

Delivering on the Energy Coppice Promise – A UK Experience

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Background

In the late eighties the first site/clone trials for short rotation coppice as a biomass fuel were conducted by the DTI and ETSU. Four farmers stepped forward to be the ‘guinea pigs’ and volunteered approximately 10 hectares of land on each of the farms located around the country. Since then research has been conducted at Long Ashton Research Station where SRC crop trials looking at varieties and practical issues have been investigated until recently and the Forestry Commission later became involved in trials with different varieties of willow on a variety of sites across the UK. All of the research conducted was focused on crop productivity, site suitability, willow varieties and practical issues such as planting and harvesting. Short rotation coppice was deemed to be a very practical, environmentally friendly and cost effective method of farm diversification for farmers and the focus remained on producer led activity.



10 Hectares of Willow Coppice from Original Site/Clone Interaction Trials

Throughout this research and development period very little attention was paid to the potential end users. Small-scale biomass plants were limited to the wood processing industry and rural areas where wood and coal fired stoves were used on a domestic level. The first few small-scale biomass heating systems were installed in the early 1990's with government funding. A variety of available equipment was used and comparison studies conducted looking at the efficiency, fuel consumption and down time of each of the boilers. Although most of the installed systems were successful the equipment was larger than standard fossil fired heating systems and vastly more expensive. In addition, there was still a certain amount of cynicism about the reliability of such systems. Oil and gas systems are extremely reliable and require little to no intervention whereas the biomass systems require a level of maintenance that was in some cases not offered as a service by the boiler manufacturer or supplier that the owner would not wish to undertake. In addition, a number of systems due to unreliable fuel supply encountered many problems and were not conducive to a rapid uptake of biomass heating systems in the UK. The development of small scale biomass systems was therefore very slow and did not encourage the planting of short rotation coppice as many of the end users had an existing

or local supply of wood fuel at a low cost and the four year lead in time for SRC was inconvenient.

UK Approach to SRC

The UK governments approach to biomass has until recently been rather disjointed and as a result schemes have failed for a variety of reasons such as lack of financial viability and poorly focused incentives. For example the main incentives for biomass development were for farmers to plant SRC. This was due to the high estimated price per tonne of SRC. The incentives were not however, focused on developers to establish plants as NFFO contracts were very competitive thus forcing down the price of electricity. As a result very little SRC was planted in the 1990's in the UK, and the SRC that was planted for research and for potential developments risked not having an end user. This was the case with the vast majority of growers who planted for research purposes for both ETSU (Energy Technology Support Unit) and the Forestry Commission. Of the four farmers who took part in the original trials only one still has the plantation, the remainder had their trees removed, and this farmer does not use his willow trees for energy but for a variety of other uses as will be described later.

SRC in the late 1990's

The late 1990's was the boom time for SRC and biomass medium scale biomass plants in the UK. Companies such as First Renewables, Border Biofuels and Ambient Energy were awarded NFFO contracts for a variety of biomass developments most of which were advanced technologies such as gasification and pyrolysis with a commitment to utilising a combination of forestry residues and short rotation coppice.

Delays to many of the projects were due to a variety of factors, the Border Biofuels plant had difficulties with road access and the cost of road improvements soon became so high that the project stalled. Ambient Energy had two identical 5.5 MW biomass gasification projects planned for Cricklade in Wiltshire and Eye in Suffolk. The project in Eye was fortunate to get planning permission however the plant proposed for Cricklade was rejected at the planning stage due to claims by local residents that electricity from biomass was not necessary – a rather bizarre claim however; it demonstrates the lack of understanding in the UK at that time.



Computer Generated View of the 5.5 MW Cricklade Biomass Plant (Ambient Energy)

Finally, there was Project ARBRE (ARable Biomass Renewable Energy) which would be a flagship project for Great Britain and Europe. It was to be an 8MW gasification plant utilising combined cycle technology situated in Eggborough in Yorkshire. Both the DTI (Department of Trade and Industry) and the European Commission put in grant funding of £3m and £10m respectively with the remainder of the finance coming from private companies.

Project ARBRE was estimated to use 43,000 odt (oven dried tonnes) of wood chip per annum and was planned to utilise biomass fuels from two main sources; forestry residues and short rotation coppice. As a result farmers in a 40 mile radius of the plant were encouraged to plant short rotation coppice and were given contract to guarantee a market for the fuel grown. In total over 1500 hectares of short rotation coppice was planted in a 40 mile radius of the plant. A growers group was established to enable farmers to pool resources and therefore ensure efficient production of fuel. The first harvest was due this autumn (2003).

Unfortunately, in 2002, the developers of Project ARBRE pulled out of the programme due to long delays in commissioning and the many technical problems encountered. As a result ARBRE has been inactive for over a year and is still seeking a new owner with many rumours circulating about companies interested in purchasing and moving the plant abroad and some that would operate the plant in its current location but would import cheaper forestry residues from Scandinavian and Baltic countries rather than honour the contracts in place with UK growers.

Reasons and Consequences of Project Failures

There is a wide variety of reasons for the failure of all of these projects that were being developed in the UK in the late 1990's and early 2000's. One of the main factors was failure to get planning permission for the construction of the biomass plant which ultimately stems from a lack of understanding within the general public regarding renewable energy, particularly biomass. In some cases, particularly for developments in AONB's (Areas of Outstanding natural Beauty) or rural areas, the decision boils down to protection of the environment versus protection of the landscape. For local communities living close to the site of the proposed development, the landscape is likely to win as has been shown with the Cricklade project and other renewable energy schemes.

This demonstrates that a strong community theme underpinning the development of any scheme, and for biomass this includes both the construction of the plant and the planting of SRC, will greatly increase the project's chance of success. If communities feel a sense of ownership of a project through strong community consultation process, potential for investment and prospective job opportunities, rather than a feeling of invasion with little to no community involvement a scheme will be championed by local communities thus vastly increasing the chances of success.

The other main reason for failure of projects in the UK is due to the use of advanced technologies which in some cases are not proven. For ARBRE this was the main reason

for failure as the plant had been successful in the planning stage, the fuel supply was in place and the project was looking very promising. However, the project encountered numerous problems in commission of the plant and never achieved electricity generation before the developers pulled out.

The three main developers involved in these advanced technology biomass projects have all gone into receivership in the last year or two. As a result a lot of bad feeling has been generated amongst the farming industry. Over 45 farmers who were contracted to supply fuel to ARBRE have been left without an end user for their fuel. A number of other farmers who planted short rotation coppice in anticipation of Cricklade, Eye and several of the Border Biofuels plants were also left without end users.

The failure of these projects has instilling little confidence in the contracted growers for Project ARBRE and this has had a knock on effect across the country when trying to employ new growers for developing projects. The national newspaper, The Guardian, has followed the story closely and the trade magazine, Farmers Weekly, has strongly reflected the views of the farmers affected by the failure of the project thus creating general ill-feeling in the industry and a high level of scepticism of new projects.

Alternative Uses for SRC

As a result of the loss of an end user for many of these farmers alternatives have had to be sourced. Some farmers have left the willow to grow and in some case it is seven or more years old. In this case it is often used for local pheasant shoots and has generated an income in this way. A farmer in Oxfordshire who planted SRC in one of the first site/clone interaction trials still has his original 10 hectares of willow coppice although it had never been used for it's original purpose as a fuel.

He has found a number of innovative uses for the willow coppice that was planted on his farm. For a period he rented out a farm building to a willow sculptor who purchased willow rods and produced a variety of sculptures and furniture. In addition, the farm is situated on the Thames and he has made one of the river side fields into a caravan park, and a mooring area for boats. For many years now he has utilised the willow rods for riverbank spiling to prevent soil erosion of the bank which is deemed to be a very beneficial practice as the freshly cut willow takes root and produces a living wall that creates habitat for a range of wildlife.



Willow Arch at Friars Court Farm

One of the ARBRE farmers has installed a woodchip fired heating system at his farm in order to create a market for his willow coppice and other farmers from ARBRE are looking at co-firing possibilities with large-scale coal fired power stations.



ARBRE Farmer, Gareth Gaunt, with his new Biomass Heating System

A Holistic Approach to SRC

In the Thames Valley we have observed the events of the last few years and have seen the effect of these failed projects, particularly ARBRE, on the uptake of new biomass projects in the rest of the country. As a renewable energy agency our emphasis has been to get projects installed and generating energy, whether electricity or heat, from renewable sources. Initially, attention was on small scale woodchip heating systems for large buildings such as schools and estates; however, security of supply was always an overriding factor for organisations when considering biomass heating. As a result TV

Energy set up a subsidiary, TV Bioenergy, to establish a local wood fuel supply infrastructure and thus guarantee security of supply enabling small scale biomass heating projects to go ahead without the concerns of fuels supply.

In the last year the UK government's target of 10% of electricity from renewable sources by 2010 has filtered down through regional government and has resulted in targets for each sub-region in the South East. For the Thames Valley and Surrey sub-region the targets for biomass are:

	Biomass Combustion / Thermal	Biomass Anaerobic Digestion	Onshore Wind	Small Scale Hydro	PV	Total
Installed Capacity (MW)						
2010	up to 85	9	39	0.5	6.8	140
2016	up to 125	14	58	0.5	11.7	209

(Source: SEERA (May 2003); 'Harnessing the Elements')

As a result of these targets it was realised that our attention would also need to be focused on the development of medium to large scale biomass electricity and CHP generation plants in addition to the small scale systems.

There is a very ready supply of biomass from existing woodlands and forests in the South East of England with Surrey being our most wooded county. However, once the surplus has been absorbed by the anticipated biomass plants the sustainable annual yield will be considerably less. In order to supply the demand from the number of plants required to meet the targets in the South East strategy document an element of energy crops would be required.

In anticipation of this requirement for short rotation coppice in the Thames Valley in the next 7 to 10 years, TV Bioenergy has planted 4 hectares of SRC as a demonstration for other farmers and landowners in the region and has applied for funding to establish a short rotation coppice producer group in order to plant SRC strategically with the increasing market and in locations close to end users. The group will enable farmers and landowners to pool their resources in terms of bulk purchases of planting material, coordinating equipment hire, sharing storage facilities and exchange of information and experience. Due to the close links to TV Energy, the producer group will have direct access to the existing and developing markets and will therefore be eligible for government planting grants which require proof of an end user.

The only medium scale biomass user in the Thames valley to date is Slough Heat and Power, an old coal fired power station that has been on the site since the 1920's. As a result of the Renewables Obligation and the Climate Change Levy the plant was converted to run on woodchips which proved to be a relatively simple process due to the solid fuel technologies employed at the power station. They utilise wood from a variety of sources such as forestry residues from tree surgeons and woodland owners, waste wood from shredding of pallets and demolition timber and also short rotation coppice from some of the existing plantations from trials and the Cricklade project.

Unfortunately, the power station can not offer SRC growers a good price for the fuel as they have a waste licence and can obtain cheap fuel from the waste industry. However, other developments in the region are on the horizon and will be in a position to offer a fair price for SRC as their licence will only permit the combustion of clean biomass fuels. The first such project will be a 6MW biomass CHP plant built as part of the Bracknell town centre redevelopment programme. The fuel demand of this plant will be in the region of 40 – 50,000 odt of woodchip per year which will need to be sourced as locally as possible. TV Energy is a partner in the development process of the energy sector of the Bracknell project and as a result will be able to link up the SRC producer group with the biomass market in Bracknell.

TV Energy's position as a developer of biomass project from the small to medium and large scale for electricity, CHP and heat only production puts them in a unique position of control of the development of biomass schemes in the region. There is the opportunity to learn from past mistakes from the failed projects in the UK and put practical solutions into place. For example, all potential biomass projects involve close consultation with local communities, site visits and seminars are organised for developers to understand the technology better and simple, reliable technologies are used and recommended. By having confidence that projects have been approached in the correct manner, farmers and landowners can be encouraged to plant SRC and have confidence in the successful operation of the scheme, and new growers can be introduced in coordination with the development of new projects.

This holistic approach to the development of biomass schemes in the South East of England will enable a successful industry to blossom and expand in line with regional government targets, it will see the generation of new jobs in the region and it will see a boost for energy crops with the introduction of a reliable end user and coordinated growth. In turn this will offer a economic and environmentally sound method of diversification for farmers in the Thames Valley and the South East.

References

1. www.guardian.co.uk (2003)
2. <http://technology.open.ac.uk/eeru/natta/renewonline> (2003)
3. Macpherson G. (1995); 'Home-Grown Energy from Short Rotation Coppice'
4. SEERA (2003); 'Harnessing the Elements'