



# The Wood-Fuelled Home

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<http://info.cat.org.uk/biomass>

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## **Why Burn Wood?**

Biomass fuels include wood, energy crops such as oilseed rape or miscanthus ('elephant grass'), animal wastes and other agricultural by-products such as straw and grain husks. When burned, these fuels release only the amount of carbon dioxide (CO<sub>2</sub>) that they absorbed whilst growing - unlike the carbon in coal, oil and gas, which was absorbed over millions of years but is being released in the space of a few decades. The energy used to harvest, process and transport the fuel does need to be factored in as well. Very little energy is needed to harvest wood, so when used locally it is a very low-carbon option.

Planting trees to absorb carbon dioxide may provide temporary mitigation from climate change, but doesn't address the fundamental problem. To meet our energy needs in a zero-carbon future we must make sustainable use of trees as fuel, and replant them as we harvest them - creating a continuous carbon cycle. Growing our own fuel also creates jobs and is ideal for strong, local economies.

## **No fire without smoke?**

Emissions from wood fuel contain virtually no sulphur dioxide and very low levels of nitrous oxides, so won't cause acid rain. Burning wood cleanly gives off very low amounts of smoke particulates, and many wood-fired appliances are certified for smokeless zones (see <https://smokecontrol.defra.gov.uk>).

It's important to burn efficiently: use properly seasoned wood (with low moisture content) and make sure that equipment is used properly. Manually fed stoves can produce lots of pollutants if operated badly.

Logs should be burned fiercely with lots of air input until they are almost charcoal, after which the stove can be 'damped down'. Reducing the air supply too early creates lots of smoke & tar. The key is good 'secondary combustion' of the high-energy volatile gases given off by burning wood. Some stoves are fitted with a 'Lamda' sensor, to regulate the amount of oxygen added and so optimise

efficiency. Avoid burning treated, painted or glued wood, or non-wood waste, as these will give off toxic and polluting gases.

Building regulations require all fuel burners to have a dedicated vent to avoid production of carbon monoxide. The chimney needs an insulated flue to prevent fumes condensing as tar. With complete combustion, wood burns to a small amount of ash, which (unlike coal ash) is an excellent fertiliser.

## **Choosing wood-fired appliances**

Before switching to any new heating system it is vital to maximise energy efficiency. Measures such as increasing insulation, lagging pipes and draught-proofing will save money on fuel, and also on equipment - as they'll allow you to specify a smaller boiler.

A combination of wood fuel and solar water heating (for hot water in summer), can give renewably-generated heat all year round.

Open fires are a poor choice, financially and environmentally. Most of the heat goes up the chimney and the rate at which the fire draws in oxygen creates draughts across the room that reduce the benefit from the fire. A simple wood stove is a great improvement; it should need only one-third as much fuel, as the efficiency can be over 70%. Automated pellet stoves are more convenient, and can even have an automatic de-ashing function.

Advanced wood heating systems for larger houses have been common for many years in mainland Europe and the USA, and are as efficient as modern gas boilers - converting well over 80% of the fuel into useful heat.

A 'batch' log boiler can be fired up once a day (or less often) and the heat stored in a large water cylinder. Automated pellet boilers make wood fuel almost as convenient as gas. They are more costly, but ease of use is a big plus.

Specially designed wood-fired ranges have a bigger firebox, to accommodate logs. However, doing everything from one appliance is not ideal, and the efficiency of these is less than dedicated boilers or stoves.

## Storage

Delivered wood should be stored for at least one year, preferably two, to air-dry it to a moisture content below 25%. Bringing logs inside for the last week or so improves them to room dryness. Burning wood with a high moisture content reduces efficiency. Wood pellets (compressed sawdust) have only 8% moisture content. Make sure pellets meet the size, shape and moisture content that is specified for your appliance - some pellets are produced for power station co-firing, and are unsuitable for domestic appliances.

The required storage space depends on how big and how well-insulated your home is. A small cottage is likely to need 8 cubic metres (m<sup>3</sup>) of logs each year, a 3-bedroom house 12m<sup>3</sup>, and a large detached house 16m<sup>3</sup>. Pellets have a higher energy content and so take up less than half as much space. Stoves use 0.5 to 1.5kg of pellets per hour, so a 15kg bag should last a few days.

Larger systems can use chipped wood - this allows more automation than logs and is cheaper than pellets. Seasoned wood is delivered, chipped, and stored until it reaches 15% moisture content. For larger schemes, it's a good idea to have a supply contract to ensure a reliable supply of wood.

## What's the cost?

A log stove is likely to cost up to £1000, with installation costs probably the same again. Modern log & pellet boilers or pellet stoves are more expensive, but you get support back through the RHI (see below).

The total installed cost (including flue, accumulator tank, fuel store, etc) of a basic log boiler might be £15,000 to £18,000, a higher specification log boiler about £20,000, and a pellet boiler about £25,000.

Remember to factor in the ongoing purchase of fuel. Bought in bulk, log fuel should be cheaper than gas, oil or coal. A 15kg bag of pellets will cost £3 to £4, but bulk delivery should be similar to or less than fossil fuel, with the cost working out at about 4.5 to 5 pence per unit (per kWh). The HETAS and Log Pile websites (below) list suppliers around the UK. Also, find out about the support structure in place for the equipment you choose, before going for the cheapest. Will it be easy to get the appliance serviced annually? Are there enough plumbers or engineers with the relevant knowledge?

## What financial support is available?

Biomass heating is supported through the Renewable Heat Incentive (RHI) scheme. To find out more, contact us or visit our RHI website <http://info.cat.org.uk/rhi>

## Finding installers:

It's always a good idea to get quotes from more than one installer. To get financial support under the Renewable Heat Incentive, installer & system must be accredited by the Microgeneration Certification Scheme (MCS): [www.microgenerationcertification.org](http://www.microgenerationcertification.org)

## Further help & advice from CAT:

### CAT Information Service

To find out more about biomass heating visit our website: <http://info.cat.org.uk/biomass>

**CAT Mail Order** sells various books on wood fuel and log or pellet fired heating systems.

☎ 01654 705959; <http://store.cat.org.uk>

We run renewable energy **short courses, including** Several HETAS-accredited courses for plumbers and heating engineers.

☎ 01654 704966; <http://courses.cat.org.uk>

Our **Graduate School of the Environment (GSE)** offers a range of full or part time postgraduate programmes that mix academic study and hands-on practical learning, including an MSc in Sustainability in Energy Provision & Demand Management.

☎ 01654 705953; <http://gse.cat.org.uk>

## Contacts:

**Energy Saving Trust:** energy efficiency advice and details of any local grants.

☎ 0300 123 1234; [www.est.org.uk](http://www.est.org.uk)

**HETAS:** Official body in the UK for biomass & solid fuel heating. Website lists approved suppliers of fuel & equipment, plus info about burning wood efficiently & safely.

☎ 01684 278170; [www.hetas.co.uk](http://www.hetas.co.uk)

**Log Pile:** Information, suppliers, examples.  
Web: [www.logpile.co.uk](http://www.logpile.co.uk)

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