

Nuffield Farming Scholarships Trust



2003 SCHOLARSHIP PRECIS REPORT

ENERGY CROPS AND THE MARKET FOR BIOMASS IN THE UK

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1. Introduction

I am a farmer, a farmer already committed to energy crops. I have planted 11% of my family's farm area to Willow Short Rotation Coppice (SRC), 172 Ha planted to supply 'Project ARBRE', a failed private enterprise and government backed renewables power station in South Yorkshire (*see Note 1, below*). Therefore, the world's largest single block of SRC that as of March 2003 (commencement date of this study) had no apparent market. Indeed, all the ARBRE growers committed their private enterprises to this new crop, inspired by government rhetoric. **Was planting SRC the right decision? Should farmers be growing energy and NOT food?**

The western world has a problem, **fossil fuels are running out and energy demand is increasing**. At the same time the western world often has the problem of overproduction in agricultural food production that in the past has led to oversupply and low world prices. Is there therefore an obvious solution? Can farmers be used to supply our energy needs? This study seeks to answer these key points. This report is written by a farmer and investigates the motives behind climate change, the inevitable shift from fossil fuels and the growing and financial viability of energy crops.

Tony Blair announced in February 2003: 'We need energy to heat and light our homes, to help us travel and to power our businesses. However, our energy system faces new challenges. Our energy supplies will increasingly depend on imported gas and oil from Europe and beyond. We need urgent global action to tackle climate change'.

The government had established grand renewables' targets and were committed to the Kyoto Protocol. There is now a need and desire that British Farmers start producing energy. In the future **ENERGY** will be politically more correct to import than **FOOD**. So this report is a farmer's view as to whether growing energy crops is viable, is it realistic for the energy providers and for the farmers.

The **Nuffield Farming Scholarship** has given to me the opportunity to study the issue in countries that are generating high percentages from their energy from Renewables, look at how they achieved this and seek if their situation can be replicated and adopted in the UK.

There is a subtle development. British farmers will have the opportunity to produce a commodity that the nation requires. We are becoming dependant on imported energy, we will be importing more electricity, oil, coal and gas, the public is beginning to realise the implications of this. So there is now a market place developing for locally grown energy. UK agriculture can start to once again meet the nation's requirements and produce energy that is environmentally clean and economically sustainable. The government has set high targets for its renewables objectives and it is now up to the market place to encourage growth.

Note 1, ARBRE: As a farmer I backed the 'ARBRE' (Arable Biomass Renewable Energy project at Eggborough, Selby, North Yorkshire) project in the late 1990s, this had much government support but still failed and left 50 UK farmers with Energy Crop and no market. So I have the self-interest to dig deep, look into this emerging industry and try to find answers as to why it is all failing, learn lessons and help build the sustainable development that at present is lacking.

2. Study Aims and Objects:

- a. Increase farmer understanding and awareness relating to growing specific crops for energy
- b. Promote Energy Crop to the market as a viable form of biomass
- c. Learn lessons from other countries that are producing significant percentages of their energy from biomass. 'No need to reinvent the wheel'
- d. Learn new and innovative husbandry techniques that could further reduce the cost of production
- e. Determine best approach when returning SRC to arable production

3. So why do we need energy crops, what are the main drivers?:

a. Economic

Firstly, there is a strengthening economic case. The UK is now reliant on imported Energy from a wide range of countries; this throws us into a situation whereby every aspect of our economy will be reactionary to fuel prices. We already in 2004 can witness the reality of this precarious economic position, our economic drivers such as interest rates and inflation are severely influenced by the 'price of oil'.

b. Political

Already we (the UK) import over half of our Net Energy and we are now classed as a Net importer of our energy. Politically are we wise to expect uninterrupted supplies of our energy from Norway, Russia, the Middle East, and North Africa?

c. Climate Change

There is now very strong scientific evidence that climate change is happening and that it is being accelerated by human activity. The world is getting warmer! This is the result of an increase in atmospheric concentrations of greenhouse gases- notably Carbon Dioxide (CO₂) released by burning fossil fuels such as Coal, Oil and Gas. By absorbing heat these gases keep the earth's temperature warmer than it otherwise would be. Climate Change research has looked at how far changes in temperature over the past century is due to human activities. Natural effects, such as variations in the sun's output and volcanoes, are insufficient to explain for the increase in temperatures.

4. Energy Crops

Specific crops planted for heat and power are classed as Energy Crops. In the UK presently two main crops are recognised as Energy Crop due to their ability to generate large amount of Biomass quickly. Biomass is 'anything derived from plant or animal matter'. These crops are Willow Short Rotation Coppice (SRC) and Miscanthus. During this report I mainly discuss Willow Short Rotation Coppice (SRC), which offers the fastest growing form of biomass in the UK. Willow SRC can reach the market within four years of planting. Energy markets (heat and/or power) require a dedicated local supply, Energy Crops can satisfy this demand.

5. Willow Short Rotation Coppice

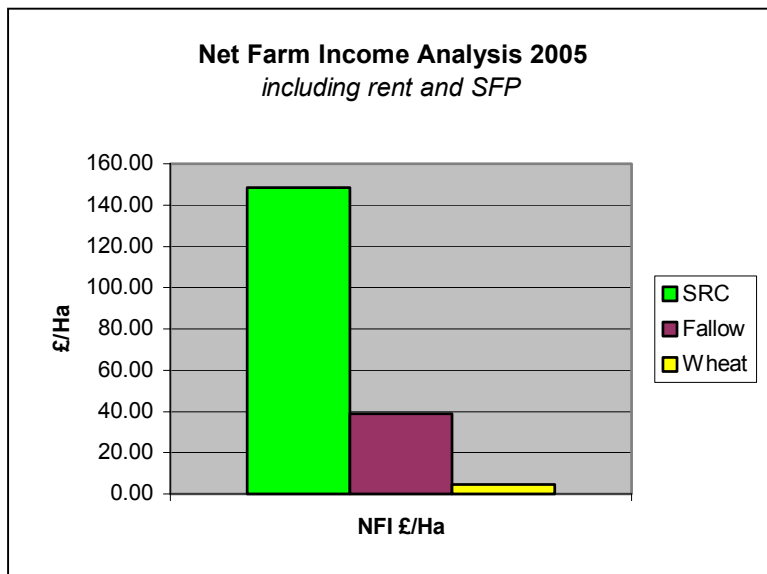
This report outlines the history of SRC, identifies and discusses the various options for husbandry techniques and storage. It examines the financial viability on farm and compares farm income with conventional cropping. CAP reform and decoupled payments are now with

us and farmers need to analyse whole farm costs, no more will farmers grow crops to claim subsidy, it is a decoupled payment. UK farmers have to adapt quickly to this. SRC has one great advantage it is as effective a tool at reducing so called 'Fixed Costs' or overhead costs as is fallow. In fact the same principal applies, if a farmer only fallows 5% of his farm then savings on fixed costs are not possible, the farm still requires the same number of tractors, staff etc. On the other hand if the farm went totally to fallow the labour and machinery costs can be brought down to the bare minimum required for maintenance and environmental protection. SRC does make financial sense as a straight Gross Margin comparison with conventional cropping, however when used as a tool to reduce overhead costs the crop is being used to its best effect.

The report also considers the implications of returning fields back to arable production. This is a big hazard that prevents farmers from planting SRC. I previously imagined that it would be an expensive task requiring much cultivation over a season. I was thankfully wrong, I visited two farmers who had removed SRC in the preceding autumn, one in Denmark and one in Sweden both were not aware of each other but had used similar systems with the same result.

So as farmers we will have a new market that is renewable energy. We have proved that by growing crops such as Willow Short Rotation Coppice (SRC) we can offer the marketplace a competitive and clean fuel. During my study it soon became clear that farmers should retain all the value in the supply chain and need to retain vertical integration. This is why I support the governments' initiatives to support and promote 'Producer Groups' as it provides a vehicle for individual farmers to embrace the market directly, minimising cost and retaining the energy price. With Energy Crops and renewable energy we farmers have an emerging industry let us make it sustainable and hold on to the income to aid the whole supply chain.

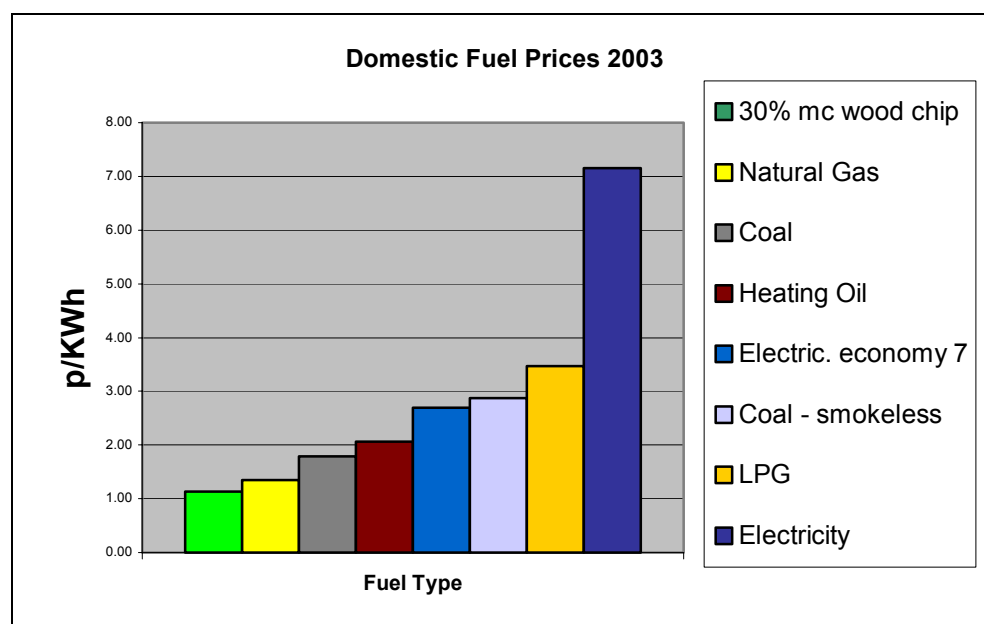
Renewable Energy Growers Ltd represents about 85% of the Energy Crop grown in the UK. It purchased a sugar cane harvester from Australia to harvest SRC in the 2003/2004 season and has harvested 300Ha within this period. It has provided support to the first growers of energy crops and is working hard with the energy markets. The wood energy will be mainly used in existing coal Power Stations and help UK generators meet their Renewable Objectives.



Farmers in the UK have learned valuable lessons already in the production of SRC and with CAP Reform and the Single Farm Payments (SFP) the crop looks very much a financially viable option for the future, but before we farmers go out and plant hundreds of thousands of Hectares to SRC we need to have secure markets.

6. The Price of SRC Fuel

Energy Crop offers the cheapest form of heating fuel and over the coming years wood heat boilers will become more common. Gas, oil and coal will only become more expensive as they run out over the next twenty years and wood heat will become the most common source of heat fuel, it already satisfies 30% of the market in Scandinavia and Austria.



7. Lessons from Abroad:

a. To stimulate domestic and local heat schemes:

The draw back to wood heating is the initial capital cost, the price to pay for efficient automated wood burning boilers. Look to Austria that has nearly 40% of their heating from wood boilers, here they have a capital grant scheme that allows up to 50% of the capital cost. The difference to the UK being that the grant is easy to obtain, it is not as a competitive tender system, therefore a market can be identified such as a council building or a group of houses and local farmers with the local supply can quote to install the scheme knowing that they will get at least 40% subsidy to the whole set up cost. It also encourages **vertical integration**, the government has recognised that local sustainability is key to the success of a sustainable energy infrastructure. It encourages this by allowing the primary producers to receive 40% grant whereby any other individuals are also able to claim the capital grant but only up to 25%. This gives the farmers and foresters an advantage but it allows any profits to remain within the supply cycle and means that the suppliers who are the farmers achieve a reasonable product price. Where middlemen are siphoning profits away from the supply chain a fair price is not capable of going to the producers. Good quality uniform fuel is key and SRC farmers can look to satisfy this critical demand support their attempts to embrace the market.

b. To stimulate Energy Suppliers to turn to Biomass and Energy Crops

Keep it simple, remember that energy suppliers and producers have to make money and will always only look to **produce electricity** at the best profit, they do not have the luxury of building biomass power stations and hoping that in 10 years time the fuel will be cheaper.

The answer is simple and one that is adopted by many other countries. It is also rational, as fossil fuel users should pay a price that compensates the environment and the government for the pollution that is emitted. Simply, **apply tax on fossil fuels**. I have been fortunate enough to demonstrate this at a DTI biomass summit however the government is reluctant to consider it, as it will have an immediate up lift of electricity price until the market adapts and has developed specific biomass power stations to burn SRC in its cheapest form- chip or billets. However, in Scandinavia it works, take Denmark for instance: Denmark is at wind saturation point! The country is Europe's leader in wind energy and it has now reached saturation point but it is Biomass that provides the vast majority of the nations renewable energy. Denmark has a similar forestland cover area to the UK at around 10% but by far the most significant renewable energy source is and will continue to be biomass. Biomass contributed 61 PJ (petajoule) in 1996, which should increase to 85 PJ in 2005 and 145 PJ in 2030. This has mainly been achieved by adopting an Energy Tax on fossil fuels and state subsidy to promote biomass CHP plants. The Energy Tax and CO2 tax account for about 150% of the purchasers buying in price if using fossil fuels. This makes biomass (wood chips, wood pellets and straw) about half price compared with fossil fuels and has been a major incentive. What's more is that the energy producers realise that the incentive will remain in force as the 'Heat Supply Act' of 1990 demonstrated cross party support and all major parties signed up to the agreement.

8. Recommendations

To UK Farmers:

- Consider planting SRC not only on Set aside area but use it on whole blocks to reduce whole farm fixed costs
- Know the market, only plant when you can be sure of the market and the price
- Grow SRC as a crop and manage it accordingly
- If grown on poor areas of farm, expect the consequences
- Retain the market share, it's a new crop with new evolving market. Support local producer groups and seek local end users
- Make sure that good quality fuel to the correct uniform specifications is delivered to the end market. Quality fuel is essential to build consumer confidence

To UK government:

- Support proven (old) as well as innovative technology
Learn from 'arbre'
- Simplify the subsidy systems
Learn from Denmark
- Allow the primary producer to keep a market advantage. Encourage vertical integration
Learn from Austria
- Benefits of Carbon trading to the producers
Keep benefits with producers
- Tax on fossil fuels
Learn from Scandinavia
- Keep it simple!
Learn from your mistakes

9. Conclusion

On setting out at the start of 2003 on the Nuffield study I left with an open mind. I had previously planted 172 Ha of SRC but I was perfectly willing to accept the consequences, if I concluded that the crop had little future I would take out the crops and return them to cereal production. This is not the case, I see yet more demand for some pioneering which is personally challenging and expensive but the study has proved to me that Willow SRC Energy Crop is viable, necessary and so, so nearly there! So the fuel is competitive but the government needs to support the growth of renewables, it's a new market offering its advantages to the whole nation. Scandinavian countries brought in fossil fuel taxes and this has given renewables a commercial advantage, I believe that this is the correct approach, it is simple and it is bringing in money from the dirty fuels. Whichever approach the government adopts, it needs to be swift or the nation's lights may just go out.

In the introduction I asked three questions:

Was planting SRC the right decision?

Answer: No and Yes! No, obviously because ARBRE failed and does not offer a market. However, Yes, because it has inspired the growers to stick together and find new markets which has now created a new viable market place.

Should farmers be growing energy and NOT food?

Answer: Yes, because financially it is the correct decision. The market is still in its infancy but is now there and marketing contracts are on offer to supply power stations such as Drax and Cottam. CAP reform and decoupled payments in agriculture have opened the door for farmers to embrace the market and energy crops offer a viable option.

The Nuffield Study has proved to me that energy crops are an emerging market that is now viable in the UK and it will become more secure over time. I believe in a secure future for energy crops and I am **not** ripping out my 172 Ha of SRC, in fact I am planning to plant more in 2005!