

CASE STUDY: PASSIVE HOUSE BLEBOCRAIGS

BRIEF: Create new Passive House with existing bothy converted into utility garage on site in Blebocraigs near St Andrews.

DATE: 2010-18

ARCHITECT: Gary Paterson Architect

STRUCTURAL ENGINEER: David Narro Assocaites

1. INTRODUCTION

This new house was created for a retired couple who wanted to move from the Scottish Borders to Fife by selling their existing house and use the proceeds to create a very low energy house on a gently south sloping site on the edge of Blebocraigs to future proof themselves from rising energy prices.

2. SITING

The house was limited to one and half storeys by a planning condition and the client was keen to have Utility / Garage Bothy in close proximity to the new house for a potential covered link. This set out the position of the house on the site and also allowed for views towards Pitscottie to the east and is why the Living Room is over the Kitchen Dining at the East end of the house.

The original intention was to create a balcony from the Living area to take advantage of the east view but this was replaced by a narrow landscape window which frames the view when seated in order to minimise the overlooking potential of the neighbouring garden ground.

3. APPEARANCE

The client was keen to have a timber cladding but was not keen on an uncontrolled naturally aging timber nor a paint or staining maintenance regime and so we went for the traditional Shou Sugi Ban approach and teamed up with Napier University's Ivor Davies and Scottish Woods in Oakley to test and create a locally grown charred larch cladding for the external walls.

Once the charred timber was agreed the colour of all other external materials was agreed to be black roof to help ensure that the house had a minimal impact on the landscape.



Figure 1. House viewed from South



Fig 2. South view, note solar pv and thermal



Fig 3 and 4 East view and cladding detail



Fig 5. Internal landscape window view

4. BUILT TIGHT

The energy model used the Passive House Planning Package to help create a very low energy demand by using an engineered timber deep section 'I' beam timber frame, taped intelligent vapour control layer and breather membrane to minimise uncontrolled ventilation heat losses and good quality tripple glazed windows. The frame was detailed to minimise cold bridging at junctions and to allow the first floor to fitted over the top of the vapour control layer to minimise uncontrolled ventilation.

5. VENTILATE RIGHT

Build tight ventilate right was the approach taken here. An efficient Mechanical Ventilation with Heat Recovery system was used which recovers over 80% of the heat from warm wet spaces in the house and transfers it to the clean fresh air which is constantly being supplied to the house. This has the added benefit of creating a healthy living environment.

6. PASSIVE SOLAR DESIGN

Most of the tripple glazed windows are facing South and East with a couple towards the West and very few towards the North. This orientation and very efficient window choice ensures that there is a net energy gain from windows and helps to ensure a very low energy demand.

7. RENEWABLE ENERGY

Because the energy demand was at such a low level, circa 2kW on a very cold day this allows opportunity for renewable technology to provide the bulk of the load. A combination of solar PV and solar thermal was used with a thermal store and heater coil used to boost the temperature of the clean fresh air provided by the MVHR system when required. Although advised not necessary there was a multifuel stove installed as an insurance policy and doesn't get used as it creates an over heating issue when on.

8. PASSIVE HOUSE CERTIFICATION

Passive house certification was issued in July 2016 and confirmed that:

- the heating demand is 15kWh per m2 of living area and year or 10 W/m2 respectively and
- the airtighness is 0.6 air changes per hour and
- the total primary energy demand for heating, domestic hot water, ventilation and all other electric appliances during normal use of less than 120kWh per m2 of living area and year.

9. OTHER INFORMATION

Fife Planning Reference 11/00916/FULL



Fig 6. Vapour control layer



Fig 7 Shou Sugi Ban test panels



Fig 8. Napier University Testing at Scottish Woods



Fig 9. Scottish Solar Energy Group visit and Passive House award ceremony.