

Carbon Positive Family Home: CB1



Property overview

Property age: 2020

Type: Detached

Wall type: Structural insulated panels (SIPs) with additional external insulation, larch cladding

Floor area: 184m²

Project Timescale: Plot purchased Mar 2017, main building phase Aug 2018 to Feb 2020

Cost of Build: £300k land, £200k build

Occupants: 2 adults, 2 children

Meet your hosts: Andy, Kate, Ailsa & Teal

We are a family of four. Kate is a doctor and research scientist, and Andy was originally an environmental scientist, but left his job to start a company ([Midsummer Energy](#)) selling renewable energy systems.

Our previous home was a narrowboat and this featured as an [Open Eco Home in 2013](#). We love the outdoor life and enjoy cycling and walking – but with Ailsa (now 6) and then Teal (4) joining the family the narrowboat was becoming a bit cramped! While we loved our boat, it was the right time for somewhere bigger – but after the boat we didn't feel like moving into a conventional house. When we stumbled across a building plot in 2017 that we liked we just thought 'why not'?

We have now lived in the house for 18 months and we love it. As we intend to live in the house for many years it made sense to spend money on the fabric at the outset to reduce energy costs in the future.

Financing, Design and Construction

The green measures that we took included Structural Insulated Panels (SIPs) with external insulation, Mechanical Ventilation with Heat Recovery (MVHR), PV and rainwater harvesting.

Many of these did not add significantly to the cost of the project. It costs little more to build in SIPs than conventional brick and block, for example. Rainwater harvesting, PV, MVHR did cost more but were a very small part of the overall cost of the project. We installed the PV system the week before the Feed-in Tariff (FIT) scheme closed its doors, so we get a small income from FIT payments.

In terms of financing, living on a narrowboat is cheap! After 20 years of very cheap accommodation (in Andy's case) we were fortunate in having been able to save most of the capital to undertake the project. In addition, we self-designed the build with the help of friends and family and employed very few professionals. We learnt a great deal through working with contractors and through trial and error.



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Performance

It is proving to be very low energy, like we hoped. And, in fact, with the PV array we export considerably more energy than we import. The energy usage is net carbon positive: exporting net 4,900 kWh/yr back to the grid, which is equivalent to 1.14 tCO₂e/yr. We are fortunate that it is a lovely location – there is green space (a churchyard) to the south-east and we were able to build the house with the four bedrooms facing towards the churchyard and the main living spaces facing south-west to the garden and the evening sun.

After 20 years on the narrowboat, it is lovely to have a garden of our own. Finishing touches on the house are on hold while we get the garden into shape. We are delighted with the result. There are very few things we would have done differently - although perhaps if we were starting it again, we would set underfloor heating pipes in the floor as well electrical resistance heating. This would allow us to use a heat pump as a heat source if we wished in the future to reduce energy use even further.

Our top tip is to do what you can! Firstly, get the fabric as high spec as you can so you use as little energy as possible - good glazing, insulation wherever possible. And keep it airtight to avoid ventilation losses.

Information

The best sources of information and advice came from family and friends, [The Green Building Forum](#) online and Mark Brinkley's book 'The Housebuilder's Bible' is full of practical, useful advice. Of the professionals we did employ, we would happily use any of them again. [McVeigh Offsite](#) in particular were extremely patient through the design process and made an excellent job with the prefabricated panels. We should not pass comment on Midsummer Energy for obvious reasons!

Key contacts, products and advice

Structural Engineer – [Andrew Firebrace Partnership](#)
MVHR – [Systemair](#), installed by [Eco Installer](#)
Building Control – [R H Building Consultancy](#)
Electrician – [Mike Himpett](#)
Carpenter – [Josip Petrina](#)
Prefabricated SIPs panels – [McVeigh Offsite](#)
PV, Eddi controller, Sunamp heat store – [Midsummer Energy](#)
Windows – [Green Building Store](#), [Valdi](#)
Rainwater harvesting – [Rainwater Harvesting Ltd](#)
Costs and full contact details available on request



Key specifications

Energy Usage

Electricity	Gas	Other fuel	Water
-4900 kWh/yr*	none	none	49 m ³ /yr**

*2400kWh import, 7300kWh export **plus rainwater, unmetered.
Usage equivalent to 34L per person per day

Insulation

- Highly insulated walls: SIPs panels with additional external insulation U value: 0.11
- Airtight with MVHR

Heating and Energy

- High thermal mass from insulated raft foundation and concrete floors
- Solar gain management from overhung canopies over the largest south-facing windows
- Large (15kW) PV array supplying considerably more energy than we use in the building
- [Sunamp](#) heat store with lower heat losses than conventional water cylinder
- 'Eddi' smart heating controller heats the [Sunamp](#) with surplus PV electricity, or dumps it into underfloor heating coils when the [Sunamp](#) is full.

Water

- Rainwater harvesting tank. Feeds the toilet cisterns, washing machine and garden tap.

Garden and natural systems

- Green roof
- Large sliding glazed doors open onto the garden and onto a balcony and pergola.

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