

## Summary:

- \* Selection of fuel type - logs, pellets, chips, multi-fuel
- \* Are fuel suppliers available locally?
- \* Sizing the system to meet the heat demand
- \* Storage space for fuel 1:3:9 ratio oil:pellets:chips
- \* Boiler house needs to be adjacent to fuel store
- \* Access for deliveries, 15-20m maximum for blown-in pipe
- \* Space for accumulator tank, 65l/kW of heating demand
- \* Maintenance and removal of ash
- \* Smoke control zone
- \* Existing flue or chimney
- \* Planning / Building control
- \* Economies based on fuel displaced and heat demand

## Wood fuels

Open fires in houses are not very efficient. About 70-85% of the heat is lost straight up the chimney.

The key to the efficient use of wood fuel lies in **controlling the air supply**. Modern wood-burning stoves burn dry wood very cleanly and efficiently.

A well-designed modern wood stove or boiler will work at **80–90%** efficiency.

**Carbon neutral** - Burning wood produces only as

much carbon dioxide as was absorbed when the tree was growing, or would be produced by the dead tree rotting in the forest.

However, we need to consider the fuel used to transport the biomass fuels. If wood fuels (which can be heavy and bulky) are transported large distances this will negate a lot of the environmental benefits they bring.

By using local wood fuels, not only can we help the environment but it will have a beneficial impact on our **local economy**, creating jobs and businesses.

In addition, using a locally produced wood fuel to heat our homes means that we are not subject to the same price fluctuations of the world fossil fuel markets. A local fuel should have a more **stable price**.



## Increasing costs for fuels and appliances



Room heater



Log boiler



Pellet stove



Multi fuel boiler



Pellet boiler



Chip boiler

### Logs

- Forestry residue
- Seasoned logs burn well
- A bulky fuel
- Lots of storage space
- Hard to handle
- Manual loading
- Manual processing
- Relatively cheap
- Hardwoods and soft-woods

### Chips

- Forestry residue, coppicing, waste wood
- Most bulky wood fuel
- Lots of storage space
- 40-km supply radius
- Supply contracts
- < 20-30% moisture
- Waste wood can be contaminated
- Relatively cheap fuel
- Chip boilers are expensive
- Best for large heat demands

### Pellets

- Sawmill sawdust
- Lignin binds the pellet
- High-quality fuel
- High-energy density
- Homogeneity
- About 2.5cm x 6-8mm
- Moisture < 10%
- Ash < 0.5%
- Also made from willow, hemp, straw etc...

NOTES

System types

A **pellet room heater** or stove is used to heat a room. Modern pellet stoves can be ignited automatically.

Some models have a back boiler which will heat enough water for domestic use and a few radiators.

Pellet stoves have an integral store for pellets. It should hold enough for 20-40 hours of operation. It will need refilling manually possibly every few days, depending on use.

Typically room heaters have a rating of between 6-12kW

**Log boilers** are relatively cheap to buy but require manual filling every day. they need space to accommodate

an accumulator tank (1000 litre or more). This enables the boiler to be fired up once a day and the stored water used as and when necessary.

The **chip boilers** are more expensive than the pellet boilers. However, as chips are cheaper than pellets, the economies of scale work to pay off the capital investment when there is a large heat demand.

For larger buildings such as small farms, schools and hospitals, chips are a good solution.

Most are highly automated systems, from the feeder, the ignition, the boiler cleaner, the control of chimney draught and even

the disposal of ash.

Wood chip boilers are generally not available below 30kW.

**Pellets boilers** are the ultimate convenience wood fuel appliances. They are as easy and convenient to use as oil.

A pellet tanker comes to the house just as a oil tanker would. The pellets are blown into a storage facility, and then the heating system and boiler is used much as you would if you were using oil. You can set it to come on and off when you want without any labour.

Pellets boilers are available from 10 kW upwards.

Do you want to use pellets, logs or chips?

The **availability** of the fuel you want to use is important.

In a rural area logs may be readily available.

In more urban areas pellets may be more readily available.

Chips are available but you may have to enter into contracts with suppliers.

If you want to find a wood supplier in your area log on to [www.logpile.co.uk](http://www.logpile.co.uk).

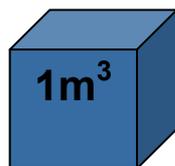
Do you want a system that can be fully **automated** or are you able to do some manual handling? Logs need manual handling while chips and pellets can be automated.

For larger **heat demands** consider wood chips. This

choice will balance the higher capital costs against the lower running costs. Pellets have a lower capital cost but the fuel cost is higher.

Biomass fuels need more **storage space** than oil. Pellets are three times as bulky as oil and chips are about three times as bulky as pellets.

If a home has an annual oil demand of 20700 kWh for space and water heating, how much storage space is needed for each of the following fuels?



Oil : Pellets : Chips  
1 : 3 : 9

Fuel type	Logs	Wood chip	Wood pellets	Heating oil
Energy content	1980	1260	3000	10350
Space				

Ideally, the fuel requirements of a property should be received in bulk just once or twice a year to keep transport costs down. Pellet suppliers generally deliver three tons at a time without a delivery charge. The storage capacity should exceed this so that you don't have to be completely empty before ordering the next load.



NOTES

Storage space design



Woodchips are a bulky fuel. Generally speaking, you need about nine times the space for wood chips as you would for oil to gain an equivalent amount of heat. Pellets are not so bad requiring only three times the space. You need enough space to store about six months worth of logs or buy properly seasoned wood.



A wood pellet storage unit needs to be of sufficient strength to hold the pellets being stored (usually 4 tonnes). It needs to be waterproof (including damp), air tight and designed to reduce condensation.

It needs to have the appropriate fittings for accommodating a blown delivery. Check with suppliers for the specific type. The delivery pipe must be made from metal and must be earthed. Static on plastic piping could be a fire hazard.



The fittings should be at chest height to be within the delivery driver's reach. An exit port should be fitted to allow the release of the delivery air. This needs a filter to reduce dust exiting the store.

The storage unit needs to be free from electrical sockets, switches and fittings. This is to prevent a dust explosion. The fuel store should not be positioned where it would result in a fire risk.



The floors of the silo should have a slope of at least 45° going towards the feed mechanism. A deflection mat should hang in the path of the pellets being blown into the storage unit.

It is recommended that storage unit has a sight glass or inspection hatch to monitor volume and to indicate to customer when to re-order.

There should be an air space at the top. Do not completely fill.

Boiler house



The boiler house needs to be adjacent to the fuel store because the screw feed system should not be too long (3m). There are systems on the market that can suck the pellets into a small hopper. These can cope with distances of 15m.

The fuel store also needs to be accessible to the delivery truck. Check how long the delivery pipe is with the supplier. Often you will have only 15-20m from truck to store. For health and safety reasons pipes can not be taken through houses.

A buffer tank is recommended with all biomass boiler installations because it increases the efficiency of the system significantly. As a rough guide, 65 litres per kW heat load can be used for the design of the storage tank

If the buffer tank is undersized it will result in unnecessary cycling which reduces efficiency.



The ash may need to be removed up to once every three weeks depending on the model, fuel usage, type of fuel and time of year. Some models may only need to be emptied once every three months. The small amount of ash that is removed can be used as a high grade fertiliser.



## NOTES

### Permissions

Wood can be burned in a **smokeless zone** if the appliance has an exemption certificate.

**Building control** approval will be required.

**Planning permission** is not usually required unless...

- The flue protrudes more than 1m above the roof height.

- The flue is installed on the principal elevation and visible from a road in Conservation Areas and World Heritage Sites.

- It is on a listed building.

### Costs

The cost of a biomass appliance depends on the size, make and type of fuel used.

Wood-pellet systems can be the all singing all dancing pellet boiler at the high end of the market down to the more basic models. They range in price from about £6,500 - £15,000 fully installed.

A 30kW wood chip boiler may be about £30,000.

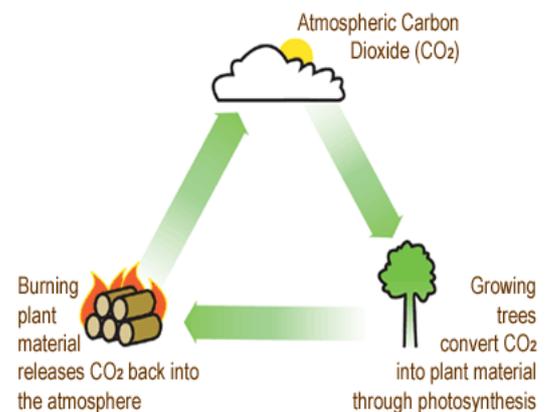
Log and multi-fuel boilers are very cost effective and start at about £5,000.

Unlike many renewable energy technologies with biomass you still have to buy fuel.

Pellets tend to be about half the price of oil. Wood chips and logs are cheaper again.

Information in grants is constantly changing but a good starting point is the Energy Saving Trust. Tel: 0800 512 012 [www.energysavingtrust.org.uk](http://www.energysavingtrust.org.uk)

Wood is a sustainable fuel when taken from a managed forest or grown as a biomass crop. The wood fuel takes just 4-20 years, to grow whereas fossil fuels such as oil and coal were formed over millions of years.



### More information

Energy Saving Trust advice centre

Tel: 0800 512 012

[www.energysavingtrust.org.uk](http://www.energysavingtrust.org.uk)

The Low Carbon Buildings Programme

[www.lowcarbonbuildings.org.uk](http://www.lowcarbonbuildings.org.uk)

Action Renewables

[www.actionrenewables.org](http://www.actionrenewables.org)

Scottish Community and Household Renewables Initiative

[www.energysavingtrust.org.uk/schri/](http://www.energysavingtrust.org.uk/schri/)

[www.stovesonline.co.uk/services/wood-pellet-suppliers.html](http://www.stovesonline.co.uk/services/wood-pellet-suppliers.html)

[www.britishbiogen.co.uk](http://www.britishbiogen.co.uk)

[www.greenenergy.org.uk](http://www.greenenergy.org.uk)

[www.nef.org.uk](http://www.nef.org.uk)