18 Sibson Road

Yvonne & Keith Bremer

Background

Yvonne & Keith bought the house in August 2010 but did not move in. Planning, design and research took up the time from purchase to September 2011. Building work then took from mid-September 2011 to the end of June 2012 when they moved in.

Materials

We tried to keep to natural materials as far as possible, although the constraints of cost and availability were factors.

Groundwork

All foundations for the extension used fairly conventional materials, concrete poured into tailor-made frames to suit the required shape.

New Walls, Roof, etc.

All the walls in the extension were built using prefabricated timber frames. These used structural timber (for load bearing) approx 200mm x 75mm section. For rigidity the exterior faces of these timber frames was clad in Oriented Strand Board (OSB) then covered with a breathable damp-proof membrane. To the outside if this was attached approx 60mm of wood fibre insulation then a lime render. Some sections were finished in a top coat of render, others clad in Cedar planking.

The floors and roof in the extension were constructed using similar timber structures but the ground floor used suspended sheep's wool (supported by wire mesh between the joists). Insulation was also installed between the ground floor ceiling and first floor flooring (this may have been unnecessary). The roof used sheep's wool insulation again with a glass reinforced plastic (glass fibre) cladding on the roof surface.

The 200mm deep void in the timber frame was filled with two layers of sheep's wool insulation, using 1200mm x 600mm x 100mm batts.

The interior was finished with plasterboard and plaster.

Internal Insulation

Internal insulation was applied to all the original walls that would remain exposed after the extension was built. This was installed using timber frames (75 x 40 mm) then filled with sheep's wool insulation (100 mm thick, packed tight). It was also applied to the party walls with the adjoining house (for both thermal and acoustic insulation). A damp-proof membrane was attached to the outer face of the timber frames – adjacent to the wall.

The interior was finished with plasterboard and plaster.

Doors and Windows

These are built to order from FSC timber and can be supplied to any size within reason. They are factory painted (from a fairly wide range of colours) and come with a ten-year guarantee.

We chose the triple glazed option for thermal efficiency although double glazed is available. The supplier offers other options with glazing and we chose the warm-edge spacers throughout for improved efficiency.

(Warning: The triple glazed folding doors arrive as a single, ready-made unit that can be simply installed in the opening for which they were ordered. These units are **extremely heavy** and required at least four burly builders to move them effectively.)

Heating System

We wanted to make our heating system as flexible as we could manage within our budget. We took advice from a number of sources, all of whom recommended that a ground- or air-source heat pump system was probably not appropriate in our circumstances (i.e. limited land resources for ground-source, possible noise nuisance from air-source and a ready supply of mains gas).

We have a number of potential heat sources. The primary source is a condensing gas boiler, fitted in the utility room on the ground floor. This supplies most of our heating over the winter. Other sources include a pair of thermal solar panels mounted on the front sloping roof (preheating water), the wood-burning stove with boiler in the sitting room, the mains powered immersion heater in the tank – which can also be powered using excess electricity from the Solar PV array on the flat roof. This last twist requires a box of electronics in the distribution cupboard to divert any unused solar-generated electricity to the immersion heater via a separate cable.

These multiple sources of heat require a heat store instead of a conventional hot water tank. A heat store differs from a normal tank in that the hot water is in a semi-sealed system, it is not drawn off to supply hot water. Hot water (for taps, showers, etc.) is heated by passing it through the heat store via a coiled pipe (a heat exchanger) where it takes heat from the water in the tank but doesn't take water from the tank. The heat store tank is well insulated.

Central Heating

Instead of radiators we have installed under-floor heating throughout the ground floor and in the extension floors on the first floor (study, bathroom and wc). Because of the way bedrooms are used we chose not to use underfloor heating there so that we could, in turn, reuse the original floor boards. Underfloor heating requires special flooring – it is not suitable for solid wood floors – we used engineered real wood flooring with a special underlay suitable for under-floor heating.

The underfloor heating is fed directly from the heat store via a manifold that controls the flow of warm water to each of a number of zones. The manifold valves are in turn controlled by room thermostats that govern the times the heating is on and the temperature below which is comes on.

The bedrooms have low-temperature radiators so that they can work from the same source as the underfloor heating and be controlled via the same manifold.

Domestic Hot Water

This is supplied at mains pressure, passing through the heat exchanger coil in the tank to heat up before being delivered to the taps, showers, etc. Note that the gas boiler does not fire up when a hot tap is turned on but only burns when the heat in the heat store is depleted. This means the gas boiler runs for longer on each burn and is able to operate more efficiently in condensing mode.

Renewables

We have tried to make as much use of renewable energy sources as we could, within our budget and our ability to find information about such technical topics.

We have two solar water heating panels on the front sloping roof of the house feeding in to the heat store via a control system in the tank cupboard in the study.

We have an array of 12 solar PV (Photo Voltaic) panels mounted at an angle on the flat roof (above the extension). We receive the Feed In Tariff at about 21p per unit generated and 3p per unit for the estimated units returned to the grid (currently calculated at 50% of generated).

By utilising a device that diverts unused solar-generated electricity from our solar PV array to the

immersion heater in the heat store together with the solar hot water panels we were able to turn off the gas boiler completely over most of last summer (late May to late September). We needed to run the gas boiler only for extra hot water demands or cloudy weather – a total of about 4 hours over the four months.

The wood-burning stove is fuelled from wood obtained locally and ethically. The stove is not used every day, even in winter, as we both work and also spend several evenings a week out of the house.

Lighting

All downlights are LED (Light Emitting Diode) based. These typically use only a tenth of the energy of a corresponding Halogen bulb. Although they cost more per bulb, a single bulb will normally last for tens of thousands of hours (e.g. 25,000 hours is typical). The economics of using these, which can be simply installed as direct replacements for Halogen, is compelling. Over the life of a single bulb you might typically save over £100 just in electricity costs at today's prices and that doesn't include the cost of replacing Halogen bulbs approximately 20 times over this period nor the hassle of installing them.

For pendant lights we use the now well-established fluorescent bulbs which have similar cost-saving benefits over incandescent bulbs as LEDs have over Halogen.

Products and Suppliers

Sheep's wool insulation – is now widely available from a number of big builder's merchants, or go to www.greenbuildingstore.co.uk.

Wood fibre insulation is available from a few builder's merchants or go to www.greenbuildingstore.co.uk.

Wood burning stove is a Dunsley Yorkshire. If you want a wood burner with a boiler in this area then this is really the only option because any stove must be DEFRA approved for a smoke-controlled area. The Yorkshire (at the time we installed it) was the only DEFRA ticked wood burner with a boiler option.

Triple glazed windows and doors - these were purchased from The Green Building Store (www.greenbuildingstore.co.uk) from their Ecocontract range.

Heating system, plumbing and solar panels were all supplied and installed by Drayton and Ellis of Stockport.

Building and project management carried out by John McNair (Elohim CS Ltd) of Chorlton.