

# Biomass: growing for profit and a greener Cornwall



Outline of the possibilities and  
benefits  
for farmers and growers:

- Financial
- Environmental

## New crops for 2005

Renewable Energy Office for Cornwall  
*with*  
Cornwall Sustainable Energy  
Partnership  
June 2004



Community  
Renewable  
Initiative

## What is biomass?

Biomass is plant and animal material used for energy purposes to make heat, electricity or transport fuels. Biomass includes forest arisings and by-products along with specially grown crops such as short rotation coppice willow and the perennial grass miscanthus as well as oil seed crops such as oil seed rape and

crambe as well as animal and plant wastes such as food wastes and animal slurries. This outline covers specially grown plant material only. As there are many sources of plant based biomass there are many technologies suitable for conversion from the farm product to the saleable energy. In this leaflet we aim to give an introduction to biomass and indicate where to obtain further information.



## Why is biomass important?

Increasing the use of renewable energy in the UK, Europe and the World is gaining in importance as climate change impacts are being recognised with increasing urgency. Biomass energy is ideal to help with reducing greenhouse gas emissions from fossil fuel burning as it can be made available as solid, liquid or gaseous fuels and can be used to generate electricity. This flexibility as well as the large potential resource base makes the development of biomass resources a major for Cornwall.

Not only does biomass help with climate change issues, but it also can provide significant local employment and can be grown profitably by farmers locally yielding long term secure income to provide some certainty in an uncertain future for the industry.



Pictures courtesy of  
Bio-Renewables  
Ltd, South West  
Wood Fuels Ltd ,  
Atlantic Energy Ltd



*Harvesting miscanthus*

### *What are the crops?*

Biomass offers many exciting opportunities for energy supply for Cornwall. This table shows the wide range of crops that can be grown and how they are processed.

Type of fuel	Energy crop	Processed to/by	Used for
<b>Solid</b>	Wood Wood wastes Forestry residues Miscanthus (elephant grass) Coppice woods	Logs Chips Pellets Bales	Electricity Heat Combined heat and power
<b>Liquid</b>	Oil seed crops e.g. oil seed rape, mustard, crambe, camelina Used vegetable oils and animal fats	Bio-diesel	Transport fuels for diesel vehicles either 100% or in a mix with fossil diesel (bio-diesel)
	Wood/forestry residues and wood wastes	Bio-oil	Heating oil for boilers in domestic & commercial use
	Sugar beet, wood residues, miscanthus, coppice wood	Ethanol	Transport fuels to replace petrol Electricity/combined heat and power
<b>Gas</b>	Animal slurries & food wastes	Anaerobic digestion	Heat or combined heat and power
	Wood residues and wood wastes, miscanthus	Pyrolysis or gasification	Electricity or combined heat & power

## What is the value to the grower?

The value to the grower obviously depends on which crops are grown, what is being replaced and how well they grow as well as the expected value of each crop. CAP reform provides the opportunity to become market focussed and reassess individual farms from 2005. As the support is moving to an area payment, the opportunity to grow non-food crops is obvious. Energy crops under contract can be grown on set-aside land, remaining at 10% of eligible land, and in addition a small payment of 45euro/ha is available for energy crops on non set-aside land , although this is limited to 1.5 m ha throughout Europe and will probably mean payments will be reduced pro-rata. Here we show some examples of growing biomass crops and their expected returns for the grower in Cornwall, when twelve hectares are grown on "average" land.



Birds nest in miscanthus

- ***Short rotation coppice/miscanthus***

Compared to other cropping systems such as beef rearing and sheep short rotation coppice which is cut every three years and miscanthus which is cut every year, show good returns on a partial budget calculation. Compared to beef rearing £362/ha and compared to sheep £140/ha. The partial budget calculates the new income and costs saved on previous activity compared to the previous income foregone and new costs incurred. This return assumes that the power plant or heating plant operator provides the harvesting and covers the transport costs to the processing location. The gross margin is around £250/ha rising with inflation and with a long term contract to provide security of income.

- ***Forestry small wood***

Larger wood and logs from managed woodland will have a higher value for materials uses such as timber and construction work. Only the small round wood, thinnings, branch wood and brash will be useful for energy. Some of this smaller wood stays on the forest floor, but a higher proportion can be sold for energy without disrupting environmental plans. The income from this extra wood has little cost and can sustainably yield around £100-200/ha pa depending on wood species and circumstances.



*Field of miscanthus*

- ***Annual crops e.g. oil seed crops for transport fuels***

Annual crops include oil seed crops for bio-diesel production and wheat or sugar beet to make ethanol also used as a transport fuel. Already Cornish garages are selling diesel with a 5% bio-diesel content, which helps with the lubricity lacking in ULSD. Diesel cars can with a small modification use 100% bio-diesel. As oil seed crops such as oil seed rape, camelina yellow mustard and crambe also have non energy uses their return as an energy crop will be after processing, from around 2.6 tonnes of oilseed. The price for seeds is around £200/t yielding a gross margin of around £450/ha at the farm gate if the straw value is included.

## ***What is the government view?***

The European Union and the UK government is increasing enthusiastic about the possibilities for biomass energy. The government is consulting now about plans for a new law to ensure that 5.75% of our transport fuels come from biomass sources within the next six years.

The DTI and Defra are also putting in place assistance to increase the production of biomass for many energy purposes. They have set up several grant schemes to assist the development of this aim as well as funding research on improving crop yields in promising species/cultivars.



## ***Grant assistance?***

Grant assistance is available to encourage the biomass industry through grants for pellet stoves in homes through the Clear Skies Grant Scheme: towards the costs of establishing coppice and miscanthus plantations as well as capital grants for biomass power plants and community heating schemes, through DEFRA and DTI Biomass grants and in Cornwall possibly through Objective One.



Pellet stove installed with grant aid, keeps the house warm by filling the top hopper once every 1-2 days



## ***How big can the industry be?***

If many projects, as suggested in renewable energy plans for Cornwall were implemented, ranging from home heating pellet stoves to bio-diesel for local transport are installed then a local industry worth £100 million a year could result, with the creation of 600 new long term jobs. This would also supply 10% of local energy demand saving millions each year in imported energy bills. It would also put Cornwall once again in the forefront with carbon dioxide savings of nearly half a million tonnes a year.

This level of activity would provide differing uses for 11% of Cornwall's land including inserting oil seed crops into the rotations practised by arable farmers and planting more woodlands. In the past some 20% of farmland was used for transport crops, when horses were the main mode of transport, so land use changes on a large scale. The pursuit of a range of options for biomass use will ensure that a patchwork of land use in Cornwall will continue.

## ***Example projects***

A village woodchip boiler in Wales has saved 20% on heating bills and provides heat to a school, a community centre and in the future to 19 homes.

Launceston College has one for its heating, but so far there has been little other activity. In other suitable large buildings. The opportunity can now be taken.

How many of these could Cornwall install in schools, colleges, public buildings such as swimming pools, in hotels, hospitals and care homes?



# Sources of information

## *Organisations*

- **British Biogen** [www.britishbiogen.co.uk](http://www.britishbiogen.co.uk) national trade association for encouraging increased biomass energy use
- **Cornwall Agricultural Development Team:** assisting Cornwall's agricultural sector access European funding Tel 01872 322885
- **Cornwall Sustainable Energy Partnership:** working to alleviate fuel poverty & for sustainable energy actions Tel 01209 614974
- **National Farmers Union:** encourages biomass on farms
- **Renewable Energy Office for Cornwall:** trade association for renewable energy development in Cornwall Tel 01872 864488

## *Companies working in biomass locally*

- **Atlantic Energy:** consultancy and project development for biomass combined heat and power plant, and oil seed crop processing for transport fuel production Tel 01872 864488
- **Bical:** assisting farmers with miscanthus throughout South West Tel 01884 35899
- **Forest Enterprise:** largest woodland owner in Cornwall, working to increase up take of wood for energy purposes Tel 01392 834206
- **Renewable Heat and Power:** supply pellets and pelleting machinery in South West Tel 01398 351166
- **South West Wood Fuels:** co-operative dedicated to automated wood heat boiler installations in the South West Tel 01398 324558
- **Working Woodlands:** working with woodland owners to increase wood markets in Cornwall and Devon Tel 01803 867891

## *Other sources of information*

- Powerplants: biofuels made easy, by Brian Horne. Centre for Alternative Technology, Machynllyth, 1996
- Biomass Farmer and User, bi-monthly Home Grown Energy, Falmouth
- Biomass as a renewable energy source: report from Royal Commission on Environmental Pollution, 2004

