

High Street - CB3 0QA

Beautiful new-build with rammed earth wall and multiple ecological features

Meet your hosts, Kate and Nick

As self-builders Nick and I were very keen to use the opportunity to reduce our environmental impact through good design and materials. Inspired by *The Whole House Book* written by Cindy Harris and Pat Borer and with the expertise of like-minded AC Architects (ACA) we began.

The Building Process

It took the best part of a year working with ACA to research available products, get costs for the major elements (to ensure we were going to stay in budget), to finalise detailed drawings and create a design specification document. Local builder Ian Rudd won the tender process, we took on the site management and ACA stayed involved throughout to manage the contracts.

We also took on one part of the build ourselves, the rammed earth wall (REW). The wall was to be 5.2 metres high. The only higher examples we could find in the country built unstabilised (without ~7% cement) were at the Centre for Alternative Technology in Wales. Our first attempt at the wall failed, it literally fell down, which was devastating. With a massive effort we delayed the build, regrouped and rebuilt.

We moved in June 2012 and it was joyful to behold our newly finished building. It has proved over the years to be a very comfortable place to live, we love the light, the space, our views and our rammed earth wall.

Low Energy Measures

Key principals:

- Orientate to benefit from solar gain
- Super insulate
- Build airtight then ventilate right
- Add thermal mass
- Consider cooling and solar shading

Structurally Insulated Panels (SIPs) offer excellent U-values (insulation properties) in a comparatively thin material and their factory production minimises waste and build time on site. They offer less scope for gaps than some construction methods however a lot of vigilance was needed on site to ensure gaps were not left in the envelope.

It took a very long time to decide upon a ventilation and heating strategy. We went with gas, solar thermal and an 'intelligent' whole house extraction system from Passivent. Intelligent because it is adjusted by hygroscopic strips in the window inlet vents and ceiling extract vents. If the air is moist the strip expands and the vent aperture widens. All extracts are ducted to a single whole house extraction fan so air is constantly drawn - in a moist room the vents will be open more than elsewhere and so more air is drawn through that room.



www.openecohomes.org

High Street, CB3 0QA – 2017

Open Eco Homes is a Cambridge Carbon Footprint project. Charity number 1127376



Photos: © Tim Rawle

High Street - CB3 0QA

Beautiful new-build with rammed earth wall and multiple ecological features

Since moving in we have added a wood burning stove with back boiler (always part of our plan) a car port and shed with green roof, an electric car and 2 children.

Performance

The heating system is complicated but works well. The underfloor heating means the temperature doesn't/can't vary much during the heating season but we keep the house on the cool side and use the log burner for quick heat/cosy evenings.

The thermal mass of the rammed earth wall evens out temperature highs and lows but it's effect is at it's most tangible when we use it to night purge during hot spells in the summer: open a velux at the top of the wall and a window downstairs and the night air cools the wall ready for it to absorb more heat from the house the next day.

Sunny days in autumn and spring warm the house beautifully. Our SE facing greenhouse/conservatory was designed as an unheated space to provide a draft lobby, ventilation preheat and a buffer zone for a large area of glazing. It also provides an excellent clothes drying space for most of the year; even through 2 rounds of cloth nappies we have managed without a tumble dryer.

Our old fashioned, open to the elements, larder ended up east facing (north facing just wouldn't fit) but functions well. Very cold in the winter and always a few degrees cooler than the ambient temperature during the summer.

We have combined gas and electricity from Ecotricity. They provided us with figures for the average yearly consumption for 3 bed and 4+ bed homes among their customers to compare (below).

Ecotricity	Our use 4 bed p.a.	Average 3 bed p.a.	Average 4+ bed p.a.	Old terrace cottage p.a.
Gas (incl. heating)	£359 7,899kWh 49 kWh m ²	£793 17,120 kWh	£960 21,120kwh	89 kWh m ²
Electricity	£544 2,548kwh 16 kWh m ²	£749 3920kWh	£903 4,880kwh	36 kWh m ²

Age, Type: 2012, Custom Build, Detached

Wall type, Floor area: SIPs construction, 160 sq m

Project timescale: 4.5 yrs total, build time 1 yr

Cost of build: £350,000

Number of people: 2 adults/2 children

Key features

- Oriented & designed to benefit from solar gain
- Structurally insulated panels (SIPs) construction
- Super insulated, whole envelope U value <0.13
- Air tight – 2.4 a/c per hour achieved
- Ventilation pre heat via conservatory
- Woodfire Firo boiler stove
- Whole house intelligent ventilation for cold season
- Active/natural ventilation routes for warm season
- Rammed earth wall, providing thermal mass
- Condensing gas boiler, thermal store, zoned UFH
- Solar thermal panels feeding into thermal store
- 3.8 kw solar PV panels
- Timber framed triple glazing – U value around 1
- Rainwater harvesting feeding outdoor tap, toilets and washing machine
- Reclaimed materials
- Water and energy efficient fittings/appliances
- Traditional larder
- Green roof on carport
- Renault Zoe electric car

Key contacts, products and costs

Architects: AC Architects Cambridge Ltd.
www.acarchitects.com

Main contractor: Ian Rudd, ian.rudd58@live.co.uk

Structurally Insulated Panels: Whole house structure at 175mm and insulation to u-value 0.14, £49k, SIPs UK, www.sips.uk.com

Windows/doors: Euro Profile timber framed triple glazing windows and doors, £15.5k, Greensteps, www.greensteps.co.uk

Folding sliding doors (including installation): £6k, Solorlux through Ecomerchant, www.ecomerchant.co.uk

Roof lights: £6k, Velux, www.velux.co.uk

Heating system: including UFH, Greenstar 24Ri condensing boiler, Ecocat thermal store, 2 x 12 evacuated tube solar thermal, £13k, Chelmer Heating, www.chelmerheating.co.uk

PV panels: 3.8kW Sharp panels and Aurora inverter, £12.3k, Joju www.jojuSolar.co.uk

Rainwater harvesting system: 3750l tank with header tank, £2.5k, www.rainwaterharvesting.co.uk

Ventilation: Whole house assisted ventilation system (iMEV), £860, Passivent www.passivent.com

www.openecohomes.org

High Street, CB3 0QA – 2017

Open Eco Homes is a Cambridge Carbon Footprint project. Charity number 1127376



Photos: © Tim Rawle