

# Domestic heating with logs

Small scale energy security



This domestic heating solution provides heating and hot water for a family of four (two adults and two children). It involves a 10kW woodburning stove with back boiler. This provides hot water both through the taps and into the wet system central heating radiators. It is also linked to solar thermal panels which provide hot water in the summer.

This heating solution has been installed in a first floor flat, part of a 1950s semi-detached 2 storey house that has been converted into 3 flats. It is in a village close to Oxford which is on the gas network – so the family were able to end their gas usage and were cut off the network.

The stove, accumulator tank, solar thermal panels and associated expansion tank and piping were installed at a cost of £10,000 by local company Oxford Renewables. Of this, £6000 covered in the supply and installation of the stove and accumulator tank, £4000 covered the supply and installation of the solar thermal panels.

The woodburning stove uses seasoned logs from the local woodland, less than a mile from the house, which is sustainably managed. The stove requires logs of less than 30-25% moisture content. When a tree is felled it consists of about 50% water by weight. Drying the wood, called seasoning, reduces the proportion of water and means the usable heat energy in the wood increases. Typically a solid cubic metre of wood seasoned in a dry, well ventilated situation over the spring/summer will have about 30% moisture content and contain between 18,000 and 2,500 kWh of energy.

## objectives

- Energy security – have local control over the family's energy supplies to reduce impact of rising fossil fuel prices
- Environmental values - demonstrate the values of the family
- Support local forestry businesses – purchase logs from sustainably managed local woods

## actions

- The failure of the gas combi-boiler stimulated research undertaken into possible renewable options for heating the house.
- Quotes were obtained from local stove installers
- The system was commissioned in September 2009 – just ahead of the heating season and arrival of the 2<sup>nd</sup> child of the family.
- The new woodburning stove was installed and attached to the flue (replacing the previous 4kW space heating woodburning stove). Solar panels on the south facing roof were also installed and both heating sources were connected up to a new 300litre accumulator tank.
- A wood store was built against a wall alongside the flats. Logs were bought from the local woodland.

## achievements

- 100% renewable energy system (electricity also provided by green electricity provider).



## Key facts

- The stove is a 10kW Dunsley stove, with a back boiler.
- The stove was chosen for its back boiler, so it could produce hot water and feed into the central heating system.
- The stove is in the living room and fits on the 1.5m<sup>2</sup> footprint of a previous 4kw stove
- The back boiler pipes lead to a 300 litre accumulator tank in the attic, which is also connected to the solar thermal panels and an expansion tank. The accumulator and expansion tank has a footprint of about 2 m<sup>2</sup>
- The heat produced from the fire is stored in the water of the accumulator tank, from which heat is drawn for domestic heating throughout the day and evening. A monitor ensures that when the tank temperature is less than that of the solar panels (generally between late spring and autumn) the heat source for the water in the accumulator tank automatically switches to the solar panels.
- The wood store was built along an alley way on the side of the flats – the only location for storage within easy reach for bringing logs into the house. It has a small covered roof to prevent re-wetting. It is not ideal to be against a wall, as it does not maximise air flow for drying. However this was a compromise for there is very limited space for storage as with many high density housing areas.
- The wood store has a capacity of c7 cubic metres of 25cm long stacked logs
- The logs are seasoned and split, then delivered in a small flat bed truck by the forestry workers at the local wood. Travel distance is approx 1.5 miles from their wood yard to the flat. It is tipped in front of the house and then moved manually by the family to the wood store. They sometimes split the wood further to ensure
- The family need around 6-8 cubic metres of stacked seasoned logs per year.
- The family sometimes take approximate moisture meter readings to check how seasoned the logs are – ideally aiming for 17-20%.
- Logs are carried inside manually. There is enough log storage inside for 1-2 days

## quotes

*“The combination of wood burning stove and solar thermal works well and prevents having to light the stove during the summer. However the solar thermal can sometimes struggle to provide enough hot water on a grey summer’s day.”* Stove owner

*“I’ve never had anyone ask me to end their account. I’ll have to ask my supervisor what to do...”*  
British Gas Call Centre Employee

*“Sometimes the need to feed the fire makes it feel like we have a third child. Yet the fire is beautiful, and it is great to be able to heat the flat using local resources.”* Stove owner

## partners

Stove owner  
Stove installer:

Private family  
Oxford Renewables

## funding

Project cost: £10,000 Funded by family with £400 Grant from Low Carbon Buildings Programme (towards the solar thermal, not the stove).

## lessons learnt

- It was difficult to get 3 comparable quotes for a system such as this. Therefore a good working relationship with the installing company was the key factor in choosing them. The owners were impressed by the can-do attitude of the company and their care for detail when measuring and installing.
- Initially logs used not seasoned enough – often a problem when installing at the start of the heating system. This led to some problems with tarring on the flue as flue gas temperatures were not high enough. Seasoned logs were then bought from the local woodland and are generally split further by the owners to facilitate the drying process. Potential stove owners need to plan ahead to ensure supply of seasoned logs.
- When installing upstairs, as the stove is closer to the roof, a shorter flue can be installed, but it is important to ensure it is long enough to ensure enough draw.
- To comply with Building Regulations we had to move roof joists to allow the required distance from the flammable surfaces when inserting the flue through the roof space.
- In the winter this system does require quite a lot of manual work to keep the stove supplied with logs. However if the tank temperature rises to 70 degrees C in the evening there is enough heat to run the central heating automatically in the morning. Towards the end of the heating season the heat can last up to 2 days in the tank.