Biomass

Laurence GOULD PARTNERSHIP LTD renewables

Potential for the High Weald

Renewable energy is a major form of development that is significant in its contribution to tackling climate change, but which may also present new impacts and challenges to the High Weald Areas of Outstanding Natural Beauty (AONB).

The word 'weald' means wilderness or forest. There still remains large areas of woodland within the High Weald, much of which is presently unmanaged, this includes ancient woodlands, gills and shaws. The majority of farms and small holdings across the Weald have an area of woodland present. Reintroducing sustainable management to these woodlands is an aim of the High Weald management plan with particular emphasis on: reversing neglect – reintroducing sustainable management and reinvigerating collapsed timber markets.

Introduction

The term *biomass heating* refers to the combustion of plant based organic materials for the purpose of heating. The materials fall into 2 basic categories:

- Woody resources from sustainable sources such as fast growing trees or subsidiary waste products such as sawdust or recycled untreated pallets.
- Non-woody resources such as straws, animal waste and grass materials such as miscanthus (elephant grass).

Unlike open fires, modern biomass boilers burn at an efficiency rate of about 90%, often involve automatic fuel feed systems and are controlled via thermostats and timers with the same convenience of a fossil fuel system. They can provide all of your heating requirements if the systems are well designed and you may even be able to sell excess heat via a private pipeline to neighbouring homes or businesses. The limiting factors are the supply of biomass, the space for biomass storage and the distance the hot water needs to be piped (1km of insulated pipe costs approximately £80,000).

Is burning biomass really renewable?

Burning biomass fuels is seen as a renewable energy because the CO^2 released when the wood is burnt is absorbed by new planted material. This is known as the carbon cycle. However some CO^2 is emitted by the fuels used during harvest and transport – it is therefore very important that locally produced biomass is utilised.

How much fuel will I need?

The fuel requirement depends on the amount of heat required and the moisture content of the material. A typical detached house has an annual heating requirement of 25,000kWh, this would require 6.3 tonnes of wood chip (moisture

content <30% - from dried round wood). This would take up about 25m³ of space over the year, which would normally be bought or produced in smaller installments. This system would be an equivalent to an oil system with an annual demand of 3m³.

Is the fuel store important?

Storage space for the biomass is critical, with enough space available to accommodate bulk loads. In fact with biomass boilers being so proven as a technology, the critical issue is the design, size and technology employed within the fuel store. It is particularly important to remember that if wood chips are used as a biomass material that they do not 'flow' therefore augers and rotating arms need to be employed to ensure the woodchips reach the boiler. Also, woodchip does not exert and outward pressure so stores need not be fully strengthened. Wood pellets on the other hand flow easily but require increased processing in order to make them, giving them a higher carbon footprint and greatly increasing the cost (potentially 3 times the cost of woodchip per kWh of output).

What kind of wood is best?

Different types of wood have different calorific values.
1 tonne of woodchip @ set moisture content provides same quantity of heat. But chip varies in weight from 250-800kg/m³. Dense hardwood, therefore, has lower delivery/processing costs but is a more valuable timber (competes with firewood). Low value timber e.g. willow and pine has a higher delivery and processing cost. Chestnut coppice is a low value but high calorific timber.

Is moisture content important?

The dryer the better! Moisture content is critical and should be stated when ordering woodchip or if drying your own wood will need to be carefully monitored to ensure the ideal <30% required by most biomass boilers. There are European standards for moisture content, and your boiler will state the moisture content required for maximum efficiency.

What are the environmental benefits of biomass?

As well as saving fossil fuels and the associated release of CO^2 there are wider benefits to utilising particularly woody biomass from local woodlands including the rejuvenation of woodland management in neglected woodlands with the associated wildlife benefits and the accompanying stimulation of local jobs.

Biomass has another distinct benefit over oil in that if it is spilt it can just be swept up and doesn't cause a pollution incident.

Wood Pellets vs. Wood Chips?

Wood chips are cheaper than pellets per unit of energy delivered. However, they are not always suitable for domestic or intensive heating uses since they require considerably more storage space and their energy content is less predictable.

Fossil fuels are 2-3 times more energy dense than biomass fuels such as pellets. This means if you use 1m³ of oil a month, you will need 2-3m³ of wood pellets.

Wood chips require 3-4 times the storage space as wood pellets for the same energy content.

The 'embodied energy' of a fuel is one way to estimate the impact its production has had on the environment. Embodied energy can come from extraction, refining, manufacture and distribution. Woodland biomass distributed locally will have much lower embodied energy than oil or gas. If from already dry wood (eg. logs/pallets) it will also have a lighter footprint than short rotation coppice or energy crops. If it utilises wood otherwise going to waste then this should also be taken into consideration. However, wood pellets do have higher embodied energy than wood chip. This reflects the greater energy used in their manufacture. Transporting bulkier woodchip long distances will cancel out this advantage.

Can I use waste wood?

Great care must be taken if using waste wood. Woodchip must be free from stones, soil, metal, plastic and other foreign bodies, chemicals for wood treatment, paint, creosote, MDF/chipboard glue. Ideally any contaminated wood should be disposed of by a licensed recycler.

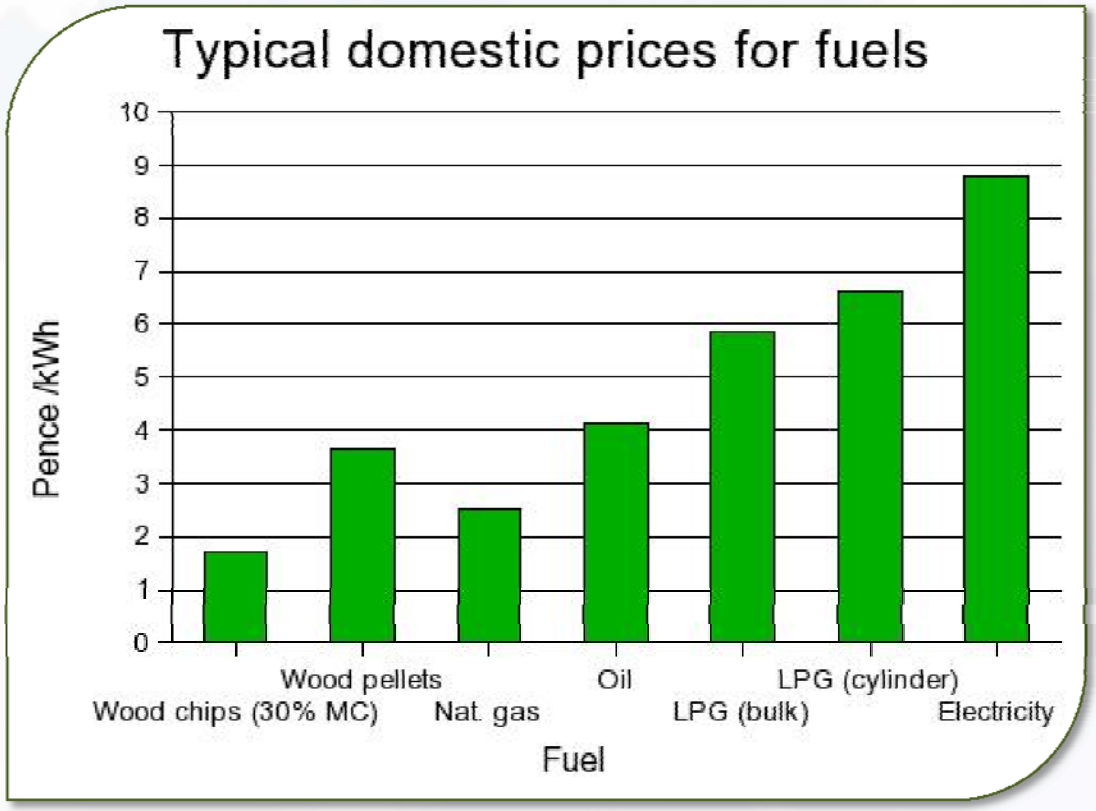
What about costs and maintenance?

Costs vary greatly and expert advice should be sort to match the boiler to your requirements. Costs vary on the technology used, the size of the boiler, the store required and the amount of pipework required.

As a guide a 100kw boiler for a farmhouse and offices would cost approximately £30,000, including the store and buffer tank.

A typical stand alone pellet heater would cost £2,000 to £3,000.

Biomass can be bought in or management can be undertaken in your own woodland. To buy in one tonne of woodchip would cost about £60 (equivalent to 400litres of oil – approx cost £175). If managing your own woodlands you could expect approximately 75 tonnes of useable wood per acre, shrinking to 60 tonnes when dry, this could provide enough biomass to heat nearly 10 average properties. Payback varies, capital costs for biomass systems are much greater than conventional systems but have a much cheaper cost per kW, particularly with fossil fuel cost rapidly increasing. As a guide:



Savings are greater in non – gas areas, with paybacks of about 10 years expected (without a grant). Shorter paybacks will be achieved if replacing an electrical system.

Annual cleaning is required on most boilers, this is often included as part of a maintenance contract. Ash pans usually need emptying every 1 to 3 weeks depending on the boiler size, the ash is usually about 2% of what is burnt, although it is much greater for boilers that burn straws.

Calculations as to the cost of pellets vs. other fuel types should take account of energy density and cost per delivered unit. It is best to compare fuel costs in pence per kWh - that is to say the cost of 'delivered energy'. At today's prices wood pellet fuel is competitive with delivered oil and significantly cheaper than delivered gas. Woodchip is much cheaper. Delivery charges for biomass may be higher as there is less competition.

With the price of oil and gas likely to rise, and the cost of pellets/chip likely to fall with increased demand, these cost savings could become even greater in the future.

SWOT analysis

A SWOT Analysis is a strategic planning method used to evaluate the Strengths, Weaknesses, Opportunities, and Threats involved in a project or in a business venture.

STRENGTHS	WEAKNESSES
• Good value for space and water heating with fairly short paybacks • 90% efficient • Easy to retrofit to existing systems • Woodfuel cheaper than fossil fuels • Reduced carbon footprint • Boiler can be sized to the job	• Higher capital costs than fossil systems • Storage space required (doesn't just arrive on demand in a pipe!) • Boilers are bigger than fossil equivalents • More hands on than other technologies
OPPORTUNITIES	**THREATS**
• Potential to sell excess heat to neighbours • Potential to use your own woodland / sell biomass • Stimulates woodland management, associated wildlife and local jobs	• Biomass source needs to be local • Quality (moisture content) needs to be consistent • Planning may be required for flues and stores

Planning Issues

Planning within the High Weald AONB

The High Weald Unit's role is to interpret government policy in the light of the AONB Management Plan (http://www.highweald.org/text.asp?PageId=254) and to provide advice to local authorities and others regarding planning applications. The Unit also responds to consultations regarding new planning policy at national, regional and local level, again based on the Components of Natural Beauty identified by the Management Plan. The Local Council is of course the responsible body as regards the exercise of planning powers.

Planning guidance (see below) actively encourages renewable development but makes allowances for designated areas such as the High Weald AONB:

In sites with nationally recognised designations planning permission for renewable projects should only be granted where it can be demonstrated that the objectives of designation in the area will not

be compromised by the development, and any significant adverse effects on the qualities for which the area has been designated are clearly outweighed by the environmental, social and economic benefits.

Planning permission

Extracted from Planning and policy Statement (PPS) 22
http://www.communities.gov.uk/publications/planningandbuilding/pps22.

Planning permission is not normally needed when installing a biomass system in a house if the work is all internal. If the installation requires a flue outside, however, it will normally be permitted development if the conditions outlined below are met.

- Flues on the rear or side elevation of the building are allowed to a maximum of one metre above the highest part of the roof.
- If the building is listed or in a designated area even if you enjoy permitted development rights it is advisable to check with your local planning authority before a flue is fitted. Consent is also likely to be needed for internal alterations.
- In a conservation area or in a World Heritage site the flue should not be fitted on the principal or side elevation if it would be visible from a highway.

If the project also requires an outside building to store fuel or related equipment the same rules apply to that building as for other extensions and garden outbuildings.

The remit of consideration for planners is around the power plant and associated impacts and not the production of the fuel source. However, the impacts of growing and collecting the fuel are key to ensuring the successful development of a facility. Many of the environmental issues associated with the fuel supply (e.g. impact on landscape, ecology, archaeology, land use etc) may be covered by an Environmental Impact Assessment (EIA) undertaken by other bodies in connection with the scheme – for instance the Forestry Commission (FC) for all applications submitted in England under the Energy Crops Scheme.

Building Regulation

If you wish to install a biomass appliance, building regulations apply. You should take into account factors such as ventilation, noise and general safety. Installation should be carried out by a suitably qualified installer.

Building regulations also apply to other aspects of the work such as electrical installation and plumbing work.

Contacts

District or Borough Council Planning Departments for the High Weald area:

Horsham: **01403 215187**	Crawley: **01293 438787**	Mid Sussex: **01444 458166** **(main switchboard)**
Tandridge: **01883 732859**	**Wealden:** 01892 653311 (main switchboard)	**Rother:** 01424 787600
Hastings: **01424 783300**	**Sevenoaks:** 01732 227000 (main switchboard)	**Tonbridge & Malling:** 01732 844522 (main switchboard)
Tunbridge Wells: **01892 526121** **(main switchboard)**	**Ashford:** 01233 637311 (main switchboard)	

Further Information

Planning Policy Statement 22: Renewable Energy – http://www.communities.gov.uk/publications/planningandbuilding/pps22

Planning for Renewable Energy: A Companion Guide to PPS22 - http://www.communities.gov.uk/publications/planningandbuilding/planningrenewable

High Weald Management Plan - http://www.highweald.org/text.asp?PageId=254

Useful contacts

Biomass Energy Centre – www.biomassenergycentre.org.uk

Centre for alternative technology – www.cat.org.uk

Carbon Trust – www.carbontrust.co.uk

Potential Grant sources

Bio Energy Capital Grants Scheme – www.defra.gov.uk

Low Carbon Buildings programme – www.lowcarbonbuildings.co.uk

England Rural Development Programme – www.seeda.co.uk

WARR partnership (LEADER) – www.warrpartnership.org.uk

High Weald AONB (Sustainable Development Fund) – www.highweald.org

Carbon Trust (Interest Free Loans) – www.carbontrust.org.uk

Enhanced Capital Allowance Scheme – www.eca.gov.uk