

Whitwell Way, Coton – CB23 7PW

Impressive DIY retrofit with passive house extension

Meet your hosts Bart and Rose

“When buying the house in 2011, we knew it would require a lot of work to bring it up-to-date. When realising how much energy was required to provide hot water and keep the house warm in winter, I (Bart) got more and more interested in the energy consumption of homes and how ours could be improved.

When we (Rose and Bart) decided to go ahead with having an extension built. I (Bart) wanted to have this built to Passivhaus standards since the extension should not increase the energy consumption, but act as a starting point for a whole-house thermal improvement project instead. The architects, Eco Design Consultants, did the Passivhaus calculations, designed the extension and provided an options report which sets out the steps required to achieve different levels of energy efficiency: AECB Silver, EuroPhit and PassivHaus EnerPhit.

From the resulting build specification I quickly became aware that our budget would not stretch to accommodate the many eco-specialist tradespeople needed to achieve the desired build standard, so I decided to DIY many of the more specific jobs. This required doing a lot of homework, and requesting some extra leave from work.

The extension is now finished, and even though I expected it to be good the level of comfort still astounds me, in particular the contrast with the existing part of the home before renovation. This has spurred us on to take on the other bits of the existing house, taking it room by room as (DIY) time and finances allow.

Although many improvements have been made already, continuation of the external wall insulation to include the front of the house, and finishing the installation of a ventilation system with heat recovery (MVHR), including further addressing air tightness, are two big jobs that are still in progress.

The build process

The extension and initial thermal improvement was financed through savings and taking out an extra mortgage, so obviously on a very restricted budget. So far I believe the eco-retrofit has been very cost effective: the “eco” aspect of the extension has added about 15% to the cost compared to a “standard” extension.

Since the house is small, fuel bills were manageable even before extending, and the main driver for the building works was to make the house bigger and more comfortable, without increasing fuel consumption. It is difficult to put a price tag on comfort, so although they were considered, payback periods were never the main consideration. They are a very unfair measure anyway, in my opinion.

The builder was contracted to deliver the raw build of the extension, after which I would further manage the build, hiring tradespeople directly and contributing through DIY. As the build is slightly out of the ordinary, I have been very involved from an early stage onwards, doing a lot of reading and homework, and making sure the specifications and details were right to avoid getting locked into lower performance or standards than aimed for. As we continued to live in the house, the project had to be scheduled to fit within the space available.



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Performance

The changes have been enormous. The extended living space has transformed the house, and the levels of comfort have improved beyond recognition. Draughts are largely gone, and the house is at an even temperature throughout, and stays cool in summer.

The CO₂ footprint of our house has reduced by about 60%, or 1.5 tonnes per year, with potential for more. The house is now much more comfortable, while energy use for heating has gone down by 70%. Looking at the numbers is one thing, experiencing it is quite another!”

Age: 1945

Type: Semi-detached

Wall type: 50mm cavity wall brick

Floor area: 78.9m²

Cost of project: £80,000

Occupants: 2 adults, 1 child.

Key features

- Single storey extension built to Passivhaus standards: super insulation and very high airtightness throughout. Triple glazing used for all doors and windows. Low CO₂ embedded materials by using glulam (wood) beam for extension roof, low mass roof tiles, use of aerated block instead of brick, and wood cladding for the exterior.

Insulation

- Loft insulation topped up to 270mm rockwool.
- Kitchen floor and living room floor taken up and all replaced with super-insulated screed floors with wet underfloor heating (UFH) throughout.
- 200mm polystyrene External Wall Insulation (EWI) on rear and side of existing house with front facade pending. 100mm EWI to 300mm below DPC.
- Side door replaced with triple glazed, high airtightness door.

Heating/energy

- Old back boiler replaced with modern condensing boiler driving UFH directly using weather compensation controls. Separate zone for radiators on first floor.
- 2.88 kWp solar PV array, with diverter for heat store immersion element to supply domestic hot water.
- LED lighting throughout. Washing machine, dishwasher with timers to make best use of solar PV energy.

Water

- Rain water soakaways. Water butts to be reinstated soon.

Other

- Recycling of building rubble for patio, landscaping (pending).

Key contacts

Architect: www.ecodesignconsultants.co.uk

Builder: www.smbbuilders.co.uk

Kitchen: www.magnet.co.uk

Surveyor: www.als-surveys.com

Structural engineer: www.watson-hallam.co.uk

Insulation: www.insulationshop.co

MVHR: www.greenbuildingstore.co.uk

Roof light: www.roofingsuperstore.co.uk

Electrics: www.ds-electricalservice.co.uk

Plumbers: www.clarityheating.com

Plumbing: www.mjpotts.co.uk, www.dandjplumbing.co.uk

Plasterer: Mikey: 07860 679646

Kitchen surfaces (recycled plastic): www.smile-plastics.com

External wood cladding: www.millworks.co.uk (Bottisham)

Advice: Amongst others – [Green Building Forum](http://www.greenbuildingforum.org), [Green Building Bible](http://www.greenbuildingbible.com), [Open Eco Homes](http://www.openecohomes.org), Tom Braggs' [videos on Trumpington Warm Homes](http://www.tombraggs.com) www.openecohomes.org/video/