as an attractive, affordable, durable and sustainable alternative to engineered flooring. Flooring for the entire ground floor cost £200.

A natural, non toxic oil called Osmo 'Polyx Oil' was used as a finish on all woodwork.

In the kitchen existing clay floor tiles were kept and cleaned up. The kitchen worktop is made from locally sourced oak (from Wests).

Water efficiency

During the renovation, the house was completely rewired and re-plumbed. When re-plumbing, a greywater recycling system was put in place. This automatically diverts used water from the bath and the washing machine onto the garden.

By discharging this straight onto the garden the need to store is avoided. Storing untreated greywater can be problematic.

Further improvements planned

Tom has plans for further improvements including building an extension on the south side with glazing designed to capture solar gain; a rainwater harvesting system with a storage tank under the front garden. Finance permitting Tom would like to install photovoltaic panels.

Lessons learnt

Tom has enjoyed the challenge of undertaking work on his own house and especially learning about designing a space and water heating system that incorporates wood, gas and solar energy.

Contacts

Structural engineer

Guy Macken
www.mitchinsonmacken.co.uk

Heating engineer

Mark Rainbow
www.intelligentheat.com

HETAS engineer

Simon:
www.agreeneralternative.co.uk

Carpentry

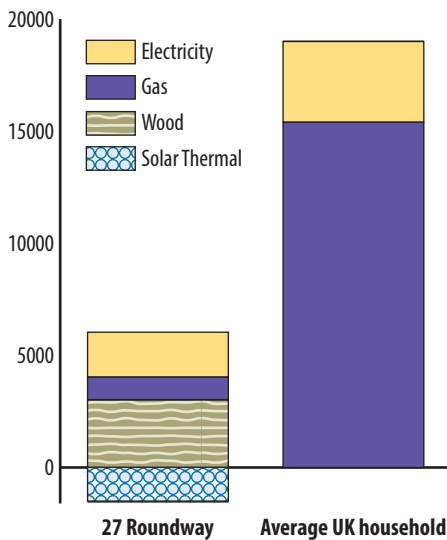
Tom Harrison
www.thomasharrisondesign.com

Timber merchant

Petworth www.wlwest.co.uk

Energy and CO₂ performance

Energy performance kWh



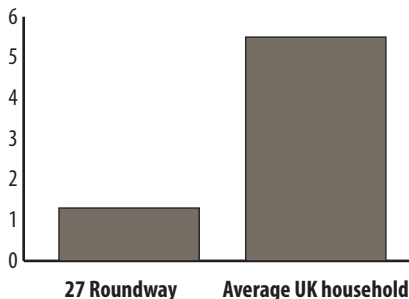
Energy use (generation) kWh

Source	27 Roundway	Average UK household ¹
Gas	1000	15400
Wood	3000	0
Electricity	2000	3600
PV Electricity ²	0	0
Solar Thermal	-1500	0
Totals	4500	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

Entity	CO ₂ emissions (tonnes)
27 Roundway	1.3
Average UK household ⁴	5.5

76% 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 Ecobee Project and has been selected within the scope of the INTERREG IV A France (Channel): England cross-border European cooperation programme and is financed by the ERDF. For more information on the Ecobee Project see: www.ecobeeproject.eu