

THE POTENTIAL FOR FARMERS TO BECOME INVOLVED IN THE WOODFUEL SUPPLY CHAIN THROUGH THE USE OF SHORT ROTATION FORESTRY

FINAL REPORT

NOVEMBER 2007

**PREPARED FOR NORTHERN WOODHEAT BY CAMERON ROSS,
CROSSCUT FORESTRY**

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EXECUTIVE SUMMARY

This study was commissioned by Highland Birchwoods as part of the Northern Woodheat Project. Northern Woodheat is a Northern Periphery Programme funded project managed by Highland Birchwoods with partners in Scotland, Iceland, and Finland. The principal aim of the project is to encourage small and medium scale wood-fuel supply chains optimising benefits to local communities.

The remit of the study was to consider the potential for farmers in Caithness, in the far North of Scotland, to become involved in the growing, processing, and supply of woodfuel through the use of a Short Rotation Forestry system (SRF) using species native to the Highlands.

An earlier, and more extensive, report, commissioned by the Forestry Commission and Defra, and published by LTS International in 2006 identified SRF as having potential as a source of renewable energy for heat and power generation in the UK. The report advised on a number of issues that needed to be addressed before SRF could be widely established but concluded that, "Overall, SRF appears to have potential ... as a source of renewable fuel. There are potential negative impacts from SRF, but these could be controlled and minimised by the application of a creative, integrated code of practice to ensure SRF operates in an optimal way to secure the positive impacts."

The report recommends that clear guidance in the form of a code of practice should be provided to growers on how to establish and manage their SRF crops in a way that minimises the effects on these aspects and suggests further research on:

- Growth rates and yields that might be achieved
- The economics of SRF for the grower
- The water use of SRF stands.

Although focused on Eastern England the LTS report identifies the general potential for SRF on a national basis whereas this particular report considers the issues associated with its implementation in a particular locality with the aim of providing clear advice within the context of that locality.

Caithness is the most northerly region on the mainland of the United Kingdom and agriculture and forestry are important aspects of its economy. Almost 80% of land in the region is managed under some form of agricultural tenure and with uncertainties related to Common Agricultural Policy (CAP) reforms and the economics of farming in a marginal area, many landowners and farmers in the region are aware of the need to consider diversification options to secure their futures.

Global demand for timber products is growing and the emerging markets of China and India, in particular, are absorbing vast quantities of timber from Europe and Russia that would previously have been utilised in Western Europe. This situation is having an impact on timber markets with increased prices for timber products and, most significantly, serious concerns are being raised about the availability of timber resources to meet this increasing demand.

Simultaneously the renewable energy industry in Scotland has developed in response to international, national, and local policies aimed at reducing greenhouse gas emissions and increasing the amount of energy generated from renewable resources. The burning of wood to generate heat and power is an integral feature of these policies, and mechanisms have been put

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in place to encourage the development of a wide range of wood-fuel plants. As a result there are many recently commissioned woodfuel developments and many more under construction and in the planning stage. The recently formed Woodfuel Task Force for Scotland has indicated a rise in demand for wood-fuel in Scotland from a current 200000 green tonnes/annum to 2.6million green tonnes/annum within 3 years.

In Caithness, a newly formed company, Caithness Heat & Power is presently constructing a 4MW Combined Heat & Power (CHP) plant in Wick, a town with approximately 8000 inhabitants. Through the burning of 8000tonnes of wood-fuel per year and the utilisation of surplus heat from the local distillery this plant will have the capacity to provide heat and hot water for 500 homes and a local hospital. The second phase of this development will increase the capacity to a level where most of the homes and small businesses within Wick could be supplied with heat & hot water requiring a total of 32000tonnes of woodchip/annum.

Initially the plant will be supplied from existing state and private woodlands within Caithness where large-scale afforestation schemes in the 1960's, 70's and 80's have ensured a relatively low value timber resource remote from existing markets and therefore readily available for local markets.

Production forecasts for the North of Scotland indicate increasing volumes of timber suitable for woodfuel being available until 2025 at which point production reaches a peak and then starts to reduce. Forestry Commission Scotland (FCS) has committed to supply up to 50% of the projects timber requirements leaving the project requiring 50% of its raw material from the private sector. Although the indications are that this timber is available, private sector woodland owners are reluctant to make long-term commitments and are greatly influenced by supply and demand scenarios when marketing their timber. With the increasing demand and predicted shortfalls for SRW throughout Europe, and considering the fact that SRW is presently being shipped out of Caithness to markets in Scandinavia, it would be prudent for Caithness Heat & Power to be considering methods of securing raw material supplies from the private sector for the medium to long term.

It is within this context that farmers should be considering the growing of woodfuel from SRF either independently, co-operatively, or in partnership with Caithness Heat & Power. Historically farmers have been reluctant to plant trees on their land as they consider this to be the removal of land from agriculture. This situation is exacerbated when it is the best land that is being considered for forestry and recent price rises for cereal crops will strengthen this attitude within agricultural communities.

Where opportunities may arise for forestry is on improved land not suitable for cereal production but currently used for the grazing of livestock. There is widespread recognition that the rearing of sheep and cattle is an economically marginal operation and with uncertainties over on-going support measures, feed prices, administrative costs, and bio-security many farming units are considering the viability of their livestock.

If significant reduction of livestock were to occur in Caithness then the growing of wood-fuel on a 20year rotation, possibly more acceptable to farmers than a conventional forestry rotation of 40 years, would be an alternative land-use worth consideration.

Within 30miles of the plant at Wick there is 46000ha's of improved grassland, free of nature conservation designations and identified within the Highland Councils Forest & Woodland Strategy document as being a priority area for the development of farm woodlands. This

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suggests that with adequate consideration to existing guidelines on woodland creation and landscape, statutory bodies and consultees should be generally supportive of SRF proposals in these areas.

Due to Short Rotation Forestry being a new concept within UK forestry there are currently very few examples and very limited experience of its management. Establishment costs are likely to be broadly similar, to those for establishing conventional woodland on agricultural land, subject to stocking densities, but the yields and therefore financial returns associated with SRF are uncertain. This uncertainty is increased for this particular study by its emphasis on native species with poorly developed growth models, and also the harsh Caithness climate.

Another significant aspect of the economic model that is currently unclear is the level of support available through a Forestry Grant Scheme. The Scottish Rural Development Program (SRDP) to be launched early in 2008 should clarify this issue and is likely to include grant assistance for the establishment of energy crops. The interim Woodland Creation support mechanisms introduced for planting season 2007/08 include a one-off payment of £1000/ha for the establishment of Short Rotation Coppice. This level of support would not be sufficient to attract investment in SRF but it gives an indication of the intent to support energy crops.

Although inconclusive, initial indications are that with adequate support measures in the form of a targeted establishment grant and some modification of species mix to include a proportion of faster growing non-native species than SRF in the North of Scotland could be a viable diversification option for farmers and landowners.

There are various models as to how this diversification could be implemented but the model most likely to maximise returns and to secure long-term success would be the formation of a co-operative producer group to grow, harvest, process, and ultimately supply the woodchip to the end user thereby maximizing the added value elements of the process.

In conclusion, this report identifies that Short Rotation Forestry has the potential to provide a viable alternative land-use to some forms of agriculture currently practiced in Caithness. However before making any strong recommendations on this basis the author suggests:-

- Awaiting the launch of the SRDP suite of grants early in 2008.
- A brief research project looking at growth rates and yields for woodlands established on improved land, in the Highlands during the period 1988 – 2000, under the Farm Woodland Premium Scheme and its predecessor the Farm Woodland Scheme.
- More considered study of the economics of various SRF models for the grower based on the above.
- Discussions between potential growers, relevant agencies and with Caithness Heat & Power Company to identify the most suitable model for delivery of the maximum benefits to the local economy.
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It is vital that, if this project is to progress, then a strategic and co-ordinated approach involving all stakeholders should be applied from this point on.

1.0 INTRODUCTION

This work is a study into the potential for farmers in Caithness, in the far North of Scotland, to become involved in the growing, processing, and supply of woodfuel through the use of a short rotation forestry system (SRF) using species native to the Highlands.

The study is part of the Northern Woodheat Project, one of the objectives of which is to encourage the development of sustainable woodfuel supply chains at the small to medium scale maximising opportunities for local employment and business diversification.

There are several relevant issues addressed by the study with the aim of presenting clear advice on the suitability and impacts of such a system in the region within the context of the Scottish Forestry Strategy, The Highland Forest & Woodland Strategy, a changing agricultural support mechanism, and the construction of the Caithness Heat & Power Plant in Wick.

Issues addressed include:-

- Identification and suitability of appropriate species.
- Identification of suitable sites.
- An assessment of the current market for woodfuel in the region.
- An assessment of the existing woodfuel resource in the region.
- Future demand for Woodfuel.
- Economic implications.
- Constraints.
- Funding Opportunities.
- Policy implications.
- Further work required.

In a wider context the growing of woodfuel sits comfortably with the Scottish policy objective to increase the amount of electricity consumed from renewable sources and the UK commitment to reducing greenhouse gas emissions.

Woodfuel has the potential to make a major contribution to these targets as it is both renewable and carbon neutral as emissions created during combustion are similar to the carbon sequestered from the atmosphere during tree growth.

There is also growing recognition of the value of the supply of heat and hot water from biomass schemes.

The author would like to thank all the individuals and organisations who have assisted in the preparation of this report. All information and data, provided by a number of third parties, has been reported in good faith but the author cannot be held responsible for the accuracy of the original sources.

2.0 THE POLICY CONTEXT

The European Union

The European Union has ambitious policy targets for Renewable Energy, Biomass Energy and Liquid Bio-fuels.

The Scottish Government

- Biomass Action Plan – 450MW of electricity.
- Renewable Heat Strategy – is forthcoming.
- Scottish Forestry Strategy – tackling climate change.
 - promotion of timber.
 - business development.
- Woodfuel Task Force – concerns over timber supplies for biomass schemes and existing processors.

The Highland Council

- Clean Environment Policy
- Forests and Woodlands Strategy

2.1 HIGHLAND FOREST & WOODLAND STRATEGY

The Highland Forest & Woodland Strategy published in May 2006 is a regional policy document whose aim is to translate the national forestry strategy into local priorities suited to the character and geography of the Highland area.

The strategy is a comprehensive document that recognises forestry as an important and extensive use of land that is capable of producing a wide range of benefits. It recognises that there are many opportunities associated with woodland management and expansion and the strategy aims to maximise these in a way that integrates well with other land uses.

The three main functions of the document are:-

- Identifying specific strategic opportunities in key areas
- Highlighting opportunities within the region that merit targeted funding
- Providing a framework for the evaluation of forestry developments.

The key principles underlying the strategic vision for forestry in the Highlands are:

- Ensuring sustainability
- Increasing the community benefits from forestry and woodlands
- Identifying opportunities for forest and woodland expansion
- Improve existing forests and woodlands to deliver multiple benefits

- Work with partners to address economic and infrastructure issues
- Retain and enhance the level of funding for forestry in Highlands

From these principles a systematic assessment of the strategic constraints and opportunities associated with forestry across the region has been carried out resulting in a “broadbrush” indication of the areas’ most suited to specific types of forestry.

Within the context of this study most of the improved and arable land within Caithness is identified as a “Priority Area For The Development Of Farm Forestry” the definition of which is as follows:-

“These areas of the region have been identified on the basis of intermediate land capability for agriculture (LCA), ie classes 3.2 – 5.3. This range extends from average quality arable land to land capable of use as improved grassland but only at low stocking densities. Opportunities exist in such area to better integrate farm woodlands into farm holdings and to provide benefits in shelter and sporting management. There are also opportunities to conserve biodiversity by adding value to farm woodlands, developing woodland grazing regimes, and by creating energy from farm woodlands. A range of woodland types in suitable locations (in Caithness and the Inner Moray Firth particularly) are possible, from shelterbelts, copses, and native woodlands to well designed productive woodland.”

3.0 BACKGROUND TO SHORT ROTATION FORESTRY

Short rotation forestry (SRF), as a silvicultural system involves the growing of trees over a relatively short timescale (10-20years), on improved or arable farmland taking advantage of the higher productivity of such sites and the high productivity of young plantations. When felled the trees would normally be replaced with coppice growth from the cut stumps or by new planting.

Although there are very few examples within the UK and none on an extensive scale, SRF is practised in many regions around the world where Poplar, Eucalypt, and Nothofagus species are used widely in the production of biomass.

The management aim is to promote a stand of single stem trees to a size that can be efficiently harvested and handled, typically removing only the stem wood under a conventional harvesting system.

A report, commissioned by the Forestry Commission and Defra, published in 2006 identified SRF as having potential as a source of renewable energy for heat and power generation in the UK. The report advised on a number of issues that needed to be addressed before SRF could be widely established. These included the impacts upon:

- Biodiversity
- Archaeology
- Landscape
- Water use

The authors recommend that clear guidance in the form of a code of practice should be provided to growers on how to establish and manage their SRF crops in a way that minimises the effects on these aspects.

In conclusion the report states “Overall, SRF appears to have potential ... as a source of renewable fuel. There are potential negative impacts from SRF, but these could be controlled

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and minimised by the application of a creative, integrated code of practice to ensure SRF operates in an optimal way to secure the positive impacts.”

The report recommends further research on:

- Growth rates and yields that might be achieved
- The economics of SRF for the grower
- The water use of SRF stands.

SRF is commonly mistaken to be Short Rotation Coppice, (SRC), which uses fast growing tree species, normally Willow and Poplar, coppiced and harvested, mainly for energy use, on a cycle of 2 – 5 years. SRC has also been the subject of a recent study by the Scottish Agricultural College (SAC) with a report “Commercial viability of non food crops and biomass on Scottish Farms” being published in March 2007.

4.0 LOCATION & LAND AVAILABILITY

4.1 CAITHNESS

Caithness is the most northerly part of the UK mainland and covers 1800sq km. It is a land of open rolling farmland and moorland studded with lochs and dissected by rivers, roads, and scattered settlements. To the north and east it is fringed with dramatic coastal scenery.

Much of the landscape is dominated by open moorland and bog that is of international significance and has been designated as Scotland’s most recent National Nature Reserve.

Forestry currently covers 10% of the land area in the region and gained some notoriety, during the 1970’s and 80’s, with large-scale afforestation of these important habitats with exotic species such as Sitka Spruce and Lodgepole Pine under a tax regime that attracted investment from wealthy individuals and institutions.

Agriculture is the predominant land use in the area and mixed farming and crofting is carried out widely with arable and improved grassland covering 25% of the land area. Most of this better land is located in the NE part of the region. The production of a range of crops along with the rearing of cattle and sheep makes a significant contribution to the economy of the region.

It is widely recognised that agriculture throughout the UK is undergoing radical changes and many farmers face an uncertain future. One of the major causes of this of this uncertainty is the reduction and ultimate removal of the Single Farm Payment (SFP). This payment is a support mechanism paid to farmers that recognises the value of production subsidies that have been historically paid to them and this payment it is likely that this will be phased out in 2012.

This hugely significant change will subject the economics of many agricultural operations to a scrutiny not previously experienced and many traditional practices may not stand up well against this scrutiny. There are serious concerns within the agricultural and rural land use organisations that in many situations cereal and livestock production without some form of subsidy is just not viable especially at the scale of the traditional family run farm found throughout the Highlands.

Cereal prices in 2007 have recovered significantly and will have bolstered the confidence of those with arable land but will have cost further concerns for livestock producers as feed costs increase.

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It is recognised by many at all levels of the agricultural industry that, for the industry to have a secure and vibrant future, diversification is required.

There are various forms of diversification for farming enterprises to consider however, the remit of this study is to consider the opportunities associated with the growing and supply of biomass for fuel.

4.2 LAND AVAILABILITY

It is unlikely that significant areas of arable land, a valued land type on any farm, would become available for SRF and recent cereal prices consolidate this situation. The economic situation for the rearing of livestock is a different matter with many enterprises confirming that without external subsidy the operation is not viable in the current marketplace. A reduction in stock numbers is occurring across Scotland and it may well be that some of the land presently supporting livestock production in Caithness could become available for alternative uses should farmers opt for livestock reductions or removal.

The improved grasslands current used for grazing and feed production would be suitable for the growth of SRF and there are approximately 46000hectares of this type of land within 30miles of the Heat and Power plant at Wick. This proximity to the marketplace is a very significant factor in the economics of the wood-fuel supply chain as transport costs are a major factor in the viability of the operation.

5.0 SILVICULTURAL SYSTEM

To successfully establish a crop of any type of tree requires planning and careful consideration of the factors associated with the chosen site. These factors would normally include:-

- Site Factors Such As Soils, Topography, Aspect, Altitude, Exposure
- Drainage
- Ground Preparation
- Planting Method
- Tree Spacing
- Species Choice
- Weed Control
- Protection/Fencing
- Rotation Length

5.1 Site Factors

It is recognised that for a successful SRF system the site needs to be either improved grassland or arable land. By their very nature such sites will have soils suitable for tree growth and mechanised workings however the other factors will be more site specific.

Most of the improved farmland is situated in the NE of the region where the open rolling landscape is typically below 100metres. Exposure is a significant feature across this region increasing on land nearer the coast where salt spray also becomes a factor for consideration.

Although a limiting factor for tree growth there are examples of good establishment and growth rates on some very exposed sites within Caithness. Careful planning, site selection, choice of species and the potential use of existing hedgerows for shelter, a common feature throughout

the agricultural landscape of Caithness, would all help to mitigate against the effects of exposure.

5.2 Ground Preparation

The aim of ground preparation is to make the land suitable for planting and is important to encourage rapid establishment and early growth of the trees to be planted.

Land that has been subject to regular shallow ploughing, as would be the case on arable land, or land that has experienced intensive grazing over many years could suffer from compaction that would inhibit early root development. Sub-soiling and rotovating of the site would alleviate this problem.

5.3 Drainage

Trees require a considerable amount of soil moisture for growth but they cannot thrive on land where the soil is waterlogged. They also require sufficient rooting depth to provide stability and to prevent windblow. If SRF is to be established on improved grassland or arable land then the existing drainage system will, in most cases, be sufficient for tree growth in the first rotation however, it is quite likely that during this first rotation the tree roots will impede the existing drainage system resulting in reduced capacity for the next rotation or significant remedial works in the event of a return to conventional agricultural systems.

5.4 Species

The remit of this study was to consider the potential for SRF using species native to the Highlands of Scotland. The criteria used to select these particular species included:

- Expected growth rates
- Suitability for likely site types
- Tolerance of exposure
- Capacity to produce a single stem
- Establishment costs
- Suitable for growing in mixture
- Potential for re-growth from cut stumps at end of first rotation

5.5 Recommended Species

To minimise the risks associated with establishing a crop and the uncertainties over growth rates a mixture of several species with similar growth rates would be suitable.

For the purposes of this project native species are considered to be species that would have occurred naturally throughout the Highland region rather than species that would have been specifically native to the areas within Caithness where the planting may take place.

Of this suite of native species Ash, Birch, Alder, and Aspen have been identified as meeting most of the selection criteria.

Alder (*Alnus glutinosa*) A hardy species capable of rapid early growth and tolerant of exposure and wetter sites. Good for coppicing. Liable to die-back but not likely to suffer within the timescale for SRF.

Ash (*Fraxinus excelsior*) A less hardy species but still capable of rapid growth in its' early years on the right site. Will coppice freely.

Birch Both species of Birch (*pendula* & *pubescens*) could be utilised although *pendula* has the potential to provide a better yield *pubescens* will be more tolerant of exposure. Both species have rapid early growth and will coppice freely when young.

Aspen (*Populus tremula*) A "bit of a dark horse", Aspen has the capacity for vigorous early growth and will tolerate the most exposed sites. Although difficult to cultivate and therefore more expensive to establish, certain varieties will sucker freely in the absence of browsing, contributing to lower replacement costs for the next rotation. Including Aspen as a component of a native species SRF mixture could prove to be highly beneficial.

There are many other species that could be included in a list of species suitable for SRF and by suggesting the above in no way precludes others that may be worthy of consideration. One species in particular, which although not a native tree, that should be given further consideration is Sycamore (*Acer pseudoplatanus*). Sycamore has become naturalised in the Highland Region and can be found growing throughout Caithness and with its' vigorous growth, tolerance of exposure and salt spray, and the capacity to coppice freely this tree would be an ideal component for an SRF stand.

5.6 Planting Density

The conventional stocking density for productive woodland of 2500 trees per hectare (2m X 2m) is unlikely to be sufficient for the successful establishment of an SRF plantation. This density is considered a compromise between the cost of establishment and securing early capture of the site and therefore early competition between trees.

Densities of 3000-4000 trees/ha would contribute to more rapid establishment of the site and should result in better yields but obviously will be more expensive to establish. 2500/ha is the density recognised and supported by previous grant schemes and it important that any support measures for SRF recognise the values of higher initial stocking levels.

5.7 Planting

On the majority of sites likely to be made available for SRF, mechanised planting should be possible. This will contribute to lower planting costs.

5.8 Weed Control

Due to the fertility of potential SRF sites the control of competing vegetation is a very important factor in ensuring satisfactory establishment. An initial herbicide treatment to eliminate weeds at the start of the process will be required and additional applications will be required until the trees are no longer competing with the vegetation. Site conditions and plant spacing will allow mechanised applications.

5.9 Fencing/Protection

Young trees need to be protected from browsing animals to ensure satisfactory establishment. At the very least SRF sites will require protection from livestock and subject to local conditions protection from rabbits, hares, and deer may also be required.

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Tree-shelters that are commonly used to aid the establishment of broadleaved tree species throughout the UK are unlikely to be suitable due to the exposed nature and windiness of the Caithness landscape.

5.10 Formative Pruning

The development of straight, single stem trees is an important feature of all commercial forestry systems as such trees enable more efficient harvesting and contribute to improved recovery of merchantable timber from the stand. In the case of SRF with broadleaved trees in an exposed environment it will be necessary to carry out a pruning operation at some point between year 5 and 10 to ensure the development of single stem trees.

6.0 IMPACT UPON NATURAL HERITAGE

There are various potential impacts associated with the development of a SRF system. Some of these potential impacts are beneficial, on biodiversity and landscape, and some may be damaging depending on how the woodland is managed. Scottish Natural Heritage,(SNH), were consulted upon the project and their response is included in the appendices of this report. A summary of their response is outlined below.

6.1 Designated Sites

Many areas in Caithness have natural heritage designations such as Sites of Special Scientific Interest (SSSIs), Special Protection Area (SPAs), Special Areas of Conservation (SACs) and Ramsar sites. Most of the previously identified land suitable for SRF is free from designation and therefore the potential impacts on biodiversity should be beneficial rather than detrimental subject to existing guidelines and standards being adhered to. Any interaction between designated sites and proposed SRF sites will have to be considered and discussed with Scottish Natural Heritage prior to approvals for planting being given.

6.2 Impact on Soil & Water Quality

Potential impacts on water quality are closely linked to effects on the soil and are controlled by the Water Environment (Controlled Activities Scotland) Regulations 2005 and forthcoming General Binding Rules for Controlling Diffuse Pollution.

Compliance with the UK Forestry Standard and associated guidelines will mitigate against potential adverse impacts on soil quality and water environment, and will ensure that woodland creation proposals take account of biodiversity considerations.

6.3 Impacts on Biodiversity

The introduction of native tree species should increase the biodiversity value of these areas and if linked with the planting of hedges within managed agricultural land could help to maintain biodiversity interests by providing habitat and cover for birds and mammals post woodland harvest.

The planting of SRF may be of benefit to some bird species but it may also displace others depending on the area of planting and changes in woodland height/density. Harvesting should take place in winter, hence avoiding the nesting season.

Ensuring a wide range of stand ages and thus some degree of cyclical harvesting will enhance benefits for farmland biodiversity. In addition, by ensuring a mix of tree species within the woodland a greater range of bird species can be supported.

6.4 Impacts on Climate Change

Planting on well drained lowland soils will provide good opportunities for carbon sequestration without counterbalancing losses from the soil. In addition planting woodland may offer advantages over annual arable crops for carbon sequestration due to a more extensive root system and longer growth cycle.

6.5 Impacts on Landscape and Visual Amenity

New woodland if well sited and managed in accordance with Forestry Commission guidance, can add to landscape diversity and compensate for past woodland and hedgerow losses within agricultural landscapes. Care will be required in harvesting, as the timescales involved for woodland growth and clearance are quite long, hence changes in the landscape resulting from harvesting could be dramatic with potential adverse effects on amenity. This could be mitigated in most areas by harvesting cyclically, so that extensive areas are not harvested at once.

6.6 Impacts on Access and Recreation

It is important to ensure that any changes in land use do not restrict recreation or access opportunities. Establishment of corridors through woodland plantations should be designed to maintain access.

In summary most concerns regarding the impact of SRF on the Natural Heritage of the region can be mitigated against through the use of existing guidelines and codes of practice. To ensure a balanced approach SNH should be involved in or kept informed of any measures that arise for further development of a project.

7.0 SMALL ROUNDWOOD/WOODFUEL MARKET

Although historically wood has featured as an important fuel, in more recent times this has not been the case as fossil fuels, electricity, and gas have become more popular with a perception of being cheap, clean, and readily available. This has resulted in smaller diameter and poorer quality timber being utilised by the industrial scale woodchip, pulp and paper industries.

For owners of productive forests within Caithness the markets for timber products are remote being located over a 100miles south around Inverness and along the Moray Coast. For all timber harvesting operations in the north transport costs are a major factor and in the case of small roundwood (SRW), the least valuable of the produce, transporting this to the inner Moray Firth creates a deficit. In recent years the export of SRW from Scrabster & Wick has allowed SRW operations to breakeven or to produce a small surplus.

Concerns over carbon emissions from the burning of fossil fuels and their impact on global climates along with uncertainties over security of supply for oil and gas related products have forced the international community to look at alternative sources of power.

International and national commitments to reducing greenhouse gas emissions have resulted in government policies favouring renewable energy supplies and the generation of heat and power from the burning of wood is one potential source.

From being a very minor market for forest owners and timber processors in Scotland at the turn of the 21st century, woodfuel is quickly emerging as a major opportunity for the forest industry.

The Woodfuel Task Force, set up earlier this year by Forestry Commission Scotland, with the remit of advising the Minister for Environment on a range of matters relating to woodfuel resources, supply, and usage by the end of 2007 have identified that currently the demand in Scotland for wood fibre for renewable energy schemes is 200000 green tonnes per annum. Within 3 years this will rise to 2.6million tonnes as developments currently under construction or within the planning system come on stream.

The developing economies of China and India are escalating the global demand for all timber products and the Task Force has highlighted that throughout Europe significant shortfalls, 50 million cubic metres per year by 2020, 80 million by 2030, and 194 million by 2060, are expected.

8.0 NORTH SCOTLAND TIMBER RESOURCE

Within the context of Caithness and the North of Scotland there are currently significant areas of woodland producing merchantable timber. The plantations established throughout the 1960's through to the late 1980's, either by the Forestry Commission or by private investors through benevolent tax regimes, presently have the potential to yield 100000 ODT /yr rising to 190000 ODT/yr by 2025 (FC Woodfuel Resource Forecast Biomass). Although serving a wide range of markets these woodlands will have the capacity to supply the district heating scheme at Wick for many years and will have been a principal driver for the siting of such a scheme in the area.

Beyond 2025 production from these woodlands will drop off considerably and there will be circumstances where the timber from these forests will never be harvested due to environmental constraints.

The rapidly developing woodfuel sector in Scotland and the predicted shortfalls throughout Europe will place increasing demands upon this resource. Timber is currently being shipped out of Caithness to meet the raw material requirements of processors in Western Europe and other proposed developments will be considering this resource. The Balcas Combined Heat and Power Plant and Wood Pellet manufacturing facility at Invergordon has planning permission and construction works are imminent. Once complete this development will require 200000 green tonnes of round timber a large proportion of which will be sourced from woodlands in Caithness and Sutherland.

All these global, pan European, national, and local factors indicate the increasing value of existing timber resources and the need for the development of new resources. Short Rotation Forestry systems have the potential to make a rapid contribution to increasing this resource.

9.0 ECONOMICS OF SHORT ROTATION FORESTRY

Probably the most important factor for farmers when considering the potential of SRF is the economics of the operation. Farmers are used to operating on annual crop rotations and budgets and for them to contemplate the planting of a crop that will not be ready to harvest for 20years a strong economic argument will be required.

It is currently not possible to develop an economic case for SRF due to two significant reasons.

9.1 Scottish Rural Development Program

Until the launch of the SRDP in the spring of 2008 it is unclear what the support measures for forestry and more specifically forestry energy crops will be.

The interim Woodland Creation support mechanisms introduced for planting season 2007/08 include a one-off payment of £1000/ha for the establishment of Short Rotation Coppice. This level of support would not be sufficient to attract investment in SRF but it gives an indication of the intent to support energy crops.

Due to the fact that the development of SRF in Caithness would be making a significant contribution to strategic and regional priorities then there is the possibility of additional assistance to the basic establishment grant being made available.

As well as support for the establishment of a woodfuel crop it is quite likely that opportunities will exist within the SRDP through the priorities associated with improving the competitiveness of rural land based businesses. These opportunities, and the case for additional establishment grant, could be enhanced and further developed if a coherent co-operative approach to establishing the resource and adding value to it were to be adopted.

9.2 Growth Rates and Yield.

With SRF being a new concept it is very difficult to make accurate predictions upon the growth rates and ultimately the yields and value at the time of harvest. The current uncertainties over the stocking density levels that will be supported within the forestry measures of the SRDP also have an impact on yields.

The emphasis on native species that have relatively poorly developed or non-existent growth models exacerbates this situation making estimates of final yield very difficult.

9.3 SRF Economic Calculator

A spreadsheet incorporating all aspects of the establishment costs, grant assistance, and value at time of harvest has been developed to demonstrate Internal Rates of Return for the operation. Using recognised discounting techniques the will be a valuable tool for assessing the financial returns associated with particular SRF models.

The spreadsheet will allow the variation of a number of factors including establishment costs, grant assistance, and value at time of harvest and can be modified as this information becomes clearer.

10.0 ADDED VALUE AND COOPERATIVE WORKING

On the assumption that an economic argument can be made for Short Rotation Forestry in the North of Scotland then there a various models on how best it should be implemented and it is important to consider various options to ensure that maximum benefit to the individuals planting their land and to the local economy is secured. Three models are considered below and it quite likely that other options exist or that, variations in the structure, incorporating different aspects of the models outlined below, could be developed.

Model 1. Independent Landowner Approach.

The most basic model for consideration is where an individual farmer plants his crop of trees, manages the stand, and markets the produce independently. This model gives the grower complete control of the operations on his land but does not allow for any advantages that may be accrued from working with others to secure economies of scale and marketing power.

This approach would be more suited to a small-scale approach where the individual may be considering supplying his own property/properties with woodfuel.

Model 2. Lease Land To Energy Company.

Another model to consider would be where the farmer enters into a lease with an energy company, (in this case most likely Caithness Heat and Power), giving the company access to their land for the duration of the SRF rotation. The energy company would act as a tenant and would take complete responsibility for the establishment, management, harvesting, and marketing of the crop. This option guarantees raw material supplies for the energy company and significantly reduces the risks associated with the crop for the farmer whilst producing a guaranteed annual income.

Although this option provides security for the landowner there are no opportunities for added value and the legal aspects of a 20year agricultural tenancy would have to be considered.

Model 3. Co-operative Venture.

Agricultural co-operatives are a proven mechanism by which individual farmers can work together to benefit from economies of scale and marketing power thereby improving the profitability of their businesses. The co-operative model of business has been found to be uniquely appropriate to the needs of farmers in competitive economies throughout the world and excellent working examples co-operatives operating in the woodfuel supply chain can be found throughout Central Europe.

In this model farmers prepared to establish SRF on their land would enter into a co-operative venture with others. The structure of the co-operative would require consideration but one model would be where each farmer had a share in the co-operative relative to the amount of land entered into the scheme. The co-operative would lease the land from the farmers and would have the responsibility for establishing, managing, harvesting, and marketing the stand.

This structure ensures the potential for adding value

This approach would benefit from economies of scale throughout the rotation. The co-operative would have significant marketing power at the time of harvest and would not necessarily have to be committed to one energy user.

The setting up of such a venture is likely to attract support through the SRDP.

11.0 SUMMARY & RECOMMENDATIONS

Without clear information on the support measures for Short Rotation Forestry included in the forthcoming Scottish Rural Development Program and the uncertainties associated with the growth rates and subsequent yields of native trees in a productive woodland situation it is difficult to give clear guidance on the potential for such a system in Caithness from an economic point of view.

FINAL REPORT

There is no doubt that, with a satisfactory economic argument, Short Rotation Forestry has the potential to provide an alternative land use for land currently utilised for the rearing of livestock. In addition to farm diversification there are many other socio-economic, and environmental benefits to be gained from such a resource and this is recognised by the appropriate land use agencies that would be generally supportive of the development of an SRF scheme. At a local level markets are being developed that will welcome an additional resource being established that will meet demands in the medium to longer term and in the wider marketplace demand for timber is expected to grow and competition between processors is likely to increase the value of timber resources.

The contribution that SRF can make to strategic and regional goals ensures there is strong justification for additional targeted funding being made available for the region.

Having identified the potential for a scheme it is important that to build upon it a strategic and co-ordinated approach needs to be adopted from this point on and there are four key recommendations, all inextricably linked, that need to be considered.

11.1 Scottish Rural Development Programme

It is important that the forestry/energy crops opportunities within the SRDP are assessed as soon as it is announced.

11.2 Review Yield Information

There are many broadleaved woodlands, throughout Scotland, established on improved land under the Farm Woodland Premium Scheme and its predecessors. Although not directly comparable, an assessment of the growth rates on some of these earlier schemes would give some meaningful information that could be modified for the Caithness area and utilised in financial forecasts. Forest Research are expected to publish the results of recently carried out research into the growth rates of broadleaved species which, although not directly related to SRF, could provide some meaningful information.

11.3 Financial Models

With additional yield information and clarification on the SRDP funding options, the SRF calculator spreadsheet will be a useful tool for assessing the financial viability of various models allowing comparisons on various stocking densities, growth rates, and grant rates etc to be carried out quickly.

11.4 Initiate Discussion

Whilst awaiting the outcomes of the above, discussions should be instigated amongst stakeholders to ascertain the various options available for developing the project and to identify the most suitable model for delivery of the maximum benefits to the farmers making their land available and to the local economy.