

Delivering on the energy coppice promise – A UK experience

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1. BACKGROUND

In the late eighties the first site/clone interaction trials for short rotation coppice (SRC) as a biomass fuel were conducted by the Department of Energy and its technical support unit, ETSU. Four farmers volunteered to be the ‘guinea pigs’ and approximately 10 hectares of land was planted on each of the farms located in different parts of 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. More recently, the Forestry Commission have become involved in trials with different varieties of willow on a range 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. SRC was deemed to be a very practical, environmentally friendly and cost effective method of diversification for farmers and the focus remained on producer led activity.



10 Hectares of Willow Coppice from an original site/clone interaction trial

Throughout this research and development period very little attention was paid to the potential end users. The UK has no history of district heating which has been a route for many countries ‘plugging in’ biomass projects. The emphasis has therefore been on developing small to medium scale heat only projects. 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 the help of 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 considerably more expensive.

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Operating experience showed that biomass systems required a level of maintenance that was in some cases not offered as a service by the boiler manufacturer or supplier. By comparison, conventional oil and gas systems were seen to be extremely reliable and required little to no intervention. Further more, a number of systems encountered severe problems due to unreliable and poor quality fuel supply. These factors taken together did little to encourage the uptake of biomass heating systems in the UK.

As a result, the development of small scale biomass systems was very slow and did not encourage the use of wood fuel. The case for energy crops was further affected by the ready availability of cheap or even free supplies of local wood chip from existing woodland operations. The four year lead in time for SRC was seen as inconvenient and the extra cost in producing the fuel the killer blow.

2. UK APPROACH TO SRC

The UK governments approach to biomass has until recently also been rather disjointed with a lack of connection between producers and potential users (the market). As a result schemes have failed for a variety of reasons such as lack of financial viability and poorly focused incentives. 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 cast majority of growers who planted for research purposes for both ETSU 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.

3. 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 (Non Fossil Fuel Obligation) 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 occurred to many of the projects due to a variety of factors, the Border Biofuels plant had difficulties with road access and the cost of road improvements became so high that the project eventually 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. Nevertheless, it demonstrates the continuing lack of understanding in the UK of the need for green energy. Off the record comments concerning Cricklade also show that local residents feared this plant might be 'a Trojan Horse' for a waste incinerator and the concomitant risk that would be posed from harmful emissions. Additionally, residents did not like the 'visual intrusion' of the plant (particularly the stack) and also objected to the additional vehicle movements that would be needed to supply the plant with fuel.

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

Finally, there was the project ARBRE (ARable Biomass Renewable Energy) which was to be a flagship project for the UK and Europe. It was to be an 8MW gasification plant utilising combined cycle technology situated in Eggborough in Yorkshire on the site of an old power station. 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 SRC. As a result, farmers in a 40 mile radius of the plant were encouraged to plant SRC and were given contracts. This to ensure a market for the fuel grown. In total, over 1500 hectares of short rotation coppice was planted. A growers group was established to enable farmers to pool resources and to facilitate efficient production of fuel. The first harvest was due this autumn (2003).

Unfortunately, in 2002, the final developers (there had been much changing of companies and influences over the years) 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. There are many rumours circulating about companies interested in purchasing and moving the plant abroad. There is also a possibility of operating the plant in its current location but the company concerned would import cheaper forestry residues from Scandinavian and Baltic countries rather than honour the contracts currently in place with UK growers.

The truth is yet to emerge, likewise a final solution – if one exists to this unfortunate project development now haunting the industry.

4. REASONS AND CONSEQUENCES OF PROJECT FAILURES

There are a wide variety of reasons for the failure of these key 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

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of the proposed development, the landscape is likely to be the primary concern as has been shown with the Cricklade project and other renewable energy schemes.

One way around the planning difficulties is to demonstrate 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. We believe that this will greatly increase the project's chances of success. If communities feel a sense of ownership of a project through a 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.

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 otherwise looking very promising. However, the project encountered numerous problems in commissioning and never achieved electricity generation from wood fuel 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. This does not bode well for the embryonic wood fuel industry. Coupled with this, much 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 SRC in anticipation of Cricklade project, Eye and several of the Border Biofuels plants were also left without end users. However, they have hectares of SRC ready for harvest!

The failure of these projects has instilled 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.

5. 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 cases it is seven or more years old. In such cases the SRC 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 its 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.

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Willow Arch at Friars Court Farm, Oxfordshire

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

6. 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 regional renewable energy agency our emphasis has been to get projects installed and generating energy, whether electricity or heat/ cooling, 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,

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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 consequence 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/ tri-generation or even polygeneration plants (e.g., includes the production of hydrogen for transport fuels) 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 than that required. In order to supply the anticipated local demand from the number of plants required to meet the targets in the South East strategy an element of energy crops will be required.

In anticipation of this requirement for SRC in the Thames Valley in the next 7-10 years, TV Bioenergy (Coppice) Ltd has planted 14 hectares of SRC (with partner RMC Aggregates) as a demonstration for other farmers and landowners in the region and has applied for funding to establish a SRC 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. The new company business plan calls for 2,600 hectares of SRC to be planted by 2008.

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 large 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 benefits accruing from Government initiatives such as 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. This plant utilises wood from a variety of sources such as forestry residues from tree surgeons

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and woodland owners, waste wood from shredding of pallets and demolition timber and also SRC from some of the existing plantations from trials and the Cricklade project.

Unfortunately, the power station will not offer SRC growers a good enough price for the fuel to make growing an economic proposition. (Slough has a waste licence and can obtain cheap fuel from the waste industry therefore there is not the need.) However, other developments in the region are on the horizon and TV Bioenergy in conjunction with new plant operators will be in a position to offer a fair price for SRC. Such projects will only permit the combustion of clean biomass fuels and will need to pay a premium price for wood fuel. The first such project will be a 6MW biomass CHP/tri-generation 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 co-developer of biomass project from the small to medium and large scale for electricity, CHP and heat only production potentially puts them in a unique position to influence 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 an economic and environmentally sound method of diversification for farmers in the Thames Valley and the South East of England.

7. REFERENCES

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