# Wood pellet boiler in the sitting room

Provides hot water and heats whole house and annexe

This domestic heating solution provides hot water and central heating for a family of four (two adults and two young children). The wood pellet boiler is located in the sitting room and has a visible flame so looks like a big stove. The internal hopper is filled with pellets to feed the boiler, this is filled up daily when it is cold, otherwise every 2-3 days. There is an internal sliding plate so that in summer the boiler only provides hot water and doesn't heat the room. The boiler needs cleaning every 500 hours which is about 4 times a year - the ash is put on the compost heap. The complete system cost about £8,000.

The house is Grade II listed, it is an 19th century 2-bedroom thatched cottage with an adjoining stable block converted to 2 more bedrooms and an office. The boiler heats both buildings and the hot water is supplemented by solar thermal panels on the roof of the stable block. About 2-3 tonnes of pellets are used each year, these are stored in bags in an outside shed and in a cupboard under the stairs. They are currently collected from Countrywide but they can also be delivered once an account is set up. A pallet of bags provides 1 tonne of pellets. The annual cost is about £500-600.

Both buildings have been completely retro-fitted to deliver a SAP rating of 69/100 (this Standard Assessment Rating is a way of calculating energy efficiency in homes) which is within band C for the Energy Performance Certificate. Emissions have been reduced by 87% by a whole variety of measures but the biggest factor is investment in insulation.

The owner and designer of the renovation of the house is the architect and broadcaster Charlie Luxton, who is passionate about sustainability and architecture. He has spent the last 10 years designing and building sustainable buildings, making television programmes about architecture and design, and working on environmental community projects.

## objectives

- Since the village was not on gas, they wanted to use a renewable source of energy
- To reduce their heat demands within the house and reduce carbon emissions by 80%
- To reduce water consumption to reduce how much hot water is required
- To take a long-term view - eco-renovation isn't cheap but buying long lasting quality items will save money in the long run

## actions

- Bought house in 2005
- Lived in main house while converting stable block to live in while renovating main house
- Started renovating main house in 2008
- First major investment was insulation, which was key to heat conservation and keeping down heating costs. The floors of the cottage were raised by 150mm to allow for super-insulation underneath and the walls and roof were insulated too. Stone walls were internally insulated with Pavadentro, a wood fibre insulation board used with lime plaster to both insulate and enhance the thermal mass of the stone wall. This means the cottage has a slower response to external changes and mediates temperature fluctuations
- Wood pellet boiler installed to provide all the heat and hot water aided by solar thermal panels on the roof of the stable block

## achievements

- 100% renewable energy system
- Reduced carbon emissions by 87%
- Annual boiler consumption 2-3 tonnes of wood pellets costing about £600
- Made a home that looks beautiful, will age gracefully and has not cost the earth

## key facts

- The boiler is a 12kw Windhager FireWin 90% efficiency with wood pellet autofeed
- Wood pellets are made from compressed waste sawdust or recycled pallets, they are very dense with a low humidity (<10%) and can be burnt with a very high combustion efficiency.
- Pellets are conveniently bagged and can be stored easily. They can be picked up from the local Countrywide store or delivered to the property.
- 4 Solar thermal panels on roof of stable block
- Roof Insulation: 125-300mm recycled glass wool insulation under the thatched roof.
- Floor insulation: 150mm non-CFC extruded polystyrene under the floor.
- Wall insulation: 65mm Pavadentro panels with 25mm in the window reveals.
- A south-facing porch with lots of glazing provides an element of passive solar heating.
- All white goods have a high-energy efficiency rating & low energy bulbs are fitted throughout.
- V-Phase voltage reduction unit reduces current to 220v resulting in 10% drop in energy bills.
- Walls: Natural lime plaster with lime wash. Natural lime plaster has been used on interior and exterior walls rather than concrete or gypsum products to allow the building to breathe.
- Floor/Window Sills: Scottish elm from forest thinning and hedgerow.
- Kitchen: Sustainable FSC (Forest Stewardship Council) ply has been used for the kitchen carcass and FSC poplar for the doors. Work surfaces are reclaimed teak labtops.
- Other Joinery: Sussex Chestnut from forest thinning and hedgerow.
- Rainwater harvesting system: All roofs drain into an underground reservoir and the water used for the washing machine, flushing toilets and outside taps.
- Toilets have been retro-fitted with an interflush system where the toilet only flushes for the time that the handle is held down. This system was chosen in preference to a dual flush system due to concerns about leakage.
- Showers have been fitted with low-flow showerheads.
- Central thermostat and thermostatic radiator valves help regulate the temperature.
- Paint: odourless, solvent-free organic paints. Varnishes: natural oil and wax.

## quotes

*"The pellet wood burner turns itself on and off and burns everything you put in there – it's very efficient."* Stove owner

*'The super-insulation is so efficient that this house is always at the right temperature now. It's warm in the winter and cool during the summer months."* Stove owner

*"I tried to learn as much as I could on the practical side, like standing beside the plumber while he installed the boiler, asking questions and being an extra pair of hands when I wasn't working in my office or filming."* Stove owner

## partners

Stove owner

Private family

## funding

Project cost: Boiler cost £8,000
Total for eco-renovating the house £140,000

## lessons learnt

- Turned into a major project with lots of challenges – but ultimately incredibly satisfying.
- Tough 18 months living in the house without central heating while working on the stables.
- Would make the same choices if doing the project again.
- The best way to reduce energy consumption in the home is to reduce the requirement for space heating – this is the biggest chunk of energy used in the house.
- Really important to insulate the loft, windows and floor - 20% heat is lost through the floor.
- Reduce heat loss from the hot water system by insulating the water tank & lagging pipes.
- Use low flow taps and showerheads to reduce the demand for hot water.
- Use solar heat to supplement heating the hot water all year round.
- Use the low winter sun to heat south-facing rooms.
- Consider where wood for construction comes from, source FSC and also reuse wood.
- Consider the breathability of the building at the same time as the thermal performance.
- Consider the embodied energy in materials used.
- Consider the toxicity of materials used.
- Part of the SEA Old Home Superhome network of exemplar older properties which have been made more energy efficient – open 18 Sept 2011 (Hook Norton Green Homes Day)

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