



**SevernWye**  
ENERGY AGENCY

# Case Study: Wood Pellet Stove with Back Boiler at Westonbirt Arboretum Keepers Cottage

## Key Points

- 24 kW max output
- 17.5 kW to water and 6.5 kW to room
- Real flame and 13 radiators
- 43 kg pellet storage - enough for 36 hours at the lowest setting



## Westonbirt Arboretum

This is the site of the National Arboretum owned by the Forestry Commission. It is supported by 19,000 'friends' and has an education and learning team who handle 10,000 children's visits per year.

## Keeper's Cottage

This building has been converted to office accommodation for Arboretum staff. When it was converted, there was a policy decision to use wood heating. The running costs are cheaper than LPG, the other on site fuel option. Electric heating was not available because the maximum limit had already been reached on the incoming cable.

The Keepers Cottage can be compared in size to a small 4 bedroom house.

## The System

The installed stove is a Lucrezia Idro, it is made by Extraflame and was supplied by Wood Energy Ltd of North Devon.

It has been placed in an open plan office area to show off its features as well as providing its radiant heat. A back boiler directs the rest of the heat into the 'wet' central heating system. This provides 'domestic' hot water and heat to 13 radiators.

A conventional programme controller is used, which enables ease of programming in a way that most are familiar with.

The stove is 90% efficient - this is reflected in the small amount of ash produced. The ash is removed approx once a week and put on the gardens. Other maintenance tasks, including cleaning of the grate and heat exchanger, are carried out monthly - the stove needs to be cool for these tasks.

During the winter the stove consumes approx 2 x 15kg bags of pellets per working day.

The stove can be left on low heat over weekends and holidays

Ash tray removed - this small amount is three days worth of ash at high output.



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## Costs and Funding Sources

The installed cost of the stove was approx £6,000.  
At current prices and consumption rate the stove costs around £180/ month to run during the coldest months.

## Environmental Benefits

Wood fuel from a sustainable source is classified as carbon neutral. Although combustion of wood fuel releases CO<sub>2</sub> this is offset by the CO<sub>2</sub> absorbed by new trees.

The sustainable management of woodland can also help to improve the woodland bio-diversity.

The boiler is equipped with automatic ignition and modern controls which ensure that complete combustion takes place, minimising emissions. Smoke is only visible briefly during the initial start-up phase.

## Loading the Stove

Pellets are decanted from the 15kg bags (which are quite difficult to manoeuvre and lift to a stove of this height) into a coal scuttle for ease of loading. The hopper is accessed by lifting the lid at the top of the unit - the pellets are then poured in.  
The bags of pellets are kept dry in a near by shed.



## Pellet Purchasing

Pellets are bought from Fast Forward Energy Powys (01597 823 835) at about £250 per tonne inclusive of VAT and delivery. It is delivered in one or two tonne loads, made up of 15kg bags. The wood is sourced from off-cuts from a local processor before being processed into pellets in Powys. Relatively speaking this is a local source of UK manufactured pellets. The quality appears to be very good with a very low dust level in the bag and a typical conformance test showing 0.3% ash content.

## Lessons Learnt

The stove and back boiler are now working extremely well and reliably. Initially there were issues with the connection to the central heating system and the inclusion and provision of a 'dump load' radiator required by this specific installation.

In order to avoid these teething problems the owners recommend that any non specialist plumbers and builders working on the project stay in close contact with the biomass stove suppliers right up to commissioning.

Pellet consumption levels can be reduced with improvements to the overall energy efficiency of the building.

For example the addition of thermostatic radiator valves (TRVs) to control temperature independently in each room, proper system balancing (this requires adjusting the Lock Shield Valves on each radiator and possibly the pump) and good levels of insulation throughout.

## Further Information:

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