



Small scale biomass heating



What is it?

Biomass is living and dead biological material such as wood and animal waste. Wood in the form of logs, chips and pellets (compressed sawdust) as well as cereal grains can be used in domestic and other small scale systems to provide space and water heating.



25kW wood pellet/grain boiler

Unlike old-fashioned open fires, modern wood fuelled stoves and boilers burn very efficiently (80-90%). Also, modern pellet and wood chip systems involve automatic fuel-feed and are controlled through

thermostats and timers with almost the same convenience as a fossil fuelled boiler system. There are currently about 2-3000 installations in the UK.

Wood fuel can come in a variety of forms and from a variety of sources:

Fuel type	Sources
Logs	Trees thinned out from woodlands and hedgerows in the course of necessary woodland management
Pellets	Untreated wood waste e.g. sawdust & pallets
Grains	Cereal crops e.g. wheat
Wood chip	Thinnings/brushings from woodland management and tree surgery; untreated wood waste, e.g. pallets & joinery offcuts; energy crops (willow coppice & miscanthus)

Why is burning wood and crops renewable energy?

Although carbon dioxide (CO₂) is released when wood is burnt this is absorbed by new trees planted to replace those that are cut down. This is known as the carbon cycle. There are some additional CO₂ emissions from fuel used during harvesting and transport but overall this amounts to a fraction of that produced from burning fossil fuels. A

typical detached house which was converted to a wood pellet boiler from an oil heating system would reduce its CO₂ emissions from 5.3 tonnes to 0.8 tonnes per annum.

Can I produce all my heating with this technology?

Yes, but it depends on which technology you go for. A room heater fuelled by pellets is like having a gas fire or wood stove and provides additional heating to a room. Some models can be fitted with a back boiler to provide hot water. Log and pellet boilers are larger installations that can provide all the space and water heating of a house. Wood chip boilers are cost effective for high heat loads such as a large farmhouse with farm offices or a school. You might even be able to sell heat to neighbouring buildings via a heat meter.

How much wood fuel will I need?

The moisture content (MC) of your wood supply dictates the amount needed and the boiler technology used - a wetter fuel such as tree surgery thinnings (MC above 35%) will require a moving grate type of boiler whilst with drier fuels such as chipped round wood or pallets (about 25% MC) a fixed hearth may be used. The moving grate is more expensive but this is compensated by the cheaper fuel used.

Fuel	Moisture content	Amount of wood fuel required* (tonnes per annum)
Wood pellets	< 10%	5.4
Grain	10%	6.0
Wood chips from air dried round wood or pallets	25%	6.3
Wood chips from tree surgery	50%	9.5

* Based on a typical detached house with annual heating requirement of 25,000 kWh



How much space is required?

Wood has a lower energy content than fossil fuels so you need more of it to provide the same amount of heat. A typical detached house would require roughly 3 m³ of oil but 7 m³ of pellets or 21-35 m³ of wood chip weighing between 5-12 tonnes depending on moisture content.



Wood pellets

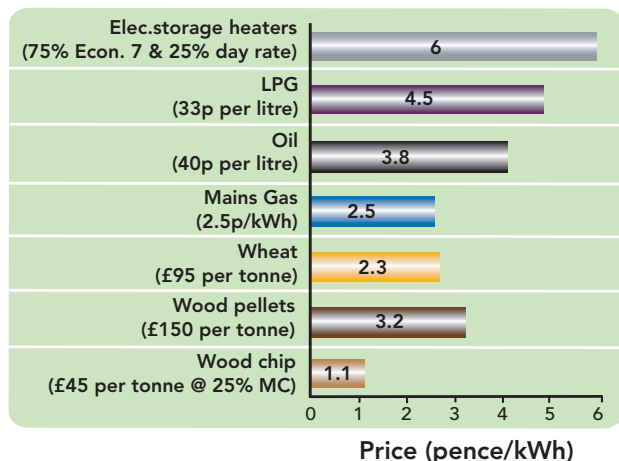
Hence, if you wish to go for the boiler option you must have sufficient space to accommodate bulk deliveries of wood fuel. You will also need space to accommodate the boiler and fuel hopper - which as a rule is about double the space required by an oil boiler.

Pellet fuelled room heaters tend to be a similar size to propane room heaters. These might only be required a few hours a day during the winter months with an annual heating demand of perhaps 1800 kWh which would only require space to store 360 kg of pellets. This could be accommodated by a typical garage. All biomass systems require a flue.

How much maintenance is required?

You will have to empty the ash pan from time to time. This might be weekly for large boilers to a few times a year with room heaters. The ash content of wood is less than 2% so for the room heater example (above) 360 kg of pellets would lead to about 7 kg of ash per annum. Once a year the burner should be cleaned and this can be taken care of as part of a maintenance contract with a fuel supplier or boiler manufacturer. Grain burners tend to produce more ash and clinker deposits but these should not be a problem as long as the boiler tubes are cleaned every few weeks (a job that takes a few minutes).

Heating costs of biomass fuels versus fossil fuels



What does it cost?

A stand alone room heater costs from £2,000-£3,000. A log, pellet or grain boiler for a typical house costs from £5,000-£10,000 whilst a 100 kW wood chip boiler for a farmhouse and offices might cost £30,000. Costs can vary according to the technology used, the amount of pipework, any thermal storage required etc. Unlike other renewable technologies you will need to budget for fuel. However, wood chip is very competitive and is currently cheaper than fossil fuels.

Can I get a grant?

The Low Carbon Buildings Programme offers



Pellet room heater (Energy Saving Trust)

a maximum £600 grant for room heaters with automated wood pellet feed as long as this is less than 20% of the total cost (exclusive of VAT). For wood fuelled boiler systems the maximum grant is £1,500 regardless of size subject to an overall 30% limit (exclusive of VAT). The installer and the product must be approved and a condition of the grant is that you must already have installed a basic level of energy efficiency measures including

wall and loft insulation, adequate heating controls and low energy light bulbs.

What is the pay back?

Savings are best in off-gas areas and for properties with high heat loads. For instance a large farmhouse with a heating requirement of 75,000 kWh per annum might pay back the cost of conversion from oil or LPG to a wood chip, grain or pellet boiler in 2-4 years based on current prices and getting a grant. For smaller 3 bedroom properties with an annual demand of 25,000 kWh, the best current paybacks (4-8 years) are for grain or log boilers when replacing electrical heating systems.

Room heaters tend to be used to boost the temperature of a single room and their frequency of use will vary with each situation. Hence, it is difficult to calculate a payback.

Are there any planning issues?

Always check with your local authority, before installing a system. There are few restrictions if you are using clean wood chip. If you have to construct a separate boiler house and fuel store this will probably require planning permission. As yet there are few automatic wood-heating products that are eligible for smoke control zones.



What is the potential for the technology in Dorset?

In Dorset there are 28,000 hectares of woodland and forest making up 11% of the land cover. Sustainable management of this resource could provide between 4,000-16,000 dry tonnes of wood fuel per annum enough for up to 4000 houses. There are also significant quantities of clean wood waste (estimated at 100,000 tonnes per annum) going to landfill. Approximately 30% of Dorset's housing stock is not connected with mains gas. West Dorset is particularly poorly served by the gas network with



100kw wood chip boiler (Farmers' Weekly)

80% of the houses (over 6,000 properties) relying on more expensive heating fuels. Biomass could be an affordable solution for these hard to heat houses. The Dorset Woodlink project aims to improve the prospects for biomass by bringing wood fuel suppliers into contact with consumers.

Pros and cons of wood fuel heating

Pros

- Good value space and water heating with fairly short paybacks
- Most woodfuel is cheaper than fossil fuels
- Options for different sized properties

Cons

- Boilers are bigger than fossil fuel equivalent
- Need storage space for fuel
- More hands on than other technologies e.g. needs de-ashing

Biomass installers based in the South West

It is best to check that a product and installer are approved by the Low Carbon Buildings Programme. Always get several quotes before committing to an installer.

Company	Telephone	Web address
Bioheat	01963 32604	www.biomassheating.co.uk
Dunster Woodfuels	01643 821188	www.dunsterwoodfuels.co.uk
Eco-Exmoor	01598 763595	www.eco-exmoor.co.uk
Econergy	08700 545554	www.woodenergy.co.uk
Treco	08451 309012	www.treco.co.uk
Wood Energy	01398 351349	www.woodenergyltd.co.uk

More information

Wood Fuel SW Advice Service	08450 740674	
Wood fuel suppliers	01908 665555	www.logpile.co.uk
Dorset Woodlink Officer	01305 756784	d.rees@dorsetcc.gov.uk
Forestry Commission	01420 526197	www.biomassenergycentre.org.uk
Renewable Energy Officer	01305 228530	k.lindegaard@dorsetcc.gov.uk
Energy Saving Trust case studies	0845 1207799	www.est.org.uk/myhome
Low Carbon Buildings Programme	0800 9150990	www.lowcarbonbuildings.org.uk
Dorset Energy Advice Centre	0800 512012	www.dorsetagenda21.org.uk
Dorset Agenda 21	01305 213721	www.dorsetagenda21.org.uk