27 Roundway, Coldean, Brighton BN1 9AQ

Introduction and approach

Tom is a woodworker who has imaginatively transformed his semidetached post war house in Coldean into a home that is heated virtually exclusively by renewable fuels; the sun and wood.

Having completely gutted the house, 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 woodburning stove heats the house and provides hot water in winter.

Tom has also added a large timber built workshop with a green wildflower roof. Materials have been used ingeniously, with an emphasis on reuse and secondhand sourcing. Rather than using high embodied energy masonry, Tom prefers to build with sustainable timber from local and FSC sources.

Energy efficiency measures

Heating and hot water

The main heating source is an 11 kW Hunter Herald woodburning stove, centrally sited in the downstairs living area. This has a back boiler, which provides hot water and also feeds the radiators upstairs using a gravity-fed, vented system. Wood fuel for winter use is sourced half from offcuts from Tom's business, and half from a local woodland management scheme along Coldean Lane.

As back up heating, there is an old Potterton gas boiler, but in recent years this has hardly been used at all, with the gas standing order set at just £1 per month.

The woodburner and back up gas boiler are united by an Esse centralizer, from which heat is directed onwards to either the hot water cylinder or the radiators.

The hot water cylinder has twin coils to further combine heat in summer from an evacuated tube array on the roof, which Tom sourced for only £700. This system is pressurised, with an expansion tank.

Insulation

Walls – The walls have a cavity but this has not yet been filled. This was to have been done last winter, but the grants were unexpectedly withdrawn. Tom has also hesitated because he eventually intends to build an extension onto the back wall.

Windows – Glazing throughout is pre-existing aluminium framed double glazing. Upstairs Tom has manufactured new hardwood windows with triple glazing in the bedrooms.

OVERVIEW	
Owner	Tom Harrison
Type:	Semi Detached
Age:	1947
Beds:	2
Walls:	cavity
Area: 105m2 inc shed and outhouse. (House = 70, outhouse = 10, shed = 25)	
Residents:	2

FEATURES
+ Food cultivation
+ Green roof (on shed)
+ Grey water recycling
+ Loft insulation
+ Rainwater recycling (in process)
+ Recycled materials
+ Solar thermal hot water
+ Sustainable materials
+ Triple glazing (DIY)
+ Water conservation
+ Woodburning stove (back boiler

Roof – The loft is fully insulated with a mixture of mineral and wood fibre.

Porch – a timber framed porch has been added at the front for extra shelter and insulation.

Renewables and low carbon technology

Solar thermal – An evacuated tube array meets more than half of Tom's annual hot water needs.

Electricity is supplied by Ecotricity from 100% renewable sources. So energy is effectively 99% carbon neutral.

In the kitchen there is an energy-saving induction hob and some low energy lamps.

Natural sustainable 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, and construction of the shed.

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, to reduce

the embedded energy and impact of the build.

Because of its low impact and low cost, plywood was also used in the flooring, walls and storage units. Much of this was fast growing spruce, which is easily produced sustainably. The end result is an affordable, attractive and practical alternative to more expensive options such as engineered flooring. Flooring for the ground floor, as an example, only cost £200. A natural non-toxic oil, Osmo Polyx Oil, was used as a finish on all woodwork.

In the kitchen, the existing clay tiles were kept, cleaned and re-used. The kitchen worktop is made from locally sourced oak from Petworth and Uckfield.

The shed is built using timber frame and cladding, with 6" of insulation throughout for maximum sound attenuation, heat conservation, sustainability, and internal space saving.

Other sustainable measures/ lifestyle decisions

Grey water recycling – bath water has been diverted directly onto the garden where it waters the vegetable beds via a surface network of drilled plastic tubing.

Rainwater harvesting – Tom is installing a 5000l litre underground tank in the front garden to gather rainwater, which will be used by the toilet and washing machine.

Food cultivation- Tom is vegetarian and grows a variety of salad, vegetable and fruit crops in the garden.

Wildlife – The shed roof and garden are both sown with wildflowers and is a resource for local wildlife.

Lessons learnt

The renewable heating system, combining wood and solar, with minimal gas has proved a great success. The ESSE centraliser in particular has helped to make it work.

Timber frame construction allows four to five times more insulation to be installed within the walls than traditional cavity wall construction of the same thickness. If using natural insulation as well - like wood fibre or sheeps wool - the environmental impact of construction is carbon positive (rather than negative, as when using bricks, mortar and petro-chemical insulation products like foam board).

Using recycled timber is a labour of love, as the time spent sorting and grading greatly increases the build time. Tom believes this is very much a self-build priority, rather than for commercial projects.

Professionals

Carpentry – Tom Harrison. www.thomasharrisondesign.com/ www.brightonsheds.wordpress.com

Heating engineer – Mark Rainbow. www.intelligentheat.com

HETAS engineer – Simon. www.agreeneralternative.com

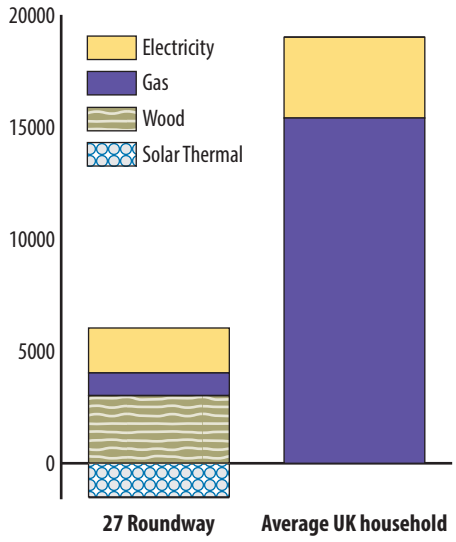
Structural engineer – Guy Macken. www.mitchinsonmacken.co.uk

Timber merchant – Petworth. www.wlwest.co.uk

Woodburning stove – Hunter Herald. www.hunterstoves.co.uk

Energy and CO_2 performance

Energy performance kWh



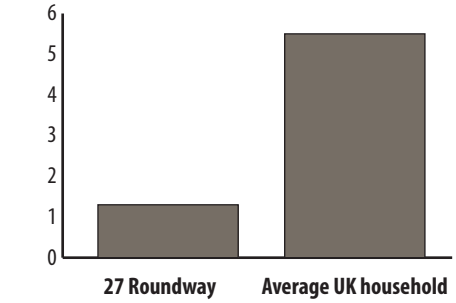
Energy use (generation) kWh

	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



CO_2 emissions (tonnes)[3]

27 Roundway	Average UK household[4]
1.3	5.5

76% below average

[3] CO_2 fuel emissions factors from SAP 2009

[4] Average fuel emissions 0.233kg CO_2/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. Eco Open Houses 2015 is being run is part of the national Green Open Homes network established with funding from the Department of Energy and Climate Change (DECC) and is now maintained and managed by the Centre for Sustainable Energy (CSE). This years event is part funded by Brighton & Hove City Council.