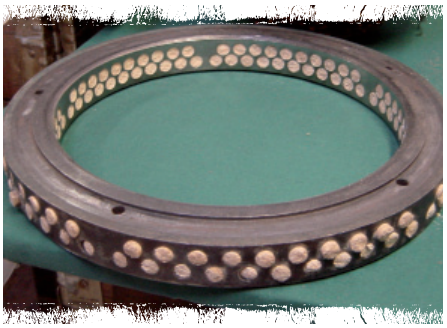
Information Sheet 8

Domestic Heating with Pellets

Pellets are a very refined version of woodfuel. They have very consistent characteristics, which mean that the systems which run on them are engineered to operate very efficiently and incorporate a range of high-tech features.

Pellet Production

Wood Pellets are made by compressing clean dry sawdust, under very high pressure through a die. The heat generated by the pressure melts the lignin in the wood, binding the sawdust into a pellet as it cools. The material used for producing pellets usually comes from industries who are already producing large amounts of dry sawdust as a result of secondary processing (production of furniture, doors, window frames etc.). These industries often find that disposal of sawdust can be a problem and producing pellets reduces the volume of material they have to treat as waste, reducing landfill.



Pellets have a relatively high embodied energy (the energy used in production) compared to logs and woodchip though this is still only about 2 - 3% of the energy value of the end product (excluding drying).

Fuel Characteristics

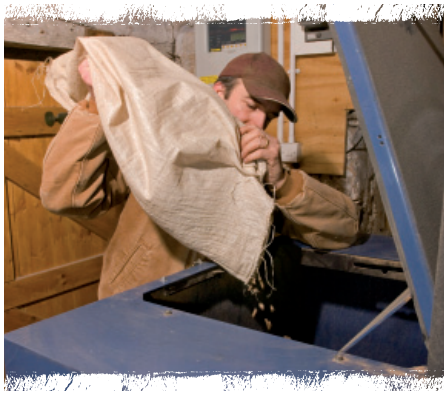
Pellets are very consistent, having the same size and shape which means that they flow without getting jammed. This is important as it means that fuel bins don't need a system for agitating the fuel to stop it getting blocked, allowing pellets to be delivered pneumatically.

Pellets for domestic and small scale applications are typically 6-8 mm diameter, industrial applications are 10-12 mm. Above 25 mm diameter they are known as briquettes and can resemble a fire-log in appearance and function, with improved storage, handling, and combustion properties. (Please see information sheet 9 for more information on briquettes).

Because they are made from very dry wood, pellets have a very high calorific value. They are also highly compressed, so have a very high energy density. Pellet installation typically will have smaller fuel bin requirement than a woodchip system (usually about 5-6m^3 for a domestic scale system).

Extra processing requirements to make pellets means that they tend to cost typically about 1p/kWh more than chip (around £185 per bulk tonne). This makes them close to the cost of mains gas and still usually significantly cheaper than oil or LPG. Prices vary considerably between suppliers, and depend on order size: bulk deliveries, typically a minimum of 3 or 5 tonnes, tend to be significantly cheaper than bagged pellets.

Pellets are already used very widely in continental Europe, and many pellet suppliers and installers import pellets and equipment. This would affect the embodied energy of the fuel as the energy required to transport the fuel is increased. However, even imported pellets offer considerable CO_2 emission reduction compared to fossil fuels.



Pellets are a less robust fuel than either logs or woodchip. They can disintegrate when handled roughly, and this can cause fuel jams. As pellets are so dry they can absorb liquids, (many pellet manufacturers also sell them as cat litter) losing calorfic value and disintergrating causing problems for an appliance.

Poor quality pellets can crumble or produce more ash, so it is important that pellets have been manufactured to a recognised standard. An EU-wide suite of standards for solid biofuels, including pellets, covering both the properties of the fuels, and also how they are to be evaluated, is being developed by CEN/TC 335. Specific fuel specifications and classes are defined in CEN/TS 14961. Pellets are usually <10% moisture content and <1% ash, should be made from clean, untreated wood and have sufficient mechanical durability not to crumble to dust readily. It is preferable that the pellet feedstock is from sustainable sources.

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Using Pellets

Pellet systems are the most high-tech wood burning appliances currently available for domestic heating.
They routinely run at over 90% efficiency as the high calorific value, and consistency of the fuel allow the systems to use a variety of sophisticated features.

Stoves

Stoves are available which burn pellets in much the same way as a conventional log burner. Designs vary, but most systems incorporate a small fuel bin in the top of the stove which is filled by hand using bagged pellets. These are burnt a few at a time in a grate at the front of the stove to give an effect similar to a log stove. Stoves vary in size but are available from small units (1kW) providing warm air for space heating in a single room, to larger units (≈12kW) which combine space heating with several radiators, under floor heating and hot water.

Boilers

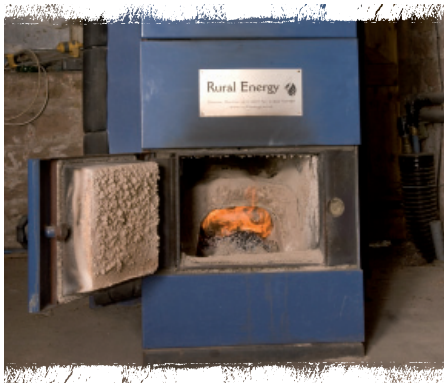
Pellet boilers are now widely available in the UK, usually imported from mainland Europe or Ireland, through specialist installers. Pellet boilers are available in a wide range of sizes from very small domestic devices for energy efficient houses, up to systems suitable for large buildings or district heating schemes as well as for conventional homes. Installed coal boilers can also be converted to run on wood pellets.

Pellet storage hoppers are available off the shelf, in a range of designs for indoor, outdoor, above and below ground storage. Pellets can be transferred from the hopper by an auger screw or pneumatic delivery.

The boiler itself might cost around three times the price of a top end gas boiler, and most will require in addition a pellet store, pellet feed mechanism and a flue, but running cost can be significantly less than oil or LPG systems. Some are available with a built in hopper that requires periodic filling from a bag. Small systems tend to be significantly larger than the equivalent capacity gas boiler as a ceramic lined firebox is required as well as mechanical components to feed the solid fuel.

Pellet boilers are typically very efficient, with all the features expected from a modern boiler, including on some models the option to control and monitor remotely by telephone or internet.

For a domestic house just one delivery of fuel a year may be required, and this can be delivered from a tanker, via a hose up to 30 m long allowing convenient siting of the store.



Smoke Control Areas

Pellets are not approved for use in smoke control areas except in officially approved 'exempt appliances.' The website **www.uksmokecontrolareas.co.uk** gives lists of Smoke Control Areas, and the appliances approved for use in them. There are a number of different pellet boilers approved for use in smoke control areas and a few pellet stoves.

Useful Links and Further Information:

Biomass Energy Centre

"A 'one stop shop' to provide information to anyone in the UK with an interest in biomass derived solid, liquid and gaseous fuels and associated conversion technologies."
www.biomassenergycentre.org.uk

Logpile

For information on fuel suppliers and boiler installers.
www.logpile.co.uk

Forestry Commission

Further information on using wood as fuel and finding your regional contact:
www.forestry.gov.uk/woodfuel
www.forestry.gov.uk/yhwoodfuel

HETAS

Expect to see quality suppliers signing-up to an assurance scheme run by HETAS. With consistent product labelling, it will be easier to choose appropriate pellets for an appliance. See **www.hetas.co.uk/public/Solid_Biomass_Assurance_Scheme.html** for further information.

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