

Passive House

Eldorado Crescent, Cheltenham



2015



NUMBER OF BEDROOMS: 4

OCCUPANTS: 2

CONSTRUCTION:

High density bricks and 300mm insulation

KEY FEATURES:

A beautifully designed modern 'passive house' with solar PV, mechanical ventilation and air source heat pumps

Measures installed

House built to passive house standard with super insulated walls, roof and floor

Fully triple glazed and high performance insulated doors

Mechanical ventilation with heat recovery

2 Ecocent Air source heat pumps - one feeding the ventilation system and one for the domestic hot water

3000 litre underground rainwater harvesting system

Carbon savings and potential benefits

Virtually no space heating required and improved thermal comfort

Exceptional air tightness

Controlled air flow eliminating any condensation issues

Reduced energy consumption, low carbon heat source and Renewable Heat Incentive payments

Long term water storage and reduced onsite water use

The home & occupants

The occupants were living in a cold, draughty and inefficient Victorian house and were interested in living in a more environmentally friendly way as well as keeping warm in winter.

Moving away from the area was something they did not want to do having put down roots for a number of years in Cheltenham, as well as having family commitments.

A 1950s detached house came up for sale just around the corner from where they lived that had not been improved since it was built. They saw an opportunity, and bought the house in 2011. They demolished the existing house and contracted an architect to design a new 'passive house' for them on the existing plot.

"I love the fact that it is always warm enough and that the house makes very low demands on the environment"

What is a passive house?

A passive house refers to a voluntary building standard developed by the Passive House Institute in Germany. To reach passive house standard the house must be airtight and have minimal heating and cooling demands. This standard is often reached by using mechanical ventilation and employing a number of measures in the building design and process such as insulation, heat recovery, orientation to maximise solar gains and solar shading, and elimination of thermal bridges (cold spots).

116 new EPC rating



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What they did

Design and build

The owners estimated that they used around 55,000kWhs of energy per year in their Victorian home and had an initial aim to reduce their energy use in the new home by half to no more than 27000kWhs. In fact they now only use around 9000kWhs a year!

The design and planning process to complete the house took around 12 months. As the house is in a conservation area there were planning requirements to consider, such as ensuring that the house look was in 'keeping' with the built characteristics of the area.

The build time was a further 12 months and the couple moved into the house in April 2013. A competitive tender was undertaken to employ the builder and the build process proved to be challenging for the builder and the trades employed to complete the house, particularly for those not familiar with the air tightness requirements of passive houses. Educating all involved to ensure there was no air leakage was key in making the house 'passive'.

The house has half metre thick walls, 200mm of which comprises high density compressed ash bricks set in a thin lime mortar to reduce air leakage and 300mm of insulation. To help in ensuring the house remained 'in keeping' with the housing stock in the area, some of the homes façade comprises an acrylic and render brick slip finish.

As well as super insulated walls, loft, floors and doors, triple glazed windows and low energy bulbs the house is designed to maximise benefits from the sun. The majority of windows are on the south facing side of the house, and the solar PV canopy above the ground floor is designed to shade the living areas of the house in the summer months whilst also maximising solar electricity generation.

Renewable energy and heating

Although Passive House standard does not specify renewable energy requirements, the owners wanted to include solar photovoltaics in an aim to be energy neutral. A 10kWp PV array was installed on the south facing roof of the house which generates an income of around £1500 a year from the government's 'Feed in Tariff' scheme. The homes total electric cost typically amounts to around £850 a year.

The only space heating in the home is provided by the MVHR which is assisted by a small Earth Save Products Ecocent air to water heat pump with thermal store. Hot water is provided by a separate Ecocent heat pump, with both Ecocent's benefitting from the energy generated from the solar PV system.



What is MVHR

Mechanical Ventilation with Heat Recovery systems or MVHR extract warm, damp air from the home and draw in fresh air from the outside. The warm, extracted air is passed through a heat exchanger to recover the heat before being expelled outside. The cool, fresh outside air is also passed through a heat exchanger, where it is pre-warmed before being pumped into the property.

Although a conventional heating system is not required in a passive house, the owners did look into fitting a wood burning stove to provide a focal point to the main living area. Unfortunately, the relatively high heat output of even the smallest stoves and smoke control requirements made this not possible. Not having a focal point heater is one thing they do miss, and point out to consider when designing your passive home.

What are the next steps?

Solar energy battery backup is the next step the owners are taking in their aim to be energy neutral. Battery systems suited to domestic properties are currently being developed by a number of companies and when they become available, the owners aim to be able to store enough electricity to then only require importing from the grid for the 3 coldest winter months of the year.

For further details of the build specifics of this home, you can visit the passive house website at:

http://www.passivhausprojekte.de/index.php?lang=en#d_3809

If I could offer one piece of advice it would be...

"If you are building a passive house, bear in mind that it can take a while for the house to warm up and dry out. If possible, arrange to move in over the summer!"